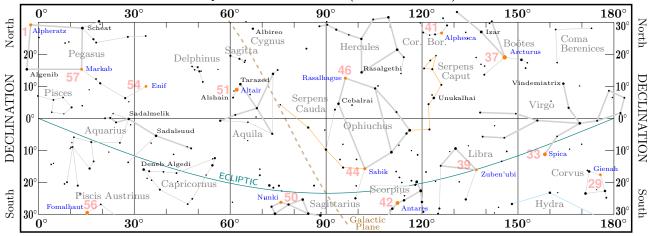
#### GENERATED USING SKYFIELD

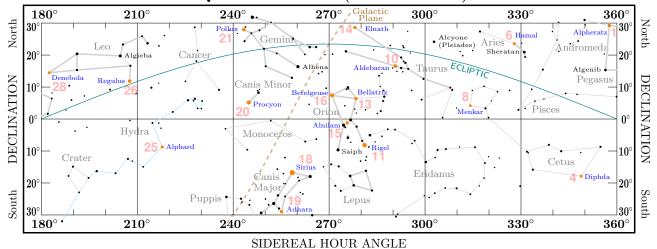
http://rhodesmill.org/skyfield/

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



#### SIDEREAL HOUR ANGLE

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



## THE NAUTICAL ALMANAC

# 2025

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 <a href="http://thenauticalalmanac.com">http://thenauticalalmanac.com</a> has been publishing Celestial Navigation related material with software provided here.

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

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

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

h	Aries	Venus	5	M	ars	Jup	iter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	100°54.0		13°35.2	335°46.4	N23°32.7	29°01.0	N21° 47.2	114°23.0	S07°55.0			1
1	115°56.4	145°30.2	34.1	350°49.7	33.0	44°03.8	47.2	129°25.3	54.9	Alpheratz	357°34.8	29°13.9
2	130°58.9	160°30.2	33.0	5°53.1	33.3	59°06.5	47.2	144°27.6	54.8	Ankaa	353°07.2	-42°10.4
3	146°01.4		31.9	20°56.4	33.5	74°09.3	• • 47.2	159°29.9	• • 54.8	Schedar	349°31.1	56°40.7
4	161°03.8	190°30.0	30.8	35°59.7	33.8	89°12.0	47.1	174°32.2	54.7	Diphda	348°47.3	-17°51.1
5	176°06.3	205°30.0	29.7	51°03.0	34.1	$104^{\circ}14.8$	47.1	189°34.4	54.6	Achernar	335°20.0 327°51.1	-57°06.9 23°34.9
6	191°08.8		13°28.6	66°06.3	N23°34.4	119°17.5	N21°47.1	204°36.7	S07°54.5	Hamal Polaris	313°44.0	89° 22.4
7	$206^{\circ}11.2$	235°29.9	27.5	81°09.6	34.6	134°20.3	47.1	219°39.0	54.5	Acamar	315°11.5	-40° 12.4
8	221°13.7	250°29.8	26.4	96°13.0	34.9	149°23.0	47.0	234°41.3	54.4	Menkar	314°06.0	4°11.3
9	236°16.2		• • 25.4	111°16.3	• • 35.2	164°25.8	• • 47.0	249°43.6	• • 54.3	Mirfak	308°27.9	49°57.2
10	251°18.6	280°29.7	24.3	126°19.6	35.5	179°28.5	47.0	264°45.9	54.2	Aldebaran	290°39.3	16°33.6
11 12	266°21.1 281°23.5	295°29.6 310°29.6	23.2 13°22.1	141°22.9 156°26.2	35.7 N23°36.0	194°31.3 209°34.0	47.0 N21°46.9	279°48.2 294°50.5	54.1 \$07°54.1	Rigel	281°03.6	-8°10.4
13	296°26.0	325°29.5	21.0	171°29.6	36.3	209°34.0 224°36.8	46.9	309°52.8	54.0	Capella	280°21.4	46°01.4
14	311°28.5	340°29.5	19.9	186°32.9	36.6	239°39.5	46.9	324°55.0	53.9	Bellatrix	278°22.6	6°22.3
15	326°30.9		• • 18.8	201°36.2	36.8	254°42.3	• • 46.9	339°57.3	• • 53.8	Elnath	278°01.5	28°37.7
16	341°33.4	10°29.4	17.7	216°39.5	37.1	269°45.0	46.9	354°59.6	53.7	Alnilam	275°37.4	-1°11.2
17	356°35.9	25°29.3	16.6	231°42.9	37.4	284°47.7	46.8	10°01.9	53.7	Betelgeuse	270°51.8	7°24.7
18	11°38.3	40°29.3	13° 15.5	246°46.2	N23°37.7	299°50.5	N21°46.8	25°04.2	S07°53.6	Canopus Sirius	263°51.8 258°25.9	-52°42.5 -16°45.0
19	26°40.8	55° 29.2	14.4	261°49.5	37.9	314°53.2	46.8	40°06.5	53.5	Adhara	255°05.5	-10 45.0 -29°00.3
20	41°43.3	70°29.2	13.3	276°52.9	38.2	329°56.0	46.8	55°08.8	53.4	Procyon	244°50.5	5°09.6
21	56°45.7		• 12.2	291°56.2	• • 38.5	344°58.7	• • 46.7	70°11.1	• • 53.4	Pollux	243°16.9	27°57.9
22	71°48.2	100°29.1	11.1	306°59.5	38.8	0°01.5	46.7	85°13.4	53.3	Avior	234°14.1	-59°35.2
23	86°50.7	115°29.1	10.0	322°02.9	39.0	15°04.2	46.7	100°15.6	53.2	Suhail	222°46.0	-43°31.9
Mer.p	ass. 17:14	$\nu$ -0.1' d-1.1'	m-4.45	$\nu$ 3.3′ d0.	3′ m-1.21	$\nu 2.7' \ d-0.0$	.0′ m-2.74	$\nu$ 2.3′ d-0	.1' m $1.05$	Miaplacidus	221°37.5	-69°48.9
		-		-		-				Alphard	217°47.5	-8°46.0
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.2	11°50.6
0	101°53.1		13°08.9	337°06.2	N23°39.3	30°07.0	N21°46.7	115°17.9	S07°53.1	Dubhe Denebola	193°40.7 182°24.9	61°36.7 14°25.8
1	$116^{\circ}55.6$	145°29.0	07.8	352°09.6	39.6	45°09.7	46.6	130°20.2	53.0	Gienah	175°43.6	-17° 40.8
2	131°58.0	160°28.9	06.7	7°12.9	39.9	60°12.4	46.6	145°22.5	53.0		173°43.0	-63°14.0
3	147°00.5		• • 05.6	22°16.2	• • 40.1	75°15.2	• • 46.6	160°24.8	• • 52.9	Gacrux	171°51.7	-57°14.9
4	162°03.0	190°28.9	04.5	37°19.6	40.4	90°17.9	46.6	175°27.1	52.8	Alioth	166°13.0	55°49.1
5	177°05.4	205°28.8	03.4	52°22.9	40.7	105°20.7	46.5	190°29.4	52.7	Spica	158°22.4	-11°17.5
6 7	192°07.9 207°10.4	220°28.8 235°28.7	01.2	67°26.3 82°29.6	N23°41.0	120°23.4 135°26.2	N21°46.5	205°31.6 220°33.9	S07°52.6	Alkaid	$152^{\circ}52.1$	49°11.0
8	207 10.4 222°12.8		13°00.1	97°33.0	41.3 41.5	150°28.9	46.5 46.5	235°36.2	52.6 52.5	Hadar	148°36.3	-60°29.3
9	237°15.3		12°59.0	112°36.3	• • 41.8	165°31.6	• • 46.4	250°38.5	52.4	Menkent	147°57.8	-36°29.4
10	252°17.8	280°28.6	57.9	127°39.7	42.1	180°34.4	46.4	265°40.8	52.3	Arcturus	145°48.1	19°03.0
11	267°20.2	295°28.6	56.8	142°43.0	42.4	195°37.1	46.4	280°43.1	52.2	Rigil Kent. Kochab	139°40.7 137°20.4	-60°56.1 74°02.8
12	282°22.7		12°55.7	157°46.4	N23°42.6	210°39.9	N21°46.4	295°45.4	S07°52.2	Zuben'ubi	136°56.2	-16°08.7
13	297°25.2	325°28.6	54.5	172°49.7	42.9	225°42.6	46.3	310°47.7	52.1	Alphecca	126°04.0	26° 37.7
14	312°27.6	340°28.5	53.4	187°53.1	43.2	240°45.3	46.3	325°49.9	52.0	Antares	112°16.2	-26°29.2
15 16	327°30.1 342°32.5	355°28.5 10°28.5	· · 52.3 51.2	202°56.4 217°59.8	· · 43.5 43.7	255°48.1 270°50.8	· · 46.3 46.3	340°52.2 355°54.5	· · 51.9 51.8	Atria	107°10.9	-69°04.2
17	357°35.0	25°28.4	50.1	233°03.1	44.0	285°53.6	46.3	10°56.8	51.8	Sabik	102°03.1	-15°45.4
18	12°37.5		12°49.0	248°06.5	N23°44.3	300°56.3	N21°46.2	25°59.1	S07°51.7	Shaula	96°10.8	-37°07.3
19	27°39.9	55°28.4	47.9	263°09.8	44.6	315°59.0	46.2	41°01.4	51.6	Rasalhague	95°58.9 90°42.7	12°32.4 51°29.0
20	42°42.4	70°28.4	46.8	278°13.2	44.8	331°01.8	46.2	56°03.6	51.5	Eltanin Kaus Aust.	83°32.9	-34°22.4
21	57°44.9		• • 45.7	293°16.6	• • 45.1	346°04.5	• • 46.2	71°05.9	• • 51.4	Vega	80°33.7	38° 48.3
22	72°47.3	100°28.3	44.6	308°19.9	45.4	1°07.2	46.1	86°08.2	51.4	Nunki	75°48.2	-26°16.0
23	87°49.8	115°28.3	43.5	323°23.3	45.7	16°10.0	46.1	101°10.5	51.3	Altair	62°00.3	8°56.0
Mer.p	ass. 17:10	$\nu$ -0.0' d-1.1'	m-4.46	$\nu$ 3.3′ d0.	3′ m-1.24	$\nu 2.7' \ d-0.0$	.0′ m-2.74	$\nu 2.3' \ d-0$	.1′ m1.06	Peacock	53°06.3	-56°39.4
										Deneb	49°26.2	45°22.2
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°39.1	9°59.4
0	102°52.3		12°42.4	338°26.6	N23°45.9	31°12.7	N21° 46.1	116°12.8	S07°51.2	Al Na'ir	27°33.2	-46°50.6
1	117°54.7	145°28.3	41.2	353°30.0	46.2	46°15.5	46.1	131°15.1	51.1	Fomalhaut Scheat	15°14.7 13°45.4	-29°29.6
2	132°57.2	160°28.3	40.1	8°33.4	46.5	61°18.2	46.0	146°17.4	51.0	Markab	13°30.1	28° 13.2 15° 20.4
3	147°59.6	175°28.2	• • 39.0	23°36.7	• • 46.8	76°20.9	• • 46.0	$161^{\circ}19.6$	• • 50.9	IVIAIRAD	15 50.1	15 20.4
4	163°02.1	190°28.2	37.9	38°40.1	47.1	91°23.7	46.0	176°21.9	50.9	Jan 01 Wed	SHA	Mer.pass
5	178°04.6	205°28.2	36.8	53°43.5	47.3	106°26.4	46.0	191°24.2	50.8	Venus	29°36.3	15:18
6	193°07.0		12°35.7	68°46.8	N23°47.6	121°29.1	N21°45.9	206°26.5	S07°50.7	Mars		01:37
7	208°09.5	235°28.2	34.6	83°50.2	47.9	136°31.9	45.9	221°28.8	50.6	Jupiter Saturn	288°07.1 13°29.0	22:00 16:20
8 9	223°12.0 238°14.4	250°28.2 265°28.2	33.5 · · 32.3	98°53.6 113°57.0	48.2 •• 48.4	151°34.6 166°37.3	45.9 •• 45.9	236°31.1 251°33.3	50.5 •• 50.5	Saturn	13 29.0	10.20
10	253°16.9	280°28.1	31.2	129°00.3	48.7	181°40.1	45.9	266°35.6	50.4	Jan 02 Thu	SHA	Mer.pass
11	268°19.4	295°28.1	30.1	144°03.7	49.0	196°42.8	45.8	281°37.9	50.3	Venus	28°35.9	15:18
12	283°21.8		12°29.0	159°07.1	N23°49.3	211°45.5	N21°45.8	296°40.2	S07°50.2	Mars		01:31
13	298°24.3	325°28.1	27.9	$174^{\circ}10.5$	49.5	226°48.3	45.8	$311^{\circ}42.5$	50.1	Jupiter Saturn	288°13.8 13°24.8	21:56 16:16
14	313°26.8	340°28.1	26.8	189°13.8	49.8	241°51.0	45.8	326°44.8	50.1	Saturn	13 24.0	10.10
15	328°29.2		• • 25.7	204°17.2	50.1	256°53.7	• • 45.7	341°47.0	• • 50.0	Jan 03 Fri	SHA	Mer.pass
16	343°31.7	10°28.1	24.5	219°20.6	50.4	271°56.5	45.7	356°49.3	49.9	Venus	27°36.0	15:18
17 18	358°34.1 13°36.6	25°28.1 40°28.1	23.4 12°22.3	234°24.0 249°27.4	50.6 N23°50.9	286°59.2 302°01.9	45.7 N21°45.7	11°51.6 26°53.9	49.8 \$07°49.7	Mars		01:26
19	28°39.1	55°28.1	21.2	264°30.8	51.2	317°04.7	45.6	41°56.2	49.6	Jupiter Saturn	288 20.5 13°20.5	21:51 16:13
20	43°41.5	70°28.1	20.1	279°34.1	51.5	332°07.4	45.6	56°58.4	49.6			10.13
21	58°44.0		• • 19.0	294°37.5	• • 51.7	$347^{\circ}10.1$	• • 45.6	72°00.7	• • 49.5	Horizont	al parallax	
22	73°46.5	100°28.1	17.8	309°40.9	52.0	2°12.9	45.6	87°03.0	49.4		Venus:	0.2
23	88°48.9	115°28.1	16.7	324°44.3	52.3	17°15.6	45.6	102°05.3	49.3		Mars:	0.2
Mer.p	ass. 17:06	$\nu$ -0.0′ $d$ -1.1′	m-4.47	$\nu$ 3.4′ d0.	3′ m-1.26	$\nu$ 2.7′ d-0.	.0′ m-2.73	$\nu$ 2.3′ d-0	.1′ m1.06			

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°08.4	\$22°59.9	164°13.2	7.1'	\$25°51.6	-7.2'	57.4'
1	194°08.1	59.7	178°39.2	7.1'	25°44.4	-7.4	57.4'
2	209°07.8	59.5	193°05.4	7.2'	25°37.1	-7.5	57.4'
3	224°07.5	• • 59.3	207°31.6	7.2'	25°29.5	-7.7'	57.4'
4	239°07.2	59.1	221°57.8	7.3'	25°21.9	-7.8'	57.5'
5	254°06.9	58.8	236°24.1	7.3'	25°14.0	-8.0'	57.5'
6	269°06.6	S22°58.6	250°50.4	7.4'	S25°06.1	-8.1'	57.5'
7	284°06.3	58.4	265°16.8	7.5'	24°57.9	-8.3'	57.5'
8	299°06.0	58.2	279°43.3	7.5'	24°49.7	-8.4'	57.5'
9	314°05.7 329°05.4	· · 58.0 57.8	294°09.8 308°36.4	7.6' 7.6'	24°41.2 24°32.6	-8.6' -8.7'	57.6' 57.6'
10 11	344°05.1	57.6	323°03.0	7.0 7.7'	24° 23.9	-8.9'	57.6'
12	359°04.8	522°57.4	323 03.0 337°29.7	7.8'	S24°15.0	-8.9 -9.0'	57.6
13	14°04.5	57.1	351°56.5	7.8'	24°06.0	-9.2'	57.6'
14	29°04.2	56.9	6°23.3	7.9'	23°56.9	-9.3'	57.7'
15	44°03.9	• • 56.7	20°50.1	7.9'	23°47.6	-9.4	57.7'
16	59°03.7	56.5	35°17.1	8.0'	23°38.1	-9.6'	57.7'
17	74°03.4	56.3	49°44.1	8.1'	23°28.5	-9.7'	57.7'
18	89°03.1	S22°56.0	64°11.2	8.1'	S23°18.8	-9.9'	57.7'
19	104°02.8	55.8	78°38.3	8.2'	23°08.9	-10.0'	57.8'
20	119°02.5	55.6	93°05.5	8.3'	22°58.9	-10.1'	57.8'
21	134°02.2	• • 55.4	107°32.8	8.3'	22°48.8	-10.3'	57.8'
22 23	149°01.9 164°01.6	55.2 54.9	122°00.1 136°27.5	8.4' 8.5'	22°38.5 22°28.1	-10.4' -10.5'	57.8' 57.8'
23			130 21.3			-10.5	51.0
	SD = 16.3'	d = -0.2'		SI	O = 15.6'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°01.3	\$22°54.7	150°55.0	8.5'	S22°17.6	-10.7'	57.8'
1	194°01.0	54.5	165°22.5	8.6'	22°06.9	-10.8'	57.9'
2	209°00.7	54.3	179°50.1	8.7'	21°56.1	-10.9'	57.9'
3 4	224°00.4 239°00.1	· · 54.0 53.8	194°17.8 208°45.5	8.7' 8.8'	21°45.1 21°34.1	-11.1' -11.2'	57.9' 57.9'
5	253° 59.9	53.6	200° 43.3 223° 13.3	8.9'	21°22.9	-11.2	57.9'
6	268° 59.6	\$22°53.3	237°41.2	9.0'	S21°11.6	-11.4	58.0'
7	283°59.3	53.1	252°09.2	9.0'	21°00.2	-11.6'	58.0'
8	298°59.0	52.9	266°37.2	9.1'	20°48.6	-11.7'	58.0'
9	313°58.7	• • 52.6	281°05.3	9.2'	20°36.9	-11.8'	58.0'
10	328° 58.4	52.4	295°33.4	9.2'	$20^{\circ}25.1$	-11.9'	58.0'
11	343°58.1	52.2	310°01.7	9.3'	20°13.2	-12.0'	58.0'
12	358° 57.8	S22°51.9	324°30.0	9.4'	\$20°01.2	-12.1'	58.1'
13 14	13° 57.5 28° 57.2	51.7 51.5	338°58.3 353°26.8	9.4' 9.5'	19°49.0 19°36.8	-12.3' -12.4'	58.1' 58.1'
15	43° 56.9	51.2	7°55.3	9.6'	19° 24.4	-12.4 -12.5'	58.1
16	58° 56.7	51.0	22°23.9	9.7'	19°11.9	-12.6'	58.1'
17	73°56.4	50.8	36°52.5	9.7'	18°59.3	-12.7'	58.1'
18	88°56.1	S22°50.5	51°21.3	9.8'	S18°46.6	-12.8'	58.2'
19	103°55.8	50.3	65°50.0	9.9'	18°33.8	-12.9'	58.2'
20	118°55.5	50.0	80°18.9	9.9'	18°20.9	-13.0'	58.2'
21	133°55.2	• • 49.8	94°47.8	10.0'	18°07.8	-13.1'	58.2'
22	148° 54.9 163° 54.6	49.5	109°16.8 123°45.9	10.1'	17°54.7 17°41.5	-13.2'	58.2'
23		49.3	123 45.9	10.1'		-13.3'	58.2'
	SD = 16.3'	d = -0.2'		SI	O = 15.8'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°54.3	S22°49.1	138°15.0	10.2'	<b>S</b> 17°28.2	-13.4'	58.3'
1	193°54.1	48.8	152°44.2	10.3'	17°14.7	-13.5'	58.3'
2	208°53.8	48.6	167°13.5	10.3'	17°01.2	-13.6'	58.3'
3	223°53.5 238°53.2	· · 48.3	181°42.8 196°12.2	10.4' 10.5'	16°47.6 16°33.9	-13.7'	58.3' 58.3'
4 5	238°53.2 253°52.9	48.1 47.8	196°12.2 210°41.7	10.5'	16°33.9 16°20.1	-13.8' -13.9'	58.3'
6	268° 52.6	522°47.6	210 41.7 225°11.2	10.5	\$16°06.2	-13.9	58.3
7	283°52.3	47.3	239°40.8	10.7'	15°52.2	-14.1'	58.4
8	298° 52.0	47.1	254°10.4	10.7'	15°38.1	-14.2'	58.4'
9	313°51.8	• • 46.8	268°40.1	10.8'	$15^{\circ}24.0$	-14.2'	58.4'
10	328° 51.5	46.6	283°09.9	10.8'	15°09.7	-14.3'	58.4'
11	343°51.2	46.3	297°39.8	10.9'	14°55.4	-14.4'	58.4'
12	358° 50.9 13° 50.6	\$22°46.1 45.8	312°09.6 326°39.6	11.0' 11.0'	\$14°41.0 14°26.5	-14.5'	58.4'
13 14	13°50.6 28°50.3	45.8 45.6	326°39.6 341°09.6	11.0′ 11.1′	14°26.5 14°11.9	-14.6' -14.7'	58.4' 58.5'
15	43°50.0	· · 45.3	355°39.7	11.1	14 11.9 13°57.2	-14.7'	58.5'
16	58° 49.7	45.0	10°09.8	11.2'	13°42.5	-14.8'	58.5
17	73°49.5	44.8	24°40.0	11.2'	13°27.7	-14.9'	58.5
18	88°49.2	S22°44.5	39°10.2	11.3'	<b>S</b> 13°12.8	-15.0'	58.5'
19	103°48.9	44.3	53°40.5	11.3'	12°57.8	-15.0'	58.5'
20	118° 48.6	44.0	68°10.9	11.4'	12°42.8	-15.1'	58.5'
21	133° 48.3 148° 48.0	• • 43.7	82°41.3 97°11.7	11.4'	12°27.7 12°12.5	-15.2'	58.5'
22 23	148°48.0 163°47.8	43.5 43.2	97°11.7 111°42.2	11.5' 11.5'	12°12.5 11°57.3	-15.2' -15.3'	58.6' 58.6'
23		d = -0.2'	111 42.2			-13.3	30.0
	SD = 16.3'		SL	O = 15.9'			

N 72°         08:23         10:39         Image: color of the color of	Lat.	Twi	light	Sunrise	Sunset	Twi	light
N 70°         08:04         09:47         ■         14:21         16:05           68°         07:49         09:16         ■         14:53         16:20           66°         07:37         08:52         10:25         13:43         15:17         16:32           64°         07:26         08:33         09:48         14:20         15:35         16:42           60°         07:17         08:18         09:22         14:47         15:50         16:52           60°         07:09         08:05         09:02         15:07         16:03         17:00           N 58°         07:02         07:54         08:45         15:24         16:15         17:07           56°         06:55         07:44         08:31         15:38         16:24         17:13           54°         06:50         07:35         08:19         15:50         16:33         17:19           52°         06:44         07:27         08:08         16:01         16:41         17:24           50°         06:39         07:20         07:58         16:10         16:48         17:29           45°         06:28         07:05         07:38         16:30         1	Lut.	Naut.	Civil	Junisc	Juliset	Civil	Naut.
68° 07:49 09:16	N 72°	08:23	10:39			13:30	15:46
66° 07:37 08:52 10:25 13:43 15:17 16:32 64° 07:26 08:33 09:48 14:20 15:35 16:42 62° 07:17 08:18 09:22 14:47 15:50 16:52 60° 07:09 08:05 09:02 15:07 16:03 17:00 N 58° 07:02 07:54 08:45 15:24 16:15 17:07 56° 06:55 07:44 08:31 15:38 16:24 17:13 54° 06:50 07:35 08:19 15:50 16:33 17:19 52° 06:44 07:27 08:08 16:01 16:41 17:24 50° 06:39 07:20 07:58 16:10 16:48 17:29 45° 06:28 07:05 07:38 16:30 17:04 17:41 N 40° 06:18 06:52 07:22 16:46 17:17 17:51 35° 06:09 06:40 07:08 17:00 17:28 18:00 30° 06:00 06:30 06:56 17:12 17:38 18:08 20° 05:44 06:12 06:36 17:12 17:38 18:08 20° 05:44 06:12 06:36 17:33 17:57 18:24 N 10° 05:28 05:55 06:17 17:51 18:14 18:40 0° 05:12 05:38 06:00 18:08 18:30 18:56 \$ 10° 04:53 05:20 05:43 18:25 18:48 19:15 20° 04:31 05:00 05:25 18:43 19:08 19:37 30° 04:03 04:36 05:03 19:05 19:32 20:05 20:46 45° 02:53 03:41 04:18 19:50 20:26 21:15 \$ 50° 02:09 03:13 03:57 20:11 20:55 21:58 52° 01:04 02:41 03:34 20:34 21:27 23:02 56° //// 02:20 03:04 21:03 22:15 //// 58° //// 01:52 03:04 21:03 22:15 ////	<b>N</b> 70°	08:04	09:47			14:21	16:05
64° 07:26 08:33 09:48 14:20 15:35 16:42 62° 07:17 08:18 09:22 14:47 15:50 16:52 60° 07:09 08:05 09:02 15:07 16:03 17:00 N 58° 07:02 07:54 08:45 15:24 16:15 17:07 56° 06:55 07:44 08:31 15:38 16:24 17:13 54° 06:50 07:35 08:19 15:50 16:33 17:19 52° 06:44 07:27 08:08 16:01 16:41 17:24 50° 06:39 07:20 07:58 16:10 16:48 17:29 45° 06:28 07:05 07:38 16:30 17:04 17:41 N 40° 06:18 06:52 07:22 16:46 17:17 17:51 35° 06:09 06:40 07:08 17:00 17:28 18:00 30° 06:00 06:30 06:56 17:12 17:38 18:08 20° 05:44 06:12 06:36 17:33 17:57 18:24 N 10° 05:28 05:55 06:17 17:51 18:14 18:40 0° 05:12 05:38 06:00 18:08 18:30 18:56 S 10° 04:53 05:20 05:43 18:25 18:48 19:15 20° 04:31 05:00 05:25 18:43 19:08 19:37 30° 04:03 04:36 05:03 19:05 19:32 20:05 35° 03:45 04:21 04:51 19:18 19:47 20:23 40° 03:22 04:03 04:36 05:03 19:05 19:32 20:05 35° 03:45 04:21 04:51 19:18 19:47 20:23 40° 03:22 04:03 04:36 19:32 20:05 20:46 45° 02:53 03:41 04:18 19:50 20:26 21:15 S 50° 02:09 03:13 03:57 20:11 20:55 21:58 52° 01:43 02:58 03:46 20:22 21:10 22:24 54° 01:04 02:41 03:34 20:34 21:27 23:02 56° //// 02:20 03:04 21:03 22:15 //// 58° //// 01:52 03:04 21:03 22:15 ////	68°	07:49	09:16			14:53	16:20
62° 07:17 08:18 09:22 14:47 15:50 16:52 60° 07:09 08:05 09:02 15:07 16:03 17:00   N 58° 07:02 07:54 08:45 15:24 16:15 17:07 56° 06:55 07:44 08:31 15:38 16:24 17:13 54° 06:50 07:35 08:19 15:50 16:33 17:19 52° 06:44 07:27 08:08 16:01 16:41 17:24 15:0° 06:39 07:20 07:58 16:10 16:48 17:29 45° 06:28 07:05 07:38 16:30 17:04 17:41   N 40° 06:18 06:52 07:22 16:46 17:17 17:51 35° 06:09 06:40 07:08 17:00 17:28 18:00 30° 06:00 06:30 06:56 17:12 17:38 18:08 20° 05:44 06:12 06:36 17:33 17:57 18:24   N 10° 05:28 05:55 06:17 17:51 18:14 18:40 0° 05:12 05:38 06:00 18:08 18:30 18:56   S 10° 04:53 05:20 05:43 18:25 18:48 19:15 20° 04:31 05:00 05:25 18:43 19:08 19:37 30° 04:03 04:36 05:03 19:05 19:32 20:05 340° 03:22 04:03 04:36 05:03 19:05 19:32 20:05 440° 03:22 04:03 04:36 19:32 20:05 20:46 45° 02:53 03:41 04:18 19:50 20:26 21:15   S 50° 02:09 03:13 03:57 20:11 20:55 21:58 52° 01:04 02:41 03:34 20:23 42:127 23:02 556° //// 02:20 03:04 21:03 22:15 //// 58° //// 01:52 03:04 21:03 22:15 ////		07:37	08:52	10:25	13:43	15:17	16:32
60°         07:09         08:05         09:02         15:07         16:03         17:00           N 58°         07:02         07:54         08:45         15:24         16:15         17:07           56°         06:55         07:44         08:31         15:38         16:24         17:13           54°         06:50         07:35         08:19         15:50         16:33         17:19           52°         06:44         07:27         08:08         16:01         16:41         17:24           50°         06:39         07:20         07:58         16:10         16:48         17:29           45°         06:28         07:05         07:38         16:30         17:04         17:41           N 40°         06:18         06:52         07:22         16:46         17:17         17:51           35°         06:09         06:40         07:08         17:00         17:28         18:00           30°         06:00         06:30         06:56         17:12         17:38         18:08           20°         05:44         06:12         06:36         17:33         17:57         18:24           N 10°         05:28         05:55		07:26	08:33	09:48	14:20	15:35	16:42
N 58°         07:02         07:54         08:45         15:24         16:15         17:07           56°         06:55         07:44         08:31         15:38         16:24         17:13           54°         06:50         07:35         08:19         15:50         16:33         17:19           52°         06:44         07:27         08:08         16:01         16:41         17:24           50°         06:39         07:20         07:58         16:10         16:48         17:29           45°         06:28         07:05         07:38         16:30         17:04         17:41           N 40°         06:18         06:52         07:22         16:46         17:17         17:51           35°         06:09         06:40         07:08         17:02         17:38         18:08           20°         05:44         06:12         06:36         17:33         17:57         18:24           N 10°         05:28         05:55         06:17         17:51         18:14         18:40           0°         05:12         05:38         06:00         18:08         18:30         18:56           S 10°         04:53         05:20					14:47	15:50	
56°         06:55         07:44         08:31         15:38         16:24         17:13           54°         06:50         07:35         08:19         15:50         16:33         17:19           52°         06:44         07:27         08:08         16:01         16:41         17:24           50°         06:39         07:20         07:58         16:10         16:48         17:29           45°         06:28         07:05         07:38         16:30         17:04         17:41           N 40°         06:18         06:52         07:22         16:46         17:17         17:51           35°         06:09         06:40         07:08         17:00         17:28         18:00           30°         06:00         06:30         06:56         17:12         17:38         18:08           20°         05:44         06:12         06:36         17:33         17:57         18:24           N 10°         05:28         05:55         06:17         17:51         18:14         18:40           0°         05:12         05:38         06:00         18:08         18:30         18:56           5 10°         04:53         05:20	60°	07:09	08:05	09:02	15:07	16:03	17:00
54°         06:50         07:35         08:19         15:50         16:33         17:19           52°         06:44         07:27         08:08         16:01         16:41         17:24           50°         06:39         07:20         07:58         16:10         16:48         17:29           45°         06:28         07:05         07:38         16:30         17:04         17:41           N 40°         06:18         06:52         07:22         16:46         17:17         17:51           35°         06:09         06:40         07:08         17:00         17:28         18:08           20°         05:44         06:12         06:36         17:33         17:57         18:24           N 10°         05:28         05:55         06:17         17:51         18:14         18:40           0°         05:12         05:38         06:00         18:08         18:30         18:56           S 10°         04:53         05:20         05:43         18:25         18:48         19:15           20°         04:31         05:00         05:25         18:43         19:08         19:37           20°         04:31         05:00	N 58°	07:02	07:54	08:45	15:24	16:15	17:07
52°         06:44         07:27         08:08         16:01         16:41         17:24           50°         06:39         07:20         07:58         16:10         16:48         17:29           45°         06:28         07:05         07:38         16:30         17:04         17:41           N 40°         06:18         06:52         07:22         16:46         17:17         17:51           35°         06:09         06:40         07:08         17:00         17:28         18:00           30°         06:00         06:30         06:56         17:12         17:38         18:08           20°         05:44         06:12         06:36         17:33         17:57         18:24           N 10°         05:28         05:55         06:17         17:51         18:14         18:40           0°         05:12         05:38         06:00         18:08         18:30         18:56           S 10°         04:53         05:20         05:43         18:25         18:48         19:15           20°         04:31         05:00         05:25         18:43         19:08         19:37           30°         04:03         04:36	56°	06:55	07:44	08:31	15:38	16:24	17:13
50°         06:39         07:20         07:58         16:10         16:48         17:29           45°         06:28         07:05         07:38         16:30         17:04         17:41           N 40°         06:18         06:52         07:22         16:46         17:17         17:51           35°         06:09         06:40         07:08         17:00         17:28         18:00           30°         06:00         06:30         06:56         17:12         17:38         18:08           20°         05:44         06:12         06:36         17:12         17:38         18:08           N 10°         05:28         05:55         06:17         17:51         18:14         18:40           0°         05:12         05:38         06:00         18:08         18:30         18:56           S 10°         04:53         05:20         05:43         18:25         18:48         19:15           20°         04:31         05:00         05:25         18:43         19:08         19:37           30°         04:03         04:36         05:03         19:05         19:32         20:05           35°         03:45         04:01		06:50	07:35	08:19	15:50	16:33	17:19
45°         06:28         07:05         07:38         16:30         17:04         17:41           N 40°         06:18         06:52         07:22         16:46         17:17         17:51           35°         06:09         06:40         07:08         17:00         17:28         18:00           30°         06:00         06:30         06:56         17:12         17:38         18:08           20°         05:44         06:12         06:36         17:33         17:57         18:24           N 10°         05:28         05:55         06:17         17:51         18:14         18:40           0°         05:12         05:38         06:00         18:08         18:30         18:56           S 10°         04:53         05:20         05:43         18:25         18:48         19:15           20°         04:31         05:00         05:25         18:43         19:08         19:37           30°         04:03         04:36         05:03         19:05         19:32         20:05           35°         03:45         04:21         04:51         19:18         19:47         20:23           40°         03:22         04:03		06:44	07:27	80:80	16:01	16:41	17:24
N 40°         06:18         06:52         07:22         16:46         17:17         17:51           35°         06:09         06:40         07:08         17:00         17:28         18:00           30°         06:00         06:30         06:56         17:12         17:38         18:08           20°         05:44         06:12         06:36         17:33         17:57         18:24           N 10°         05:28         05:55         06:17         17:51         18:14         18:40           0°         05:12         05:38         06:00         18:08         18:30         18:56           S 10°         04:53         05:20         05:43         18:25         18:48         19:15           20°         04:31         05:00         05:25         18:43         19:08         19:35           30°         04:03         04:36         05:03         19:05         19:32         20:05           35°         03:45         04:21         04:51         19:18         19:47         20:23           40°         03:22         04:03         04:36         19:32         20:05         20:46           45°         02:53         03:41	50°	06:39	07:20	07:58	16:10	16:48	17:29
35°         06:09         06:40         07:08         17:00         17:28         18:00           30°         06:00         06:30         06:56         17:12         17:38         18:08           20°         05:44         06:12         06:36         17:33         17:57         18:24           N 10°         05:28         05:55         06:17         17:51         18:14         18:40           0°         05:12         05:38         06:00         18:08         18:30         18:56           S 10°         04:53         05:20         05:43         18:25         18:48         19:15           20°         04:31         05:00         05:25         18:43         19:08         19:37           30°         04:03         04:36         05:03         19:05         19:32         20:05           35°         03:45         04:21         04:51         19:18         19:47         20:23           40°         03:22         04:03         04:36         19:32         20:05         20:46           45°         02:53         03:41         04:18         19:50         20:26         21:15           50°         02:09         03:13	45°	06:28	07:05	07:38	16:30	17:04	17:41
30°         06:00         06:30         06:56         17:12         17:38         18:08           20°         05:44         06:12         06:36         17:33         17:57         18:24           N 10°         05:28         05:55         06:17         17:51         18:14         18:40           0°         05:12         05:38         06:00         18:08         18:30         18:56           S 10°         04:53         05:20         05:43         18:25         18:48         19:15           20°         04:31         05:00         05:25         18:43         19:08         19:37           30°         04:03         04:36         05:03         19:05         19:32         20:05           35°         03:45         04:21         04:51         19:18         19:47         20:23           40°         03:22         04:03         04:36         19:32         20:05         20:46           45°         02:53         03:41         04:18         19:50         20:26         21:15           S 50°         02:09         03:13         03:57         20:11         20:55         21:58           52°         01:43         02:58		06:18	06:52	07:22	16:46	17:17	17:51
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		06:00					
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		05:44	06:12	06:36	17:33	17:57	18:24
S 10°     04:53     05:20     05:43     18:25     18:48     19:15       20°     04:31     05:00     05:25     18:43     19:08     19:37       30°     04:03     04:36     05:03     19:05     19:32     20:05       35°     03:45     04:21     04:51     19:18     19:47     20:23       40°     03:22     04:03     04:36     19:32     20:05     20:46       45°     02:53     03:41     04:18     19:50     20:26     21:15       5 50°     02:09     03:13     03:57     20:11     20:55     21:58       52°     01:43     02:58     03:46     20:22     21:10     22:24       56°     ////     02:20     03:20     20:47     21:47     23:02       58°     ////     01:52     03:04     21:03     22:15     ////					17:51	18:14	18:40
20°         04:31         05:00         05:25         18:43         19:08         19:37           30°         04:03         04:36         05:03         19:05         19:32         20:05           35°         03:45         04:21         04:51         19:18         19:47         20:23           40°         03:22         04:03         04:36         19:32         20:05         20:46           45°         02:53         03:41         04:18         19:50         20:26         21:15           5 50°         02:09         03:13         03:57         20:11         20:55         21:58           52°         01:43         02:58         03:46         20:22         21:10         22:24           54°         01:04         02:41         03:34         20:34         21:27         23:02           56°         ////         02:20         03:20         20:47         21:47         ////           58°         ////         01:52         03:04         21:03         22:15         ////	0°	05:12	05:38	06:00	18:08	18:30	18:56
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		04:53	05:20	05:43	18:25	18:48	19:15
35°         03:45         04:21         04:51         19:18         19:47         20:23           40°         03:22         04:03         04:36         19:32         20:05         20:46           45°         02:53         03:41         04:18         19:50         20:26         21:15 <b>5</b> 50°         02:09         03:13         03:57         20:11         20:55         21:58           52°         01:43         02:58         03:46         20:22         21:10         22:24           54°         01:04         02:41         03:34         20:34         21:27         23:02           56°         ////         02:20         03:20         20:47         21:47         ////           58°         ////         01:52         03:04         21:03         22:15         ////		04:31	05:00	05:25	18:43	19:08	19:37
40°         03:22         04:03         04:36         19:32         20:05         20:46           45°         02:53         03:41         04:18         19:50         20:26         21:15           S 50°         02:09         03:13         03:57         20:11         20:55         21:58           52°         01:43         02:58         03:46         20:22         21:10         22:24           54°         01:04         02:41         03:34         20:34         21:27         23:02           56°         ////         02:20         03:04         20:47         21:47         ////           58°         ////         01:52         03:04         21:03         22:15         ////							
45°         02:53         03:41         04:18         19:50         20:26         21:15           \$ 50°         02:09         03:13         03:57         20:11         20:55         21:58           52°         01:43         02:58         03:46         20:22         21:10         22:24           54°         01:04         02:41         03:34         20:34         21:27         23:02           56°         ////         02:20         03:20         20:47         21:47         ////           58°         ////         01:52         03:04         21:03         22:15         ////							
S 50°         02:09         03:13         03:57         20:11         20:55         21:58           52°         01:43         02:58         03:46         20:22         21:10         22:24           54°         01:04         02:41         03:34         20:34         21:27         23:02           56°         ////         02:20         03:20         20:47         21:47         ////           58°         ////         01:52         03:04         21:03         22:15         ////							
52°         01:43         02:58         03:46         20:22         21:10         22:24           54°         01:04         02:41         03:34         20:34         21:27         23:02           56°         ////         02:20         03:20         20:47         21:47         ////           58°         ////         01:52         03:04         21:03         22:15         ////	45°	02:53	03:41	04:18	19:50	20:26	21:15
54° 01:04 02:41 03:34 20:34 21:27 23:02 56° //// 02:20 03:20 20:47 21:47 //// 58° //// 01:52 03:04 21:03 22:15 ////							
56° //// 02:20 03:20 20:47 21:47 //// 58° //// 01:52 03:04 21:03 22:15 ////							
58° //// 01:52 03:04 21:03 22:15 ////							
<b>S</b> 60°   /// 01:10 02:45   21:22 22:56 ///							
	<b>S</b> 60°	////	01:10	02:45	21:22	22:56	////

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

h	Aries	Ve	nus		ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	103°51.4	130°28.1	\$12°15.6	339°47.7	N23°52.6	32°18.3	N21°45.5	117°07.6	S07°49.2			
1	118°53.9	145°28.1	14.5	354°51.1	52.8	47°21.1	45.5	132°09.9	49.2	Alpheratz	357°34.9	29°13.8
2	133°56.3	160°28.1	13.4	9°54.5	53.1	62°23.8	45.5	147°12.1	49.1	Ankaa	353°07.2	-42°10.4
3	148°58.8	175°28.1	12.2	24°57.9	53.4	77° 26.5	• • 45.5	162°14.4	• • 49.0	Schedar	349°31.1	56°40.7
4	164°01.3	175 28.1 190°28.1	11.1	40°01.2	53.7	92°29.2	45.4	102 14.4 177°16.7	48.9	Diphda	348°47.3	-17°51.1
5	179°03.7	205°28.1	10.0	55°04.6	53.7	107°32.0	45.4	192°19.0	48.8	Achernar	335°20.0	-57°06.9
6	179 03.7 194°06.2	200°28.2	\$12°08.9	70°08.0	N23°54.2	107 32.0 122°34.7	N21°45.4	207°21.3	\$07°48.7	Hamal	$327^{\circ}51.1$	23°34.9
7	209°08.6	235°28.2	07.8	85°11.4	54.5	137° 37.4		207 21.3 222°23.5	48.7	Polaris	313°45.3	89°22.5
	209 08.0 224°11.1	250°28.2	07.8	100°14.8	54.8	157° 37.4 152° 40.2	45.4	237°25.8		Acamar	$315^{\circ}11.5$	-40°12.4
8 9					55.1	167° 42.9	45.3	251° 25.6 252° 28.1	48.6	Menkar	$314^{\circ}06.0$	4°11.3
	239°13.6	265°28.2	• • 05.5	115°18.2			• • 45.3	267°30.4	• • 48.5	Mirfak	308°27.9	49°57.2
10	254°16.0 269°18.5	280°28.2	04.4	130°21.6 145°25.0	55.3	182°45.6	45.3		48.4	Aldebaran	290°39.3	16°33.6
11		295°28.2	03.3		55.6	197°48.3	45.3	282°32.7	48.3	Rigel	281°03.6	-8°10.4
12	284°21.0	310°28.2	\$12°02.1	160°28.4	N23°55.9	212°51.1	N21°45.3	297°34.9	S07°48.3	Capella	280°21.4	46°01.5
13	299°23.4	325°28.3	12°01.0	175°31.8	56.2	227°53.8	45.2	312°37.2	48.2	Bellatrix	278°22.6	6°22.3
14	314°25.9	340°28.3	11°59.9	190°35.2	56.4	242°56.5	45.2	327°39.5	48.1	Elnath	278°01.5	28°37.7
15	329°28.4	355°28.3	• • 58.8	205°38.6	• • 56.7	257°59.2	• • 45.2	342°41.8	• • 48.0	Alnilam	275°37.4	-1°11.2
16	344°30.8	10°28.3	57.6	220°42.0	57.0	273°02.0	45.2	357°44.1	47.9	Betelgeuse	270°51.8	7°24.7
17	359°33.3	25°28.3	56.5	235°45.4	57.3	288°04.7	45.1	12°46.3	47.8	Canopus	263°51.8	-52°42.5
18	14°35.7	40°28.3	S11°55.4	250°48.8	N23°57.5	303°07.4	N21°45.1	27°48.6	S07°47.8	Sirius	258°25.9	-16°45.0
19	29°38.2	55°28.4	54.3	265°52.2	57.8	318° 10.1	45.1	42°50.9	47.7	Adhara	255°05.5	-29°00.3
20	44°40.7	70°28.4	53.1	280°55.7	58.1	333°12.9	45.1	57°53.2	47.6	Procyon	244°50.5	5°09.6
21	59°43.1	85°28.4	• • 52.0	295°59.1	• • 58.4	348° 15.6	• • 45.1	72°55.5	• • 47.5	Pollux	243°16.9	27°57.9
22	74°45.6	100°28.4	50.9	311°02.5	58.6	3°18.3	45.0	87°57.7	47.4	Avior	234°14.1	-59°35.2
23	89°48.1	115°28.5	49.8	326°05.9	58.9	18°21.0	45.0	103°00.0	47.3	Suhail	222°45.9	-43°31.9
Mer.n	pass. 17:02	$\nu 0.0' d-1$	.1′ m-4.48	$\nu$ 3.4 $^{\prime}$ d0	3′ m-1.28	$\nu 2.7' d-0$	.0′ m-2.72	$\nu 2.3' d-0$	.1′ m1.06	Miaplacidus	221°37.5	-69°49.0
										Alphard	217°47.5	-8°46.0
_			_		_		_		_	Regulus	207°34.2	11°50.6
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.7	61°36.7
0	104°50.5	130°28.5	S11°48.6	341°09.3	N23°59.2	33°23.8	N21°45.0	118°02.3	S07°47.3	Denebola	182°24.9	14°25.8
1	119°53.0	145°28.5	47.5	356°12.7	59.5	48° 26.5	45.0	133°04.6	47.2	Gienah	175°43.5	-17°40.8
2	134°55.5	160°28.6	46.4	11°16.1	23°59.7	63°29.2	44.9	148°06.8	47.1		173°00.1	-63°14.0
3	149°57.9	175°28.6	• • 45.2	26°19.5	24°00.0	78°31.9	• • 44.9	163°09.1	• • 47.0		171°51.6	-57°14.9
4	165°00.4	190°28.6	44.1	41°22.9	00.3	93°34.7	44.9	178°11.4	46.9	Alioth	166°12.9	55°49.1
5	180°02.9	205°28.6	43.0	56°26.4	00.5	108°37.4	44.9	193°13.7	46.8	Spica	158°22.4	-11°17.5
6	195°05.3	220°28.7	S11°41.9	71°29.8	N24°00.8	123°40.1	N21°44.9	208°16.0	S07°46.8	Alkaid	152°52.1	49°11.0
7	$210^{\circ}07.8$	235°28.7	40.7	86°33.2	01.1	138° 42.8	44.8	223°18.2	46.7	Hadar	148°36.3	-60°29.3
8	225°10.2	250°28.7	39.6	101°36.6	01.4	153° 45.5	44.8	238°20.5	46.6		147°57.8	-36°29.4
9	240°12.7	265°28.8	• • 38.5	116°40.0	•• 01.6	168°48.3	• • 44.8	253°22.8	• • 46.5	Arcturus	145°48.0	19°03.0
10	255°15.2	280°28.8	37.3	131°43.5	01.9	183°51.0	44.8	268°25.1	46.4	Rigil Kent.	139°40.6	-60°56.1
11	270°17.6	295°28.9	36.2	146°46.9	02.2	198°53.7	44.8	283°27.3	46.3	Kochab	137°20.4	74°02.8
12	285°20.1	310°28.9	S11°35.1	161°50.3	N24°02.5	213°56.4	N21°44.7	298°29.6	S07°46.3	Zuben'ubi	136°56.2	-16°08.7
13	300°22.6	325°28.9	33.9	176°53.7	02.7	228°59.1	44.7	313°31.9	46.2	Alphecca	126°04.0	26°37.6
14	315°25.0	340°29.0	32.8	191°57.1	03.0	244°01.9	44.7	328°34.2	46.1	Antares	112° 16.2	-26°29.2
15	330°27.5	355°29.0	• • 31.7	207°00.6	• • 03.3	259°04.6	• • 44.7	343°36.4	• • 46.0	Atria	107°10.9	-20°29.2 -69°04.2
16	345°30.0	10°29.1	30.5	222°04.0	03.6	274°07.3	44.6	358°38.7	45.9	Sabik	107 10.9 102°03.1	-15°45.4
17	0°32.4	25°29.1	29.4	237°07.4	03.8	289°10.0	44.6	13°41.0	45.8	Shaula	96°10.8	-13 43.4 -37°07.3
18	15°34.9	40°29.2	S11°28.3	252°10.8	N24°04.1	304° 12.7	N21°44.6	28°43.3	S07°45.8	Rasalhague	95°58.9	12°32.4
19	30°37.4	55°29.2	27.1	267°14.3	04.4	$319^{\circ}15.5$	44.6	43°45.6	45.7	Eltanin	90°42.7	51°29.0
20	45°39.8	70°29.2	26.0	282°17.7	04.7	334° 18.2	44.6	58°47.8	45.6	Kaus Aust.	83°32.9	-34°22.4
21	60°42.3	85°29.3	• • 24.9	297°21.1	• • 04.9	349°20.9	• • 44.5	73°50.1	• • 45.5	Vega	80°33.7	38°48.3
22	75°44.7	100°29.3	23.7	312°24.6	05.2	4°23.6	44.5	88°52.4	45.4	Nunki	75°48.1	-26°16.0
23	90°47.2	115°29.4	22.6	327°28.0	05.5	19°26.3	44.5	103°54.7	45.3	Altair	62°00.3	8°56.0
N/au	16.50	0 0/ -/ 1	.1′ m-4.48	2 1/	2/ 1 20	27/ 40	0/ 2.72	0 2/ 4 0	1/1 06	Peacock	53°06.3	-56°39.4
ivier.p	bass. 16:58	$\nu$ 0.0 a-1	.1 m-4.48	$\nu_{3.4}$ au.	3′ m-1.30	ν2.Γ α-0	.0′ m-2.72	$\nu$ 2.3 a-0	.1′ m1.06	Deneb	49°26.3	45°22.2
										Enif	33°39.1	9°59.4
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.2	-46°50.6
0	105°49.7	130°29.4	<b>S</b> 11°21.5	342°31.4	N24°05.8	34°29.0	N21°44.5	118°56.9	507°45.2	Fomalhaut	27 33.2 15°14.7	-40 50.6 -29°29.6
1	120°52.1	145°29.5	20.3	357°34.9	06.0	49°31.8	44.4	133°59.2	45.2	Scheat	13°45.4	28°13.2
2	135°54.6	160°29.5	19.2	12°38.3	06.3	64°34.5	44.4	149°01.5	45.1	Markab	13°30.1	26 13.2 15°20.4
3	150°57.1	175°29.6	• • 18.1	27°41.7	• • 06.6	79°37.2	• • 44.4	164°03.8	• • 45.0	ividikaD	10 00.1	10 20.4
4	165°59.5	190°29.7	16.9	42°45.2	06.8	94°39.9	44.4	179°06.0	44.9	Jan 04 Sat	SHA	Mer.pass
5	181°02.0	205°29.7	15.8	57°48.6	07.1	109°42.6	44.4	194°08.3	44.8	Venus	$26^{\circ}36.7$	15:18
6	196°04.5	220°29.8	<b>S</b> 11°14.6	72°52.0	N24°07.4	124°45.3	N21°44.3	209°10.6	S07°44.7	Mars	$235^{\circ}56.3$	01:21
7	211°06.9	235°29.8	13.5	87°55.5	07.7	139°48.0	44.3	224°12.9	44.7	Jupiter	288°26.9	21:47
8	226°09.4	250°29.9	12.4	102°58.9	07.9	154°50.8	44.3	$239^{\circ}15.1$	44.6	Saturn	13°16.2	16:09
9	241°11.8	265°29.9	• • 11.2	118°02.4	• • 08.2	169°53.5	• • 44.3	254°17.4	• • 44.5	In: OF C	CIIA	Ma:: :-
10	$256^{\circ}14.3$	280°30.0	10.1	133°05.8	08.5	184°56.2	44.3	$269^{\circ}19.7$	44.4	Jan 05 Sun	SHA	Mer.pass
11	271°16.8	295°30.1	08.9	148°09.2	08.7	199°58.9	44.2	284°22.0	44.3	Venus	25°38.0	15:18
12	286°19.2	310°30.1	S11°07.8	163°12.7	N24°09.0	215°01.6	N21°44.2	299°24.2	S07°44.2	Mars	236°18.8	01:15
13	301°21.7	325°30.2	06.7	$178^{\circ}16.1$	09.3	230°04.3	44.2	$314^{\circ}26.5$	44.1	Jupiter	288°33.2	21:42
14	$316^{\circ}24.2$	340°30.3	05.5	193°19.6	09.6	245°07.0	44.2	329°28.8	44.1	Saturn	13°11.8	16:05
15	331°26.6	355°30.3	• • 04.4	208°23.0	• • 09.8	260°09.7	• • 44.2	344°31.0	• • 44.0	Jan 06 Mon	SHA	Mer.pass
16	$346^{\circ}29.1$	10°30.4	03.2	223°26.5	10.1	275°12.5	44.1	359°33.3	43.9	Venus	24°39.8	15:18
17	1°31.6	25°30.5	02.1	238°29.9	10.4	290°15.2	44.1	14°35.6	43.8	Mars	236°41.8	01:10
18	16°34.0	40°30.5	<b>S</b> 11°01.0	253°33.4	N24°10.6	305° 17.9	N21°44.1	29°37.9	S07°43.7	Jupiter	288°39.4	21:38
19	31°36.5	55°30.6	$10^{\circ}59.8$	268°36.8	10.9	320°20.6	44.1	44°40.1	43.6	Saturn	13°07.3	16:02
20	46°39.0	70°30.7	58.7	283°40.2	11.2	335°23.3	44.0	59°42.4	43.6			
21	61°41.4	85°30.7	• • 57.5	298°43.7	. 11.5	350° 26.0	• • 44.0	74°44.7	• • 43.5	Horizont	al parallax	
22	76°43.9	100°30.8	56.4	313°47.1	11.7	5°28.7	44.0	89°47.0	43.4		Venus:	0.2
23	91°46.3	115°30.9	55.3	328°50.6	12.0	20°31.4	44.0	104°49.2	43.3		Mars:	0.2
										·		
ivier.p	bass. 16:54	$\nu$ 0.1' $d$ -1	.1′ m-4.49	$\nu$ 3.4′ $d0$ .	3′ m-1.32	ν2.Γ d-0	.0′ m-2.71	$\nu$ 2.3' $d$ -0	.1′ m1.07			

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°47.5	S22°43.0	$126^{\circ}12.8$	11.6'	S11°42.0	-15.4'	58.6'
1	193°47.2	42.7	140°43.4	11.6'	11°26.6	-15.4'	58.6'
2	208°46.9	42.4	155°14.0	11.7'	11°11.2	-15.5'	58.6'
3 4	223°46.6 238°46.3	· · 42.2 41.9	169°44.7 184°15.4	11.7' 11.8'	10°55.7 10°40.2	-15.5' -15.6'	58.6' 58.6'
5	253°46.0	41.6	198°46.2	11.8'	10° 40.2	-15.0 -15.7'	58.6'
6	268°45.8	S22°41.4	213°17.0	11.9'	S10°08.9	-15.7'	58.7'
7	283°45.5	41.1	227°47.9	11.9'	09°53.2	-15.8'	58.7'
8	298°45.2	40.8	242°18.8	11.9'	09°37.4	-15.8'	58.7'
9 10	313°44.9 328°44.6	· · 40.6 40.3	256°49.8 271°20.7	12.0' 12.0'	09°21.6 09°05.7	-15.9'	58.7' 58.7'
10	328 44.0 343°44.4	40.3 40.0	271 20.7 285°51.8	12.1'	09 05.7 08°49.8	-15.9' -16.0'	58.7'
12	358°44.1	S22°39.7	300°22.8	12.1'	508°33.8	-16.0'	58.7'
13	13°43.8	39.5	$314^{\circ}53.9$	12.1'	08°17.8	-16.1'	58.7'
14	28°43.5	39.2	329°25.0	12.2'	08°01.8	-16.1'	58.7'
15 16	43°43.2 58°42.9	· · 38.9 38.6	343°56.2 358°27.4	12.2' 12.2'	07°45.6 07°29.5	-16.2' -16.2'	58.7' 58.8'
17	73°42.7	38.4	12°58.6	12.3'	07°29.3	-16.2'	58.8'
18	88°42.4	S22°38.1	27°29.9	12.3'	S06°57.1	-16.3	58.8'
19	103°42.1	37.8	42°01.2	12.3'	06°40.8	-16.3'	58.8'
20	118°41.8	37.5	56°32.5	12.3'	06°24.5	-16.3'	58.8'
21 22	133°41.5 148°41.3	· · 37.3	71°03.8 85°35.2	12.4' 12.4'	06°08.1 05°51.8	-16.4' -16.4'	58.8' 58.8'
23	148 41.3 163°41.0	37.0 36.7	85 35.2 100°06.5	12.4'	05 51.8 05°35.3	-16.4'	58.8'
25			100 00.5			10.1	30.0
	SD = 16.3'	d = -0.3'		SL	O = 16.0'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°40.7 193°40.4	\$22°36.4	114°37.9 129°09.4	12.4' 12.4'	\$05°18.9 05°02.4	-16.5' -16.5'	58.8' 58.8'
1 2	193 40.4 208°40.1	36.1 35.8	129 09.4 143°40.8	12.4	05 02.4 04°45.9	-16.5'	58.8'
3	223°39.9	• • 35.6	158°12.3	12.5'	04° 43.9	-16.6'	58.9'
4	238°39.6	35.3	172°43.7	12.5'	04°12.8	-16.6'	58.9'
5	253°39.3	35.0	$187^{\circ}15.2$	12.5'	03°56.3	-16.6'	58.9'
6	268°39.0	\$22°34.7	201°46.7	12.5'	\$03°39.7 03°23.0	-16.6'	58.9'
7 8	283°38.8 298°38.5	34.4 34.1	216°18.2 230°49.8	12.5' 12.5'	03°23.0 03°06.4	-16.6' -16.7'	58.9' 58.9'
9	313°38.2	33.8	245°21.3	12.5'	03° 00.4 02° 49.7	-16.7'	58.9'
10	328°37.9	33.5	259°52.9	12.6'	02°33.0	-16.7'	58.9'
11	343°37.6	33.3	274°24.4	12.6'	02°16.3	-16.7'	58.9'
12	358°37.4	S22°33.0	288°56.0	12.6'	S01°59.6	-16.7'	58.9'
13 14	13°37.1 28°36.8	32.7 32.4	303°27.5 317°59.1	12.6' 12.6'	01°42.9 01°26.2	-16.7' -16.7'	58.9' 58.9'
15	43°36.5	32.1	332°30.7	12.6'	01°09.4	-16.8'	58.9'
16	58°36.3	31.8	347°02.2	12.6'	00°52.7	-16.8'	59.0'
17	73°36.0	31.5	1°33.8	12.6'	00°35.9	-16.8'	59.0'
18 19	88°35.7 103°35.4	\$22°31.2 30.9	16°05.4 30°36.9	12.6' 12.6'	\$00°19.1 \$00°02.4	-16.8' -16.8'	59.0' 59.0'
20	103 35.4 118°35.2	30.9	45°08.5	12.5'	N00°14.4	16.8	59.0'
21	133°34.9	30.3	59°40.0	12.5'	00°31.2	16.8'	59.0'
22	148°34.6	30.0	$74^{\circ}11.5$	12.5'	00°48.0	16.8'	59.0'
23	163°34.3	29.7	88°43.1	12.5'	01°04.7	16.8'	59.0'
	SD = 16.3'	d = -0.3'		SI	O = 16.0'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°34.1	\$22°29.4	103°14.6	12.5'	N01°21.5	16.8'	59.0'
1	193°33.8	29.1	117°46.1	12.5'	01°38.3 01°55.1	16.8'	59.0'
2	208°33.5 223°33.2	28.8 •• 28.5	132°17.6 146°49.1	12.5' 12.5'	01°55.1 02°11.8	16.8' 16.8'	59.0' 59.0'
4	238°33.0	28.2	161°20.5	12.4'	02°11.8	16.7	59.0'
5	253°32.7	27.9	175°52.0	12.4'	02°45.3	16.7'	59.0'
6	268°32.4	S22°27.6	190°23.4	12.4'	N03°02.1	16.7	59.0'
7	283°32.1 298°31.9	27.3 27.0	204°54.8 219°26.2	12.4' 12.4'	03°18.8 03°35.5	16.7' 16.7'	59.0' 59.1'
8 9	298°31.9 313°31.6	26.7	219°26.2 233°57.5	12.4	03° 35.5 03° 52.2	16.7	59.1' 59.1'
10	328°31.3	26.4	248°28.9	12.3'	04°08.9	16.7	59.1'
11	343°31.0	26.1	263°00.2	12.3'	04°25.5	16.6'	59.1'
12	358°30.8	\$22°25.7	277°31.5	12.2'	N04°42.1	16.6'	59.1'
13 14	13°30.5 28°30.2	25.4 25.1	292°02.7 306°33.9	12.2' 12.2'	04°58.8 05°15.4	16.6' 16.6'	59.1' 59.1'
14 15	43°30.2	24.8	300 33.9 321°05.1	12.2'	05 15.4 05°31.9	16.5	59.1'
16	58°29.7	24.5	335°36.3	12.1'	05°48.5	16.5	59.1'
17	73°29.4	24.2	350°07.4	12.1'	06°05.0	16.5'	59.1'
18	88°29.1	\$22°23.9	4°38.5	12.0'	N06°21.5	16.5	59.1'
19 20	103°28.9 118°28.6	23.6 23.2	19°09.5 33°40.5	12.0' 12.0'	06°38.0 06°54.4	16.4' 16.4'	59.1' 59.1'
20	118 28.0 133°28.3	22.9	33 40.5 48°11.5	12.0	06 54.4 07°10.8	16.4	59.1'
22	148°28.1	22.6	62°42.4	11.9'	07°27.1	16.3	59.1'
23	163°27.8	22.3	77°13.3	11.8'	07°43.5	16.3'	59.1'
	SD = 16.3'	d = -0.3'		SI	O = 16.1'		

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

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

#### January 07, 08, 09 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	106°48.8	130°31.0	S10°54.1	343°54.1	N24°12.3	35°34.1	N21°44.0	119°51.5	S07°43.2			
1	121°51.3	145°31.0	53.0	358°57.5	12.5	50°36.8	43.9	134°53.8	43.1	Alpheratz	357°34.9	29°13.8
2	136°53.7	160°31.1	51.8	14°01.0	12.8	65°39.6	43.9	149° 56.0	43.0	Ankaa	353°07.2	-42°10.4
3	151°56.2	175°31.2	50.7	29°04.4	. 13.1	80°42.3	• • 43.9	164°58.3	• • 43.0	Schedar	349°31.1	56°40.7
4	166°58.7	190°31.3	49.5	44°07.9	13.4	95° 45.0	43.9	180°00.6	42.9	Diphda	348°47.3	-17°51.1
5	182°01.1	205°31.3	48.4	59°11.3	13.6	110° 47.7	43.9	195°02.9	42.8	Achernar	335°20.1	-57°06.9
6	197°03.6	220°31.4	\$10°47.3	74°14.8	N24° 13.9	125° 50.4	N21°43.8	210°05.1	S07°42.7	Hamal	327°51.1	23°34.9
7	212°06.1	235° 31.5	46.1	89° 18.2	14.2	140°53.1	43.8	225°07.4	42.6	Polaris	313°46.5	89°22.5
8	227°08.5	250°31.6	45.0	104°21.7	14.4	155°55.8	43.8	240°09.7	42.5	Acamar	315°11.5	-40°12.5
9	242°11.0	265°31.7	• • 43.8	119°25.2	14.7	170°58.5	• • 43.8	255° 11.9	• • 42.4	Menkar	314°06.0	4°11.3
10	257°13.5	280°31.7	42.7	134°28.6	15.0	186° 01.2	43.8	270°14.2	42.4	Mirfak	308°28.0	49°57.2
11	272°15.9	295°31.8	41.5	149°32.1	15.0	201°03.9	43.7	285° 16.5	42.3	Aldebaran	290°39.3	16°33.6
12	287°18.4	310°31.9	\$10°40.4	164°35.5	N24° 15.5	216°06.6	N21°43.7	300° 18.8	S07°42.2	Rigel	281°03.6	-8°10.4
13	302°20.8	325°32.0	39.2	179°39.0	15.8	231°09.3	43.7	315°21.0	42.1	Capella	280°21.5	46°01.5
14	317°23.3	340°32.1	38.1	194°42.5	16.1	246° 12.0	43.7	330°23.3	42.0	Bellatrix	278°22.6	6°22.3
15	332°25.8	355° 32.2	36.9	209°45.9	16.3	261°14.7	• • 43.7	345° 25.6	41.9	Elnath	278°01.5	28°37.7
16	347°28.2	10°32.3	35.8	224°49.4	16.6	276° 17.4	43.6	0°27.8	41.8	Alnilam	275°37.4	-1°11.2
17	2°30.7	25°32.4	34.6	239°52.8	16.9	291°20.1	43.6	15°30.1	41.8	Betelgeuse	270°51.8	7°24.7
18	17°33.2	40°32.5	\$10°33.5	254°56.3	N24°17.1	306°22.8	N21°43.6	30°32.4	S07°41.7	Canopus	263°51.8	-52°42.5
19	32°35.6	55°32.6	32.3	269°59.8	17.4	321°25.5	43.6	45°34.7	41.6	Sirius	258°25.9	-16°45.0
20	47°38.1	70°32.6	31.2	285°03.2	17.7	336°28.3	43.6	60°36.9	41.5	Adhara	255°05.5	-29°00.4
21	62°40.6	85°32.7	• • 30.0	300°06.7	•• 17.9	351°31.0	• • 43.5	75°39.2	41.4	Procyon	244°50.5	5°09.6
22	77°43.0	100°32.8	28.9	315° 10.2	18.2	6°33.7	43.5	90°41.5	41.4	Pollux	243°16.9	27°57.9
23	92°45.5	115°32.9	27.7	330°13.6	18.5	21°36.4	43.5	105° 43.7	41.3	Avior	234°14.1	-59°35.2
										Suhail	222°45.9	-43°31.9
Mer.p	ass. 16:50	$\nu$ 0.1′ <i>d</i> -1	$.1^\prime$ m-4.50	$\nu$ 3.5′ d0.	3′ m-1.34	$\nu 2.7' \ d-0$	.0′ m-2.71	$\nu$ 2.3′ d-0	.1' m $1.07$	Miaplacidus	221°37.5	-69°49.0
										Alphard	217°47.5	-8°46.0
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.2	11°50.6
0	107°47.9	130°33.0	S10°26.6	345°17.1	N24°18.7	36°39.1	N21°43.5	120° 46.0	S07°41.1	Dubhe	193°40.6	61°36.7
1	122°50.4	145°33.1	25.4	0°20.6	19.0	51°41.8	43.5	135° 48.3	41.1	Denebola	182°24.8	14°25.8
2	137°52.9	160°33.2	24.3	15°24.1	19.3	66° 44.5	43.4	150°50.5	41.0	Gienah	175°43.5	-17°40.8
3	152°55.3	175°33.3	23.1	30°27.5	. 19.5	81°47.2	• • 43.4	165°52.8	40.9		173°00.0	-63°14.0
4	167°57.8	190°33.4	22.0	45°31.0	19.8	96°49.9	43.4	180°55.1	40.8		171°51.6	-57°14.9
5	183°00.3	205°33.5	20.8	60°34.5	20.1	111°52.6	43.4	195° 57.4	40.7	Alioth	166°12.9	55°49.1
6	198°02.7	220° 33.6	\$10°19.7	75°37.9	N24°20.3	126°55.3	N21°43.4	210°59.6	S07°40.6	Spica	158°22.3	-11°17.5
7	213°05.2	235° 33.7	18.5	90°41.4	20.6	141°58.0	43.3	226°01.9	40.5	Alkaid	152°52.1	49°11.0
8	228°07.7	250° 33.9	17.4	105°44.9	20.9	157°00.7	43.3	241°04.2	40.5	Hadar	148°36.2	-60°29.4
9	243°10.1	265°34.0	16.2	120°48.4	· · 21.1	172°03.4	43.3	256° 06.4	40.4		147°57.7	-36°29.4
10	258°12.6	280°34.1	15.1	135°51.8	21.4	187°06.1	43.3	271°08.7	40.3	Arcturus	145°48.0	19°03.0
11	273°15.1	295°34.2	13.9	150°55.3	21.7	202°08.8	43.3	286° 11.0	40.2	Rigil Kent.	139°40.6	-60°56.1
12	288°17.5	310°34.3	\$10°12.8	165°58.8	N24°21.9	217° 11.5	N21°43.2	301°13.2	S07°40.1	Kochab	137°20.3	74°02.8
13	303°20.0	325°34.4	11.6	181°02.3	22.2	232° 14.2	43.2	316° 15.5	40.0	Zuben'ubi		-16°08.7
14	318°22.4	340°34.5	10.5	196°05.8	22.5	247° 16.8	43.2	331°17.8	39.9	Alphecca	126°04.0	26°37.6
15	333°24.9	355°34.6	• • 09.3	211°09.2	• • 22.7	262° 19.5	• • 43.2	346°20.0	• • 39.8	Antares	112°16.1	-26°29.2
16	348°27.4	10°34.7	08.2	226°12.7	23.0	277° 22.2	43.2	1°22.3	39.8	Atria	107°10.9	-69°04.2
17	3°29.8	25°34.9	07.0	241°16.2	23.3	292°24.9	43.1	16°24.6	39.7	Sabik Shaula	102°03.1	-15°45.4
18	18°32.3	40°35.0	S10°05.9	256° 19.7	N24°23.5	307° 27.6	N21°43.1	31°26.8	S07°39.6		96°10.8 95°58.9	-37°07.3 12°32.4
19	33°34.8	55°35.1	04.7	271°23.2	23.8	322°30.3	43.1	46°29.1	39.5	Rasalhague		51°29.0
20	48°37.2	70°35.2	03.6	286°26.6	24.1	337°33.0	43.1	61°31.4	39.4	Eltanin	90°42.7 83°32.9	-34°22.4
21	63°39.7	85°35.3	• • 02.4	301°30.1	• • 24.3	352° 35.7	• • 43.1	76°33.6	• • 39.3	Kaus Aust. Vega	80°33.7	-34 22.4 38°48.3
22	78°42.2	100°35.4	01.2	316°33.6	24.6	7°38.4	43.1	91°35.9	39.2	_	75°48.1	-26°16.0
23	93°44.6	115°35.6	00.1	331°37.1	24.9	22°41.1	43.0	106°38.2	39.1	Nunki Altair	62°00.3	8°56.0
1/1011	16.46	0 1/ ./ 1	1/ ma / E1	2 5/ 40	2/ 1 26	2 7/ ./ 0	0/ 2.70		1/ 1 07	Peacock	53°06.3	-56°39.4
ivier.p	ass. 16:46	$\nu$ 0.1 a-1	.1′ m-4.51	$\nu$ 3.5 $a_0$ .	3′ m-1.36	ν2.Γ a-0	.0′ m-2.70	$\nu_{2.3}$ a-0	.1′ m1.07	Deneb	49°26.3	45°22.2
										Enif	33°39.1	9°59.4
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.2	-46°50.6
0	$108^{\circ}47.1$	130°35.7	S09°58.9	346°40.6	N24°25.1	37°43.8	N21°43.0	121°40.4	<b>S</b> 07°39.1	Fomalhaut	15°14.7	-40° 30.0° -29° 29.6
1	123°49.6	145°35.8	57.8	$1^{\circ}44.1$	25.4	52°46.5	43.0	136°42.7	39.0	Scheat	13°45.4	28°13.2
2	138°52.0	160°35.9	56.6	16°47.5	25.6	67°49.2	43.0	151°45.0	38.9	Markab	13°30.1	15°20.4
3	153°54.5	$175^{\circ}36.1$	• • 55.5	31°51.0	• • 25.9	82°51.9	• • 43.0	166°47.2	• • 38.8	Iviainab		20 20.7
4	$168^{\circ}56.9$	190°36.2	54.3	$46^{\circ}54.5$	26.2	97°54.6	42.9	181°49.5	38.7	Jan 07 Tue	SHA	Mer.pass
5	183°59.4	205°36.3	53.2	$61^{\circ}58.0$	26.4	112°57.3	42.9	196°51.8	38.6	Venus	23°42.1	15:18
6	199°01.9	220°36.4	S09°52.0	77°01.5	N24°26.7	128°00.0	N21°42.9	211°54.0	S07°38.5	Mars		01:04
7	$214^{\circ}04.3$	235°36.6	50.8	$92^{\circ}05.0$	27.0	143°02.7	42.9	226°56.3	38.4	Jupiter	288°45.3	21:34
8	229°06.8	250°36.7	49.7	$107^{\circ}08.5$	27.2	158°05.3	42.9	241°58.6	38.4	Saturn	13°02.7	15:58
9	244°09.3	265°36.8	• • 48.5	122° 12.0	• • 27.5	173°08.0	• • 42.8	257°00.8	• • 38.3	Jan 08 Wed	SHA	Mor noss
10	$259^{\circ}11.7$	280°37.0	47.4	137° 15.5	27.7	188° 10.7	42.8	272°03.1	38.2	Venus	22°45.1	Mer.pass 15:18
11	$274^{\circ}14.2$	295°37.1	46.2	152° 18.9	28.0	203° 13.4	42.8	287°05.4	38.1	Mars		00:59
12	$289^{\circ}16.7$	310°37.2	S09°45.0	167°22.4	N24°28.3	218° 16.1	N21°42.8	302°07.6	S07°38.0	Jupiter	288°51.1	21:30
13	$304^{\circ}19.1$	325°37.4	43.9	182°25.9	28.5	233° 18.8	42.8	317°09.9	37.9	Saturn	12°58.1	15:55
14	$319^{\circ}21.6$	340° 37.5	42.7	$197^{\circ}29.4$	28.8	$248^{\circ}21.5$	42.7	$332^{\circ}12.2$	37.8	Saturn	12 30.1	10.00
15	334°24.1	355° 37.6	• • 41.6	212°32.9	•• 29.1	263° 24.2	• • 42.7	347° 14.4	• • 37.7	Jan 09 Thu	SHA	Mer.pass
16	349°26.5	10°37.8	40.4	227°36.4	29.3	278° 26.9	42.7	2°16.7	37.6	Venus	21°48.6	15:17
17	4°29.0	25° 37.9	39.3	242°39.9	29.6	293° 29.6	42.7	17° 19.0	37.6	Mars	237°53.5	00:53
18	19°31.4	40°38.1	S09°38.1	257°43.4	N24°29.8	308°32.2	N21°42.7	32°21.2	S07°37.5	Jupiter	288°56.7	21:25
19	34°33.9	55° 38.2	36.9	272°46.9	30.1	323°34.9	42.7	47°23.5	37.4	Saturn	12°53.4	15:51
20	49°36.4	70°38.4	35.8	287°50.4	30.4	338° 37.6	42.6	62°25.8	37.3	11. 1	al ac::-!!	
21	64°38.8	85°38.5	• • 34.6	302°53.9	• • 30.6	353°40.3	• • 42.6	77°28.0	• • 37.2	Horizont	al parallax	0.0
22	79°41.3	100°38.6	33.5	317°57.4	30.9	8°43.0	42.6	92°30.3	37.1		Venus:	0.2
23	94°43.8	115°38.8	32.3	333°00.9	31.1	23°45.7	42.6	107°32.5	37.0		Mars:	0.2
Mer.n	ass. 16:42	$\nu 0.1' d-1$	.2′ m-4.52	$\nu 3.5' d0$	3′ m-1.37	$\nu 2.7' d-0$	.0′ m-2.69	$\nu 2.3' \ d-0$	.1′ m1.07			

h	Su	Moon						
Tue	GHA	Dec	GHA	ν	Dec	d	HP	
0	178° 27.5	S22°22.0	91°44.1	11.8'	N07°59.8	16.3'	59.1'	
1	193°27.3 208°27.0	21.6 21.3	106°14.9 120°45.7	11.7'	08°16.0 08°32.2	16.2'	59.1' 59.1'	
2	208 27.0 223°26.7	21.0	120 45.7 135°16.4	11.7' 11.6'	08°48.4	16.2' 16.1'	59.1'	
4	238° 26.4	20.7	149°47.0	11.6'	09°04.5	16.1'	59.1'	
5	253°26.2	20.4	164°17.6	11.5'	09°20.6	16.0'	59.1'	
6	268°25.9 283°25.6	\$22°20.0	178°48.2 193°18.7	11.5'	N09°36.7 09°52.7	16.0'	59.1'	
7 8	283°25.6 298°25.4	19.7 19.4	193°18.7 207°49.1	11.4' 11.4'	10°08.6	15.9' 15.9'	59.1' 59.1'	
9	313°25.1	. 19.1	222°19.5	11.3'	10° 24.5	15.8'	59.1'	
10	328°24.8	18.7	236°49.8	11.3'	10°40.3	15.8'	59.1'	
11	343°24.6	18.4	251°20.1	11.2'	10°56.1	15.7'	59.1'	
12 13	358°24.3 13°24.0	\$22°18.1 17.8	265°50.3 280°20.4	11.1' 11.1'	N11°11.8 11°27.5	15.7' 15.6'	59.1' 59.1'	
14	28° 23.8	17.4	294°50.5	11.0'	11°43.1	15.6'	59.1'	
15	43°23.5	• • 17.1	309°20.5	11.0'	11°58.7	15.5'	59.1'	
16	58°23.2	16.8	323°50.5	10.9'	12° 14.2	15.4'	59.2'	
17	73°23.0	16.4	338°20.4	10.8'	12°29.6	15.4'	59.2'	
18 19	88°22.7 103°22.4	\$22°16.1 15.8	352°50.2 7°20.0	10.8' 10.7'	N12°45.0 13°00.3	15.3' 15.2'	59.2' 59.2'	
20	118° 22.2	15.4	21°49.7	10.6'	13° 15.5	15.2'	59.2'	
21	133°21.9	• • 15.1	36°19.3	10.5'	13°30.7	15.1'	59.2'	
22	148°21.7	14.8	50°48.8	10.5'	13°45.8	15.0'	59.2'	
23	163°21.4	14.4	65°18.3	10.4'	14°00.8	14.9'	59.2'	
	SD = 16.3'	d = -0.3'		SE	0 = 16.1'			
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	178°21.1	S22°14.1	79°47.7	10.3'	N14°15.8	14.9'	59.2'	
1	193°20.9	13.8	94°17.0	10.3'	14° 30.6	14.8'	59.2'	
2	208°20.6 223°20.3	13.4 •• 13.1	108°46.3 123°15.5	10.2' 10.1'	14°45.4 15°00.1	14.7' 14.6'	59.2' 59.2'	
3 4	238°20.1	12.7	123 15.5 137°44.6	10.1	15 00.1 15°14.8	14.6'	59.2'	
5	253° 19.8	12.4	152°13.6	9.9'	15° 29.3	14.5'	59.2'	
6	268°19.5	S22°12.0	166°42.5	9.9'	N15°43.8	14.4'	59.2'	
7	283°19.3	11.7	181°11.4	9.8'	15°58.2	14.3'	59.2'	
8 9	298° 19.0 313° 18.8	11.4 •• 11.0	195°40.2 210°08.9	9.7' 9.6'	16°12.5 16°26.7	14.2' 14.1'	59.2' 59.1'	
10	328° 18.5	10.7	210 00.9 224°37.5	9.0 9.5'	16° 40.8	14.1	59.1	
11	343° 18.2	10.3	239°06.0	9.5'	16°54.8	13.9'	59.1'	
12	358° 18.0	S22°10.0	253°34.5	9.4'	N17°08.8	13.8'	59.1'	
13 14	13° 17.7 28° 17.5	09.6 09.3	268°02.9 282°31.1	9.3' 9.2'	17°22.6 17°36.3	13.7' 13.6'	59.1' 59.1'	
15	43°17.2	· · 08.9	202 31.1 296°59.3	9.2 9.1'	17 30.3 17°50.0	13.5	59.1'	
16	58° 16.9	08.6	311°27.4	9.0'	18°03.5	13.4'	59.1'	
17	73° 16.7	08.2	$325^{\circ}55.5$	8.9'	18° 17.0	13.3'	59.1'	
18	88° 16.4 103° 16.2	\$22°07.9	340°23.4 354°51.2	8.8'	N18° 30.3 18° 43.5	13.2'	59.1'	
19 20	103° 16.2 118° 15.9	07.5 07.2	354 51.2 9°19.0	8.8' 8.7'	18° 43.5 18° 56.6	13.1'	59.1' 59.1'	
21	133° 15.6	. 06.8	23°46.7	8.6'	19°09.7	12.9'	59.1'	
22	148°15.4	06.5	38°14.2	8.5'	19°22.6	12.8'	59.1'	
23	163°15.1	06.1	52°41.7	8.4'	19°35.4	12.7'	59.1'	
	SD = 16.3'	d = -0.3'		SE	0 = 16.1'			
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	178° 14.9	S22°05.8	67°09.1	8.3'	N19°48.0	12.6'	59.1'	
1	193°14.6	05.4	81°36.4	8.2'	20°00.6	12.4'	59.1'	
2	208° 14.3 223° 14.1	05.1 •• 04.7	96°03.7 110°30.8	8.1' 8.0'	20°13.1 20°25.4	12.3' 12.2'	59.1' 59.1'	
4	238° 13.8	04.7	110 50.8 124°57.8	7.9'	20° 25.4 20° 37.6	12.1	59.1'	
5	253°13.6	04.0	139°24.8	7.8'	20°49.7	12.0'	59.1'	
6	268° 13.3	S22°03.6	153°51.6	7.8'	N21°01.6	11.8'	59.1'	
7 8	283°13.1 298°12.8	03.3 02.9	168°18.4 182°45.0	7.7' 7.6'	21°13.5 21°25.2	11.7' 11.6'	59.1' 59.1'	
9	298 12.8 313°12.5	· · 02.5	182 45.0 197°11.6	7.6 7.5'	21 25.2 21°36.8	11.5	59.1'	
10	328°12.3	02.2	211°38.1	7.4'	21°48.2	11.3'	59.1'	
11	343°12.0	01.8	226°04.5	7.3'	21°59.5	11.2'	59.1'	
12	358° 11.8 13° 11.5	\$22°01.5	240°30.8	7.2'	N22°10.7	11.1'	59.1'	
13 14	13°11.5 28°11.3	01.1 00.7	254°57.0 269°23.1	7.1' 7.0'	22°21.8 22°32.7	10.9' 10.8'	59.1' 59.0'	
15	43°11.0	00.4	283°49.1	6.9'	22°43.5	10.6'	59.0'	
16	58° 10.8	22°00.0	298°15.0	6.8'	22°54.1	10.5'	59.0'	
17	73° 10.5	21°59.6	312°40.9	6.8'	23°04.6	10.4	59.0'	
18 19	88° 10.2 103° 10.0	\$21°59.2 58.9	327°06.6 341°32.3	6.7' 6.6'	N23°15.0 23°25.2	10.2' 10.1'	59.0' 59.0'	
20	103° 10.0 118° 09.7	58.9 58.5	341 32.3 355°57.9	6.5	23° 25.2 23° 35.2	9.9'	59.0° 59.0°	
21	133°09.5	• • 58.1	10°23.4	6.4'	23°45.2	9.8'	59.0'	
22	148°09.2	57.8	24°48.8	6.3'	23°54.9	9.6'	59.0'	
23	163°09.0	57.4	39°14.1	6.2'	24°04.5	9.5'	59.0'	
	SD = 16.3'	d = -0.4'		SE	D = 16.1'			

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

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

		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	50-72%	
07	06:10	06:23	12:06	18:30	06:05		
08	06:36	06:48	12:07	19:21	06:55		
09	07:01	07:13	12:07	20:17	07:49		

### January 10, 11, 12 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	109° 46.2	130°38.9	S09°31.1	348°04.4	N24°31.4	38°48.4	N21°42.6	122°34.8	\$07°36.9			
1	124° 48.7	145°39.1	30.0	3°07.9	31.7	53°51.1	42.5	137°37.1	36.8	Alpheratz	357°34.9	29°13.8
2	139°51.2	160°39.2	28.8	18°11.4	31.9	68°53.7	42.5	152°39.3	36.8	Ankaa	353°07.2	-42°10.4
3	154°53.6	175°39.4	27.6	33°14.9	32.2	83°56.4	42.5	167°41.6	36.7	Schedar	349°31.1	56°40.7
4	169°56.1	190°39.5	26.5	48°18.4	32.4	98°59.1	42.5	182°43.9	36.6	Diphda	348°47.3	-17°51.1
5	184°58.5	205°39.7	25.3	63°21.9	32.7	114°01.8	42.5	197°46.1	36.5	Achernar	335°20.1	-57°06.9
6	200°01.0	220°39.8	S09°24.2	78°25.4	N24°33.0	129°04.5	N21°42.5	212°48.4	S07°36.4	Hamal Polaris	327°51.1 313°47.5	23°34.9 89°22.5
7	215°03.5	235°40.0	23.0	93°28.9	33.2	144°07.2	42.4	227°50.7	36.3	Acamar	315°11.6	-40°12.5
8	230°05.9	250°40.1	21.8	108°32.4	33.5	159°09.8	42.4	242°52.9	36.2	Menkar	314°06.0	4°11.3
9	245°08.4	265°40.3	• • 20.7	123°35.9	• • 33.7	174°12.5	• • 42.4	257°55.2	• • 36.1	Mirfak	308° 28.0	49°57.2
10	260°10.9	280°40.5	19.5	138°39.4	34.0	189°15.2	42.4	272°57.4	36.0	Aldebaran	290°39.3	16°33.6
11	275°13.3	295°40.6	18.3	153°42.9	34.2	204°17.9	42.4	287°59.7	36.0	Rigel	281°03.6	-8°10.4
12	290°15.8	310°40.8	S09°17.2	168°46.4	N24°34.5	219°20.6 234°23.3	N21°42.3	303°02.0	\$07°35.9	Capella	280°21.4	46°01.5
13 14	305°18.3 320°20.7	325°40.9 340°41.1	16.0 14.9	183°49.9 198°53.4	34.8 35.0	234 23.3 249°25.9	42.3 42.3	318°04.2 333°06.5	35.8 35.7	Bellatrix	278°22.6	6°22.3
15	335°23.2	355°41.3	13.7	213°56.9	• • 35.3	264°28.6	42.3	348°08.8	• • 35.6	Elnath	$278^{\circ}01.5$	28°37.7
16	350°25.7	10°41.4	12.5	229°00.4	35.5	279°31.3	42.3	3°11.0	35.5	Alnilam	275°37.4	-1°11.2
17	5°28.1	25°41.6	11.4	244°03.9	35.8	294°34.0	42.3	18°13.3	35.4	Betelgeuse	270°51.8	7°24.7
18	20°30.6	40°41.8	S09°10.2	259°07.4	N24°36.0	309°36.7	N21°42.2	33°15.5	S07°35.3	Canopus	263°51.8	-52°42.6
19	35°33.0	55°41.9	09.0	274°11.0	36.3	324°39.3	42.2	48°17.8	35.2	Sirius	258°25.9	-16°45.1
20	50°35.5	70°42.1	07.9	289°14.5	36.6	339°42.0	42.2	63°20.1	35.2	Adhara	255°05.5	-29°00.4
21	65°38.0	85°42.3	• • 06.7	$304^{\circ}18.0$	• • 36.8	354°44.7	• • 42.2	78°22.3	• • 35.1	Procyon	244°50.5	5°09.6 27°57.9
22	80°40.4	$100^{\circ}42.4$	05.5	$319^{\circ}21.5$	37.1	9°47.4	42.2	93°24.6	35.0	Pollux Avior	243° 16.9 234° 14.1	-59°35.3
23	95°42.9	115°42.6	04.4	334°25.0	37.3	24°50.1	42.2	108°26.9	34.9	Suhail	234 14.1 222° 45.9	-59 35.3 -43°31.9
Mern	pass. 16:38	$\nu 0.1' d_{-1}$	.2′ m-4.53	$\nu$ 3.5 $^{\prime}$ d0	3′ m-1.39	ν2 7' d-Ω	.0′ m-2.69	ν2 3' d-0	.1′ m1.08	Miaplacidus	221°37.5	-43 31.9 -69°49.0
-νισι.μ		ν J.1 U-1.		- J.J UU.	- 111 1.33	u-0	2.03	- 2.5 u-0		Alphard	217°47.5	-8°46.0
										Regulus	207°34.2	11°50.6
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.6	61°36.7
0	110°45.4	130°42.8	S09°03.2	349°28.5	N24°37.6	39°52.7	N21°42.1	123°29.1	S07°34.8	Denebola	182°24.8	14°25.8
1	125° 47.8	145°42.9	02.0	4°32.0	37.8	54°55.4	42.1	138°31.4	34.7	Gienah	175°43.5	-17°40.8
2	140°50.3	160°43.1	09°00.9	19°35.5	38.1	69°58.1	42.1	153°33.6	34.6	Acrux	173°00.0	-63°14.0
3 4	155°52.8	175°43.3	08°59.7	34°39.0	• • 38.3	85°00.8	• • 42.1	168°35.9 183°38.2	• • 34.5	Gacrux	$171^{\circ}51.5$	-57°14.9
5	170°55.2 185°57.7	190°43.5 205°43.6	58.5 57.4	49°42.5 64°46.1	38.6 38.9	100°03.5 115°06.1	42.1 42.1	103 30.2 198°40.4	34.4 34.3	Alioth	$166^{\circ}12.9$	55°49.1
6	201°00.2	205 43.0 220°43.8	508° 56.2	79°49.6	N24°39.1	130°08.8	N21°42.0	213°42.7	507°34.3	Spica	158° 22.3	-11°17.5
7	216°02.6	235°44.0	55.0	94°53.1	39.4	145°11.5	42.0	228°44.9	34.2	Alkaid	152°52.1	49°11.0
8	231°05.1	250°44.2	53.9	109°56.6	39.6	160°14.2	42.0	243°47.2	34.1	Hadar	148°36.2	-60°29.4
9	246°07.5	265°44.4	• • 52.7	125°00.1	39.9	175°16.8	42.0	258°49.5	• • 34.0	Menkent		-36°29.4
10	261°10.0	280°44.5	51.5	140°03.6	40.1	190°19.5	42.0	273°51.7	33.9	Arcturus	145°48.0	19°02.9 -60°56.1
11	276°12.5	295°44.7	50.4	155°07.1	40.4	205°22.2	42.0	288°54.0	33.8	Rigil Kent. Kochab	139° 40.5 137° 20.2	74°02.8
12	291°14.9	310°44.9	S08°49.2	170°10.7	N24°40.6	220°24.9	N21°41.9	303°56.2	S07°33.7	Zuben'ubi	136° 56.2	-16°08.7
13	306° 17.4	325°45.1	48.0	$185^{\circ}14.2$	40.9	235°27.5	41.9	318°58.5	33.6	Alphecca	126°03.9	26°37.6
14	321°19.9	340°45.3	46.9	200°17.7	41.1	250°30.2	41.9	334°00.8	33.5	Antares	112° 16.1	-26°29.2
15	336°22.3	355° 45.5	• • 45.7	215°21.2	• • 41.4	265°32.9	• • 41.9	349°03.0	• • 33.4	Atria	107° 10.8	-69°04.2
16	351°24.8	10°45.6	44.5	230°24.7	41.6	280°35.6	41.9	4°05.3	33.3	Sabik	102°03.1	-15°45.4
17	6°27.3	25°45.8	43.4	245°28.2	41.9	295°38.2	41.9	19°07.5	33.3	Shaula	96°10.7	-37°07.3
18	21°29.7	40°46.0 55°46.2	S08°42.2	260°31.8	N24°42.1	310°40.9	N21°41.8	34°09.8	S07°33.2	Rasalhague	95°58.9	12°32.4
19 20	36°32.2 51°34.7	55 46.∠ 70°46.4	41.0 39.8	275°35.3 290°38.8	42.4 42.6	325°43.6 340°46.2	41.8 41.8	49°12.1 64°14.3	33.1 33.0	Eltanin	90°42.7	51°28.9
21	66°37.1	85°46.6	• • 38.7	305°42.3	• • 42.9	355°48.9	• • 41.8	79°16.6	• • 32.9	Kaus Aust.	83°32.9	-34°22.4
22	81°39.6	100°46.8	37.5	320°45.8	43.1	10°51.6	41.8	94°18.8	32.8	Vega	80°33.6	38°48.3
23	96° 42.0	115°47.0	36.3	335°49.3	43.4	25°54.3	41.8	109°21.1	32.7	Nunki	75°48.1	-26°16.0
						-				Altair	62°00.3	8°56.0
Mer.p	pass. 16:34	$\nu$ 0.2′ d-1.	.2′ m-4.54	$\nu$ 3.5′ d0.	3′ m-1.41	$\nu$ 2.7′ d-0	.0′ m-2.68	$\nu$ 2.3′ d-0	.1′ m1.08	Peacock Deneb	53°06.3 49°26.3	-56°39.4 45°22.2
										Enif	33°39.1	9°59.4
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.2	-46°50.6
0	111° 44.5	130°47.2	508°35.2	350°52.9	N24°43.6	40°56.9	$N21^{\circ}41.7$	124°23.4	S07°32.6	Fomalhaut	15° 14.7	-40°30.0
1	126° 47.0	145°47.4	34.0	5°56.4	43.9	55°59.6	41.7	139°25.6	32.5	Scheat	13°45.4	28°13.2
2	141°49.4	160°47.6	32.8	20°59.9	44.1	71°02.3	41.7	154°27.9	32.4	Markab	$13^{\circ}30.1$	15°20.4
3	156°51.9	175°47.8	•• 31.7	36°03.4	• • 44.4	86°04.9	• • 41.7	169°30.1	• • 32.3	Inn 10 E :	CHA	Mon non
4	171°54.4	190°48.0	30.5	51°06.9	44.6	101°07.6	41.7	184°32.4	32.3	Jan 10 Fri Venus	<b>SHA</b> 20°52.7	Mer.pass 15:17
5 6	186°56.8 201°59.3	205°48.2 220°48.4	29.3 \$08°28.1	66°10.5 81°14.0	44.9 N24°45.1	116°10.3 131°12.9	41.7 N21°41.6	199°34.6 214°36.9	32.2 \$07°32.1		20 52.7 238° 18.2	00:48
7	201 59.5 217°01.8	235°48.6	27.0	96°17.5	45.4 45.4	131 12.9 146°15.6	41.6	214 30.9 229°39.2	32.0	Jupiter		21:21
8	232°04.2	250°48.8	25.8	111°21.0	45.4 45.6	161°18.3	41.6	244°41.4	31.9	Saturn	12°48.6	15:47
9	247°06.7	265°49.0	• • 24.6	126°24.6	• • 45.9	176°21.0	• • 41.6	259°43.7	• • 31.8			
10	262°09.2	280°49.2	23.5	141°28.1	46.1	191°23.6	41.6	274°45.9	31.7	Jan 11 Sat	SHA	Mer.pass
11	277°11.6	295°49.4	22.3	156°31.6	46.4	206°26.3	41.6	289°48.2	31.6	Venus	19°57.4	15:17
12	292°14.1	310°49.6	S08°21.1	171°35.1	N24°46.6	221°29.0	N21°41.5	304°50.4	S07°31.5	Mars Jupiter		00:42 21:17
13	307° 16.5	325°49.8	19.9	186°38.7	46.9	236°31.6	41.5	319°52.7	31.4	Saturn	289 07.4 12°43.7	15:44
14	322°19.0	340°50.0	18.8	201°42.2	47.1	251°34.3	41.5	334°55.0	31.3			
15	337°21.5	355°50.3	•• 17.6	216°45.7	• • 47.4	266°37.0	• • 41.5	349°57.2	• • 31.3	Jan 12 Sun	SHA	Mer.pass
16	352°23.9	10°50.5	16.4	231°49.2	47.6	281°39.6	41.5	4°59.5	31.2	Venus	19°02.7	15:17
17	7°26.4 22°28.9	25°50.7	15.3	246°52.8	47.8	296°42.3	41.5	20°01.7	31.1		239°08.4	00:36
18 19	22°28.9 37°31.3	40°50.9 55°51.1	\$08°14.1 12.9	261°56.3 276°59.8	N24°48.1 48.3	311°44.9 326°47.6	N21°41.4 41.4	35°04.0 50°06.2	\$07°31.0 30.9		289°12.4	21:12
20	52°33.8	70°51.3	12.9	276 59.8 292°03.3	48.3 48.6	320 47.0 341°50.3	41.4 41.4	65°08.5	30.9	Saturn	12°38.8	15:40
21	67°36.3	85°51.6	10.6	307°06.9	• 48.8	356°52.9	• • 41.4	80°10.8	• • 30.7	Horizont	al parallax	
22	82°38.7	100°51.8	09.4	322°10.4	49.1	11°55.6	41.4	95°13.0	30.6		Venus:	0.2
23	97°41.2	115°52.0	08.2	337°13.9	49.3	26°58.3	41.4	110°15.3	30.5		Mars:	0.2
N/a==			.2′ m-4.55		2′ m-1.42		.0′ m-2.67		.1′ m1.08			
ivier.p	pass. 16:30	$\nu$ 0.2 a-1.	.∠ 111-4.55	$\nu$ 3.5° $a$ 0.	∠ III-1.4∠ ———	ν2.1 α-U	.0 111-2.07	ν2.5 a-0	.1 1111.08			

h	Su	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178°08.7	S21°57.0	53°39.3	6.1'	N24° 14.0	9.3'	59.0'
1	193°08.5	56.6	68°04.5	6.1'	24°23.3	9.2'	59.0'
2	208°08.2	56.3	82°29.5	6.0'	24° 32.5	9.0'	59.0'
3	223°08.0 238°07.7	• • 55.9	96°54.5 111°19.4	5.9'	24°41.5 24°50.3	8.8'	59.0' 58.9'
4 5	238°07.7 253°07.5	55.5 55.1	111°19.4 125°44.2	5.8' 5.7'	24°50.3 24°59.0	8.7' 8.5'	58.9° 58.9°
6	268°07.2	521° 54.8	140°09.0	5.7'	N25° 07.5	8.4	58.9
7	283°07.0	54.4	154°33.6	5.6'	25° 15.9	8.2'	58.9'
8	298°06.7	54.0	168°58.2	5.5'	25°24.1	8.0'	58.9'
9	313°06.5	• • 53.6	183°22.7	5.4'	$25^{\circ}32.1$	7.9'	58.9'
10	328°06.2	53.3	197°47.1	5.4'	25°40.0	7.7'	58.9'
11	343°06.0 358°05.7	52.9 <b>S</b> 21°52.5	212°11.5 226°35.8	5.3' 5.2'	25° 47.7 N25° 55.2	7.5' 7.4'	58.9' 58.9'
12 13	13°05.5	521 52.5 52.1	220 35.8 241°00.0	5.2 5.1'	26° 02.6	7.4 7.2'	58.9'
14	28°05.2	51.7	255°24.1	5.1'	26°09.8	7.0'	58.9
15	43°05.0	51.3	269°48.2	5.0'	26° 16.8	6.9'	58.8'
16	58°04.7	51.0	284°12.2	4.9'	$26^{\circ}23.7$	6.7'	58.8'
17	73°04.5	50.6	298°36.1	4.9'	26°30.4	6.5'	58.8'
18	88°04.2	S21°50.2	313°00.0	4.8'	N26°36.9	6.3'	58.8'
19 20	103°04.0 118°03.7	49.8 49.4	327°23.8 341°47.6	4.8' 4.7'	26° 43.2 26° 49.3	6.1' 6.0'	58.8' 58.8'
21	118 03.7 133°03.5	· · 49.4	341 47.0 356°11.3	4.7 4.7'	26° 55.3	5.8'	58.8'
22	148°03.2	48.6	10°35.0	4.6'	27°01.1	5.6'	58.8'
23	163°03.0	48.2	24°58.6	4.5'	27°06.7	5.4'	58.8'
	SD = 16.3'	d = -0.4'		SI	D = 16.1'		
				J1			
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°02.8 193°02.5	\$21°47.8 47.5	39°22.1 53°45.6	4.5'	N27°12.1 27°17.4	5.3' 5.1'	58.7' 58.7'
1 2	193 02.5 208°02.3	47.5 47.1	68°09.1	4.5' 4.4'	27 17.4 27°22.5	5.1 4.9'	58.7'
3	203°02.0	• • 46.7	82°32.5	4.4'	27°27.3	4.7'	58.7'
4	238°01.8	46.3	96°55.8	4.3'	27°32.0	4.5'	58.7'
5	253°01.5	45.9	111°19.2	4.3'	27°36.6	4.3'	58.7'
6	268°01.3	S21°45.5	125°42.4	4.3'	N27°40.9	4.1'	58.7'
7 8	283°01.0 298°00.8	45.1 44.7	140°05.7 154°28.9	4.2' 4.2'	27°45.0 27°49.0	4.0' 3.8'	58.7' 58.6'
9	313°00.5	• • 44.3	168°52.1	4.2'	27° 52.8	3.6'	58.6'
10	328°00.3	43.9	183°15.3	4.1'	27°56.4	3.4'	58.6'
11	343°00.1	43.5	197°38.4	4.1'	27°59.8	3.2'	58.6'
12	357°59.8	S21°43.1	212°01.5	4.1'	N28°03.0	3.0'	58.6'
13	12°59.6 27°59.3	42.7	226°24.6 240°47.7	4.1' 4.1'	28°06.0 28°08.8	2.8'	58.6'
14 15	42°59.1	42.3 •• 41.9	240 47.7 255°10.7	4.1	28°11.5	2.6' 2.5'	58.6' 58.5'
16	57°58.8	41.5	269°33.8	4.0'	28° 13.9	2.3'	58.5
17	72°58.6	41.1	283°56.8	4.0'	$28^{\circ}16.2$	2.1'	58.5'
18	87°58.4	S21°40.7	298°19.8	4.0'	N28° 18.2	1.9'	58.5'
19	102°58.1	40.3	312°42.8	4.0'	28°20.1	1.7'	58.5'
20 21	117°57.9 132°57.6	39.9 •• 39.5	327°05.8 341°28.8	4.0' 4.0'	28°21.8 28°23.3	1.5' 1.3'	58.5' 58.4'
22	147°57.4	39.1	355°51.9	4.0'	28°24.6	1.1'	58.4
23	162°57.2	38.7	10°14.9	4.0'	28°25.7	0.9'	58.4'
	SD = 16.3'	d = -0.4'		SI	D = 16.0'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	177°56.9 192°56.7	\$21°38.2 37.8	24°37.9 39°00.9	4.0' 4.1'	N28° 26.7 28° 27.4	0.7' 0.5'	58.4' 58.4'
2	207°56.4	37.6	53°24.0	4.1'	28° 27.9	0.3	58.4
3	222°56.2	• • 37.0	67°47.1	4.1'	28°28.3	0.2	58.3'
4	237°56.0	36.6	$82^{\circ}10.1$	4.1'	$28^{\circ}28.5$	-0.0'	58.3'
5	252°55.7	36.2	96°33.3	4.1'	28°28.5	-0.2'	58.3'
6	267°55.5 282°55.3	\$21°35.8	110°56.4	4.2'	N28°28.2	-0.4'	58.3'
7 8	282°55.3 297°55.0	35.4 35.0	125°19.5 139°42.7	4.2' 4.2'	28° 27.8 28° 27.3	-0.6' -0.8'	58.3' 58.2'
9	312°54.8	• • 34.5	159 42.7 154°05.9	4.2'	28° 26.5	-0.6 -1.0'	58.2'
10	327°54.5	34.1	168°29.2	4.3'	28° 25.5	-1.1'	58.2'
11	342°54.3	33.7	182°52.5	4.3'	28° 24.4	-1.3'	58.2'
12	357°54.1	S21°33.3	197°15.8	4.4'	N28°23.0	-1.5'	58.2'
13 14	12°53.8 27°53.6	32.9 32.5	211°39.2 226°02.6	4.4' 4.5'	28°21.5 28°19.8	-1.7' -1.9'	58.2' 58.1'
14 15	42°53.4	· · 32.0	240°26.0	4.5'	28° 17.9	-1.9 -2.1'	58.1'
16	57°53.1	31.6	254°49.5	4.6'	28° 15.8	-2.3	58.1
17	72°52.9	31.2	$269^{\circ}13.1$	4.6'	28° 13.6	-2.4'	58.1'
18	87°52.7	S21°30.8	283°36.7	4.7'	N28°11.1	-2.6'	58.1'
19	102°52.4	30.4	298°00.4	4.7'	28°08.5	-2.8'	58.0'
20 21	117°52.2 132°51.9	29.9 •• 29.5	312°24.1 326°47.9	4.8' 4.9'	28°05.7 28°02.7	-3.0' -3.2'	58.0' 58.0'
22	147°51.7	29.5	341°11.7	4.9'	26 02.7 27°59.6	-3.2' -3.3'	58.0'
23	162°51.5	28.7	355°35.7	5.0'	27°56.2	-3.5'	58.0'
	SD = 16.3'	d = -0.4'		SI	D = 15.9'		

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

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

			Sun		Moon			
Day		Eqn.of	Time	Mer.	Mer.Pass.		Age	
,		00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	11-13	
		mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	82-95%	
10	)	07:25	07:37	12:08	21:16	08:46		
11	L	07:49	08:01	12:08	22:17	09:46		
12	2	08:12	08:24	12:08	23:18	10:48		

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

h	Aries	Ve	enus		ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	112°43.7	130°52.2	S08°07.0	352°17.4	N24°49.6	42°00.9	N21°41.4	125°17.5	S07°30.4			
1	127°46.1	145°52.4	05.9	7°21.0	49.8	57°03.6	41.3	140°19.8	30.3	Alpheratz	357°34.9	29°13.8
2	142°48.6	160°52.7	04.7	22°24.5	50.0	72°06.3	41.3	155°22.0	30.2	Ankaa	353°07.2	-42°10.4
3	157°51.0	175°52.9	03.5	37°28.0	50.3	87°08.9	41.3	170°24.3	30.1	Schedar	349°31.2	56°40.7
4	172°53.5	190°53.1	02.3	52°31.6	50.5	102° 11.6	41.3	185°26.6	30.1	Diphda	348°47.3	-17°51.1
5	187°56.0	205°53.3	01.2	67°35.1	50.8	117° 14.2	41.3	200°28.8	30.0	Achernar	335°20.1	-57°06.9
6	202°58.4	220°53.6	S08°00.0	82°38.6	N24°51.0	132° 16.9	N21°41.3	215°31.1	S07°29.9	Hamal	327°51.1	23°34.9
7	218°00.9	235°53.8	07°58.8	97°42.1	51.3	147° 19.6	41.2	230°33.3	29.8	Polaris	313°48.5	89°22.5
8	233°03.4	250°54.0	57.7	112°45.7	51.5	162°22.2	41.2	245°35.6	29.7	Acamar	315°11.6	-40°12.5
9	248°05.8	265°54.3	• • 56.5	127°49.2	51.7	177° 24.9	• • 41.2	260°37.8	• • 29.6	Menkar	314°06.0	4°11.3
10	263°08.3	280°54.5	55.3	142°52.7	52.0	192°27.5	41.2	275°40.1	29.5	Mirfak	308°28.0	49°57.2
11	278°10.8	295°54.7	54.1	157°56.3	52.2	207°30.2	41.2	290°42.3	29.4	Aldebaran	290°39.3	16°33.6
12	293°13.2	310°55.0	S07°53.0	172°59.8	N24°52.5	222° 32.9	N21°41.2	305°44.6	S07°29.3	Rigel	281°03.6	-8°10.4
13	308°15.7	325°55.2	51.8	188°03.3	52.7	237°35.5	41.2	320°46.8	29.2	Capella	280°21.4	46°01.5
14	323°18.2	340°55.4	50.6	203°06.8	52.9	252°38.2	41.1	335°49.1	29.1	Bellatrix	278°22.6	6°22.3
15	338°20.6	355°55.7	• • 49.4	218°10.4	• • 53.2	267°40.8	• • 41.1	350°51.4	• • 29.0	Elnath	278°01.5	28°37.7
16	353°23.1	10°55.9	48.2	233°13.9	53.4	282°43.5	41.1	5°53.6	28.9	Alnilam	275°37.4	-1°11.2
17	8°25.5	$25^{\circ}56.1$	47.1	248°17.4	53.7	297°46.1	41.1	20°55.9	28.9	Betelgeuse	270°51.7	7°24.7
18	23°28.0	40°56.4	S07°45.9	263°21.0	N24°53.9	312°48.8	N21°41.1	35°58.1	S07°28.8	Canopus	263°51.8	-52°42.6
19	38°30.5	55°56.6	44.7	278°24.5	54.1	$327^{\circ}51.5$	41.1	51°00.4	28.7	Sirius	258°25.9	-16°45.1 -29°00.4
20	53°32.9	70°56.9	43.5	293°28.0	54.4	$342^{\circ}54.1$	41.0	66°02.6	28.6	Adhara	255°05.5	
21	68°35.4	85°57.1	• • 42.4	308°31.6	• • 54.6	357°56.8	• • 41.0	81°04.9	• • 28.5	Procyon Pollux	244°50.5 243°16.9	5°09.6 27°57.9
22	83°37.9	100°57.4	41.2	323°35.1	54.9	12°59.4	41.0	96°07.1	28.4	1	243°16.9 234°14.1	-59°35.3
23	98°40.3	115°57.6	40.0	338°38.6	55.1	28°02.1	41.0	111°09.4	28.3	Avior Suhail	234°14.1 222°45.9	-59°35.3 -43°31.9
1/10==	ass. 16:26	-	2′ m-4.56		2′ m-1.43	1/27/ 40	.0′ m-2.67	1/2 3/ 4 0	.1′ m1.08	Miaplacidus	222°45.9 221°37.4	-43°31.9 -69°49.0
ivier.p	ass. 10:20	$\nu$ 0.2 $a$ -1	∠ rn-4.50	$\nu$ 5.5 a0.	∠ 111-1.43	ν2.1 α-0	.u m-2.0/	ν2.3 α-0	.1 IUT.08	Miaplacidus	221°37.4 217°47.4	-69°49.0 -8°46.0
										Regulus	217°47.4 207°34.2	-8°46.0 11°50.6
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	207 34.2 193°40.5	61°36.7
0	113°42.8	130°57.8	<b>S</b> 07°38.8	353°42.2	N24°55.3	43°04.7	N21°41.0	126°11.6	<b>S</b> 07°28.2	Dubne	193°40.5 182°24.8	14°25.8
1	128°45.3	145°58.1	37.7	8°45.7	55.6	58°07.4	41.0	141°13.9	28.1	Gienah	182 24.8 175°43.5	-17°40.8
2	143°47.7	160°58.3	36.5	23°49.2	55.8	73°10.0	41.0	156°16.1	28.0		175 43.5 172°59.9	-17 40.8 -63°14.0
3	158°50.2	175°58.6	• • 35.3	38°52.8	• • 56.0	88°12.7	• • 40.9	171°18.4	• • 27.9		172 59.9 171°51.5	-03 14.0 -57°15.0
4	173°52.7	190°58.8	34.1	53°56.3	56.3	103°15.4	40.9	186°20.7	27.8	Alioth	166°12.8	55°49.1
5	188°55.1	$205^{\circ}59.1$	33.0	68°59.8	56.5	$118^{\circ}18.0$	40.9	201°22.9	27.7	Spica	158°22.3	-11°17.5
6	203°57.6	220°59.4	S07°31.8	84°03.4	N24°56.8	133°20.7	N21°40.9	216°25.2	S07°27.6	Alkaid	150° 22.3 152° 52.0	49°11.0
7	219°00.0	235°59.6	30.6	99°06.9	57.0	148°23.3	40.9	231°27.4	27.6	Hadar	148°36.1	-60°29.4
8	234°02.5	250°59.9	29.4	114°10.4	57.2	$163^{\circ}26.0$	40.9	246°29.7	27.5		140°57.7	-36°29.4
9	249°05.0	$266^{\circ}00.1$	• • 28.2	129°14.0	• • 57.5	178°28.6	• • 40.9	261°31.9	• • 27.4	Arcturus	145°48.0	19°02.9
10	264°07.4	281°00.4	27.1	144°17.5	57.7	193°31.3	40.8	276°34.2	27.3	Rigil Kent.	139°40.5	-60°56.1
11	279°09.9	296°00.6	25.9	$159^{\circ}21.0$	57.9	208°33.9	40.8	291°36.4	27.2	Kochab	137°20.2	74°02.8
12	294°12.4	311°00.9	S07°24.7	174°24.6	N24°58.2	223°36.6	N21°40.8	306°38.7	S07°27.1	Zuben'ubi	136°56.1	-16°08.7
13	309°14.8	$326^{\circ}01.2$	23.5	$189^{\circ}28.1$	58.4	238°39.2	40.8	321°40.9	27.0	Alphecca	126°03.9	26°37.6
14	324°17.3	341°01.4	22.4	204°31.6	58.6	253°41.9	40.8	336°43.2	26.9	Antares	112° 16.1	-26°29.2
15	339°19.8	$356^{\circ}01.7$	• • 21.2	219°35.2	• • 58.9	268°44.5	• • 40.8	351°45.4	• • 26.8	Atria	107° 10.7	-69°04.1
16	354°22.2	11°01.9	20.0	234°38.7	59.1	283°47.2	40.8	6°47.7	26.7	Sabik	102°03.0	-15°45.4
17	9°24.7	26°02.2	18.8	249°42.3	59.3	298°49.8	40.7	21°49.9	26.6	Shaula	96°10.7	-37°07.3
18	24°27.1	41°02.5	S07°17.6	264°45.8	N24°59.6	313°52.5	N21°40.7	36°52.2	S07°26.5	Rasalhague	95°58.8	12°32.4
19	39°29.6	56°02.7	16.5	279°49.3	24°59.8	328°55.1	40.7	51°54.4	26.4	Eltanin	90°42.7	51°28.9
20	54°32.1	71°03.0	15.3	294°52.9	25°00.0	343° 57.8	40.7	66°56.7	26.3	Kaus Aust.	83°32.9	-34°22.4
21	69°34.5	86°03.3	• • 14.1	309°56.4	00.3	359°00.4	• • 40.7	81°58.9	• • 26.2	Vega	80°33.6	38°48.3
22	84°37.0	101°03.5	12.9	324°59.9	00.5	14°03.1	40.7	97°01.2	26.1	Nunki	75°48.1	-26°16.0
23	99°39.5	116°03.8	11.8	340°03.5	00.7	29°05.7	40.7	112°03.4	26.1	Altair	62°00.3	8°56.0
Mer n	pass. 16:22	$\nu 0.2' d-1$	2′ m-4.57	$\nu^{3.5'} d0$	2′ m-1.44	$\nu^2 7' d-0$	.0′ m-2.66	$\nu 2.3' d-0$	.1′ m1.09	Peacock	53°06.3	-56°39.4
										Deneb	49°26.3	45°22.2
										Enif	33°39.1	9°59.4
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.2	-46°50.6
0	114°41.9	131°04.1	S07°10.6	355°07.0	N25°01.0	44°08.3	N21°40.7	127°05.7	S07°26.0	Fomalhaut	$15^{\circ}14.7$	-29°29.6
1	129°44.4	146°04.4	09.4	10°10.5	01.2	59°11.0	40.6	142°07.9	25.9	Scheat	13°45.4	28°13.2
2	144°46.9	161°04.6	08.2	25°14.1	01.4	74° 13.6	40.6	157°10.2	25.8	Markab	$13^{\circ}30.1$	15°20.4
3	159°49.3	176°04.9	• • 07.0	40°17.6	•• 01.6	89° 16.3	• • 40.6	172°12.4	• • 25.7	1 10::	C	
4	174°51.8	191°05.2	05.9	55°21.1	01.9	104°18.9	40.6	187°14.7	25.6	Jan 13 Mon	SHA	Mer.pass
5	189°54.3	206°05.5	04.7	70°24.7	02.1	119°21.6	40.6	202°16.9	25.5	Venus	18°08.6	15:16
6	204°56.7	221°05.8	S07°03.5	85°28.2	N25°02.3	134°24.2	N21°40.6	217°19.2	S07°25.4	Mars		00:31
7	219°59.2	236°06.0	02.3	100°31.8	02.6	149°26.9	40.6	232°21.4	25.3	Jupiter	289°17.3	21:08
8	235°01.6	251°06.3	01.1	115°35.3	02.8	164°29.5	40.5	247°23.7	25.2	Saturn	12°33.9	15:36
9	250°04.1	266°06.6	07°00.0	130°38.8	• • 03.0	179°32.2	• • 40.5	262°25.9	• • 25.1	Jan 14 Tue	SHA	Mer.pass
10	265°06.6	281°06.9	06°58.8	145°42.4	03.2	194°34.8	40.5	277°28.2	25.0	Venus	17°15.1	15:16
11	280°09.0	296°07.2	57.6	160°45.9	03.5	209°37.4	40.5	292°30.4	24.9	Mars	239°59.4	00:25
12	295°11.5	311°07.4	\$06°56.4	175°49.4	N25°03.7	224°40.1	N21°40.5	307°32.7	S07°24.8	Jupiter	289°21.9	21:04
13	310°14.0	326°07.7	55.2	190°53.0	03.9	239°42.7	40.5	322°34.9	24.7	Saturn	12°28.8	15:33
14	325°16.4	341°08.0	54.1	205°56.5	04.2	254°45.4	40.5	337°37.2	24.6			
15	340°18.9	356°08.3	• • 52.9	221°00.1	04.4	269°48.0	• • 40.5	352°39.4	• • 24.5	Jan 15 Wed	SHA	Mer.pass
16	355°21.4	11°08.6	51.7	236°03.6	04.6	284°50.6	40.4	7°41.7	24.5	Venus	16°22.2	15:15
17	10°23.8 25°26.3	26°08.9 41°09.2	50.5 \$06°49.3	251°07.1	04.8 N25°05.1	299°53.3	40.4 N21°40.4	22°43.9 37°46.2	24.4 \$07°24.3	Mars	240°25.1	00:19
18	25°26.3 40°28.8	41°09.2 56°09.5	48.2	266°10.7 281°14.2	N25°05.1 05.3	314° 55.9 329° 58.6	N21 40.4 40.4	52°48.4	S07°24.3	Jupiter		21:00
19	40°28.8 55°31.2	56°09.5 71°09.8		281°14.2 296°17.7		329°58.6 345°01.2	40.4 40.4	52°48.4 67°50.7	24.2	Saturn	12°23.8	15:29
20 21	55°31.2 70°33.7	71°09.8 86°10.1	47.0 • • 45.8	311°21.3	05.5 •• 05.7	0°03.8	40.4 •• 40.4	82°52.9	24.1	Horizont	al parallax	
22	70 33.7 85°36.1	101°10.4	44.6	311 21.3 326°24.8	06.0	0 03.8 15°06.5	40.4	82 52.9 97°55.2	23.9		Venus:	0.2
23	100°38.6	116° 10.4	43.4	341°28.4	06.0	30°09.1	40.4	112°57.4	23.9		Mars:	0.2
										L		
Mer.p	ass. 16:19	$\nu$ 0.3′ <i>d</i> -1	2′ m-4.58	$\nu$ 3.5′ d0.	2′ m-1.45	$\nu$ 2.6′ d-0	.0′ m-2.65	$\nu$ 2.3′ d-0	.1' m $1.09$			

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	177°51.2	S21°28.2	9°59.6	5.1'	N27°52.7	-3.7'	57.9'
1 2	192°51.0 207°50.8	27.8 27.4	24°23.7 38°47.8	5.1' 5.2'	27°49.0 27°45.2	-3.9' -4.0'	57.9' 57.9'
3	222°50.5	• • 27.0	53°12.0	5.3'	27°41.1	-4.2'	57.9'
4	237°50.3	26.5	67°36.3	5.4'	27°36.9	-4.4'	57.8'
5	252°50.1	26.1	82°00.6	5.4'	27°32.5	-4.6'	57.8'
6 7	267°49.9 282°49.6	\$21°25.7 25.2	96°25.1 110°49.6	5.5' 5.6'	N27°28.0 27°23.3	-4.7' -4.9'	57.8' 57.8'
8	297°49.4	24.8	125°14.2	5.7'	27°18.4	-5.1'	57.8'
9	312°49.2	• • 24.4	139°38.9	5.8'	27°13.3	-5.2'	57.7'
10 11	327°48.9 342°48.7	23.9 23.5	154°03.6 168°28.5	5.9' 5.9'	27°08.1 27°02.7	-5.4' -5.5'	57.7' 57.7'
12	357°48.5	521°23.1	182°53.4	6.0'	N26°57.2	-5.5'	57.7'
13	12°48.2	22.6	197°18.5	6.1'	26°51.5	-5.9'	57.6'
14	27°48.0	22.2	211°43.6	6.2'	26°45.6	-6.0'	57.6'
15 16	42°47.8 57°47.6	· · 21.8 21.3	226°08.8 240°34.2	6.3' 6.4'	26°39.6 26°33.4	-6.2' -6.3'	57.6' 57.6'
17	72°47.3	20.9	254°59.6	6.5'	26°27.1	-6.5	57.5'
18	87°47.1	S21°20.5	269°25.1	6.6'	N26°20.6	-6.6'	57.5'
19 20	102°46.9 117°46.6	20.0 19.6	283°50.7 298°16.4	6.7' 6.8'	26°13.9 26°07.2	-6.8'	57.5' 57.5'
20	117°46.6 132°46.4	19.6	298°16.4 312°42.3	6.9	26°07.2	-6.9' -7.1'	57.5'
22	147°46.2	18.7	327°08.2	7.0'	25°53.1	-7.2	57.4'
23	162°46.0	18.2	341°34.2	7.1'	25°45.9	-7.4'	57.4'
	SD = 16.3'	d = -0.4'		SI	O = 15.8'		
Tue	GHA	Dec	GHA	ν	Dec	d	НР
Tue 0	<b>GHA</b> 177°45.7	<b>S</b> 21°17.8	356°00.4	u 7.2'	Dec N25°38.5	a -7.5'	<b>нР</b> 57.4'
1	192°45.5	17.4	10°26.6	7.4'	25°31.0	-7.7'	57.4'
2	207°45.3	16.9	24°53.0	7.5'	25°23.3	-7.8'	57.3'
3 4	222°45.1 237°44.8	· · 16.5 16.0	39°19.4 53°46.0	7.6' 7.7'	25°15.5 25°07.6	-7.9' -8.1'	57.3' 57.3'
5	252°44.6	15.6	68°12.7	7.8'	24°59.5	-8.2'	57.3'
6	267°44.4	S21°15.1	82°39.5	7.9'	N24°51.3	-8.4'	57.2'
7	282°44.2	14.7	97°06.4 111°33.4	8.0'	24°42.9 24°34.4	-8.5'	57.2'
8 9	297°43.9 312°43.7	14.2 •• 13.8	111°33.4 126°00.5	8.1' 8.2'	24°34.4 24°25.8	-8.6' -8.7'	57.2' 57.2'
10	327°43.5	13.3	140°27.7	8.4'	24°17.1	-8.9'	57.1'
11	342°43.3	12.9	154°55.1	8.5'	24°08.2	-9.0'	57.1'
12 13	357°43.0 12°42.8	\$21°12.4 12.0	169°22.6 183°50.1	8.6' 8.7'	N23°59.2 23°50.1	-9.1' -9.2'	57.1' 57.1'
14	27°42.6	11.5	198°17.8	8.8'	23°40.8	-9.2 -9.4'	57.1°
15	42°42.4	• • 11.1	212°45.7	8.9'	23°31.5	-9.5'	57.0'
16 17	57°42.1 72°41.9	10.6 10.2	227°13.6 241°41.6	9.0' 9.2'	23°22.0 23°12.4	-9.6' -9.7'	57.0' 57.0'
18	72 41.9 87°41.7	521°09.7	241 41.6 256°09.8	9.2	23 12.4 N23°02.7	-9.7 -9.8'	56.9
19	102°41.5	09.3	270°38.0	9.4'	22°52.8	-9.9'	56.9'
20	117°41.3	8.80	285°06.4	9.5'	22°42.9	-10.1'	56.9'
21 22	132°41.0 147°40.8	· · 08.3 07.9	299°34.9 314°03.5	9.6' 9.7'	22°32.8 22°22.7	-10.2' -10.3'	56.8' 56.8'
23	162°40.6	07.4	328°32.3	9.8'	22°12.4	-10.4	56.8'
	SD = 16.3'	d = -0.4'		SI	D = 15.6'		
Wed 0	<b>GHA</b> 177°40.4	<b>Dec</b> \$21°07.0	<b>GHA</b> 343°01.1	u  10.0'	<b>Dec</b> N22°02.0	d -10.5'	<b>HP</b> 56.8'
1	192°40.2	06.5	357°30.1	10.1	21°51.5	-10.6'	56.7'
2	207°39.9	06.0	11°59.1	10.2'	21°40.9	-10.7'	56.7'
3 4	222°39.7 237°39.5	· · 05.6 05.1	26°28.3 40°57.6	10.3' 10.4'	21°30.3 21°19.5	-10.8' -10.9'	56.7' 56.7'
5	252°39.3	04.7	55°27.0	10.4	21°08.6	-10.9	56.6
6	267°39.1	S21°04.2	69°56.6	10.6'	N20°57.6	-11.1'	56.6'
7	282°38.8 297°38.6	03.7	84°26.2 98°56.0	10.8' 10.9'	20°46.5 20°35.4	-11.2' -11.3'	56.6' 56.6'
8 9	297°38.6 312°38.4	03.3 · · 02.8	98°56.0 113°25.8	10.9'	20°35.4 20°24.1	-11.3'	56.5'
10	327°38.2	02.3	$127^{\circ}55.8$	11.1'	20°12.8	-11.4'	56.5'
11	342°38.0	01.9	142°25.9	11.2'	20°01.3	-11.5'	56.5'
12 13	357°37.8 12°37.5	\$21°01.4 00.9	156°56.1 171°26.4	11.3' 11.4'	N19°49.8 19°38.2	-11.6' -11.7'	56.5' 56.4'
14	27°37.3	00.9	185°56.8	11.5'	19°26.5	-11.7	56.4
15	42°37.1	21°00.0	200°27.4	11.6'	19°14.7	-11.9'	56.4'
16	57°36.9 72°36.7	20°59.5 59.0	214°58.0 229°28.7	11.7' 11.9'	19°02.9 18°50.9	-11.9' -12.0'	56.3'
17 18	72°36.7 87°36.5	59.0 \$20°58.6	243°59.6	12.0'	N18°38.9	-12.0	56.3' 56.3'
19	102°36.3	58.1	258°30.6	12.1'	18°26.8	-12.2'	56.3'
20	117°36.0	57.6	273°01.6	12.2'	18°14.7	-12.2'	56.2'
21 22	132°35.8 147°35.6	· · 57.2 56.7	287°32.8 302°04.1	12.3' 12.4'	18°02.4 17°50.1	-12.3' -12.4'	56.2' 56.2'
23	162°35.4	56.2	316°35.4	12.5'	17°37.7	-12.4'	56.2
	SD = 16.3'	d = -0.5'		SI	D = 15.5'		

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

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

### January 16, 17, 18 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	115°41.1	131°11.0	S06°42.3	356°31.9	N25°06.4	45° 11.8	N21°40.3	127° 59.7	S07°23.7			
1	130°43.5	146°11.3	41.1	11°35.4	06.6	60° 14.4	40.3	143°01.9	23.6	Alpheratz	357°34.9	29°13.8
2	145°46.0	161°11.6	39.9	26°39.0	06.8	75° 17.0	40.3	158°04.2	23.5	Ankaa	353°07.2	-42°10.4
3	160°48.5	176° 11.9	• • 38.7	41° 42.5	07.1	90° 19.7	40.3	173°06.4	• • 23.4	Schedar	349°31.2	56°40.7
4	175°50.9	191°12.2	37.5	56°46.0	07.3	105°22.3	40.3	188° 08.7	23.3	Diphda	348°47.3	-17°51.1
5	190°53.4	206° 12.5	36.3	71°49.6	07.5	120°24.9	40.3	203°10.9	23.2	Achernar	335°20.1	-57°06.9
6	205°55.9	221°12.8	S06°35.2	86°53.1	N25°07.7	135° 27.6	N21°40.3	218° 13.2	S07°23.1	Hamal	327°51.1	23°34.9
7	220°58.3	236° 13.1	34.0	101°56.7	08.0	150° 30.2	40.3	233° 15.4	23.0	Polaris	313°50.0	89°22.5
8	236°00.8	251°13.4	32.8	117°00.2	08.2	165°32.9	40.2	248° 17.7	22.9	Acamar	$315^{\circ}11.6$	-40°12.5
9	251°03.3	266° 13.7	31.6	132°03.7	08.4	180°35.5	40.2	263° 19.9	• • 22.8	Menkar	314°06.0	4°11.3
10	266°05.7	281°14.0	30.4	147°07.3	08.6	195°38.1	40.2	278°22.2	22.7	Mirfak	308°28.0	49°57.2
11	281°08.2	296°14.3	29.3	162°10.8	08.8	210°40.8	40.2	293°24.4	22.6	Aldebaran	290°39.3	16°33.6
12	296°10.6	311°14.6	S06°28.1	177°14.3	N25°09.1	225°43.4	N21°40.2	308° 26.7	S07°22.5	Rigel	281°03.6	-8°10.4
13	311°13.1	326° 14.9	26.9	192°17.9	09.3	240°46.0	40.2	323°28.9	22.5	Capella	280°21.4	46°01.5
14	326°15.6	341°15.3	25.7	207°21.4	09.5	255°48.7	40.2	338°31.1	22.4	Bellatrix	278°22.6	6°22.3
15	341°18.0	356° 15.6	• • 24.5	222°25.0	•• 09.7	270°51.3	. 40.2	353° 33.4	22.3	Elnath	278°01.5	28°37.8
16	356°20.5	11°15.9	23.4	237°28.5	09.9	285°53.9	40.1	8°35.6	22.2	Alnilam	275°37.4	-1°11.2
17	11°23.0	26° 16.2	22.2	252°32.0	10.2	300° 56.6	40.1	23°37.9	22.2	Betelgeuse	270°51.7	7°24.7
18	26°25.4	41°16.5	S06°21.0	267°35.6	N25° 10.4	315°59.2	N21°40.1	38° 40.1	S07°22.0	Canopus	263°51.9	-52°42.6
19	20 25.4 41°27.9	56° 16.8		282°39.1		315 59.2 331°01.8	40.1	53° 42.4	21.9	Sirius	258°25.9	-16°45.1
20	56°30.4	71°17.2	19.8 18.6	202 39.1 297°42.6	10.6 10.8	346°04.5	40.1	68° 44.6	21.9	Adhara	255°05.5	-29°00.4
								83°46.9		Procyon	244°50.5	5°09.6
21	71°32.8	86°17.5	17.4	312°46.2	• • 11.0	1°07.1	• • 40.1		• • 21.7	Pollux	243°16.9	27°57.9
22	86°35.3	101°17.8	16.3	327°49.7	11.2	16°09.7	40.1	98°49.1	21.6	Avior	$234^{\circ}14.1$	-59°35.3
23	101°37.7	116° 18.1	15.1	342°53.3	11.5	31°12.3	40.1	113°51.4	21.5	Suhail	222°45.9	-43°31.9
Mer.	pass. 16:15	$\nu$ 0.3′ d-1	.2′ m-4.59	$\nu$ 3.5′ d0.	2′ m-1.45	$\nu$ 2.6′ d-0	.0′ m-2.65	$\nu$ 2.2′ d-0	.1′ m1.09	Miaplacidus	221°37.4	-69°49.0
										Alphard	217°47.4	-8°46.1
			_		_		_		_	Regulus	$207^{\circ}34.1$	11°50.6
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.5	61°36.7
0	116°40.2	131° 18.5	S06°13.9	357°56.8	N25°11.7	46° 15.0	N21°40.0	128°53.6	S07°21.4	Denebola	182°24.8	14°25.8
1	131°42.7	146° 18.8	12.7	13°00.3	11.9	61° 17.6	40.0	143°55.9	21.3		175°43.4	-17°40.8
2	146°45.1	161° 19.1	11.5	28°03.9	12.1	76° 20.2	40.0	158° 58.1	21.2		172°59.9	-63°14.0
3	161°47.6	176° 19.4	• • 10.4	43°07.4	• • 12.3	91°22.9	• • 40.0	174°00.3	• • 21.1		171°51.5	-57°15.0
4	176°50.1	191° 19.8	09.2	58° 10.9	12.5	106°25.5	40.0	189°02.6	21.0	Alioth	166°12.8	55°49.1
5	191°52.5	206°20.1	08.0	73° 14.5	12.7	121°28.1	40.0	204°04.8	20.9	Spica	158°22.3	-11°17.5
6	206°55.0	221°20.4	S06°06.8	88° 18.0	N25° 13.0	136° 30.7	N21°40.0	219°07.1	S07°20.8	Alkaid	152°52.0	49°11.0
7	221°57.5	236° 20.8	05.6	103°21.5	13.2	151° 33.4	40.0	234°09.3	20.7	Hadar	148°36.1	-60°29.4
8	236°59.9	251°21.1	04.4	118°25.1	13.4	166° 36.0	40.0	249°11.6	20.6		147°57.6	-36°29.5
9	252°02.4	266°21.4	• • 03.3	133°28.6	• • 13.6	181°38.6	• • 39.9	264°13.8	• • 20.5	Arcturus	145°47.9	19°02.9
10	267°04.9	281°21.8	02.1	148°32.2	13.8	196°41.3	39.9	279°16.1	20.4	Rigil Kent.	139°40.4	-60°56.1
11	282°07.3	296°22.1	06°00.9	163°35.7	14.0	211°43.9	39.9	294°18.3	20.3	Kochab	$137^{\circ}20.1$	74°02.7
12	297°09.8	311°22.4	S05°59.7	178°39.2	N25° 14.2	226°46.5	N21°39.9	309°20.6	S07°20.2	Zuben'ubi	136°56.1	-16°08.7
13	312°12.2	326° 22.8	58.5	193°42.8	14.5	241°49.1	39.9	324°22.8	20.2	Alphecca	126°03.9	26°37.6
14	327°14.7	341°23.1	57.3	208°46.3	14.7	256°51.8	39.9	339°25.0	20.1	Antares	$112^{\circ}16.1$	-26°29.2
15	342°17.2	356°23.5	56.2	223°49.8	• • 14.9	271°54.4	• • 39.9	354°27.3	• • 20.0	Atria	$107^{\circ}10.7$	-69°04.1
16	357°19.6	11°23.8	55.0	238°53.4	15.1	286°57.0	39.9	9°29.5	19.9	Sabik	102°03.0	-15°45.4
17	12°22.1	26°24.1	53.8	253°56.9	15.3	301°59.6	39.9	24°31.8	19.8	Shaula	96°10.7	-37°07.3
18	27°24.6	41°24.5	S05°52.6	269°00.4	N25° 15.5	317°02.3	N21°39.8	39°34.0	S07°19.7	Rasalhague	95°58.8	12°32.4
19	42°27.0	56°24.8	51.4	284°04.0	15.7	332°04.9	39.8	54°36.3	19.6	Eltanin	90°42.7	51°28.9
20	57°29.5	71°25.2	50.2	299°07.5	15.9	347°07.5	39.8	69°38.5	19.5	Kaus Aust.	83°32.9	-34°22.4
21	72°32.0	86°25.5	• • 49.1	314°11.0	16.1	2°10.1	• • 39.8	84°40.7	• • 19.4	Vega	80°33.6	38°48.2
22	87°34.4	101°25.9	47.9	329°14.6	16.3	17°12.7	39.8	99°43.0	19.3	Nunki	75°48.1	-26°16.0
23	102°36.9	116°26.2	46.7	344°18.1	16.5	32° 15.4	39.8	114°45.2	19.2	Altair	62°00.3	8°56.0
Mer.p	pass. 16:11	$\nu$ 0.3′ d-1	.2′ m-4.60	$\nu$ 3.5′ d0.	2′ m-1.44	$\nu 2.6' \ d-0$	.0′ m-2.64	$\nu 2.2' \ d-0$	.1' m1.09	Peacock	53°06.3	-56°39.4
										Deneb	49°26.3	45°22.2
_			_		_		_		_	Enif	$33^{\circ}39.1$	9°59.3
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.2	-46°50.6
0	117°39.4	131°26.6	S05°45.5	359°21.6	N25° 16.8	47°18.0	N21°39.8	129° 47.5	\$07°19.1	Fomalhaut	15°14.7	-29°29.6
1	132°41.8	146°26.9	44.3	14°25.2	17.0	62°20.6	39.8	144°49.7	19.0	Scheat	13°45.4	28°13.2
2	147°44.3	161°27.3	43.2	29°28.7	17.2	77°23.2	39.8	159°52.0	18.9	Markab	13°30.1	15°20.4
3	162°46.7	176°27.6	• • 42.0	44°32.2	17.4	92°25.9	•• 39.7	174°54.2	• • 18.8	lon 16 Th	CHA	Me:: ::
4	177°49.2	191°28.0	40.8	59°35.8	17.6	107°28.5	39.7	189°56.5	18.7	Jan 16 Thu	SHA 15° 20.0	Mer.pass
5	192°51.7	206°28.4	39.6	74°39.3	17.8	122°31.1	39.7	204°58.7	18.6	Venus	15°29.9	15:15
6	207°54.1	221°28.7	S05°38.4	89°42.8	N25°18.0	137°33.7	N21°39.7	220°00.9	S07° 18.5	Mars		00:14
7	222°56.6	236°29.1	37.2	104°46.4	18.2	152°36.3	39.7	235°03.2	18.4	Jupiter	289°30.7	20:56
8	237°59.1	251°29.4	36.1	119°49.9	18.4	167°38.9	39.7	250°05.4	18.3	Saturn	12°18.6	15:26
9	253°01.5	266°29.8	• • 34.9	134°53.4	18.6	182°41.6	•• 39.7	265°07.7	18.2	Jan 17 Fri	SHA	Mer.pass
10	268°04.0	281°30.2	33.7	149°57.0	18.8	197°44.2	39.7	280°09.9	18.1	Venus	14°38.2	15:14
11	283°06.5	296°30.5	32.5	165°00.5	19.0	212°46.8	39.7	295°12.2	18.0	Mars		00:08
12	298°08.9	311°30.9	S05°31.3	180°04.0	N25° 19.2	227°49.4	N21°39.7	310°14.4	\$07°17.9	Jupiter	289°34.8	20:51
13	313°11.4	326°31.3	30.1	195°07.6	19.4	242°52.0	39.6	325°16.6	17.8	Saturn	12°13.4	15:22
14	328°13.8	341°31.6	29.0	210°11.1	19.6	257°54.7	39.6	340°18.9	17.7			
15	343°16.3	356°32.0	• • 27.8	225°14.6	• • 19.8	272°57.3	• • 39.6	355°21.1	• • 17.6	Jan 18 Sat	SHA	Mer.pass
16	358°18.8	11°32.4	26.6	240°18.2	20.0	287°59.9	39.6	10°23.4	17.5	Venus	13°47.2	15:14
17	13°21.2	26°32.7	25.4	255°21.7	20.2	303°02.5	39.6	25°25.6	17.4	Mars		00:03
18	28°23.7	41°33.1	S05°24.2	270°25.2	N25°20.4	318°05.1	N21°39.6	40°27.8	S07°17.3	Jupiter		20:47
19	43°26.2	56°33.5	23.0	285°28.7	20.6	333°07.7	39.6	55°30.1	17.2	Saturn	12°08.1	15:19
20	58°28.6	71°33.9	21.9	300°32.3	20.8	348°10.3	39.6	70°32.3	17.1	Horizont	al parallax	
21	73°31.1	86°34.2	• • 20.7	315°35.8	• • 21.0	3°13.0	• • 39.6	85°34.6	•• 17.0	1101120111	Venus:	0.2
22	88°33.6	101°34.6	19.5	330°39.3	21.2	18° 15.6	39.6	100°36.8	16.9		Mars:	0.2
23	103°36.0	116°35.0	18.3	345°42.9	21.4	33°18.2	39.5	115°39.1	16.8		iviai 5.	0.4
Mer.n	pass. 16:07	$\nu 0.4' \ d-1$	.2′ m-4.61	$\nu$ 3.5 $^{\prime}$ $d$ 0	2′ m-1.42	$\nu 2.6' d-0$	.0′ m-2.63	$\nu 2.2' \ d-0$	.1′ m1.09			

h	Su	n	Moon				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	177°35.2	\$20°55.7	331°06.9	12.6'	N17°25.3	-12.5'	56.1'
1	192°35.0	55.3	$345^{\circ}38.5$	12.7'	$17^{\circ}12.8$	-12.6'	56.1'
2	207°34.8	54.8	0°10.2	12.8'	17°00.2	-12.6'	56.1'
3	222°34.6	• • 54.3	14°41.9	12.9'	16°47.6	-12.7'	56.1'
4 5	237°34.3 252°34.1	53.8 53.3	29°13.8 43°45.8	13.0' 13.1'	16°34.8 16°22.1	-12.8' -12.8'	56.0' 56.0'
6	267°33.9	53.3 \$20°52.9	45 45.6 58°17.9	13.1	N16°09.2	-12.0	56.0'
7	282°33.7	52.4	72°50.0	13.3'	15°56.4	-12.9'	56.0'
8	297°33.5	51.9	87°22.3	13.4'	15°43.4	-13.0'	55.9'
9	312°33.3	• • 51.4	$101^{\circ}54.6$	13.4'	15°30.4	-13.1'	55.9'
10	327°33.1	50.9	116°27.1	13.5'	15°17.3	-13.1'	55.9'
11	342°32.9	50.4	130°59.6	13.6'	15°04.2	-13.2'	55.9'
12 13	357°32.7 12°32.5	\$20°50.0 49.5	145°32.3 160°05.0	13.7' 13.8'	N14°51.1 14°37.8	-13.2' -13.3'	55.8' 55.8'
14	27°32.2	49.5 49.0	174°37.8	13.9	14 37.6 14°24.6	-13.3'	55.8'
15	42°32.0	48.5	189° 10.7	14.0'	14°11.2	-13.4'	55.8'
16	57°31.8	48.0	203°43.7	14.1'	13°57.9	-13.4'	55.7'
17	72°31.6	47.5	$218^{\circ}16.8$	14.2'	13°44.5	-13.5'	55.7'
18	87°31.4	S20°47.0	232°49.9	14.2'	N13°31.0	-13.5'	55.7'
19	102°31.2 117°31.0	46.5	247°23.1 261°56.5	14.3'	13°17.5 13°04.0	-13.5'	55.7'
20 21	117°31.0 132°30.8	46.1 • • 45.6	261°56.5 276°29.9	14.4' 14.5'	13°04.0 12°50.4	-13.6' -13.6'	55.6' 55.6'
22	147°30.6	45.1	291°03.4	14.6'	12°36.8	-13.7	55.6'
23	162°30.4	44.6	305°36.9	14.6'	12°23.1	-13.7'	55.6'
	SD = 16.3'	d = -0.5'		SI	D = 15.3'		
				- 51			
Fri	GHA	Dec COO® 44 1	GHA	ν 147'	Dec	d 12.7'	HP
0 1	177°30.2 192°30.0	\$20°44.1 43.6	320°10.6 334°44.3	14.7' 14.8'	N12°09.4 11°55.7	-13.7' -13.8'	55.5' 55.5'
2	207°29.8	43.1	349° 18.1	14.9'	11°41.9	-13.8'	55.5'
3	222°29.6	• • 42.6	3°51.9	14.9'	11°28.1	-13.8'	55.5'
4	237°29.4	42.1	18°25.9	15.0'	11°14.2	-13.9'	55.4'
5	252°29.1	41.6	32°59.9	15.1'	11°00.3	-13.9'	55.4'
6 7	267°28.9 282°28.7	\$20°41.1 40.6	47°34.0 62°08.1	15.2' 15.2'	N10°46.4 10°32.5	-13.9' -14.0'	55.4' 55.4'
8	202 20.7 297°28.5	40.0	76°42.4	15.2	10° 32.5	-14.0'	55.4'
9	312°28.3	39.6	91°16.7	15.4'	10°04.5	-14.0'	55.3'
10	327°28.1	39.1	$105^{\circ}51.0$	15.4'	09°50.5	-14.0'	55.3'
11	342°27.9	38.6	120°25.4	15.5'	09°36.5	-14.1'	55.3'
12	357°27.7 12°27.5	\$20°38.1 37.6	134°59.9 149°34.5	15.6'	N09°22.4 09°08.3	-14.1'	55.3'
13 14	12 27.5 27°27.3	37.0 37.1	149 34.5 164°09.1	15.6' 15.7'	09 08.3 08°54.2	-14.1' -14.1'	55.2' 55.2'
15	42°27.1	36.6	178°43.8	15.7'	08°40.0	-14.2'	55.2'
16	57°26.9	36.1	$193^{\circ}18.5$	15.8'	08°25.9	-14.2'	55.2'
17	72°26.7	35.6	207°53.3	15.8'	08°11.7	-14.2'	55.2'
18	87°26.5 102°26.3	\$20°35.1	222°28.1 237°03.0	15.9'	N07°57.5 07°43.3	-14.2'	55.1' 55.1'
19 20	102 26.3 117°26.1	34.6 34.1	251°38.0	16.0' 16.0'	07 43.3 07°29.0	-14.2' -14.3'	55.1'
21	132°25.9	• • 33.6	266° 13.0	16.1	07°14.8	-14.3'	55.1'
22	147°25.7	33.1	280°48.1	16.1'	07°00.5	-14.3'	55.0'
23	162°25.5	32.6	295°23.2	16.2'	06°46.2	-14.3'	55.0'
	SD = 16.3'	d = -0.5'		SI	O = 15.1'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	177°25.3	S20°32.1	309°58.4	16.2'	N06°31.9	-14.3'	55.0'
1	192°25.1	31.5	324°33.6	16.3'	06°17.6	-14.3'	55.0'
2 3	207°24.9 222°24.7	31.0 •• 30.5	339°08.8 353°44.1	16.3' 16.4'	06°03.3 05°48.9	-14.3' -14.3'	55.0' 54.9'
3 4	222°24.7 237°24.5	30.5	353°44.1 8°19.5	16.4'	05°48.9 05°34.6	-14.3 -14.4'	54.9'
5	252°24.3	29.5	22°54.9	16.4	05°20.2	-14.4'	54.9'
6	267°24.1	S20°29.0	37°30.3	16.5'	N05°05.8	-14.4'	54.9'
7	282°23.9	28.5	52°05.8	16.5'	04°51.5	-14.4'	54.9'
8	297°23.8	28.0	66°41.3	16.6'	04°37.1	-14.4'	54.9'
9	312°23.6 327°23.4	•• 27.4	81° 16.9 95° 52.5	16.6'	04°22.7 04°08.3	-14.4'	54.8'
10 11	327°23.4 342°23.2	26.9 26.4	95°52.5 110°28.1	16.6' 16.7'	04°08.3 03°53.9	-14.4' -14.4'	54.8' 54.8'
12	357°23.0	\$20°25.9	110 28.1 125°03.8	16.7	N03°39.5	-14.4'	54.8'
13	12°22.8	25.4	$139^{\circ}39.5$	16.7'	03°25.1	-14.4'	54.8'
14	27°22.6	24.9	154° 15.2	16.8'	03°10.7	-14.4'	54.7'
15	42°22.4	• • 24.3	168°51.0	16.8'	02°56.3	-14.4'	54.7'
16 17	57°22.2 72°22.0	23.8 23.3	183°26.8 198°02.6	16.8' 16.9'	02°41.9 02°27.5	-14.4' -14.4'	54.7' 54.7'
18	87°21.8	23.3 520°22.8	212°38.5	16.9	N02°13.1	-14.4'	54.7
19	102°21.6	22.3	227° 14.4	16.9'	01°58.7	-14.4'	54.7'
20	117°21.4	21.7	241°50.3	16.9'	01°44.3	-14.4'	54.6'
21	132°21.2	• • 21.2	256°26.2	17.0'	01°29.9	-14.4'	54.6'
22 23	147°21.0 162°20.9	20.7 20.2	271°02.1 285°38.1	17.0' 17.0'	01°15.5 01°01.1	-14.4' -14.4'	54.6' 54.6'
23			203 30.1			-14.4	J4.0
	SD = 16.2'	d = -0.5'		SL	O = 15.0'		

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

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

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age	
- 4,	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%	
16	09:39	09:49	12:10	01:59	14:22		
17	09:59	10:09	12:10	02:44	15:05		
18	10:19	10:28	12:10	03:26	15:46		

### January 19, 20, 21 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	118°38.5	131°35.4	S05°17.1	0°46.4	N25°21.6	48° 20.8	N21°39.5	130°41.3	S07°16.7			
1	133°41.0	146°35.7	16.0	15°49.9	21.8	63°23.4	39.5	145°43.5	16.7	Alpheratz	357°34.9	29°13.8
2	148°43.4	161°36.1	14.8	30°53.4	22.0	78° 26.0	39.5	160°45.8	16.6	Ankaa	353°07.3	-42°10.4
3	163°45.9	176°36.5	13.6	45°57.0	22.2	93°28.6	39.5	175°48.0	. 16.5	Schedar	349°31.2	56°40.7
4	178°48.3	191°36.9	12.4	61°00.5	22.4	108°31.2	39.5	190°50.3	16.4	Diphda	348°47.4	-17°51.1
5	193°50.8	206°37.3	11.2	76°04.0	22.6	123°33.9	39.5	205°52.5	16.3	Achernar	335°20.2	-57°06.9 23°34.9
6	208°53.3	221°37.7	S05°10.0	91°07.6	N25°22.8	138°36.5	N21°39.5	220°54.7	S07°16.2	Hamal Polaris	327°51.1 313°51.5	23 34.9 89°22.5
7	223°55.7	236°38.0	08.9	$106^{\circ}11.1$	23.0	153°39.1	39.5	235°57.0	16.1	Acamar	315°11.6	-40°12.5
8	238°58.2	251°38.4	07.7	121°14.6	23.2	168°41.7	39.5	250°59.2	16.0	Menkar	314°06.0	4°11.3
9	254°00.7	266°38.8	• • 06.5	136°18.1	• • 23.4	183°44.3	• • 39.5	266°01.5	• • 15.9	Mirfak	308°28.0	49°57.2
10	269°03.1	281°39.2	05.3	151°21.7	23.6	198°46.9	39.4	281°03.7	15.8	Aldebaran	290°39.3	16°33.6
11	284°05.6	296°39.6	04.1	166°25.2	23.8	213°49.5	39.4	296°05.9	15.7	Rigel	281°03.6	-8°10.4
12	299°08.1	311°40.0	S05°02.9	181°28.7	N25°24.0	228°52.1	N21°39.4	311°08.2	\$07°15.6	Capella	$280^{\circ}21.5$	46°01.5
13 14	314°10.5 329°13.0	326°40.4 341°40.8	01.8 05°00.6	196°32.2 211°35.8	24.2 24.4	243° 54.7 258° 57.3	39.4 39.4	326°10.4 341°12.7	15.5 15.4	Bellatrix	278°22.6	6°22.3
15	344°15.4	356°41.2	04°59.4	211 33.8 226°39.3	24.4	274°00.0	39.4	356°14.9	15.3	Elnath	$278^{\circ}01.5$	28°37.8
16	359°17.9	11°41.6	58.2	241°42.8	24.8	289°02.6	39.4	11°17.1	15.2	Alnilam	275°37.4	-1°11.2
17	14°20.4	26°42.0	57.0	256°46.3	25.0	304°05.2	39.4	26°19.4	15.1	Betelgeuse	270°51.7	7°24.7
18	29°22.8	41°42.4	S04°55.8	271°49.9	N25°25.2	319°07.8	N21°39.4	41°21.6	S07°15.0	Canopus	263°51.9	-52°42.6
19	44°25.3	56°42.8	54.7	286°53.4	25.4	334° 10.4	39.4	56°23.9	14.9	Sirius	258°25.9	-16°45.1
20	59°27.8	71°43.2	53.5	301°56.9	25.6	349°13.0	39.4	71°26.1	14.8	Adhara	255°05.5	-29°00.4
21	74°30.2	86°43.6	• • 52.3	317°00.4	• • 25.8	4°15.6	• • 39.3	86°28.3	• • 14.7	Procyon	244°50.5 243°16.9	5°09.6 27°57.9
22	89°32.7	$101^{\circ}44.0$	51.1	332°03.9	25.9	19° 18.2	39.3	101°30.6	14.6	Pollux Avior	243 16.9 234°14.1	-59°35.3
23	104°35.2	$116^{\circ}44.4$	49.9	347°07.5	26.1	34°20.8	39.3	116°32.8	14.5	Suhail	234 14.1 222°45.9	-39 35.3 -43°32.0
Mern	ass. 16:03	$\nu 0.4' d_{-1}$	.2′ m-4.62	ν3.5′ dΩ	2′ m-1.41	ν2 6' d-0	.0′ m-2.62	ν2 2' d-0	.1′ m1.09	Miaplacidus	221°37.4	-43 32.0 -69°49.1
-νισι.ρ		ν J.∓ U-I	7.02	-5.5 40.		- 2.0 U-0	2.02	- 2.2 u-0		Alphard	217°47.4	-8°46.1
			_		_		_		_	Regulus	207°34.1	11°50.6
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.5	61°36.7
0	119°37.6	131°44.8	S04°48.8	2°11.0	N25°26.3	49°23.4	N21°39.3	131°35.1	\$07°14.4	Denebola	182°24.7	14°25.8
1	134°40.1 149°42.6	146°45.2	47.6	17°14.5	26.5	64°26.0	39.3	146°37.3 161°39.5	14.3	Gienah	175°43.4	-17°40.8
2	149°42.6 164°45.0	161°45.6 176°46.0	46.4	32°18.0 47°21.6	26.7 · · · 26.9	79°28.6 94°31.2	39.3	161°39.5 176°41.8	14.2		172°59.8	-63°14.0
3 4	104 45.0 179°47.5	176 46.0 191°46.4	· · 45.2 44.0	62°25.1	27.1	94 31.2 109°33.8	· · 39.3 39.3	176 41.8 191°44.0	· · 14.1 14.0	I .	171°51.4	-57°15.0
5	179 47.5 194°49.9	206°46.8	42.8	77°28.6	27.1	109 33.6 124° 36.4	39.3	206°46.2	13.9	Alioth	166°12.8	55°49.1
6	209°52.4	200°40.0 221°47.3	\$04°41.7	92°32.1	N25°27.5	139°39.0	N21°39.3	200°40.2 221°48.5	S07°13.8	Spica	158°22.2	-11°17.5
7	224°54.9	236°47.7	40.5	107°35.6	27.7	154°41.6	39.3	236°50.7	13.7	Alkaid	152°51.9	49°11.0
8	239°57.3	251°48.1	39.3	122°39.1	27.8	169° 44.2	39.2	251°53.0	13.6	Hadar	148°36.0	-60°29.4
9	254°59.8	266°48.5	38.1	137°42.7	28.0	184°46.8	39.2	266°55.2	• • 13.5		147°57.6	-36°29.5
10	270°02.3	281°48.9	36.9	152°46.2	28.2	199°49.4	39.2	281°57.4	13.4	Arcturus	145°47.9 139°40.4	19°02.9 -60°56.1
11	285°04.7	296°49.3	35.8	167°49.7	28.4	214°52.0	39.2	296°59.7	13.3	Rigil Kent. Kochab	139°40.4 137°20.1	74°02.7
12	300°07.2	311°49.8	S04°34.6	182°53.2	N25°28.6	229°54.6	N21°39.2	312°01.9	S07°13.2	Zuben'ubi	136°56.1	-16°08.7
13	$315^{\circ}09.7$	326°50.2	33.4	197°56.7	28.8	244°57.2	39.2	327°04.1	13.1	Alphecca	126°03.9	26°37.6
14	330°12.1	341°50.6	32.2	213°00.3	29.0	259°59.8	39.2	342°06.4	13.0	Antares	112° 16.0	-26°29.2
15	345°14.6	356°51.0	• • 31.0	228°03.8	• • 29.1	275°02.4	• • 39.2	357°08.6	• • 12.9	Atria	107°10.7	-69°04.1
16	0°17.1	11°51.5	29.8	243°07.3	29.3	290°05.0	39.2	12°10.9	12.8	Sabik	102°03.0	-15°45.4
17	15°19.5	26°51.9	28.7	258°10.8	29.5	305°07.6	39.2	27°13.1	12.7	Shaula	96°10.7	-37°07.3
18	30°22.0	41°52.3	S04°27.5	273°14.3	N25°29.7	320° 10.2	N21°39.2	42°15.3	S07°12.6	Rasalhague	95°58.8	12°32.4
19	45°24.4	56°52.7	26.3	288°17.8	29.9	335°12.8	39.2	57°17.6	12.5	Eltanin	90°42.6	51°28.9
20 21	60°26.9 75°29.4	71°53.2 86°53.6	25.1 •• 23.9	303°21.3 318°24.9	30.1 · · 30.3	350° 15.4 5° 18.0	39.2 · · 39.1	72°19.8 87°22.0	12.4 · · 12.3	Kaus Aust.	83°32.8	-34°22.4
22	90°31.8	101°54.0	22.8	333°28.4	30.4	20°20.6	39.1	102°24.3	12.3	Vega	80°33.6	38°48.2
23	105°34.3	116°54.5	21.6	348°31.9	30.4	35°23.2	39.1	117°26.5	12.1	Nunki	75°48.1	-26°16.0
										Altair	62°00.3	8°56.0
Mer.p	ass. 15:59	$\nu$ 0.4′ d-1	.2′ m-4.63	$\nu$ 3.5′ d0.	2′ m-1.39	$\nu$ 2.6′ d-0	.0′ m-2.62	$\nu$ 2.2′ d-0	.1′ m1.10	Peacock	53°06.3	-56°39.3
										Deneb Enif	49°26.3 33°39.1	45°22.1 9°59.3
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.3	-46°50.6
0	120°36.8	$131^{\circ}54.9$	S04°20.4	3°35.4	$N25^{\circ}30.8$	50°25.8	N21°39.1	132°28.8	S07°12.0	Fomalhaut	27 33.3 15°14.7	-40°30.0 -29°29.6
1	135°39.2	146°55.3	19.2	18°38.9	31.0	65°28.4	39.1	147°31.0	11.9	Scheat	13°45.4	28°13.2
2	150°41.7	161°55.8	18.0	33°42.4	31.2	80°31.0	39.1	162°33.2	11.8	Markab	13°30.1	15°20.4
3	165°44.2	176°56.2	• • 16.9	48°45.9	• • 31.3	95°33.6	• • 39.1	177°35.5	• • 11.7			
4	180°46.6	191°56.6	15.7	63°49.4	31.5	110°36.2	39.1	192°37.7	11.6	Jan 19 Sun	SHA 12°56.0	Mer.pass
5	195°49.1	206°57.1	14.5	78°52.9	31.7	125°38.8	39.1	207°39.9	11.5 \$07°11.4	Venus Mars	12°56.9 242°07.9	15:13 23:51
6 7	210°51.5 225°54.0	221°57.5	504°13.3	93°56.5	N25°31.9	140°41.4	N21°39.1	222°42.2 237°44.4	S07°11.4	Jupiter		20:43
7 8	240°56.5	236°58.0 251°58.4	12.1 10.9	109°00.0 124°03.5	32.1 32.2	155° 44.0 170° 46.6	39.1 39.1	252°46.6	11.3 11.2	Saturn	12°02.8	15:15
9	255°58.9	266°58.9	•• 09.8	124 03.5 139°07.0	32.4	170 40.0 185°49.1	39.1	267°48.9	11.1			
10	271°01.4	281°59.3	08.6	154°10.5	32.4	200°51.7	39.0	282°51.1	11.0	Jan 20 Mon	SHA	Mer.pass
11	286°03.9	296°59.7	07.4	169°14.0	32.8	215°54.3	39.0	297°53.3	10.9	Venus	12°07.2	15:13
12	301°06.3	312°00.2	S04°06.2	184°17.5	N25°33.0	230° 56.9	N21°39.0	312°55.6	S07°10.8	Mars		23:46
13	316°08.8	327°00.6	05.0	199°21.0	33.1	245°59.5	39.0	327°57.8	10.7	Jupiter		20:39
14	331°11.3	$342^{\circ}01.1$	03.9	214°24.5	33.3	261°02.1	39.0	$343^{\circ}00.1$	10.6	Saturn	11°57.4	15:11
15	$346^{\circ}13.7$	$357^{\circ}01.5$	• • 02.7	229°28.0	• • 33.5	276°04.7	• • 39.0	$358^{\circ}02.3$	• • 10.5	Jan 21 Tue	SHA	Mer.pass
16	1°16.2	12°02.0	01.5	244°31.5	33.7	291°07.3	39.0	13°04.5	10.4	Venus	$11^{\circ}18.1$	15:12
17	16°18.7	27°02.5	04°00.3	259°35.0	33.8	306°09.9	39.0	28°06.8	10.3	Mars		23:40
18	31°21.1	42°02.9	S03°59.1	274°38.5	N25°34.0	321°12.5	N21°39.0	43°09.0	S07°10.2		289°49.0	20:35
19	46°23.6	57°03.4	58.0	289°42.0	34.2	336° 15.0	39.0	58°11.2	10.1	Saturn	11°52.0	15:08
20	61°26.0	72°03.8	56.8	304°45.5	34.4	351°17.6	39.0	73°13.5	10.0	Horizont	al parallax	
21 22	76°28.5 91°31.0	87°04.3 102°04.7	• • 55.6 54.4	319°49.0 334°52.5	· · 34.5 34.7	6° 20.2 21° 22.8	· · 39.0 39.0	88°15.7 103°17.9	· · 09.9 09.8	710.12011	Venus:	0.2
23	91 31.0 106°33.4	102 04.7 117°05.2	53.3	349°56.0	34.7	36° 25.4	39.0	103 17.9 118°20.2	09.8		Mars:	0.2
										L		
Mer.p	ass. 15:55	$\nu$ 0.4′ $d$ -1	.2′ m-4.64	$\nu$ 3.5′ d0.	2′ m-1.36	$\nu$ 2.6′ d-0	.0′ m-2.61	$\nu$ 2.2′ d-0	.1′ m1.10			

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	177°20.7	\$20°19.6	300°14.1	17.0'	N00°46.7	-14.4'	54.6'
1 2	192°20.5 207°20.3	19.1 18.6	314°50.1 329°26.2	17.0' 17.1'	00°32.3 00°18.0	-14.4' -14.4'	54.6' 54.6'
3	222°20.1	• • 18.1	344°02.2	17.1'	N00°03.6	-14.4'	54.5'
4	237°19.9	17.5	358°38.3	17.1'	S00°10.8	14.3'	54.5'
5 6	252°19.7 267°19.5	17.0 \$20°16.5	13°14.4 27°50.5	17.1' 17.1'	00°25.1 \$00°39.4	14.3' 14.3'	54.5' 54.5'
7	282°19.3	15.9	42°26.6	17.1'	00°53.8	14.3	54.5'
8	297°19.1	15.4	57°02.7	17.1'	01°08.1	14.3'	54.5'
9	312°19.0	• • 14.9	71°38.9	17.1'	01°22.4	14.3'	54.5'
10 11	327°18.8 342°18.6	14.3 13.8	86°15.0 100°51.2	17.2' 17.2'	01°36.7 01°51.0	14.3' 14.3'	54.4' 54.4'
12	357°18.4	\$20°13.3	115°27.3	17.2'	S02°05.2	14.3'	54.4'
13	12°18.2	12.7	130°03.5	17.2'	02°19.5	14.2'	54.4'
14 15	27°18.0 42°17.8	12.2 •• 11.7	144°39.6 159°15.8	17.2' 17.2'	02°33.7 02°47.9	14.2' 14.2'	54.4' 54.4'
16	57°17.6	11.1	173°52.0	17.2'	02 47.9 03°02.1	14.2'	54.4
17	72°17.5	10.6	188°28.2	17.2'	03°16.3	14.2'	54.4'
18	87°17.3	\$20°10.1	203°04.3	17.2'	\$03°30.5 03°44.6	14.2'	54.4'
19 20	102°17.1 117°16.9	09.5 09.0	217°40.5 232°16.7	17.2' 17.2'	03°44.6 03°58.8	14.1' 14.1'	54.3' 54.3'
21	132°16.7	08.4	246°52.8	17.2'	04°12.9	14.1'	54.3'
22	147°16.5	07.9	261°29.0	17.2'	04°27.0	14.1'	54.3'
23	162°16.4	07.4	276°05.1	17.1'	04°41.1	14.0'	54.3'
	SD = 16.2'	d = -0.5'		SI	O = 14.9'		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	177°16.2	\$20°06.8	290°41.3	17.1'	<b>S</b> 04°55.1	14.0'	54.3'
1	192°16.0 207°15.8	06.3 05.7	305°17.4 319°53.6	17.1' 17.1'	05°09.1 05°23.1	14.0' 14.0'	54.3' 54.3'
2	207 15.8 222°15.6	05.2	319 53.0 334°29.7	17.1' 17.1'	05 23.1 05°37.1	14.0'	54.3'
4	237°15.4	04.7	349°05.8	17.1'	05°51.1	13.9'	54.3'
5	252°15.3	04.1	3°41.9	17.1'	06°05.0	13.9'	54.3'
6 7	267°15.1 282°14.9	\$20°03.6 03.0	18°17.9 32°54.0	17.1' 17.0'	506°18.9 06°32.8	13.9' 13.9'	54.3' 54.2'
8	297°14.7	02.5	47°30.0	17.0'	06°46.6	13.8'	54.2'
9	312°14.5	•• 01.9	62°06.1	17.0'	07°00.5	13.8'	54.2'
10 11	327°14.4 342°14.2	01.4 00.8	76°42.1 91°18.1	17.0' 17.0'	07°14.2 07°28.0	13.8' 13.7'	54.2' 54.2'
12	357°14.0	\$20°00.3	105°54.0	16.9'	507°41.8	13.7	54.2'
13	12°13.8	$19^{\circ}59.7$	120°30.0	16.9'	$07^{\circ}55.5$	13.7'	54.2'
14 15	27°13.6 42°13.5	59.2 •• 58.6	135°05.9 149°41.8	16.9' 16.9'	08°09.1 08°22.8	13.6' 13.6'	54.2' 54.2'
15 16	42 13.5 57°13.3	58.1	149 41.8 164°17.7	16.8'	08°22.8	13.6'	54.2'
17	72°13.1	57.5	178°53.5	16.8'	08°50.0	13.5'	54.2'
18	87°12.9	\$19°57.0	193°29.3 208°05.1	16.8'	\$09°03.5 09°17.0	13.5'	54.2'
19 20	102°12.7 117°12.6	56.4 55.9	208°05.1 222°40.9	16.8' 16.7'	09°17.0	13.5' 13.4'	54.2' 54.2'
21	132°12.4	• • 55.3	237°16.6	16.7'	09°43.9	13.4	54.2'
22	147°12.2	54.8	251°52.3	16.7'	09°57.4	13.4'	54.2'
23	162°12.0	54.2	266°27.9	16.6'	10°10.7	13.3'	54.2'
	SD = 16.2'	d = -0.5'		SI	D = 14.8'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	177°11.9 192°11.7	\$19°53.6 53.1	281°03.6 295°39.2	16.6' 16.6'	\$10°24.0 10°37.3	13.3' 13.3'	54.2' 54.2'
2	207°11.5	52.5	310°14.7	16.5'	10°50.6	13.2	54.2'
3	222°11.3	• • 52.0	324°50.2	16.5'	11°03.8	13.2'	54.2'
4 5	237°11.2 252°11.0	51.4 50.8	339°25.7 354°01.1	16.4' 16.4'	11°17.0 11°30.1	13.1' 13.1'	54.2' 54.2'
6	267°10.8	50.8 \$19°50.3	8°36.5	16.4	511°43.2	13.1	54.2'
7	282°10.6	49.7	23°11.9	16.3'	11°56.2	13.0'	54.2'
8	297°10.5 312°10.3	49.2 •• 48.6	37°47.2 52°22.4	16.3' 16.2'	12°09.3 12°22.2	13.0' 12.9'	54.2' 54.2'
10	312 10.3 327°10.1	48.0	66°57.7	16.2'	12°22.2	12.9'	54.2'
11	342°10.0	47.5	81°32.8	16.1'	12°48.0	12.8'	54.2'
12	357°09.8	\$19°46.9	96°07.9	16.1'	\$13°00.8	12.8'	54.2'
13 14	12°09.6 27°09.4	46.3 45.8	110°43.0 125°18.0	16.0' 16.0'	13°13.6 13°26.3	12.7' 12.7'	54.2' 54.2'
15	42°09.3	• • 45.2	$139^{\circ}53.0$	15.9'	13°39.0	12.6'	54.2'
16	57°09.1	44.6	154°27.9	15.9'	13°51.6	12.6'	54.2'
17 18	72°08.9 87°08.8	44.1 \$19°43.5	169°02.8 183°37.6	15.8' 15.8'	14°04.2 \$14°16.7	12.5' 12.5'	54.2' 54.2'
19	102°08.6	42.9	103 37.0 198°12.4	15.7'	14°29.2	12.5	54.2'
20	117°08.4	42.4	212°47.1	15.6'	14°41.7	12.4'	54.2'
21 22	132°08.3 147°08.1	· · 41.8 41.2	227°21.7 241°56.3	15.6' 15.5'	14°54.0 15°06.4	12.3' 12.3'	54.2' 54.2'
23	162°07.9	40.7	256°30.8	15.5'	15°18.6	12.2'	54.2'
	SD = 16.2'	d = -0.6'			D = 14.8'		
			-				

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

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

		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	76-58%	
19	10:37	10:46	12:11	04:06	16:25		
20	10:55	11:04	12:11	04:45	17:05		
21	11:13	11:21	12:11	05:25	17:45		

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

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	121°35.9	132°05.7 \$03°52.1	4°59.5 N25°35.1	51°28.0 N21°39.0	133°22.4 S07°09.6	
1	136°38.4	147°06.1 50.9	20°03.0 35.2	66° 30.6 38.9	148° 24.6 09.5	Alpheratz 357°34.9 29°13.8
2	151°40.8	162°06.6 49.7	35°06.5 35.4	81°33.2 38.9	163°26.9 09.4	Ankaa 353°07.3 -42°10.4
3	166°43.3	177°07.1 · · 48.5	50°10.0 · · 35.6	96°35.7 · · 38.9	178°29.1 · · 09.3	Schedar 349°31.2 56°40.7
4	181°45.8	192°07.5 47.4	65°13.5 35.7	111°38.3 38.9	193°31.3 09.2	Diphda 348°47.4 -17°51.1
5	$196^{\circ}48.2$	207°08.0 46.2	80°17.0 35.9	126° 40.9 38.9	208°33.6 09.1	Achernar 335°20.2 -57°06.9 Hamal 327°51.1 23°34.9
6	211°50.7	222°08.5 \$03°45.0	95°20.5 N25°36.1	141°43.5 N21°38.9	223°35.8 <b>S</b> 07°09.0	Polaris 313°52.8 89°22.5
7	226°53.2	237°08.9 43.8	110°24.0 36.3	156° 46.1 38.9	238° 38.0 08.9	Acamar 315°11.6 -40°12.5
8	241°55.6	252°09.4 42.6	125°27.5 36.4	171°48.7 38.9	253° 40.3 08.8	Menkar 314°06.0 4°11.3
9	256°58.1	267°09.9 · · 41.5	140°31.0 · · 36.6	186°51.2 · · 38.9	268° 42.5 · · 08.7	Mirfak 308°28.0 49°57.2
10 11	272°00.5 287°03.0	282°10.4 40.3 297°10.8 39.1	155°34.5 36.8 170°38.0 36.9	201°53.8 38.9 216°56.4 38.9	283° 44.7 08.6 298° 47.0 08.5	Aldebaran 290°39.4 16°33.6
12	302°05.5	312°11.3 S03°37.9	185°41.5 N25°37.1	231°59.0 N21°38.9	313°49.2 S07°08.4	Rigel 281°03.6 -8°10.4
13	317°07.9	327°11.8 36.7	200°45.0 37.3	247°01.6 38.9	328°51.4 08.3	Capella 280°21.5 46°01.5
14	332°10.4	342°12.3 35.6	215°48.5 37.4	262°04.2 38.9	343°53.7 08.2	Bellatrix 278°22.6 6°22.3
15	$347^{\circ}12.9$	357°12.8 · · 34.4	230°52.0 · · 37.6	277°06.7 · · 38.9	358°55.9 · · 08.1	Elnath 278°01.5 28°37.8
16	2°15.3	12°13.2 33.2	245°55.5 37.8	292°09.3 38.9	13°58.1 08.0	Alnilam 275°37.4 -1°11.2 Betelgeuse 270°51.8 7°24.7
17	$17^{\circ}17.8$	27°13.7 32.0	260°59.0 37.9	307°11.9 38.9	29°00.4 07.9	Canopus 263°51.9 -52°42.6
18	32°20.3	42°14.2 \$03°30.9	276°02.5 N25°38.1	322°14.5 N21°38.8	44°02.6 \$07°07.8	Sirius 258°25.9 -16°45.1
19	47°22.7	57°14.7 29.7	291°05.9 38.3	337°17.1 38.8	59°04.8 07.7	Adhara 255°05.5 -29°00.4
20	62°25.2 77°27.6	72°15.2 28.5	306°09.4 38.4 321°12.9 · · 38.6	352°19.6 38.8 7°22.2 · · 38.8	74°07.1 07.6	Procyon 244°50.5 5°09.6
21 22	92°30.1	87°15.7 · · · 27.3 102°16.2 26.2	321°12.9 · · 38.6 336°16.4 38.8	7°22.2 · · 38.8 22°24.8 38.8	89°09.3 · · 07.5 104°11.5 07.4	Pollux 243°16.9 27°57.9
23	107°32.6	117°16.6 25.0	351°19.9 38.9	37°27.4 38.8	119°13.8 07.3	Avior 234°14.1 -59°35.3
		-			-	Suhail 222°45.9 -43°32.0
Mer.p	ass. 15:51	ν0.5' d-1.2' m-4.65	$\nu$ 3.5′ d0.2′ m-1.34	ν2.6' d-0.0' m-2.60	ν2.2' d-0.1' m1.10	Miaplacidus 221°37.4 -69°49.1
						Alphard 217°47.4 -8°46.1 Regulus 207°34.1 11°50.6
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°40.4 61°36.7
0	122°35.0	132°17.1 <b>S</b> 03°23.8	6°23.4 N25°39.1	52°30.0 N21°38.8	134°16.0 \$07°07.2	Denebola 182°24.7 14°25.8
1	137°37.5	147°17.6 22.6	21°26.9 39.3	67°32.5 38.8	149° 18.2 07.1	Gienah 175°43.4 -17°40.9
2	152°40.0	162°18.1 21.4	36°30.4 39.4	82°35.1 38.8	164°20.5 07.0	Acrux 172°59.8 -63°14.0
3	167°42.4 182°44.9	177°18.6 · · 20.3 192°19.1 19.1	51°33.8 · · 39.6 66°37.3 39.8	97°37.7 · · 38.8 112°40.3 38.8	179°22.7 · · · 06.9 194°24.9	Gacrux 171°51.4 -57°15.0
4 5	102 44.9 197°47.4	192°19.1 19.1 207°19.6 17.9	66°37.3 39.8 81°40.8 39.9	112°40.3 38.8 127°42.8 38.8	194°24.9 06.8 209°27.1 06.7	Alioth 166°12.7 55°49.1
6	212°49.8	222°20.1 S03°16.7	96°44.3 N25°40.1	142°45.4 N21°38.8	224°29.4 S07°06.6	Spica 158°22.2 -11°17.6
7	227°52.3	237°20.6 15.6	111°47.8 40.2	157°48.0 38.8	239°31.6 06.5	Alkaid 152°51.9 49°11.0
8	242°54.8	252°21.1 14.4	126°51.3 40.4	172°50.6 38.8	254° 33.8 06.4	Hadar 148°36.0 -60°29.4
9	257°57.2	267°21.6 · · 13.2	141°54.7 · · 40.6	187°53.1 · · 38.8	269°36.1 · · 06.3	Menkent 147°57.6 -36°29.5 Arcturus 145°47.9 19°02.9
10	272°59.7	282°22.1 12.0	156°58.2 40.7	202°55.7 38.8	284°38.3 06.2	Arcturus 145°47.9 19°02.9 Rigil Kent. 139°40.4 -60°56.1
11	288°02.1	297°22.6 10.9	172°01.7 40.9	217°58.3 38.8	299° 40.5 06.1	Kochab 137°20.0 74°02.7
12	303°04.6	312°23.1 \$03°09.7	187°05.2 N25°41.0	233°00.9 N21°38.8	314°42.8 \$07°06.0	Zuben'ubi 136°56.0 -16°08.8
13	318°07.1	327°23.6 08.5	202°08.7 41.2	248°03.4 38.7	329° 45.0 05.9	Alphecca 126°03.8 26°37.6
14	333°09.5	342°24.2 07.3	217°12.1 41.4	263°06.0 38.7	344°47.2 05.8	Antares 112°16.0 -26°29.2
15 16	348°12.0 3°14.5	357°24.7 · · 06.2 12°25.2	232°15.6 · · 41.5 247°19.1 41.7	278°08.6 · · 38.7 293°11.2 38.7	359°49.5 · · 05.7 14°51.7	Atria 107°10.6 -69°04.1
17	18°16.9	27°25.7 03.8	262°22.6 41.8	308° 13.7 38.7	29°53.9 05.4	Sabik 102°03.0 -15°45.4
18	33°19.4	42°26.2 \$03°02.6	277°26.0 N25°42.0	323°16.3 N21°38.7	44°56.1 S07°05.3	Shaula 96°10.6 -37°07.3
19	48°21.9	57°26.7 01.5	292°29.5 42.1	338° 18.9 38.7	59° 58.4 05.2	Rasalhague 95°58.8 12°32.4
20	63°24.3	72°27.2 03°00.3	307°33.0 42.3	353°21.4 38.7	75°00.6 05.1	Eltanin 90°42.6 51°28.9 Kaus Aust. 83°32.8 -34°22.3
21	78°26.8	$87^{\circ}27.8$ $02^{\circ}59.1$	322°36.5 · · 42.5	8°24.0 · · 38.7	90°02.8 · · 05.0	Vega 80°33.6 38°48.2
22	93°29.3	102°28.3 57.9	337°39.9 42.6	23°26.6 38.7	105°05.1 04.9	Nunki 75°48.1 -26°16.0
23	108°31.7	$117^{\circ}28.8$ 56.8	352°43.4 42.8	38°29.2 38.7	120° 07.3 04.8	Altair 62°00.3 8°56.0
Mer.p	ass. 15:47	ν0.5' d-1.2' m-4.66	ν3.5′ d0.2′ m-1.32	ν2.6' d-0.0' m-2.59	ν2.2' d-0.1' m1.10	Peacock 53°06.3 -56°39.3
						Deneb 49°26.3 45°22.1
F!	CIIA	CUA D	CHA Des	CHA De-	CHA De-	Enif 33°39.1 9°59.3
Fri 0	<b>GHA</b> 123°34.2	<b>GHA Dec</b> 132°29.3 <b>S</b> 02°55.6	<b>GHA Dec</b> 7° 46.9 N25° 42.9	<b>GHA Dec</b> 53°31.7 N21°38.7	<b>GHA Dec</b> 135°09.5 <b>S</b> 07°04.7	Al Na'ir 27°33.3 -46°50.6
1	138°36.6	147°29.8 54.4	22°50.3 43.1	68°34.3 38.7	150°11.8 04.6	Fomalhaut 15°14.7 -29°29.5
2	153°39.1	162°30.4 53.2	37°53.8 43.2	83°36.9 38.7	165°14.0 04.5	Scheat 13°45.4 28°13.2 Markab 13°30.1 15°20.4
3	168°41.6	177°30.9 · · 52.1	52°57.3 · · 43.4	98°39.4 · · 38.7	180°16.2 · · 04.4	Markab 13 30.1 13 20.4
4	183°44.0	192°31.4 50.9	68°00.8 43.5	113°42.0 38.7	195°18.4 04.3	Jan 22 Wed SHA Mer.pass
5	198°46.5	207°31.9 49.7	83°04.2 43.7	128° 44.6 38.7	210°20.7 04.2	Venus 10°29.8 15:11
6	213°49.0	222°32.5 <b>S</b> 02°48.5	98°07.7 N25°43.8	143°47.1 N21°38.7	225°22.9 <b>S</b> 07°04.1	Mars 243°23.6 23:35
7	228°51.4	237°33.0 47.4	113°11.2 44.0	158° 49.7 38.7	240°25.1 04.0	Jupiter 289°52.1 20:31
8	243°53.9	252°33.5 46.2	128°14.6 44.1	173°52.3 38.7	255°27.4 03.9	Saturn 11°46.5 15:04
9	258°56.4	267°34.1 · · 45.0	143°18.1 · · 44.3	188° 54.8 · · 38.7	270°29.6 · · 03.8	Jan 23 Thu SHA Mer.pass
10 11	273°58.8 289°01.3	282°34.6 43.9 297°35.1 42.7	158°21.6 44.4 173°25.0 44.6	203°57.4 38.7 219°00.0 38.7	285°31.8 03.7 300°34.1 03.6	Venus 9°42.1 15:10
12	304°03.8	312°35.7 S02°41.5	188°28.5 N25°44.7	234°02.5 N21°38.6	315°36.3 S07°03.5	Mars 243°48.3 23:29
13	319°06.2	327°36.2 40.3	203°31.9 44.9	249°05.1 38.6	330° 38.5 03.4	Jupiter 289°54.9 20:26
14	334°08.7	342°36.7 39.2	218°35.4 45.0	264°07.7 38.6	345°40.7 03.3	Saturn 11°40.9 15:01
15	349°11.1	357° 37.3 · · · 38.0	233°38.9 · · 45.2	279° 10.2 · · 38.6	0°43.0 · · 03.2	Jan 24 Fri SHA Mer.pass
16	4°13.6	12°37.8 36.8	248° 42.3 45.3	294°12.8 38.6	15°45.2 03.1	Venus 8°55.1 15:10
17	19°16.1	27°38.4 35.7	263°45.8 45.5	309°15.3 38.6	30°47.4 03.0	Mars 244°12.7 23:23
18	34°18.5	42°38.9 S02°34.5	278°49.2 N25°45.6	324°17.9 N21°38.6	45°49.6 \$07°02.9	Jupiter 289°57.5 20:22
19 20	49°21.0 64°23.5	57°39.5 33.3 72°40.0 32.1	293°52.7 45.8 308°56.2 45.9	339°20.5 38.6 354°23.0 38.6	$60^{\circ}51.9$ 02.8 $75^{\circ}54.1$ 02.7	Saturn 11°35.3 14:57
21	79°25.9	87°40.6 · · 31.0	323°59.6 · · 46.1	9°25.6 · · 38.6	90°56.3 · · 02.6	Horizontal parallax
22	94°28.4	102°41.1 29.8	339°03.1 46.2	24°28.2 38.6	105°58.6 02.5	Venus: 0.3
23	109°30.9	117°41.7 28.6	354°06.5 46.4	39°30.7 38.6	121°00.8 02.4	Mars: 0.2
Mern	ass. 15:43	ν0.5′ <i>d</i> -1.2′ m-4.67	ν3.5′ d0.2′ m-1.29	ν2.6' d-0.0' m-2.58	ν2.2' d-0.1' m1.10	
р					= 0.1 1111110	

h	Su	n	Moon				
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	177°07.7	<b>S</b> 19°40.1	271°05.3	15.4'	<b>S</b> 15°30.8	12.2'	54.2'
1	192°07.6	39.5	285°39.7	15.3'	15°43.0	12.1'	54.2'
2 3	207° 07.4 222° 07.2	38.9 •• 38.4	300°14.0 314°48.3	15.3' 15.2'	15°55.1 16°07.1	12.0' 12.0'	54.2' 54.2'
4	237°07.1	37.8	329°22.5	15.1'	16°19.1	11.9'	54.3'
5	252°06.9	37.2	343°56.7	15.1'	16°31.0	11.9'	54.3'
6	267°06.7	S19°36.6	358°30.8	15.0'	S16°42.9	11.8'	54.3'
7 8	282°06.6 297°06.4	36.1 35.5	13°04.8 27°38.7	14.9' 14.9'	16°54.7 17°06.4	11.7' 11.7'	54.3' 54.3'
9	312°06.2	34.9	42°12.6	14.8'	17 00.4 17°18.1	11.6'	54.3'
10	327°06.1	34.3	56°46.4	14.7'	17°29.7	11.5'	54.3'
11	342°05.9	33.7	71°20.1	14.7'	17°41.2	11.5'	54.3'
12	357°05.8 12°05.6	\$19°33.2 32.6	85°53.8 100°27.4	14.6' 14.5'	\$17°52.7 18°04.1	11.4'	54.3' 54.3'
13 14	27°05.4	32.0 32.0	100 27.4 115°00.9	14.5 14.4'	18 04.1 18°15.5	11.3' 11.3'	54.3'
15	42°05.3	31.4	129°34.4	14.4'	18°26.8	11.2'	54.4'
16	57°05.1	30.8	144°07.7	14.3'	18°38.0	11.1'	54.4'
17	72°04.9	30.3	158°41.0	14.2'	18°49.1	11.1'	54.4'
18 19	87°04.8 102°04.6	\$19°29.7 29.1	173°14.2 187°47.4	14.1' 14.1'	\$19°00.2 19°11.2	11.0' 10.9'	54.4' 54.4'
20	102 04.6 117°04.5	29.1	202°20.4	14.1 14.0'	19 11.2 19°22.1	10.9	54.4' 54.4'
21	132°04.3	27.9	216°53.4	13.9'	19°33.0	10.8'	54.4'
22	147°04.1	27.3	231°26.3	13.8'	19°43.7	10.7'	54.4'
23	162°04.0	26.7	245°59.1	13.7'	19°54.4	10.6'	54.4'
	SD = 16.2'	d = -0.6'		SE	0 = 14.8'		
Thu	GHA	Dec	GHA	ν	Dec	d	НР
0	177°03.8	\$19°26.2	260°31.9	13.7'	\$20°05.0	10.5'	54.5'
1	192°03.7	25.6	$275^{\circ}04.5$	13.6'	$20^{\circ}15.6$	10.5'	54.5'
2	207°03.5	25.0	289°37.1	13.5'	20°26.1	10.4'	54.5'
3 4	222°03.3 237°03.2	· · 24.4 23.8	304°09.6 318°42.0	13.4' 13.3'	20°36.4 20°46.7	10.3' 10.2'	54.5' 54.5'
5	252°03.0	23.0	333°14.3	13.2'	20°57.0	10.2	54.5'
6	267°02.9	S19°22.6	347°46.5	13.1'	S21°07.1	10.1'	54.5'
7	282°02.7	22.0	2°18.7	13.1'	21°17.2	10.0'	54.6'
8	297°02.5	21.4	16°50.7	13.0'	21°27.1	9.9'	54.6'
9	312°02.4 327°02.2	· · 20.8 20.3	31°22.7 45°54.6	12.9' 12.8'	21°37.0 21°46.8	9.8' 9.7'	54.6' 54.6'
10 11	342°02.2	20.3 19.7	45 54.6 60°26.4	12.8	21 46.8 21°56.5	9. <i>1</i> 9.6'	54.6'
12	357°01.9	S19°19.1	74°58.1	12.6'	S22°06.2	9.5'	54.6'
13	12°01.8	18.5	89°29.7	12.5'	22°15.7	9.4'	54.7'
14	27°01.6 42°01.5	17.9	104°01.2 118°32.6	12.4'	22°25.1 22°34.5	9.3'	54.7'
15 16	42°01.5 57°01.3	· · 17.3 16.7	118° 32.6 133° 04.0	12.3' 12.2'	22° 34.5 22° 43.7	9.3' 9.2'	54.7' 54.7'
17	72°01.1	16.1	147°35.2	12.2'	22°52.9	9.1'	54.7'
18	87°01.0	S19°15.5	162°06.4	12.1'	S23°02.0	9.0'	54.7'
19	102°00.8	14.9	176°37.4	12.0'	23°10.9	8.9'	54.8'
20 21	117°00.7 132°00.5	14.3 •• 13.7	191°08.4 205°39.3	11.9' 11.8'	23°19.8 23°28.6	8.8' 8.7'	54.8' 54.8'
22	147°00.4	13.1	200° 39.3	11.7'	23°37.3	8.6'	54.8'
23	162°00.2	12.5	234°40.8	11.6'	23°45.8	8.5'	54.8'
	SD = 16.2'	d = -0.6'		SE	0 = 14.9'		
Fri	GHA	Doo	GHA		Dec	d	HP
0	177°00.1	<b>Dec</b> \$19°11.9	249°11.4	u 11.5'	\$23°54.3	a 8.4'	пР 54.9'
1	191°59.9	11.3	263°41.9	11.4'	24°02.7	8.3'	54.9'
2	206° 59.8	10.7	278°12.3	11.3'	24°10.9	8.2'	54.9'
3	221°59.6 236°59.5	10.1	292°42.6 307°12.8	11.2'	24°19.1	8.0'	54.9'
4 5	236°59.5 251°59.3	09.5 08.9	307°12.8 321°42.9	11.1' 11.0'	24°27.1 24°35.1	7.9' 7.8'	54.9' 55.0'
6	266° 59.2	\$19°08.2	336°12.9	10.9'	\$24°42.9	7.7'	55.0'
7	281°59.0	07.6	350°42.9	10.8'	24°50.6	7.6'	55.0'
8	296°58.9	07.0	5°12.7	10.7'	24°58.2	7.5'	55.0'
9 10	311°58.7 326°58.6	· · 06.4 05.8	19°42.5 34°12.1	10.6' 10.6'	25°05.7 25°13.1	7.4' 7.3'	55.0' 55.1'
11	341°58.4	05.0	48°41.7	10.5	25°20.4	7.3 7.2'	55.1'
12	356° 58.3	<b>S</b> 19°04.6	63°11.1	10.4'	S25°27.5	7.0'	55.1'
13	11°58.1	04.0	77°40.5	10.3'	25°34.6	6.9'	55.1'
14 15	26°58.0 41°57.8	03.4 •• 02.8	92°09.7 106°38.9	10.2' 10.1'	25°41.5 25°48.3	6.8' 6.7'	55.2' 55.2'
15 16	41°57.8 56°57.7	02.2	106°38.9 121°08.0	10.1	25°48.3 25°55.0	6.6'	55.2' 55.2'
17	71°57.5	01.5	135°37.0	9.9'	26°01.5	6.4	55.2'
18	86°57.4	S19°00.9	150°05.9	9.8'	S26°08.0	6.3'	55.2'
19	101°57.2	19°00.3	164°34.7	9.7'	26°14.3	6.2'	55.3'
20 21	116° 57.1 131° 57.0	18°59.7 •• 59.1	179°03.4 193°32.0	9.6' 9.5'	26°20.5 26°26.5	6.1' 5.9'	55.3' 55.3'
22	131 57.0 146°56.8	58.5	193 32.0 208°00.5	9.5 9.4'	26° 32.4	5.9 5.8'	55.3'
23	161°56.7	57.9	222°29.0	9.3'	26°38.2	5.7'	55.4
	SD = 16.2'	d = -0.6'		SE	0 = 15.0'		

1 -4	Twilight		Si.	S	Twilight		
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.	
N 72°	07:38	09:17	_		15:08	16:47	
N 70°	07:27	08:51	10:39	13:46	15:33	16:58	
68°	07:17	08:32	09:55	14:29	15:53	17:08	
66°	07:09	08:16	09:26	14:58	16:08	17:16	
64°	07:02	08:03	09:05	15:20	16:21	17:22	
62°	06:56	07:52	08:47	15:37	16:32	17:29	
60°	06:51	07:43	08:33	15:51	16:42	17:34	
N 58°	06:46	07:35	08:21	16:04	16:50	17:39	
56°	06:41	07:27	08:10	16:14	16:57	17:43	
54°	06:37	07:21	08:01	16:24	17:04	17:48	
52°	06:33	07:14	07:52	16:32	17:10	17:51	
50°	06:29	07:09	07:45	16:39	17:15	17:55	
45°	06:21	06:57	07:29	16:55	17:27	18:03	
<b>N</b> 40°	06:14	06:46	07:16	17:08	17:38	18:11	
35°	06:07	06:37	07:04	17:20	17:47	18:17	
30°	06:00	06:29	06:55	17:30	17:55	18:24	
20°	05:47	06:14	06:37	17:46	18:10	18:37	
N 10°	05:35	06:00	06:22	18:01	18:24	18:49	
0°	05:21	05:46	06:08	18:15	18:37	19:03	
<b>S</b> 10°	05:05	05:32	05:54	18:30	18:52	19:18	
20°	04:47	05:15	05:39	18:45	19:09	19:37	
30°	04:23	04:54	05:21	19:03	19:29	20:00	
35°	04:08	04:42	05:10	19:13	19:41	20:15	
40°	03:49	04:27	04:58	19:25	19:56	20:34	
45°	03:25	04:09	04:44	19:39	20:13	20:57	
<b>S</b> 50°	02:53	03:47	04:27	19:56	20:36	21:29	
52°	02:36	03:35	04:18	20:05	20:47	21:46	
54° 56°	02:14	03:23	04:09	20:14	21:00	22:07	
58°	01:46 00:57	03:07 02:49	03:58 03:46	20:24 20:36	21:15 21:32	22:34 23:18	
<b>S</b> 60°	////	02:49	03:40	20:50	21:54	////	
		Moonris	e e		Moonset		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri	
N 72°	04:26			07:24			
N 70°	03:36			08:16	_		
68°	03:05	05:42		08:48	07:44		
66°	02:43	04:45		09:12	08:41		
64°	02:25	04:12	06:23	09:31	09:15	08:43	
62°	02:10	03:48	05:35	09:47	09:40	09:32	
60°	01:58	03:29	05:04	10:00	10:00	10:03	

Lat.		Moonris	e		Moonset	:
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
N 72°	04:26			07:24		
<b>N</b> 70°	03:36			08:16		_
68°	03:05	05:42		08:48	07:44	
66°	02:43	04:45		09:12	08:41	
64°	02:25	04:12	06:23	09:31	09:15	08:43
62°	02:10	03:48	05:35	09:47	09:40	09:32
60°	01:58	03:29	05:04	10:00	10:00	10:03
<b>N</b> 58°	01:48	03:13	04:42	10:11	10:16	10:27
56°	01:39	03:00	04:23	10:21	10:30	10:46
54°	01:31	02:48	04:07	10:30	10:43	11:02
52°	01:24	02:38	03:54	10:37	10:53	11:15
50°	01:17	02:29	03:42	10:44	11:03	11:27
45°	01:03	02:10	03:18	11:00	11:23	11:53
<b>N</b> 40°	00:52	01:55	02:59	11:12	11:39	12:13
35°	00:43	01:42	02:43	11:23	11:53	12:30
30°	00:34	01:31	02:29	11:32	12:06	12:44
20°	00:20	01:11	02:05	11:49	12:26	13:09
N 10°	00:07	00:55	01:45	12:03	12:45	13:30
0°		00:39	01:27	12:17	13:02	13:51
<b>S</b> 10°		00:24	01:08	12:30	13:19	14:11
20°		80:00	00:48	12:45	13:37	14:32
30°	23:49	•• ••	00:25	13:01	13:58	14:58
35°	23:39		00:12	13:11	14:11	15:12
40° 45°	23:26	23:56		13:22	14:25	15:30
-	23:12	23:38	•• ••	13:35	14:43	15:51
<b>S</b> 50°	22:54	23:16	23:45	13:51	15:04	16:17
52°	22:46	23:05	23:32	13:59	15:14	16:30
54°	22:37	22:53	23:17	14:08	15:26	16:45
56° 58°	22:27 22:15	22:39 22:23	22:59 22:38	14:17	15:39	17:02
<b>S</b> 60°	22:15	22:23 22:04	22:38	14:28 14:41	15:55 16:13	17:23 17:50
3 00	22:02	22:04	22:10	14:41	10:13	17:50

		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	49-30%	
22	11:29	11:37	12:12	06:06	18:28		
23	11:45	11:52	12:12	06:50	19:14		
24	12:00	12:07	12:12	07:38	20:04	4	

Section   Color   Co	h	Aries	Ve	nus		ars	Jup	oiter	Sat	urn		Stars	
1	Sat	GHA	GHA	Dec	CH4	Dec	GHA	Dec	GHA	Dec		SHA	Dec
2 1519736   167428   25.5   27124   466   69758   36   151902   622   62   65   65   67   67   67   67   67   67												3114	
2   1547-852   1057-853   2551   2591-09   4-06   2591-05   3.05   1057-05   201   3.05   3											Alpheratz		29°13.8
3 199° 467 177° 429° 520 67°233 · 469 99°410 · 386 181°07 · 0.20 5 School 201° 404 4 202° 202° 277°08 1 4 140 140 140 140 140 140 140 140 140											Ankaa	353°07.3	-42°10.4
Mart											Schedar	349°31.2	56°40.7
Section   1997											Diphda	348°47.4	-17°51.1
Color											Achernar	335°20.2	-57°06.9
7 22°506 23°61. 193 14°341 475 159°51.2 386 24°18.6 0.15 470°607 412°18.0 34°19.0 476 1775°7. 386 32°10.3 0.14 40°10.0 471.2 170°19.1 120°10.2 32°61.4 1410°10. 478 100°50.5 30°10.3 0.14 40°10.0 471.2 170°19.1 120°10.2 32°19.4 1411.0 478 100°50.5 30°10.3 0.14 40°10.0 471.2 170°19.1 120°10.2 32°19.4 1411.0 478 100°50.5 386 31°29.7 50°10.0 40°11.2 40°10.2 112°12.0 30°10.9 112°12.0 30°10.9 112°12.0 30°10.9 112°12.0 30°10.9 112°12.0 30°10.9 112°12.0 30°10.9 112°12.0 30°10.9 112°12.0 30°10.9 112°12.0 30°10.9 112°12.0 30°10.9 112°12.0 30°10.9 112°12.0 30°10.9 112°12.0 30°10.0 112°10.0 30°10.0 112											Hamal	$327^{\circ}51.2$	23°34.9
24   San   25   26   77   27   15   15   16   14   41   47   18   18   18   18   18   18   18   1											Polaris	313°54.0	89°22.5
9 926*55. 207*172											Acamar	$315^{\circ}11.6$	-40°12.5
11   200706   200748   36   200748   15   5   109745   41   200701   200714   36   301727   507010   4   301727   200711   301728   301727   301728   301727   301728   301727   301728   301728   301728   301727   301728   3017											Menkar	$314^{\circ}06.0$	4°11.2
11 200°00 372°48 50°13 1 10°14 PSP 41 20°01 A 88.6 30°12°5 511 1 20°10 A 20°13 1 20°13											Mirfak	308°28.0	49°57.2
12 330°63 43 234°89 50°134 109°151 4 109°151 4 109°161 4 109°161 4 109°162 1 12 20°163 48 48.4 22 28°065 3 8.6 30°732 4 0.00 8											Aldebaran	290°39.4	16°33.6
19   19   19   19   19   19   19   19											Rigel	281°03.6	-8°10.4
13 30703 37750 6 099 235703 7 468 2016 3 380 33340 000											_	280°21.5	
15											Bellatrix	278°22.6	6°22.3
April													
Berlegens											II.		
19   507-77   19-38   502-10   5000													
Simple   S											_		
Adhara   25°05.5   29°00.6   20°07.5   20°07.6   20°07.5   20°07													
22   96   75   106   75   107   108   34   34   35   35   35   35   35   36   36   36													
Polity   P													
23   10   30   11   75   30   30   35   22   497   40   321   385   21   24   27   30   35   31   21   24   27   30   35   31   31   34   34   34   35   32   34   34   34   35   32   34   34   34   34   34   34   34													
Mer. pass. 15.30													
Maphelodus   Z21"374   48"461   Section   CHA   Dec	23	110°30.0	117°55.3	00.6	355°29.2	49.7	40°32.1	38.5	121°54.2	06°59.9			
Sun   GHA   GHA   Dec   GHA	Mern	ass. 15·30	$\nu 0.6' d_{-1}$	.2′ m-4 68	$\nu$ 3.5 $^{\prime}$ d0	1' m-1 27	ν2 6′ d-0	.0′ m-2 58	ν2 2' d-Ω	.1′ m1 10	l l		
Sun   GHA   GHA   Dec   GHA   Dec   CHA   Dec   Dubbe   1379.34   11°9.06   11°9.05   12°9.35   13°9.34   11°9.06   12°9.35   13°9.39   14°7.56   13°9.35   13°9.39   14°7.56   15°9.35   13°9.39   14°7.56   15°9.35   13°9.39   14°7.56   15°9.35   13°9.35   13°9.39	ν.σι.ρ		- J.U U-1		- 5.5 do.		u-0	.5 111 2.50	- 2.2 U-U				
Sum GHA													
0 125°325. 9 125°536	Sun		GHA		GHA				GHA				
1 140°349	0			S01°59.4		N25°49.9		N21°38.5	136°56.5	S06°59.8			
2 155°37.9 177°57.6 5.55.9 57.1 40°39.5 50.1 85°39.7 38.5 167°00.9 59.6 182°57.7 59.1 127°57.6 5.55.9 5742.9 5.03 100°42.3 3.85.1 182°03.1 59.5 4.6 4.8 127°58.8 53.6 85°42.9 5.03 100°42.3 3.85.1 182°03.1 59.5 4.6 4.8 127°58.8 53.6 85°43.8 50.5 130°47.4 3.85.5 122°07.6 59.3 59.6 160°52.7 120°5.7 120°5.0 59.2 120°5.0	1		147°56.4	58.3		50.0			151°58.7	59.7			
1707399 1777576 25 54.9 55.9 554.29 1.00 42.3 38.5 182°031 1.95.5 d 6 18754.6 38.5 182°031 1.95.5 d 6 18754.6 38.5 182°031 1.95.5 d 6 18754.6 38.5 122°07.6 59.3 d 6 18754.6 38.5 122°07.6 59.2 d 6 18754.6 38.5 122°07.6 59.2 d 18754.6 38.9 d 18754.6 38.5 122°07.6 59.2 d 18754.6 38.9 d 18754.6 38.5 122°07.6 59.2 d 18754.6 38.9 d 18755.6 38.6 12.7 d 18755.6 12.7	2	155°37.4	162°57.0	57.1	40°39.5	50.1	85°39.7	38.5	167°00.9	59.6			
185°42.3   192°88.2   54.8   70°46.4   50.4   115°46.8   38.5   197°05.4   59.4   Alloth   166°12.7   55°40.1     5   200°44.8   207°98.8   53.6   85°49.8   50.5   130°47.4   38.5   122°07.6   59.3   50.6     6   215°47.2   222°99.4   501°52.4   100°52.2   725°50.7   145°49.9   N21°38.5   227°00.8   506°59.2   Alloth   166°12.7   73°60.9     6   246°62.2   255°00.6   50.1   131°00.1   50.9   175°55.0   38.5   257°14.3   55.9   Menkent   147°57.6   36°29.4     7   200°40.4   280°01.2   44.9   440°03.5   51.1   190°57.6   38.5   227°16.5   58.8   Arctural   146°35.0   36°20.4     10   275°57.1   283°01.7   47.8   161°00.9   51.2   206°00.1   38.5   227°16.5   58.8   Arctural   146°35.0   36°20.1     12   200°90.6   296°0.2   46.6   107°10.3   51.3   221°02.6   38.5   302°20.9   58.6   Kochal   37°19.9   74°00.7     12   300°02.0   313°02.9   5165.3   41.3   206°17.2   31.6   210°07.1   38.5   32°254.6   50	3	170°39.9	177°57.6	• • 55.9	55°42.9	• • 50.3	100°42.3	• • 38.5	182°03.1	• • 59.5			
Section   Color   Co	4	185°42.3	192°58.2	54.8		50.4	$115^{\circ}44.8$	38.5	197°05.4	59.4			
7 220°497 238°000 51.3 110°56.6 50.8 160°52.5 38.5 227°10.8 500°59.2 Alkiald 126°51.9 49°10.9 51.0 240°52.9 180°52.9 180°59.2 59°006 50°00.9 4 140°03.5 51.1 190°57.6 38.5 257°14.3 559 40ethol. 110°57.6 50°00.9 4 140°03.5 51.1 190°57.6 38.5 257°14.3 559 40ethol. 110°57.6 36°29.5 110°27.6 51.1 20°09.6 20°0.2 44.8 161°0.9 51.2 206°00.1 38.5 227°16.5 58.8 Arctum. 145°47.9 19°0.2 9 11.2 20°09.6 20°0.2 46.6 161°0.9 51.2 206°00.1 38.5 227°16.5 58.8 Arctum. 145°47.9 19°0.2 9 11.2 20°09.6 20°0.2 46.6 161°10.3 51.3 221°02.6 38.5 200°20.9 58.6 Kochab. 137°19.9 74°0.2 7.2 11.2 10°09.6 20°0.2 54.6 10°10.3 51.3 221°02.6 38.5 302°20.9 58.6 Kochab. 137°19.9 74°0.2 7.2 11.2 11.2 11.2 11.2 11.2 11.2 11.	5	200°44.8	207°58.8	53.6	85°49.8	50.5	130°47.4	38.5	212°07.6	59.3	l l		
7 230°49.7 238°00.6 50.1 131°00.1 50.9 175°5.5 38.5 287°1.2 59.0 49.2 253°00.6 50.1 131°00.1 50.9 175°5.5 38.5 287°1.2 58.9 40.2 50°0.1 38.5 287°1.2 58.9 40.2 50°0.1 38.5 287°1.2 58.9 40.2 50°0.1 38.5 287°1.2 58.9 40.2 58.0 1.2 20°0.1 38.5 287°1.2 58.9 40.2 58.0 1.2 20°0.1 38.5 287°1.2 58.0 46.6 176°10.3 51.3 221°0.6 38.5 287°1.5 58.7 58.7 11.2 20°0.2 313°0.2 9 50°4.5 40.3 51.3 221°0.6 38.5 287°1.5 58.7 58.7 58.7 11.2 20°0.0 58.6 11.2 20°0.0 58.6 11.2 20°0.0 58.6 11.2 20°0.0 58.6 11.2 20°0.0 58.6 11.2 20°0.0 58.6 11.2 20°0.0 58.6 11.2 20°0.0 58.6 11.2 20°0.0 58.6 11.2 20°0.0 58.6 11.2 20°0.0 58.6 11.2 20°0.0 58.6 11.2 20°0.0 58.6 11.2 20°0.0 58.6 11.2 20°0.0 58.0 11.2 20°0.0 58	6		222°59.4	S01°52.4	100°53.2	N25°50.7		N21°38.5	227°09.8	S06°59.2			
8 245°522 23°300.6 50.1 131°00.1 50.9 175°550 38.5 27°16.3 58.9   Healthert 147'577 - 30°29.7   10°205°576 1 283°01.7 47.8   161°06.9 51.1 190°576 38.5 27°16.7 58.8   Arcturus 145°4.7 91°02.9   11°205°96 298°02.3 46.6 1.0 16°06.9 51.2 200°00.1 38.5 287°18.7 58.6   Kochab 137°19.9 74°02.7   12°05°96 298°02.3 46.6 1.0 16°08.3 51.3 22°10.6 38.5 302°20.9 58.6   Kochab 137°19.9 74°02.7   12°05°96 298°02.3 46.6 1.0 16°08.3 51.3 22°10.6 38.5 302°20.9 58.6   Kochab 137°19.9 74°02.7   12°20.5 52.0 30°02.0 313°02.9 50°45.4   191°13.8 N25°51.5 230°05.2 N21°38.5 317°21.2 506°88.5   Kochab 137°19.9 74°02.7   12°20.5 52.0 30°01.7   12°20.5 58.1   12°20.6 51.7   266°10.3 38.5 332°25.6 58.4   136°0.4 50°0.4   13°10.7   13°20.4   13°	7	230°49.7	238°00.0	51.3	115°56.6	50.8	160°52.5	38.5	242°12.0				
9 260°94.7 280°01.2 48.9 146°03.5 · 51.1 190°57.6 · 38.5 267°18.7 58.7 1 190°02.9 10 278°74.7 283°01.7 47.8 161°06.9 51.2 206°00.1 38.5 267°18.7 58.7 11 290°99.6 298°02.3 46.6 176°10.3 51.3 221°02.6 38.5 267°18.7 58.7 128.1 1290°09.6 298°02.3 46.6 176°10.3 51.3 221°02.6 38.5 267°18.7 58.7 128.1 1290°0.2 313°02.9 500°4.5 44.3 206°17.2 51.6 251°07.7 38.5 332°25.4 58.4 14 336°07.0 336°30.1 43.1 221°02.6 51.7 266°10.3 38.5 322°24.6 58.3 147°32.2 506°8.5 14.6 211°0.1 191°13.8 N25°1.5 220°15.5 20°15.4 38.5 17°32.0 58.1 141°1.1 11.2 11°0.4 40.8 251°27.5 52.0 296°15.4 38.5 17°32.0 58.1 141°1.1 11.2 11°0.5 4.0 18.5 11°21.1 11°17.9 38.5 32°34.3 586°7.9 18.3 18.3 616.8 43°06.6 501°38.5 281°34.3 526°2.5 20°20.5 N21°38.5 47°36.5 506°7.9 18.3 11°41.9 18.2 11°21.1 11°21.1 118°09.0 31.1 11°17.9 18.5 10°2.9 11°28.1 18.2 11°24.2 88°08.4 · 35.0 326°44.5 · 52.6 11°28.1 · 38.5 107°45.6 57.5 27.2 11°29.1 11°29.1 118°09.0 32.7 36°51.4 52.9 41°33.2 38.5 107°45.6 57.5 North 118°09.0 32.7 36°51.4 52.9 41°33.2 38.5 107°45.6 57.5 North 118°09.0 32.7 36°51.4 52.9 41°33.2 38.5 107°45.6 57.5 North 118°09.0 32.7 36°51.4 52.9 41°33.2 38.5 107°45.6 57.5 North 118°09.0 32.7 36°51.4 52.9 41°33.2 38.5 107°45.6 57.5 North 118°09.0 32.7 36°51.4 52.9 41°33.2 38.5 107°45.6 57.5 North 118°09.0 32.7 36°51.4 52.9 41°33.2 38.5 122°47.6 57.5 North 118°09.0 32.7 26°30.6 38.5 107°45.6 57.5 North 118°09.0 32.7 26°30.6 38.5 10°45.6 57.5 North 118°09.0 32.7 26°30.6 38.5 10°45.6 57.5 North 118°09.0 32.0 36°48.2 North 118°09.0 32.7 26°30.6 38.5 10°45.6 57.5 North 118°09.0 32.0 36°48.2 North 118°09.0 32.0 36°49.2 North 118°09.0 32.0 36°49.2 North 118°09.0 North 118°0									257°14.3				
10 275°57.1 283°07.4 47.8 161°069 51.2 206°00.1 38.5 287°18.7 58.7 11 20°05.6 298°02.3 466 176°103 51.3 221°02.6 38.5 302°02.0 58.6 186°10.7 21°2.0 306°02.0 313°02.9 501°45.4 191°13.8 N25°51.5 236°05.2 N21°35.5 317°23.2 506°56.5 18.1 320°07.0 343°04.1 43.1 221°0.6 51.7 266°10.3 38.5 32°02.9 58.3 18.1 20°07.0 343°04.1 43.1 221°0.6 51.7 266°10.3 38.5 32°08.5 52.9 8.3 18.2 12°0.4 51.9 281°12.8 38.5 22°9.8 58.2 18.2 12°0.4 51.9 281°12.8 38.5 22°9.8 58.2 18.2 12°0.4 51.9 281°12.8 38.5 22°9.8 58.2 18.2 12°0.4 51.9 281°12.8 38.5 22°9.8 58.2 18.2 12°0.6 51.1 51°0.4 388°0.6 501°38.5 281°34.3 N25°52.2 266°15.4 38.5 11°32.0 58.1 51.1 12°1.4 28°0.0 36.6 501°38.5 281°34.3 N25°52.2 266°15.5 N21°38.5 32°34.3 58.0 18.3 16°10.8 38.6 18.3 16°10.8 18.3 16°10.8 18.3 16°10.8 281°2.2 31°10.3 580°0.2 33.8 341°3.0 38.5 62°38.5 7°40.9 57.7 18.2 18.2 18.2 18.2 18.2 18.2 18.2 18.2	9	260°54.6	268°01.2	• • 48.9	146°03.5	• • 51.1	190°57.6	• • 38.5	272°16.5	• • 58.8			
11 200°50.6 298°02.3 46.6 176°10.3 51.3 221°02.6 38.5 302°20.9 58.6 123 000°30.7 120°30.9 50.6 120°30.7 120°30.9 50.6 120°30.7 120°30.9 50.6 120°30.7 120°30.9 50.6 50.6 120°30.9 50.6 50.6 120°30.9 50.6 50.6 120°30.9 50.6 120°30.9 50.6 50.6 120°30.9 50.6 50.6 120°30.9 50.6 50.6 120°	10										II.		
13   306   305   318   302   318   302   318											_		
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16													
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18   36°168   43°066   50°385   281°343   N25°522   336°305   N21°385   47°365   506°57.9     19   51°193   58°07.2   37.3   296°37.7   52.4   311°28.1   31°41.1   52.5   356°25.6   38.5   62°38.7   57.8     21   81°24.2   88°08.4   · · · · · · · · · · · · · · · · · ·													
19													
20   66°21.7   73°07.8   36.1   311°41.1   52.5   356°25.6   38.5   77°40.9   57.7     21   81°42.2   88°08.4   35.0   336°45.5   52.6   11°8.1   38.5   2°43.2   57.6     22   96°26.7   103°09.0   33.8   341°48.0   52.7   26°30.6   38.5   107°45.4   57.5     Mer.pass. 15:35   ν0.6′ d-1.2′ m-4.69   ν3.4′ d0.1′ m-1.24   ν2.6′ d-0.0′ m-2.57   ν2.2′ d-0.1′ m1.10   ν2.6′ d-0.1′ m1.10				07.0		FO. 4					_		
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Mon         GHA         CHA         Dec         GHA         Dec         Genus         Cenus         Seal         Al Na'ir         20°         Cenus         Seal         26°5.1         20°6.2         20°6.2         20°1.2         20°5.3         36°40.8         38.5         19°58.7         56.9         40°8.9         32.2         30°1.2         30°1.1         30°1.1         30°1.2         30°1.1         30°1.2         30°1.1         30°2.2         30°2.2         30°2.3         30°2.2													
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15											Saturn		14:50
16       7°11.0       13°20.3       13.0       252°49.3       55.0       297°16.3       38.5       18°25.4       55.6       Venus       6°38.6       15:07         17       22°13.5       28°20.9       11.8       267°52.7       55.1       312°18.9       38.5       33°27.6       55.5       Mars       245°23.2       23:07         18       37°16.0       43°21.5       501°10.6       282°56.1       N25°55.2       327°21.4       N21°38.5       48°29.8       506°55.4       Jupiter       290°04.1       20:10         19       52°18.4       58°22.2       09.5       297°59.5       55.3       342°24.0       38.5       63°32.1       55.3       53       54       55.2       38.5       78°34.3       55.2       54       55.2       38.5       78°34.3       55.2       55.1       55.1       55.3       55.3       342°24.0       38.5       78°34.3       55.2       55.1       55.1       55.3       55.3       55.3       38.5       78°34.3       55.2       55.1       55.1       55.1       55.1       55.1       55.1       55.1       55.1       55.1       55.1       55.1       55.1       55.1       55.1       55.1       55.1       55.1												61	
17 22°13.5 28°20.9 11.8 267°52.7 55.1 312°18.9 38.5 33°27.6 55.5 Mars 245°23.2 23:07 18 37°16.0 43°21.5 501°10.6 282°56.1 N25°55.2 327°21.4 N21°38.5 48°29.8 506°55.4 19 52°18.4 58°22.2 09.5 297°59.5 55.3 342°24.0 38.5 63°32.1 55.3 20 67°20.9 73°22.8 08.3 313°02.8 55.4 357°26.5 38.5 78°34.3 55.2 21 82°23.4 88°23.5 · · 07.2 328°06.2 · · 55.6 12°29.0 · · · 38.5 93°36.5 · · 55.1 22 97°25.8 103°24.1 06.0 343°09.6 55.7 27°31.6 38.5 108°38.7 55.0 23 112°28.3 118°24.8 04.9 358°13.0 55.8 42°34.1 38.5 123°41.0 54.9 Mars: 0.2 23:07 Jupiter 290°04.1 20:10 Saturn 11°18.2 14:46													
18  37°16.0  43°21.5  501°10.6  282°56.1  N25°55.2  327°21.4  N21°38.5  48°29.8  506°55.4  19  52°18.4  58°22.2  09.5  297°59.5  55.3  342°24.0  38.5  63°32.1  55.3  20  67°20.9  73°22.8  08.3  313°02.8  55.4  357°26.5  38.5  78°34.3  55.2  21  82°23.4  88°23.5  ·· 07.2  328°06.2  ·· 55.6  12°29.0  ·· 38.5  93°36.5  ·· 55.1  22  97°25.8  103°24.1  06.0  343°09.6  55.7  27°31.6  38.5  108°38.7  55.0  23  112°28.3  118°24.8  04.9  358°13.0  55.8  42°34.1  38.5  123°41.0  54.9  48°29.8  506°55.4  506°55.4  55.3  500°55.4  5													
19 52°18.4 58°22.2 09.5 297°59.5 55.3 342°24.0 38.5 63°32.1 55.3 20 67°20.9 73°22.8 08.3 313°02.8 55.4 357°26.5 38.5 78°34.3 55.2 21 82°23.4 88°23.5 · · 07.2 328°06.2 · · 55.6 12°29.0 · · 38.5 93°36.5 · · 55.1 22 97°25.8 103°24.1 06.0 343°09.6 55.7 27°31.6 38.5 108°38.7 55.0 23 112°28.3 118°24.8 04.9 358°13.0 55.8 42°34.1 38.5 123°41.0 54.9  Mars: 0.2													
20 67°20.9 73°22.8 08.3 313°02.8 55.4 357°26.5 38.5 78°34.3 55.2 21 82°23.4 88°23.5 · · 07.2 328°06.2 · · 55.6 12°29.0 · · 38.5 93°36.5 · · 55.1 22 97°25.8 103°24.1 06.0 343°09.6 55.7 27°31.6 38.5 108°38.7 55.0 23 112°28.3 118°24.8 04.9 358°13.0 55.8 42°34.1 38.5 123°41.0 54.9  Horizontal parallax Venus: 0.3 Mars: 0.2													
21       82°23.4       88°23.5       · · 07.2       328°06.2       · · 55.6       12°29.0       · · 38.5       93°36.5       · · 55.1       Horizontal parallax         22       97°25.8       103°24.1       06.0       343°09.6       55.7       27°31.6       38.5       108°38.7       55.0       Venus:       0.3         23       112°28.3       118°24.8       04.9       358°13.0       55.8       42°34.1       38.5       123°41.0       54.9       Mars:       0.2											Saturn	11°18.2	14:46
22       97°25.8       103°24.1       06.0       343°09.6       55.7       27°31.6       38.5       108°38.7       55.0       Venus: 0.3         23       112°28.3       118°24.8       04.9       358°13.0       55.8       42°34.1       38.5       123°41.0       54.9       Mars: 0.2											Horizont	al parallay	
23 112°28.3 118°24.8 04.9 358°13.0 55.8 42°34.1 38.5 123°41.0 54.9 Mars: 0.2												-	0.3
20 112 20.5 110 21.0 01.5 35.0 12.5 11.0 51.5													
Mer.pass. 15:31 $\nu 0.6' \ d$ -1.2' m-4.70 $\nu 3.4' \ d$ 0.1' m-1.21 $\nu 2.5' \ d$ -0.0' m-2.56 $\nu 2.2' \ d$ -0.1' m1.11		112 28.3											
	Mer.p	ass. 15:31	u0.6′ $d$ -1	.2′ m-4.70	$\nu$ 3.4′ d0.	1′ m-1.21	$\nu$ 2.5′ d-0	.0′ m-2.56	$\nu$ 2.2′ d-0	$.1^\prime$ m $1.11$			

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	176°56.5	S18°57.2	236°57.3	9.3'	S26°43.9	5.5'	55.4'
1	191°56.4 206°56.2	56.6	251°25.5 265°53.7	9.2'	26°49.5	5.4'	55.4'
2 3	206 56.2 221°56.1	56.0 • • 55.4	265°53.7 280°21.8	9.1' 9.0'	26°54.9 27°00.1	5.3' 5.1'	55.4' 55.5'
4	236°55.9	54.8	294°49.8	8.9'	27°05.3	5.0'	55.5'
5	251°55.8	54.1	$309^{\circ}17.7$	8.8'	$27^{\circ}10.3$	4.9'	55.5'
6	266°55.7	\$18°53.5	323°45.5	8.7'	\$27°15.1	4.7'	55.5'
7 8	281°55.5 296°55.4	52.9 52.3	338°13.2 352°40.8	8.6' 8.6'	27° 19.9 27° 24.5	4.6' 4.5'	55.6' 55.6'
9	311°55.2	• • 51.7	7°08.4	8.5'	27°28.9	4.3'	55.6'
10	326°55.1	51.0	21°35.9	8.4'	27°33.2	4.2'	55.7'
11	341°55.0 356°54.8	50.4	36°03.3 50°30.6	8.3'	27°37.4 527°41.4	4.0'	55.7'
12 13	356 54.8 11°54.7	\$18°49.8 49.2	64°57.8	8.2' 8.2'	27°41.4 27°45.3	3.9' 3.7'	55.7' 55.7'
14	26°54.5	48.5	79°25.0	8.1'	27°49.0	3.6'	55.8'
15	41°54.4	• • 47.9	93°52.0	8.0'	27°52.6	3.4'	55.8'
16 17	56°54.3 71°54.1	47.3 46.7	108°19.0 122°45.9	7.9' 7.8'	27°56.1 27°59.4	3.3' 3.1'	55.8' 55.8'
18	86°54.0	\$18°46.0	137°12.8	7.8'	\$28° 02.5	3.0'	55.9'
19	101°53.8	45.4	151°39.6	7.7'	28°05.5	2.8'	55.9'
20	116°53.7	44.8	166°06.3	7.6'	28°08.3	2.7'	55.9'
21 22	131°53.6 146°53.4	· · 44.1 43.5	180°32.9 194°59.5	7.6' 7.5'	28°11.0 28°13.6	2.5' 2.4'	56.0' 56.0'
23	161°53.3	42.9	209°26.0	7.3 7.4'	28° 15.9	2.4	56.0'
	SD = 16.2'	d = -0.6'			D = 15.1'		
				JI			
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	176°53.2 191°53.0	\$18° 42.2 41.6	223°52.4 238°18.7	7.4' 7.3'	\$28° 18.2 28° 20.2	2.1' 1.9'	56.0' 56.1'
2	206°52.9	41.0	250° 45.0	7.2'	28° 22.2	1.8'	56.1
3	221°52.8	• • 40.4	267°11.3	7.2'	28°23.9	1.6'	56.1'
4	236°52.6	39.7	281°37.5	7.1'	28° 25.5	1.4'	56.2'
5 6	251°52.5 266°52.4	39.1 \$18°38.4	296°03.6 310°29.6	7.1' 7.0'	28°26.9 \$28°28.2	1.3' 1.1'	56.2' 56.2'
7	281°52.2	37.8	324°55.7	7.0'	28° 29.3	1.0'	56.3
8	296°52.1	37.2	339°21.6	6.9'	28°30.3	0.8'	56.3'
9	311°52.0	• • 36.5	353°47.5	6.9'	28°31.1	0.6'	56.3'
10 11	326°51.8 341°51.7	35.9 35.3	8°13.4 22°39.2	6.8' 6.8'	28°31.7 28°32.2	0.5' 0.3'	56.3' 56.4'
12	356°51.6	S18°34.6	37°04.9	6.7'	S28°32.5	0.1	56.4
13	11°51.4	34.0	51°30.6	6.7'	28° 32.6	-0.0'	56.4'
14 15	26°51.3 41°51.2	33.3 · · 32.7	65°56.3 80°21.9	6.6' 6.6'	28°32.6 28°32.4	-0.2' -0.4'	56.5' 56.5'
16	41 51.2 56°51.0	32.1	94°47.5	6.5	28°32.4 28°32.1	-0.4 -0.5'	56.5'
17	71°50.9	31.4	109°13.1	6.5'	28°31.5	-0.7'	56.6'
18	86°50.8	\$18° 30.8	123°38.6 138°04.1	6.5'	\$28°30.8 28°30.0	-0.9'	56.6'
19 20	101°50.6 116°50.5	30.1 29.5	158 04.1 152°29.5	6.4' 6.4'	28°29.0	-1.0' -1.2'	56.6' 56.6'
21	131°50.4	28.9	166°54.9	6.4'	28°27.8	-1.4'	56.7'
22	146°50.3	28.2	181°20.3	6.4'	28°26.4	-1.5'	56.7'
23	161°50.1	27.6	195°45.7	6.3'	28°24.9	-1.7'	56.7'
	SD = 16.2'	d = -0.6'		SI	O = 15.3'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°50.0	<b>S</b> 18°26.9	210°11.0	6.3'	\$28°23.2	-1.9'	56.8'
1	191°49.9	26.3	224°36.3	6.3'	28°21.3	-2.0'	56.8'
2	206°49.8 221°49.6	25.6 •• 25.0	239°01.6 253°26.9	6.3' 6.3'	28° 19.2 28° 17.0	-2.2' -2.4'	56.8' 56.9'
4	236°49.5	24.3	267°52.2	6.2'	28°14.6	-2.6'	56.9'
5	251°49.4	23.7	282°17.4	6.2'	28° 12.1	-2.7'	56.9'
6 7	266°49.2 281°49.1	\$18°23.0 22.4	296°42.7 311°07.9	6.2' 6.2'	\$28°09.3 28°06.4	-2.9' -3.1'	57.0' 57.0'
8	281 49.1 296°49.0	22.4	311°07.9 325°33.1	6.2'	28°06.4 28°03.4	-3.1' -3.2'	57.0° 57.0°
9	311°48.9	• • 21.1	339°58.3	6.2'	28°00.1	-3.4'	57.0'
10	326°48.8	20.4	354°23.5	6.2'	27°56.7	-3.6'	57.1'
11 12	341°48.6 356°48.5	19.8 \$18° 19.1	8°48.7 23°13.9	6.2' 6.2'	27°53.1 \$27°49.3	-3.8' -3.9'	57.1' 57.1'
13	11°48.4	18.5	37°39.2	6.2	27°45.4	-3.9 -4.1'	57.1 57.2'
14	26°48.3	17.8	52°04.4	6.2'	27°41.3	-4.3'	57.2'
15	41°48.1 56°48.0	•• 17.2	66°29.6 80°54.8	6.2'	27°37.0	-4.4'	57.2'
16 17	56°48.0 71°47.9	16.5 15.9	80°54.8 95°20.0	6.2' 6.2'	27°32.6 27°28.0	-4.6' -4.8'	57.3' 57.3'
18	86°47.8	S18° 15.2	109°45.3	6.3'	S27°23.2	-5.0'	57.3'
19	101°47.6	14.5	124°10.5	6.3'	27°18.2	-5.1'	57.3'
20 21	116°47.5 131°47.4	13.9 •• 13.2	138°35.8 153°01.1	6.3' 6.3'	27°13.1 27°07.8	-5.3' -5.5'	57.4' 57.4'
22	131 47.4 146°47.3	12.6	167°26.4	6.3	27°02.3	-5.6'	57.4'
23	161°47.2	11.9	181°51.7	6.3'	26°56.7	-5.8'	57.5'
	SD = 16.2'	d = -0.6'		SI	D = 15.5'		

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

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

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age	
Luy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	26-28	
	mm:ss mm:ss		hh:mm	hh:mm	hh:mm	22-8%	
25	12:14	12:21	12:12	08:30	20:58		
26	12:27	12:34	12:13	09:26	21:54		
27	12:40	12:46	12:13	10:23	22:52		

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	127°30.7	133°25.4	S01°03.7	13°16.4	N25°55.9	57° 36.6	N21°38.5	138°43.2	S06°54.7			
1	142°33.2	148°26.1	02.6	28° 19.8	56.0	72°39.2	38.5	153° 45.4	54.6	Alpheratz	357°34.9	29°13.8
2	157°35.7	163°26.7	01.4	43°23.2	56.1	87°41.7	38.5	168°47.6	54.5	Ankaa	353°07.3	-42°10.4
3	172°38.1	178°27.4	01°00.2	58° 26.6	56.2	102°44.2	• • 38.5	183°49.8	• • 54.4	Schedar	349°31.3	56°40.7
4	187°40.6	193°28.0	00°59.1	73°30.0	56.4	117°46.8	38.5	198°52.1	54.3	Diphda	348°47.4	-17°51.1
5	202°43.1	208°28.7	57.9	88°33.3	56.5	132°49.3	38.5	213°54.3	54.2	Achernar	335°20.2	-57°06.9
6	217°45.5	223°29.3	S00°56.8	103°36.7	N25° 56.6	147°51.8	N21°38.5	228°56.5	S06°54.1	Hamal	327°51.2	23°34.9
7	232°48.0	238° 30.0	55.6	118° 40.1	56.7	162°54.3	38.5	243°58.7	54.0	Polaris	313°55.3	89°22.5
8	247°50.5	253°30.6	54.5	133°43.5	56.8	177° 56.9	38.5	259°00.9	53.9	Acamar	315°11.6	-40°12.5
9	262°52.9	268°31.3	• • 53.3	148°46.9	56.9	192°59.4	• • 38.5	274°03.2	• • 53.8	Menkar	314°06.0	4°11.2
10	277°55.4	283°32.0	52.2	163°50.3	57.0	208°01.9	38.5	289°05.4	53.7	Mirfak	308°28.0	49°57.2
11	292°57.9	298°32.6	51.0	178°53.6	57.2	223°04.5	38.5	304°07.6	53.6	Aldebaran	290°39.4	16°33.6
12	308°00.3	313°33.3	S00°49.9	193°57.0	N25°57.3	238°07.0	N21°38.5	319°09.8	S06°53.5	Rigel	281°03.6	-8°10.4
13	323°02.8	328°33.9	48.7	209°00.4	57.4	253°09.5	38.5	334°12.0	53.4	Capella	280°21.5 278°22.6	46°01.5 6°22.3
14	338°05.2	343°34.6	47.6	224°03.8	57.5	$268^{\circ}12.1$	38.5	349°14.3	53.3	Bellatrix Elnath	278°01.5	0 22.3 28°37.8
15	353°07.7	358°35.3	• • 46.4	239°07.1	• • 57.6	283°14.6	• • 38.5	$4^{\circ}16.5$	• • 53.2	Alnilam	275°37.4	-1°11.2
16	8°10.2	13°36.0	45.3	254°10.5	57.7	$298^{\circ}17.1$	38.5	$19^{\circ}18.7$	53.1	Betelgeuse	270°51.8	7°24.7
17	23°12.6	28° 36.6	44.1	269°13.9	57.8	313°19.6	38.5	34°20.9	52.9	Canopus	263°51.9	-52°42.7
18	38°15.1	43°37.3	S00°43.0	284°17.3	N25°57.9	328°22.2	N21°38.5	49°23.2	S06°52.8	Sirius	258°25.9	-16°45.1
19	53°17.6	58°38.0	41.8	299° 20.6	58.0	343°24.7	38.5	64°25.4	52.7	Adhara	255°05.5	-10°45.1 -29°00.5
20	68°20.0	73°38.7	40.7	314°24.0	58.1	358°27.2	38.5	79°27.6	52.6	Procyon	244°50.4	5°09.6
21	83°22.5	88°39.3	• • 39.5	329°27.4	58.3	13°29.7	• • 38.5	94°29.8	• • 52.5	Pollux	243°16.9	27°57.9
22	98°25.0	103°40.0	38.4	344°30.7	58.4	28°32.3	38.5	109°32.0	52.4	Avior	234°14.1	-59°35.4
23	113°27.4	118°40.7	37.2	359°34.1	58.5	43°34.8	38.5	124°34.2	52.3	Suhail	222°45.8	-43°32.0
Mer.n	ass. 15:27	$\nu$ 0.6′ d-1	.2′ m-4.71	$\nu$ 3.4 $'$ d0	1' m-1.19	$\nu$ 2.5′ d0	0′ m-2.55	$\nu 2.2' \ d-0$	.1′ m1.11	Miaplacidus	221°37.4	-69°49.1
										Alphard	217°47.4	-8°46.1
										Regulus	207°34.1	11°50.6
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.4	61°36.7
0	128°29.9	133°41.4	S00°36.1	14°37.5	N25°58.6	58° 37.3	N21°38.5	139°36.5	S06°52.2	Denebola	182°24.7	14°25.8
1	143°32.3	148°42.1	34.9	29°40.8	58.7	73°39.8	38.5	154°38.7	52.1	Gienah	175°43.3	-17°40.9
2	158°34.8	163°42.7	33.8	44°44.2	58.8	88°42.4	38.5	169°40.9	52.0	Acrux	172°59.7	-63°14.1
3	173°37.3	178°43.4	• • 32.6	59°47.6	• • 58.9	103°44.9	• • 38.5	184°43.1	• • 51.9	Gacrux	171°51.3	-57°15.0
4	188°39.7	193°44.1	31.5	74°50.9	59.0	118° 47.4	38.5	199°45.3	51.8	Alioth	166°12.7	55°49.1
5	203°42.2	208°44.8	30.3	89°54.3	59.1	133°49.9	38.5	214°47.6	51.7	Spica	158°22.2	-11°17.6
6	218°44.7	223°45.5	500°29.2	104°57.6	N25° 59.2	148°52.4	N21°38.5	229°49.8	S06°51.6	Alkaid	152°51.8	49°10.9
7	233°47.1	238°46.2	28.0	120°01.0	59.3	163°55.0	38.5	244°52.0	51.5	Hadar	148°35.9	-60°29.4
8	248°49.6	253°46.9	26.9	135°04.3	59.4	178° 57.5	38.5	259°54.2	51.3	Menkent	$147^{\circ}57.5$	-36°29.5
9	263°52.1	268°47.6	• • 25.7	150°07.7	• • 59.5	194°00.0	· · 38.5	274°56.4	• • 51.2	Arcturus	145°47.8	19°02.9
10	278°54.5	283°48.3	24.6	165°11.1	59.6	209°02.5	38.5	289°58.7	51.1	Rigil Kent.	139°40.3	$-60^{\circ}56.1$
11	293°57.0	298°49.0	23.4	180°14.4	59.7	224°05.1	38.5	305°00.9	51.0	Kochab	$137^{\circ}19.9$	74°02.7
12	308°59.5	313°49.7	S00°22.3	195°17.8	N25°59.8	239°07.6	N21°38.5	320°03.1	\$06°50.9	Zuben'ubi	$136^{\circ}56.0$	-16°08.8
13	324°01.9	328°50.4	21.1	210°21.1	25°59.9	254° 10.1	38.6	335°05.3	50.8	Alphecca	126°03.8	26°37.6
14	339°04.4	343°51.1	20.0	225°24.5	26°00.0	269°12.6	38.6	350°07.5	50.7	Antares	$112^{\circ}16.0$	-26°29.2
15	354°06.8	358°51.8	• • 18.9	240°27.8	00.1	284°15.1	• • 38.6	5°09.8	• • 50.6	Atria	$107^{\circ}10.5$	-69°04.1
16	9°09.3	13°52.5	17.7	255°31.2	00.2	299°17.6	38.6	20°12.0	50.5	Sabik	102°02.9	-15°45.4
17	24°11.8	28°53.2	16.6	270°34.5	00.3	314°20.2 329°22.7	38.6	35°14.2	50.4	Shaula	$96^{\circ}10.6$	-37°07.3
18 19	39°14.2	43°53.9	S00°15.4	285°37.9	N26°00.4		N21°38.6	50°16.4	S06°50.3	Rasalhague	95°58.7	12°32.3
	54°16.7 69°19.2	58° 54.6 73° 55.3	14.3	300°41.2 315°44.5	00.5	344°25.2 359°27.7	38.6	65°18.6 80°20.8	50.2	Eltanin	90°42.6	51°28.8
20 21	84°21.6	73 55.5 88°56.0	13.1 •• 12.0	315 44.5 330°47.9	00.6 •• 00.7	14° 30.2	38.6 •• 38.6	95°23.1	50.1 •• 50.0	Kaus Aust.	83°32.8	-34°22.3
22	99°24.1	103°56.7	10.9	345°51.2	00.7	29°32.7	38.6	110°25.3	49.9	Vega	80°33.6	38°48.2
23	114°26.6	103 50.7 118° 57.4	09.7	0°54.6	00.8	44° 35.3	38.6	110 25.5 125°27.5	49.9	Nunki	75°48.0	-26°16.0
23	114 20.0	110 57.4		0 34.0	00.9	44 33.3	30.0			Altair	62°00.2	8°56.0
Mer.p	ass. 15:23	$\nu$ 0.7′ d-1	.1′ m-4.72	$\nu$ 3.4′ d0.	1'  m-1.16	$\nu 2.5' \ d0.$	.0′ m-2.54	$\nu$ 2.2′ d-0	.1' m $1.11$	Peacock	53°06.2	-56°39.3
										Deneb	49°26.2	45°22.1
ть	CHA	CHA	Doo	CHA	Doo	CHA	Doo	CHA	Dee	Enif	33°39.1	9°59.3
Thu 0	<b>GHA</b> 129°29.0	<b>GHA</b> 133° 58.2	<b>Dec</b> \$00°08.6	<b>GHA</b> 15°57.9	<b>Dec</b> N26°01.0	<b>GHA</b> 59°37.8	<b>Dec</b> N21°38.6	<b>GHA</b> 140°29.7	<b>Dec</b> \$06°49.6	Al Na'ir	27°33.3	-46°50.5
1	129 29.0 144°31.5	133 58.2 148°58.9	07.4	31°01.2	N26 01.0 01.1	59 37.8 74°40.3	38.6	140 29.7 155°31.9	49.5	Fomalhaut	15°14.7	-29°29.5
2	144 31.5 159°34.0	148 58.9 163°59.6	07.4	31 01.2 46°04.6	01.1	74 40.3 89°42.8	38.6	155 31.9 170°34.1	49.5 49.4	Scheat	13°45.4	28°13.2
3	174° 36.4	103 59.0 179°00.3	05.1	61°07.9	01.3	09 42.0 104°45.3	38.6	170 34.1 185°36.4	• • 49.4	Markab	13°30.1	15°20.4
4	174 30.4 189°38.9	179 00.3 194°01.0	04.0	76°11.2	01.4	104 45.3 119° 47.8	38.6	200°38.6	49.3	Jan 28 Tue	SHA	Mer.pass
5	204°41.3	209°01.8	02.9	91°14.6	01.4	134°50.3	38.6	215°40.8	49.2	Venus	5°54.7	15:06
6	219°43.8	224°02.5	S00°01.7	106° 17.9	N26°01.6	149° 52.9	N21°38.6	230°43.0	S06°49.0	Mars		23:02
7	219 45.0 234°46.3	239°03.2	500°01.7 S00°00.6	100 17.9 121°21.2	01.7	164° 55.4	38.6	245°45.2	48.9	Jupiter	290°05.9	20:06
8	249°48.7	254°03.9	N00°00.5	136°24.6	01.8	179° 57.9	38.6	260°47.5	48.8	Saturn	11°12.4	14:43
9	264°51.2	269°04.7	01.7	151°27.9	01.9	195°00.4	• • 38.6	275°49.7	• • 48.7			
10	279°53.7	284°05.4	02.8	166°31.2	02.0	210°02.9	38.6	290°51.9	48.6	Jan 29 Wed	SHA	Mer.pass
11	294°56.1	299°06.1	04.0	181°34.6	02.1	225°05.4	38.6	305°54.1	48.5	Venus	5°11.5	15:05
12	309°58.6	314°06.9	N00°05.1	196°37.9	N26°02.2	240°07.9	N21°38.6	320°56.3	S06°48.4	Mars		22:56
13	325°01.1	329°07.6	06.2	211°41.2	02.3	255° 10.4	38.6	335°58.5	48.2	Jupiter	290°07.4	20:02
14	340°03.5	344°08.3	07.4	226°44.5	02.3	270°12.9	38.6	351°00.8	48.1	Saturn	11°06.6	14:39
15	355°06.0	359°09.1	• • 08.5	241°47.9	• • 02.4	285°15.5	• • 38.6	6°03.0	• • 48.0	Jan 30 Thu	SHA	Mer.pass
16	10°08.5	14°09.8	09.7	256°51.2	02.5	300° 18.0	38.6	21°05.2	47.9	Venus	4°29.1	15:03
17	25°10.9	29° 10.6	10.8	271°54.5	02.6	315°20.5	38.6	36°07.4	47.8	Mars		22:51
18	40°13.4	44°11.3	N00°11.9	286°57.8	N26°02.7	330°23.0	N21°38.6	51°09.6	<b>S</b> 06°47.7	Jupiter		19:58
19	55°15.8	59°12.0	13.1	$302^{\circ}01.1$	02.8	$345^{\circ}25.5$	38.6	$66^{\circ}11.8$	47.6	Saturn	11°00.7	14:36
20	70°18.3	$74^{\circ}12.8$	14.2	$317^{\circ}04.4$	02.9	$0^{\circ}28.0$	38.6	81°14.0	47.5			
21	85°20.8	89° 13.5	• • 15.3	$332^{\circ}07.8$	• • 03.0	$15^{\circ}30.5$	• • 38.6	96°16.3	• • 47.4	Horizont	al parallax	
22	$100^{\circ}23.2$	$104^{\circ}14.3$	16.5	$347^{\circ}11.1$	03.1	$30^{\circ}33.0$	38.6	111°18.5	47.3		Venus:	0.3
23	115°25.7	$119^{\circ}15.0$	17.6	2°14.4	03.2	45°35.5	38.7	$126^{\circ}20.7$	47.2		Mars:	0.2
Mar	ass. 15:20	υΩ 7/ A 1	.1′ m-4.73	1/3 3/ 40	1′ m-1.13	1/2 5/ 40	.0′ m-2.54	1/2 2/ 4 0	.1′ m1.11			
ivier.p	uss. 15.20	νυ.ι u-1	.11-4.13	$\nu$ J.J. $u$ $0$ .	I 111-1.13	ν2.5 UU.	0 111-2.34	ν 2.2 U-U	.1111.11			

h	Su	n					
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	176°47.0	S18°11.3	$196^{\circ}17.1$	6.4'	<b>S</b> 26°50.9	-6.0'	57.5'
1	191°46.9	10.6	210°42.4	6.4'	26°44.9	-6.1'	57.5'
2	206° 46.8 221° 46.7	09.9 •• 09.3	225°07.8 239°33.3	6.4' 6.5'	26°38.8 26°32.5	-6.3' -6.5'	57.6' 57.6'
4	236° 46.6	08.6	253°58.7	6.5	26°26.0	-6.6'	57.6'
5	251°46.5	0.80	268°24.2	6.5'	$26^{\circ}19.4$	-6.8'	57.6'
6	266° 46.3	\$18°07.3	282°49.7	6.5'	\$26°12.6	-7.0'	57.7'
7 8	281° 46.2 296° 46.1	06.6 06.0	297°15.2 311°40.8	6.6' 6.6'	26°05.6 25°58.5	-7.1' -7.3'	57.7' 57.7'
9	311°46.0	05.3	326°06.4	6.7'	25°51.2	-7.5	57.8'
10	326° 45.9	04.6	340°32.1	6.7'	25°43.7	-7.6'	57.8'
11 12	341° 45.8 356° 45.6	04.0 \$18°03.3	354°57.8 9°23.5	6.7' 6.8'	25°36.1 \$25°28.3	-7.8' -7.9'	57.8' 57.9'
13	11° 45.5	02.6	9 23.5 23°49.3	6.8	25°20.4	-7.9 -8.1'	57.9'
14	26°45.4	02.0	38°15.1	6.9'	25°12.3	-8.3	57.9'
15	41°45.3	• • 01.3	52°41.0	6.9'	25°04.0	-8.4'	57.9'
16 17	56° 45.2 71° 45.1	00.6 18°00.0	67°06.9 81°32.9	7.0' 7.0'	24°55.6 24°47.0	-8.6' -8.7'	58.0' 58.0'
18	86° 45.0	\$17°59.3	95°58.9	7.1	\$24°38.3	-8.9'	58.0'
19	101°44.9	58.6	110°24.9	7.1'	$24^{\circ}29.4$	-9.0'	58.1'
20	116° 44.7	58.0	124°51.0	7.2'	24°20.3	-9.2'	58.1'
21 22	131° 44.6 146° 44.5	· · 57.3 56.6	139°17.2 153°43.4	7.2' 7.3'	24°11.1 24°01.8	-9.4' -9.5'	58.1' 58.1'
23	161°44.4	55.9	168°09.7	7.3'	24 01.8 23°52.3	-9.5 -9.7'	58.2'
	SD = 16.2'	d = -0.7'		SE	0 = 15.7'		
			-				
Wed 0	<b>GHA</b> 176° 44.3	<b>Dec</b> \$17°55.3	<b>GHA</b> 182°36.0	u 7.4'	Dec 523°42.6	d -9.8'	<b>HP</b> 58.2'
1	170 44.3 191°44.2	54.6	197°02.4	7.4 7.4'	23°32.8	-9.6 -10.0'	58.2'
2	206°44.1	53.9	211°28.8	7.5'	$23^{\circ}22.9$	-10.1'	58.2'
3	221°44.0	• • 53.2	225°55.3	7.5'	23°12.8	-10.2'	58.3'
4 5	236° 43.9 251° 43.7	52.6 51.9	240°21.9 254°48.5	7.6' 7.7'	23°02.5 22°52.1	-10.4' -10.5'	58.3' 58.3'
6	266° 43.6	S17°51.2	269°15.1	7.7'	S22°41.6	-10.7'	58.3
7	281°43.5	50.5	283°41.9	7.8'	$22^{\circ}30.9$	-10.8'	58.4'
8	296°43.4	49.9	298°08.6	7.8'	22°20.1	-11.0'	58.4
9 10	311°43.3 326°43.2	· · 49.2 48.5	312°35.5 327°02.4	7.9' 8.0'	22°09.1 21°58.0	-11.1' -11.2'	58.4' 58.4'
11	341°43.1	47.8	341°29.4	8.0'	21°46.8	-11.4'	58.5
12	356°43.0	S17°47.1	355°56.4	8.1'	S21°35.5	-11.5'	58.5'
13	11° 42.9	46.5	10°23.5	8.2'	21°23.9 21°12.3	-11.6'	58.5'
14 15	26° 42.8 41° 42.7	45.8 •• 45.1	24°50.7 39°17.9	8.2' 8.3'	21°12.3 21°00.5	-11.8' -11.9'	58.5' 58.6'
16	56° 42.6	44.4	53°45.2	8.4'	20°48.6	-12.0'	58.6'
17	71°42.5	43.7	68°12.6	8.4'	$20^{\circ}36.6$	-12.2'	58.6'
18	86° 42.4 101° 42.3	\$17°43.1	82°40.0 97°07.5	8.5' 8.6'	\$20°24.5 20°12.2	-12.3'	58.6'
19 20	101 42.3 116°42.2	42.4 41.7	97 07.5 111°35.0	8.6	20 12.2 19°59.8	-12.4' -12.5'	58.7' 58.7'
21	131° 42.0	• • 41.0	126°02.6	8.7'	19°47.2	-12.7'	58.7'
22	146°41.9	40.3	140°30.3	8.8'	19°34.6	-12.8'	58.7'
23	161°41.8	39.6	154°58.1	8.8'	19°21.8	-12.9'	58.8'
	SD = 16.2'	d = -0.7'		SE	0 = 15.9'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°41.7	\$17°38.9	169°25.9	8.9'	\$19°08.9	-13.0'	58.8'
1 2	191°41.6 206°41.5	38.3 37.6	183°53.8 198°21.7	8.9' 9.0'	18°55.9 18°42.8	-13.1' -13.2'	58.8' 58.8'
3	221°41.4	36.9	212°49.7	9.1'	18°29.6	-13.4'	58.8'
4	236°41.3	36.2	227°17.8	9.1'	18°16.2	-13.5'	58.9'
5	251° 41.2 266° 41.1	35.5 \$17°34.8	241°46.0 256°14.2	9.2' 9.3'	18°02.7 \$17°49.2	-13.6'	58.9'
6 7	266°41.1 281°41.0	34.8 34.1	256°14.2 270°42.4	9.3'	17°35.5	-13.7' -13.8'	58.9' 58.9'
8	296°40.9	33.4	285°10.8	9.4'	$17^{\circ}21.7$	-13.9'	58.9
9	311°40.8	• • 32.8	299°39.2	9.5'	17°07.8	-14.0'	59.0'
10 11	326°40.7 341°40.6	32.1 31.4	314°07.6 328°36.2	9.5' 9.6'	16°53.8 16°39.7	-14.1' -14.2'	59.0' 59.0'
12	341°40.6 356°40.5	31.4 \$17°30.7	328° 36.2 343° 04.8	9.6	516°25.5	-14.2 -14.3'	59.0° 59.0°
13	11°40.4	30.0	357°33.4	9.7'	$16^{\circ}11.2$	-14.4'	59.0'
14	26°40.3	29.3	12°02.1	9.8'	15°56.8	-14.5'	59.1'
15 16	41°40.2 56°40.1	· · 28.6 27.9	26°30.9 40°59.8	9.8' 9.9'	15°42.3 15°27.7	-14.6' -14.7'	59.1' 59.1'
16 17	71°40.1	27.9 27.2	40°59.8 55°28.7	9.9 10.0'	15° 27.7 15° 13.0	-14.7' -14.8'	59.1' 59.1'
18	86°40.0	S17°26.5	69°57.6	10.0'	<b>S</b> 14°58.2	-14.9'	59.1'
19	101°39.9	25.8	84°26.6	10.1'	14°43.4	-15.0'	59.1'
20 21	116°39.8 131°39.7	25.1 •• 24.4	98°55.7 113°24.9	10.1' 10.2'	14°28.4 14°13.4	-15.0' -15.1'	59.2' 59.2'
22	131 39.7 146°39.6	23.7	113 24.9 127°54.1	10.2	14 13.4 13°58.2	-15.1 -15.2'	59.2' 59.2'
23	161°39.5	23.0	142°23.3	10.3'	13°43.0	-15.3'	59.2
	SD = 16.2'	d = -0.7'		SE	0 = 16.0'		_

N 72°         O7:19         O8:51         10:53         13:35         15:37         17:09           N 70°         O7:10         O8:30         10:01         14:27         15:57         17:18           68°         O7:02         O8:14         O9:29         14:58         16:13         17:25           66°         O6:56         O8:01         O9:06         15:21         16:27         17:31           62°         O6:45         O7:40         O8:33         15:54         16:37         17:37           62°         O6:45         O7:40         O8:33         15:54         16:37         17:42           60°         O6:41         O7:32         O8:20         16:07         16:55         17:46           N 58°         O6:37         O7:25         O8:09         16:18         17:02         17:50           56°         O6:33         O7:18         O8:00         16:27         17:09         17:54           54°         O6:30         O7:12         O7:52         16:35         17:14         17:57           52°         O6:26         O7:07         O7:44         16:43         17:20         18:01           45°         O6:16         O6:51	Lat.	Twi	light	Sunrise	Sunset	Twi	light
N 70°         07:10         08:30         10:01         14:27         15:57         17:18           68°         07:02         08:14         09:29         14:58         16:13         17:25           66°         06:56         08:01         09:06         15:21         16:27         17:31           62°         06:50         07:50         08:48         15:40         16:37         17:37           62°         06:45         07:40         08:33         15:54         16:47         17:42           60°         06:41         07:32         08:20         16:07         16:55         17:42           60°         06:37         07:25         08:09         16:18         17:02         17:50           56°         06:33         07:18         08:00         16:27         17:09         17:54           54°         06:30         07:12         07:52         16:35         17:14         17:57           52°         06:26         07:07         07:44         16:43         17:20         18:01           50°         06:23         07:02         07:37         16:49         17:25         18:04           45°         06:16         06:51	Lat.	Naut.	Civil	Junisc	Junioci	Civil	Naut.
68°         07:02         08:14         09:29         14:58         16:13         17:25           66°         06:56         08:01         09:06         15:21         16:27         17:31           64°         06:50         07:50         08:48         15:40         16:37         17:37           62°         06:45         07:40         08:33         15:54         16:47         17:42           60°         06:41         07:32         08:20         16:07         16:55         17:46           N 58°         06:37         07:25         08:09         16:18         17:02         17:50           56°         06:33         07:18         08:00         16:27         17:09         17:54           54°         06:30         07:12         07:52         16:35         17:14         17:57           52°         06:26         07:07         07:44         16:43         17:20         18:01           50°         06:23         07:02         07:37         16:49         17:25         18:04           45°         06:16         06:51         07:23         17:04         17:35         18:11           N 40°         06:10         06:42	N 72°	07:19	08:51	10:53	13:35	15:37	17:09
66° 06:56 08:01 09:06 15:21 16:27 17:31 64° 06:50 07:50 08:48 15:40 16:37 17:37 62° 06:45 07:40 08:33 15:54 16:47 17:42 60° 06:41 07:32 08:20 16:07 16:55 17:46 N 58° 06:37 07:25 08:09 16:18 17:02 17:50 56° 06:33 07:18 08:00 16:27 17:09 17:54 54° 06:30 07:12 07:52 16:35 17:14 17:57 52° 06:26 07:07 07:44 16:43 17:20 18:01 50° 06:23 07:02 07:37 16:49 17:25 18:04 45° 06:10 06:42 07:11 17:16 17:44 18:17 35° 06:04 06:34 07:01 17:26 17:53 18:23 30° 05:58 06:27 06:52 17:35 18:00 18:29 20° 05:47 06:13 06:36 17:50 18:13 18:40 N 10° 05:35 06:01 06:23 18:04 18:26 18:51 0° 05:23 05:48 06:10 18:17 18:38 19:04 S 10° 05:08 05:34 05:57 18:30 18:52 19:18 20° 04:51 05:19 05:42 18:44 19:07 19:35 35° 04:15 04:49 05:06 19:07 35° 04:29 05:00 05:26 19:00 19:26 19:57 35° 04:15 04:49 05:17 19:09 19:37 20:10 40° 03:58 04:19 04:53 19:33 20:06 20:49 S 50° 03:07 03:58 04:37 04:21 20:04 20:48 21:49 55° 02:12 03:23 04:12 20:13 21:01 22:12 58° 01:40 03:08 04:01 20:24 21:16 22:42	<b>N</b> 70°	07:10	08:30	10:01	14:27	15:57	17:18
64° 06:50 07:50 08:48 15:40 16:37 17:37 62° 06:45 07:40 08:33 15:54 16:47 17:42 60° 06:41 07:32 08:20 16:07 16:55 17:46 N 58° 06:37 07:25 08:09 16:18 17:02 17:50 56° 06:33 07:18 08:00 16:27 17:09 17:54 54° 06:30 07:12 07:52 16:35 17:14 17:57 52° 06:26 07:07 07:44 16:43 17:20 18:01 50° 06:23 07:02 07:37 16:49 17:25 18:04 45° 06:16 06:51 07:23 17:04 17:35 18:11 N 40° 06:10 06:42 07:11 17:16 17:44 18:17 35° 06:04 06:34 07:01 17:26 17:53 18:23 30° 05:58 06:27 06:35 07:02 17:35 18:00 18:29 20° 05:47 06:13 06:36 17:50 18:13 18:40 N 10° 05:35 06:01 06:23 18:04 18:26 18:51 0° 05:23 05:48 06:10 18:17 18:38 19:04 S 10° 05:08 05:34 05:57 18:30 18:52 19:18 20° 04:51 05:19 05:42 18:44 19:07 19:35 30° 04:29 05:00 05:26 19:00 19:26 19:57 35° 04:15 04:49 05:17 19:09 19:37 20:10 40° 03:58 04:35 05:06 19:20 19:50 20:27 45° 03:36 04:19 04:53 19:38 20:04 20:49 S 50° 03:07 03:58 04:37 04:21 20:42 20:42 21:16 22:42 258° 01:40 03:08 04:01 20:24 21:16 22:42		07:02	08:14	09:29	14:58	16:13	17:25
62°         06:45         07:40         08:33         15:54         16:47         17:42           60°         06:41         07:32         08:20         16:07         16:55         17:46           N 58°         06:37         07:25         08:09         16:18         17:02         17:50           56°         06:33         07:18         08:00         16:27         17:09         17:54           52°         06:30         07:12         07:52         16:35         17:14         17:57           52°         06:26         07:07         07:44         16:43         17:20         18:01           50°         06:23         07:02         07:37         16:49         17:25         18:04           45°         06:16         06:51         07:23         17:04         17:35         18:11           N 40°         06:10         06:42         07:11         17:16         17:44         18:17           35°         06:04         06:34         07:01         17:26         17:35         18:03           30°         05:58         06:27         06:52         17:35         18:00         18:29           20°         05:47         06:13		06:56	08:01	09:06	15:21	16:27	17:31
60°         06:41         07:32         08:20         16:07         16:55         17:46           N 58°         06:37         07:25         08:09         16:18         17:02         17:50           56°         06:33         07:18         08:00         16:27         17:09         17:54           54°         06:30         07:12         07:52         16:35         17:14         17:57           52°         06:26         07:07         07:44         16:43         17:20         18:01           50°         06:23         07:02         07:37         16:49         17:25         18:04           45°         06:16         06:51         07:23         17:04         17:35         18:11           N 40°         06:10         06:42         07:11         17:16         17:44         18:17           35°         06:04         06:34         07:01         17:26         17:53         18:23           30°         05:58         06:27         06:52         17:35         18:00         18:29           20°         05:47         06:13         06:36         17:50         18:13         18:40           N 10°         05:35         06:01		06:50	07:50	08:48	15:40	16:37	17:37
N 58°         06:37         07:25         08:09         16:18         17:02         17:50           56°         06:33         07:18         08:00         16:27         17:09         17:54           54°         06:30         07:12         07:52         16:35         17:14         17:57           52°         06:26         07:07         07:44         16:43         17:20         18:01           50°         06:23         07:02         07:37         16:49         17:25         18:04           45°         06:16         06:51         07:23         17:04         17:35         18:11           N 40°         06:10         06:42         07:11         17:16         17:44         18:17           35°         06:04         06:34         07:01         17:26         17:35         18:00         18:29           20°         05:47         06:13         06:36         17:50         18:13         18:40           N 10°         05:35         06:01         06:23         18:04         18:26         18:51           0°         05:23         05:48         06:10         18:17         18:38         19:04           S 10°         04:51						16:47	17:42
56°         06:33         07:18         08:00         16:27         17:09         17:54           54°         06:30         07:12         07:52         16:35         17:14         17:57           52°         06:26         07:07         07:44         16:43         17:20         18:01           50°         06:23         07:02         07:37         16:49         17:25         18:04           45°         06:16         06:51         07:23         17:04         17:35         18:11           N 40°         06:10         06:42         07:11         17:16         17:44         18:17           35°         06:04         06:34         07:01         17:26         17:35         18:03           30°         05:58         06:27         06:52         17:35         18:00         18:29           20°         05:47         06:13         06:36         17:50         18:13         18:40           N 10°         05:35         06:01         06:23         18:04         18:26         18:51           0°         05:23         05:48         06:10         18:17         18:38         19:04           S 10°         04:51         05:19	60°	06:41	07:32	08:20	16:07	16:55	17:46
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35°         06:04         06:34         07:01         17:26         17:53         18:23           30°         05:58         06:27         06:52         17:35         18:00         18:29           20°         05:47         06:13         06:36         17:50         18:13         18:40           N 10°         05:35         06:01         06:23         18:04         18:26         18:51           0°         05:23         05:48         06:10         18:17         18:38         19:04           S 10°         05:08         05:34         05:57         18:30         18:52         19:18           20°         04:51         05:19         05:42         18:44         19:07         19:35           30°         04:29         05:00         05:26         19:00         19:26         19:57           35°         04:15         04:49         05:17         19:09         19:37         20:10           40°         03:58         04:35         05:06         19:20         19:50         20:27           45°         03:36         04:19         04:53         19:33         20:06         20:49           5 50°         03:07         03:58	45°	06:16	06:51	07:23	17:04	17:35	18:11
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		05:58					
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40°         03:58         04:35         05:06         19:20         19:50         20:27           45°         03:36         04:19         04:53         19:33         20:06         20:49           S 50°         03:07         03:58         04:37         19:48         20:27         21:17           52°         02:52         03:48         04:29         19:56         20:37         21:32           54°         02:34         03:37         04:21         20:04         20:48         21:49           56°         02:12         03:23         04:12         20:13         21:01         22:12           58°         01:40         03:08         04:01         20:24         21:16         22:42		04:29	05:00	05:26	19:00	19:26	19:57
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58° 01:40 03:08 04:01 20:24 21:16 22:42			03:37		1	20:48	-
		02:12	03:23		20:13	21:01	22:12
<b>S</b> 60°   00:31 02:49 03:49   20:36 21:35 23:37							
	<b>S</b> 60°	00:31	02:49	03:49	20:36	21:35	23:37

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

January 31, 01, 02 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
0	130°28.2	134°15.8	N00° 18.7	17°17.7	N26°03.2	60°38.0	N21°38.7	141°22.9	S06°47.1		
1	145°30.6	149° 16.5	19.9	32°21.0	03.3	75°40.5	38.7	156°25.1	47.0	Alpheratz	
2	160°33.1	164° 17.3	21.0	47°24.3	03.4	90°43.0	38.7	171°27.3	46.8	Ankaa Schedar	353°07.3
3	175°35.6	179°18.0	• • 22.1	62°27.6	• • 03.5	105°45.5	• • 38.7	186°29.6	• • 46.7	Diphda	349°31.3 348°47.4
4	190°38.0	194° 18.8	23.3	77°30.9	03.6	120°48.0	38.7	201°31.8	46.6	Achernar	335°20.3
5	205°40.5	209°19.6	24.4	92°34.2	03.7	135°50.5	38.7	216°34.0	46.5	Hamal	327°51.2
6	220°42.9	224°20.3	N00°25.5	107°37.5	N26°03.8	150°53.0	N21°38.7	231°36.2	S06°46.4	Polaris	
7	235°45.4	239°21.1	26.7	122°40.8	03.9	165°55.6	38.7	246°38.4	46.3	Acamar	315°11.7
8	250°47.9	254°21.9	27.8	137°44.1 152°47.4	03.9	180°58.1	38.7	261°40.6	46.2	Menkar	314°06.0
9 10	265°50.3 280°52.8	269°22.6 284°23.4	· · 28.9 30.1	152 47.4 167°50.7	· · 04.0 04.1	196°00.6 211°03.1	· · 38.7 38.7	276°42.9 291°45.1	· · 46.1 46.0	Mirfak	$308^{\circ}28.1$
11	295°55.3	299° 24.2	31.2	182°54.0	04.1	211 03.1 226°05.6	38.7	306°47.3	45.9	Aldebaran	290°39.4
12	310°57.7	314°24.9	N00°32.3	197°57.3	N26°04.3	241°08.1	N21°38.7	321°49.5	S06°45.8	Rigel	281°03.6
13	326°00.2	329°25.7	33.4	213°00.6	04.4	256°10.6	38.7	336°51.7	45.7	Capella	280°21.5
14	341°02.7	344°26.5	34.6	228°03.9	04.4	271°13.1	38.7	351°53.9	45.5	Bellatrix	278°22.6
15	$356^{\circ}05.1$	359°27.2	• • 35.7	243°07.2	• • 04.5	286°15.6	• • 38.7	$6^{\circ}56.1$	• • 45.4	Elnath Alnilam	278°01.5 275°37.4
16	11°07.6	14°28.0	36.8	258°10.5	04.6	$301^{\circ}18.1$	38.7	21°58.4	45.3	Betelgeuse	270°51.8
17	26°10.1	29°28.8	38.0	273°13.8	04.7	316°20.6	38.7	37°00.6	45.2	Canopus	263°51.9
18	41°12.5	44°29.6	N00°39.1	288°17.1	N26°04.8	331°23.1	N21°38.7	52°02.8	S06°45.1	Sirius	258°25.9
19	56°15.0	59°30.4	40.2	303°20.4	04.9	346°25.6	38.7	67°05.0	45.0	Adhara	255°05.5
20 21	71°17.4 86°19.9	74°31.1 89°31.9	41.3 •• 42.5	318°23.7 333°27.0	04.9 •• 05.0	1°28.1 16°30.6	38.7 •• 38.7	82°07.2 97°09.4	44.9 •• 44.8	Procyon	244°50.4
22	101°22.4	104° 32.7	43.6	348°30.2	05.1	31°33.1	38.7	97 09.4 112°11.6	44.6	Pollux	$243^{\circ}16.9$
23	116°24.8	119°33.5	44.7	3°33.5	05.2	46°35.6	38.8	127°13.9	44.6	Avior	234°14.1
							_			Suhail	222°45.8
Mer.p	bass. 15:16	$\nu 0.8' d1.$	1′ m-4.74	$\nu$ 3.3′ d0.	.1′ m-1.10	$\nu^{2.5'} d0.$	.0′ m-2.53	$\nu^{2.2'} d^{-0}$	.1′ m1.11	Miaplacidus	221°37.4 217°47.4
										Alphard Regulus	217 47.4 207°34.1
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.3
0	131°27.3	134°34.3	N00°45.8	18°36.8	N26°05.2	61°38.0	N21°38.8	142°16.1	S06°44.5	Denebola	182°24.6
1	146°29.8	149°35.1	47.0	33°40.1	05.3	76°40.5	38.8	157°18.3 172°20.5	44.4	Gienah	175°43.3
2	161°32.2 176°34.7	164°35.9 179°36.7	48.1 •• 49.2	48°43.4 63°46.6	05.4 •• 05.5	91°43.0 106°45.5	38.8 •• 38.8	172°20.5 187°22.7	44.2 •• 44.1		172°59.7
3 4	170 34.7 191°37.2	179 30.7 194°37.5	50.3	78°49.9	05.6	100 45.5 121°48.0	38.8	202°24.9	44.1		171°51.3
5	206°39.6	209° 38.3	51.5	93°53.2	05.6	136°50.5	38.8	217°27.1	43.9	Alioth	166°12.6
6	221°42.1	224°39.1	N00°52.6	108°56.5	N26°05.7	151°53.0	N21°38.8	232°29.4	S06°43.8	Spica	158°22.1 152°51.8
7	236°44.5	239°39.9	53.7	123°59.7	05.8	166°55.5	38.8	247°31.6	43.7	Alkaid Hadar	152 51.8 148°35.8
8	251°47.0	254°40.7	54.8	139°03.0	05.9	181°58.0	38.8	262°33.8	43.6		140° 53.6 147° 57.5
9	266°49.5	269°41.5	• • 55.9	154°06.3	• • 05.9	197°00.5	• • 38.8	277°36.0	• • 43.5		145°47.8
10	281°51.9	284° 42.3	57.1	169°09.6	06.0	212°03.0	38.8	292°38.2	43.4	Rigil Kent.	$139^{\circ}40.2$
11 12	296°54.4 311°56.9	299°43.1 314°43.9	58.2 N00°59.3	184°12.8 199°16.1	06.1 N26°06.2	227°05.5 242°08.0	38.8 N21°38.8	307°40.4 322°42.6	43.3 \$06°43.2	Kochab	137°19.8
13	326°59.3	329° 44.7	01°00.4	214°19.4	06.2	257°10.5	38.8	337°44.8	43.1	Zuben'ubi	136°56.0
14	342°01.8	344°45.5	01.6	229°22.6	06.3	272°13.0	38.8	352°47.1	42.9	Alphecca	126°03.8 112°15.9
15	357°04.3	359°46.3	• • 02.7	244°25.9	• • 06.4	287°15.5	• • 38.8	7°49.3	• • 42.8	Antares Atria	112 15.9 107°10.4
16	12°06.7	14°47.1	03.8	259°29.1	06.5	302°17.9	38.8	22°51.5	42.7	Sabik	107 10.4 102°02.9
17	27°09.2	29°47.9	04.9	274°32.4	06.5	317°20.4	38.8	37°53.7	42.6	Shaula	96°10.6
18	42°11.7	44°48.8	N01°06.0	289°35.7	N26°06.6	332°22.9	N21°38.9	52°55.9	S06°42.5	Rasalhague	95°58.7
19	57°14.1 72°16.6	59° 49.6 74° 50.4	07.1	304°38.9 319°42.2	06.7 06.7	347°25.4 2°27.9	38.9	67°58.1 83°00.3	42.4	Eltanin	90°42.6
20 21	87°19.0	89°51.2	08.3 •• 09.4	319 42.2 334°45.4	06.7 •• 06.8	17°30.4	38.9 •• 38.9	98°02.5	42.3 •• 42.2	Kaus Aust.	83°32.8
22	102°21.5	104°52.0	10.5	349°48.7	06.9	32°32.9	38.9	113°04.8	42.2	Vega	80°33.5
23	117°24.0	119°52.9	11.6	4°51.9	07.0	47°35.4	38.9	128°07.0	42.0	Nunki	75°48.0 62°00.2
			1′ m-4.75		1′ m-1.07		.0′ m-2.52	-	.1′ m1.11	Altair Peacock	53°06.2
ivier.p	bass. 15:12	νο.ο α1.	1 m-4.75	$\nu$ 3.3 $a_0$ .	1 m-1.07	ν2.5 do.	.0 111-2.52	ν2.2 <b>α</b> -0	.1 m1.11	Deneb	49°26.2
										Enif	33°39.1
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.2
0	132°26.4	134°53.7	N01°12.7	19°55.2	N26°07.0	62°37.9	N21°38.9	143°09.2	S06°41.9	Fomalhaut	15°14.7
1	147°28.9	149°54.5	13.8	34°58.4	07.1	77°40.3	38.9	158°11.4 173°13.6	41.7	Scheat	13°45.5
2 3	162°31.4 177°33.8	164° 55.4 179° 56.2	15.0 •• 16.1	50°01.7 65°04.9	07.2 · · 07.2	92°42.8 107°45.3	38.9 •• 38.9	173 13.0 188°15.8	41.6 •• 41.5	Markab	13°30.1
4	192°36.3	194°57.0	17.2	80°08.2	07.3	122°47.8	38.9	203°18.0	41.4	Jan 31 Fri	SHA
5	207°38.8	209°57.9	18.3	95°11.4	07.4	137°50.3	38.9	218°20.2	41.3	Venus	3°47.6
6	222°41.2	224°58.7	N01°19.4	110°14.7	N26°07.4	152°52.8	N21°38.9	233°22.5	S06°41.2	Mars	246°49.5
7	237°43.7	239°59.5	20.5	125°17.9	07.5	167°55.3	38.9	248°24.7	41.1	Jupiter	
8	252°46.2	255°00.4	21.6	140°21.2	07.6	182°57.7	38.9	263°26.9	41.0	Saturn	10°54.8
9	267°48.6	270°01.2	• • 22.8	155°24.4	• • 07.6	198°00.2	• • 38.9	278°29.1	• • 40.9	Feb 01 Sat	SHA
10	282°51.1	285°02.1	23.9	170°27.6	07.7	213°02.7	39.0	293°31.3	40.8	Venus	3°07.0
11 12	297°53.5 312°56.0	300°02.9 315°03.7	25.0 N01°26.1	185°30.9 200°34.1	07.8 N26°07.8	228°05.2 243°07.7	39.0 N21°39.0	308°33.5 323°35.7	40.6 \$06°40.5	Mars	$247^{\circ}09.5$
13	327°58.5	330°04.6	27.2	215°37.3	07.9	258°10.2	39.0	338°37.9	40.4	Jupiter	
14	343°00.9	345°05.4	28.3	230°40.6	08.0	273°12.6	39.0	353°40.1	40.3	Saturn	10°48.8
15	358°03.4	0°06.3	• • 29.4	245°43.8	• • 08.0	288°15.1	• • 39.0	8°42.4	• • 40.2	Feb 02 Sun	SHA
16	13°05.9	15°07.2	30.5	260°47.0	08.1	303°17.6	39.0	23°44.6	40.1	Venus	$2^{\circ}27.3$
17	28°08.3	30°08.0	31.6	275°50.3	08.2	318°20.1	39.0	38°46.8	40.0		247°28.8
18	43°10.8	45°08.9	N01°32.7	290°53.5	N26°08.2	333°22.6	N21°39.0	53°49.0	S06°39.9		290°11.4
19	58°13.3 73°15.7	60°09.7 75°10.6	33.8 35.0	305°56.7 321°00.0	08.3 08.3	348°25.0 3°27.5	39.0	68°51.2 83°53.4	39.8 30.7	Saturn	10°42.7
20 21	73°15.7 88°18.2	75° 10.6 90° 11.4	35.0 · · 36.1	321°00.0 336°03.2	· · 08.4	18°30.0	39.0 •• 39.0	83°53.4 98°55.6	39.7 · · 39.6	Horizont	tal parallax
22	103°20.6	105°12.3	37.2	351°06.4	08.5	33°32.5	39.0	113°57.8	39.4		Venus:
23	118°23.1	120° 13.2	38.3	6°09.6	08.5	48°35.0	39.0	129°00.0	39.3		Mars:
Merr	pass. 15:08	$\nu$ 0.8' d1	1′ m-4.76	ν3.3′ dΩ	.1′ m-1.05	$\nu 2.5' d0$	.0′ m-2.51	ν2.2′ d-Ω	.1′ m1.11		

Dec

29°13.8 -42°10.4

56°40.7

-17°51.1 -57°06.8

23°34.9

89°22.5

-40°12.5

4°11.2

49°57.2

16°33.6 -8°10.4

 $46^{\circ}01.5$ 

 $6^{\circ}22.3$ 

28°37.8

 $-1^{\circ}11.2$ 

7°24.7

-52°42.7 -16°45.1

-29°00.5

 $5^{\circ}09.6$ 

27°57.9

-59°35.4

-43°32.0

-69°49.1 -8°46.1

11°50.6

61°36.7

14°25.8

-17°40.9

 $-63^{\circ}14.1$ -57°15.0

55°49.1

-11°17.6

49°10.9

-60°29.4

-36°29.5

19°02.9

-60°56.1

74°02.7

-16°08.8

26°37.5 -26°29.2

-69°04.1

-15°45.4  $-37^{\circ}07.3$ 

 $12^{\circ}32.3$ 

51°28.8

-34°22.3

38°48.2

-26°16.0

8°55.9

-56°39.3

 $45^{\circ}22.1$ 

 $9^{\circ}59.3$ 

-46°50.5

-29°29.5

28°13.1

15°20.4

Mer.pass

15:02

22:46

19:54

14:32

15:01

22:41

19:50

14:29

15:00 22:35

19:46

14:25

0.3

0.2

Mer.pass

Mer.pass

h	Su	n	Moon				
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	176°39.4	S17°22.3	$156^{\circ}52.6$	10.4'	<b>S</b> 13°27.7	-15.4'	59.2'
1	191°39.3	21.6	171°22.0	10.4'	13°12.4	-15.4'	59.2'
2	206°39.2 221°39.1	20.9	185°51.4	10.5'	12°56.9 12°41.4	-15.5'	59.3'
3 4	221 39.1 236°39.0	· · 20.2 19.5	200°20.9 214°50.4	10.5' 10.6'	12°41.4 12°25.8	-15.6' -15.7'	59.3' 59.3'
5	250°39.0° 251°38.9	18.8	214 30.4 229°20.0	10.6'	12°25.8	-15.7'	59.3'
6	266°38.8	S17° 18.1	243°49.6	10.7'	S11°54.4	-15.8'	59.3'
7	281°38.7	17.4	$258^{\circ}19.3$	10.7'	11°38.6	-15.9'	59.3'
8	296°38.7	16.7	272°49.0	10.8'	11°22.7	-15.9'	59.3'
9	311°38.6	• • 16.0	287°18.8	10.8'	11°06.8	-16.0'	59.3'
10 11	326°38.5 341°38.4	15.3 14.6	301°48.6 316°18.5	10.9' 10.9'	10°50.8 10°34.7	-16.1' -16.1'	59.4' 59.4'
12	356°38.3	\$17° 13.9	330°48.4	11.0'	\$10° 18.6	-16.2	59.4
13	11°38.2	13.2	345°18.4	11.0'	10°02.4	-16.3'	59.4'
14	26°38.1	12.5	359°48.4	11.1'	$09^{\circ}46.1$	-16.3'	59.4'
15	41°38.0	• • 11.8	14°18.5	11.1'	09°29.8	-16.4	59.4
16 17	56°37.9 71°37.9	11.1 10.4	28°48.6 43°18.7	11.1' 11.2'	09°13.4 08°57.0	-16.4' -16.5'	59.4' 59.4'
18	86°37.8	\$17°09.6	57°48.9	11.2'	S08°40.6	-16.5	59.4
19	101°37.7	08.9	72°19.1	11.3'	08°24.0	-16.6'	59.5'
20	116°37.6	08.2	86°49.4	11.3'	08°07.5	-16.6'	59.5'
21	131°37.5	• • 07.5	101°19.7	11.3'	07°50.9	-16.7'	59.5'
22 23	146°37.4 161°37.3	06.8 06.1	115°50.0 130°20.3	11.4' 11.4'	07°34.2 07°17.5	-16.7' -16.7'	59.5' 59.5'
23			150 20.3			-10.7	39.3
	SD = 16.2'	d = -0.7'		SI	D = 16.2'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°37.2 191°37.2	\$17°05.4 04.7	144°50.7 159°21.2	11.4' 11.5'	\$07°00.8 06°44.0	-16.8'	59.5'
1 2	191°37.2 206°37.1	04.7 04.0	159°21.2 173°51.6	11.5'	06°44.0	-16.8' -16.9'	59.5' 59.5'
3	200 37.1 221°37.0	. 03.2	188°22.1	11.5'	06°10.3	-16.9'	59.5'
4	236°36.9	02.5	202°52.6	11.5'	05°53.4	-16.9'	59.5'
5	251°36.8	01.8	$217^{\circ}23.2$	11.6'	05°36.5	-17.0'	59.5'
6	266°36.7	\$17°01.1	231°53.8	11.6'	S05°19.6	-17.0'	59.5'
7 8	281°36.7 296°36.6	17°00.4 16°59.7	246°24.4 260°55.0	11.6' 11.6'	05°02.6 04°45.6	-17.0' -17.0'	59.5' 59.5'
9	311°36.5	59.0	275°25.6	11.7'	04°43.0	-17.0 -17.1'	59.6'
10	326°36.4	58.2	289°56.3	11.7'	04°11.5	-17.1'	59.6'
11	341°36.3	57.5	304°27.0	11.7'	03°54.4	-17.1'	59.6'
12	356°36.3	S16°56.8	318°57.7	11.7'	503°37.3	-17.1'	59.6'
13 14	11°36.2 26°36.1	56.1 55.4	333°28.4 347°59.2	11.7' 11.8'	03°20.1 03°03.0	-17.1' -17.2'	59.6' 59.6'
15	41°36.0	• • 54.6	2°29.9	11.8'	02°45.8	-17.2	59.6'
16	56°35.9	53.9	17°00.7	11.8'	02°28.7	-17.2'	59.6'
17	71°35.9	53.2	31°31.5	11.8'	02°11.5	-17.2'	59.6'
18	86°35.8 101°35.7	\$16°52.5	46°02.3 60°33.1	11.8'	\$01°54.3 01°37.1	-17.2'	59.6' 59.6'
19 20	101 35.7 116°35.6	51.8 51.0	75°03.9	11.8' 11.8'	01 37.1 01°19.8	-17.2' -17.2'	59.6'
21	131°35.5	50.3	89°34.7	11.8'	01°02.6	-17.2	59.6'
22	146°35.5	49.6	$104^{\circ}05.6$	11.8'	00°45.4	-17.2'	59.6'
23	161°35.4	48.9	118°36.4	11.8'	00°28.2	-17.2'	59.6'
	SD = 16.2'	d = -0.7'		SI	O = 16.2'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°35.3	S16°48.2	133°07.3	11.8'	S00°10.9	-17.2'	59.6'
1	191°35.2	47.4	147°38.1	11.8'	N00°06.3	17.2'	59.6'
2	206°35.2	46.7	162°08.9	11.8'	00°23.6	17.2'	59.6'
3 4	221°35.1 236°35.0	· · 46.0 45.2	176°39.8 191°10.6	11.8' 11.8'	00°40.8 00°58.0	17.2' 17.2'	59.6' 59.6'
5	251°34.9	44.5	205°41.5	11.8'	01°15.2	17.2'	59.6'
6	266°34.9	S16°43.8	220°12.3	11.8'	N01°32.4	17.2'	59.6'
7	281°34.8	43.1	234°43.2	11.8'	01°49.7	17.2'	59.6'
8	296°34.7 311°34.6	42.3	249°14.0	11.8'	02°06.8	17.2'	59.6'
9 10	311°34.6 326°34.6	· · 41.6 40.9	263°44.8 278°15.6	11.8' 11.8'	02°24.0 02°41.2	17.2' 17.2'	59.6' 59.6'
11	341°34.5	40.9	292°46.4	11.8'	02°58.3	17.1	59.6'
12	356°34.4	\$16°39.4	307°17.2	11.8'	N03°15.5	17.1'	59.6'
13	11°34.3	38.7	321°48.0	11.8'	03°32.6	17.1'	59.6'
14 15	26°34.3 41°34.2	38.0 •• 37.2	336°18.7 350°49.5	11.7' 11.7'	03°49.7 04°06.8	17.1' 17.0'	59.6' 59.6'
15 16	41 34.2 56°34.1	36.5	5°20.2	11.7' 11.7'	04°06.8 04°23.8	17.0° 17.0°	59.6'
17	71°34.1	35.8	19°50.9	11.7'	04°25.8	17.0'	59.6'
18	86°34.0	S16°35.0	34°21.6	11.7'	N04°57.8	17.0'	59.6'
19	101°33.9	34.3	48°52.3	11.6'	05°14.8	16.9'	59.6'
20 21	116°33.9 131°33.8	33.6 •• 32.8	63°22.9 77°53.6	11.6' 11.6'	05°31.7 05°48.6	16.9' 16.9'	59.6' 59.6'
21	131°33.8 146°33.7	32.8	92°24.2	11.6'	05°48.6 06°05.5	16.8	59.5'
23	161°33.7	31.4	106°54.7	11.5'	06°22.3	16.8	59.5'
	SD = 16.2'	d = -0.7'		SI	O = 16.3'		

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	2-4	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	3-15%	
31	13:22	13:27	12:13	14:01	01:36		
01	13:31	13:35	12:14	14:50	02:25		
02	13:39	13:42	12:14	15:38	03:14		

#### February 03, 04, 05 UT (Mon., Tue., Wed.)

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	133°25.6	135°14.0 N01°39.4	21°12.8 N26°08.6	63°37.4 N21°39.1	144°02.3 \$06°39.2	
1	148°28.0	150°14.9 40.5	36°16.1 08.7	78°39.9 39.1	159°04.5 39.1	Alpheratz 357°35.0 29°13.8
2	163°30.5	165° 15.8 41.6	51°19.3 08.7	93°42.4 39.1	174°06.7 39.0	Ankaa 353°07.3 -42°10.4
3	178°33.0	180°16.6 · · 42.7	66°22.5 · · 08.8	108°44.9 · · 39.1	189°08.9 · · 38.9	Schedar 349°31.3 56°40.7
4	193°35.4	195°17.5 43.8	81°25.7 08.8	123°47.4 39.1	204°11.1 38.8	Diphda 348°47.4 -17°51.1
5	208°37.9	210° 18.4 44.9	96°28.9 08.9	138°49.8 39.1	219°13.3 38.7	Achernar 335°20.3 -57°06.8
6	200° 37.9 223° 40.4	225°19.3 N01°46.0	111°32.1 N26°09.0	153°52.3 N21°39.1	234°15.5 S06°38.6	Hamal 327°51.2 23°34.9
7	238°42.8	240°20.2 47.1	126°35.3 09.0	168°54.8 39.1	249°17.7 38.5	Polaris 313°58.5 89°22.5
8	253°45.3	255°21.0 48.2	141°38.6 09.1	183°57.3 39.1	264°19.9 38.3	Acamar 315°11.7 -40°12.5
9	268° 47.8	270°21.9 · · 49.3	156°41.8 · · 09.1	198°59.7 · · 39.1	279°22.1 · · 38.2	Menkar 314°06.1 4°11.2
10	283°50.2	285°22.8 50.4	171°45.0 09.2	214°02.2 39.1	294°24.4 38.1	Mirfak 308°28.1 49°57.2
11	298°52.7	300°23.7 51.5	186°48.2 09.2	229°04.7 39.1	309°26.6 38.0	Aldebaran 290°39.4 16°33.6
12	313°55.1	315°24.6 N01°52.6	201°51.4 N26°09.3	244°07.2 N21°39.1	324°28.8 S06°37.9	Rigel 281°03.6 -8°10.5
13	328°57.6	330°25.5 53.7	216°54.6 09.4	259°09.6 39.1	339°31.0 37.8	Capella 280°21.5 46°01.5
14	344°00.1	345°26.3 54.8	231°57.8 09.4	274°12.1 39.2	354°33.2 37.7	Bellatrix 278°22.6 6°22.3
15	359°02.5	0°27.2 · · 55.9	247°01.0 · · 09.5	289°14.6 · · 39.2	9°35.4 · · 37.6	Elnath 278°01.5 28°37.8
16	14°05.0	15°28.1 57.0	262°04.2 09.5	304°17.0 39.2	24°37.6 37.5	Alnilam 275°37.4 -1°11.2
17	29°07.5	30°29.0 58.1	277°07.4 09.6	319°19.5 39.2	39°39.8 37.4	Betelgeuse 270°51.8 7°24.7
18	44°09.9	45°29.9 N01°59.2	292°10.6 N26°09.6	334°22.0 N21°39.2	54°42.0 S06°37.2	Canopus 263°51.9 -52°42.7
19	59°12.4	60°30.8 02°00.3	307°13.8 09.7	349°24.5 39.2	69°44.2 37.1	Sirius 258°25.9 -16°45.1
20	74°14.9	75°31.7 01.4	322°17.0 09.7	4°26.9 39.2	84°46.4 37.0	Adhara 255°05.5 -29°00.5
21	89°17.3	90°32.6 · · 02.5	337°20.2 · · 09.8	19°29.4 · · 39.2	99°48.7 · · 36.9	Procyon 244°50.4 5°09.6
22	104°19.8	105°33.5 03.6	352°23.3 09.8	34°31.9 39.2	114°50.9 36.8	Pollux 243°16.9 27°57.9
23	119°22.2	120°34.4 04.7	7°26.5 09.9	49°34.3 39.2	129°53.1 36.7	Avior 234°14.1 -59°35.4
						Suhail 222°45.8 -43°32.0
Mer.p	ass. 15:04	$ u 0.9' \ d1.1' \ \text{m-4.77}$	$ u 3.2' \ d0.1' \ \text{m-}1.02$	$\nu 2.5' \ d0.0' \ \text{m-}2.50$	$ u 2.2' \ d$ -0.1' m1.11	Miaplacidus 221°37.4 -69°49.2
	-					Alphard 217°47.4 -8°46.1
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Regulus 207°34.0 11°50.6
0	134°24.7	135°35.3 N02°05.8	22°29.7 N26°09.9	64°36.8 N21°39.2	144°55.3 \$06°36.6	Dubhe 193°40.3 61°36.7
1	149°27.2	150°36.3 06.9	37°32.9 10.0	79°39.3 39.2	159°57.5 36.5	Denebola 182°24.6 14°25.7
2	164°29.6	165°37.2 08.0	52°36.1 10.1	94°41.7 39.3	174°59.7 36.4	Gienah 175°43.3 -17°40.9
3	179°32.1	180°38.1 · · 09.1	67°39.3 · · 10.1	109°44.2 · · 39.3	190°01.9 · · 36.2	Acrux 172°59.6 -63°14.1
4	194°34.6	195°39.0 10.1	82°42.5 10.2	124°46.7 39.3	205°04.1 36.1	Gacrux 171°51.3 -57°15.1
5	209°37.0	210°39.9 11.2	97°45.6 10.2	139°49.2 39.3	220°06.3 36.0	Alioth 166°12.6 55°49.1
6	209°37.0	225°40.8 N02°12.3	112°48.8 N26°10.3	154°51.6 N21°39.3	235°08.5 S06°35.9	Spica 158°22.1 -11°17.6
7	239°42.0	240°41.7 13.4	127°52.0 10.3	169°54.1 39.3	250°10.7 35.8	Alkaid 152°51.8 49°10.9
8	254°44.4	255° 42.7 14.5	142°55.2 10.4	184°56.6 39.3	265°13.0 35.7	Hadar 148°35.8 -60°29.4
9	269°46.9	270°43.6 · · 15.6	157°58.3 · · 10.4	199°59.0 · · 39.3	280°15.2 · · 35.6	Menkent 147°57.5 -36°29.5
10	284°49.4	285°44.5 16.7	173°01.5 10.4	215°01.5 39.3	295°17.4 35.5	Arcturus 145°47.8 19°02.9
11	299°51.8	300°45.4 17.8	188°04.7 10.5	230°03.9 39.3	310°19.6 35.4	Rigil Kent. 139°40.2 -60°56.1
12	314°54.3	315°46.4 N02°18.9	203°07.9 N26°10.5	245°06.4 N21°39.3	325°21.8 S06°35.3	Kochab 137°19.7 74°02.7
13	329°56.7	330°47.3 20.0	218°11.0 10.6	260°08.9 39.3	340°24.0 35.1	Zuben'ubi 136°55.9 -16°08.8
14	344°59.2	345°48.2 21.0	233°14.2 10.6	275°11.3 39.4	355°26.2 35.0	Alphecca 126°03.7 26°37.5
15	0°01.7	0°49.2 · · 22.1	248°17.4 · · 10.7	290°13.8 · · 39.4	10°28.4 · · 34.9	Antares 112°15.9 -26°29.2
16	15°04.1	15°50.1 23.2	263°20.5 10.7	305°16.3 39.4	25°30.6 34.8	Atria 107°10.4 -69°04.1
17	30°06.6	30°51.0 24.3	278°23.7 10.8	320°18.7 39.4	40°32.8 34.7	Sabik 102°02.9 -15°45.4
18	45°09.1	45°52.0 N02°25.4	293°26.9 N26°10.8	335°21.2 N21°39.4	55°35.0 S06°34.6	Shaula 96°10.5 -37°07.3
19	60°11.5	60°52.9 26.5	308°30.0 10.9	350°23.7 39.4	70°37.2 34.5	Rasalhague 95°58.7 12°32.3
20	75°14.0	75°53.9 27.6	323°33.2 10.9	5°26.1 39.4	85°39.4 34.4	Eltanin 90°42.5 51°28.8
21	90°16.5	90°54.8 · · 28.6	338°36.3 · · 11.0	20°28.6 · · 39.4	100°41.7 · · 34.3	Kaus Aust. 83°32.7 -34°22.3
22	105°18.9	105°55.8 29.7	353°39.5 11.0	35°31.0 39.4	115°43.9 34.1	Vega 80°33.5 38°48.2
23	120°21.4	120° 56.7 30.8	8°42.7 11.0	50°33.5 39.4	130°46.1 34.0	Nunki 75°48.0 -26°16.0
	120 21.4	-				Altair 62°00.2 8°55.9
Mer.p	ass. 15:00	$ u 0.9' \ d1.1' \ \text{m-4.78} $	$ u 3.2' \ d0.1' \ \text{m-}0.99$	$ u 2.5' \ d0.0' \ \text{m-}2.50$	$ u 2.2' \ d$ -0.1' m1.11	Peacock 53°06.2 -56°39.3
						Deneb 49°26.2 45°22.1
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°39.1 9°59.3
oved 0	135°23.9	135°57.7 N02°31.9	23°45.8 N26°11.1	65°36.0 N21°39.5	145°48.3 S06°33.9	Al Na'ir 27°33.3 -46°50.5
1	150°26.3	150°58.6 33.0	38°49.0 11.1	80°38.4 39.5	160°50.5 33.8	Fomalhaut 15°14.7 -29°29.5
2	165°28.8	165° 59.6 34.0	53°52.1 11.2	95°40.9 39.5	175°52.7 33.7	Scheat 13°45.5 28°13.1
3	180°31.2	181°00.5 · · 35.1	68°55.3 · · 11.2	110°43.3 · · 39.5	175 52.7 53.7 190°54.9 · · 33.6	Markab 13°30.1 15°20.4
4	195°33.7	196°01.5 36.2	83°58.4 11.3	125°45.8 39.5	205°57.1 33.5	Feb 03 Mon SHA Mer.pass
5	210°36.2	211°02.4 37.3	99°01.6 11.3	140°48.3 39.5	220°59.3 33.4	Venus 1°48.5 14:58
6	225°38.6	226°03.4 N02°38.4	114°04.7 N26°11.3	155°50.7 N21°39.5	236°01.5 S06°33.3	Mars 247°47.3 22:30
7	240°41.1	241°04.4 39.4	129°07.9 11.4	170°53.2 39.5	251°03.7 33.1	Jupiter 290°11.9 19:42
8	255°43.6	256°05.3 40.5	144°11.0 11.4	185°55.6 39.5	266°05.9 33.0	Saturn 10°36.7 14:22
9	270°46.0	271°06.3 · · 41.6	159°14.1 · · 11.5	200°58.1 · · 39.5	281°08.1 · · 32.9	
10	285°48.5	286°07.3 42.7	174°17.3 11.5	216°00.5 39.5	296°10.3 32.8	Feb 04 Tue SHA Mer.pass
11	300°51.0	301°08.2 43.8	189°20.4 11.6	231°03.0 39.6	311°12.6 32.7	Venus 1°10.6 14:57
12	315°53.4	316°09.2 N02°44.8	204°23.6 N26°11.6	246°05.5 N21°39.6	326°14.8 \$06°32.6	Mars 248°05.0 22:25
13	330°55.9	331°10.2 45.9	219°26.7 11.6	261°07.9 39.6	341°17.0 32.5	Jupiter 290°12.1 19:38
14	345°58.4	346°11.1 47.0	234°29.8 11.7	276°10.4 39.6	356°19.2 32.4	Saturn 10°30.6 14:18
15	1°00.8	1°12.1 · · 48.1	249°33.0 · · 11.7	291°12.8 · · 39.6	11°21.4 · · 32.3	Feb 05 Wed SHA Mer.pass
16	16°03.3	16°13.1 49.1	264°36.1 11.7	306°15.3 39.6	26°23.6 32.1	Venus 0°33.8 14:55
17	31°05.7	31°14.1 50.2	279°39.2 11.8	321°17.7 39.6	41°25.8 32.0	Mars 248°22.0 22:20
18	46°08.2	46°15.1 N02°51.3	294°42.3 N26°11.8	336°20.2 N21°39.6	56°28.0 S06°31.9	Jupiter 290°12.1 19:34
19	61°10.7	61°16.1 52.3	309°45.5 11.9	351°22.6 39.6	71°30.2 31.8	Saturn 10°24.4 14:15
20	76°13.1	76°17.0 53.4	324°48.6 11.9	6°25.1 39.7	86°32.4 31.7	
21	91°15.6	91°18.0 · · 54.5	339°51.7 · · 11.9	21°27.5 · · 39.7	101°34.6 · · 31.6	Horizontal parallax
22	$106^{\circ}18.1$	106°19.0 55.6	354°54.8 12.0	36°30.0 39.7	116°36.8 31.5	Venus: 0.3
23	121°20.5	121°20.0 56.6	9°58.0 12.0	51°32.4 39.7	131°39.0 31.4	Mars: 0.2
		ν1.0' d1.1' m-4.79	ν3.2' d0.0' m-0.96	ν2.5' d0.0' m-2.49	ν2.2' d-0.1' m1.11	
ivier.p	pass. 14:56	ν1.0 U1.1 III-4.79	νσ.2 αυ.υ III-U.90	ν2.3 d0.0 III-2.49	ν Δ.Δ. U-U.1 III1.11	

h	Su	n	Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	176°33.6	\$16°30.6	121°25.3	11.5'	N06°39.1	16.8'	59.5'
1 2	191°33.5 206°33.4	29.9 29.1	135°55.8 150°26.3	11.5' 11.5'	06°55.9 07°12.6	16.7' 16.7'	59.5' 59.5'
3	200 33.4 221°33.4	. 28.4	164°56.7	11.4'	07°29.3	16.6'	59.5'
4	236°33.3	27.7	179°27.2	11.4'	07°45.9	16.6'	59.5'
5	251°33.3	26.9	193°57.6 208°27.9	11.4'	08°02.5 N08°19.1	16.5	59.5'
6 7	266°33.2 281°33.1	\$16°26.2 25.5	208°27.9 222°58.2	11.3' 11.3'	08°35.6	16.5' 16.5'	59.5' 59.5'
8	296°33.1	24.7	237°28.5	11.2'	08°52.0	16.4	59.5'
9	311°33.0	• • 24.0	251°58.8	11.2'	09°08.4	16.3'	59.5'
10 11	326°32.9 341°32.9	23.2 22.5	266°29.0 280°59.1	11.2' 11.1'	09°24.8 09°41.1	16.3' 16.2'	59.5' 59.5'
12	356°32.8	\$16°21.7	200 59.1 295°29.3	11.1	N09°57.3	16.2	59.5
13	11°32.7	21.0	309°59.3	11.0'	10°13.5	16.1'	59.4'
14	26°32.7	20.3	324°29.4	11.0'	10°29.6	16.1'	59.4'
15 16	41°32.6 56°32.5	· · 19.5 18.8	338°59.4 353°29.3	10.9' 10.9'	10°45.7 11°01.7	16.0' 15.9'	59.4' 59.4'
17	71°32.5	18.0	7°59.2	10.8'	11°17.6	15.9'	59.4'
18	86°32.4	<b>S</b> 16°17.3	22°29.1	10.8'	N11°33.5	15.8'	59.4'
19 20	101°32.4 116°32.3	16.5 15.8	36°58.8 51°28.6	10.7' 10.7'	11°49.3 12°05.1	15.7' 15.7'	59.4' 59.4'
21	131°32.3	15.0	65°58.3	10.7	12 05.1 12°20.7	15.6'	59.4'
22	146°32.2	14.3	80°27.9	10.6'	12°36.3	15.5'	59.4'
23	161°32.1	13.6	94°57.5	10.5'	12°51.9	15.5'	59.4'
	SD = 16.2'	d = -0.7'		SE	0 = 16.2'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	176°32.1	S16°12.8	$109^{\circ}27.0$	10.5'	N13°07.3	15.4'	59.4'
1	191°32.0	12.1	123°56.5	10.4'	13°22.7	15.3'	59.3'
2	206°31.9 221°31.9	11.3 · · 10.6	138°25.9 152°55.3	10.4' 10.3'	13°38.0 13°53.2	15.2' 15.1'	59.3' 59.3'
4	236°31.8	09.8	167°24.6	10.3	14°08.4	15.1	59.3'
5	251°31.8	09.1	181°53.8	10.2'	14°23.4	15.0'	59.3'
6	266°31.7 281°31.7	\$16°08.3 07.6	196°23.0 210°52.1	10.1' 10.0'	N14°38.4 14°53.3	14.9' 14.8'	59.3' 59.3'
7 8	281 31.7 296°31.6	07.6	210 52.1 225°21.1	10.0'	14 53.3 15°08.1	14.8	59.3'
9	311°31.5	06.1	239°50.1	9.9'	15°22.8	14.6'	59.3'
10	326°31.5	05.3	254°19.1	9.9'	15°37.4	14.5'	59.2'
11 12	341°31.4 356°31.4	04.5 \$16°03.8	268°47.9 283°16.7	9.8' 9.7'	15°52.0 N16°06.4	14.4' 14.4'	59.2' 59.2'
13	11°31.3	03.0	297°45.4	9.7'	16°20.8	14.3'	59.2'
14	26°31.3	02.3	312°14.1	9.6'	16°35.0	14.2'	59.2'
15 16	41°31.2 56°31.2	· · 01.5 00.8	326°42.7 341°11.2	9.5' 9.4'	16°49.2 17°03.3	14.1' 14.0'	59.2' 59.2'
17	71°31.1	16°00.0	355°39.6	9.4'	17°17.2	13.9'	59.2'
18	86°31.1	\$15°59.3	10°08.0	9.3'	N17°31.1	13.8'	59.2'
19 20	101°31.0 116°31.0	58.5 57.7	24°36.3 39°04.5	9.2' 9.2'	17°44.8 17°58.5	13.6' 13.5'	59.1' 59.1'
21	131°30.9	• • 57.0	59 04.5 53°32.7	9.2	17 56.5 18°12.0	13.4	59.1'
22	146°30.9	56.2	68°00.8	9.0'	18°25.5	13.3'	59.1'
23	161°30.8	55.5	82°28.8	8.9'	18°38.8	13.2'	59.1'
	SD = 16.2'	d = -0.7'		SI	0 = 16.2'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°30.8	<b>S</b> 15°54.7	96°56.7	8.9'	N18°52.0	13.1'	59.1'
1 2	191°30.7 206°30.7	54.0 53.2	111°24.6 125°52.3	8.8' 8.7'	19°05.1 19°18.1	13.0' 12.9'	59.1' 59.0'
3	200 30.7 221°30.6	· · 52.4	125 52.3 140°20.1	8. <i>1</i> 8.6'	19 18.1 19°31.0	12.9	59.0'
4	236°30.6	51.7	154°47.7	8.6'	19°43.7	12.6'	59.0'
5	251°30.5 266°30.5	50.9 \$15°50.1	169°15.2 183°42.7	8.5' 8.4'	19°56.4 N20°08.9	12.5' 12.4'	59.0' 59.0'
6 7	200 30.5 281°30.4	515 50.1 49.4	183 42.7 198°10.1	8.4 8.3'	20°21.3	12.4	59.0'
8	296°30.4	48.6	212°37.5	8.3'	20°33.6	12.2'	59.0'
9	311°30.3	• • 47.9	227°04.7	8.2'	20°45.7	12.0'	59.0'
10 11	326°30.3 341°30.2	47.1 46.3	241°31.9 255°59.0	8.1' 8.0'	20°57.7 21°09.6	11.9' 11.8'	58.9' 58.9'
12	356°30.2	\$15°45.6	270°26.0	7.9'	N21°21.4	11.6'	58.9
13	11°30.1	44.8	284°52.9	7.9'	21°33.0	11.5'	58.9'
14 15	26°30.1 41°30.0	44.0 •• 43.3	299°19.8 313°46.6	7.8' 7.7'	21°44.5 21°55.9	11.4' 11.2'	58.9' 58.9'
15 16	56°30.0	42.5	313 40.0 328°13.3	7. <i>1</i> 7.6'	21 55.9 22°07.2	11.2	58.9'
17	71°29.9	41.7	342°39.9	7.6'	22°18.3	11.0'	58.8'
18	86°29.9	\$15°41.0	357°06.5	7.5'	N22°29.2	10.8'	58.8'
19 20	101°29.9 116°29.8	40.2 39.4	11°33.0 25°59.4	7.4' 7.3'	22°40.1 22°50.8	10.7' 10.6'	58.8' 58.8'
21	131°29.8	• • 38.7	40°25.7	7.2'	23°01.3	10.4	58.8'
22	146°29.7	37.9	54°51.9	7.2'	23°11.7	10.3'	58.8'
23	161°29.7	37.1	69°18.1	7.1'	23°22.0	10.1'	58.7'
	SD = 16.2'	d = -0.8'		SE	0 = 16.1'		

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

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

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Mer.Pass.		
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	5-7	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	25-46%	
03	13:46	13:49	12:14	16:27	04:02		
04	13:52	13:54	12:14	17:18	04:52		
05	13:57	13:59	12:14	18:12	05:45		

#### February 06, 07, 08 UT (Thu., Fri., Sat.)

h	Aries	Ven	us	M	ars	Jup	oiter	Sat	urn		Stars	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
			N02°57.7		N26°12.0		N21°39.7	146°41.2	506°31.2			
0	136°23.0			25°01.1		66°34.9				Alpheratz	357°35.0	29°13.8
1	151°25.5	151°22.0	58.8	40°04.2	12.1	81°37.3	39.7	161°43.4	31.1	Ankaa	353°07.3	-42°10.4
2	166°27.9	166°23.0	02°59.8	55°07.3	12.1	96°39.8	39.7	176°45.6	31.0	Schedar	349°31.3	56°40.7
3	181°30.4	181°24.0	03°00.9	70°10.4	• • 12.1	111°42.2	• • 39.7	191°47.8	• • 30.9	Diphda	348°47.4	-17°51.1
4	196°32.8	196°25.0	02.0	85°13.6	12.2	126°44.7	39.7	206°50.1	30.8	Achernar	335°20.3	-57°06.8
5	211°35.3	$211^{\circ}26.0$	03.0	100°16.7	12.2	141°47.1	39.7	221°52.3	30.7	Hamal	327°51.2	23°34.9
6	226°37.8	226°27.0	N03°04.1	115°19.8	N26°12.2	156°49.6	N21°39.8	236°54.5	S06°30.6		313°59.8	89°22.5
7	241°40.2	241°28.0	05.2	130°22.9	12.3	171°52.0	39.8	251°56.7	30.5	Polaris		
8	256°42.7	256°29.0	06.2	145°26.0	12.3	186°54.5	39.8	266°58.9	30.4	Acamar	315°11.7	-40°12.5
9	271°45.2	271°30.0	• • 07.3	160°29.1	. 12.3	201°56.9	• • 39.8	282°01.1	30.2	Menkar	314°06.1	4°11.2
10	286°47.6	286°31.0	08.4	175°32.2	12.4	216°59.4	39.8	297°03.3	30.1	Mirfak	308°28.1	49°57.2
11	301°50.1	301°32.1	09.4	190°35.3	12.4	232°01.8	39.8	312°05.5	30.0	Aldebaran	290°39.4	16°33.6
			N03° 10.5	205°38.4	N26°12.4		N21°39.8	312 03.3 327°07.7		Rigel	281°03.6	-8°10.5
12	316°52.6					247°04.3			S06°29.9	Capella	280°21.5	46°01.5
13	331°55.0	331°34.1	11.5	220°41.5	12.5	262°06.7	39.8	342°09.9	29.8	Bellatrix .	278°22.6	6°22.3
14	346°57.5	346°35.1	12.6	235°44.6	12.5	277°09.2	39.8	357°12.1	29.7	Elnath	278°01.5	28°37.8
15	2°00.0	1°36.1	•• 13.7	250°47.7	• • 12.5	292°11.6	• • 39.9	12°14.3	• • 29.6	Alnilam	275°37.4	-1°11.2
16	17°02.4	16°37.2	14.7	265°50.8	12.6	$307^{\circ}14.1$	39.9	$27^{\circ}16.5$	29.5	Betelgeuse	270°51.8	7°24.7
17	32°04.9	31°38.2	15.8	280°53.9	12.6	322°16.5	39.9	42°18.7	29.3	Canopus	263°51.9	-52°42.7
18	47°07.3	46°39.2	N03° 16.8	295°57.0	N26°12.6	337°18.9	N21°39.9	57°20.9	S06°29.2		258°25.9	-32 42.7 -16°45.1
19	62°09.8	61°40.2	17.9	311°00.1	12.6	352°21.4	39.9	72°23.1	29.1	Sirius		
20	77°12.3	$76^{\circ}41.3$	19.0	326°03.2	12.7	7°23.8	39.9	87°25.3	29.0	Adhara	255°05.5	-29°00.5
21	92°14.7	91°42.3	• • 20.0	341°06.3	· · 12.7	22°26.3	• • 39.9	102°27.5	28.9	Procyon	244°50.4	5°09.6
22	107°17.2	106°43.3	21.1	356°09.4	12.7	37°28.7	39.9	117°29.7	28.8	Pollux	243°16.9	27°57.9
23	107 17.2 122°19.7	100°43.3 121°44.4	22.1	11°12.5	12.7	52°31.2	40.0	132°31.9	28.7	Avior	234°14.1	-59°35.4
23	122 19.7	121 44.4	22.1	11 12.5	12.8			132 31.9	20.1	Suhail	222°45.8	-43°32.1
Mer.r	pass. 14:52	$\nu 1.0' \ d1.1$	′ m-4.79	$\nu$ 3.1′ d0.	0′ m-0.93	$\nu 2.5' \ d0$	.0′ m-2.48	$\nu 2.2' \ d-0$	.1′ m1.11	Miaplacidus	221°37.4	-69°49.2
										Alphard	217°47.4	-8°46.1
										Regulus	207°34.0	11°50.6
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.3	61°36.7
0	$137^{\circ}22.1$		$N03^{\circ}23.2$	26°15.5	$N26^{\circ}12.8$	67°33.6	N21°40.0	147°34.2	S06°28.6	Denebola	182°24.6	14°25.7
1	152°24.6	151°46.5	24.2	41°18.6	12.8	82°36.0	40.0	162°36.4	28.4	Gienah	175°43.3	-17°40.9
2	$167^{\circ}27.1$	166°47.5	25.3	56°21.7	12.8	97°38.5	40.0	177°38.6	28.3		173° 43.3	-63°14.1
3	182°29.5	181°48.6	• • 26.3	71°24.8	• • 12.9	112°40.9	• • 40.0	192°40.8	• • 28.2			
4	197°32.0	196°49.6	27.4	86°27.9	12.9	127°43.4	40.0	207°43.0	28.1		171°51.2	-57°15.1
5	212°34.5	211°50.7	28.5	101°31.0	12.9	142°45.8	40.0	222°45.2	28.0	Alioth	166°12.6	55°49.1
6	227°36.9		N03°29.5	116°34.0	N26°12.9	157°48.2	N21°40.0	237°47.4	S06°27.9	Spica	158°22.1	-11°17.6
	242°39.4	241°52.8		131°37.1		172°50.7		252°49.6		Alkaid	152°51.8	49°10.9
7			30.6		13.0		40.0		27.8	Hadar	148°35.8	-60°29.4
8	257°41.8	256° 53.8	31.6	146°40.2	13.0	187°53.1	40.1	267°51.8	27.7	Menkent	147°57.4	-36°29.5
9	272°44.3	271°54.9	• • 32.7	161°43.3	• • 13.0	202°55.6	• • 40.1	282°54.0	• • 27.5	Arcturus	145°47.8	19°02.9
10	287°46.8	286°55.9	33.7	176°46.3	13.0	217°58.0	40.1	297°56.2	27.4	Rigil Kent.	139°40.1	-60°56.1
11	302°49.2	301°57.0	34.8	191°49.4	13.1	233°00.4	40.1	312°58.4	27.3	Kochab	137°19.7	74°02.7
12	317°51.7	$316^{\circ}58.1$	N03°35.8	206°52.5	$N26^{\circ}13.1$	248°02.9	N21°40.1	328°00.6	S06°27.2	Zuben'ubi	136°55.9	-16°08.8
13	332°54.2	331°59.1	36.8	221°55.5	13.1	263°05.3	40.1	343°02.8	27.1	Alphecca	126°03.7	26°37.5
14	347°56.6	$347^{\circ}00.2$	37.9	236°58.6	13.1	278°07.8	40.1	358°05.0	27.0	· ·	112° 15.9	-26°29.2
15	2°59.1	2°01.3	• • 38.9	252°01.7	• • 13.2	293°10.2	• • 40.1	13°07.2	• • 26.9	Antares		
16	18°01.6	17°02.3	40.0	267°04.7	13.2	308°12.6	40.2	28°09.4	26.8	Atria	107°10.3	-69°04.1
17	33°04.0	32°03.4	41.0	282°07.8	13.2	323°15.1	40.2	43°11.6	26.6	Sabik	102°02.9	-15°45.4
18	48°06.5		N03°42.1	297°10.8	N26°13.2	338°17.5	N21°40.2	58°13.8	S06°26.5	Shaula	96°10.5	-37°07.3
19	63°09.0	62°05.5		312°13.9	100	353°19.9		73°16.0		Rasalhague	95°58.7	12°32.3
			43.1		13.2		40.2		26.4	Eltanin	90°42.5	51°28.8
20	78°11.4	77°06.6	44.2	327°17.0	13.3	8°22.4	40.2	88°18.2	26.3	Kaus Aust.	83°32.7	-34°22.3
21	93°13.9	92°07.7	• • 45.2	342°20.0	• • 13.3	23°24.8	• • 40.2	103°20.4	• • 26.2	Vega	80°33.5	38°48.2
22	108°16.3	107°08.8	46.2	357°23.1	13.3	38°27.2	40.2	118°22.6	26.1	Nunki	75°48.0	-26°16.0
23	123°18.8	122°09.9	47.3	12°26.1	13.3	53°29.7	40.2	133°24.8	26.0	Altair	62°00.2	8°55.9
Mer r	pass. 14:48	$\nu 1.0' \ d1.1$	′ m-4 80	$\nu 3.1' d0$	0′ m-0.90	$\nu^2 4' d0$	.0′ m-2.47	$\nu 2.2' d-0$	.1′ m1.12	Peacock	53°06.2	-56°39.3
										Deneb	49°26.2	45°22.1
										Enif	33°39.0	9°59.3
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.3	-46°50.5
0	$138^{\circ}21.3$	$137^{\circ}11.0$	N03°48.3	27°29.2	N26°13.3	68°32.1	N21°40.3	148°27.0	S06°25.9	Fomalhaut	15°14.7	-29°29.5
1	153°23.7	$152^{\circ}12.1$	49.4	42°32.2	13.4	83°34.5	40.3	163°29.2	25.7	Scheat	13°45.5	28°13.1
2	168°26.2	$167^{\circ}13.1$	50.4	57°35.3	13.4	98°37.0	40.3	178°31.4	25.6	Markab	13°30.1	15°20.4
3	183°28.7	182° 14.2	• • 51.4	72°38.3	. 13.4	113°39.4	• • 40.3	193°33.6	25.5	iviarkab	13 30.1	10 ∠0.4
4	198°31.1	197° 15.3	52.5	87°41.3	13.4	128°41.8	40.3	208°35.8	25.4	Feb 06 Thu	SHA	Mer.pass
5	213°33.6	212° 16.4	53.5	102°44.4	13.4	143°44.3	40.3	223°38.0	25.3	Venus	359°58.0	14:54
6	228°36.1		N03°54.6	117°47.4	N26°13.5	158°46.7	N21°40.3	238°40.2	S06°25.2	Mars	248°38.1	22:15
								250° 40.2 253° 42.5		Jupiter	290°11.9	19:30
7	243°38.5	242°18.6	55.6	132°50.5	13.5	173°49.1	40.4		25.1		10°18.2	
8	258°41.0	257° 19.7	56.6	147°53.5	13.5	188°51.5	40.4	268°44.7	25.0	Saturn	10 1δ.2	14:11
9	273°43.5	272°20.8	• • 57.7	162°56.6	• • 13.5	203°54.0	• • 40.4	283°46.9	• • 24.8	Feb 07 Fri	SHA	Mer.pass
10	288°45.9	287°21.9	58.7	177°59.6	13.5	218°56.4	40.4	298°49.1	24.7	Venus	359°23.3	14:52
11	303°48.4	302°23.1	03°59.7	193°02.6	13.5	233°58.8	40.4	313°51.3	24.6	Mars	248°53.4	22:10
12	318°50.8		N04°00.8	208°05.7	N26°13.6	249°01.3	N21°40.4	328°53.5	S06°24.5	Jupiter	240° 33.4 290° 11.5	19:27
13	333°53.3	332°25.3	01.8	223°08.7	13.6	264°03.7	40.4	343°55.7	24.4	Saturn	290 11.5 10°12.0	
14	348°55.8	347°26.4	02.8	$238^{\circ}11.7$	13.6	$279^{\circ}06.1$	40.4	358°57.9	24.3	Saturn	10 12.0	14:08
15	3°58.2	2°27.5	• • 03.9	$253^{\circ}14.7$	• • 13.6	294°08.5	• • 40.5	14°00.1	• • 24.2	Feb 08 Sat	SHA	Mer.pass
16	19°00.7	17°28.6	04.9	268°17.8	13.6	309°11.0	40.5	29°02.3	24.0	Venus		14:50
17	34°03.2	32°29.7	05.9	283°20.8	13.6	324°13.4	40.5	44°04.5	23.9	Mars		22:06
18	49°05.6		N04°06.9	298°23.8	N26°13.6	339°15.8	N21°40.5	59°06.7	S06°23.8	Jupiter		19:23
19	64°08.1	62°32.0	08.0	313°26.8	13.7	354°18.3	40.5	74°08.9	23.7			
										Saturn	10°05.8	14:04
20	79°10.6	77°33.1	09.0	328°29.9	13.7	9°20.7	40.5	89°11.1	23.6	Horizont	al parallax	
21	94°13.0	92°34.3	• • 10.0	343°32.9	• • 13.7	24°23.1	• • 40.5	104°13.3	• • 23.5	1101120110	Venus:	0.3
22	109°15.5	107°35.4	11.0	358°35.9	13.7	39°25.5	40.6	119°15.5	23.4		Mars:	0.3
23	124°17.9	122°36.5	12.1	13°38.9	13.7	54°28.0	40.6	134°17.7	23.3		ividi 5.	0.2
Mer.r	pass. 14:44	$\nu 1.1' \ d1.0$	' m-4.81	$\nu$ 3.0′ d0.	0′ m-0.87	$\nu 2.4' \ d0$	.0′ m-2.46	$\nu 2.2' \ d-0$	.1′ m1.12			

h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	176°29.6	S15°36.3	83°44.2	7.0'	$N23^{\circ}32.1$	10.0'	58.7'
1	191°29.6	35.6	98°10.2 112°36.2	6.9'	23°42.1	9.8'	58.7'
2	206°29.6 221°29.5	34.8 •• 34.0	112° 36.2 127° 02.1	6.9' 6.8'	23°51.9 24°01.6	9.7' 9.5'	58.7' 58.7'
4	236°29.5	33.3	141°27.9	6.7'	24°11.1	9.4	58.7'
5	251°29.4	32.5	155°53.6	6.7'	24°20.5	9.2'	58.7'
6 7	266°29.4 281°29.4	\$15°31.7 30.9	170°19.2 184°44.8	6.6' 6.5'	N24°29.7 24°38.8	9.1' 8.9'	58.6' 58.6'
8	296°29.3	30.9	199° 10.4	6.4	24° 47.7	8.8'	58.6
9	311°29.3	• • 29.4	213°35.8	6.4'	24°56.5	8.6'	58.6'
10	326°29.2	28.6	228°01.2	6.3'	25°05.1	8.4'	58.6'
11 12	341°29.2 356°29.2	27.8 \$15°27.1	242°26.5 256°51.7	6.2' 6.2'	25°13.5 N25°21.8	8.3' 8.1'	58.6' 58.5'
13	11°29.1	26.3	271°16.9	6.1'	25°29.9	8.0'	58.5
14	26°29.1	25.5	285°42.0	6.1'	25° 37.9	7.8'	58.5'
15	41°29.1 56°29.0	· · 24.7 24.0	300°07.1 314°32.1	6.0' 5.9'	25°45.7 25°53.3	7.6' 7.5'	58.5' 58.5'
16 17	71°29.0	23.2	314 32.1 328°57.0	5.9'	25° 53.3 26° 00.8	7.3'	58.5'
18	86°29.0	S15°22.4	343°21.9	5.8'	N26°08.1	7.1'	58.4'
19	101°28.9	21.6	357°46.7	5.8'	26° 15.3	7.0'	58.4'
20 21	116°28.9 131°28.9	20.8 •• 20.1	12°11.5 26°36.2	5.7' 5.6'	26°22.2 26°29.0	6.8' 6.6'	58.4' 58.4'
22	146°28.8	19.3	41°00.8	5.6'	26° 35.7	6.5	58.4
23	161°28.8	18.5	55°25.4	5.5'	26°42.1	6.3'	58.4'
	SD = 16.2'	d = -0.8'		SI	D = 16.0'		
F!	CUA	Da -	GHA		D	اب	HP
Fri 0	<b>GHA</b> 176°28.7	Dec \$15° 17.7	<b>GHA</b> 69°49.9	u 5.5'	Dec N26° 48.4	<i>d</i> 6.1'	HP 58.3'
1	191°28.7	16.9	84° 14.4	5.4'	26°54.6	5.9'	58.3'
2	206°28.7	16.2	98°38.9	5.4'	27°00.5	5.8'	58.3'
3 4	221°28.7 236°28.6	· · 15.4 14.6	113°03.3 127°27.6	5.4' 5.3'	27°06.3 27°11.9	5.6' 5.4'	58.3' 58.3'
5	250°28.6	13.8	141°52.0	5.3'	27°17.3	5.4	58.3'
6	266°28.6	S15°13.0	$156^{\circ}16.2$	5.2'	N27°22.6	5.1'	58.2'
7	281°28.5	12.2	170°40.5	5.2'	27° 27.6	4.9'	58.2'
8 9	296°28.5 311°28.5	11.4 •• 10.7	185°04.6 199°28.8	5.2' 5.1'	27°32.5 27°37.3	4.7' 4.5'	58.2' 58.2'
10	326°28.4	09.9	213°52.9	5.1'	27°41.8	4.4'	58.2
11	341°28.4	09.1	228° 17.0	5.1'	27°46.2	4.2'	58.2'
12 13	356°28.4 11°28.3	\$15°08.3 07.5	242°41.1 257°05.1	5.0' 5.0'	N27°50.3 27°54.3	4.0' 3.8'	58.1' 58.1'
14	26°28.3	06.7	271°29.1	5.0'	27°58.2	3.6'	58.1
15	41°28.3	•• 05.9	285°53.1	5.0'	28°01.8	3.5'	58.1'
16	56°28.3 71°28.2	05.2 04.4	300°17.1 314°41.0	4.9'	28°05.3 28°08.6	3.3' 3.1'	58.1' 58.1'
17 18	86°28.2	515°03.6	314 41.0 329°04.9	4.9' 4.9'	28 08.6 N28°11.7	2.9'	58.0'
19	101°28.2	02.8	343°28.9	4.9'	28°14.6	2.7'	58.0'
20	116°28.2	02.0	357°52.7		28° 17.3	2.6'	58.0'
21 22	131°28.1 146°28.1	· · 01.2 15°00.4	12°16.6 26°40.5	4.9' 4.9'	28° 19.9 28° 22.2	2.4' 2.2'	58.0' 58.0'
23	161°28.1	14° 59.6	41°04.4	4.9'	28° 24.4	2.0'	58.0'
	SD = 16.2'	d = -0.8'	-	SI	D = 15.9'		
٠.	CUA		CIIA			,	
Sat 0	<b>GHA</b> 176°28.1	<b>Dec</b> \$14°58.8	<b>GHA</b> 55°28.2	ν 4.9'	<b>Dec</b> N28° 26.4	d 1.8'	<b>HP</b> 57.9'
1	191°28.0	58.0	69°52.1	4.9'	28°28.3	1.6'	57.9'
2	206°28.0	57.2	84°16.0	4.9'	28°29.9	1.5'	57.9'
3 4	221°28.0 236°28.0	· · 56.4 55.7	98°39.8 113°03.7	4.9' 4.9'	28°31.4 28°32.6	1.3' 1.1'	57.9' 57.9'
5	251°27.9	54.9	$127^{\circ}27.6$	4.9'	28°33.7	0.9'	57.8'
6	266°27.9	\$14° 54.1	141°51.5	4.9'	N28°34.7	0.7'	57.8'
7 8	281°27.9 296°27.9	53.3 52.5	156° 15.4 170° 39.3	4.9' 4.9'	28° 35.4 28° 35.9	0.5' 0.4'	57.8' 57.8'
9	311°27.8	51.7	170 39.3 185°03.2	4.9' 4.9'	28°36.3	0.4	57.8'
10	326°27.8	50.9	$199^{\circ}27.1$	5.0'	28°36.5	0.0'	57.8'
11	341°27.8 356°27.8	50.1 \$14°49.3	213°51.1 228°15.1	5.0'	28°36.5 N28°36.3	-0.2' -0.4'	57.7'
12 13	356°27.8 11°27.8	\$14°49.3 48.5	228° 15.1 242° 39.1	5.0' 5.0'	N28°36.3 28°35.9	-0.4° -0.5'	57.7' 57.7'
14	26°27.7	47.7	$257^{\circ}03.1$	5.1'	28°35.4	-0.7'	57.7'
15	41°27.7	• • 46.9	271°27.2	5.1'	28°34.7	-0.9'	57.7'
16 17	56°27.7 71°27.7	46.1 45.3	285°51.3 300°15.4	5.1' 5.2'	28°33.8 28°32.7	-1.1' -1.3'	57.6' 57.6'
18	86°27.7	\$14° 44.5	314°39.6	5.2'	N28° 31.4	-1.4'	57.6'
19	101°27.6	43.7	329°03.8	5.2'	28°30.0	-1.6'	57.6'
20	116°27.6 131°27.6	42.9	343°28.0 357°52.3	5.3' 5.3'	28° 28.4 28° 26.6	-1.8'	57.6' 57.5'
21 22	131°27.6 146°27.6	· · 42.1 41.3	357°52.3 12°16.7	5.3° 5.4'	28°26.6 28°24.6	-2.0' -2.1'	57.5' 57.5'
23	161°27.6	40.5	26°41.0	5.4'	28° 22.5	-2.3'	57.5'
	SD = 16.2'	d = -0.8'		SI	D = 15.8'		

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

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

		Sun		Moon				
Day	Eqn.of	Time	Mer.	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	58-78%		
06	14:01	14:03	12:14	19:09	06:40			
07	14:05	14:06	12:14	20:09	07:39			
08	14:08	14:09	12:14	21:09	08:39			

### February 09, 10, 11 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	139°20.4	137°37.7	N04°13.1	28°41.9	N26°13.7	69°30.4	N21°40.6	149°19.9	S06°23.1			
1	154°22.9	152°38.8	14.1	43°44.9	13.7	84°32.8	40.6	164°22.1	23.0	Alpheratz	357°35.0	29°13.8
2	169°25.3	167°39.9	15.1	58° 48.0	13.7	99°35.2	40.6	179°24.3	22.9	Ankaa	353°07.3	-42°10.4
3	184°27.8	182°41.1	. 16.2	73°51.0	13.8	114°37.6	• • 40.6	194°26.5	22.8	Schedar	349°31.3	56°40.7
4	199°30.3	197°42.2	17.2	88°54.0	13.8	129°40.1	40.6	209°28.7	22.7	Diphda	348°47.4	-17°51.1
5	214°32.7	212°43.4	18.2	103°57.0	13.8	144°42.5	40.7	224°30.9	22.6	Achernar	335°20.3	-57°06.8
6	229°35.2	227°44.5	N04°19.2	119°00.0	N26°13.8	159°44.9	N21°40.7	239°33.1	S06°22.5	Hamal Polaris	327°51.2 314°01.1	23°34.9 89°22.5
7	244°37.7	242°45.7	20.3	134°03.0	13.8	174°47.3	40.7	254°35.3	22.3	Acamar	314 01.1 315°11.7	-40°12.5
8	259°40.1	257°46.8	21.3	149°06.0	13.8	189°49.8	40.7	269°37.5	22.2	Menkar	314°06.1	4°11.2
9	274°42.6	272°48.0	• • 22.3	164°09.0	• • 13.8	204°52.2	• • 40.7	284°39.7	• • 22.1	Mirfak	308°28.1	49°57.2
10	289°45.1	287°49.1	23.3	179°12.0	13.8	219°54.6	40.7	299°41.9	22.0	Aldebaran	290°39.4	16°33.6
11	304°47.5	302°50.3	24.3	194° 15.0	13.8	234°57.0	40.7	314°44.1	21.9	Rigel	281°03.6	-8°10.5
12	319°50.0 334°52.4	317°51.4 332°52.6	N04°25.3 26.4	209° 18.0 224° 21.0	N26°13.8	249°59.4 265°01.9	N21°40.8	329°46.3 344°48.5	\$06°21.8	Capella	280°21.5	46°01.5
13 14	349°54.9	347°53.8	27.4	239°24.0	13.9 13.9	280°04.3	40.8 40.8	359°50.7	21.7 21.6	Bellatrix	278°22.6	6°22.3
15	4°57.4	2°54.9	28.4	254°27.0	13.9	295°06.7	40.8	14°52.9	• • 21.4	Elnath	278°01.5	28°37.8
16	19°59.8	17°56.1	29.4	269°30.0	13.9	310°09.1	40.8	29°55.1	21.3	Alnilam	275°37.4	-1°11.2
17	35°02.3	32°57.3	30.4	284°33.0	13.9	325°11.5	40.8	44°57.3	21.2	Betelgeuse	270°51.8	7°24.7
18	50°04.8	47°58.5	N04°31.4	299°35.9	N26°13.9	340°13.9	N21°40.8	59°59.5	S06°21.1	Canopus	263°52.0	-52°42.7 -16°45.2
19	65°07.2	62°59.6	32.4	314°38.9	13.9	$355^{\circ}16.4$	40.9	75°01.7	21.0	Sirius Adhara	258°25.9 255°05.5	-10 45.2 -29°00.5
20	80°09.7	78°00.8	33.4	329°41.9	13.9	$10^{\circ}18.8$	40.9	90°03.9	20.9		244°50.4	5°09.6
21	95°12.2	93°02.0	• • 34.5	344°44.9	• • 13.9	25°21.2	• • 40.9	105°06.1	• • 20.8	Procyon Pollux	244 50.4 243°16.9	27°57.9
22	110°14.6	108°03.2	35.5	359°47.9	13.9	40°23.6	40.9	120°08.3	20.6	Avior	234°14.1	-59°35.5
23	125°17.1	123°04.4	36.5	14°50.9	13.9	55°26.0	40.9	135°10.5	20.5	Suhail	222°45.8	-43°32.1
Mer.p	ass. 14:40	$\nu 1.1' d1.$	0′ m-4.82	$\nu$ 3.0′ d0.	0′ m-0.84	$\nu^{2.4'} d0.$	0′ m-2.46	$\nu 2.2' \ d-0$	.1′ m1.12	Miaplacidus	221°37.4	-69°49.2
										Alphard	217°47.3	-8°46.1
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.0	11°50.6
0	140°19.6	138°05.5	N04°37.5	29°53.8	N26°13.9	70°28.4	N21°40.9	150°12.7	S06°20.4	Dubhe	193°40.2	61°36.7
1	155°22.0	153°06.7	38.5	44° 56.8	13.9	85°30.9	40.9	165°14.9	20.3	Denebola	182°24.6	14°25.7
2	170°24.5	168°07.9	39.5	59° 59.8	13.9	100°33.3	41.0	180°17.1	20.2	Gienah	175°43.3	-17°40.9
3	185°26.9	183°09.1	40.5	75°02.8	13.9	115°35.7	• • 41.0	195°19.3	20.1		172°59.6	-63°14.1
4	200°29.4	198°10.3	41.5	90°05.7	13.9	130°38.1	41.0	210°21.5	20.0	Alioth	171°51.2 166°12.5	-57°15.1 55°49.1
5	$215^{\circ}31.9$	213°11.5	42.5	105°08.7	13.9	145°40.5	41.0	225°23.7	19.8	Spica	158°22.1	-11°17.6
6	230°34.3	228°12.7	N04°43.5	120°11.7	N26°13.9	160°42.9	N21°41.0	240°25.9	S06°19.7	Alkaid	150° 22.1° 152° 51.7	49°10.9
7	245°36.8	243°13.9	44.5	135° 14.7	14.0	175°45.3	41.0	$255^{\circ}28.1$	19.6	Hadar	148°35.7	-60°29.4
8	260°39.3	258°15.1	45.5	150° 17.6	14.0	190°47.8	41.1	270°30.3	19.5		147°57.4	-36°29.5
9	275°41.7	273°16.3	• • 46.5	165°20.6	• • 14.0	205°50.2	• • 41.1	285°32.5	• • 19.4	Arcturus	145°47.7	19°02.9
10	290°44.2	288°17.5	47.5	180°23.6	14.0	220°52.6	41.1	300°34.7	19.3	Rigil Kent.	139°40.1	-60°56.1
11 12	305°46.7 320°49.1	303°18.7 318°19.9	48.5 N04°49.5	195°26.5 210°29.5	14.0 N26°14.0	235°55.0 250°57.4	41.1 N21°41.1	315°36.9 330°39.1	19.2 \$06°19.0	Kochab	$137^{\circ}19.6$	74°02.7
13	335°51.6	333°21.2	50.5	210 29.5 225°32.4	14.0	265°59.8	41.1	345°41.3	18.9	Zuben'ubi	136°55.9	-16°08.8
14	350°54.1	348°22.4	51.5	240°35.4	14.0	281°02.2	41.2	0°43.5	18.8	Alphecca	126°03.7	26°37.5
15	5°56.5	3°23.6	52.5	255°38.3	• • 14.0	296°04.6	• • 41.2	15°45.7	• • 18.7	Antares	112°15.8	-26°29.2
16	20°59.0	18°24.8	53.5	270°41.3	14.0	311°07.0	41.2	30°47.9	18.6	Atria	107°10.2	-69°04.1 -15°45.4
17	36°01.4	33°26.0	54.5	285°44.3	14.0	326°09.4	41.2	45°50.1	18.5	Sabik Shaula	102°02.8 96°10.5	-15 45.4 -37°07.3
18	51°03.9	48°27.3	N04°55.5	300°47.2	N26°14.0	341°11.9	N21°41.2	60°52.3	S06°18.4	Rasalhague	95°58.7	12°32.3
19	66°06.4	63°28.5	56.5	315°50.2	14.0	$356^{\circ}14.3$	41.2	75°54.5	18.2	Eltanin	90°42.5	51°28.8
20	81°08.8	78°29.7	57.5	330°53.1	14.0	11°16.7	41.2	90°56.7	18.1	Kaus Aust.	83°32.7	-34°22.3
21	96°11.3	93°31.0	• • 58.5	345° 56.1	• • 14.0	26° 19.1	• • 41.3	105°58.9	• • 18.0	Vega	80°33.5	38°48.1
22	111°13.8	108°32.2	04°59.5	0°59.0	14.0	41°21.5	41.3	121°01.1	17.9	Nunki	75°47.9	-26°16.0
23	126°16.2	123°33.4	05°00.4	16°01.9	14.0	56°23.9	41.3	136°03.3	17.8	Altair	62°00.2	8°55.9
Mer.p	ass. 14:36	$\nu 1.2' \ d1.$	0′ m-4.82	$\nu$ 3.0′ d0.	0'  m-0.81	$\nu$ 2.4′ d0.	0′ m-2.45	$\nu 2.2' \ d-0$	.1' m $1.12$	Peacock	53°06.1	-56°39.3
										Deneb	49°26.2	45°22.0
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°39.0	9°59.3
0	141°18.7	138°34.7	N05°01.4	31°04.9	N26°14.0	71°26.3	N21°41.3	151°05.5	S06°17.7	Al Na'ir Fomalhaut	27°33.2 15°14.7	-46°50.5 -29°29.5
1	156°21.2	153°35.9	02.4	46°07.8	14.0	86°28.7	41.3	166°07.7	17.6	Scheat	13°45.5	-29°29.5° 28°13.1
2	171°23.6	168°37.2	03.4	$61^{\circ}10.8$	14.0	$101^{\circ}31.1$	41.3	$181^{\circ}09.9$	17.4	Markab	13°30.1	15°20.4
3	186°26.1	183°38.4	• • 04.4	76° 13.7	• • 13.9	116°33.5	• • 41.4	196°12.1	• • 17.3			
4	201°28.6	198°39.7	05.4	91°16.6	13.9	131°35.9	41.4	211°14.3	17.2	Feb 09 Sun	SHA	Mer.pass
5	216°31.0	213°40.9	06.4	106° 19.6	13.9	146°38.3	41.4	226°16.5	17.1		358°17.2	14:48
6	231°33.5	228°42.2	N05°07.4	121°22.5	N26°13.9	161°40.7	N21°41.4	241°18.7	S06°17.0		249°21.5 290°10.0	22:01
7 8	246°35.9 261°38.4	243°43.4 258°44.7	08.3 09.3	136°25.5 151°28.4	13.9 13.9	176° 43.1 191° 45.5	41.4	256°20.9 271°23.1	16.9 16.8	Jupiter Saturn	9°59.5	19:19 14:01
9	201 38.4 276°40.9	258 44.7 273°45.9	10.3	166°31.3	13.9	191 45.5 206°47.9	41.4 •• 41.5	271 23.1 286°25.3	16.8			
10	270 40.9 291°43.3	273 45.9 288°47.2	11.3	181°34.2	13.9	200 47.9 221°50.3	41.5	301°27.5	16.5	Feb 10 Mon	SHA	Mer.pass
11	306°45.8	303°48.4	12.3	196°37.2	13.9	236°52.7	41.5	316°29.7	16.4		357°46.0	14:46
12	321°48.3	318°49.7	N05°13.3	211°40.1	N26°13.9	251°55.1	N21°41.5	331°31.9	S06°16.3	Mars		21:56
13	336°50.7	333°51.0	14.2	226°43.0	13.9	266°57.5	41.5	346°34.1	16.2	Jupiter		19:15
14	351°53.2	$348^{\circ}52.3$	15.2	$241^{\circ}45.9$	13.9	$281^{\circ}59.9$	41.5	1°36.3	16.1	Saturn	9°53.1	13:57
15	6°55.7	3°53.5	•• 16.2	256°48.9	• • 13.9	297°02.3	• • 41.6	16°38.5	• • 16.0	Feb 11 Tue	SHA	Mer.pass
16	21°58.1	18°54.8	17.2	271°51.8	13.9	312°04.7	41.6	31°40.6	15.8		$357^{\circ}16.0$	14:44
17	37°00.6	33°56.1	18.1	286°54.7	13.9	327°07.1	41.6	46°42.8	15.7		249°46.2	21:51
18	52°03.0	48°57.4	N05°19.1	301°57.6	N26°13.9	342°09.5	N21°41.6	61°45.0	\$06°15.6		290°07.6	19:11
19	67°05.5	63°58.6	20.1	317°00.5	13.9	357°11.9	41.6	76°47.2	15.5	Saturn	9°46.8	13:54
20 21	82°08.0 97°10.4	78°59.9 94°01.2	21.1	332°03.4 347°06.3	13.9 •• 13.8	12° 14.3 27° 16.7	41.6 •• 41.7	91°49.4 106°51.6	15.4 •• 15.3	Horizont	al parallax	
22	97 10.4 112°12.9	94 01.2 109°02.5	23.0	2°09.3	13.8	42° 19.1	41.7	100 51.0 121°53.8	15.3		Venus:	0.3
23	127°15.4	124°03.8	24.0	17° 12.2	13.8	57°21.5	41.7	136°56.0	15.0		Mars:	0.2
			0′ m-4.83		.0′ m-0.79		0′ m-2.44		.1′ m1.12	-		
ivier.p	ass. 14:32	$\nu_{1.2}$ al.	U III-4.83	ν2.9 a-0	.0 111-0.79	ν2.4 a0.	U III-2.44	ν2.2 a-0	.1 1111.12			

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	176°27.6	S14°39.7	41°05.5	5.5'	N28°20.1	-2.5'	57.5'
1	191°27.5	38.9	55°29.9	5.5'	28°17.6	-2.7'	57.5'
2	206°27.5	38.1	69°54.5	5.6'	28°15.0	-2.8'	57.5'
3	221°27.5	• • 37.3	84°19.0	5.6'	28°12.1	-3.0'	57.4
4 5	236°27.5 251°27.5	36.5 35.7	98°43.7 113°08.4	5.7' 5.8'	28°09.1 28°05.9	-3.2' -3.4'	57.4' 57.4'
6	266°27.5	514°34.9	113 00.4 127°33.1	5.8'	N28°02.6	-3.4 -3.5'	57.4
7	281°27.5	34.1	141°58.0	5.9'	27°59.1	-3.7'	57.4'
8	296°27.4	33.3	156°22.9	6.0'	27°55.4	-3.9'	57.3'
9	311°27.4	• • 32.4	170°47.8	6.0'	27°51.5	-4.0'	57.3'
10	326°27.4	31.6	185°12.8	6.1'	27°47.5	-4.2'	57.3'
11	341°27.4	30.8 \$14°30.0	199°37.9	6.2'	27°43.3	-4.4'	57.3'
12 13	356°27.4 11°27.4	29.2	214°03.1 228°28.3	6.2' 6.3'	N27°38.9 27°34.4	-4.5' -4.7'	57.3' 57.2'
14	26°27.4	28.4	242°53.6	6.4	27°29.7	-4.1°	57.2'
15	41°27.4	• • 27.6	257°19.0	6.5'	27°24.9	-5.0'	57.2'
16	56°27.3	26.8	271°44.5	6.5'	27°19.9	-5.2'	57.2'
17	71°27.3	26.0	286°10.0	6.6'	27°14.7	-5.3'	57.2'
18	86°27.3	S14°25.2	300°35.6	6.7'	N27°09.4	-5.5'	57.1'
19	101°27.3 116°27.3	24.4	315°01.3	6.8'	27°03.9	-5.6'	57.1'
20 21	116°27.3 131°27.3	23.6 • • 22.7	329°27.1 343°53.0	6.9' 7.0'	26°58.2 26°52.5	-5.8' -5.9'	57.1' 57.1'
22	131 27.3 146°27.3	21.9	358°18.9	7.0'	26°46.5	-5.9 -6.1'	57.1'
23	161°27.3	21.1	12°45.0	7.1'	26°40.4	-6.2	57.0'
	SD = 16.2'	d = -0.8'		CI	D = 15.7'		
	3D = 10.2	<i>u</i> = -0.6		31	J = 15.7		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	176°27.3 191°27.3	\$14°20.3 19.5	27°11.1 41°37.3	7.2' 7.3'	N26°34.2 26°27.8	-6.4' -6.5'	57.0' 57.0'
2	206°27.2	19.5	56°03.6	7.3 7.4'	26°21.2	-0.5 -6.7'	57.0'
3	221°27.2	• • 17.9	70°30.0	7.5'	26°14.5	-6.8'	57.0'
4	236°27.2	17.1	84°56.5	7.6'	26°07.7	-7.0'	57.0'
5	251°27.2	16.2	99°23.1	7.7'	26°00.7	-7.1'	56.9'
6	266°27.2 281°27.2	\$14° 15.4	113°49.8 128°16.5	7.8'	N25°53.6 25°46.3	-7.3'	56.9'
7 8	281 ° 27.2 296° 27.2	14.6 13.8	128° 16.5 142° 43.4	7.9' 8.0'	25°46.3 25°38.9	-7.4' -7.5'	56.9' 56.9'
9	311°27.2	• • 13.0	157°10.4	8.1'	25°31.4	-7.7'	56.9
10	326°27.2	12.2	171°37.5	8.2'	25°23.7	-7.8'	56.8'
11	341°27.2	11.3	186°04.6	8.3'	25°15.9	-8.0'	56.8'
12	356°27.2	S14°10.5	200°31.9	8.4'	N25°07.9	-8.1'	56.8'
13	11°27.2 26°27.2	09.7	214°59.2 229°26.7	8.5'	24°59.8 24°51.6	-8.2'	56.8'
14 15	20 27.2 41°27.2	08.9 •• 08.1	243°54.3	8.6' 8.7'	24 51.0 24°43.2	-8.4' -8.5'	56.8' 56.7'
16	56°27.2	07.3	258°21.9	8.8'	24°34.8	-8.6'	56.7
17	71°27.2	06.4	272°49.7	8.9'	24°26.2	-8.7'	56.7'
18	86°27.2	S14°05.6	287°17.6	9.0'	N24°17.4	-8.9'	56.7'
19	101°27.2	04.8	301°45.5 316°13.6	9.1'	24°08.6	-9.0'	56.7'
20 21	116°27.2 131°27.2	04.0 · · 03.1	310 13.0 330°41.8	9.2' 9.3'	23°59.6 23°50.5	-9.1' -9.2'	56.6' 56.6'
22	146°27.2	02.3	345°10.1	9.4'	23°41.3	-9.2' -9.3'	56.6
23	161°27.2	01.5	359°38.5	9.5'	23°31.9	-9.5'	56.6'
	SD = 16.2'	d = -0.8'		SI	O = 15.6'		
Tue	GHA	Dec	GHA	ν	Dec	d	НР
0	176°27.2	\$14°00.7	14°06.9	9.6'	N23°22.5	-9.6'	56.5
1	191°27.2	13°59.9	28°35.5	9.7'	23°12.9	-9.7'	56.5'
2	206°27.2	59.0	43°04.2	9.8'	23°03.2	-9.8'	56.5'
3	221°27.2	• • 58.2	57°33.0	9.9'	22°53.4	-9.9'	56.5'
4 5	236°27.2 251°27.2	57.4 56.6	72°01.9 86°31.0	10.0' 10.1'	22°43.5 22°33.5	-10.0' -10.1'	56.5' 56.4'
6	251°27.2 266°27.2	50.6 \$13°55.7	101°00.1	10.1	N22°23.3	-10.1	56.4
7	281°27.2	54.9	101 00.1 115°29.3	10.2	22°13.1	-10.2	56.4
8	296°27.2	54.1	129°58.6	10.4'	22°02.7	-10.4	56.4'
9	311°27.2	•• 53.3	144°28.0	10.5'	21°52.3	-10.6'	56.4'
10	326°27.2	52.4	158°57.6	10.6'	21°41.7	-10.7'	56.3'
11	341°27.2 356°27.2	51.6 \$13°50.8	173°27.2 187°56.9	10.7' 10.8'	21°31.1 N21°20.3	-10.8'	56.3'
12 13	350°27.2 11°27.2	513 50.8	187°56.9 202°26.8	10.8	N21°20.3 21°09.5	-10.8' -10.9'	56.3' 56.3'
14	26°27.2	49.1	202 20.8 216°56.7	11.0'	21 09.5 20°58.5	-10.9	56.3
15	41°27.2	• • 48.3	$231^{\circ}26.7$	11.1'	20°47.5	-11.1'	56.2'
16	56°27.2	47.5	245°56.9	11.2'	20°36.4	-11.2'	56.2'
17	71°27.2	46.6	260°27.1	11.3'	20°25.1	-11.3'	56.2'
18 19	86°27.2 101°27.2	\$13°45.8 45.0	274°57.5 289°27.9	11.4' 11.5'	N20°13.8 20°02.4	-11.4' -11.5'	56.2' 56.2'
20	101 27.2 116°27.2	45.0 44.2	303°58.5	11.6'	19°50.9	-11.5 -11.6'	56.1'
21	131°27.2	• • 43.3	318°29.1	11.7'	19°39.3	-11.7	56.1
22	146°27.2	42.5	332°59.9	11.8'	19°27.7	-11.8'	56.1'
23	161°27.2	41.7	347°30.7	11.9'	19°15.9	-11.8'	56.1'
	SD = 16.2'	d = -0.8'		SI	D = 15.4'		

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

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

		Sun		Moon				
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age		
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	11-13		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	86-97%		
09	14:10	14:10	12:14	22:07	09:38			
10	14:11	14:11	12:14	23:01	10:35			
11	14.11	14.11	12.14	23.52	11.27			

#### February 12, 13, 14 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	142°17.8	139°05.1	N05°25.0	32°15.1	N26° 13.8	72°23.9	N21°41.7	151°58.2	S06°14.9			
1	157°20.3	154°06.4	25.9	47°18.0	13.8	87°26.3	41.7	167°00.4	14.8	Alpheratz	357°35.0	29°13.8
2	172°22.8	169°07.7	26.9	62°20.9	13.8	102°28.7	41.8	182°02.6	14.7	Ankaa	353°07.3	-42°10.4
3	187°25.2	184°09.0	• • 27.9	77°23.8	• • 13.8	$117^{\circ}31.1$	• • 41.8	197°04.8	• • 14.6	Schedar	349°31.4	56°40.7
4	202°27.7	199°10.3	28.8	92°26.7	13.8	132°33.5	41.8	$212^{\circ}07.0$	14.5	Diphda	348°47.4	-17°51.1
5	$217^{\circ}30.2$	214°11.6	29.8	107°29.6	13.8	147°35.9	41.8	$227^{\circ}09.2$	14.3	Achernar Hamal	335°20.3 327°51.2	-57°06.8 23°34.9
6	232°32.6	229°12.9	N05°30.8	122°32.5	N26° 13.8	162°38.3	N21°41.8	242°11.4	S06°14.2	Polaris	314°02.6	89°22.5
7	247°35.1	244°14.2	31.7	137°35.4	13.8	177°40.7	41.8	257°13.6	14.1	Acamar	315°11.7	-40°12.5
8	262°37.5	259° 15.5	32.7	152°38.3	13.7	192°43.1	41.9	272°15.8	14.0	Menkar	314°06.1	4°11.2
9	277°40.0	274°16.8	· · 33.7	167°41.2	• • 13.7	207°45.5	· · 41.9	287°18.0	• • 13.9	Mirfak	308°28.1	49°57.2
10 11	292°42.5 307°44.9	289° 18.1 304° 19.5	34.6 35.6	182°44.1 197°46.9	13.7 13.7	222°47.9 237°50.3	41.9 41.9	302°20.2 317°22.4	13.8 13.7	Aldebaran	290°39.4	16°33.6
12	307 44.9 322°47.4	319° 20.8	N05° 36.5	212°49.8	N26° 13.7	252° 52.7	N21°41.9	317 22.4 332°24.6	506°13.5	Rigel	281°03.6	-8°10.5
13	337°49.9	334° 22.1	37.5	227°52.7	13.7	267°55.1	41.9	347°26.8	13.4	Capella	280°21.5	46°01.5
14	352°52.3	349°23.4	38.5	242°55.6	13.7	282°57.5	42.0	2°29.0	13.3	Bellatrix	278°22.6	6°22.3
15	7°54.8	4°24.8	• • 39.4	257°58.5	· · 13.7	297° 59.9	• • 42.0	17°31.2	• • 13.2	Elnath	278°01.6	28°37.8
16	22°57.3	19°26.1	40.4	273°01.4	13.6	313°02.2	42.0	32°33.4	13.1	Alnilam	275°37.5 270°51.8	-1°11.2 7°24.7
17	$37^{\circ}59.7$	34°27.4	41.3	288°04.3	13.6	328°04.6	42.0	47°35.6	13.0	Betelgeuse Canopus	263°52.0	-52°42.7
18	53°02.2	49°28.8	N05°42.3	303°07.1	N26° 13.6	343°07.0	N21°42.0	62°37.8	S06°12.9	Sirius	258°25.9	-16°45.2
19	68°04.7	64°30.1	43.2	318°10.0	13.6	358°09.4	42.1	77°40.0	12.7	Adhara	255°05.5	-29°00.5
20	83°07.1	79°31.4	44.2	333°12.9	13.6	13°11.8	42.1	92°42.2	12.6	Procyon	244°50.4	5°09.6
21	98°09.6	94°32.8	• • 45.1	348°15.8	• • 13.6	28°14.2	• • 42.1	107°44.4	• • 12.5	Pollux	243°16.9	27°57.9
22	113°12.0	109°34.1	46.1	3°18.6	13.6	43°16.6	42.1	122°46.6 137°48.8	12.4	Avior	234°14.1	-59°35.5
23	128°14.5	124°35.5	47.0	18°21.5	13.5	58°19.0	42.1		12.3	Suhail	222°45.8	-43°32.1
Mer.p	ass. 14:28	$\nu$ 1.3′ d1.	.0′ m-4.84	$\nu$ 2.9′ d-0	.0′ m-0.76	$\nu$ 2.4′ d0.	.0′ m-2.43	$\nu$ 2.2′ d-0	.1' m $1.12$	Miaplacidus	221°37.4	-69°49.2
										Alphard	217°47.3	-8°46.1
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.0	11°50.5
0	143°17.0	139°36.8	N05°48.0	33°24.4	N26°13.5	73°21.4	N21°42.1	152°50.9	S06°12.2	Dubhe Denebola	193°40.2 182°24.6	61°36.8 14°25.7
1	$158^{\circ}19.4$	154°38.2	48.9	48°27.3	13.5	88°23.7	42.2	$167^{\circ}53.1$	12.0	Gienah	175°43.2	-17°40.9
2	173°21.9	169°39.5	49.9	63°30.1	13.5	103°26.1	42.2	182°55.3	11.9		172°59.5	-63°14.2
3	188°24.4	184°40.9	• • 50.8	78°33.0	• • 13.5	118°28.5	• • 42.2	197°57.5	• • 11.8	Gacrux		-57°15.1
4	203°26.8	199°42.3	51.8	93°35.8 108°38.7	13.5	133°30.9 148°33.3	42.2	212°59.7 228°01.9	11.7	Alioth	$166^{\circ}12.5$	55°49.1
5 6	218°29.3 233°31.8	214°43.6 229°45.0	52.7 N05°53.7	108 38.7 123°41.6	13.4 N26°13.4	148 33.3 163°35.7	42.2 N21°42.3	243°04.1	11.6 \$06°11.5	Spica	158°22.0	-11°17.6
7	248°34.2	244°46.3	54.6	138°44.4	13.4	178°38.1	42.3	258°06.3	11.4	Alkaid	152°51.7	49°10.9
8	263°36.7	259° 47.7	55.6	153°47.3	13.4	193°40.5	42.3	273°08.5	11.2	Hadar	148°35.7	-60°29.4
9	278°39.1	274°49.1	• • 56.5	168°50.1	· · 13.4	208°42.8	• • 42.3	288°10.7	11.1	Menkent		-36°29.5
10	293°41.6	289°50.5	57.5	183°53.0	13.4	223°45.2	42.3	303°12.9	11.0	Arcturus	145°47.7 139°40.0	19°02.9 -60°56.1
11	308°44.1	304°51.8	58.4	198°55.9	13.3	238°47.6	42.4	$318^{\circ}15.1$	10.9	Rigil Kent. Kochab	139° 40.0 137° 19.5	74°02.7
12	323°46.5	319°53.2	N05°59.3	213°58.7	N26°13.3	253°50.0	N21°42.4	333°17.3	S06°10.8	Zuben'ubi	136°55.9	-16°08.8
13	338°49.0	334°54.6	$06^{\circ}00.3$	229°01.6	13.3	268°52.4	42.4	348°19.5	10.7	Alphecca	126°03.7	26°37.5
14	353°51.5	349°56.0	01.2	244°04.4	13.3	283°54.8	42.4	3°21.7	10.5	Antares	112°15.8	-26°29.2
15	8°53.9	4°57.4	• • 02.2	259°07.3	· · 13.3	298°57.1	• • 42.4	18°23.9	• • 10.4	Atria	$107^{\circ}10.2$	-69°04.1
16 17	23°56.4 38°58.9	19°58.8 35°00.1	03.1 04.0	274°10.1 289°12.9	13.2 13.2	313°59.5 329°01.9	42.4 42.5	33°26.1 48°28.3	10.3 10.2	Sabik	102°02.8	-15°45.4
18	54°01.3	50°01.5	N06°05.0	304°15.8	N26° 13.2	344°04.3	N21°42.5	63°30.5	S06°10.1	Shaula	96°10.5	-37°07.3
19	69°03.8	65°02.9	05.9	319°18.6	13.2	359°06.7	42.5	78°32.7	10.0	Rasalhague	95°58.6	12°32.3
20	84°06.3	80°04.3	06.8	334°21.5	13.2	14°09.1	42.5	93°34.9	09.9	Eltanin Kaus Aust.	90°42.5 83°32.7	51°28.8 -34°22.3
21	99°08.7	95°05.7	• • 07.8	349°24.3	• • 13.1	29°11.4	• • 42.5	108°37.1	• • 09.7	Vega	80°33.5	-34 22.3 38°48.1
22	$114^{\circ}11.2$	110°07.1	08.7	4°27.1	13.1	44°13.8	42.6	123°39.2	09.6	Nunki	75°47.9	-26°16.0
23	129°13.6	125°08.5	09.6	19°30.0	13.1	59°16.2	42.6	138°41.4	09.5	Altair	62°00.2	8°55.9
Mer.p	ass. 14:25	$\nu 1.4' d0.$	.9′ m-4.84	$\nu 2.9' \ d-0$	.0′ m-0.73	$\nu 2.4' \ d0.$	.0′ m-2.42	$\nu 2.2' \ d-0$	.1′ m1.12	Peacock	53°06.1	-56°39.2
										Deneb	49°26.2	45°22.0
E!	CHA	CHA	Dee	CHA	Doo	CHA	Doo	CHA	Doo	Enif	33°39.0	9°59.3
Fri 0	<b>GHA</b> 144°16.1	<b>GHA</b> 140°09.9	<b>Dec</b> N06° 10.5	<b>GHA</b> 34°32.8	<b>Dec</b> N26°13.1	<b>GHA</b> 74° 18.6	<b>Dec</b> N21 <sup>o</sup> 42.6	<b>GHA</b> 153°43.6	<b>Dec</b> \$06°09.4	Al Na'ir	27°33.2	-46°50.5
1	159° 18.6	155° 11.4	11.5	49°35.7	13.1	89°21.0	42.6	168°45.8	09.3	Fomalhaut	15°14.7	-29°29.5
2	174°21.0	170° 12.8	12.4	64°38.5	13.0	104°23.3	42.6	183°48.0	09.2	Scheat Markab	13°45.5 13°30.1	28°13.1
3	189°23.5	185° 14.2	· · 13.3	79°41.3	· · 13.0	119°25.7	• • 42.7	198°50.2	• • 09.0	iviarkab	13 30.1	15°20.4
4	204°26.0	200°15.6	14.3	94°44.1	13.0	134°28.1	42.7	213°52.4	08.9	Feb 12 Wed	SHA	Mer.pass
5	$219^{\circ}28.4$	$215^{\circ}17.0$	15.2	109°47.0	13.0	$149^{\circ}30.5$	42.7	228°54.6	8.80	Venus		14:42
6	234°30.9	230° 18.4	N06° 16.1	124°49.8	N26°12.9	164°32.8	N21°42.7	243°56.8	S06°08.7	Mars		21:47
7	249°33.4	245° 19.9	17.0	139°52.6	12.9	179°35.2	42.7	258°59.0	08.6	Jupiter		19:07
8	264°35.8	260°21.3	17.9	154°55.4	12.9	194°37.6	42.8	274°01.2	08.5	Saturn	9°40.4	13:50
9 10	279°38.3 294°40.8	275°22.7 290°24.2	· · 18.9 19.8	169°58.3 185°01.1	· · 12.9 12.8	209°40.0 224°42.4	· · 42.8 42.8	289°03.4 304°05.6	· · 08.3 08.2	Feb 13 Thu	SHA	Mer.pass
11	309°43.2	305° 25.6	20.7	200°03.9	12.8	239° 44.7	42.8	319°07.8	08.2	Venus		14:40
12	324°45.7	320°27.0	N06°21.6	215°06.7	N26° 12.8	254°47.1	N21°42.8	334°10.0	S06°08.0	Mars	250°07.4	21:42
13	339°48.1	$335^{\circ}28.5$	22.5	230°09.5	12.8	269°49.5	42.9	349°12.2	07.9	Jupiter Saturn		19:04 13:47
14	354°50.6	350° 29.9	23.5	245°12.3	12.7	284°51.9	42.9	4°14.4	07.8	Saturn	9°34.0	15:47
15	9°53.1	5°31.4	• • 24.4	260°15.2	• • 12.7	299°54.2	• • 42.9	19°16.6	• • 07.7	Feb 14 Fri	SHA	Mer.pass
16	24°55.5	20°32.8	25.3	275°18.0	12.7	314°56.6	42.9	34°18.8	07.5		355°53.8	14:38
17 18	39°58.0 55°00.5	35°34.3 50°35.7	26.2 N06°27.1	290°20.8 305°23.6	12.7 N26° 12.6	329°59.0 345°01.4	42.9 N21°43.0	49°20.9	07.4 \$06°07.3	Mars		21:38
18	70°02.9	65° 37.2	28.0	305 23.6 320°26.4	12.6	0°03.7	N21 43.0 43.0	64°23.1 79°25.3	07.2	Jupiter Saturn	290°02.5 9°27.5	19:00
20	85°05.4	80°38.6	28.9	335°29.2	12.6	15°06.1	43.0	94°27.5	07.2	Saturn	9 21.5	13:43
21	100°07.9	95°40.1	29.8	350°32.0	12.6	30°08.5	• • 43.0	109°29.7	07.0	Horizont	al parallax	
22	115°10.3	110°41.6	30.8	5°34.8	12.5	45°10.8	43.0	124°31.9	06.8		Venus:	0.3
23	130°12.8	125°43.0	31.7	20°37.6	12.5	$60^{\circ}13.2$	43.1	139°34.1	06.7		Mars:	0.2
Mer n	ass. 14:21	ν1.4′ dΩ	.9′ m-4.85	ν2.8′ d-0	.0′ m-0.70	$\nu$ 2.4' d0	.0′ m-2.42	ν2.2' d-Ω	.1′ m1.12			

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	176°27.3	\$13°40.8	2°01.7	12.0'	N19°04.1	-11.9'	56.1'
1 2	191°27.3 206°27.3	40.0 39.2	16°32.7 31°03.8	12.1' 12.2'	18°52.2 18°40.2	-12.0' -12.1'	56.0' 56.0'
3	200 27.3 221°27.3	• • 38.3	45°35.1	12.3'	18°28.1	-12.1'	56.0'
4	236°27.3	37.5	$60^{\circ}06.4$	12.4'	$18^{\circ}16.0$	-12.2'	56.0'
5	251°27.3	36.7	74°37.8	12.5'	18°03.7	-12.3'	56.0'
6 7	266°27.3 281°27.3	\$13°35.8 35.0	89°09.3 103°41.0	12.6' 12.7'	N17°51.4 17°39.1	-12.4' -12.4'	55.9' 55.9'
8	296°27.3	34.2	118°12.7	12.8'	17°26.6	-12.5'	55.9'
9	311°27.3	• • 33.3	$132^{\circ}44.5$	12.9'	$17^{\circ}14.1$	-12.6'	55.9'
10	326°27.3	32.5	147°16.3	13.0'	17°01.5	-12.6'	55.9'
11 12	341°27.4 356°27.4	31.7 \$13°30.8	161°48.3 176°20.4	13.1' 13.2'	16°48.9 N16°36.2	-12.7' -12.8'	55.8' 55.8'
13	11°27.4	30.0	190°52.6	13.2'	16°23.4	-12.8'	55.8'
14	26°27.4	29.2	205°24.8	13.3'	16°10.6	-12.9'	55.8'
15	41°27.4 56°27.4	· · 28.3 27.5	219°57.1 234°29.6	13.4' 13.5'	15°57.7 15°44.7	-13.0' -13.0'	55.8' 55.7'
16 17	71°27.4	26.6	234 29.0 249°02.1	13.6'	15 44.7 15°31.7	-13.1'	55.7'
18	86°27.4	S13°25.8	263°34.7	13.7'	N15°18.6	-13.1'	55.7'
19	101°27.5	25.0	278°07.3	13.8'	15°05.5	-13.2'	55.7'
20 21	116°27.5 131°27.5	24.1 •• 23.3	292°40.1 307°12.9	13.8' 13.9'	14°52.3 14°39.1	-13.2' -13.3'	55.7' 55.6'
22	131 27.5 146°27.5	22.4	307 12.9 321°45.9	14.0'	14° 25.8	-13.3'	55.6'
23	161°27.5	21.6	336°18.9	14.1'	14°12.4	-13.4'	55.6'
	SD = 16.2'	d = -0.8'		SI	D = 15.3'		
<b>-</b> .						,	
Thu 0	<b>GHA</b> 176°27.5	<b>Dec</b> \$13°20.8	<b>GHA</b> 350°52.0	u 14.2'	<b>Dec</b> N13°59.0	<i>d</i> -13.4′	<b>HP</b> 55.6'
1	191°27.6	19.9	5°25.1	14.2'	13°45.6	-13.5'	55.6'
2	206°27.6	19.1	$19^{\circ}58.4$	14.3'	$13^{\circ}32.1$	-13.5'	55.5'
3	221°27.6	• • 18.2	34°31.7	14.4'	13°18.5	-13.6'	55.5'
4 5	236°27.6 251°27.6	17.4 16.6	49°05.1 63°38.5	14.5' 14.5'	13°04.9 12°51.3	-13.6' -13.7'	55.5' 55.5'
6	266°27.6	S13°15.7	78°12.1	14.6'	N12°37.6	-13.7'	55.5'
7	281°27.7	14.9	92°45.7	14.7'	12°23.9	-13.8'	55.4'
8	296°27.7	14.0	107°19.4	14.8'	12°10.1	-13.8'	55.4'
9 10	311°27.7 326°27.7	· · 13.2 12.3	121°53.1 136°26.9	14.8' 14.9'	11°56.3 11°42.5	-13.8' -13.9'	55.4' 55.4'
11	341°27.7	11.5	151°00.8	15.0'	11°28.6	-13.9'	55.4'
12	356°27.7	S13°10.6	165°34.8	15.0'	N11°14.7	-13.9'	55.3'
13 14	11°27.8 26°27.8	09.8 08.9	180°08.8 194°42.9	15.1' 15.2'	11°00.8 10°46.8	-14.0'	55.3' 55.3'
14 15	20 27.8 41°27.8	08.1	194 42.9 209°17.1	15.2'	10 46.8 10°32.8	-14.0' -14.0'	55.3'
16	56°27.8	07.3	223°51.3	15.3'	10°18.7	-14.1'	55.3'
17	71°27.8	06.4	238°25.6	15.3'	10°04.7	-14.1'	55.2'
18 19	86°27.9 101°27.9	\$13°05.6 04.7	252°59.9 267°34.3	15.4' 15.5'	N09°50.6 09°36.4	-14.1' -14.2'	55.2' 55.2'
20	116°27.9	03.9	282°08.8		09°30.4		55.2'
21	131°27.9	• • 03.0	296°43.3	15.6'	$09^{\circ}08.1$	-14.2'	55.2'
22	146°28.0	02.2	311°17.9	15.6'	08°53.8	-14.2'	55.2'
23	161°28.0	01.3	325°52.5	15.7'	08°39.6	-14.3'	55.1'
	SD = 16.2'	d = -0.8'		SI	D = 15.2'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°28.0	\$13°00.5	340°27.2	15.7'	N08°25.3	-14.3'	55.1'
1 2	191°28.0 206°28.1	12°59.6 58.8	355°02.0 9°36.8	15.8' 15.8'	08°11.1 07°56.8	-14.3' -14.3'	55.1' 55.1'
3	200°28.1	57.9	24°11.6	15.9'	07°42.4	-14.3'	55.1
4	236°28.1	57.1	38°46.5	15.9'	07°28.1	-14.4'	55.0'
5	251°28.1 266°28.1	56.2 \$12°55.4	53°21.5 67°56.5	16.0'	07°13.7 N06°59.3	-14.4' -14.4'	55.0'
6 7	266°28.1 281°28.2	\$12°55.4 54.5	67°56.5 82°31.5	16.0' 16.1'	06°44.9	-14.4' -14.4'	55.0' 55.0'
8	296°28.2	53.7	97°06.6	16.1'	06°30.5	-14.4'	55.0'
9	311°28.2	• • 52.8	111°41.7	16.2'	06°16.1	-14.4'	55.0'
10 11	326°28.3 341°28.3	51.9 51.1	126°16.9 140°52.1	16.2' 16.3'	06°01.6 05°47.2	-14.5' -14.5'	54.9' 54.9'
12	356°28.3	\$1.1 \$12°50.2	140 52.1 155°27.4	16.3	N05°32.7	-14.5'	54.9'
13	11°28.3	49.4	$170^{\circ}02.7$	16.3'	05°18.2	-14.5'	54.9'
14	26°28.4	48.5	184°38.1	16.4	05°03.7	-14.5'	54.9'
15 16	41°28.4 56°28.4	· · 47.7 46.8	199°13.4 213°48.9	16.4' 16.5'	04°49.2 04°34.7	-14.5' -14.5'	54.9' 54.8'
17	71°28.4	46.0	213 46.9 228°24.3	16.5'	04°34.7	-14.5'	54.8'
18	86°28.5	S12°45.1	242°59.8	16.5'	N04°05.7	-14.5'	54.8'
19 20	101°28.5 116°28.5	44.3 43.4	257°35.3 272°10.9	16.6' 16.6'	03°51.2 03°36.6	-14.5' -14.5'	54.8' 54.8'
20	116°28.5 131°28.6	43.4 •• 42.5	272°10.9 286°46.5	16.6'	03°36.6 03°22.1	-14.5' -14.5'	54.8'
22	146°28.6	41.7	$301^{\circ}22.1$	16.7'	03°07.5	-14.5'	54.7'
23	161°28.6	40.8	315°57.8	16.7'	02°53.0	-14.5'	54.7'
	SD = 16.2'	d = -0.9'		SI	O = 15.0'		

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

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

		Sun			Moon	
Day	Eqn.of	Time	Mer.	Mer.Pass.		Age
_ Day	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	14-16
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	100-98%
12	14:11	14:11	12:14	-:-	12:15	
13	14:10	14:09	12:14	00:38	12:59	
14	14:08	14:07	12:14	01:20	13:41	

### February 15, 16, 17 UT (Sat., Sun., Mon.)

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	145°15.2	140°44.5	N06°32.6	35°40.4	N26°12.5	75° 15.6	N21°43.1	154°36.3	S06°06.6			
1	160°17.7	155°46.0	33.5	50°43.2	12.5	90°18.0	43.1	169°38.5	06.5	Alpheratz	357°35.0	29°13.8
2	175°20.2	170°47.4	34.4	65°46.0	12.4	105°20.3	43.1	184°40.7	06.4	Ankaa	353°07.3	-42°10.4
3	190°22.6	185°48.9	• • 35.3	80°48.8	• • 12.4	120°22.7	• • 43.1	199°42.9	• • 06.3	Schedar	349°31.4	56°40.7
4	$205^{\circ}25.1$	200°50.4	36.2	95°51.6	12.4	135°25.1	43.2	214°45.1	06.1	Diphda	348°47.4	-17°51.1
5	220°27.6	215°51.9	37.1	110°54.4	12.3	150°27.4	43.2	229°47.3	06.0	Achernar	335°20.4	-57°06.8
6	235°30.0	230°53.4	N06°38.0	125°57.1	N26°12.3	165°29.8	N21°43.2	244°49.5	S06°05.9	Hamal	327°51.2	23°34.9
7	250°32.5	245°54.8	38.9	140°59.9	12.3	$180^{\circ}32.2$	43.2	259°51.7	05.8	Polaris	314°04.3	89°22.5
8	265°35.0	260°56.3	39.8	156°02.7	12.2	195°34.5	43.2	274°53.9	05.7	Acamar	315°11.8	-40°12.5
9	280°37.4	275°57.8	• • 40.7	171°05.5	• • 12.2	$210^{\circ}36.9$	• • 43.3	289°56.0	• • 05.6	Menkar	314°06.1 308°28.2	4°11.2
10	295°39.9	290°59.3	41.6	186°08.3	12.2	225°39.3	43.3	304°58.2	05.4	Mirfak		49°57.2 16°33.6
11	310°42.4	306°00.8	42.5	201°11.1	12.2	240°41.6	43.3	320°00.4	05.3	Aldebaran	290°39.4	
12	325°44.8	321°02.3	N06°43.4	216°13.8	N26°12.1	255°44.0	N21°43.3	335°02.6	S06°05.2	Rigel	281°03.6	-8°10.5 46°01.5
13	340°47.3	336°03.8	44.3	231°16.6	12.1	270°46.4	43.4	350°04.8	05.1	Capella Bellatrix	280°21.6 278°22.6	6°22.3
14	355°49.7	351°05.3	45.2	$246^{\circ}19.4$	12.1	285°48.7	43.4	5°07.0	05.0	Elnath	278°22.0	28°37.8
15	10°52.2	6°06.8	• • 46.1	$261^{\circ}22.2$	• • 12.0	$300^{\circ}51.1$	• • 43.4	20°09.2	• • 04.9	Alnilam	275°37.5	-1°11.2
16	25°54.7	21°08.3	46.9	276°24.9	12.0	315°53.5	43.4	35°11.4	04.7	Betelgeuse	270°51.8	7°24.7
17	40°57.1	36°09.9	47.8	291°27.7	12.0	330°55.8	43.4	50°13.6	04.6	Canopus	263°52.0	-52°42.7
18	55°59.6	51°11.4	N06°48.7	306° 30.5	N26°11.9	345°58.2	N21°43.5	65°15.8	S06°04.5	Sirius	258°25.9	-32 42.7 -16°45.2
19	71°02.1	66°12.9	49.6	321°33.3	11.9	1°00.6	43.5	80°18.0	04.4	Adhara	255°05.5	-10° 45.2 -29° 00.5
20	86°04.5	81°14.4	50.5	336°36.0	11.9	$16^{\circ}02.9$	43.5	95°20.2	04.3	Procyon	244°50.5	5°09.6
21	101°07.0	96°15.9	•• 51.4	351°38.8	• • 11.8	31°05.3	• • 43.5	110°22.4	• • 04.2	Pollux	244° 30.3 243° 16.9	27°57.9
22	$116^{\circ}09.5$	111°17.5	52.3	6°41.6	11.8	46°07.7	43.5	125°24.6	04.0	Avior	245 10.9 234°14.1	-59°35.5
23	131°11.9	126°19.0	53.2	21°44.3	11.8	$61^{\circ}10.0$	43.6	140°26.7	03.9	Suhail	222°45.8	-43°32.1
Mern	ass. 14:17	v1 5' d0	9′ m-4.85	ν2 8' d-Ω	.0′ m-0.67	1/2 A' dO	0′ m-2.41	1/2 2' d. O	.1′ m1.12	Miaplacidus	221°37.4	-43 32.1 -69°49.2
- IVIEL.P	455. 14.11	ν1.5 do.	9 111-4.03	ν2.0 u-0	.0 111-0.07	ν2.4 do.	0 111-2.41	ν2.2 <b>u</b> -0	.1 1111.12	Alphard	217°47.3	-8°46.1
										Regulus	207°34.0	11°50.5
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.2	61°36.8
0	146°14.4	141°20.5	N06°54.0	$36^{\circ}47.1$	N26°11.7	$76^{\circ}12.4$	N21°43.6	155°28.9	S06°03.8	Denebola	182°24.6	14°25.7
1	$161^{\circ}16.8$	156°22.1	54.9	51°49.8	11.7	$91^{\circ}14.7$	43.6	170°31.1	03.7	Gienah	175°43.2	-17°40.9
2	$176^{\circ}19.3$	171°23.6	55.8	66°52.6	11.7	$106^{\circ}17.1$	43.6	185°33.3	03.6	Acrux	172°59.5	-63°14.2
3	191°21.8	186°25.1	• • 56.7	81°55.4	•• 11.6	$121^{\circ}19.5$	• • 43.7	200°35.5	• • 03.5		171°51.1	-57°15.1
4	206°24.2	201°26.7	57.6	96°58.1	11.6	136°21.8	43.7	215°37.7	03.3	Alioth	166°12.5	55°49.1
5	221°26.7	216°28.2	58.4	$112^{\circ}00.9$	11.6	151°24.2	43.7	230°39.9	03.2	Spica	158°22.0	-11°17.6
6	236°29.2	231°29.8	N06°59.3	127°03.6	N26°11.5	166°26.5	N21°43.7	245°42.1	S06°03.1	Alkaid	152°51.7	49°10.9
7	251°31.6	246°31.3	$07^{\circ}00.2$	142°06.4	11.5	181°28.9	43.7	260°44.3	03.0	Hadar	148°35.6	-60°29.5
8	266°34.1	261°32.9	01.1	157°09.1	11.5	196°31.3	43.8	275°46.5	02.9			-36°29.5
9	281°36.6	276°34.4	• • 01.9	172°11.9	• • 11.4	211°33.6	• • 43.8	290°48.7	• • 02.8	Arcturus	145°47.7	19°02.8
10	296°39.0	291°36.0	02.8	187° 14.6	11.4	226°36.0	43.8	305°50.9	02.6	Rigil Kent.	139°40.0	-60°56.2
11	311°41.5	306°37.5	03.7	202°17.4	11.4	241°38.3	43.8	320°53.1	02.5	Kochab	137°19.5	74°02.7
12	326°44.0	321°39.1	N07°04.6	217°20.1	N26°11.3	256°40.7	N21°43.8	335°55.2	S06°02.4	Zuben'ubi	136°55.8	-16°08.8
13	341°46.4	336°40.7	05.4	232°22.8	11.3	271°43.1	43.9	350°57.4	02.3	Alphecca	126°03.6	26°37.5
14	356°48.9	351°42.2	06.3	247°25.6	11.2	286°45.4	43.9	5°59.6	02.2	Antares	112°15.8	-26°29.2
15	11°51.3	6°43.8	• • 07.2	262°28.3	• • 11.2	301°47.8	• • 43.9	21°01.8	• • 02.1	Atria	$107^{\circ}10.1$	-69°04.1
16	26°53.8	21°45.4	0.80	277°31.1	11.2	316°50.1	43.9	36°04.0	01.9	Sabik	102°02.8	-15°45.4
17	41°56.3	36°47.0	08.9	292°33.8	11.1	331°52.5	44.0	51°06.2	01.8	Shaula	96°10.4	-37°07.3
18	56°58.7	51°48.5	N07°09.8	307°36.5	N26°11.1	346°54.8	N21°44.0	66°08.4	S06°01.7	Rasalhague	95°58.6	12°32.3
19	72°01.2	66°50.1	10.6	322°39.3	11.1	1°57.2	44.0	81°10.6	01.6	Eltanin	90°42.4	51°28.8
20	87°03.7	81°51.7	11.5	337° 42.0	11.0	16°59.6	44.0	96°12.8	01.5	Kaus Aust.	83°32.6	-34°22.3
21	102°06.1	96°53.3	• • 12.3	352°44.7	• • 11.0	32°01.9	• • 44.0	111°15.0	• • 01.4	Vega	80°33.4	38°48.1
22	117°08.6	111°54.9	13.2	7°47.5	10.9	47°04.3	44.1	126°17.2	01.2	Nunki	75°47.9	-26°16.0
23	132°11.1	126°56.5	14.1	22°50.2	10.9	62°06.6	44.1	141°19.4	01.1	Altair	62°00.2	8°55.9
Mer.p	ass. 14:13	$\nu 1.5' \ d0.$	9′ m-4.85	$\nu$ 2.8′ d-0	.0′ m-0.64	$\nu$ 2.4′ d0.	0′ m-2.40	$\nu$ 2.2′ d-0	.1'  m1.12	Peacock	$53^{\circ}06.1$	-56°39.2
										Deneb	49°26.2	45°22.0
NA	CHA	CHA	D	CIIA	D	CIIA	D	CIIA	D	Enif	33°39.0	9°59.3
Mon 0	<b>GHA</b> 147°13.5	<b>GHA</b> 141°58.1	<b>Dec</b> N07°14.9	<b>GHA</b> 37° 52.9	<b>Dec</b> N26°10.9	<b>GHA</b> 77°09.0	<b>Dec</b> N21 <sup>o</sup> 44.1	<b>GHA</b> 156°21.5	<b>Dec</b> \$06°01.0	Al Na'ir	27°33.2	-46°50.5
1	147 13.5 162°16.0	141 58.1 156°59.7	No7 14.9 15.8	52°55.6	10.8	92°11.3	N21 44.1 44.1	150 21.5 171°23.7	00.9	Fomalhaut	15°14.7	-29°29.5
2	102 10.0 177°18.4	172°01.3	16.6	67° 58.4	10.8	92 11.3 107°13.7	44.1	171 23.7 186°25.9	00.9	Scheat	13°45.5	28°13.1
3	177 10.4 192°20.9	172 01.3 187°02.9	10.0	83°01.1	. 10.8	107 13.7 122°16.0	• • 44.2	201°28.1	00.8	Markab	13°30.1	15°20.3
4	207°23.4	202°04.5	18.3	98°03.8	10.7	137°18.4	44.2	216°30.3	00.7	Feb 15 Sat	SHA	Mer.pass
5	207 25.4 222°25.8	202 04.3 217°06.1	19.2	113°06.5	10.7	152°20.7	44.2	231°32.5	00.4	Venus		14:36
6	237°28.3	232°07.7	N07°20.0	128°09.2	N26°10.6	167°23.1	N21°44.3	246°34.7	S06°00.3	Mars	250°25.1	21:33
7	252°30.8	247°09.3	20.9	143°11.9	10.6	182°25.4	44.3	261°36.9	00.2	Jupiter		18:56
8	267°33.2	262°10.9	21.7	158° 14.7	10.5	102 23.4 197°27.8	44.3	276°39.1	00.1	Saturn	9°21.1	13:40
9	282°35.7	277°12.6	22.6	173° 17.4	10.5	212°30.1	• • 44.3	291°41.3	06°00.0			
10	297°38.2	292°14.2	23.4	188°20.1	10.5	227°32.5	44.3	306°43.5	05°59.8	Feb 16 Sun	SHA	Mer.pass
11	312°40.6	307°15.8	24.3	203°22.8	10.3	242°34.8	44.4	321°45.7	59.7	Venus		14:33
12	327°43.1	322°17.4	N07°25.1	218°25.5	N26°10.4	257°37.2	N21°44.4	336°47.8	S05°59.6	Mars		21:29
13	342°45.6	337°19.1	26.0	233° 28.2	10.3	272°39.5	44.4	351°50.0	59.5	Jupiter		18:52
14	357°48.0	352°20.7	26.8	248°30.9	10.3	287°41.9	44.4	6°52.2	59.4	Saturn	9°14.6	13:36
15	12°50.5	7°22.3	• • 27.7	263°33.6	. 10.2	302°44.2	• • 44.5	21°54.4	• • 59.3	Feb 17 Mon	SHA	Mer.pass
16	27°52.9	22°24.0	28.5	278° 36.3	10.2	317°46.6	44.5	36°56.6	59.1	Venus		14:31
17	42°55.4	37°25.6	29.3	293°39.0	10.2	332°48.9	44.5	51°58.8	59.0	Mars	250°39.4	21:25
18	57°57.9	52°27.3	N07°30.2	308°41.7	N26°10.1	347°51.3	N21°44.5	67°01.0	S05°58.9	Jupiter		18:48
19	73°00.3	67°28.9	31.0	323°44.4	10.1	2°53.6	44.6	82°03.2	58.8	Saturn	9°08.0	13:33
20	88°02.8	82°30.6	31.8	338° 47.1	10.0	17°56.0	44.6	97°05.4	58.7	Jatuill	9 00.0	13.33
21	103°05.3	97°32.2	32.7	353°49.8	. 10.0	32°58.3	• • 44.6	112°07.6	• • 58.6	Horizont	al parallax	
22	118°07.7	112°33.9	33.5	8° 52.5	09.9	48°00.7	44.6	127°09.7	58.4	1	Venus:	0.4
23	133°10.2	127°35.5	34.3	23°55.2	09.9	63°03.0	44.6	142°11.9	58.3		Mars:	0.2
										-		_
ivier.p	ass. 14:09	$\nu_{1.0^{\circ}} a_{0.}$	9′ m-4.86	ν2.1 α-0	.0′ m-0.61	ν2.4′ <b>α</b> 0.	0′ m-2.39	ν2.2' <b>α</b> -0	.1′ m1.12			

h	Su	Moon					
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	176°28.7	<b>S</b> 12°40.0	$330^{\circ}33.5$	16.7'	N02°38.5	-14.5'	54.7'
1	191°28.7	39.1	345°09.2 359°44.9	16.7'	02°23.9	-14.5'	54.7'
2	206°28.7 221°28.7	38.2 •• 37.4	359°44.9 14°20.7	16.8' 16.8'	02°09.4 01°54.8	-14.5' -14.5'	54.7' 54.7'
4	236°28.8	36.5	28°56.4	16.8'	01°40.3	-14.5'	54.7'
5	251°28.8	35.7	43°32.3	16.8'	01°25.7	-14.5'	54.6'
6	266°28.8	\$12°34.8	58°08.1	16.9'	N01°11.2	-14.5'	54.6'
7 8	281°28.9 296°28.9	33.9 33.1	72°43.9 87°19.8	16.9' 16.9'	00°56.7 00°42.2	-14.5' -14.5'	54.6' 54.6'
9	311°28.9	32.2	101°55.7	16.9'	00°27.6	-14.5'	54.6'
10	326°29.0	31.4	$116^{\circ}31.6$	16.9'	N00°13.1	-14.5'	54.6'
11	341°29.0	30.5	131°07.5	16.9'	S00°01.4	14.5'	54.6'
12 13	356°29.0 11°29.1	\$12°29.6 28.8	145°43.5 160°19.4	17.0' 17.0'	\$00°15.9 00°30.4	14.5' 14.5'	54.5' 54.5'
14	26°29.1	27.9	174°55.4	17.0'	00°30.4	14.5	54.5
15	41°29.2	• • 27.0	189°31.4	17.0'	00°59.3	14.5'	54.5'
16	56°29.2	26.2	204°07.4	17.0'	01°13.8	14.4'	54.5'
17	71°29.2 86°29.3	25.3 \$12°24.5	218°43.4 233°19.4	17.0'	01°28.2 <b>S</b> 01°42.6	14.4'	54.5' 54.5'
18 19	86 29.3 101°29.3	23.6	233 19.4 247°55.4	17.0' 17.0'	01°57.0	14.4' 14.4'	54.5'
20	116°29.3	22.7	262°31.4	17.0'	02°11.4	14.4	54.4'
21	131°29.4	• • 21.9	277°07.5	17.0'	02°25.8	14.4'	54.4'
22	146°29.4	21.0	291°43.5	17.0'	02°40.2	14.4'	54.4'
23	161°29.4	20.1	306°19.5	17.0'	02°54.6	14.3'	54.4'
	SD = 16.2'	d = -0.9'		SI	O = 14.9'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°29.5	<b>S</b> 12° 19.3	320°55.6	17.0'	S03°08.9	14.3'	54.4'
1	191°29.5	18.4	335°31.6	17.0'	03°23.2	14.3'	54.4'
2 3	206°29.6 221°29.6	17.5 •• 16.7	350°07.7 4°43.7	17.0' 17.0'	03°37.5 03°51.8	14.3' 14.3'	54.4' 54.4'
4	236°29.6	15.8	19°19.8	17.0'	03°51.8	14.2'	54.3
5	251°29.7	14.9	33°55.8	17.0'	04°20.3	14.2'	54.3'
6	266°29.7	S12°14.0	48°31.8	17.0'	S04°34.5	14.2'	54.3'
7	281°29.8	13.2	63°07.9	17.0'	04°48.7	14.2'	54.3'
8 9	296°29.8 311°29.8	12.3 •• 11.4	77°43.9 92°19.9	17.0' 17.0'	05°02.9 05°17.0	14.1' 14.1'	54.3' 54.3'
10	326°29.9	10.6	106°55.9	17.0'	05°31.1	14.1'	54.3'
11	341°29.9	09.7	121°31.9	17.0'	05°45.2	14.1'	54.3'
12	356°30.0	\$12°08.8	136°07.9	17.0'	S05°59.3	14.0'	54.3'
13 14	11°30.0 26°30.0	08.0 07.1	150°43.9 165°19.8	17.0' 17.0'	06°13.3 06°27.3	14.0' 14.0'	54.3' 54.3'
15	41°30.1	06.2	179°55.8	16.9'	06°41.3	14.0'	54.2'
16	56°30.1	05.3	194°31.7	16.9'	06°55.3	13.9'	54.2'
17	71°30.2	04.5	209°07.6	16.9'	07°09.2	13.9'	54.2'
18 19	86°30.2 101°30.3	\$12°03.6 02.7	223°43.6 238°19.4	16.9' 16.9'	\$07°23.1 07°37.0	13.9' 13.8'	54.2' 54.2'
20	116°30.3	01.8	252°55.3		07°50.8	13.8'	54.2'
21	131°30.4	• • 01.0	267°31.2	16.8'	08°04.6	13.8'	54.2'
22	146°30.4	12°00.1	282°07.0	16.8'	08°18.4	13.7'	54.2'
23	161°30.4	11°59.2	296°42.8	16.8'	08°32.1	13.7'	54.2'
	SD = 16.2'	d = -0.9'		SI	O = 14.8'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	176°30.5 191°30.5	\$11°58.3 57.5	311°18.6 325°54.3	16.8'	\$08°45.8 08°59.5	13.7' 13.6'	54.2' 54.2'
2	191°30.5 206°30.6	57.5 56.6	325°54.3 340°30.1	16.7' 16.7'	08°59.5 09°13.1	13.6'	54.2'
3	221°30.6	55.7	355°05.8	16.7'	09°26.7	13.6'	54.2'
4	236°30.7	54.8	9°41.4	16.7'	09°40.2	13.5'	54.2'
5	251°30.7	54.0 \$11°53.1	24°17.1	16.6'	09°53.7	13.5'	54.1'
6 7	266°30.8 281°30.8	511°53.1 52.2	38°52.7 53°28.3	16.6' 16.6'	\$10°07.2 10°20.6	13.4' 13.4'	54.1' 54.1'
8	296°30.9	51.3	68°03.9	16.5'	10°34.0	13.4	54.1'
9	311°30.9	• • 50.5	82°39.4	16.5'	10°47.4	13.3'	54.1'
10	326°31.0	49.6	97°14.9	16.5'	11°00.7	13.3'	54.1'
11 12	341°31.0 356°31.1	48.7 \$11°47.8	111°50.4 126°25.8	16.4' 16.4'	11°14.0 \$11°27.2	13.2' 13.2'	54.1' 54.1'
13	11°31.1	46.9	141°01.2	16.4	11°40.4	13.1'	54.1'
14	26°31.2	46.1	155°36.5	16.3'	11°53.5	13.1'	54.1'
15	41°31.2	• • 45.2	170°11.9	16.3'	12°06.6	13.0'	54.1'
16 17	56°31.3 71°31.3	44.3 43.4	184°47.1 199°22.4	16.2' 16.2'	12°19.6 12°32.6	13.0' 12.9'	54.1' 54.1'
18	71 31.3 86°31.4	43.4 \$11°42.5	213°57.6	16.2'	\$12°45.6	12.9'	54.1
19	101°31.4	41.7	228°32.7	16.1'	12°58.5	12.9'	54.1'
20	116°31.5	40.8	243°07.8	16.1'	13°11.3	12.8'	54.1'
21	131°31.5 146°31.6	· · 39.9 39.0	257°42.9 272°17.9	16.0' 16.0'	13°24.1 13°36.9	12.7' 12.7'	54.1' 54.1'
22 23	146°31.6 161°31.6	39.0 38.1	272°17.9 286°52.9	16.0° 15.9'	13°36.9 13°49.6	12.7° 12.6'	54.1' 54.1'
	SD = 16.2'	d = -0.9'			D = 14.8'	0	
					17.0		

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

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

Sun

Moon

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

h	Aries	Ver	`	М	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	148°12.7	142°37.2	N07° 35.2	38°57.9	N26° 09.9	78°05.4	N21°44.7	157°14.1	S05°58.2			
1	163°15.1	157°38.9	36.0	54°00.6	09.8	93°07.7	44.7	172°16.3	58.1	Alpheratz	357°35.0	29°13.7
2	178°17.6	172°40.5	36.8	69°03.2	09.8	108° 10.0	44.7	187°18.5	58.0	Ankaa	353°07.4	-42°10.4
3	193°20.1	187°42.2	• • 37.7	84°05.9	09.7	123°12.4	• • 44.7	202°20.7	• • 57.8	Schedar	349°31.4	56°40.6
4	208°22.5	202°43.9	38.5	99°08.6	09.7	138° 14.7	44.8	217°22.9	57.7	Diphda	348°47.4	-17°51.1
5	223°25.0	217°45.6	39.3	114°11.3	09.6	153° 17.1	44.8	232°25.1	57.6	Achernar	335°20.4	-57°06.8
6	238°27.4	232°47.2	N07°40.1	129°14.0	N26°09.6	168° 19.4	N21°44.8	247°27.3	S05°57.5	Hamal	327°51.2	23°34.9
7	253°29.9	247°48.9	41.0	144°16.6	09.5	183°21.8	44.8	262°29.5	57.4	Polaris	314°05.7	89°22.5
8	268°32.4	262°50.6	41.8	159°19.3	09.5	198°24.1	44.9	277°31.7	57.3	Acamar	315°11.8	-40°12.5
9	283°34.8	277°52.3	• • 42.6	174°22.0	• • 09.4	213°26.4	• • 44.9	292°33.8	• • 57.1	Menkar	314°06.1	4°11.2
10	298°37.3	292°54.0	43.4	189°24.7	09.4	228°28.8	44.9	307°36.0	57.0	Mirfak	308°28.2	49°57.2 16°33.6
11	313°39.8	307°55.7	44.3	204°27.3	09.3	243°31.1	44.9	322°38.2	56.9	Aldebaran	290°39.4 281°03.7	-8°10.5
12	328°42.2	322° 57.4	N07°45.1	219°30.0	N26°09.3	258° 33.5	N21°45.0	337°40.4	\$05°56.8	Rigel Capella	281 03.7 280°21.6	-8 10.5 46°01.5
13	343°44.7	$337^{\circ}59.1$	45.9	234°32.7	09.2	273°35.8	45.0	352°42.6	56.7	Bellatrix	278°22.6	6°22.3
14	358°47.2	353°00.8	46.7	249°35.4	09.2	288°38.2	45.0	7°44.8	56.6	Elnath	278°01.6	28°37.8
15	13°49.6	8°02.5	• • 47.5	264°38.0	• • 09.2	303°40.5	• • 45.0	22°47.0	• • 56.4	Alnilam	275°37.5	-1°11.2
16	28°52.1	23°04.2	48.3	279°40.7	09.1	318°42.8	45.1	37°49.2	56.3	Betelgeuse	270°51.8	7°24.7
17	43°54.5	38°05.9	49.1	294°43.4	09.1	333°45.2	45.1	52°51.4	56.2	Canopus	263°52.0	-52°42.7
18	58°57.0	53°07.6	N07°50.0	309°46.0	N26°09.0	348°47.5	N21°45.1	67°53.6	S05°56.1	Sirius	258°25.9	-16°45.2
19	73°59.5	68°09.3	50.8	324°48.7	09.0	3°49.8	45.1	82°55.7	56.0	Adhara	255°05.5	-29°00.5
20	89°01.9	83°11.0	51.6	339°51.3	08.9	18°52.2	45.2	97°57.9	55.9	Procyon	244°50.5	5°09.6
21	104°04.4	98°12.8	• • 52.4	354°54.0	08.9	33°54.5	• • 45.2	113°00.1	• • 55.7	Pollux	243°16.9	27°57.9
22	119°06.9	113°14.5	53.2 54.0	9°56.7 24°59.3	08.8	48°56.9	45.2 45.2	128°02.3	55.6	Avior	234°14.1	-59°35.5
23	134°09.3	128° 16.2	54.0		8.80	63°59.2	45.2	143°04.5	55.5	Suhail	222°45.8	-43°32.1
Mer.p	ass. 14:05	$\nu$ 1.7′ d0.8	8′ m-4.86	$\nu$ 2.7′ d-0	.0′ m-0.58	$\nu$ 2.3′ d0.	0′ m-2.38	$\nu$ 2.2′ d-0	.1' m1.12	Miaplacidus	221°37.4	-69°49.3
										Alphard	217°47.3	-8°46.2
Wed	GHA	GHA	Doc	GHA	Doc	GHA	Doc	GHA	Doc	Regulus	207°34.0	11°50.5
vved 0	<b>GHA</b> 149°11.8	<b>GHA</b> 143°18.0	<b>Dec</b> N07° 54.8	<b>GHA</b> 40°02.0	<b>Dec</b> N26°08.7	79°01.5	<b>Dec</b> N21°45.2	БНА 158°06.7	<b>Dec</b> \$05°55.4	Dubhe	193°40.2	61°36.8
1	149°11.8 164°14.3	143° 18.0 158° 19.7	55.6	40°02.0 55°04.6	N26 08.7 08.7	79°01.5 94°03.9	N21 45.2 45.3	158°06.7 173°08.9	505 55.4 55.3	Denebola	182°24.6	14°25.7
2	179° 16.7	173° 21.4	56.4	70°07.3	08.7	109°06.2	45.3	173 00.9 188°11.1	55.1	Gienah	175°43.2	-17°41.0
3	194°19.2	188°23.2	57.2	85°09.9	08.6	109 00.2 124°08.5	• • 45.3	203°13.3	55.0	Acrux	172°59.5	-63°14.2
4	209°21.7	203°24.9	58.0	100°12.6	08.5	139° 10.9	45.3	218°15.4	54.9		171°51.1	-57°15.1
5	224°24.1	218°26.7	58.8	115°15.2	08.5	154° 13.2	45.4	233°17.6	54.8	Alioth	166°12.4	55°49.1
6	239°26.6	233°28.4	N07°59.6	130°17.8	N26°08.4	169° 15.5	N21°45.4	248°19.8	S05°54.7	Spica	158°22.0	-11°17.6
7	254°29.0	248°30.2	08°00.4	145°20.5	08.4	184° 17.9	45.4	263°22.0	54.6	Alkaid	152°51.6	49°10.9
8	269°31.5	263°31.9	01.2	160°23.1	08.3	199° 20.2	45.4	278°24.2	54.4	Hadar	148°35.6	-60°29.5
9	284°34.0	278°33.7	02.0	175°25.8	08.3	214°22.5	• • 45.5	293°26.4	• • 54.3	Menkent	147°57.3	-36°29.6
10	299°36.4	293°35.4	02.8	190°28.4	08.2	229°24.9	45.5	308°28.6	54.2	Arcturus	145°47.7	19°02.8
11	314°38.9	308°37.2	03.6	205°31.0	08.1	244°27.2	45.5	323°30.8	54.1	Rigil Kent.	139°40.0	-60°56.2
12	329°41.4	323°39.0	N08°04.3	220°33.7	N26°08.1	259°29.5	N21°45.5	338°33.0	S05°54.0	Kochab	137°19.4 136°55.8	74°02.7 -16°08.8
13	344°43.8	338°40.7	05.1	235°36.3	08.0	274°31.9	45.6	353°35.1	53.8	Zuben'ubi Alphecca	130° 55.6 126° 03.6	26°37.5
14	359°46.3	353°42.5	05.9	250°39.0	08.0	289°34.2	45.6	8°37.3	53.7	Antares	120 03.0 112°15.8	-26°29.2
15	14°48.8	8°44.3	• • 06.7	265°41.6	• • 07.9	304°36.5	• • 45.6	23°39.5	• • 53.6	Atria	107° 10.1	-20°29.2 -69°04.1
16	29°51.2	$23^{\circ}46.1$	07.5	280°44.2	07.9	$319^{\circ}38.9$	45.6	38°41.7	53.5	Sabik	107° 10.1	-15°45.4
17	44°53.7	38°47.8	08.3	295°46.8	07.8	334°41.2	45.7	53°43.9	53.4	Shaula	96°10.4	-37°07.3
18	59°56.2	53°49.6	N08°09.1	310°49.5	N26°07.8	349°43.5	N21°45.7	68°46.1	S05°53.3	Rasalhague	95°58.6	12°32.3
19	74°58.6	68°51.4	09.8	325°52.1	07.7	4°45.9	45.7	83°48.3	53.1	Eltanin	90°42.4	51°28.8
20	90°01.1	83°53.2	10.6	340°54.7	07.7	19°48.2	45.7	98°50.5	53.0	Kaus Aust.	83°32.6	-34°22.3
21	105°03.5	98°55.0	• • 11.4	355°57.3	• • 07.6	34°50.5	• • 45.8	113°52.7	• • 52.9	Vega	80°33.4	38°48.1
22	120°06.0	113°56.8	12.2	11°00.0	07.6	49°52.9	45.8	128°54.8	52.8	Nunki	75°47.9	-26°16.0
23	135°08.5	128°58.6	12.9	26°02.6	07.5	64°55.2	45.8	143°57.0	52.7	Altair	62°00.1	8°55.9
Mer.p	ass. 14:01	$\nu 1.7' \ d0.8$	8′ m-4.86	$\nu 2.7' \ d-0$	.1′ m-0.56	$\nu 2.3' d0.$	0′ m-2.38	$\nu 2.2' \ d-0$	.1′ m1.12	Peacock	53°06.1	-56°39.2
										Deneb	49°26.2	45°22.0
<b>-</b> .		G114	_	6114	_	G11.4	_	6114	_	Enif	33°39.0	9°59.3
Thu	GHA 150°10 0	GHA	<b>Dec</b> N08° 13.7	GHA	Dec	<b>GHA</b>	<b>Dec</b> N21°45.9	GHA	Dec	Al Na'ir	27°33.2	-46°50.5
0 1	150°10.9 165°13.4	144°00.4 159°02.2	N08° 13.7 14.5	41°05.2 56°07.8	N26°07.4 07.4	79°57.5 94°59.8	N21°45.9 45.9	158°59.2 174°01.4	\$05°52.6 52.4	Fomalhaut	15°14.7	-29°29.5
2	180°15.9	159 02.2 174°04.0	14.5 15.3	71°10.4	07.4	94 59.8 110°02.2	45.9 45.9	174 01.4 189°03.6	52.4 52.3	Scheat	13°45.5	28°13.1
3	180 15.9 195°18.3	174 04.0 189°05.8	15.3	71 10.4 86°13.0	07.3	110 02.2 125°04.5	45.9 • • 45.9	204°05.8	52.3 · · 52.2	Markab	13°30.1	15°20.3
4	210°20.8	204°07.6	16.8	101°15.7	07.3	140°06.8	46.0	219°08.0	52.2	Feb 18 Tue	SHA	Mer.pass
5	210 20.0 225°23.3	219°09.5	17.6	116° 18.3	07.2	155°09.1	46.0	234°10.2	52.0	Venus		14:28
6	240°25.7	234°11.3	N08° 18.3	131°20.9	N26°07.1	170°11.5	N21°46.0	249°12.4	S05°51.8	Mars	250°45.2	21:20
7	255°28.2	249°13.1	19.1	146°23.5	07.1	185°13.8	46.0	264°14.5	51.7	Jupiter	289°52.7	18:45
8	270°30.6	264° 14.9	19.9	161°26.1	07.0	200°16.1	46.1	279°16.7	51.6	Saturn	9°01.5	13:29
9	285°33.1	279°16.8	• • 20.6	176°28.7	• • 06.9	215° 18.4	• • 46.1	294°18.9	• • 51.5	F-1 10 111	CIII	
10	300°35.6	294°18.6	21.4	191°31.3	06.9	230°20.8	46.1	309°21.1	51.4	Feb 19 Wed	SHA	Mer.pass
11	$315^{\circ}38.0$	309°20.4	22.2	206°33.9	06.8	245°23.1	46.1	324°23.3	51.3	Venus	354°06.2	14:25
12	330°40.5	324°22.3	N08°22.9	221°36.5	N26°06.8	260°25.4	N21°46.2	339°25.5	S05°51.1	Mars Jupiter	250°50.2 289°49.7	21:16 18:41
13	345°43.0	339°24.1	23.7	236°39.1	06.7	275° 27.7	46.2	354°27.7	51.0	Saturn	289 49.7 8°54.9	13:26
14	0°45.4	354°26.0	24.4	251°41.7	06.7	290°30.1	46.2	9°29.9	50.9	Saturn	0 34.9	13.20
15	15°47.9	9°27.8	• • 25.2	266°44.3	• • 06.6	305°32.4	• • 46.2	24°32.0	• • 50.8	Feb 20 Thu	SHA	Mer.pass
16	30°50.4	24°29.7	25.9	281°46.9	06.5	320° 34.7	46.3	39°34.2	50.7	Venus		14:22
17	45°52.8	39°31.5	26.7	296°49.5	06.5	335°37.0	46.3	54°36.4	50.5	Mars	250°54.3	21:12
18	60°55.3	54°33.4	N08° 27.4	311°52.1	N26°06.4	350°39.4	N21°46.3	69°38.6	S05°50.4	Jupiter		18:37
19	75°57.8	69°35.2	28.2	326°54.7	06.4	5°41.7	46.3	84°40.8	50.3	Saturn	8°48.3	13:22
20	91°00.2	84°37.1	28.9	341°57.2	06.3	20°44.0	46.4	99°43.0	50.2	Horizont	al parallax	
21	106°02.7	99°39.0	• • 29.7	356°59.8	06.2	35°46.3	• • 46.4	114°45.2	• • 50.1	TIOTIZUTI	Venus:	0.4
22	121°05.1	114°40.8	30.4	12°02.4	06.2	50°48.6	46.4	129°47.4	50.0		Mars:	0.4
23	136°07.6	129°42.7	31.2	27°05.0	06.1	65°51.0	46.5	144°49.6	49.8	L	141013.	0.2
Mer.p	ass. 13:57	$\nu 1.8' \ d0.8$	8′ m-4.86	$\nu$ 2.6′ d-0	.1′ m-0.53	$\nu$ 2.3′ d0.	0′ m-2.37	$\nu$ 2.2′ d-0	.1' m $1.12$			

h	Su	Moon							
Tue	GHA	Dec	GHA	ν	Dec	d	HP		
0	176°31.7	S11°37.3	301°27.8	15.9'	\$14°02.2	12.6'	54.1'		
1 2	191°31.7 206°31.8	36.4 35.5	316°02.7 330°37.5	15.8' 15.8'	14°14.8 14°27.4	12.5' 12.5'	54.1' 54.1'		
3	221°31.8	• • 34.6	345°12.3	15.7'	14°39.9	12.4	54.1		
4	236°31.9	33.7	359°47.0	15.7'	$14^{\circ}52.3$	12.4'	54.1'		
5	251°31.9	32.8	14°21.7	15.6'	15°04.7	12.3'	54.1'		
6 7	266°32.0 281°32.0	S11°31.9 31.1	28°56.3 43°30.9	15.6' 15.5'	\$15°17.0 15°29.2	12.3' 12.2'	54.1' 54.1'		
8	296°32.1	30.2	58°05.4	15.5'	15°41.4	12.1'	54.1		
9	311°32.1	• • 29.3	$72^{\circ}39.9$	15.4'	15°53.6	12.1'	54.1'		
10	326°32.2 341°32.3	28.4	87°14.3 101°48.6	15.3'	16°05.7 16°17.7	12.0' 12.0'	54.1'		
11 12	341 32.3 356°32.3	27.5 \$11°26.6	101 48.0 116°22 9	15.3' 15.2'	516°29.6	12.0	54.1' 54.1'		
13	11°32.4	25.7	130°57.1	15.2'	16°41.5	11.8'	54.1'		
14	26°32.4	24.9	145°31.3	15.1'	16°53.4	11.8'	54.1'		
15 16	41°32.5 56°32.5	· · 24.0 23.1	160°05.4 174°39.5	15.0' 15.0'	17°05.1 17°16.8	11.7' 11.6'	54.1' 54.1'		
17	71° 32.6	22.2	189°13.5	14.9'	17° 28.5	11.6'	54.1'		
18	86°32.7	S11°21.3	203°47.4	14.9'	S17°40.0	11.5'	54.1'		
19	101°32.7	20.4	218°21.2	14.8'	17°51.5	11.4'	54.1'		
20 21	116°32.8 131°32.8	19.5 •• 18.6	232°55.0 247°28.7	14.7' 14.7'	18°03.0 18°14.3	11.4' 11.3'	54.1' 54.1'		
22	146° 32.9	17.7	262°02.4	14.6'	18°25.6	11.2'	54.2'		
23	161°32.9	16.9	276°36.0	14.5'	18°36.9	11.2'	54.2'		
	SD = 16.2'	d = -0.9'		SE	0 = 14.8'				
Wed	GHA	Dec	GHA	ν	Dec	d	HP		
0	176°33.0	S11°16.0	291°09.5	14.5'	S18°48.0	11.1'	54.2'		
1	191°33.1	15.1	305°43.0	14.4'	18°59.1	11.0'	54.2'		
2	206°33.1 221°33.2	14.2 •• 13.3	320°16.4 334°49.7	14.3' 14.2'	19°10.1 19°21.1	10.9' 10.9'	54.2' 54.2'		
3 4	236° 33.2	12.4	349°22.9	14.2'	19°21.1	10.9	54.2'		
5	251°33.3	11.5	3°56.1	14.1'	19°42.7	10.7'	54.2'		
6	266°33.4	S11°10.6	18°29.2	14.0'	\$19°53.4	10.6'	54.2'		
7 8	281°33.4 296°33.5	09.7 08.8	33°02.2 47°35.2	14.0' 13.9'	20°04.0 20°14.6	10.6' 10.5'	54.2' 54.2'		
9	311° 33.5	• • 07.9	62°08.0	13.8'	20°25.1	10.4	54.2'		
10	326°33.6	07.0	76°40.8	13.7'	20°35.4	10.3'	54.2'		
11	341°33.7 356°33.7	06.2 \$11°05.3	91°13.6 105°46.2	13.6'	20°45.8 \$20°56.0	10.2'	54.3'		
12 13	356°33.7 11°33.8	04.4	105°46.2 120°18.8	13.6' 13.5'	21°06.1	10.1' 10.1'	54.3' 54.3'		
14	26° 33.9	03.5	134°51.3	13.4'	21°16.2	10.0'	54.3'		
15	41°33.9	• • 02.6	149°23.7	13.3'	21°26.2	9.9'	54.3'		
16 17	56°34.0 71°34.1	01.7 11°00.8	163°56.0 178°28.3	13.3' 13.2'	21°36.1 21°45.9	9.8' 9.7'	54.3' 54.3'		
18	86°34.1	\$10°59.9	193°00.5	13.1'	\$21°55.6	9.6'	54.3'		
19	101°34.2	59.0	207°32.6	13.0'	22°05.2	9.5'	54.3'		
20 21	116°34.2 131°34.3	58.1 •• 57.2	222°04.6 236°36.5	12.9' 12.8'	22°14.7 22°24.2	9.4' 9.4'	54.4' 54.4'		
22	131 34.3 146°34.4	56.3	250 50.5 251°08.4	12.8	22°24.2	9.4 9.3'	54.4'		
23	161°34.4	55.4	265°40.1	12.7'	22°42.8	9.2'	54.4'		
	SD = 16.2'	d = -0.9'		SE	D = 14.8'				
Thu	GHA	Dec	GHA	ν	Dec	d	HP		
0	176°34.5	<b>S</b> 10°54.5	280°11.8	12.6'	S22°52.0	9.1'	54.4'		
1	191°34.6	53.6	294°43.4	12.5'	23°01.0	9.0'	54.4'		
2	206°34.6 221°34.7	52.7 •• 51.8	309°14.9 323°46.4	12.4' 12.3'	23°10.0 23°18.9	8.9' 8.8'	54.4' 54.4'		
4	236°34.8	50.9	338°17.7	12.3'	23°27.7	8.7'	54.5		
5	251°34.8	50.0	352°49.0	12.2'	23°36.4	8.6'	54.5'		
6 7	266°34.9 281°35.0	\$10°49.1 48.2	7°20.1 21°51.2	12.1' 12.0'	\$23°44.9 23°53.4	8.5' 8.4'	54.5' 54.5'		
8	201 35.0 296°35.0	46.2	36°22.2	11.9'	23° 55.4 24° 01.8	8.3'	54.5'		
9	311°35.1	• • 46.4	50°53.2	11.8'	24°10.1	8.2'	54.5'		
10	326°35.2 341°35.3	45.5	65°24.0 79°54.7	11.7'	24°18.3 24°26.3	8.1'	54.6'		
11 12	341°35.3 356°35.3	44.6 \$10°43.7	79°54.7 94°25.4	11.7' 11.6'	24°26.3 <b>S</b> 24°34.3	8.0' 7.9'	54.6' 54.6'		
13	11°35.4	42.8	$108^{\circ}56.0$	11.5'	24°42.2	7.8'	54.6'		
14	26°35.5	41.9	123°26.5	11.4'	24°49.9	7.6'	54.6'		
15 16	41°35.5 56°35.6	· · 41.0 40.1	137°56.9 152°27.2	11.3' 11.2'	24°57.6 25°05.1	7.5' 7.4'	54.6' 54.7'		
17	71°35.7	39.2	152 27.2 166°57.4	11.2 11.1'	25 05.1 25°12.5	7.4 7.3'	54.7'		
18	86°35.7	S10°38.3	181°27.5	11.1'	S25°19.8	7.2'	54.7'		
19 20	101°35.8 116°35.9	37.4	195°57.6 210°27.5	11.0' 10.9'	25°27.0 25°34.1	7.1'	54.7' 54.7'		
20	116° 35.9 131° 36.0	36.5 •• 35.6	210°27.5 224°57.4	10.9	25° 34.1 25° 41.1	7.0' 6.9'	54.7		
22	146°36.0	34.7	239°27.2	10.7'	25°47.9	6.7'	54.8'		
23	161°36.1	33.8	253°56.9	10.6'	25°54.7	6.6'	54.8'		
	SD = 16.2'	d = -0.9'	SD = 14.8′						

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

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

# February 21, 22, 23 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	151°10.1	144°44.6	N08°31.9	42°07.6	N26°06.1	80°53.3	N21°46.5	159°51.7	S05°49.7			
1	166°12.5	159°46.5	32.7	57°10.2	06.0	95°55.6	46.5	174°53.9	49.6	Alpheratz	357°35.0	29°13.7
2	181°15.0	174°48.3	33.4	72°12.7	05.9	110°57.9	46.5	189°56.1	49.5	Ankaa	353°07.4	-42°10.4
3	196°17.5	189°50.2	• • 34.2	87°15.3	• • 05.9	126°00.2	• • 46.6	204°58.3	49.4	Schedar	349°31.4	56°40.6
4	211°19.9	204°52.1	34.9	102°17.9	05.8	141°02.6	46.6	220°00.5	49.2	Diphda	348°47.4	-17°51.1
5	226°22.4	219°54.0	35.6	117°20.5	05.8	156°04.9	46.6	235°02.7	49.1	Achernar	335°20.4	-57°06.8
6	241°24.9	234°55.9	N08° 36.4	132°23.1	N26°05.7	171° 07.2	N21°46.6	250°04.9	\$05°49.0	Hamal	$327^{\circ}51.3$	23°34.9
7	256°27.3	249°57.8	37.1	147°25.6	05.6	186°09.5	46.7	265°07.1	48.9	Polaris	314°07.0	89°22.5
				162°28.2				280°09.2		Acamar	$315^{\circ}11.8$	-40°12.5
8	271°29.8	264°59.7	37.8 · · 38.6		05.6	201°11.8	46.7		48.8	Menkar	$314^{\circ}06.1$	4°11.2
9	286°32.3	280°01.6		177°30.8	• • 05.5	216°14.1	• • 46.7	295°11.4	• • 48.6	Mirfak	308°28.2	49°57.2
10	301°34.7	295°03.5	39.3	192°33.3	05.5	231°16.5	46.7	310°13.6	48.5	Aldebaran	290°39.4	16°33.6
11	316°37.2	310°05.4	40.0	207°35.9	05.4	246° 18.8	46.8	325°15.8	48.4	Rigel	281°03.7	-8°10.5
12	331°39.6	325°07.3	N08°40.8	222°38.5	N26°05.3	261°21.1	N21°46.8	340°18.0	S05°48.3	Capella	280°21.6	46°01.5
13	346°42.1	340°09.3	41.5	237°41.0	05.3	276°23.4	46.8	355°20.2	48.2	Bellatrix	278°22.6	6°22.3
14	1°44.6	355°11.2	42.2	252°43.6	05.2	291°25.7	46.9	10°22.4	48.1	Elnath	278°01.6	28°37.8
15	16°47.0	10° 13.1	• • 42.9	267°46.2	• • 05.1	306°28.0	• • 46.9	25°24.5	• • 47.9	Alnilam	275°37.5	-1°11.2
16	31°49.5	25° 15.0	43.6	282°48.7	05.1	321°30.3	46.9	40°26.7	47.8	Betelgeuse	270°51.8	7°24.7
17	46°52.0	40° 17.0	44.4	297°51.3	05.0	336° 32.7	46.9	55°28.9	47.7	Canopus	263°52.0	-52°42.7
18	61°54.4	55° 18.9	N08°45.1	312°53.8	N26°05.0	351°35.0	N21°47.0	70°31.1	S05°47.6	Sirius	258°25.9	-16°45.2
19	76°56.9	70°20.8	45.8	327°56.4	04.9	6°37.3	47.0	85°33.3	47.5	Adhara	255°05.5	-29°00.5
20	91°59.4	85°22.8	46.5	342°58.9	04.8	21°39.6	47.0	100°35.5	47.3	Procyon	244°50.5	5°09.6
21	107°01.8	100°24.7	• • 47.2	358°01.5	• • 04.8	36°41.9	• • 47.0	115°37.7	• • 47.2	Pollux	243°16.9	27°57.9
22	122°04.3	115°26.7	48.0	13°04.0	04.7	51°44.2	47.1	130°39.9	47.1	Avior	234°14.2	-59°35.5
23	137°06.7	130°28.6	48.7	28°06.6	04.6	66°46.5	47.1	145°42.0	47.0	Suhail	222°45.8	-43°32.1
Morn	ass. 13:53	v1 0' d0	7′ m-4.85	126' d 0	.1′ m-0.50	1/2 3/ 40	0′ m-2.36	1/2 2' d 0	.1′ m1.12	Miaplacidus	221°37.4	-69°49.3
- wer.p		ν1.9 do.	1 111-4.05	ν2.0 <i>u</i> -0	.1 111-0.50	ν2.3 d0.	U III-2.30	ν2.2 <b>u</b> -0	.1 1111.12	Alphard	217°47.3	-8°46.2
										Regulus	207°34.0	-6 40.2 11°50.5
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		193°40.2	61°36.8
0	152°09.2	145°30.6	N08°49.4	43°09.1	N26°04.6	81°48.8	N21°47.1	160°44.2	S05°46.9	Dubhe	193 40.2 182°24.5	14°25.7
1	167°11.7	160°32.5	50.1	58°11.7	04.5	96°51.2	47.2	175°46.4	46.7	Denebola		
2	182°14.1	175°34.5	50.8	73°14.2	04.4	111°53.5	47.2	190°48.6	46.6	Gienah	175°43.2	-17°41.0
3	197°16.6	190°36.4	51.5	88°16.8	04.4	126°55.8	• • 47.2	205°50.8	• • 46.5		172°59.5	-63°14.2
4	212°19.1	205°38.4	52.2	103°19.3	04.3	141°58.1	47.2	220°53.0	46.4		171°51.1	-57°15.2
5	227°21.5	220°40.4	52.9	118°21.8	04.2	157°00.4	47.3	235°55.2	46.3	Alioth	166°12.4	55°49.1
6	242°24.0	235° 42.3	N08°53.6	133°24.4	N26° 04.2	172°02.7	N21°47.3	250°57.4	S05°46.2	Spica	158°22.0	-11°17.6
7	257°26.5	250° 44.3	54.3	148°26.9	04.1	187°05.0	47.3	265°59.5	46.0	Alkaid	152°51.6	49°10.9
8	272°28.9	265°46.3	55.0	163°29.5	04.0	202°07.3	47.3	281°01.7	45.9	Hadar	148°35.6	-60°29.5
9	287°31.4	280°48.3	• • 55.7	178°32.0	• • 04.0	217°09.6	• • 47.4	296°03.9	• • 45.8	Menkent	147°57.3	-36°29.6
10	302°33.9	295°50.3	56.4	170 32.0 193°34.5	03.9	232°11.9	47.4	311°06.1	45.7	Arcturus	145°47.6	19°02.8
11	317°36.3	310°52.2	57.1	208°37.1	03.9	247° 14.3	47.4	326°08.3	45.7	Rigil Kent.	139°39.9	-60°56.2
12	317 30.3 332°38.8	325° 54.2	N08° 57.8	208°37.1 223°39.6	N26°03.8	262° 16.6	N21°47.5	341°10.5	\$05°45.4	Kochab	137°19.4	74°02.7
										Zuben'ubi	136°55.8	-16°08.8
13	347°41.2 2°43.7	340°56.2	58.5	238°42.1 253°44.6	03.7	277°18.9	47.5	356°12.7	45.3	Alphecca	$126^{\circ}03.6$	26°37.5
14		355°58.2	59.2		03.6	292°21.2	47.5	11°14.8	45.2	Antares	112°15.7	-26°29.3
15	17°46.2	11°00.2	08°59.9	268°47.2	• • 03.6	307°23.5	• • 47.5	26°17.0	• • 45.1	Atria	$107^{\circ}10.0$	-69°04.1
16	32°48.6	26°02.2	09°00.6	283°49.7	03.5	322°25.8	47.6	41°19.2	45.0	Sabik	102°02.8	-15°45.4
17	47°51.1	41°04.2	01.3	298°52.2	03.4	337°28.1	47.6	56°21.4	44.8	Shaula	96°10.4	-37°07.2
18	62°53.6	56°06.2	N09°01.9	313°54.7	N26°03.4	352°30.4	N21°47.6	71°23.6	S05°44.7	Rasalhague	95°58.6	12°32.3
19	77°56.0	71°08.3	02.6	328°57.3	03.3	7°32.7	47.7	86°25.8	44.6	Eltanin	90°42.4	51°28.8
20	92°58.5	86° 10.3	03.3	343°59.8	03.2	22°35.0	47.7	101°28.0	44.5	Kaus Aust.	83°32.6	-34°22.3
21	108°01.0	101°12.3	• • 04.0	359°02.3	• • 03.2	37°37.3	• • 47.7	116°30.1	• • 44.4	Vega	80°33.4	38°48.1
22	123°03.4	116° 14.3	04.7	14°04.8	03.1	52°39.6	47.7	131°32.3	44.3	Nunki	75°47.9	-26°15.9
23	138°05.9	131°16.3	05.3	29°07.3	03.0	67°41.9	47.8	146°34.5	44.1	Altair	62°00.1	8°55.9
Mer n	ass. 13:49	$v^2 0' d0$	7′ m-4.85	$v^2 5' d - 0$	.1′ m-0.47	v2 3' d0	0′ m-2.35	v2 2' d-0	.1′ m1.12	Peacock	53°06.1	-56°39.2
				ν 2.5 α σ		- Z.5 GO.				Deneb	49°26.2	45°22.0
										Enif	33°39.0	9°59.3
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.2	-46°50.4
0	153°08.4	146°18.4	N09°06.0	44°09.8	N26°03.0	82°44.2	N21°47.8	161°36.7	S05°44.0	Fomalhaut	15°14.7	-29°29.5
1	168°10.8	161°20.4	06.7	59°12.3	02.9	97°46.5	47.8	176°38.9	43.9	Scheat	13°45.5	28°13.1
2	183°13.3	176°22.4	07.4	74°14.9	02.8	112°48.8	47.9	191°41.1	43.8	Markab	13°30.1	15°20.3
3	198°15.7	191°24.5	• • 08.0	89°17.4	• • 02.8	127°51.1	• • 47.9	206°43.3	• • 43.7			
4	213°18.2	206°26.5	08.7	104°19.9	02.7	142°53.4	47.9	221°45.4	43.5	Feb 21 Fri	SHA	Mer.pass
5	228°20.7	221°28.6	09.4	119°22.4	02.6	157° 55.7	47.9	236°47.6	43.4	Venus		14:19
6	243°23.1	236° 30.6	N09° 10.1	134°24.9	N26° 02.5	172°58.0	N21°48.0	251°49.8	S05°43.3	Mars	250°57.5	21:08
7	258°25.6	251°32.7	10.7	149°27.4	02.5	188°00.3	48.0	266°52.0	43.2	Jupiter	289°43.2	18:34
8	273°28.1	266°34.7	11.4	164°29.9	02.4	203°02.6	48.0	281°54.2	43.1	Saturn	8°41.7	13:19
9	288°30.5	281°36.8	• • 12.1	179°32.4	• • 02.3	$218^{\circ}04.9$	• • 48.1	296°56.4	• • 42.9	Eab 22 C-	CHA	Mo: ====
10	303°33.0	296°38.9	12.7	194°34.9	02.3	233°07.2	48.1	311°58.6	42.8	Feb 22 Sat	<b>SHA</b> 353°21.3	Mer.pass
11	318°35.5	311°40.9	13.4	209°37.4	02.2	248°09.5	48.1	327°00.7	42.7	Venus		14:16
12	333°37.9	326°43.0	N09°14.0	224°39.9	N26°02.1	263°11.8	N21°48.1	342°02.9	S05°42.6	Mars	250°59.9	21:04
13	348°40.4	341°45.1	14.7	239°42.4	02.0	$278^{\circ}14.1$	48.2	$357^{\circ}05.1$	42.5	Jupiter	289°39.6	18:30
14	3°42.9	356°47.1	15.3	254°44.9	02.0	293°16.4	48.2	12°07.3	42.3	Saturn	8°35.0	13:15
15	18°45.3	11°49.2	• • 16.0	269°47.4	• • 01.9	308° 18.7	• • 48.2	27°09.5	• • 42.2	Feb 23 Sun	SHA	Mer.pass
16	33°47.8	26°51.3	16.7	284°49.8	01.8	323°21.0	48.3	42°11.7	42.1	Venus		14:13
17	48°50.2	41°53.4	17.3	299°52.3	01.8	338°23.3	48.3	57°13.9	42.0	Mars		21:00
18	63°52.7	56° 55.5	N09° 18.0	314°54.8	N26°01.7	353°25.6	N21°48.3	72°16.0	S05°41.9		289°35.9	18:26
19	78°55.2	71°57.6	18.6	329°57.3	01.6	8°27.9	48.3	87°18.2	41.8	Saturn	8°28.3	13:12
20	93°57.6	86°59.7	19.3	344°59.8	01.5	23°30.2	48.4	102°20.4	41.6	Jatuill	0 20.3	13.14
21	109°00.1	102°01.8	• • 19.9	0°02.3	01.5	38°32.5	• • 48.4	117°22.6	• • 41.5	Horizont	al parallax	
22	124°02.6	117°03.9	20.5	15°04.8	01.3	53°34.8	48.4	132°24.8	41.4		Venus:	0.4
23	139°05.0	132°06.0	21.2	30°07.2	01.3	68°37.1	48.5	147°27.0	41.3		Mars:	0.2
										-		
Mer.p	ass. 13:45	$\nu$ 2.0′ d0.	7′ m-4.85	$\nu 2.5' \ d-0$	.1′ m-0.44	$\nu 2.3' \ d0.$	0′ m-2.34	$\nu$ 2.2′ d-0	.1' m $1.12$			

h	Su	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	176°36.2	S10°32.9	268°26.5	10.5'	S26°01.3	6.5'	54.8'
1	191°36.2	32.0	282°56.1	10.4'	26°07.8	6.4'	54.8'
2	206°36.3	31.1	297°25.5	10.4'	26°14.2	6.3'	54.9'
3 4	221°36.4 236°36.5	· · 30.2	311°54.9 326°24.1	10.3' 10.2'	26°20.4 26°26.6	6.1' 6.0'	54.9' 54.9'
5	250°36.5	28.3	340°53.3	10.2	26°32.6	5.9'	54.9'
6	266°36.6	S10°27.4	355°22.4	10.0'	S26°38.5	5.8'	54.9'
7	281°36.7	26.5	9°51.5	9.9'	26°44.2	5.6'	55.0'
8	296°36.8	25.6	24°20.4	9.9'	26°49.9	5.5'	55.0'
9 10	311°36.8 326°36.9	· · 24.7 23.8	38°49.2 53°18.0	9.8' 9.7'	26°55.4 27°00.8	5.4' 5.3'	55.0' 55.0'
11	341°37.0	22.9	67°46.7	9.6'	27°06.0	5.1'	55.1'
12	356°37.1	S10°22.0	82°15.3	9.5'	S27°11.1	5.0'	55.1'
13	11°37.1	21.1	96°43.8	9.4'	$27^{\circ}16.1$	4.9'	55.1'
14	26°37.2	20.2	111°12.3 125°40.6	9.4'	27°21.0 27°25.7	4.7'	55.1'
15 16	41°37.3 56°37.4	· · 19.3 18.4	125 40.6 140°08.9	9.3' 9.2'	27°30.3	4.6' 4.5'	55.2' 55.2'
17	71°37.4	17.4	154°37.1	9.1'	27°34.7	4.3'	55.2'
18	86°37.5	S10° 16.5	169°05.2	9.0'	S27°39.1	4.2'	55.2'
19	101°37.6	15.6	183°33.3	9.0'	27°43.2	4.0'	55.3'
20 21	116°37.7 131°37.8	14.7 •• 13.8	198°01.2 212°29.1	8.9' 8.8'	27°47.3 27°51.2	3.9' 3.8'	55.3' 55.3'
22	131 37.8 146°37.8	12.9	212 29.1 226°57.0	o.o 8.7'	27°55.0	3.6'	55.3'
23	161°37.9	12.0	241°24.7	8.7'	27°58.6	3.5'	55.4'
	SD = 16.2'	d = -0.9'		SD	0 = 15.0'		
_							
Sat 0	<b>GHA</b> 176°38.0	Dec \$10°11.1	<b>GHA</b> 255°52.4	ν 8.6'	<b>Dec</b> 528°02.1	d 3.3'	<b>HP</b> 55.4'
1	176 38.0 191°38.1	10.2	255 52.4 270°20.0	8.5'	28°05.4	3.3 3.2'	55.4'
2	206°38.2	09.2	284°47.5	8.5'	28°08.6	3.0'	55.4'
3	221°38.2	•• 08.3	299°14.9	8.4'	28°11.6	2.9'	55.5'
4	236°38.3	07.4	313°42.3 328°09.7	8.3'	28°14.5 28°17.3	2.8'	55.5'
5 6	251°38.4 266°38.5	06.5 \$10°05.6	342°36.9	8.3' 8.2'	28 17.3 S28°19.9	2.6' 2.5'	55.5' 55.6'
7	281°38.6	04.7	357°04.1	8.1	28°22.4	2.3'	55.6'
8	296°38.6	03.8	11°31.2	8.1'	28°24.7	2.2'	55.6'
9	311°38.7	• • 02.9	25°58.3	8.0'	28°26.8	2.0'	55.6'
10 11	326°38.8 341°38.9	01.9 01.0	40°25.3 54°52.2	7.9' 7.9'	28°28.8 28°30.7	1.9' 1.7'	55.7' 55.7'
12	356°39.0	\$10°00.1	69°19.1	7.8'	528°32.4	1.6'	55.7'
13	11°39.0	09°59.2	83°45.9	7.8'	28°34.0	1.4'	55.8'
14	26°39.1	58.3	98°12.6	7.7'	28°35.4	1.2'	55.8'
15 16	41°39.2 56°39.3	• • 57.4 56.5	112°39.3 127°06.0	7.6' 7.6'	28°36.6 28°37.7	1.1' 0.9'	55.8' 55.9'
17	71°39.4	50.5 55.5	141°32.6	7.5	20°38.6	0.9	55.9'
18	86°39.5	S09°54.6	155°59.1	7.5'	S28°39.4	0.6'	55.9'
19	101°39.5	53.7	170°25.6	7.4'	28°40.0	0.5'	56.0'
20	116°39.6	52.8	184°52.0	7.4'	28°40.5	0.3	56.0'
21 22	131°39.7 146°39.8	· · 51.9 51.0	199°18.4 213°44.8	7.3' 7.3'	28°40.8 28°40.9	0.1' -0.0'	56.0' 56.0'
23	161°39.9	50.0	228°11.1	7.3'	28°40.9	-0.2	56.1
	SD = 16.2'	d = -0.9'		SD	0 = 15.1'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	176°40.0	S09°49.1	242°37.3	7.2'	\$28°40.7	-0.3	56.1
1	191°40.1	48.2	257°03.6	7.2'	28°40.4	-0.5'	56.1'
2	206°40.1	47.3	271°29.7	7.1'	28°39.9	-0.7'	56.2'
3 4	221°40.2 236°40.3	•• 46.4 45.4	285°55.9 300°22.0	7.1' 7.1'	28°39.2 28°38.4	-0.8' -1.0'	56.2' 56.2'
5	251°40.4	44.5	314°48.0	7.1	28°37.4	-1.0	56.3
6	266°40.5	S09°43.6	329°14.1	7.0'	S28°36.3	-1.3'	56.3'
7	281°40.6	42.7	343°40.1	7.0'	28°35.0	-1.5'	56.3'
8 9	296°40.7 311°40.7	41.8 •• 40.8	358°06.1 12°32.0	6.9' 6.9'	28°33.5 28°31.8	-1.6' -1.8'	56.4' 56.4'
10	311 40.7 326°40.8	39.9	26°57.9	6.9'	28°31.8 28°30.0	-1.8 -2.0'	56.4'
11	341°40.9	39.0	41°23.8	6.9	28°28.1	-2.1	56.5
12	356°41.0	<b>S</b> 09°38.1	55°49.7	6.8'	S28°25.9	-2.3'	56.5'
13	11°41.1	37.2	70°15.5	6.8'	28°23.6	-2.5'	56.5'
14 15	26°41.2 41°41.3	36.2 •• 35.3	84°41.4 99°07.2	6.8' 6.8'	28°21.1 28°18.5	-2.6' -2.8'	56.6' 56.6'
16	56°41.4	34.4	113°33.0	6.8	28°15.7	-2.0'	56.7'
17	71°41.5	33.5	127°58.7	6.8'	28°12.7	-3.1'	56.7'
18	86°41.5	S09°32.5	142°24.5	6.8'	\$28°09.6	-3.3'	56.7'
19 20	101°41.6 116°41.7	31.6 30.7	156°50.2 171°16.0	6.7' 6.7'	28°06.3 28°02.8	-3.5' -3.6'	56.8' 56.8'
20	131°41.8	29.8	171 16.0 185°41.7	6.7'	28 02.8 27°59.1	-3.8'	56.8'
22	146°41.9	28.9	200°07.5	6.7'	27°55.3	-4.0'	56.9'
23	161°42.0	27.9	214°33.2	6.7'	27°51.3	-4.1'	56.9'
	SD = 16.2'	d = -0.9'		SD	0 = 15.3'		

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

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

			Sun		Moon			
	Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
İ		00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	23-25	
		mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	48-28%	
	21	13:35	13:32	12:14	06:19	18:45		
ı	22	13:28	13:24	12:13	07:12	19:40		
	23	13:20	13:16	12:13	08:08	20:36		

## February 24, 25, 26 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	154°07.5	147°08.1	N09°21.8	45°09.7	N26°01.2	83°39.4	N21°48.5	162°29.2	S05°41.2			
1	169°10.0	162°10.2	22.5	60°12.2	01.2	98°41.7	48.5	102 29.2 177°31.3	41.0	Alpheratz	357°35.0	29°13.7
2	184°12.4	102 10.2 177°12.3	23.1	75° 14.7	01.2	113°44.0	48.6	192°33.5	40.9	Ankaa	353°07.4	$-42^{\circ}10.3$
3	199°14.9	192°14.4	23.7	90°17.1	01.0	128° 46.3	• • 48.6	207°35.7	40.8	Schedar	349°31.4	56°40.6
4	214°17.4	207°16.6	24.4	105° 19.6	00.9	143°48.6	48.6	222°37.9	40.7	Diphda	348°47.4	-17°51.1
5	229°19.8	222°18.7	25.0	120°22.1	00.9	158° 50.9	48.6	237°40.1	40.6	Achernar	335°20.4	-57°06.8
6	244°22.3	237°20.8	N09°25.6	135°24.6	N26°00.8	173°53.1	N21°48.7	252°42.3	S05°40.4	Hamal	327°51.3	23°34.9
7	259°24.7	252°23.0	26.3	150° 27.0	00.7	188°55.4	48.7	267°44.5	40.3	Polaris	314°08.3	89°22.5
8	274°27.2	267°25.1	26.9	165°29.5	00.6	203°57.7	48.7	282°46.6	40.2	Acamar	315°11.8	-40°12.5
9	289°29.7	282°27.2	27.5	180°32.0	00.6	219°00.0	• • 48.8	297°48.8	40.1	Menkar	314°06.1	4°11.2
10	304°32.1	297°29.4	28.2	195°34.4	00.5	234°02.3	48.8	312°51.0	40.0	Mirfak	308°28.2	49°57.2
11	319°34.6	312°31.5	28.8	210°36.9	00.4	249°04.6	48.8	327°53.2	39.8	Aldebaran	290°39.5	16°33.6
12	334°37.1	327°33.7	N09°29.4	225°39.3	N26°00.3	264°06.9	N21°48.8	342°55.4	S05°39.7	Rigel	281°03.7	-8°10.5
13	349°39.5	342°35.8	30.0	240°41.8	00.3	279°09.2	48.9	357°57.6	39.6	Capella	280°21.6	46°01.5
14	4°42.0	357°38.0	30.6	255° 44.3	00.2	294°11.5	48.9	12°59.7	39.5	Bellatrix	278°22.7	6°22.3
15	19°44.5	12°40.1	31.3	270°46.7	00.1	309° 13.8	• • 48.9	28°01.9	• • 39.4	Elnath	278°01.6	28°37.8
16	34°46.9	27°42.3	31.9	285°49.2	00.0	324°16.1	49.0	43°04.1	39.2	Alnilam	275°37.5	-1°11.2
17	49°49.4	42°44.5	32.5	300°51.6	26°00.0	339° 18.3	49.0	58°06.3	39.1	Betelgeuse	270°51.8	7°24.7
18	64°51.8	57°46.7	N09°33.1	315°54.1	N25°59.9	354°20.6	N21°49.0	73°08.5	S05°39.0	Canopus	263°52.1	-52°42.8
19	79°54.3	72°48.8	33.7	330° 56.5	59.8	9°22.9	49.1	88°10.7	38.9	Sirius	258°25.9	-16°45.2
20	94°56.8	87°51.0	34.3	345°59.0	59.7	24°25.2	49.1	103°12.9	38.8	Adhara	255°05.5	-29°00.5
21	109°59.2	102°53.2	34.9	1°01.4	• • 59.7	39°27.5	• • 49.1	118°15.0	38.7	Procyon	244°50.5	5°09.5
22	125°01.7	117°55.4	35.5	16°03.9	59.6	54°29.8	49.2	133°17.2	38.5	Pollux	243°16.9	27°57.9
23	140°04.2	132°57.6	36.1	31°06.3	59.5	69°32.1	49.2	148°19.4	38.4	Avior	234°14.2	-59°35.5
										Suhail	222°45.8	-43°32.2
Mer.p	ass. 13:41	$\nu 2.1' \ d0.$	.6′ m-4.84	$\nu 2.5' \ d-0$	.1′ m-0.42	$\nu$ 2.3′ d0.	.0′ m-2.34	$\nu$ 2.2′ d-0	.1'  m1.12	Miaplacidus	221°37.4	-69°49.3
										Alphard	217°47.3	-8°46.2
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.0	11°50.5
0	155°06.6	147°59.8	N09°36.8	46°08.8	N25°59.4	84°34.4	N21°49.2	163°21.6	S05°38.3	Dubhe	193°40.2	61°36.8
1	170°09.1	163°01.9	37.4	61°11.2	59.3	99°36.6	49.2	178°23.8	38.2	Denebola	182°24.5	14°25.7
2	185°11.6	178°04.1	38.0	76° 13.7	59.3	114°38.9	49.3	193°26.0	38.1	Gienah	175°43.2	-17°41.0
3	200°14.0	178 04.1 193°06.3	•• 38.6	91°16.1	59.2	129°41.2	• • 49.3	208°28.1	37.9	Acrux	172°59.4	-63°14.2
4	215°16.5	208°08.6	39.1	106° 18.5	59.1	144°43.5	49.3	223°30.3	37.8		171°51.1	-57°15.2
5	230°19.0	223°10.8	39.7	121°21.0	59.0	159°45.8	49.4	238°32.5	37.7	Alioth	166°12.4	55°49.1
6	245°21.4	238°13.0	N09°40.3	136° 23.4	N25°58.9	174°48.1	N21°49.4	253°34.7	S05°37.6	Spica	158°22.0	-11°17.7
7	260°23.9	253°15.2	40.9	151° 25.8	58.9	189°50.4	49.4	268°36.9	37.5	Alkaid	152°51.6	49°10.9
8	275°26.3	268°17.4	41.5	166° 28.3	58.8	204°52.6	49.5	283°39.1	37.3	Hadar	148°35.5	-60°29.5
9	290°28.8	283°19.6	42.1	181°30.7	• • 58.7	219°54.9	• • 49.5	298°41.2	37.2		147°57.3	-36°29.6
10	305°31.3	298°21.9	42.7	196°33.1	58.6	234°57.2	49.5	313°43.4	37.1	Arcturus	145°47.6	19°02.8
11	320°33.7	313°24.1	43.3	211°35.6	58.6	249°59.5	49.5	328°45.6	37.0	Rigil Kent.	139°39.9	-60°56.2
12	335°36.2	328°26.3	N09°43.9	226°38.0	N25°58.5	265°01.8	N21°49.6	343°47.8	S05°36.9	Kochab	137°19.3	74°02.7
13	350°38.7	343°28.6	44.4	241°40.4	58.4	280°04.1	49.6	358°50.0	36.7	Zuben'ubi	136°55.8	-16°08.8
14	5°41.1	358°30.8	45.0	256° 42.9	58.3	295°06.3	49.6	13°52.2	36.6	Alphecca	126°03.6	26°37.5
15	20°43.6	13°33.0	• • 45.6	271°45.3	• • 58.2	310°08.6	• • 49.7	28°54.4	• • 36.5	Antares	112°15.7	-26°29.3
16	35°46.1	28°35.3	46.2	286°47.7	58.1	325°10.9	49.7	43°56.5	36.4	Atria	107°10.0 102°02.7	-69°04.1
17	50°48.5	43°37.5	46.8	301°50.1	58.1	340°13.2	49.7	58°58.7	36.3	Sabik		-15°45.4
18	65°51.0	58°39.8	N09°47.3	316° 52.5	N25°58.0	355° 15.5	N21°49.8	74°00.9	S05°36.1	Shaula	96°10.3	-37°07.3
19	80°53.5	73°42.1	47.9	331°55.0	57.9	$10^{\circ}17.7$	49.8	89°03.1	36.0	Rasalhague	95°58.5	12°32.3
20	95°55.9	88°44.3	48.5	346° 57.4	57.8	25°20.0	49.8	104°05.3	35.9	Eltanin Kaus Aust.	90°42.3 83°32.6	51°28.7 -34°22.3
21	110°58.4	103°46.6	• • 49.0	1°59.8	• • 57.7	40°22.3	• • 49.9	119°07.5	• • 35.8	Vega	80°33.4	-34 22.3 38°48.1
22	126°00.8	118°48.9	49.6	17°02.2	57.7	55°24.6	49.9	134°09.6	35.7	_		-26°15.9
23	141°03.3	133°51.1	50.2	32°04.6	57.6	70°26.9	49.9	149°11.8	35.5	Nunki Altair	75°47.8 62°00.1	-20 15.9 8°55.9
Maxa	12.27	2 2/ -40	6/ 1 92	2 4/ -/ 0	1/ 0.20	2 2/ 40	0/ 2.33	2 2/1 0	1/ 1 11	Peacock	53°06.0	-56°39.2
ivier.p	ass. 13:37	ν2.2° α0.	.6′ m-4.83	ν2.4° α-0	.1′ m-0.39	$\nu$ 2.3° $a$ 0.	.0′ m-2.33	$\nu$ 2.2 $a$ -0	.1′ m1.11	Deneb	49°26.2	-50 39.2 45°22.0
										Enif	33°39.0	9°59.3
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.2	-46°50.4
0	$156^{\circ}05.8$	148°53.4	N09°50.7	47°07.0	N25°57.5	$85^{\circ}29.1$		$164^{\circ}14.0$	S05°35.4	Fomalhaut	15°14.7	-40° 30.4 -29° 29.5
1	$171^{\circ}08.2$	$163^{\circ}55.7$	51.3	62°09.4	57.4	100°31.4	50.0	$179^{\circ}16.2$	35.3	Scheat	13°45.5	28°13.1
2	$186^{\circ}10.7$	178°58.0	51.9	77°11.8	57.3	$115^{\circ}33.7$	50.0	194°18.4	35.2	Markab	13°30.1	15°20.3
3	$201^{\circ}13.2$	194°00.3	• • 52.4	92°14.2	• • 57.2	$130^{\circ}36.0$	• • 50.0	209°20.6	• • 35.1			
4	$216^{\circ}15.6$	$209^{\circ}02.5$	53.0	$107^{\circ}16.7$	57.2	145°38.2	50.1	224°22.7	34.9	Feb 24 Mon	SHA	Mer.pass
5	$231^{\circ}18.1$	224°04.8	53.5	$122^{\circ}19.1$	57.1	160°40.5	50.1	239°24.9	34.8	Venus		14:09
6	246°20.6	239°07.1	N09°54.1	137°21.5	N25°57.0	175°42.8	N21°50.1	254°27.1	S05°34.7	Mars	251°02.2	20:56
7	261°23.0	254°09.4	54.6	152° 23.9	56.9	190°45.1	50.2	269°29.3	34.6	Jupiter		18:23
8	276°25.5	269°11.7	55.2	167°26.3	56.8	205°47.3	50.2	284°31.5	34.5	Saturn	8°21.7	13:08
9	291°28.0	284°14.1	• • 55.7	182°28.7	• • 56.7	220°49.6	• • 50.2	299°33.7	• • 34.3	Feb 25 Tue	SHA	Mer.pass
10	306°30.4	299°16.4	56.3	197°31.1	56.7	235°51.9	50.3	314°35.8	34.2	I	352°53.1	14:06
11	321°32.9	314°18.7	56.8	212°33.5	56.6	250°54.2	50.3	329°38.0	34.1	Mars		20:52
12	336°35.3	329°21.0	N09°57.4	227°35.8	N25°56.5	265°56.4	N21°50.3	344°40.2	S05°34.0	Jupiter		18:19
13	351°37.8	344°23.3	57.9	242°38.2	56.4	280°58.7	50.4	359°42.4	33.9	Saturn	8°15.0	13:05
14	6°40.3	359°25.6	58.5	257° 40.6	56.3	296°01.0	50.4	14°44.6	33.7	Jatuill	J 1J.U	15.05
15	21°42.7	14°28.0	• • 59.0	272°43.0	• • 56.2	311°03.3	• • 50.4	29°46.8	• • 33.6	Feb 26 Wed	SHA	Mer.pass
16	36°45.2	29°30.3	09°59.5	287°45.4	56.2	326°05.5	50.5	44°48.9	33.5	Venus	352°47.6	14:02
17	51°47.7	44°32.6	10°00.1	302°47.8	56.1	341°07.8	50.5	59°51.1	33.4	Mars		20:48
18	66°50.1	59°35.0	N10°00.6	317°50.2	N25°56.0	356° 10.1	N21°50.5	74°53.3	S05°33.3	Jupiter	289°23.4	18:15
19	81°52.6	74°37.3	01.1	332°52.6	55.9	11°12.4	50.6	89°55.5	33.1	Saturn	8°08.2	13:01
20	96°55.1	89°39.7	01.7	347°55.0	55.8	26°14.6	50.6	104°57.7	33.0	11. *	al ma:::=!!	
21	111°57.5	104°42.0	02.2	2°57.3	• • 55.7	41°16.9	• • 50.6	119°59.9	• • 32.9	Horizont	al parallax	0.4
22	127°00.0	119°44.4	02.7	17°59.7	55.6	56°19.2	50.6	135°02.0	32.8		Venus:	0.4
23	142°02.4	134°46.7	03.2	33°02.1	55.6	71°21.4	50.7	150°04.2	32.7	L	Mars:	0.2
Mer.n	ass. 13:33	$\nu 2.3' \ d0$	.6′ m-4.82	ν2.4' d-0	.1′ m-0.36	$\nu^{2.3'} d0$	.0′ m-2.32	$\nu^{2.2'} d-0$	.1′ m1.11			

h	Sun				Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	176°42.1	S09°27.0	228°58.9	6.7'	S27°47.2	-4.3'	56.9'
1	191°42.2	26.1	243°24.6	6.7'	27°42.9	-4.5'	57.0'
2	206°42.3 221°42.4	25.2 •• 24.2	257°50.3 272°16.0	6.7' 6.7'	27°38.4 27°33.7	-4.7' -4.8'	57.0' 57.0'
4	236°42.5	23.3	286°41.8	6.7	27° 28.9	-5.0'	57.1
5	251°42.6	22.4	301°07.5	6.7'	27°23.9	-5.2'	57.1'
6	266°42.6	S09°21.5	315°33.2	6.7'	S27°18.8	-5.3'	57.2'
7	281°42.7	20.5	329°59.0	6.8'	27°13.5 27°08.0	-5.5'	57.2'
8 9	296°42.8 311°42.9	19.6 •• 18.7	344°24.7 358°50.5	6.8' 6.8'	27°08.0 27°02.3	-5.7' -5.8'	57.2' 57.3'
10	326°43.0	17.8	13°16.2	6.8	26°56.5	-5.6 -6.0'	57.3'
11	341°43.1	16.8	27°42.0	6.8'	26°50.5	-6.2'	57.3'
12	356°43.2	S09°15.9	42°07.8	6.8'	S26°44.3	-6.3'	57.4'
13	11°43.3	15.0	56°33.7	6.8'	26°38.0	-6.5'	57.4'
14 15	26°43.4 41°43.5	14.0 •• 13.1	70°59.5 85°25.4	6.9' 6.9'	26°31.5 26°24.9	-6.6' -6.8'	57.4' 57.5'
16	56°43.6	12.2	99°51.2	6.9	26° 18.1	-7.0'	57.5'
17	71°43.7	11.3	114°17.1	6.9'	26°11.1	-7.1'	57.6'
18	86°43.8	S09°10.3	128°43.1	7.0'	S26°04.0	-7.3'	57.6'
19	101°43.9	09.4	143°09.0 157°35.0	7.0'	25°56.7 25°49.2	-7.5'	57.6'
20 21	116°44.0 131°44.1	08.5 •• 07.5	157° 35.0 172° 01.0	7.0' 7.0'	25°49.2 25°41.6	-7.6' -7.8'	57.7' 57.7'
22	146°44.2	06.6	172 01.0 186°27.0	7.0	25° 33.8	-7.8 -8.0'	57.7'
23	161°44.3	05.7	200°53.1	7.1'	25°25.8	-8.1'	57.8'
	SD = 16.2'	d = -0.9'		S	D = 15.5'		
т	CLIA	De-	CUA		D		<u>пр</u>
Tue 0	<b>GHA</b> 176°44.4	<b>Dec</b> <b>S</b> 09°04.8	<b>GHA</b> 215°19.2	u 7.1'	Dec \$25° 17.7	d -8.3'	<b>HP</b> 57.8'
1	191°44.5	03.8	229°45.3	7.2'	25°09.4	-8.4'	57.9'
2	206°44.6	02.9	$244^{\circ}11.5$	7.2'	$25^{\circ}01.0$	-8.6'	57.9'
3	221°44.7	• • 02.0	258°37.7	7.2'	24°52.4	-8.7'	57.9'
4 5	236°44.8 251°44.9	01.0 09°00.1	273°03.9 287°30.2	7.3' 7.3'	24°43.7 24°34.8	-8.9' -9.1'	58.0' 58.0'
6	266°45.0	S08° 59.2	301°56.5	7.3'	\$24°25.7	-9.1 -9.2'	58.0'
7	281°45.0	58.2	316°22.9	7.4'	24°16.5	-9.4'	58.1'
8	296°45.1	57.3	330°49.3	7.4'	24°07.1	-9.5'	58.1'
9	311°45.2	56.4	345°15.7 359°42.2	7.5'	23°57.6	-9.7'	58.1'
10 11	326°45.3 341°45.4	55.4 54.5	359°42.2 14°08.7	7.5' 7.6'	23°47.9 23°38.1	-9.8' -10.0'	58.2' 58.2'
12	356°45.5	S08°53.6	28°35.2	7.6'	523°28.1	-10.1	58.3'
13	11°45.6	52.6	43°01.8	7.6'	23°18.0	-10.3'	58.3'
14	26°45.7	51.7	57°28.5	7.7'	23°07.7	-10.4'	58.3'
15 16	41°45.9 56°46.0	· · 50.8 49.8	71°55.2 86°21.9	7.7' 7.8'	22°57.3 22°46.7	-10.6' -10.7'	58.4' 58.4'
17	71°46.1	49.6 48.9	100°48.7	7.8'	22° 36.0	-10.7 -10.9'	58.4'
18	86°46.2	S08°48.0	115°15.5	7.9'	S22°25.1	-11.0'	58.5'
19	101°46.3	47.0	$129^{\circ}42.4$	7.9'	$22^{\circ}14.1$	-11.2'	58.5'
20	116°46.4	46.1	144°09.3	8.0'	22°02.9		58.5'
21 22	131°46.5 146°46.6	· · 45.2 44.2	158°36.3 173°03.3	8.0' 8.1'	21°51.6 21°40.2	-11.4' -11.6'	58.6' 58.6'
23	161°46.7	43.3	187°30.4	8.1'	21°28.6	-11.7	58.6'
	SD = 16.2'	d = -0.9'		S	D = 15.8'		
\A/ I	CUA		CILA		Б.		
Wed 0	<b>GHA</b> 176°46.8	<b>Dec</b> \$08° 42.4	<b>GHA</b> 201°57.6	ν 8.2'	Dec \$21° 16.9	d -11.9'	<b>HP</b> 58.7'
1	191°46.9	41.4	$216^{\circ}24.7$	8.2'	21°05.1	-12.0'	58.7'
2	206°47.0	40.5	230°52.0	8.3'	20°53.1	-12.1'	58.7'
3	221°47.1	• • 39.6	245°19.2 259°46.6	8.3'	20°40.9 20°28.7	-12.3' -12.4'	58.8'
4 5	236°47.2 251°47.3	38.6 37.7	259°46.6 274°14.0	8.4' 8.4'	20°28.7 20°16.3	-12.4° -12.5'	58.8' 58.8'
6	266°47.4	\$08°36.7	288°41.4	8.5'	\$20°03.8	-12.7'	58.9'
7	281°47.5	35.8	303°08.9	8.5'	19°51.1	-12.8'	58.9'
8	296°47.6	34.9	317°36.4	8.6'	19°38.3	-12.9'	58.9'
9 10	311°47.7 326°47.8	· · 33.9 33.0	332°04.0 346°31.6	8.6' 8.7'	19°25.4 19°12.4	-13.0' -13.2'	59.0' 59.0'
11	320 47.8 341°47.9	33.0	0°59.3	8.7'	19 12.4 18°59.2	-13.2 -13.3'	59.0'
12	356°48.0	S08°31.1	15°27.1	8.8'	<b>S</b> 18°46.0	-13.4'	59.1'
13	11°48.1	30.2	29°54.9	8.9'	18°32.6	-13.5'	59.1'
14	26°48.2	29.2	44°22.7 58°50.6	8.9'	18° 19.0 18° 05.4	-13.6'	59.1'
15 16	41°48.3 56°48.5	· · 28.3 27.4	58°50.6 73°18.6	9.0' 9.0'	18°05.4 17°51.6	-13.8' -13.9'	59.2' 59.2'
17	71°48.6	26.4	87°46.6	9.0'	17°37.8	-13.9 -14.0'	59.2'
18	86°48.7	S08°25.5	$102^{\circ}14.7$	9.1'	<b>S</b> 17°23.8	-14.1'	59.3'
19	101°48.8	24.5	116°42.8	9.2'	17°09.7	-14.2'	59.3'
20 21	116°48.9 131°49.0	23.6 •• 22.7	131°10.9 145°39.1	9.2' 9.3'	16°55.4 16°41.1	-14.3' -14.4'	59.3' 59.4'
22	131 49.0 146°49.1	21.7	145 39.1 160°07.4	9.3'	16° 41.1	-14.4 -14.5'	59.4 59.4'
23	161°49.2	20.8	174°35.7	9.4'	16°12.1	-14.6'	59.4'
	SD = 16.1'	d = -0.9'		S	D = 16.0'		

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

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

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	26-28	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	20-6%	
24	13:12	13:07	12:13	09:05	21:33		
25	13:03	12:58	12:13	10:01	22:29		
26	12:53	12:48	12:13	10:56	23:22		

# February 27, 28, 01 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
	157°04.9	149°49.1	N10°03.8		N25° 55.5		N21°50.7				SHA	
0				48°04.5		86°23.7		165°06.4	S05°32.5	Alpheratz	357°35.0	29°13.7
1	172°07.4	164°51.5	04.3	63°06.8	55.4	101°26.0	50.7	180°08.6	32.4	Ankaa	353°07.4	-42°10.3
2	187°09.8	179°53.8	04.8	78°09.2	55.3	116°28.3	50.8	195°10.8	32.3	Schedar	349°31.4	56°40.6
3	202°12.3	194°56.2	• • 05.3	93°11.6	• • 55.2	131°30.5	• • 50.8	210°13.0	• • 32.2	Diphda	348°47.4	-17°51.1
4	217°14.8	209°58.6	05.8	108°14.0	55.1	146°32.8	50.8	225°15.1	32.1			
5	232°17.2	225°01.0	06.3	123°16.3	55.0	161°35.1	50.9	240°17.3	31.9	Achernar		-57°06.8
6	247°19.7	240°03.3	N10°06.9	138°18.7	N25°55.0	176° 37.3	N21°50.9	255°19.5	S05°31.8	Hamal	327°51.3	23°34.9
7	262°22.2	255°05.7	07.4	153°21.1	54.9	191°39.6	50.9	270°21.7	31.7	Polaris	314°09.8	89°22.5
8	277°24.6	270°08.1	07.9	168°23.4	54.8	206°41.9	51.0	285°23.9	31.6	Acamar	$315^{\circ}11.8$	-40°12.5
										Menkar	$314^{\circ}06.1$	$4^{\circ}11.2$
9	292°27.1	285° 10.5	•• 08.4	183°25.8	• • 54.7	221°44.1	• • 51.0	300°26.1	• • 31.5	Mirfak	308°28.2	49°57.2
10	307°29.6	300°12.9	08.9	198°28.2	54.6	236°46.4	51.0	315°28.2	31.3	Aldebaran	290°39.5	16°33.6
11	322°32.0	315° 15.3	09.4	213°30.5	54.5	251°48.7	51.1	330°30.4	31.2	Rigel	281°03.7	-8°10.5
12	337°34.5	330°17.7	N10°09.9	228°32.9	N25°54.4	266°50.9	N21°51.1	345°32.6	S05°31.1	Capella	280°21.6	46°01.5
13	352°36.9	$345^{\circ}20.1$	10.4	243°35.3	54.3	281°53.2	51.1	0°34.8	31.0	Bellatrix	278°22.7	6°22.3
14	7°39.4	0°22.6	10.9	258°37.6	54.2	296°55.5	51.2	15°37.0	30.9		278°01.6	28°37.8
15	22°41.9	15°25.0	• • 11.4	273°40.0	• • 54.2	311°57.7	• • 51.2	30°39.2	• • 30.7	Elnath		
16	37°44.3	30°27.4	11.9	288°42.3	54.1	327°00.0	51.2	45°41.3	30.6	Alnilam	275°37.5	-1°11.2
17	52°46.8	45° 29.8	12.4	303°44.7	54.0	342°02.3	51.3	60°43.5	30.5	Betelgeuse	270°51.8	7°24.7
18	67°49.3	60°32.2	N10°12.9	318°47.0	N25°53.9	357°04.5	N21°51.3	75°45.7	S05°30.4	Canopus	263°52.1	-52°42.8
19	82°51.7	75° 34.7	13.3	333°49.4	53.8	12°06.8	51.3	90°47.9	30.3	Sirius	258°26.0	-16°45.2
	97°54.2	90°37.1		348°51.7		27°09.0		90 47.9 105°50.1		Adhara	255°05.6	-29°00.6
20			13.8		53.7		51.4		30.1	Procyon	244°50.5	5°09.5
21	112°56.7	105°39.5	• • 14.3	3°54.1	• • 53.6	42°11.3	• • 51.4	120°52.2	• • 30.0	Pollux	243°16.9	27°57.9
22	127°59.1	120°42.0	14.8	18°56.4	53.5	57° 13.6	51.4	135°54.4	29.9	Avior	234°14.2	-59°35.5
23	143°01.6	135°44.4	15.3	33°58.8	53.4	72° 15.8	51.5	150°56.6	29.8	Suhail	222°45.8	-43°32.2
Max :-	12:20	1/2 A/ 40	5′ m-4.81	112 1/ 10	.1′ m-0.33	1/2 2/ 40	0′ m-2.31	1/2 2/ 4 0	.1′ m1.11	Miaplacidus	222 45.6 221°37.5	-43 32.2 -69°49.3
ivier.p	pass. 13:29	$\nu$ 2.4 au.	5 m-4.81	ν2.4 α-0	.1 m-0.33	$\nu$ 2.3 au.	0 m-2.31	$\nu$ 2.2 a-0	.1 m1.11			
										Alphard	217°47.3	-8°46.2
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.0	11°50.5
0	158°04.1	150°46.9	N10° 15.8	49°01.1	N25°53.3	87° 18.1	N21°51.5	165°58.8	S05°29.7	Dubhe	193°40.1	61°36.8
1	173°06.5	165°49.3	16.2	64°03.5	53.3	102° 20.4	51.5	181°01.0	29.5	Denebola	182°24.5	14°25.7
2	188°09.0	180°51.8	16.7	79°05.8	53.2	117°22.6	51.6	196°03.2	29.4	Gienah	175°43.2	-17°41.0
3											172°59.4	-63°14.2
	203°11.4	195°54.3	• • 17.2	94°08.2	53.1	132°24.9	• • 51.6	211°05.3	• • 29.3	Gacrux	$171^{\circ}51.1$	-57°15.2
4	218°13.9	210°56.7	17.7	109°10.5	53.0	147°27.1	51.6	226°07.5	29.2	Alioth	$166^{\circ}12.4$	55°49.1
5	233°16.4	225°59.2	18.1	124°12.8	52.9	162°29.4	51.7	241°09.7	29.1	Spica	158°21.9	-11°17.7
6	248°18.8	241°01.7	N10° 18.6	139°15.2	N25°52.8	177°31.7	N21°51.7	256°11.9	S05°28.9	Alkaid	152°51.6	49°11.0
7	263°21.3	$256^{\circ}04.1$	19.1	$154^{\circ}17.5$	52.7	192°33.9	51.7	$271^{\circ}14.1$	28.8	Hadar	148°35.5	-60°29.5
8	278°23.8	271°06.6	19.5	$169^{\circ}19.8$	52.6	207°36.2	51.8	286°16.3	28.7		140° 557.3	-36°29.6
9	293°26.2	$286^{\circ}09.1$	• • 20.0	184°22.2	• • 52.5	222°38.4	• • 51.8	301°18.4	• • 28.6	1		
10	308°28.7	301°11.6	20.4	199°24.5	52.4	237°40.7	51.8	316°20.6	28.5	Arcturus	145°47.6	19°02.8
11	323°31.2	316° 14.1	20.9	214°26.8	52.3	252°43.0	51.9	331°22.8	28.3	Rigil Kent.		-60°56.2
12	338°33.6	331° 16.6	N10°21.4	229°29.2	N25°52.3	267°45.2	N21°51.9	346°25.0	S05°28.2	Kochab	$137^{\circ}19.2$	74°02.7
13	353°36.1	346° 19.1		244°31.5	52.2	282°47.5		1°27.2		Zuben'ubi	136°55.7	-16°08.9
	8°38.5	1°21.6	21.8	259°33.8		202 47.5 297°49.7	51.9 52.0	16°29.3	28.1	Alphecca	126°03.5	26°37.5
14			22.3		52.1				28.0	Antares	$112^{\circ}15.7$	-26°29.3
15	23°41.0	16°24.1	• • 22.7	274°36.1	• • 52.0	312°52.0	• • 52.0	31°31.5	• • 27.9	Atria	$107^{\circ}09.9$	$-69^{\circ}04.1$
16	38°43.5	31°26.6	23.2	289°38.5	51.9	327°54.2	52.0	46°33.7	27.7	Sabik	102°02.7	-15°45.4
17	53°45.9	46°29.1	23.6	304°40.8	51.8	342°56.5	52.1	61°35.9	27.6	Shaula	96°10.3	-37°07.3
18	68°48.4	61°31.6	N10°24.1	319°43.1	N25°51.7	357° 58.8	N21°52.1	76°38.1	S05°27.5	Rasalhague	95°58.5	12°32.3
19	83°50.9	76°34.1	24.5	334°45.4	51.6	13°01.0	52.1	91°40.3	27.4	Eltanin	90°42.3	51°28.7
20	98°53.3	91°36.6	24.9	349°47.7	51.5	28°03.3	52.2	106°42.4	27.3	Kaus Aust.	83°32.5	-34°22.3
21	113°55.8	106°39.2	• • 25.4	4°50.1	• • 51.4	43°05.5	• • 52.2	121°44.6	• • 27.1	Vega	80°33.4	38°48.1
22	128°58.3	121°41.7	25.8	19°52.4	51.3	58°07.8	52.2	136°46.8	27.0			
23	144°00.7	136°44.2	26.3	34°54.7	51.2	73° 10.0	52.3	151°49.0	26.9	Nunki	75°47.8	-26°15.9
										Altair	62°00.1	8°55.9
Mer.p	pass. 13:26	$\nu 2.5' \ d0.$	5′ m-4.80	$\nu 2.3' \ d-0$	.1' m-0.31	$\nu 2.3' \ d0.$	0′ m-2.31	$\nu$ 2.2′ d-0	.1' m $1.11$	Peacock	53°06.0	-56°39.2
										Deneb	49°26.1	45°22.0
C-4	CIIA	CIIA	D	CIIA	D	CIIA	D	CHA	D	Enif	33°39.0	9°59.3
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.2	-46°50.4
0	159°03.2	151°46.8	N10°26.7	49°57.0	N25°51.1	88° 12.3	N21°52.3	166°51.2	\$05°26.8	Fomalhaut	15° 14.7	-29°29.5
1	174°05.7	166°49.3	27.1	64°59.3	51.0	103° 14.5	52.3	181°53.4	26.7	Scheat	13°45.5	28°13.1
2	189°08.1	181°51.9	27.5	80°01.6	50.9	118° 16.8	52.4	196°55.5	26.5	Markab	13°30.1	15°20.3
3	204°10.6	196°54.4	• • 28.0	95°03.9	• • 50.8	133° 19.1	• • 52.4	211°57.7	• • 26.4		<b></b>	
4	219°13.0	211°57.0	28.4	110°06.2	50.8	148°21.3	52.4	226°59.9	26.3	Feb 27 Thu	SHA	Mer.pass
5	234°15.5	226°59.5	28.8	125°08.5	50.7	$163^{\circ}23.6$	52.5	242°02.1	26.2	Venus		13:59
6	249°18.0	242°02.1	N10°29.2	140°10.9	N25°50.6	178°25.8	N21°52.5	257°04.3	S05°26.1	Mars	250°59.6	20:44
7	264°20.4	257°04.7	29.7	155°13.2	50.5	193°28.1	52.5	272°06.4	25.9	Jupiter	$289^{\circ}18.8$	18:12
8	279°22.9	272°07.2	30.1	170°15.5	50.4	208° 30.3	52.6	287°08.6	25.8	Saturn	8°01.5	12:58
9	294°25.4	287° 09.8	• • 30.5	185°17.8	50.3	223°32.6	52.6	302°10.8	25.7			
10	309°27.8	302°12.4	30.9	200°20.1	50.2	238° 34.8	52.6	317°13.0	25.6	Feb 28 Fri	SHA	Mer.pass
	309 27.8 324°30.3		31.3		50.2	250° 34.0 253° 37.1	52.0 52.7	332°15.2		Venus	352°42.8	13:55
11		317°14.9		215°22.4					25.5	Mars	250°57.1	20:41
12	339°32.8	332°17.5	N10°31.7	230°24.7	N25°50.0	268°39.3	N21°52.7	347°17.4	S05°25.3	Jupiter		18:08
13	354°35.2	347°20.1	32.1	245°26.9	49.9	283°41.6	52.7	2°19.5	25.2	Saturn	7°54.7	12:54
14	9°37.7	2°22.7	32.5	260°29.2	49.8	298°43.8	52.8	17°21.7	25.1			
15	24°40.1	17°25.3	• • 32.9	275°31.5	• • 49.7	313°46.1	• • 52.8	32°23.9	• • 25.0	Mar 01 Sat	SHA	Mer.pass
16	39°42.6	32°27.9	33.3	290°33.8	49.6	328°48.3	52.8	47°26.1	24.9	Venus	352°43.6	13:51
17	54°45.1	47° 30.5	33.7	305°36.1	49.5	343°50.6	52.9	62°28.3	24.7		250°53.8	20:37
18	69°47.5	62°33.1	N10°34.1	320°38.4	N25°49.4	358° 52.8	N21°52.9	77°30.4	S05°24.6		289°09.1	18:04
19	84°50.0	77°35.7	34.5	335°40.7	49.3	13°55.1	52.9	92°32.6	24.5	Saturn	7°48.0	12:51
20	99°52.5	92°38.3	34.9	350°43.0	49.2	28° 57.3	53.0	107°34.8	24.4	Saturn	1 40.0	12:51
										Horizont	al parallax	
21	114°54.9	107°41.0	• • 35.3	5°45.3	· · 49.1	43°59.6	• • 53.0	122°37.0	• • 24.3		Venus:	0.4
22	129°57.4	122°43.6	35.7	20°47.5	49.0	59°01.8	53.0	137°39.2	24.1		Mars:	0.4
23	144°59.9	137°46.2	36.1	35°49.8	48.9	74°04.1	53.1	152°41.4	24.0		ividi S.	U.2
Mern	pass. 13:22	$\nu 2.5' d0$	4′ m-4.78	$\nu 2.3' d-0$	.1′ m-0.28	$\nu 2.3' d0$	0′ m-2.30	$\nu 2.2' d-0$	.1′ m1.11			

h	Sun				Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	176°49.3	S08°19.8	189°04.1	9.4'	\$15°57.5	-14.8'	59.4'
1 2	191°49.4 206°49.5	18.9 18.0	203°32.5 218°00.9	9.5' 9.5'	15°42.7 15°27.9	-14.9' -15.0'	59.5' 59.5'
3	221°49.6	17.0	232°29.4	9.6'	15°12.9	-15.1'	59.5'
4	236°49.8	16.1	246°58.0	9.6'	14°57.9	-15.2'	59.6'
5	251°49.9 266°50.0	15.1 \$08° 14.2	261°26.6 275°55.2	9.6' 9.7'	14°42.7 \$14°27.5	-15.3' -15.3'	59.6' 59.6'
6 7	266 50.0 281°50.1	13.3	275 55.2 290°23.9	9.7' 9.7'	14°12.1	-15.3' -15.4'	59.6'
8	296°50.2	12.3	304°52.7	9.8'	13°56.7	-15.5'	59.7'
9	311°50.3	• • 11.4	319°21.5	9.8'	13°41.1	-15.6'	59.7'
10 11	326°50.4 341°50.5	10.4 09.5	333°50.3 348°19.2	9.9' 9.9'	13°25.5 13°09.8	-15.7' -15.8'	59.7' 59.7'
12	356°50.6	S08°08.5	2°48.1	10.0'	S12°54.0	-15.9'	59.8'
13	11°50.8	07.6	17° 17.0	10.0'	12°38.1	-16.0'	59.8'
14 15	26°50.9 41°51.0	06.7 •• 05.7	31°46.0 46°15.1	10.0' 10.1'	12°22.2 12°06.1	-16.0' -16.1'	59.8' 59.8'
16	56°51.1	04.8	60°44.1	10.1	12°50.1	-16.1 -16.2	59.0'
17	71°51.2	03.8	$75^{\circ}13.3$	10.2'	11°33.8	-16.3'	59.9'
18	86°51.3	S08°02.9	89°42.4	10.2'	\$11°17.5	-16.4	59.9'
19 20	101°51.4 116°51.5	01.9 01.0	104°11.6 118°40.8	10.2' 10.3'	11°01.2 10°44.7	-16.4' -16.5'	59.9' 60.0'
21	131°51.7	08°00.0	133° 10.1	10.3'	10°28.2	-16.6'	60.0'
22	146°51.8	$07^{\circ}59.1$	147°39.4	10.3'	10°11.7	-16.6'	60.0'
23	161°51.9	58.1	162°08.8	10.4'	09°55.0	-16.7'	60.0'
	SD = 16.1'	d = -0.9'		SI	0 = 16.2'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	176°52.0	S07°57.2	176°38.1	10.4'	S09°38.3	-16.8'	60.0'
1	191°52.1 206°52.2	56.3 55.3	191°07.5 205°37.0	10.4' 10.5'	09°21.6 09°04.8	-16.8' -16.9'	60.1' 60.1'
2	200 52.2 221°52.3	55.3 •• 54.4	205 37.0 220°06.4	10.5	09 04.8 08°47.9	-16.9'	60.1
4	236°52.5	53.4	234°35.9	10.5'	08°30.9	-17.0'	60.1
5	251°52.6	52.5	249°05.4	10.5'	08°13.9	-17.1'	60.1
6 7	266°52.7 281°52.8	S07°51.5 50.6	263°35.0 278°04.6	10.6' 10.6'	\$07°56.9 07°39.8	-17.1' -17.2'	60.1' 60.2'
8	296°52.9	49.6	292°34.2	10.6'	07°22.6	-17.2'	60.2
9	311°53.0	• • 48.7	307°03.8	10.6'	07°05.4	-17.3'	60.2'
10 11	326°53.2 341°53.3	47.7 46.8	321°33.4 336°03.1	10.7' 10.7'	06°48.1 06°30.8	-17.3' -17.3'	60.2' 60.2'
12	356°53.4	\$07°45.8	350° 32.8	10.7	S06°13.5	-17.4	60.2
13	11°53.5	44.9	5°02.5	10.7'	05°56.1	-17.4'	60.3'
14 15	26°53.6 41°53.7	43.9 •• 43.0	19°32.2 34°02.0	10.7' 10.8'	05°38.6 05°21.2	-17.5' -17.5'	60.3' 60.3'
16	56°53.9	42.0	48°31.8	10.8	05°21.2	-17.5'	60.3
17	71°54.0	41.1	$63^{\circ}01.5$	10.8'	$04^{\circ}46.1$	-17.6'	60.3'
18	86°54.1 101°54.2	S07°40.1	77°31.3 92°01.2	10.8'	\$04°28.6 04°10.9	-17.6'	60.3'
19 20	116° 54.3	39.2 38.2	92 01.2 106°31.0	10.8' 10.8'	04 10.9 03°53.3	-17.6' -17.7'	60.3' 60.4'
21	131°54.5	• • 37.3	121°00.8	10.8'	03°35.6	-17.7'	60.4
22	146°54.6	36.3	135°30.7	10.9'	03°18.0	-17.7'	60.4'
23	161°54.7	35.4	150°00.5	10.9'	03°00.2	-17.7'	60.4'
	SD = 16.1'	d = -0.9'	-	SL	O = 16.4'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	176°54.8 191°54.9	\$07°34.4 33.5	164°30.4 179°00.2	10.9' 10.9'	\$02°42.5 02°24.8	-17.8' -17.8'	60.4' 60.4'
2	206°55.1	32.5	179 00.2 193°30.1	10.9	02°24.8	-17.8'	60.4
3	221°55.2	• • 31.6	$208^{\circ}00.0$	10.9'	$01^{\circ}49.2$	-17.8'	60.4'
4	236°55.3 251°55.4	30.6	222°29.9 236°59.8	10.9'	01°31.4 01°13.6	-17.8'	60.4'
5 6	251°55.4 266°55.5	29.7 <b>S</b> 07°28.7	236°59.8 251°29.6	10.9' 10.9'	01°13.6 S00°55.8	-17.8' -17.8'	60.4' 60.4'
7	281°55.7	27.8	$265^{\circ}59.5$	10.9'	00°37.9	-17.8'	60.5'
8	296°55.8	26.8	280°29.4	10.9'	00°20.1 500°02.2	-17.8'	60.5
9 10	311°55.9 326°56.0	· · 25.9 24.9	294°59.3 309°29.1	10.9' 10.9'	N00°15.6	-17.8' 17.8'	60.5' 60.5'
11	341°56.1	24.0	323° 59.0	10.9'	00°33.5	17.8'	60.5
12	356°56.3	S07°23.0	338° 28.9	10.9'	N00°51.3	17.8'	60.5
13 14	11°56.4 26°56.5	22.1 21.1	352°58.7 7°28.6	10.8' 10.8'	01°09.1 01°27.0	17.8' 17.8'	60.5' 60.5'
15	41°56.6	20.2	21°58.4	10.8	01°27.0	17.8	60.5
16	56°56.8	19.2	36°28.2	10.8'	02°02.6	17.8'	60.5
17 18	71°56.9 86°57.0	18.3 <b>S</b> 07°17.3	50° 58.0 65° 27.8	10.8' 10.8'	02°20.5 N02°38.3	17.8' 17.8'	60.5' 60.5'
19	101°57.1	16.3	79°57.6	10.8	02°56.0	17.8'	60.5
20	116°57.3	15.4	94°27.3	10.7'	$03^{\circ}13.8$	17.8'	60.5'
21 22	131°57.4 146°57.5	· · 14.4 13.5	108° 57.1 123° 26.8	10.7' 10.7'	03°31.6 03°49.3	17.7' 17.7'	60.5' 60.5'
23	140 57.5 161°57.6	13.5	123 26.8 137°56.5	10.7'	03 49.3 04°07.0	17.7' 17.7'	60.5
	SD = 16.1'	d = -1.0'		SI	0 = 16.5'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Julisce	Civil	Naut.
N 72°	05:14	06:32	07:41	16:46	17:56	19:14
<b>N</b> 70°	05:18	06:29	07:31	16:56	17:58	19:09
68°	05:22	06:26	07:23	17:04	18:01	19:05
66°	05:25	06:24	07:16	17:10	18:02	19:02
64°	05:27	06:22	07:10	17:16	18:04	18:59
62°	05:29	06:20	07:05	17:21	18:06	18:57
60°	05:31	06:19	07:01	17:25	18:07	18:55
N 58°	05:32	06:17	06:57	17:29	18:09	18:54
56°	05:33	06:16	06:54	17:32	18:10	18:53
54°	05:34	06:15	06:50	17:35	18:11	18:52
52°	05:35	06:14	06:48	17:38	18:12	18:51
50°	05:35	06:13	06:45	17:41	18:13	18:51
45°	05:36	06:10	06:39	17:46	18:16	18:50
<b>N</b> 40°	05:36	06:07	06:35	17:51	18:18	18:49
35°	05:36	06:05	06:31	17:55	18:20	18:50
30°	05:35	06:03	06:27	17:58	18:22	18:50
20°	05:33	05:58	06:20	18:05	18:27	18:53
N 10°	05:29	05:53	06:15	18:10	18:32	18:56
0°	05:24	05:48	06:09	18:16	18:37	19:01
<b>S</b> 10°	05:18	05:42	06:04	18:21	18:42	19:07
20°	05:09	05:35	05:57	18:27	18:49	19:16
30°	04:57	05:26	05:50	18:34	18:58	19:27
35°	04:50	05:20	05:46	18:38	19:04	19:34
40°	04:41	05:14	05:41	18:43	19:10	19:43
45°	04:29	05:06	05:36	18:48	19:18	19:54
<b>S</b> 50°	04:15	04:56	05:29	18:55	19:28	20:09
52°	04:08	04:51	05:26	18:58	19:33	20:16
54°	04:00	04:46	05:23	19:01	19:38	20:23
56°	03:50	04:40	05:19	19:04	19:44	20:32
58° <b>S</b> 60°	03:40 03:27	04:33 04:25	05:15	19:09 19:13	19:50 19:58	20:43 20:55
3 00	03:27	04:25	05:10	19:13	19:58	∠0:55

Lat.		Moonris	е		Moonset	
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°	09:00	08:06	07:25	15:08	17:51	20:22
N 70°	08:34	07:55	07:24	15:31	17:58	20:17
68°	08:14	07:47	07:24	15:49	18:04	20:14
66°	07:58	07:39	07:23	16:03	18:08	20:10
64°	07:45	07:33	07:23	16:15	18:12	20:08
62°	07:33	07:28	07:22	16:25	18:16	20:06
60°	07:24	07:23	07:22	16:33	18:19	20:04
N 58°	07:15	07:19	07:21	16:40	18:21	20:02
56°	07:08	07:15	07:21	16:46	18:24	20:00
54°	07:01	07:12	07:21	16:52	18:26	19:59
52°	06:55	07:09	07:21	16:57	18:27	19:58
50°	06:50	07:06	07:20	17:02	18:29	19:56
45°	06:38	07:00	07:20	17:12	18:33	19:54
<b>N</b> 40°	06:28	06:54	07:19	17:20	18:36	19:52
35°	06:19	06:50	07:19	17:27	18:38	19:50
30°	06:12	06:46	07:19	17:33	18:41	19:48
20°	05:59	06:39	07:18	17:43	18:44	19:46
N 10°	05:47	06:33	07:18	17:52	18:48	19:43
0°	05:36	06:27	07:17	18:01	18:51	19:41
<b>S</b> 10°	05:25	06:21	07:17	18:09	18:54	19:39
20°	05:14	06:15	07:16	18:18	18:57	19:36
30°	05:00	06:08	07:16	18:28	19:01	19:33
35°	04:52	06:04	07:16	18:33	19:03	19:32
40°	04:43	06:00	07:16	18:40	19:05	19:30
45°	04:33	05:54	07:15	18:47	19:08	19:28
<b>S</b> 50°	04:20	05:48	07:15	18:56	19:11	19:25
52°	04:14	05:45	07:15	19:00	19:12	19:24
54°	04:07	05:41	07:15	19:04	19:14	19:23
56°	04:00	05:38	07:14	19:09	19:16	19:22
58° <b>S</b> 60°	03:52 03:42	05:34 05:29	07:14 07:14	19:15 19:21	19:18 19:20	19:20
<b>3</b> 60°	03:42	05:29	07:14	19:21	19:20	19:18

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age	
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	29-1	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	2-1%	
27	12:43	12:37	12:13	11:48	-:-		
28	12:32	12:26	12:12	12:39	00:14		
01	12:21	12:15	12:12	13:29	01:04		

h	Aries	Venus		M	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA [	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0 0	160°02.3		)°36.5	50°52.1	N25°48.8	89°06.3	N21°53.1	167° 43.5	S05°23.9			
	160°02.3 175°04.8	152°48.8 N10 167°51.5						167°43.5 182°45.7		Alpheratz	357°35.0	$29^{\circ}13.7$
1			36.9	65°54.4	48.7	104°08.5	53.1		23.8	Ankaa	353°07.4	-42°10.3
2 3	190°07.3 205°09.7	182°54.1 197°56.7	37.3 37.6	80°56.7 95°58.9	48.6 • • 48.5	119°10.8 134°13.0	53.2 •• 53.2	197°47.9 212°50.1	23.7 •• 23.5	Schedar	349°31.4	$56^{\circ}40.6$
										Diphda	348°47.4	-17°51.1
4	220°12.2	212°59.4	38.0	111°01.2	48.4	149°15.3	53.2	227°52.3	23.4	Achernar	335°20.5	-57°06.8
5	235°14.6	228°02.0	38.4	126°03.5	48.3	164°17.5	53.3	242°54.4	23.3	Hamal	327°51.3	23°34.9
6	250°17.1		)°38.8	141°05.8	N25°48.2	179°19.8	N21°53.3	257°56.6	S05°23.2	Polaris	314°11.3	89°22.5
7	265°19.6	258°07.3	39.1	156°08.0	48.1	194°22.0	53.3	272°58.8	23.1	Acamar	315°11.8	-40° 12.5
8	280°22.0	273°10.0	39.5	171°10.3	48.0	209°24.3	53.4	288°01.0	22.9	Menkar	314°06.2	4°11.2
9	295°24.5		39.9	$186^{\circ}12.6$	• • 47.9	224°26.5	• • 53.4	303°03.2	• • 22.8	Mirfak	308°28.3	49°57.2
10	$310^{\circ}27.0$	303°15.3	40.2	201°14.9	47.8	239°28.7	53.5	318°05.3	22.7	Aldebaran	290°39.5	16°33.6
11	325°29.4	318°18.0	40.6	$216^{\circ}17.1$	47.7	254°31.0	53.5	333°07.5	22.6	Rigel	290 39.3 281°03.7	-8° 10.5
12	340°31.9	333°20.7 N10	)°41.0	231°19.4	N25°47.6	269°33.2	N21°53.5	348°09.7	S05°22.5	_		-6 10.5 46°01.5
13	355°34.4	348°23.3	41.3	246°21.6	47.5	284°35.5	53.6	3°11.9	22.3	Capella	280°21.6	
14	10°36.8	3°26.0	41.7	261°23.9	47.4	299°37.7	53.6	$18^{\circ}14.1$	22.2	Bellatrix	278°22.7	6°22.3
15	25°39.3	18°28.7 ⋅ ⋅	42.0	276°26.2	• • 47.3	314°40.0	• • 53.6	33°16.3	• • 22.1	Elnath	278°01.6	28° 37.8
16	40°41.7	33°31.4	42.4	291°28.4	47.2	329°42.2	53.7	48°18.4	22.0	Alnilam	275°37.5	-1°11.2
17	55°44.2	48°34.1	42.7	306°30.7	47.1	344°44.4	53.7	63°20.6	21.9	Betelgeuse	270°51.8	7°24.7
18	70°46.7		)°43.1	321°32.9	N25°47.0	359°46.7	N21°53.7	78°22.8	S05°21.7	Canopus	263°52.1	-52°42.8
19	85°49.1	78°39.5	43.4	336°35.2	46.9	14°48.9	53.8	93°25.0	21.6	Sirius	258°26.0	-16°45.2
20	100°51.6	93°42.2	43.8	351°37.5	46.8	29°51.2	53.8	108° 27.2	21.5	Adhara	255°05.6	-29°00.6
20	100 51.0 115°54.1		44.1	6°39.7	. 46.7	29 51.2 44°53.4	53.8	106 27.2 123°29.3	. 21.5	Procyon	244°50.5	5°09.5
				6°39.7 21°42.0				123°29.3 138°31.5		Pollux	243°16.9	$27^{\circ}57.9$
22	130°56.5	123°47.6	44.5		46.6	59°55.6	53.9		21.3	Avior	234°14.2	-59° 35.6
23	145°59.0	138°50.3	44.8	36°44.2	46.5	74°57.9	53.9	153°33.7	21.1	Suhail	222°45.8	-43°32.2
Mer.p	ass. 13:18	ν2.6' d0.4' m	-4.76	$\nu 2.3' \ d-0$	1' m-0.25	$\nu 2.2' \ d0$	.0′ m-2.29	$\nu 2.2' \ d-0$	.1′ m1.11	Miaplacidus	221°37.5	-69°49.3
										Alphard	217°47.3	-8°46.2
										Regulus	207°34.0	11°50.5
Mon	GHA		Оес	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.1	61°36.8
0	$161^{\circ}01.5$		)°45.1	51°46.5	N25°46.4	90°00.1	N21°53.9	168°35.9	S05°21.0	Denebola	182°24.5	14°25.7
1	$176^{\circ}03.9$	168°55.8	45.5	66°48.7	46.3	105°02.4	54.0	183°38.1	20.9	Gienah	175°43.2	-17°41.0
2	191°06.4	183°58.5	45.8	81°51.0	46.2	120°04.6	54.0	198°40.2	20.8	Acrux	175 43.2 172°59.4	-17 41.0 -63°14.3
3	206°08.9	199°01.2 · ·	46.1	96°53.2	• • 46.1	135°06.8	• • 54.0	213°42.4	• • 20.6			
4	221°11.3	214°04.0	46.4	111°55.5	46.0	150°09.1	54.1	228°44.6	20.5		171°51.0	-57° 15.2
5	236°13.8	229°06.7	46.8	126°57.7	45.9	165°11.3	54.1	243°46.8	20.4	Alioth	166°12.3	55°49.2
6	251°16.2		)°47.1	141°59.9	N25°45.8	180°13.5	N21°54.2	258°49.0	S05°20.3	Spica	158°21.9	-11° 17.7
7	266°18.7	259°12.2	47.4	157°02.2	45.7	195°15.8	54.2	273°51.1	20.2	Alkaid	152°51.5	49°11.0
8	281°21.2	274°15.0	47.7	172°04.4	45.7	210°18.0	54.2	288°53.3	20.2	Hadar	148°35.5	-60°29.5
9	201 21.2 296°23.6		48.1	172 04.4 187°06.7	· · 45.5	210 18.0 225°20.2	• • 54.3	200 55.5 303°55.5	19.9	Menkent	147°57.2	-36°29.6
	296 23.6 311°26.1	304°20.5		202°08.9		240°22.5		303 55.5 318°57.7		Arcturus	145°47.6	19°02.8
10			48.4		45.4 45.2		54.3		19.8	Rigil Kent.	139°39.8	-60°56.2
11	326°28.6	319°23.2	48.7	217°11.1	45.3	255°24.7	54.3	333°59.9	19.7	Kochab	$137^{\circ}19.2$	74°02.7
12	341°31.0		)°49.0	232°13.4	N25°45.2	270°27.0	N21°54.4	349°02.1	S05°19.6	Zuben'ubi	136°55.7	-16°08.9
13	356°33.5	349°28.8	49.3	247°15.6	45.1	285°29.2	54.4	4°04.2	19.4	Alphecca	126°03.5	26°37.5
14	11°36.0	4°31.5	49.6	262°17.8	45.0	300°31.4	54.4	19°06.4	19.3	Antares	112°15.7	-26°29.3
15	26°38.4		49.9	277°20.1	• • 44.9	315°33.7	• • 54.5	34°08.6	• • 19.2	Atria	107°09.8	-69°04.1
16	41°40.9	34°37.1	50.2	292°22.3	44.8	330°35.9	54.5	49°10.8	19.1	Sabik	107°03.0	-15° 45.4
17	56°43.4	49°39.9	50.5	307°24.5	44.7	345°38.1	54.5	64°13.0	19.0	Shaula	96°10.3	-13 43.4 -37°07.3
18	71°45.8	64°42.7 N10	°50.8	322°26.7	N25°44.6	0°40.4	N21°54.6	79° 15.1	S05°18.8	Rasalhague	95°58.5	12°32.3
19	86°48.3	79°45.5	51.1	337°29.0	44.4	15°42.6	54.6	94°17.3	18.7	_	90°42.3	51°28.7
20	101°50.7	94°48.3	51.4	352°31.2	44.3	30°44.8	54.7	109° 19.5	18.6	Eltanin Kaus Aust.	90°42.3 83°32.5	-34°22.3
21	116°53.2		51.7	7°33.4	• • 44.2	45°47.0	• • 54.7	124°21.7	• • 18.5			-34° 22.3 38° 48.1
22	131°55.7	124°53.9	52.0	22°35.6	44.1	60°49.3	54.7	139°23.9	18.4	Vega	80°33.3	
23	146°58.1	139°56.7	52.3	37°37.9	44.0	75°51.5	54.8	154°26.0	18.2	Nunki	75°47.8	-26° 15.9
										Altair	62°00.1	8°55.9
Mer.p	ass. 13:14	$ u 2.7' \ d0.3' \ { m m}$	-4.74	$\nu$ 2.2′ d-0.	.1′ m-0.23	$\nu$ 2.2′ d0.	.0′ m-2.29	$\nu$ 2.2′ d-0	.1'  m1.11	Peacock	53°06.0	-56° 39.2
										Deneb	49°26.1	45°22.0
T	CHA	CHV -	)oc	CHA	Das	CHA	Daa	CHA	Daa	Enif	33°39.0	9°59.3
Tue	GHA		Oec o°∈o∈	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.2	-46° 50.4
0	162°00.6		)°52.5	52°40.1	N25°43.9	90°53.7	N21°54.8	169°28.2	S05°18.1	Fomalhaut	15°14.7	-29°29.5
1	177°03.1	170°02.3	52.8	67°42.3	43.8	105°56.0	54.8	184°30.4	18.0	Scheat	13°45.5	28° 13.1
2	192°05.5	185°05.1	53.1	82°44.5	43.7	120°58.2	54.9	199°32.6	17.9	Markab	13°30.1	15°20.3
3	207°08.0		53.4	97°46.7	• • 43.6	136°00.4	• • 54.9	214°34.8	• • 17.8	N4. 00 0	CIIA	N4-
4	222°10.5	215°10.8	53.7	112°48.9	43.5	151°02.7	54.9	229°36.9	17.6	Mar 02 Sun	SHA	Mer.pass
5	237°12.9	230°13.6	53.9	127°51.2	43.4	166°04.9	55.0	244°39.1	17.5	Venus		13:46
6	252°15.4		)°54.2	142°53.4	N25°43.3	181°07.1	N21°55.0	259°41.3	S05°17.4	Mars	250°49.8	20:33
7	267°17.8	260°19.3	54.5	157°55.6	43.2	196°09.4	55.1	274°43.5	17.3	Jupiter	289°04.0	18:01
8	282°20.3	275°22.1	54.7	172°57.8	43.1	211°11.6	55.1	289°45.7	17.2	Saturn	7°41.2	12:47
9	297°22.8	290°25.0 · ·	55.0	188°00.0	• • 43.0	226°13.8	•• 55.1	304°47.8	• • 17.0	Mar 02 N4-	CHA	Ma:: ::
10	312°25.2	305°27.8	55.3	203°02.2	42.9	241°16.0	55.2	319°50.0	16.9	Mar 03 Mon	SHA	Mer.pass
11	327°27.7	320°30.7	55.5	218°04.4	42.7	256°18.3	55.2	$334^{\circ}52.2$	16.8	Venus		13:42
12	342°30.2		°55.8	233°06.6	N25°42.6	271°20.5	N21°55.2	349°54.4	S05°16.7	Mars	250°45.0	20:30
13	357°32.6	350°36.4	56.0	248°08.8	42.5	286°22.7	55.3	4°56.6	16.6	Jupiter		17:57
14	12°35.1	5°39.2	56.3	263°11.0	42.4	301°24.9	55.3	19°58.8	16.4	Saturn	7°34.4	12:44
15	27°37.6		56.5	278°13.2	• • 42.3	316°27.2	55.3	35°00.9	. 16.3	Mar 04 Tue	SHA	Mer.pass
16	42°40.0	35°45.0	56.8	293°15.4	42.2	331°29.4	55.4	50°03.1	16.2	Venus		
17	57°42.5	50°47.9	57.0	308°17.6	42.2	346°31.6	55.4	65°05.3	16.2			13:37
18	72°45.0		57.0 )°57.3	306 17.0 323°19.8	N25°42.0	1°33.8	N21°55.5	80° 07.5	S05° 15.9	Mars		20:26
	72 45.0 87°47.4	80°53.6		323 19.8 338°22.0			NZI 55.5 55.5	95°09.7		Jupiter		17:54
19			57.5		41.9	16°36.1			15.8	Saturn	7°27.6	12:40
20	102°49.9	95°56.5	57.7	353°24.2	41.8	31°38.3	55.5	110°11.8	15.7	Horizont	al parallax	
21	117°52.3		58.0	8°26.4	• • 41.7	46°40.5	• • 55.6	125°14.0	• • 15.6	1101120111	Venus:	0.4
22	132°54.8	126°02.3	58.2	23°28.6	41.6	61°42.7	55.6	140°16.2	15.5		Mars:	0.4
23	147°57.3	141°05.2	58.5	38°30.8	41.4	76°45.0	55.6	155°18.4	15.3		iviars:	0.2
Mern	ass. 13:10	ν2.8' d0.3' m	-4.72	$\nu 2.2' d-0$	1' m-0.20	$\nu 2.2' d\Omega$	.0′ m-2.28	$\nu 2.2' d-0$	.1′ m1.11			
р					0.20		0	0				

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	176°57.8	S07°11.6	152°26.2	10.7'	N04°24.7	17.7'	60.5
1	191°57.9	10.6	166°55.9	10.6'	04°42.4	17.6'	60.5'
2	206°58.0	09.7	181°25.5	10.6'	05°00.0	17.6'	60.5'
3	221°58.1	• • 08.7	195°55.1	10.6'	05°17.6	17.6'	60.5'
4	236°58.3	07.8	210°24.7	10.6'	05°35.2	17.5'	60.5'
5	251°58.4	06.8	224°54.2	10.5'	05°52.7	17.5'	60.5'
6	266°58.5 281°58.6	S07°05.8	239°23.8	10.5'	N06°10.2 06°27.7	17.5	60.5' 60.5'
7	281°58.6 296°58.8	04.9	253°53.3 268°22.7	10.5'	06°27.7 06°45.1	17.4'	60.5'
8 9	290 58.8 311°58.9	03.9 · · 03.0	208 22.7 282°52.2	10.4' 10.4'	06 45.1 07°02.5	17.4' 17.3'	60.5
9 10	311 58.9 326°59.0	02.0	282 52.2 297°21.6	10.4	07 02.5 07°19.9	17.3'	60.5
11	341°59.1	01.1	311°50.9	10.4	07 19.9 07°37.2	17.3	60.5
12	356°59.3	S07°00.1	326°20.3	10.3	N07°54.4	17.2	60.5
13	11°59.4	06°59.1	340°49.6	10.3'	08°11.6	17.2	60.4
14	26°59.5	58.2	355°18.8	10.2	08°28.8	17.1	60.4
15	41°59.7	57.2	9°48.0	10.2'	08°45.9	17.1'	60.4
16	56°59.8	56.3	24°17.2	10.1'	09°02.9	17.0'	60.4'
17	71°59.9	55.3	38°46.3	10.1'	09°19.9	16.9'	60.4'
18	87°00.0	S06°54.4	53°15.4	10.0'	N09°36.9	16.9'	60.4'
19	102°00.2	53.4	67°44.5	10.0'	09°53.8	16.8'	60.4'
20	117°00.3	52.4	82°13.5	10.0'	10°10.6	16.8'	60.4'
21	132°00.4	•• 51.5	96°42.4	9.9'	10°27.3	16.7'	60.4'
22	147°00.6	50.5	$111^{\circ}11.4$	9.9'	10°44.0	16.6'	60.4'
23	162°00.7	49.6	125°40.2	9.8'	11°00.6	16.6'	60.4'
	SD = 16.1'	d = -1.0'		SE	O = 16.5'		
Man	GHA	Dec	CHA		Dee	٠	НР
Mon 0	177°00.8	S06°48.6	<b>GHA</b> 140°09.0	u 9.8'	Dec N11°17.2	d 16.5'	60.3'
1	177 00.8 192°00.9	47.6	140 09.0 154°37.8	9.6 9.7'	11°33.7	16.4	60.3
2	207°01.1	46.7	169°06.5	9.7'	11°50.1	16.3	60.3
3	222°01.2	• • 45.7	183°35.2	9.6'	12°06.4	16.3	60.3
4	237°01.3	44.8	198°03.8	9.6'	12°22.7	16.2'	60.3
5	252°01.5	43.8	212°32.4	9.5'	12°38.9	16.1'	60.3
6	267°01.6	S06° 42.8	227°00.9	9.4'	N12°55.0	16.0'	60.3
7	282°01.7	41.9	241°29.3	9.4'	13°11.0	15.9'	60.3
8	297°01.9	40.9	255°57.7	9.3'	13°26.9	15.9'	60.2'
9	312°02.0	• • 40.0	270°26.0	9.3'	13°42.8	15.8'	60.2'
10	327°02.1	39.0	284°54.3	9.2'	13°58.5	15.7'	60.2'
11	342°02.3	38.0	299°22.5	9.2'	14°14.2	15.6'	60.2'
12	357°02.4	S06°37.1	313°50.7	9.1'	N14°29.8	15.5'	60.2'
13	12°02.5	36.1	328°18.8	9.0'	14°45.3	15.4'	60.2'
14	27°02.7 42°02.8	35.2	342°46.8	9.0'	15°00.7	15.3'	60.2'
15 16	42°02.8 57°02.9	· · 34.2 33.2	357°14.8 11°42.7	8.9' 8.9'	15°16.0 15°31.2	15.2' 15.1'	60.1' 60.1'
17	72°03.1	32.3	26°10.6	8.8'	15°46.3	15.1	60.1
18	87°03.2	506°31.3	40°38.4	8.7'	N16°01.3	14.9'	60.1
19	102°03.3	30.4	55°06.1	8.7'	16°16.3		60.1
20	117°03.5	29.4	69°33.7	8.6'	16°31.1	14.7'	60.1'
21	132°03.6	28.4	84°01.3	8.5'	16°45.8	14.6'	60.0'
22	147°03.7	27.5	98°28.9	8.5'	17°00.3	14.5'	60.0'
23	162°03.9	26.5	112°56.3	8.4'	17°14.8	14.4'	60.0'
	SD = 16.1'	d = -1.0'		SE	O = 16.5'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
o 0	GHA 177°04.0	S06°25.5	дна 127°23.7	ν 8.3'	Dec N17°29.2	<i>a</i> 14.3'	60.0'
1	177 04.0 192°04.1	24.6	141°51.0	8.3'	17°43.4	14.1'	60.0
2	207°04.3	23.6	156°18.3	8.2'	17°57.6	14.0'	59.9'
3	222°04.4	22.7	170°45.5	8.1'	18°11.6	13.9'	59.9'
4	237°04.5	21.7	185°12.6	8.1'	18°25.5	13.8'	59.9'
5	252°04.7	20.7	199°39.7	8.0'	18°39.3	13.7'	59.9'
6	267°04.8	S06° 19.8	214°06.6	7.9'	N18°53.0	13.5'	59.9'
7	282°05.0	18.8	228°33.6	7.8'	19°06.5	13.4'	59.8'
8	297°05.1	17.8	243°00.4	7.8'	19°19.9	13.3'	59.8'
9	312°05.2	•• 16.9	257°27.2	7.7'	19°33.2	13.2'	59.8'
10	327°05.4	15.9	271°53.9	7.6'	19°46.4	13.0'	59.8'
11	342°05.5	14.9	286°20.5	7.6'	19°59.4	12.9'	59.8'
12	357°05.6	S06°14.0	300°47.1	7.5'	N20°12.3	12.8'	59.7'
13	12°05.8	13.0	315°13.6	7.4'	20°25.1	12.6'	59.7'
14	27°05.9	12.0	329°40.0	7.4'	20°37.8	12.5'	59.7'
15	42°06.1	• • 11.1	344°06.4	7.3'	20°50.3	12.4'	59.7'
16	57°06.2	10.1	358°32.6	7.2'	21°02.6	12.2'	59.6'
17	72°06.3 87°06.5	09.2 \$06°08.2	12°58.9 27°25.0	7.1' 7.1'	21°14.9 N21°27.0	12.1' 12.0'	59.6'
18 19	87°06.5 102°06.6	506°08.2 07.2	27°25.0 41°51.1	7.1° 7.0'	N21°27.0 21°38.9	12.0	59.6' 59.6'
20	102°06.6 117°06.8	07.2 06.3	41 51.1 56° 17.1	7.0° 6.9'	21° 38.9 21° 50.7	11.8	59.6'
21	117 06.8 132°06.9	05.3	70°43.0	6.9'	21 50.7 22°02.4	11.7	59.6 59.5'
22	147°07.0	04.3	85°08.9	6.8'	22°13.9	11.5	59.5'
23	162°07.2	03.4	99°34.7	6.7'	22°25.3	11.4	59.5'
_	SD = 16.1'	d = -1.0'			0 = 16.4'		
	JD — 10.1	a — -1.0		JL	_ 10.4		

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	2-4	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	6-21%	
02	12:09	12:03	12:12	14:19	01:54		
03	11:57	11:50	12:12	15:11	02:45		
04	11:44	11:37	12:12	16:06	03:38		

h	Aries	Venus	s	Ma	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	162°59.7	156°08.1 N	10°58.7	53°33.0	N25°41.3	91°47.2	N21°55.7	170°20.6	\$05°15.2	A lash awata	357°35.0	29°13.7
1	178°02.2	171°11.0	58.9	68°35.2	41.2	106°49.4	55.7	185°22.7	15.1	Alpheratz Ankaa	357 35.0 353°07.4	-42° 10.3
2	193°04.7	186°13.9	59.1	83°37.3	41.1	121°51.6	55.7	200°24.9	15.0	Schedar	349°31.4	56°40.6
3	208°07.1	201°16.8 •	• • 59.4	98°39.5	• • 41.0	136°53.9	•• 55.8	$215^{\circ}27.1$	• • 14.9	Diphda	349° 31.4	-17°51.1
4	223°09.6	216°19.8	59.6	113°41.7	40.9	151°56.1	55.8	230°29.3	14.7	Achernar	335°20.5	-57°06.7
5	238°12.1		10°59.8	128°43.9	40.8	166°58.3	55.9	245°31.5	14.6	Hamal	327°51.3	23°34.9
6	253°14.5		11°00.0	143°46.1	N25°40.7	182°00.5	N21°55.9	260°33.6	S05°14.5	Polaris	314°12.4	89°22.5
7	268°17.0	261°28.5	00.2	158°48.3	40.6	197°02.7	55.9	275°35.8	14.4	Acamar	315°11.9	-40° 12.5
8	283°19.5	276°31.5	00.4	173°50.4	40.5	212°05.0	56.0	290°38.0	14.3	Menkar	314°06.2	4°11.2
9	298°21.9		• • 00.6	188°52.6	• • 40.3	227°07.2	56.0	305°40.2	• • 14.1	Mirfak	308°28.3	49°57.2
10	313°24.4	306°37.4	00.9	203°54.8	40.2	242°09.4	56.0	320°42.4	14.0	Aldebaran	290°39.5	16°33.6
11	328°26.8	321°40.3	01.1	218°57.0	40.1	257°11.6	56.1	335°44.5	13.9	Rigel	281°03.7	-8°10.5
12	343°29.3		11°01.3	233°59.1	N25°40.0	272°13.8	N21°56.1	350°46.7 5°48.9	S05°13.8	Capella	280°21.7	46°01.5
13 14	358°31.8 13°34.2	351°46.2 6°49.2	01.5 01.7	249°01.3 264°03.5	39.9 39.8	287°16.1 302°18.3	56.2 56.2	5 48.9 20°51.1	13.7 13.5	Bellatrix	278°22.7	6°22.3
15	28°36.7		. 01.7	204 03.3 279°05.7	39.7	317°20.5	56.2	35°53.3	. 13.4	Elnath	278°01.7	28°37.8
16	43°39.2	36°55.1	02.0	294°07.8	39.6	332°22.7	56.3	50°55.4	13.4	Alnilam	275°37.5	-1°11.2
17	58°41.6	51°58.1	02.0	309°10.0	39.5	347°24.9	56.3	65°57.6	13.3	Betelgeuse	270°51.9	$7^{\circ}24.6$
18	73°44.1		11°02.4	324° 12.2	N25°39.3	2°27.2	N21°56.3	80°59.8	S05°13.1	Canopus	263°52.1	-52°42.8
19	88°46.6	82°04.0	02.6	339° 14.3	39.2	17°29.4	56.4	96°02.0	12.9	Sirius	258°26.0	-16°45.2
20	103°49.0	97°07.0	02.8	354° 16.5	39.1	32°31.6	56.4	111°04.2	12.8	Adhara	255°05.6	-29°00.6
21	118°51.5		• • 03.0	9°18.7	• • 39.0	47°33.8	• • 56.4	126°06.3	12.7	Procyon	244°50.5	5°09.5
22	133°53.9	127°12.9	03.2	24°20.8	38.9	62°36.0	56.5	141°08.5	12.6	Pollux	243°16.9	27°57.9
23	148°56.4	142°15.9	03.3	39°23.0	38.8	77°38.2	56.5	156° 10.7	12.4	Avior	234°14.2	-59°35.6
										Suhail	222°45.9	-43°32.2
Mer.p	ass. 13:06	$\nu$ 2.9′ d0.2′	m-4.69	$\nu$ 2.2′ d-0.	1′ m-0.17	$\nu 2.2' d0.$	0′ m-2.27	$\nu 2.2' \ d-0$	.ı′ m1.11	Miaplacidus	221°37.5	-69°49.3
										Alphard	217°47.3	-8°46.2
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.0	11°50.5 61°36.8
0	163°58.9		11°03.5	54°25.1	N25°38.7	92°40.5	N21°56.6	171°12.9	505°12.3	Dubhe Denebola	193°40.1 182°24.5	14°25.7
1	179°01.3	172°21.9	03.7	69°27.3	38.6	107°42.7	56.6	186° 15.1	12.2	Gienah	162 24.5 175°43.2	-17°41.0
2	194°03.8	187°24.9	03.8	84°29.5	38.4	122°44.9	56.6	201°17.2	12.1	Acrux	175 43.2 172°59.4	-17 41.0 -63°14.3
3	209°06.3	202°27.9 ·	• • 04.0	99°31.6	• • 38.3	$137^{\circ}47.1$	• • 56.7	216° 19.4	• • 12.0	Gacrux	172 59.4 171°51.0	-03 14.3 -57°15.2
4	224°08.7	217°31.0	04.2	114°33.8	38.2	152°49.3	56.7	231°21.6	11.8	Alioth	166°12.3	55°49.2
5	239°11.2	232°34.0	04.3	129°35.9	38.1	$167^{\circ}51.5$	56.7	246°23.8	11.7	Spica	158°21.9	-11° 17.7
6	254°13.7	247°37.0 N	11°04.5	144°38.1	N25°38.0	182°53.7	N21°56.8	261°26.0	S05°11.6	Alkaid	150° 51.5	49°11.0
7	$269^{\circ}16.1$	262°40.0	04.7	159°40.2	37.9	$197^{\circ}56.0$	56.8	$276^{\circ}28.1$	11.5	Hadar	148°35.4	-60°29.5
8	284°18.6	277°43.0	04.8	174°42.4	37.8	212°58.2	56.9	291°30.3	11.4	Menkent	147°57.2	-36°29.6
9	299°21.1		• • 05.0	189°44.5	• • 37.6	228°00.4	• • 56.9	306°32.5	• • 11.2	Arcturus	145°47.6	19°02.8
10	314°23.5	307°49.1	05.1	204°46.7	37.5	243°02.6	56.9	321°34.7	11.1	Rigil Kent.	139°39.8	-60° 56.2
11	329°26.0	322°52.1	05.3	219°48.8	37.4	258°04.8	57.0	336° 36.9	11.0	Kochab	137°19.1	74°02.7
12	344°28.4		11°05.4	234°51.0	N25°37.3	273°07.0	N21°57.0	351°39.0	S05°10.9	Zuben'ubi	136°55.7	-16°08.9
13	359°30.9	352°58.2	05.6	249°53.1	37.2	288°09.2	57.0	6°41.2	10.8	Alphecca	126°03.5	26° 37.5
14	14°33.4	8°01.3	05.7	264° 55.2	37.1	303°11.4	57.1	21°43.4	10.6	Antares	112°15.6	-26°29.3
15	29°35.8		• • 05.8	279°57.4	• • 37.0	318° 13.6	• • 57.1	36° 45.6	• • 10.5	Atria	107°09.8	-69°04.1
16	44°38.3	38°07.4	06.0	294° 59.5	36.8	333°15.9	57.2	51°47.8	10.4	Sabik	102°02.7	-15°45.4
17	59°40.8	53°10.4	06.1	310°01.7	36.7	348°18.1	57.2	66°49.9	10.3	Shaula	$96^{\circ}10.3$	-37°07.3
18	74°43.2		11°06.2	325°03.8	N25°36.6	3°20.3	N21°57.2	81°52.1	S05°10.2	Rasalhague	95°58.5	12°32.3
19	89°45.7	83°16.6	06.4	340°05.9	36.5	18°22.5	57.3	96°54.3	10.0	Eltanin	90°42.3	51°28.7
20	104°48.2	98°19.6	06.5	355°08.1	36.4	33°24.7	57.3	111°56.5	09.9	Kaus Aust.	83°32.5	-34°22.3
21	119°50.6		• • 06.6	10°10.2	• • 36.3	48°26.9	• • 57.4	126°58.7	•• 09.8	Vega	80°33.3	$38^{\circ}48.1$
22	134°53.1	128°25.8	06.7	25°12.4	36.1	63°29.1	57.4	142°00.8	09.7	Nunki	75°47.8	-26° 15.9
23	149°55.6	143°28.9	06.9	40°14.5	36.0	78°31.3	57.4	157°03.0	09.6	Altair	$62^{\circ}00.1$	8°55.9
Mer.p	ass. 13:02	$\nu$ 3.0′ d0.2′	m-4.66	$\nu$ 2.2′ d-0.	1'  m-0.15	$\nu 2.2' \ d0.$	0′ m-2.26	$\nu$ 2.2′ d-0	$.1^\prime$ m $1.11$	Peacock	53°05.9	-56° 39.2
										Deneb	49°26.1	45°21.9
F!	CIIA	CIIA	D	CIIA	D	CIIA	D	CIIA	D	Enif	33°39.0	9°59.3
Fri 0	<b>GHA</b> 164°58.0	<b>GHA</b> 158°31.9 <b>N</b> 3	<b>Dec</b> 11°07.0	<b>GHA</b> 55°16.6	<b>Dec</b> N25°35.9	<b>GHA</b> 93°33.5	<b>Dec</b> N21°57.5	<b>GHA</b> 172° 05.2	<b>Dec</b> \$05°09.4	Al Na'ir	27°33.2	-46°50.4
1	180°00.5	173°35.0	07.0	70°18.7	35.8	93 33.5 108°35.7	N21 57.5 57.5	172 05.2 187°07.4	09.4	Fomalhaut	15°14.7	-29°29.4
2	195°02.9	188°38.1	07.1	85°20.9	35.7	108 35.7 123°38.0	57.5 57.5	202°09.6	09.3	Scheat	13°45.4	28° 13.0
3	210°05.4		• • 07.3	100°23.0	• • 35.6	138°40.2	• • 57.6	202 03.0 217°11.7	•• 09.1	Markab	13°30.1	15°20.3
4	225°07.9	218°44.3	07.3	115°25.1	35.4	153° 42.4	57.6	232°13.9	08.9	Mar 05 Wed	SHA	Mer.pass
5	240°10.3	233°47.4	07.5	130°27.3	35.3	168°44.6	57.7	247° 16.1	08.8	Venus	353°08.4	13:33
6	255°12.8		11°07.6	145°29.4	N25°35.2	183°46.8	N21°57.7	262°18.3	S05°08.7	Mars	250°33.2	20:23
7	270°15.3	263°53.6	07.7	160°31.5	35.1	198°49.0	57.7	277° 20.5	08.6	Jupiter	288°47.5	17:50
8	285°17.7	278°56.8	07.8	175°33.6	35.0	213°51.2	57.8	292°22.6	08.5	Saturn	7°20.8	12:37
9	300°20.2		• • 07.9	190°35.7	• • 34.9	228°53.4	• • 57.8	307°24.8	08.3	M- 00 T		
10	315°22.7	309°03.0	08.0	205°37.9	34.7	243°55.6	57.8	322°27.0	08.2	Mar 06 Thu	SHA	Mer.pass
11	330°25.1	324°06.1	08.1	220°40.0	34.6	258°57.8	57.9	337°29.2	08.1	Venus	353°20.1	13:28
12	345°27.6		11°08.2	235°42.1	N25°34.5	274°00.0	N21°57.9	352°31.4	S05°08.0	Mars	250°26.3 288°41.6	20:19
13	0°30.1	354°12.4	08.3	$250^{\circ}44.2$	34.4	289°02.2	58.0	7°33.5	07.9	Jupiter Saturn	7°14.0	17:47
14	15°32.5	9°15.5	08.3	265°46.3	34.3	304°04.4	58.0	22°35.7	07.7	Saturn	1 14.0	12:33
15	30°35.0		• • 08.4	280°48.4	• • 34.1	$319^{\circ}06.6$	• • 58.0	37°37.9	• • 07.6	Mar 07 Fri	SHA	Mer.pass
16	45°37.4	39°21.8	08.5	295°50.6	34.0	334°08.8	58.1	52°40.1	07.5	Venus	353°33.9	13:23
17	60°39.9	54°25.0	08.6	310°52.7	33.9	349°11.0	58.1	67°42.2	07.4	Mars	250°18.6	20:16
18	75°42.4		11°08.7	325°54.8	N25°33.8	4°13.2	N21°58.2	82°44.4	S05°07.3	Jupiter	288°35.5	17:43
19	90°44.8	84°31.3	08.7	340°56.9	33.7	19° 15.4	58.2	97°46.6	07.1	Saturn	7°07.2	12:30
20	105°47.3	99°34.4	8.80	355°59.0	33.5	34°17.6	58.2	112°48.8	07.0	المسامة الم	al parallar	
21	120°49.8		• • 08.9	11°01.1	• • 33.4	49°19.8	• • 58.3	127°51.0	• • 06.9	norizoni	al parallax Venus:	0.5
22	135°52.2	129°40.8	08.9	26°03.2	33.3	64°22.0	58.3	142°53.1	06.8		Mars:	0.5
23	150°54.7	144°43.9	09.0	41°05.3	33.2	79°24.2	58.3	157°55.3	06.7		ividi 5.	0.2
Mer.p	ass. 12:58	u3.1′ $d$ 0.1′	m-4.63	$\nu 2.1' \ d-0.$	1' m-0.12	$\nu$ 2.2′ d0.	0′ m-2.26	$\nu 2.2' \ d-0$	.1' m $1.11$			

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	177°07.3	506°02.4	114°00.4	6.7'	N22°36.5	11.1'	59.5'
1	192°07.4	01.4	128°26.1	6.6'	22°47.6	10.9'	59.4'
2	207°07.6	06°00.5	142°51.7	6.5'	22°58.5	10.8'	59.4'
3	222°07.7	05°59.5	157°17.2	6.5'	23°09.3	10.6'	59.4'
4	237°07.9	58.5	171°42.7	6.4'	23°19.9	10.5'	59.4'
5	252°08.0	57.6 \$05°56.6	186°08.1 200°33.4	6.3'	23°30.4 N23°40.7	10.3'	59.3'
6 7	267°08.2 282°08.3	505 56.6 55.6	200 33.4 214°58.7	6.3' 6.2'	N23 40.7 23°50.9	10.2' 10.0'	59.3' 59.3'
8	202 00.3 297°08.4	55.0 54.7	214 56.7 229°23.9	6.1	25°50.9	9.8'	59.3'
9	312°08.6	• • 53.7	243°49.0	6.1	24°10.7	9.7'	59.2'
10	327°08.7	52.7	258°14.1	6.0'	24°20.4	9.5'	59.2'
11	342°08.9	51.8	272°39.1	6.0'	24°29.9	9.4'	59.2'
12	357°09.0	\$05°50.8	287°04.1	5.9'	N24°39.3	9.2'	59.2'
13	12°09.1	49.8	301°29.0	5.8'	24°48.5	9.0'	59.1'
14	27°09.3	48.8	315°53.8	5.8'	24°57.5	8.9'	59.1'
15	42°09.4	• • 47.9	330°18.6	5.7'	25°06.3	8.7'	59.1'
16	57°09.6	46.9	344°43.4	5.7'	25°15.0	8.5'	59.1'
17	72°09.7	45.9	359°08.0	5.6'	25°23.6	8.4'	59.0'
18	87°09.9	S05°45.0	13°32.7	5.6'	N25°31.9	8.2'	59.0'
19	102°10.0 117°10.1	44.0	27°57.2	5.5'	25°40.1	8.0'	59.0'
20 21	117° 10.1 132° 10.3	43.0 •• 42.1	42°21.8 56°46.2	5.5' 5.4'	25°48.1 25°56.0	7.8' 7.7'	58.9' 58.9'
21	132°10.3 147°10.4	41.1	50°46.2 71°10.7	5.4' 5.4'	25°56.0 26°03.6	7.7° 7.5'	58.9'
23	147°10.4 162°10.6	41.1 40.1	71°10.7 85°35.0	5.4	26°13.6 26°11.1	7.5	58.9'
23						1.3	50.9
	SD = 16.1'	d = -1.0'		S	D = 16.2'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	177° 10.7	S05°39.2	99°59.4	5.3'	N26°18.5	7.1'	58.8'
1	192°10.9	38.2	114°23.7	5.2'	26°25.6	7.0'	58.8'
2	207°11.0	37.2	128°47.9	5.2'	26°32.6	6.8'	58.8'
3	222°11.2	• • 36.2	143°12.1	5.2'	26°39.4	6.6'	58.8'
4	237°11.3	35.3	157°36.3	5.1'	26°46.0	6.4'	58.7'
5	252°11.4 267°11.6	34.3 \$05°33.3	172°00.4 186°24.5	5.1' 5.1'	26°52.4 N26°58.7	6.3' 6.1'	58.7'
6 7	267°11.6 282°11.7	32.4	186°24.5 200°48.5	5.1	27°04.8	5.9'	58.7' 58.7'
8	282 11.7 297°11.9	32.4 31.4	200 48.5 215°12.6	5.0'	27 04.8 27°10.7	5.9 5.7'	58.6'
9	312° 12.0	30.4	215 12.0 229°36.6	5.0'	27°16.4	5.7 5.5'	58.6
10	327°12.2	29.5	244°00.5	4.9'	27°22.0	5.4	58.6
11	342° 12.3	28.5	258°24.5	4.9'	27°27.3	5.2'	58.5'
12	357° 12.5	S05°27.5	272°48.4	4.9'	N27°32.5	5.0'	58.5'
13	12°12.6	26.5	287°12.3	4.9'	27°37.5	4.8'	58.5'
14	27° 12.8	25.6	301°36.2	4.8'	27°42.3	4.6'	58.5'
15	42°12.9	• • 24.6	316°00.0	4.8'	27°47.0	4.5'	58.4'
16	57° 13.1	23.6	330°23.8	4.8'	27°51.4	4.3'	58.4'
17	72°13.2	22.7	344°47.6	4.8'	27°55.7	4.1'	58.4'
18	87° 13.4	S05°21.7	359°11.5	4.8'	N27°59.8	3.9'	58.4'
19	102° 13.5	20.7	13°35.2		28°03.7	3.7'	58.3'
20	117°13.7	19.7	27°59.0	4.8'	28°07.4	3.5'	58.3'
21	132° 13.8	• • 18.8	42°22.8	4.8'	28°10.9	3.3'	58.3'
22 23	147°14.0 162°14.1	17.8 16.8	56°46.6 71°10.3	4.8' 4.8'	28°14.3 28°17.4	3.2' 3.0'	58.2' 58.2'
23	SD = 16.1'	d = -1.0'	71 10.3		D = 16.0'	3.0	36.2
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	177° 14.2 192° 14.4	\$05°15.9	85°34.1 99°57.9	4.8'	N28°20.4	2.8'	58.2'
1 2	192° 14.4 207° 14.5	14.9 13.9	99°57.9 114°21.6	4.8' 4.8'	28°23.2 28°25.8	2.6' 2.4'	58.2' 58.1'
3	207 14.5 222°14.7	13.9	114 21.0 128°45.4	4.8'	28°28.2	2.4	58.1
4	237° 14.8	12.0	143°09.2	4.8	28°30.5	2.1	58.1
5	252° 15.0	11.0	157°33.0	4.8'	28°32.5	1.9'	58.1
6	267° 15.1	S05°10.0	171°56.8	4.8'	N28°34.4	1.7'	58.0'
7	282° 15.3	09.0	186°20.6	4.8'	28°36.1	1.5'	58.0'
8	297° 15.4	08.1	200°44.4	4.8'	28°37.6	1.3'	58.0'
9	312° 15.6	• • 07.1	215°08.3	4.9'	28°38.9	1.1'	57.9'
10	$327^{\circ}15.7$	06.1	229°32.1	4.9'	28°40.0	1.0'	57.9'
11	342° 15.9	05.1	243°56.0	4.9'	28°41.0	0.8'	57.9'
12	357°16.0	S05°04.2	258°19.9	4.9'	N28°41.7	0.6'	57.9'
13	12° 16.2	03.2	272°43.9	5.0'	28°42.3	0.4'	57.8'
14	27°16.4	02.2	287°07.9	5.0'	28°42.7	0.2'	57.8'
15	42°16.5	• • 01.2	301°31.9	5.0'	28°43.0	0.0'	57.8'
16	57°16.7	05°00.3	315°55.9	5.1'	28°43.0	-0.1'	57.8'
17	72°16.8	04°59.3 \$04°58.3	330°20.0	5.1'	28°42.9	-0.3'	57.7'
18	87°17.0		344°44.1 359°08.2	5.1' 5.2'	N28°42.5 28°42.0	-0.5'	57.7'
19 20	102° 17.1 117° 17.3	57.4 56.4	359°08.2 13°32.4	5.2' 5.2'	28°42.0 28°41.4	-0.7' -0.9'	57.7' 57.6'
20 21	117°17.3 132°17.4	56.4 •• 55.4	13°32.4 27°56.6	5.2'	28°41.4 28°40.5	-0.9° -1.0°	57.6'
22	132°17.4 147°17.6	54.4	42°20.9	5.3'	28° 40.5 28° 39.5	-1.0 -1.2'	57.6'
23	162° 17.7	53.5	56°45.2	5.4'	28°38.2	-1.2 -1.4'	57.6'
			- 10.2				0
	SD = 16.1'	d = -1.0'		5	D = 15.9'		

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

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

		Sun		Moon			
Day	Eqn.of	n.of Time Mer.		Mer.	Mer.Pass.		
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	5-7	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	31-54%	
05	11:31	11:24	12:11	17:04	04:34		
06	11:17	11:10	12:11	18:03	05:33		
07	11:03	10:56	12:11	19:04	06:34		

## March 08, 09, 10 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	165°57.2	159°47.1	N11°09.0	56°07.4	N25°33.1	94°26.4	N21°58.4	172° 57.5	S05°06.5			
1	180°59.6	174°50.3	09.1	71°09.5	32.9	109°28.6	58.4	187°59.7	06.4	Alpheratz	357°35.0	29°13.7
2	196°02.1	189°53.5	09.1	86°11.6	32.8	124°30.8	58.5	203°01.9	06.3	Ankaa	353°07.4	-42°10.3
3	211°04.6	204° 56.6	09.2	101°13.7	• • 32.7	139°33.0	• • 58.5	218°04.0	06.2	Schedar	349°31.4	56°40.6
4	226°07.0	219°59.8	09.2	116° 15.8	32.6	154°35.2	58.5	233°06.2	06.1	Diphda	348° 47.4	-17°51.1
5	241°09.5	235°03.0	09.3	131° 17.9	32.5	169°37.4	58.6	248°08.4	05.9	Achernar	335°20.5	-57°06.7
6	256°11.9	250°06.2	N11°09.3	146°20.0	N25°32.3	184°39.6	N21°58.6	263° 10.6	S05°05.8	Hamal	327°51.3	23°34.9
7	271°14.4	265°09.4	09.4	161°22.1	32.2	199°41.8	58.7	278° 12.8	05.7	Polaris	314°13.5	89°22.5
8	286°16.9	280°12.6	09.4	176°24.2	32.1	214°44.0	58.7	293° 14.9	05.6	Acamar	315°11.9	-40°12.4
9	301°19.3	295°15.8	• • 09.4	191°26.3	• • 32.0	229°46.2	• • 58.7	308° 17.1	• • 05.4	Menkar	314°06.2	4°11.2
10	316°21.8	$310^{\circ}19.0$	09.5	206°28.4	31.9	244°48.4	58.8	323°19.3	05.3	Mirfak	308°28.3	49°57.2
11	331°24.3	$325^{\circ}22.3$	09.5	221°30.5	31.7	259°50.6	58.8	338°21.5	05.2	Aldebaran	290°39.5	16°33.6
12	346°26.7	340°25.5	N11°09.5	236°32.6	N25°31.6	274°52.8	N21°58.9	353°23.7	S05°05.1	Rigel	281°03.7 280°21.7	-8°10.5 46°01.5
13	1°29.2	355°28.7	09.6	251°34.6	31.5	289°55.0	58.9	8°25.8	05.0	Capella Bellatrix	278° 22.7	6°22.3
14	16°31.7	$10^{\circ}31.9$	09.6	266°36.7	31.4	304°57.2	58.9	23°28.0	04.8	Elnath	278°01.7	28°37.8
15	31°34.1	25°35.1	• • 09.6	281°38.8	• • 31.3	319°59.4	• • 59.0	38° 30.2	• • 04.7	Alnilam	275°37.5	-1°11.2
16	46°36.6	40°38.4	09.6	296°40.9	31.1	335°01.6	59.0	53°32.4	04.6	Betelgeuse	270°51.9	7°24.6
17	61°39.0	55°41.6	09.6	311°43.0	31.0	350°03.8	59.1	68°34.6	04.5	Canopus	263°52.2	-52°42.8
18	76°41.5	70°44.8	N11°09.6	326°45.1	N25°30.9	5°06.0	N21°59.1	83°36.7	S05°04.4	Sirius	258°26.0	-16°45.2
19	91°44.0	85°48.1	09.6	341°47.1	30.8	20°08.2	59.1	98°38.9	04.2	Adhara	255°05.6	-29°00.6
20	106°46.4	100°51.3	09.7	356°49.2	30.6	35°10.4	59.2	113°41.1	04.1	Procyon	244°50.5	5°09.5
21	121°48.9 136°51.4	115°54.6 130°57.8	•• 09.7	11°51.3	• • 30.5	50°12.6 65°14.8	59.2	128° 43.3 143° 45.5	04.0	Pollux	$243^{\circ}16.9$	27°57.9
22 23	150 51.4 151°53.8	130 57.8 146°01.1	09.7 09.7	26°53.4 41°55.5	30.4 30.3	80°17.0	59.2 59.3	143 45.5 158° 47.6	03.9 03.8	Avior	$234^{\circ}14.2$	-59°35.6
23	151 55.0		_							Suhail	222°45.9	-43°32.2
Mer.p	ass. 12:54	$\nu$ 3.2′ d0.	1'  m-4.59	$\nu 2.1' \ d-0$	.1' m-0.10	$\nu$ 2.2′ d0.	0′ m-2.25	$\nu$ 2.2′ d-0	.1' m $1.10$	Miaplacidus	221°37.5	-69°49.4
				-		-				Alphard	217°47.3	-8°46.2
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.0	11°50.5
0	166°56.3	161°04.4	N11°09.7	56° 57.5	N25°30.1	95°19.2	N21°59.3	173°49.8	S05°03.6	Dubhe	193°40.1	61°36.8
1	181°58.8	176°07.6	09.7	71°59.6	30.0	110°21.4	59.4	188°52.0	03.5	Denebola	182°24.5	14°25.7
2	197°01.2	191° 10.9	09.6	87°01.7	29.9	125°23.6	59.4	203°54.2	03.4	Gienah	175°43.1	-17°41.0
3	212°03.7	206° 14.2	09.6	102°03.8	29.8	140°25.7	59.4	218° 56.4	03.3	Acrux	172°59.3	-63°14.3
4	227°06.2	221° 17.4	09.6	117°05.8	29.7	155°27.9	59.5	233°58.5	03.2	Gacrux	171°51.0	-57°15.2
5	242°08.6	236° 20.7	09.6	132°07.9	29.5	170°30.1	59.5	249°00.7	03.0	Alioth	166°12.3	55°49.2
6	257°11.1	251°24.0	N11°09.6	147° 10.0	N25°29.4	185°32.3	N21°59.6	264°02.9	S05°02.9	Spica	158°21.9	-11°17.7
7	272°13.5	266°27.3	09.6	$162^{\circ}12.0$	29.3	200°34.5	59.6	279°05.1	02.8	Alkaid	152°51.5 148°35.4	49°11.0
8	$287^{\circ}16.0$	281°30.6	09.5	$177^{\circ}14.1$	29.2	215°36.7	59.6	294°07.2	02.7	Hadar Menkent	148 35.4 147°57.2	-60°29.6 -36°29.6
9	$302^{\circ}18.5$	296°33.9	• • 09.5	192°16.2	• • 29.0	230°38.9	• • 59.7	309°09.4	• • 02.6	Arcturus	147 57.2 145°47.5	19°02.8
10	$317^{\circ}20.9$	311°37.2	09.5	$207^{\circ}18.2$	28.9	$245^{\circ}41.1$	59.7	324°11.6	02.4	Rigil Kent.	139°39.7	-60°56.2
11	332°23.4	326°40.4	09.5	222°20.3	28.8	260°43.3	59.8	339° 13.8	02.3	Kochab	137° 19.1	74°02.7
12	347°25.9	341°43.8	N11°09.4	237°22.4	N25°28.7	275°45.5	N21°59.8	$354^{\circ}16.0$	S05°02.2	Zuben'ubi	136°55.7	-16°08.9
13	2°28.3	$356^{\circ}47.1$	09.4	252°24.4	28.5	290°47.7	59.8	9°18.1	02.1	Alphecca	126° 03.5	26°37.5
14	17°30.8	$11^{\circ}50.4$	09.3	267°26.5	28.4	305°49.8	59.9	24°20.3	01.9	Antares	112° 15.6	-26°29.3
15	32°33.3	26°53.7	• • 09.3	282°28.5	· · 28.3	320°52.0	$21^{\circ}59.9$	39°22.5	• • 01.8	Atria	107°09.7	-69°04.1
16	47°35.7	41°57.0	09.3	297°30.6	28.2	335°54.2	22°00.0	54°24.7	01.7	Sabik	102°02.6	-15°45.4
17	62°38.2	57°00.3	09.2	312°32.7	28.0	350°56.4	00.0	69°26.9	01.6	Shaula	96°10.2	-37°07.3
18	77°40.7	72°03.6	N11°09.2	327°34.7	N25°27.9	5°58.6	N22°00.0	84°29.0	S05°01.5	Rasalhague	95°58.5	12°32.3
19	92°43.1	87°07.0	09.1	342°36.8	27.8	21°00.8	00.1	99°31.2	01.3	Eltanin	90°42.2	51°28.7
20	107°45.6	102° 10.3 117° 13.6	09.1	357°38.8	27.6	36°03.0	00.1	114°33.4	01.2	Kaus Aust.	83°32.4	-34°22.3
21 22	122°48.0 137°50.5	117 13.0 132°17.0	· · 09.0 08.9	12° 40.9 27° 42.9	· · 27.5 27.4	51°05.2 66°07.4	· · 00.2 00.2	129°35.6 144°37.8	· · 01.1 01.0	Vega	80°33.3	38°48.1
23	152°53.0	147°20.3	08.9	42° 45.0	27.4	81°09.5	00.2	159° 39.9	00.9	Nunki	75°47.7	-26°15.9
23	152 55.0									Altair	62°00.0	8°55.9
Mer.p	ass. 12:50	$\nu$ 3.3′ d-0	.0′ m-4.55	$\nu 2.1' \ d-0$	.1′ m-0.07	$\nu 2.2' \ d0.$	0′ m-2.24	$\nu 2.2' \ d-0$	.1' m $1.10$	Peacock	53°05.9	-56°39.1
										Deneb	49°26.1	45°21.9
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°39.0	9°59.3
0	167°55.4	162°23.6	N11°08.8	57°47.0	N25°27.1	96°11.7	N22°00.3	174° 42.1	S05°00.7	Al Na'ir	27°33.2	-46°50.4
1	182°57.9	177°27.0	08.7	72°49.1	27.0	111°13.9	00.3	189°44.3	00.6	Fomalhaut Scheat	15° 14.7 13° 45.4	-29°29.4 28°13.0
2	198°00.4	192°30.3	08.7	87°51.1	26.9	126°16.1	00.4	204°46.5	00.5	Markab	13° 30.1	15°20.3
3	$213^{\circ}02.8$	207°33.7	08.6	$102^{\circ}53.2$	• • 26.8	141°18.3	• • 00.4	219°48.7	• • 00.4	ividikaD	10 00.1	15 20.5
4	228°05.3	222°37.1	08.5	$117^{\circ}55.2$	26.6	$156^{\circ}20.5$	00.4	234°50.8	00.3	Mar 08 Sat	SHA	Mer.pass
5	243°07.8	237°40.4	08.4	$132^{\circ}57.2$	26.5	171°22.7	00.5	249°53.0	00.1	Venus		13:18
6	258°10.2	252°43.8	N11°08.4	147°59.3	N25°26.4	186°24.8	$N22^{\circ}00.5$	264° 55.2	<b>S</b> 05°00.0	Mars	250° 10.3	20:13
7	273°12.7	267°47.1	08.3	163°01.3	26.2	201°27.0	00.6	279°57.4	04°59.9	Jupiter	288°29.3	17:40
8	288°15.2	282°50.5	08.2	178°03.4	26.1	216°29.2	00.6	294°59.5	59.8	Saturn	7°00.3	12:26
9	303°17.6	297°53.9	•• 08.1	193°05.4	• • 26.0	231°31.4	• • 00.6	310°01.7	• • 59.7	Mar 09 Sun	SHA	Mer.pass
10	318°20.1	312°57.3	08.0	208°07.4	25.9	246°33.6	00.7	325°03.9	59.5	I I	354°08.1	13:13
11	333°22.5	328°00.6	07.9	223°09.5	25.7	261°35.8	00.7	340°06.1	59.4	Mars	250°01.2	20:09
12	348°25.0	343°04.0	N11°07.8	238°11.5	N25°25.6	276°37.9	N22°00.8	355°08.3	S04°59.3	Jupiter	288°22.9	17:36
13	3°27.5	358°07.4	07.7 07.6	253°13.6	25.5	291°40.1	8.00	10°10.4	59.2	Saturn	6°53.5	12:23
14 15	18°29.9 33°32.4	13° 10.8 28° 14.2	07.6 •• 07.5	268°15.6 283°17.6	25.3 •• 25.2	306°42.3 321°44.5	00.8	25°12.6 40°14.8	59.1	M 10 11	C114	
15 16	33°32.4 48°34.9	28° 14.2 43° 17.6	07.5	283°17.6 298°19.6	25.2	321°44.5 336°46.7	00.9	40° 14.8 55° 17.0	• • 58.9 58.8	Mar 10 Mon	SHA	Mer.pass
17	46 34.9 63°37.3	43 17.0 58°21.0	07.4	313°21.7	25.1	351°48.9	00.9	70° 19.2	58.7	Venus	354°28.2	13:07
18	78°39.8	73°24.4	N11°07.2	328°23.7	N25°24.8	6°51.0	N22°01.0	85°21.3	S04° 58.6	Mars Jupiter	249°51.6 288°16.3	20:06 17:33
19	93°42.3	88°27.8	07.1	343°25.7	24.7	21°53.2	01.0	100°23.5	58.4	Saturn	6°46.7	12:19
20	108°44.7	103°31.2	07.0	358°27.8	24.6	36°55.4	01.1	115°25.7	58.3	Jatuill	J 70.1	14.13
21	123°47.2	118° 34.6	06.8	13°29.8	• • 24.4	51°57.6	01.1	130°27.9	58.2	Horizont	al parallax	
22	138°49.6	133°38.1	06.7	28°31.8	24.3	66°59.8	01.2	145°30.1	58.1		Venus:	0.5
23	$153^{\circ}52.1$	$148^{\circ}41.5$	06.6	43°33.8	24.2	82°01.9	01.2	$160^{\circ}32.2$	58.0		Mars:	0.2
Mern	ass. 12:46	v3 3/ d.0	.1′ m-4.50	1/2 0/ d 0	.1′ m-0.05	1/2 2/ d0	0′ m-2.24	1/2 2/ d 0	.1′ m1.10			
-viei.p	uss. 14.40	ν J.J u-0		ν 2.0 u-0	0.03	ν Δ.Δ UO.	· 111-4.44	ν Δ.Δ U-U				

Sat	h	Su	n			Moon		
1	Sat	GHA	Dec	GHA	ν	Dec	d	НР
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10   337°194   42.7   215°16.4   6.0°   28°13.4   -3.3°   57.3°     11   342°196   41.7   229°41.4   6.1°   28°10.1   -3.4°   57.3°     12   357°19.7   504°40.8   244°06.6   6.2°   N28°06.7   -3.6°   57.2°     13   12°199   39.8   258°31.7   6.3°   28°03.1   -3.8°   57.2°     14   27°20.0   38.8   27°57.0   6.3°   28°03.1   -3.8°   57.2°     15   42°20.2   -37.8   287°22.3   6.4°   27°55.3   -4.1°   57.2°     16   57°20.3   36.9   301°47.7   6.5°   27°51.2   -4.3°   57.1°     17   72°20.5   35.9   316°13.2   6.6°   27°47.0   -4.4°   57.1°     18   87°20.7   504°34.9   330°38.7   6.6°   027°42.0   -4.6°   57.1°     19   102°20.8   33.9   345°04.4   6.7°   27°38.0   -4.7°   57.0°     20   117°21.0   33.0   359°30.1   6.8°   27°33.2   -4.9°   57.0°     21   132°21.1   -32.0   13°55.9   6.9°   27°28.3   -5.1°   57.0°     22   147°21.3   31.0   28°21.8   7.0°   27°22.3   -5.2°   57.0°     22   162°21.4   30.0   42°47.8   7.1°   27°18.0   -5.4°   57.0°     22   207°21.9   27.1   86°06.2   7.3°   27°15.7   -5.5°   56.9°     2   207°21.9   27.1   86°06.2   7.3°   27°01.5   -5.8°   56.9°     3   222°2.2   25.1   114°59.0   7.5°   26°44.7   -6.1°   56.8°     4   233°22.2   25.1   114°59.0   7.5°   26°44.5   -6.3°   56.8°     5   252°2.24   24.2   129°25.5   7.6°   26°43.6   -6.3°   56.8°     8   297°2.29   21.2   172°45.6   7.9°   26°24.4   -6.7°   56.7°     9   312°33.0   -20.2   187°12.5   8.0°   26°24.2   -7.5°   56.6°     10   337°33.2   16.3   245°01.0   8.4°   25°40.9   -7.1°   56.7°     11   342°33.3   18.3   216°06.6   8.2°   26°09.9   -7.1°   56.6°     12   357°35.5   504°35.3   16.3°   259°28.4   8.5°   25°42.2   -7.5°   56.6°     11   342°33.3   18.3   216°06.6   8.2°   26°44.2   -7.5°   56.6°     10   337°37.0   504°11.4   317°18.9   8.9°   3725°1.4   -6.7°   56.6°     11   342°23.7   16.3   245°01.0   8.4°   25°49.6   -7.4°   56.6°     2   207°25.7   03.6   73°30.3   8.8°   23°44.6   -9.1°   56.3°     3   222°25.9   0.06.6   46°07.7   9.5°   26°24.2   -7.5°   56.6°     4   237°26.1   0.16°   0.6°   0.6°		297°19.1		186°26.6		28°19.5		
11 342°19.6 41.7 220°41.4 6.1' 28°10.1 -3.4' 57.3' 12 357°19.7 \$04°40.8 244°06.6 6.2' \$128°06.7 -3.6' 57.2' 13 12°19.9 39.8 258°31.7 6.3' 28°03.1 -3.8' 57.2' 14 27°20.0 38.8 272°57.0 6.3' 27°59.3 -3.9' 57.2' 15 42°20.2 3.78 28°22.3 6.4' 27°55.3 -4.1' 57.2' 16 57°20.3 36.9 301°47.7 6.5' 27°51.2 -4.3' 57.1' 17 72°20.5 35.9 316°13.2 6.6 27°47.0 -4.4' 57.1' 18 87°20.7 \$04°34.9 330°38.7 6.6' \$127°42.5 -4.6' 57.1' 19 102°20.8 33.9 345°04.4 6.7' 27°38.0 -4.7' 57.1' 20 117°21.0 33.0 359°30.1 6.8' 27°33.2 -4.9' 57.0' 21 132°21.1 · 32.0 13°55.9 6.9' 27°28.3 -5.1' 57.0' 22 147°21.3 31.0 28°21.8 7.0' 27°28.3 -5.1' 57.0' 23 162°21.4 30.0 42°47.8 7.1' 27°18.0 -5.4' 57.0'  SD = 16.1' d = -1.0'  SD = 15.7'  Sun GHA Dec GHA	9		• • 43.7	200°51.4	6.0'	28°16.5	-3.1'	57.3'
12								
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18	16	57°20.3	36.9	301°47.7	6.5'	27°51.2	-4.3'	57.1'
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Sun         GHA         Dec         GHA         ν         Dec         d         HP           0         177°21.6         504°29.0         57°13.8         7.2'         N27°12.7         -5.5'         56.9'           1         192°21.8         28.1         71°40.0         7.2'         2°07.5         -5.7'         56.9'           3         222°22.1         2.61         100°32.6         7.4'         26°55.7         -6.0'         56.9'           4         237°22.2         25.1         114°59.0         7.5'         26°49.7         -6.1'         56.8'           5         252°22.4         24.2         129°25.5         7.6'         26°31.0         -6.3'         56.8'           6         267°22.5         504°32.2         112°8.5         7.9'         26°31.0         -6.5'         56.8'           7         282°27.7         22.2         158°18.8         7.8'         26°31.0         -6.7'         56.7'           9         312°33.2         19.3         201°39.5         8.1'         26°17.7         -6.8'         55.7'           10         327°33.5         504°17.3         230°33.7         8.3'         N25°49.6         -7.2'         56.6'      <								
Sun         GHA         Dec         GHA         ν         Dec         d         HP           0         177°21.6         504°29.0         57°13.8         7.2'         N27°12.7         -5.5'         56.9'           1         192°21.8         28.1         71°40.0         7.2'         2°07.5         -5.7'         56.9'           3         222°22.1         2.61         100°32.6         7.4'         26°55.7         -6.0'         56.9'           4         237°22.2         25.1         114°59.0         7.5'         26°49.7         -6.1'         56.8'           5         252°22.4         24.2         129°25.5         7.6'         26°31.0         -6.3'         56.8'           6         267°22.5         504°32.2         112°8.5         7.9'         26°31.0         -6.5'         56.8'           7         282°27.7         22.2         158°18.8         7.8'         26°31.0         -6.7'         56.7'           9         312°33.2         19.3         201°39.5         8.1'         26°17.7         -6.8'         55.7'           10         327°33.5         504°17.3         230°33.7         8.3'         N25°49.6         -7.2'         56.6'      <		SD - 16 1/						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		JD = 10.1	u — -1.0		31	J — 13.1°		
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2 207°21.9 27.1 86°06.2 7.3' 27°01.5 -5.8' 56.9' 3 222°22.1 · · · · 26.1 100°32.6 7.4' 26°55.7 -6.0' 56.9' 4 237°22.2 25.1 114°59.0 7.5' 26°49.7 -6.0' 56.9' 5 252°22.4 24.2 129°25.5 7.6' 26°43.6 -6.3' 56.8' 6 267°22.5 S04°23.2 143°52.1 7.7' N26°37.4 -6.4' 56.8' 7 282°22.7 22.2 158°18.8 7.8' 26°31.0 -6.5' 56.8' 8 297°22.9 21.2 172°45.6 7.9' 26°24.4 -6.7' 56.7' 9 312°23.0 · · · 20.2 187°12.5 8.0' 26°17.7 -6.8' 56.7' 10 327°23.2 19.3 201°39.5 8.1' 26°10.9 -7.0' 56.7' 11 342°23.3 18.3 216°06.6 8.2' 26°03.9 -7.1' 56.7' 12 357°23.5 S04°17.3 230°33.7 8.3' N25°56.8 -7.2' 56.6' 13 12°23.7 16.3 245°01.0 8.4' 25°49.6 -7.4' 56.6' 14 27°23.8 15.3 259°28.4 8.5' 25°42.2 -7.5' 56.6' 15 42°24.0 · · 14.4 273°55.9 8.6' 25°34.7 -7.6' 56.6' 16 57°24.1 13.4 288°23.5 8.7' 25°27.1 -7.8' 56.5' 17 72°24.3 12.4 302°51.1 8.8' 25°19.3 -7.9' 56.5' 18 87°24.5 S04°11.4 317°18.9 8.9' N25°11.4 -8.0' 56.5' 20 117°24.8 09.5 346°14.8 9.1' 24°55.2 -8.3' 56.5' 21 132°24.9 · · 08.5 0°42.9 9.2' 24°46.9 -8.4' 56.4' 22 147°25.1 07.5 15°11.0 9.3' 24°30.0 -8.7' 56.4' 22 147°25.1 07.5 15°11.0 9.3' 24°30.0 -8.7' 56.6' 3 22°25.9 · 00.6 87°33.5 9.8' 23°54.6 -9.1' 56.3' 3 222°25.9 · 00.6 87°33.5 9.8' 23°54.6 -9.1' 56.3' 4 237°26.1 01.6 102°02.3 9.9' 23°45.5 -9.2' 56.3' 5 252°26.2 04°00.7 116°31.2 10.0' 23°36.2 -9.4' 56.4' 22 147°25.1 07.5 15°11.0 9.3' 24°30.0 -8.7' 56.6' 28 26°26.5 58.7 145°29.3 10.2' 23°17.4 -9.6' 56.2' 8 297°26.7 57.7 159°58.5 10.3' 23°77.8 -9.5' 56.6' 10 327°27.0 55.7 189°58.5 10.3' 23°77.8 -9.7' 56.5' 11 342°27.7 55.8 23°26.1 10.8' 22°38.5 -10.0' 56.1' 12 357°27.4 503°58.8 21°755.9 11.1' N22°68.2 -9.8' 56.2' 10 327°27.0 55.7 188°57.2 10.5' 22°48.4 -9.9' 56.1' 11 342°27.7 55.8 246°55.9 10.9' 22°81.3 1-0.2' 56.1' 11 342°27.7 55.8 26°6.5 11.4' 21°15.6 -10.8' 56.1' 11 342°27.7 55.8 246°55.9 10.9' 22°81.3 1-0.2' 56.1' 11 342°27.7 55.8 246°55.9 10.9' 22°83.5 10.0' 56.1' 12 357°27.4 503°58.8 11°56.4' 10.7' N22°28.4 -10.1' 56.0' 18 87°28.0 49.9 275°55.9 11.1' 21°47.4 -10.5' 56.0' 19 102°28.5 46.9 313°57.0 11.5' 21°04.8 -0.9' 55.1' 11 342°27.5 55.								
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8         297°22.9         21.2         172°45.6         7.9'         26°24.4         -6.7'         56.7'           9         312°23.0         · 20.2         187°12.5         8.0'         26°17.7         -6.8'         56.7'           10         327°23.2         19.3         201°39.5         8.1'         26°01.9         -7.0'         56.7'           11         342°23.3         18.3         216°06.6         8.2'         26°03.9         -7.1'         56.7'           12         357°23.5         504°17.3         230°33.7         8.3'         N25°56.8         -7.2'         56.6'           13         12°23.7         16.3         245°01.0         8.4'         25°49.6         -7.4'         56.6'           15         42°24.0         · 14.4         273°55.9         8.6'         25°34.7         -7.6'         56.6'           16         57°24.1         13.4         288°23.5         8.7'         25°71.3         -7.9'         56.5'           18         87°24.5         504°11.4         317°18.9         8.9'         N25°11.4         -8.0'         56.5'           19         102°24.6         10.4         31°46.8         9.0'         25°03.3         -8.2'         <								
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14 27°23.8 15.3 259°28.4 8.5' 25°42.2 -7.5' 56.6' 15 42°24.0 · 14.4 273°55.9 8.6' 25°34.7 -7.6' 56.6' 16 57°24.1 13.4 288°23.5 8.7' 25°27.1 -7.8' 56.6' 17 72°24.3 12.4 302°51.1 8.8' 25°19.3 -7.9' 56.5' 18 87°24.5 \$04°11.4 317°18.9 8.9' N25°11.4 -8.0' 56.5' 19 102°24.6 10.4 331°46.8 9.0' 25°03.3 -8.2' 56.5' 20 117°24.8 09.5 346°14.8 9.1' 24°55.2 -8.3' 56.5' 21 132°24.9 · 0.8.5 0°42.9 9.2' 24°46.9 -8.4' 56.4' 22 147°25.1 07.5 15°11.0 9.3' 24°38.5 -8.5' 56.4' 23 162°25.3 06.5 29°39.3 9.4' 24°30.0 -8.7' 56.4'  SD = 16.1' d = -1.0'  SD = 15.5'  Mon GHA Dec GHA ν Dec d HP 0 177°25.4 \$04°05.6 44°07.7 9.5' N24°21.3 -8.8' 56.4' 1 192°25.6 04.6 58°36.2 9.6' 24°12.5 -8.9' 56.3' 2 207°25.7 03.6 73°04.8 9.7' 24°03.6 -9.0' 56.3' 3 222°25.9 · 02.6 87°33.5 9.8' 23°54.6 -9.1' 56.3' 4 237°26.1 01.6 102°02.3 9.9' 23°45.5 -9.2' 56.3' 5 252°26.2 04°00.7 116°31.2 10.0' 23°36.2 -9.4' 56.3' 6 267°26.4 \$03°59.7 131°00.2 10.1' N23°26.9 -9.5' 56.2' 7 282°26.5 58.7 145°29.3 10.2' 23°17.4 -9.6' 56.2' 9 312°26.9 · 56.7 174°27.8 10.4' 22°58.2 -9.8' 56.2' 10 327°27.0 55.7 188°57.2 10.5' 22°48.4 -9.9' 56.1' 11 342°27.5 52.8 232°26.1 10.6' 22°38.5 -10.0' 56.1' 12 357°27.4 \$03°53.8 217°56.4 10.6' 22°38.5 -10.0' 56.1' 12 357°27.4 \$03°53.8 217°56.4 10.7' N22°28.4 -10.1' 56.1' 13 12°27.5 52.8 232°26.1 10.8' 22°18.3 1.0.2' 56.1' 14 27°27.7 51.8 246°55.9 10.9' 22°08.1 -10.3' 56.1' 15 42°27.8 · 50.8 261°25.8 11.0' 21°57.8 -10.4' 56.0' 17 72°28.2 48.9 290°26.0 11.2' 21°37.9 -10.6' 56.0' 18 87°28.3 \$03°47.9 304°56.2 11.3' N21°26.3 -10.7' 56.0' 20 117°28.7 45.9 33°57.0 11.5' 12°04.8 -10.1' 55.9' 21 132°28.8 · 45.0 348°27.5 11.6' 20°53.9 -11.0' 55.9' 22 147°29.0 44.0 2°58.1 11.7' 20°42.9 -11.1' 55.9' 23 162°29.2 43.0 17°28.8 11.8' 20°31.8 -11.2' 55.9'								
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18       87°24.5       S04°11.4       317°18.9       8.9'       N25°11.4       -8.0'       56.5'         19       102°24.6       10.4       331°46.8       9.0'       25°03.3       -8.2'       56.5'         20       117°24.8       09.5       346°14.8       9.1'       24°55.2       -8.3'       56.5'         21       132°24.9       · · 08.5       0°42.9       9.2'       24°46.9       -8.4'       56.4'         22       147°25.1       07.5       15°11.0       9.3'       24°38.5       -8.5'       56.4'         23       162°25.3       06.5       29°39.3       9.4'       24°30.0       -8.7'       56.4'         8D = 16.1'       d = -1.0'       SD = 15.5'         Mon       GHA       Dec       GHA       ν       Dec       d HP         1       192°25.6       04.6       58°36.2       9.6'       24°12.5       -8.9'       56.3'         2       207°25.7       03.6       73°04.8       9.7'       24°03.6       -9.1'       56.3'         3       222°25.9       · · 02.6       87°33.5       9.8'       23°45.6       -9.1'       56.3'         4       237°26.1       01.6		57°24.1	13.4	288°23.5	8.7'	25°27.1	-7.8'	56.5'
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Mon         GHA         Dec         GHA         ν         Dec         d         HP           0         177°25.4         504°05.6         44°07.7         9.5'         N24°21.3         -8.8'         56.4'           1         192°25.6         04.6         58°36.2         9.6'         24°12.5         -8.9'         56.3'           2         207°25.7         03.6         73°04.8         9.7'         24°03.6         -9.0'         56.3'           3         222°25.9         · 02.6         87°33.5         9.8'         23°54.6         -9.1'         56.3'           4         237°26.1         01.6         102°02.3         9.9'         23°45.5         -9.2'         56.3'           5         252°26.2         04°00.7         116°31.2         10.0'         23°36.2         -9.4'         56.3'           6         267°26.4         \$03°59.7         131°00.2         10.1'         N23°26.9         -9.5'         56.2'           7         282°26.5         58.7         145°29.3         10.2'         23°17.4         -9.6'         56.2'           8         297°26.7         57.7         159°58.5         10.3'         23°07.8         -9.7'         56.2'		162°25.3	06.5	29°39.3	9.4'	24°30.0	-8.7'	56.4'
0         177°25.4         \$04°05.6         44°07.7         9.5'         \$N24°21.3         -8.8'         56.4'           1         192°25.6         04.6         58°36.2         9.6'         24°12.5         -8.9'         56.3'           2         207°25.7         03.6         73°04.8         9.7'         24°03.6         -9.0'         56.3'           3         222°25.9         · · · 02.6         87°33.5         9.8'         23°54.6         -9.1'         56.3'           4         237°26.1         01.6         102°02.3         9.9'         23°45.5         -9.2'         56.3'           5         252°26.2         04°00.7         116°31.2         10.0'         23°36.2         -9.4'         56.3'           6         267°26.4         \$03°59.7         131°00.2         10.1'         N23°26.9         -9.5'         56.2'           7         282°26.5         58.7         145°29.3         10.2'         23°17.4         -9.6'         56.2'           8         297°26.7         57.7         159°58.5         10.3'         23°07.8         -9.7'         56.2'           9         312°26.9         · · 56.7         174°27.8         10.4'         22°58.2         -9.8'		SD = 16.1'	d = -1.0'		SI	D = 15.5'		
0         177°25.4         \$04°05.6         44°07.7         9.5'         \$N24°21.3         -8.8'         56.4'           1         192°25.6         04.6         58°36.2         9.6'         24°12.5         -8.9'         56.3'           2         207°25.7         03.6         73°04.8         9.7'         24°03.6         -9.0'         56.3'           3         222°25.9         · · · 02.6         87°33.5         9.8'         23°54.6         -9.1'         56.3'           4         237°26.1         01.6         102°02.3         9.9'         23°45.5         -9.2'         56.3'           5         252°26.2         04°00.7         116°31.2         10.0'         23°36.2         -9.4'         56.3'           6         267°26.4         \$03°59.7         131°00.2         10.1'         N23°26.9         -9.5'         56.2'           7         282°26.5         58.7         145°29.3         10.2'         23°17.4         -9.6'         56.2'           8         297°26.7         57.7         159°58.5         10.3'         23°07.8         -9.7'         56.2'           9         312°26.9         · · 56.7         174°27.8         10.4'         22°58.2         -9.8'	Mon	GHA	Dec	GH∆	1)	Dec	А	НР
1       192°25.6       04.6       58°36.2       9.6'       24°12.5       -8.9'       56.3'         2       207°25.7       03.6       73°04.8       9.7'       24°03.6       -9.0'       56.3'         3       222°25.9       · 02.6       87°33.5       9.8'       23°54.6       -9.1'       56.3'         4       237°26.1       01.6       102°02.3       9.9'       23°45.5       -9.2'       56.3'         5       252°26.2       04°00.7       116°31.2       10.0'       23°36.2       -9.4'       56.3'         6       267°26.4       503°59.7       131°00.2       10.1'       N23°26.9       -9.5'       56.2'         7       282°26.5       58.7       145°29.3       10.2'       23°17.4       -9.6'       56.2'         8       297°26.7       57.7       159°58.5       10.3'       23°07.8       -9.7'       56.2'         9       312°26.9       · 56.7       174°27.8       10.4'       22°58.2       -9.8'       56.2'         10       327°27.0       55.7       188°57.2       10.5'       22°48.4       -9.9'       56.1'         11       342°27.4       503°53.8       217°56.4       10.7' <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>								
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4       237°26.1       01.6       102°02.3       9.9'       23°45.5       -9.2'       56.3'         5       252°26.2       04°00.7       116°31.2       10.0'       23°36.2       -9.4'       56.3'         6       267°26.4       \$03°59.7       131°00.2       10.1'       N23°26.9       -9.5'       56.2'         7       282°26.5       58.7       145°29.3       10.2'       23°17.4       -9.6'       56.2'         8       297°26.7       57.7       159°58.5       10.3'       23°07.8       -9.7'       56.2'         9       312°26.9       • 56.7       174°27.8       10.4'       22°58.2       -9.8'       56.2'         10       327°27.0       55.7       188°57.2       10.5'       22°48.4       -9.9'       56.1'         11       342°27.2       54.8       203°26.8       10.6'       22°38.5       -10.0'       56.1'         12       357°27.4       \$03°53.8       217°56.4       10.7'       N22°28.4       -10.1'       56.1'         13       12°27.5       52.8       232°26.1       10.8'       22°18.3       -10.2'       56.1'         14       27°27.7       51.8       246°55.9       10.9'								
5         252°26.2         04°00.7         116°31.2         10.0'         23°36.2         -9.4'         56.3'           6         267°26.4         \$03°59.7         131°00.2         10.1'         N23°26.9         -9.5'         56.2'           7         282°26.5         58.7         145°29.3         10.2'         23°17.4         -9.6'         56.2'           8         297°26.7         57.7         159°58.5         10.3'         23°07.8         -9.7'         56.2'           9         312°26.9         · 56.7         174°27.8         10.4'         22°58.2         -9.8'         56.2'           10         327°27.0         55.7         188°57.2         10.5'         22°48.4         -9.9'         56.1'           11         342°27.2         54.8         203°26.8         10.6'         22°38.5         -10.0'         56.1'           12         357°27.4         \$03°53.8         217°56.4         10.7'         N22°28.4         -10.1'         56.1'           13         12°27.5         52.8         232°26.1         10.8'         22°18.3         -10.2'         56.1'           14         27°27.7         51.8         246°55.9         10.9'         22°08.1         -10.3'<								
6         267°26.4         \$03°59.7         \$131°00.2         \$10.1'         \$N23°26.9         -9.5'         \$6.2'           7         282°26.5         \$58.7         \$145°29.3         \$10.2'         \$23°17.4         -9.6'         \$6.2'           8         297°26.7         \$57.7         \$159°58.5         \$10.3'         \$23°07.8         -9.7'         \$6.2'           9         \$12°26.9         \$\$\$\cdot \$56.7\$         \$174°27.8         \$10.4'         \$22°58.2         -9.8'         \$6.2'           10         \$327°27.0         \$55.7         \$188°57.2         \$10.5'         \$22°48.4         -9.9'         \$61.1'           \$11         \$342°27.2         \$54.8         \$203°26.8         \$10.6'         \$22°38.5         \$-10.0'         \$61.1'           \$12         \$357°27.4         \$53°5.8         \$217°56.4         \$10.7'         \$N22°28.4         \$-10.1'         \$56.1'           \$13         \$12°27.5         \$52.8         \$232°26.1         \$10.8'         \$22°18.3         \$-10.2'         \$56.1'           \$14         \$27°27.7         \$51.8         \$246°55.9         \$10.9'         \$22°08.1         \$-10.3'         \$56.1'           \$15         \$42°27.8         \$\$\$\cdo \$5.8\$         \$261°25.8 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
7       282°26.5       58.7       145°29.3       10.2'       23°17.4       -9.6'       56.2'         8       297°26.7       57.7       159°58.5       10.3'       23°07.8       -9.7'       56.2'         9       312°26.9       · · 56.7       174°27.8       10.4'       22°58.2       -9.8'       56.2'         10       327°27.0       55.7       188°57.2       10.5'       22°48.4       -9.9'       56.1'         11       342°27.2       54.8       203°26.8       10.6'       22°38.5       -10.0'       56.1'         12       357°27.4       503°53.8       217°56.4       10.7'       N22°28.4       -10.1'       56.1'         13       12°27.5       52.8       232°26.1       10.8'       22°18.3       -10.2'       56.1'         14       27°27.7       51.8       246°55.9       10.9'       22°08.1       -10.3'       56.1'         15       42°27.8       · 50.8       261°25.8       11.0'       21°57.8       -10.4'       56.0'         16       57°28.0       49.9       275°55.9       11.1'       21°47.4       -10.5'       56.0'         17       72°28.2       48.9       290°26.0       11.2'								
8       297°26.7       57.7       159°58.5       10.3'       23°07.8       -9.7'       56.2'         9       312°26.9       · 56.7       174°27.8       10.4'       22°58.2       -9.8'       56.2'         10       327°27.0       55.7       188°57.2       10.5'       22°48.4       -9.9'       56.1'         11       342°27.2       54.8       203°26.8       10.6'       22°38.5       -10.0'       56.1'         12       357°27.4       \$03°53.8       217°56.4       10.7'       N22°28.4       -10.1'       56.1'         13       12°27.5       52.8       232°26.1       10.8'       22°18.3       -10.2'       56.1'         14       27°27.7       51.8       246°55.9       10.9'       22°08.1       -10.3'       56.1'         15       42°27.8       · 50.8       261°25.8       11.0'       21°57.8       -10.4'       56.0'         16       57°28.0       49.9       275°55.9       11.1'       21°47.4       -10.5'       56.0'         17       72°28.2       48.9       290°26.0       11.2'       21°36.9       -10.6'       56.0'         18       87°28.3       \$03°47.9       304°56.2       11.3' </td <td></td> <td>282°26.5</td> <td></td> <td></td> <td></td> <td>23°17.4</td> <td></td> <td></td>		282°26.5				23°17.4		
10         327°27.0         55.7         188°57.2         10.5'         22°48.4         -9.9'         56.1'           11         342°27.2         54.8         203°26.8         10.6'         22°38.5         -10.0'         56.1'           12         357°27.4         503°53.8         217°56.4         10.7'         N22°28.4         -10.1'         56.1'           13         12°27.5         52.8         232°26.1         10.8'         22°18.3         -10.2'         56.1'           14         27°27.7         51.8         246°55.9         10.9'         22°08.1         -10.3'         56.1'           15         42°27.8         50.8         261°25.8         11.0'         21°57.8         -10.4'         56.0'           16         57°28.0         49.9         275°55.9         11.1'         21°47.4         -10.5'         56.0'           17         72°28.2         48.9         290°26.0         11.2'         21°36.9         -10.6'         56.0'           18         87°28.3         503°47.9         304°56.2         11.3'         N21°26.3         -10.7'         56.0'           19         102°28.5         46.9         319°26.5         11.4'         21°15.6         -10.8'	8	297°26.7	57.7	159°58.5	10.3'	23°07.8	-9.7'	56.2'
11         342°27.2         54.8         203°26.8         10.6'         22°38.5         -10.0'         56.1'           12         357°27.4         \$03°53.8         217°56.4         10.7'         N22°28.4         -10.1'         56.1'           13         12°27.5         52.8         232°26.1         10.8'         22°18.3         -10.2'         56.1'           14         27°27.7         51.8         246°55.9         10.9'         22°08.1         -10.3'         56.1'           15         42°27.8         · 50.8         261°25.8         11.0'         21°57.8         -10.4'         56.0'           16         57°28.0         49.9         275°55.9         11.1'         21°47.4         -10.5'         56.0'           17         72°28.2         48.9         290°26.0         11.2'         21°36.9         -10.6'         56.0'           18         87°28.3         \$03°47.9         304°56.2         11.3'         N21°26.3         -10.7'         56.0'           19         102°28.5         46.9         319°26.5         11.4'         21°15.6         -10.8'         56.0'           20         117°28.7         45.9         333°57.0         11.5'         21°04.8         -10								
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$\begin{array}{cccccccccccccccccccccccccccccccccccc$								
16         57°28.0         49.9         275°55.9         11.1'         21°47.4         -10.5'         56.0'           17         72°28.2         48.9         290°26.0         11.2'         21°36.9         -10.6'         56.0'           18         87°28.3         \$03°47.9         304°56.2         11.3'         N21°26.3         -10.7'         56.0'           19         102°28.5         46.9         319°26.5         11.4'         21°15.6         -10.8'         56.0'           20         117°28.7         45.9         333°57.0         11.5'         21°04.8         -10.9'         55.9'           21         132°28.8         · 45.0         348°27.5         11.6'         20°53.9         -11.0'         55.9'           22         147°29.0         44.0         2°58.1         11.7'         20°42.9         -11.1'         55.9'           23         162°29.2         43.0         17°28.8         11.8'         20°31.8         -11.2'         55.9'								
17         72°28.2         48.9         290°26.0         11.2'         21°36.9         -10.6'         56.0'           18         87°28.3         \$03°47.9         304°56.2         11.3'         N21°26.3         -10.7'         56.0'           19         102°28.5         46.9         319°26.5         11.4'         21°15.6         -10.8'         56.0'           20         117°28.7         45.9         333°57.0         11.5'         21°04.8         -10.9'         55.9'           21         132°28.8         · 45.0         348°27.5         11.6'         20°53.9         -11.0'         55.9'           22         147°29.0         44.0         2°58.1         11.7'         20°42.9         -11.1'         55.9'           23         162°29.2         43.0         17°28.8         11.8'         20°31.8         -11.2'         55.9'								
18     87°28.3     \$\scrip\$03°47.9     \$304°56.2     \$11.3'     \$\scrip\$N21°26.3     \$-10.7'     \$56.0'       19     \$102°28.5     \$46.9     \$319°26.5     \$11.4'     \$21°15.6     \$-10.8'     \$56.0'       20     \$117°28.7     \$45.9     \$333°57.0     \$11.5'     \$21°04.8     \$-10.9'     \$55.9'       21     \$132°28.8     \$\cdot \45.0\$     \$348°27.5     \$11.6'     \$20°53.9     \$-11.0'     \$55.9'       22     \$147°29.0     \$44.0     \$2°58.1     \$11.7'     \$20°42.9     \$-11.1'     \$55.9'       23     \$162°29.2     \$43.0     \$17°28.8     \$11.8'     \$20°31.8     \$-11.2'     \$55.9'								
19     102°28.5     46.9     319°26.5     11.4'     21°15.6     -10.8'     56.0'       20     117°28.7     45.9     333°57.0     11.5'     21°04.8     -10.9'     55.9'       21     132°28.8     · 45.0     348°27.5     11.6'     20°53.9     -11.0'     55.9'       22     147°29.0     44.0     2°58.1     11.7'     20°42.9     -11.1'     55.9'       23     162°29.2     43.0     17°28.8     11.8'     20°31.8     -11.2'     55.9'								
20     117°28.7     45.9     333°57.0     11.5'     21°04.8     -10.9'     55.9'       21     132°28.8     · 45.0     348°27.5     11.6'     20°53.9     -11.0'     55.9'       22     147°29.0     44.0     2°58.1     11.7'     20°42.9     -11.1'     55.9'       23     162°29.2     43.0     17°28.8     11.8'     20°31.8     -11.2'     55.9'								
21     132°28.8     · · 45.0     348°27.5     11.6'     20°53.9     -11.0'     55.9'       22     147°29.0     44.0     2°58.1     11.7'     20°42.9     -11.1'     55.9'       23     162°29.2     43.0     17°28.8     11.8'     20°31.8     -11.2'     55.9'								
23 162°29.2 43.0 17°28.8 11.8' 20°31.8 -11.2' 55.9'	21	132°28.8	• • 45.0	348°27.5	11.6'	20°53.9	-11.0'	55.9'
SD = 16.1'  d = -1.0' $SD = 15.4'$	23			17°28.8			-11.2'	55.9'
		SD = 16.1'	d = -1.0'		SI	O = 15.4'		

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

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

## March 11, 12, 13 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	168° 54.6	163°44.9	N11°06.5	58°35.9	N25°24.1	97°04.1	N22°01.2	175°34.4	S04°57.8			
										Alpheratz	357°35.0	29°13.7
1	183°57.0	178°48.3	06.3	73°37.9	23.9	112°06.3	01.3	190°36.6	57.7	Ankaa	353°07.4	-42°10.3
2	198°59.5	193°51.7	06.2	88°39.9	23.8	127°08.5	01.3	205°38.8	57.6	Schedar	349°31.5	56°40.6
3	$214^{\circ}02.0$	208°55.2	• • 06.1	103°41.9	• • 23.7	$142^{\circ}10.6$	•• 01.4	220°41.0	• • 57.5	Diphda	349° 47.4	-17°51.0
4	229°04.4	223°58.6	05.9	118°43.9	23.5	157° 12.8	01.4	235°43.1	57.4			
5	244°06.9	239°02.1	05.8	133°46.0	23.4	172°15.0	01.4	250°45.3	57.2	Achernar	335°20.5	-57°06.7
6	259°09.4	254°05.5	N11°05.6	148°48.0	N25°23.3	187° 17.2	N22°01.5	265°47.5	S04°57.1	Hamal	327°51.3	23°34.9
7	274°11.8	269°08.9	05.5	163°50.0	23.1	202° 19.4	01.5	280°49.7	57.0	Polaris	314°14.8	89°22.5
										Acamar	$315^{\circ}11.9$	-40°12.4
8	289°14.3	284°12.4	05.4	178°52.0	23.0	217°21.5	01.6	295°51.8	56.9	Menkar	314°06.2	4°11.2
9	304°16.8	299°15.8	• • 05.2	193°54.0	• • 22.9	232°23.7	•• 01.6	310°54.0	• • 56.8	Mirfak	308°28.3	49°57.2
10	$319^{\circ}19.2$	314°19.3	05.0	208°56.0	22.7	247°25.9	01.7	325°56.2	56.6	Aldebaran	290°39.5	16°33.6
11	334°21.7	329°22.8	04.9	223°58.0	22.6	262°28.1	01.7	340°58.4	56.5	I		
12	349°24.1	344°26.2	N11°04.7	239°00.0	N25°22.5	277°30.2	N22°01.7	356°00.6	S04°56.4	Rigel	281°03.7	-8°10.5
13	4°26.6	359°29.7	04.6	254°02.1	22.3	292°32.4	01.8	11°02.7	56.3	Capella	280°21.7	46°01.5
14	19°29.1	14°33.2	04.4	269°04.1	22.2	307°34.6	01.8	26°04.9	56.2	Bellatrix	278°22.7	6°22.3
	34°31.5							41°07.1		Elnath	278°01.7	28°37.8
15		29°36.6	• • 04.2	284°06.1	• 22.1	322°36.8	•• 01.9			Alnilam	275°37.6	$-1^{\circ}11.2$
16	49°34.0	44°40.1	04.1	299°08.1	21.9	337°38.9	01.9	56°09.3	55.9	Betelgeuse	270°51.9	7°24.6
17	64°36.5	59°43.6	03.9	$314^{\circ}10.1$	21.8	352°41.1	01.9	$71^{\circ}11.5$	55.8	Canopus	263°52.2	-52°42.8
18	79°38.9	74°47.1	N11°03.7	329°12.1	N25°21.7	7°43.3	N22°02.0	86°13.6	S04°55.7		258° 26.0	
19	94°41.4	89°50.5	03.5	$344^{\circ}14.1$	21.5	22°45.5	02.0	101°15.8	55.6	Sirius		-16°45.2
20	109°43.9	104°54.0	03.4	359° 16.1	21.4	37° 47.6	02.1	116°18.0	55.4	Adhara	255°05.6	-29°00.6
21	124°46.3	119°57.5	•• 03.2	14° 18.1	•• 21.3	52°49.8	02.1	131°20.2	• • 55.3	Procyon	244°50.5	5°09.5
	124 40.3 139°48.8					67°52.0				Pollux	243°16.9	27°57.9
22		135°01.0	03.0	29°20.1	21.1		02.1	146°22.4	55.2	Avior	234°14.3	-59°35.6
23	154°51.3	150°04.5	02.8	44°22.1	21.0	82°54.2	02.2	161°24.5	55.1	Suhail	222°45.9	-43°32.2
1/10= =	ass. 12:42	1/2 1/ 4 0	.1′ m-4.45	1/2 n/ d n	.1′ m-0.02	112 21 40	0′ m-2.23	1/2 2/ A 0	.1' m1.10	Miaplacidus	221°37.6	-69°49.4
ivier.p	uss. 14.44	ν J.Ψ U-U	.1 111-4.43	ν2.0 U-0		ν Δ.Δ u0.	0 111-2.23	ν Δ. Δ U-U	1111.10	Alphard	221 37.0 217°47.3	-8°46.2
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.0	11°50.5
0	169°53.7	165°08.0	N11°02.6	59°24.1	N25°20.9	97° 56.3	N22°02.2	176°26.7	S04°55.0	Dubhe	193°40.1	61°36.9
										Denebola	182°24.5	14°25.7
1	184°56.2	180°11.5	02.4	74°26.1	20.7	112°58.5	02.3	191°28.9	54.8	Gienah	175°43.1	$-17^{\circ}41.0$
2	199°58.6	$195^{\circ}15.0$	02.2	89°28.1	20.6	128°00.7	02.3	206°31.1	54.7		172°59.3	-63°14.3
3	$215^{\circ}01.1$	$210^{\circ}18.5$	•• 02.0	$104^{\circ}30.1$	• • 20.5	143°02.8	• • 02.3	221°33.3	• • 54.6	<b>I</b>	171°51.0	-57°15.3
4	230°03.6	225°22.0	01.8	$119^{\circ}32.1$	20.3	158°05.0	02.4	236°35.4	54.5			
5	245°06.0	240°25.5	01.6	134°34.1	20.2	173°07.2	02.4	251°37.6	54.4	Alioth	166°12.3	55°49.2
6	260°08.5	255°29.0	N11°01.4	149°36.0	N25°20.1	188°09.4	N22°02.5	266°39.8	S04°54.2	Spica	158°21.9	-11°17.7
	275°11.0	270°32.6		164°38.0		203°11.5		281°42.0		Alkaid	152°51.5	$49^{\circ}11.0$
7			01.2		19.9		02.5		54.1	Hadar	148°35.4	-60°29.6
8	290°13.4	285°36.1	01.0	179°40.0	19.8	218° 13.7	02.6	296°44.1	54.0	Menkent	147°57.2	-36°29.6
9	305° 15.9	300°39.6	00.8	194°42.0	• • 19.7	233°15.9	• • 02.6	311°46.3	• • 53.9	Arcturus	145°47.5	19°02.8
10	320° 18.4	315°43.1	00.6	209°44.0	19.5	248° 18.0	02.6	326°48.5	53.7	Rigil Kent.	139°39.7	-60°56.2
11	335°20.8	330°46.7	00.3	224°46.0	19.4	263°20.2	02.7	341°50.7	53.6	_	137° 19.0	74°02.8
12	350°23.3	345°50.2	N11°00.1	239°48.0	N25°19.3	278°22.4	N22°02.7	356°52.9	S04°53.5	Kochab		
13	5°25.7	0°53.7	10°59.9	254° 50.0	19.1	293°24.5	02.8	11°55.0	53.4	Zuben'ubi	136°55.7	-16°08.9
	20°28.2	15°57.3		269°51.9		308°26.7		26°57.2		Alphecca	126°03.4	26°37.5
14			59.7		19.0		02.8		53.3	Antares	$112^{\circ}15.6$	-26°29.3
15	35° 30.7	31°00.8	• • 59.4	284°53.9	• • 18.9	323°28.9	• • 02.8	41°59.4	• • 53.1	Atria	107°09.6	-69°04.1
16	50°33.1	46°04.4	59.2	299°55.9	18.7	338°31.0	02.9	57°01.6	53.0	Sabik	102°02.6	-15°45.4
17	65°35.6	61°07.9	59.0	314°57.9	18.6	353°33.2	02.9	72°03.8	52.9	Shaula	96°10.2	-37°07.3
18	80°38.1	$76^{\circ}11.5$	$N10^{\circ}58.7$	329°59.9	N25°18.4	8°35.4	$N22^{\circ}03.0$	87°05.9	S04°52.8	Rasalhague	95°58.4	12°32.2
19	95°40.5	91°15.0	58.5	$345^{\circ}01.8$	18.3	23°37.5	03.0	102°08.1	52.7	_		
20	110°43.0	106°18.6	58.3	0°03.8	18.2	38°39.7	03.0	117°10.3	52.5	Eltanin	90°42.2	51°28.7
21	125°45.5	121°22.1	• • 58.0	15°05.8	• 18.0	53°41.9	03.1	132°12.5	52.4	Kaus Aust.	83°32.4	-34°22.3
										Vega	80°33.3	38°48.1
22	140°47.9	136°25.7	57.8	30°07.8	17.9	68°44.0	03.1	147°14.7	52.3	Nunki	75°47.7	-26°15.9
23	155°50.4	151°29.3	57.5	45°09.7	17.8	83°46.2	03.2	162°16.8	52.2	Altair	62°00.0	8°55.9
Morn	ass. 12:38	1/3 E/ d 0	.2′ m-4.40	"3 0' d 0	.1′ m0.00	1/2 2/ 40	0′ m-2.22	1/2 2' d C	.1′ m1.10	Peacock	53°05.9	-56°39.1
IVIEL.P	ass. 12.30	ν3.3 u-0	.2 111-4.40	ν2.0 u-0	.1 1110.00	ν2.2 do.	0 111-2.22	ν2.2 u-0	.1 1111.10	Deneb	49°26.1	45°21.9
										Enif	33° 38.9	9°59.3
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	1		
0	170°52.9	166°32.8	N10°57.3	60°11.7	N25°17.6	98° 48.4	N22°03.2	177°19.0	S04°52.1	Al Na'ir	27°33.1	-46°50.4
1	170 52.9 185°55.3	100 32.6 181°36.4	57.0	75°13.7	17.5		03.3	177 19.0 192°21.2	51.9	Fomalhaut	15°14.7	-29°29.4
						113°50.5				Scheat	13°45.4	28°13.0
2	200°57.8	196°40.0	56.7	90°15.6	17.4	128°52.7	03.3	207°23.4	51.8	Markab	13°30.1	15°20.3
3	216°00.2	211°43.5	• • 56.5	105° 17.6	• • 17.2	143°54.9	• • 03.3	222°25.6	• • 51.7		<b></b>	
4	231°02.7	226°47.1	56.2	$120^{\circ}19.6$	17.1	158°57.0	03.4	237°27.7	51.6	Mar 11 Tue	SHA	Mer.pass
5	246°05.2	241°50.7	55.9	$135^{\circ}21.6$	16.9	173°59.2	03.4	252°29.9	51.5	Venus	354°50.3	13:02
6	261°07.6	256°54.3	N10°55.7	150°23.5	N25°16.8	189°01.4	N22°03.5	267°32.1	S04°51.3	Mars	249°41.3	20:03
7	276° 10.1	271°57.9	55.4	165°25.5	16.7	204° 03.5	03.5	282°34.3	51.2	Jupiter	288°09.5	17:29
8	291°12.6	287°01.5	55.1	180°27.4	16.7	219°05.7	03.5	202 34.3 297°36.4	51.2	Saturn	6°39.8	12:16
										Jatuill	J J3.0	14.10
9	306° 15.0	302°05.1	• • 54.9	195°29.4	•• 16.4	234°07.9	• • 03.6	312°38.6	• • 51.0	Mar 12 Wed	SHA	Mer.pass
10	321°17.5	317°08.7	54.6	210°31.4	16.2	249°10.0	03.6	327°40.8	50.9	Venus		12:56
11	336°20.0	332°12.3	54.3	225°33.3	16.1	264°12.2	03.7	342°43.0	50.7	Mars		20:00
12	351°22.4	347°15.9	N10°54.0	240°35.3	N25°16.0	279°14.3	N22°03.7	357°45.2	S04°50.6	!		
13	6°24.9	$2^{\circ}19.5$	53.7	255°37.3	15.8	294°16.5	03.8	12°47.3	50.5	Jupiter		17:26
14	21°27.3	17°23.1	53.4	270°39.2	15.7	309°18.7	03.8	27°49.5	50.4	Saturn	6°33.0	12:12
	36°29.8	32°26.7	53.1	285°41.2	•• 15.6	324° 20.8	03.8	42°51.7	50.3	Ma:: 12 TI	C114	N4a :: :-
15										Mar 13 Thu	SHA	Mer.pass
16	51°32.3	47°30.3	52.8	300°43.1	15.4	339°23.0	03.9	57°53.9	50.1	Venus		12:51
17	66°34.7	62°33.9	52.5	315°45.1	15.3	354°25.1	03.9	72°56.1	50.0	Mars	249°18.9	19:57
18	81°37.2	77°37.5	N10°52.2	330°47.0	N25°15.1	9°27.3	N22°04.0	87°58.2	S04°49.9	Jupiter		17:22
19	96°39.7	92°41.1	51.9	345°49.0	15.0	24°29.5	04.0	103°00.4	49.8	Saturn	6°26.2	12:09
20	111°42.1	107°44.7	51.6	0°50.9	14.9	39°31.6	04.1	118°02.6	49.7	Jatuill	3 20.2	12.09
21	111 42.1 126° 44.6	107 44.7 122°48.4	51.3	15°52.9	• • 14.7	54° 33.8	•• 04.1	133°04.8	• • 49.5	Horizont	al parallax	
											Venus:	0.5
22	141°47.1	137°52.0	51.0	30°54.8	14.6	69°35.9	04.1	148°07.0	49.4		Mars:	0.2
23	156° 49.5	152°55.6	50.7	45°56.8	14.4	84°38.1	04.2	163°09.1	49.3		iviars:	0.2
1/10= =	ass. 12:34	1/3 6/ 4 0	.3′ m-4.34	1/2 n/ 4 n	.1′ m0.03	1/2 2/ 40	0′ m-2.22	1/2 2/ 4 0	.1′ m1.11			
ivier.p	ass. 14.34	ν3.0 <b>u</b> -0	.5 111-4.54	$\nu$ 2.0 $a$ -0	.1110.03	ν2.2 aU.	0 111-2.22	$\nu$ Z.Z $u$ -U	1111.11			

Tue         GHA         Dec         GHA         Dec         d         HP           0         177°29.3         \$303°42.0         31°59.6         11.9° N20°20.7         -1.13′ 55.8°           2         207°29.6         40.0         61°01.6         11.9° 58.1         11.4′ 55.8°           3         22°29.8         3.91         79°32.7         12.1         19°58.1         11.4′ 55.8°           5         25°30.1         33.1         99°03.9         12.3         19°35.1         11.16         55.8°           6         267°30.3         \$08°36.1         119°06.5         12.5° N19°11.9         11.7° 55.7°           7         282°30.6         34.2         148°09.6         12.7° 18°48.3         11.9° 55.7°           9         312°30.8         33.22         117°31.3         12.8° 18°24.4         12.1° 55.7°           11         342°31.1         31.2         191°44.9         12.9° 18°44.4         12.1° 55.7°           12         357°31.3         \$03°30.2         206°16.8         13.0° N18°00.3         12.2° 55.6°           13         12°31.6         22.3         323°20.9         13.2° 17°38.8         12.3° 55.6°           15         42°31.8         20°3.2         22.2° 48.	h	Su	n	Moon				
1	Tue	GHA	Dec	GHA	ν	Dec	d	HP
2								
	1		41.0					
5								
Fig.								
The color of the								
Section   Sect								
10   337° 31.0   32.2   77° 13.0   12.8°   18° 24.4   -12.1°   55.6°     12   337° 31.3   S03° 30.2   206° 16.8   13.0°   N18° 00.3   -12.2°   55.6°     13   12° 31.5   29.2   220° 48.8   13.1°   17° 48.1   -12.3°   55.6°     14   27° 31.6   28.3   238° 20.9   13.2°   17° 35.8   12.3°   55.6°     15   42° 31.8   27.3   249° 53.1   13.3°   17° 23.4   -12.4°   55.6°     16   57° 32.0   26.3   264° 25.4   13.4°   17° 11.0   -12.5°   55.5°     17   72° 32.1   25.3   278° 57.8   13.5°   16° 58.6   -12.5°   55.5°     19   102° 32.5   23.3   308° 02.8   13.6°   16° 33.4   -12.7°   55.5°     20   117° 32.6   22.4   322° 35.4   13.7°   16° 20.8   -12.8°   55.5°     21   132° 32.8   21.4   337° 08.1   13.8°   16° 08.0   -12.8°   55.4°     22   147° 33.0   20.4   351° 40.9   13.9°   15° 55.2   -12.9°   55.4°     23   162° 33.1   19.4   6° 13.8   13.9°   15° 52.2   -12.9°   55.4°     24   207° 33.5   17.4   35° 19.7   14.1°   15° 10.5   -13.0°   55.4°     2   207° 33.6   16.5   49° 52.8   14.2°   15° 03.5   -13.0°   55.4°     2   207° 33.6   16.5   49° 52.8   14.2°   15° 03.5   -13.0°   55.4°     2   207° 34.3   503° 12.5   108° 06.0   14.5°   14.2°   13.1°   55.3°     3   222° 33.8   0.15.5   64° 26.0   14.3°   14° 31.3   13.2°   55.3°     5   252° 34.1   13.5   93° 32.6   14.4°   14° 24.1   -13.2°   55.3°     6   267° 34.3   503° 12.5   108° 06.0   14.5°   14.2°   13.1°   55.3°     7   282° 34.5   11.5   122° 39.5   14.6°   13° 57.5   -13.3°   55.4°     9   312° 34.8   0.96   51° 46.7   14.7°   13° 30.8   13.3°   55.2°     13   32° 35.0   06.6   166° 20.4   14.8°   13° 13.7   13.3°   55.2°     15   42° 35.8   0.30° 06.6   145° 14.1°   14° 14.2° 1.13.2°   55.3°     16   57° 36.0   0.2° 30.8   14.8°   13° 13.7   14.1° 15.5°     17   72° 36.2   0.7° 36.6   166° 20.4   14.8°   13° 13.7   31.3°   55.1°     18   87° 36.0   0.2° 50.8   34° 09.9   15.1°   12° 09.5   -13.7°   55.1°     15   42° 35.8   0.30° 06.6   145° 06.6   145° 06.8   13.3°   55.1°     16   57° 36.0   0.2° 50.8   34° 09.9   15.1°   10° 05.0   -14.0°   5				148°09.6		18°48.3		
11   342°31.1   31.2   391°44.9   12.9'   18°12.4   -12.1'   55.6'     13   12°31.5   29.2   220°48.8   13.1'   17°48.1   -12.3'   55.6'     14   27°31.6   28.3   235°20.9   13.2'   17°35.8   -12.3'   55.6'     15   42°31.8   27.73   249°53.1   13.3'   17°234.1   -12.4'   55.6'     16   57°32.0   26.3   264°25.4   13.4'   17°11.0   -12.5'   55.5'     18   87°32.3   503°24.3   293°30.2   13.5'   N16°46.0   -12.6'   55.5'     18   87°32.3   503°24.3   293°30.2   13.5'   N16°46.0   -12.6'   55.5'     19   102°32.5   22.3   308°02.8   13.6'   16°33.4   -12.7'   55.5'     20   117°32.6   22.4   322°35.4   13.7'   16°20.8   -12.7'   55.5'     21   132°32.8   -2.1.4   337°08.1   13.8'   16°08.0   -12.8'   55.4'     22   147°33.0   20.4   351°40.9   13.9'   15°55.2   -12.9'   55.4'     22   147°33.3   503°18.4   20°46.7   14.0'   N15°29.5   -13.0'   55.4'     3   220°33.8   -15.5   64°26.0   14.3'   14°50.4   -13.1'   55.3'     4   237°34.0   14.5   76°59.3   14.3'   14°37.3   -13.2'   55.3'     5   252°34.1   13.5   93°32.6   14.4'   14°24.1   -13.2'   55.3'     6   267°34.3   503°12.5   108°06.0   14.5'   N14°10.8   -13.3'   55.3'     7   282°34.5   01.6   137°13.1   14.6'   13°4.2   -13.4'   55.2'     10   327°35.0   08.6   166°20.4   14.8'   13°17.4   -13.2'   55.3'     8   297°34.6   01.6   137°13.1   14.6'   13°4.2   -13.4'   55.2'     10   327°35.3   030°0.6   195°28.0   14.5'   N14°10.8   -13.3'   55.3'     11   342°35.5   0.66   166°24.4   14.8'   13°17.4   -13.5'   55.2'     12   357°35.3   503°0.6   195°3.4   15.5'   10°3.6   -13.6'   55.2'     13   12°35.5   0.66   166°24.4   14.8'   13°17.4   -13.5'   55.2'     15   42°35.8   0.00.6   156°4.7   14.8'   13°03.9   -13.5'   55.2'     15   42°35.8   0.00.6   156°24.1   14.8'   13°17.4   -13.5'   55.2'     15   42°35.8   0.00.6   156°24.1   14.8'   13°17.4   -13.5'   55.2'     15   42°35.8   0.06   16°20.4   14.8'   13°17.4   -13.5'   55.2'     16   57°36.0   0.00   0.00   0.15'   N14°10.8   -13.3'   55.2'     17   72°36.2   0.00   0.00   0.00   0.00   0.00	9	312°30.8	• • 33.2	162°41.3	12.8'	18°36.4	-12.0'	55.7'
12   357°31.3   S03°30.2   206°16.8   13.0'   N18°00.3   .12.2   55.6'     14   27°31.6   29.2   220°48.8   13.1'   17°48.1   -12.3'   55.6'     15   42°31.8   · · · · · · · · · · · · · · · · · ·								
13								
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15								
17								
18	16	57°32.0	26.3	264°25.4	13.4'	17°11.0	-12.5'	55.5'
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117°32.6   22.4   322°35.4   13.7   16°20.8   -12.7   55.5     21   132°32.8   21.4   337°08.1   13.8   16°08.0   -12.7   55.5     22   147°33.0   20.4   337°08.1   13.8   16°08.0   -12.8   55.4     3162°33.1   19.4   6°13.8   13.9   15°55.2   -12.9   55.4     5D = 16.1								
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Wed         GHA         Dec         GHA         ν         Dec         d         HP           0         177°33.3         503°18.4         20°46.7         14.0'         N15°29.5         -13.0'         55.4'           1         192°33.5         17.4         35°19.7         14.1'         15°16.5         -13.0'         55.4'           2         207°33.6         16.5         49°52.8         14.2'         15°03.5         -13.1'         55.4'           3         222°33.8         16.5         49°52.8         14.2'         15°03.5         -13.1'         55.3'           4         237°34.0         14.5         78°59.3         14.3'         14°37.3         -13.2'         55.3'           6         267°34.5         51.5         108°06.0         14.5'         N14°10.8         -13.3'         55.3'           7         282°34.5         11.5         122°39.5         14.6'         13°42.2         -13.4'         55.2'           8         297°34.6         10.6         137°15.1         14.0'         13°30.8         -13.4'         55.2'           10         327°35.0         08.6         166°20.4         14.8'         13°17.4         13°30.9         13.5'								
177°33.3   S03°18.4   20°46.7   14.0'   N15°29.5   -13.0'   55.4'     1   192°33.5   17.4   35°19.7   14.1'   15°16.5   -13.0'   55.4'     2   207°33.6   16.5   49°52.8   14.2'   15°16.5   -13.0'   55.4'     3   222°33.8   · 15.5   64°26.0   14.3'   14°50.4   -13.1'   55.3'     4   237°34.0   14.5   78°59.3   14.3'   14°50.4   -13.1'   55.3'     5   252°34.1   13.5   93°32.6   14.4'   14°24.1   -13.2'   55.3'     6   267°34.3   S03°12.5   108°06.0   14.5'   N14°10.8   -13.3'   55.3'     7   282°34.5   11.5   122°39.5   14.6'   13°47.5   -13.3'   55.3'     8   297°34.8   · 0.9.6   151°46.7   14.7'   13°30.8   -13.4'   55.3'     9   312°34.8   · 0.9.6   151°46.7   14.7'   13°30.8   -13.4'   55.3'     10   327°35.0   08.6   166°20.4   14.8'   13°03.9   -13.5'   55.2'     11   342°35.1   07.6   180°54.1   14.8'   13°03.9   -13.5'   55.2'     12   357°35.3   S03°06.6   195°28.0   14.9'   N12°50.4   -13.6'   55.2'     13   12°35.5   05.6   210°01.9   15.0'   12°30.8   -13.6'   55.2'     14   27°35.7   04.7   224°35.8   15.0'   12°23.2   -13.7'   55.1'     15   42°35.8   · 0.3.7   239°09.9   15.1'   12°09.5   -13.7'   55.1'     16   57°36.0   02.7   253°44.0   15.2'   11°42.1   -13.8'   55.1'     17   72°36.2   01.7   268°18.1   15.2'   11°42.1   -13.8'   55.1'     18   87°36.3   S03°00.7   282°52.3   15.3'   N11°28.3   -13.8'   55.1'     19   102°36.5   02°99.7   528.8   312°01.0   15.4'   11°00.7   -13.9'   55.1'     20   117°36.7   58.8   312°01.0   15.4'   11°00.7   -13.9'   55.1'     21   132°35.8   · 57.8   326°35.4   15.5'   10°48.9   -14.0'   55.0'     22   247°37.5   53.8   24°53.5   15.7'   09°50.9   -14.0'   55.0'     3   222°37.9   · 51.9   54°03.0   15.8'   09°08.7   -14.1'   54.9'     4   237°38.0   50.9   68°37.8   15.8'   09°02.8   -14.1'   54.9'     5   252°38.2   49.9   83°12.6   15.9'   00°50.9   -14.0'   55.0'     10   327°39.4   S02°43.0   185°17.8   16.2'   07°29.3   -14.3'   54.8'     11   342°39.2   44.0   170°42.6   16.2'   07°29.3   -14.3'   54.8'     12   357°39.4   S02°43.0   186°17.8   1		JD — 10.1	u — -1.0		31			
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Thu         GHA         Dec         GHA         ν         Dec         d         HP           0         177° 37.4         \$02° 54.8         10° 18.9         15.6'         N10° 05.0         -14.0'         55.0'           1         192° 37.5         53.8         24° 53.5         15.7'         09° 50.9         -14.1'         55.0'           2         207° 37.7         52.8         39° 28.2         15.7'         09° 36.9         -14.1'         55.0'           3         222° 37.9         · 51.9         54° 03.0         15.8'         09° 22.8         -14.1'         54.9'           4         237° 38.0         50.9         68° 37.8         15.8'         09° 22.8         -14.1'         54.9'           5         252° 38.2         49.9         83° 12.6         15.9'         08° 54.6         -14.2'         54.9'           6         267° 38.4         \$02° 48.9         97° 47.5         15.9'         N08° 40.4         -14.2'         54.9'           7         282° 38.6         47.9         112° 22.4         16.0'         08° 26.2         -14.2'         54.9'           8         297° 38.7         46.9         126° 57.4         16.0'         08° 12.0         -14.2' <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>								
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0         177°37.4         S02°54.8         10°18.9         15.6'         N10°05.0         -14.0'         55.0'           1         192°37.5         53.8         24°53.5         15.7'         09°50.9         -14.0'         55.0'           2         207°37.7         52.8         39°28.2         15.7'         09°36.9         -14.1'         55.0'           3         222°37.9         · 51.9         54°03.0         15.8'         09°22.8         -14.1'         54.9'           4         237°38.0         50.9         68°37.8         15.8'         09°08.7         -14.1'         54.9'           5         252°38.2         49.9         83°12.6         15.9'         08°54.6         -14.2'         54.9'           6         267°38.4         502°48.9         97°47.5         15.9'         N08°40.4         -14.2'         54.9'           7         282°38.6         47.9         112°22.4         16.0'         08°26.2         -14.2'         54.9'           8         297°38.7         46.9         126°57.4         16.0'         08°12.0         -14.2'         54.9'           9         312°38.9         - 45.9         141°32.4         16.1'         07°57.8         -14.3'	Thu	CHV	Doc	CHV	1,	Doc	d	нр
1       192°37.5       53.8       24°53.5       15.7'       09°50.9       -14.0'       55.0'         2       207°37.7       52.8       39°28.2       15.7'       09°36.9       -14.1'       55.0'         3       222°37.9       · 51.9       54°03.0       15.8'       09°22.8       -14.1'       54.9'         4       237°38.0       50.9       68°37.8       15.8'       09°08.7       -14.1'       54.9'         5       252°38.2       49.9       83°12.6       15.9'       08°54.6       -14.2'       54.9'         6       267°38.4       502°48.9       97°47.5       15.9'       N08°40.4       -14.2'       54.9'         7       282°38.6       47.9       112°22.4       16.0'       08°26.2       -14.2'       54.9'         8       297°38.7       46.9       126°57.4       16.0'       08°12.0       -14.2'       54.9'         9       312°38.9       · 45.9       141°32.4       16.1'       07°57.8       -14.3'       54.8'         10       327°39.1       45.0       156°07.5       16.1'       07°43.5       -14.3'       54.8'         11       342°39.2       44.0       170°42.6       16.2'								
3         222°37.9         · · 51.9         54°03.0         15.8'         09°22.8         -14.1'         54.9'           4         237°38.0         50.9         68°37.8         15.8'         09°08.7         -14.1'         54.9'           5         252°38.2         49.9         83°12.6         15.9'         08°54.6         -14.2'         54.9'           6         267°38.4         S02°48.9         97°47.5         15.9'         N08°40.4         -14.2'         54.9'           7         282°38.6         47.9         112°22.4         16.0'         08°26.2         -14.2'         54.9'           8         297°38.7         46.9         126°57.4         16.0'         08°12.0         -14.2'         54.9'           9         312°38.9         · 45.9         141°32.4         16.1'         07°57.8         -14.3'         54.8'           10         327°39.1         45.0         156°07.5         16.1'         07°43.5         -14.3'         54.8'           11         342°39.2         44.0         170°42.6         16.2'         07°29.3         -14.3'         54.8'           12         357°39.4         S02°43.0         185°17.8         16.2'         N07°15.0         -14.	1	192°37.5		24°53.5	15.7'	09°50.9	-14.0'	55.0'
4       237°38.0       50.9       68°37.8       15.8'       09°08.7       -14.1'       54.9'         5       252°38.2       49.9       83°12.6       15.9'       08°54.6       -14.2'       54.9'         6       267°38.4       502°48.9       97°47.5       15.9'       N08°40.4       -14.2'       54.9'         7       282°38.6       47.9       112°22.4       16.0'       08°26.2       -14.2'       54.9'         8       297°38.7       46.9       126°57.4       16.0'       08°12.0       -14.2'       54.9'         9       312°38.9       · 45.9       141°32.4       16.1'       07°57.8       -14.3'       54.8'         10       327°39.1       45.0       156°07.5       16.1'       07°57.8       -14.3'       54.8'         11       342°39.2       44.0       170°42.6       16.2'       07°29.3       -14.3'       54.8'         12       357°39.4       S02°43.0       185°17.8       16.2'       N07°15.0       -14.3'       54.8'         13       12°39.6       42.0       199°53.0       16.3'       06°46.3       -14.4'       54.8'         14       27°39.8       41.0       214°28.3       16.3' <th></th> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
5         252°38.2         49.9         83°12.6         15.9'         08°54.6         -14.2'         54.9'           6         267°38.4         S02°48.9         97°47.5         15.9'         N08°40.4         -14.2'         54.9'           7         282°38.6         47.9         112°22.4         16.0'         08°26.2         -14.2'         54.9'           8         297°38.7         46.9         126°57.4         16.0'         08°12.0         -14.2'         54.9'           9         312°38.9         · 45.9         141°32.4         16.1'         07°57.8         -14.3'         54.8'           10         327°39.1         45.0         156°07.5         16.1'         07°43.5         -14.3'         54.8'           11         342°39.2         44.0         170°42.6         16.2'         07°29.3         -14.3'         54.8'           12         357°39.4         S02°43.0         185°17.8         16.2'         N07°15.0         -14.3'         54.8'           13         12°39.6         42.0         199°53.0         16.3'         06°46.3         -14.4'         54.8'           14         27°39.8         41.0         214°28.3         16.3'         06°32.0         -14.4'								
6         267°38.4         S02°48.9         97°47.5         15.9'         N08°40.4         -14.2'         54.9'           7         282°38.6         47.9         112°22.4         16.0'         08°26.2         -14.2'         54.9'           8         297°38.7         46.9         126°57.4         16.0'         08°12.0         -14.2'         54.9'           9         312°38.9         · 45.9         141°32.4         16.1'         07°57.8         -14.3'         54.8'           10         327°39.1         45.0         156°07.5         16.1'         07°43.5         -14.3'         54.8'           11         342°39.2         44.0         170°42.6         16.2'         N07°15.0         -14.3'         54.8'           12         357°39.4         502°43.0         185°17.8         16.2'         N07°15.0         -14.3'         54.8'           13         12°39.6         42.0         199°53.0         16.3'         07°00.7         -14.3'         54.8'           14         27°39.8         41.0         214°28.3         16.3'         06°46.3         -14.4'         54.8'           15         42°39.9         · 40.0         229°03.6         16.3'         06°32.0         -1								
7         282°38.6         47.9         112°22.4         16.0'         08°26.2         -14.2'         54.9'           8         297°38.7         46.9         126°57.4         16.0'         08°12.0         -14.2'         54.9'           9         312°38.9         · 45.9         141°32.4         16.1'         07°57.8         -14.3'         54.8'           10         327°39.1         45.0         156°07.5         16.1'         07°43.5         -14.3'         54.8'           11         342°39.2         44.0         170°42.6         16.2'         07°29.3         -14.3'         54.8'           12         357°39.4         502°43.0         185°17.8         16.2'         N07°15.0         -14.3'         54.8'           13         12°39.6         42.0         199°53.0         16.3'         07°00.7         -14.3'         54.8'           14         27°39.8         41.0         214°28.3         16.3'         06°46.3         -14.4'         54.8'           15         42°39.9         · 40.0         229°03.6         16.3'         06°32.0         -14.4'         54.8'           16         57°40.1         39.0         243°38.9         16.4'         06°17.6         -14.4'<								
8         297°38.7         46.9         126°57.4         16.0'         08°12.0         -14.2'         54.9'           9         312°38.9         · 45.9         141°32.4         16.1'         07°57.8         -14.3'         54.8'           10         327°39.1         45.0         156°07.5         16.1'         07°43.5         -14.3'         54.8'           11         342°39.2         44.0         170°42.6         16.2'         07°29.3         -14.3'         54.8'           12         357°39.4         S02°43.0         185°17.8         16.2'         N07°15.0         -14.3'         54.8'           13         12°39.6         42.0         199°53.0         16.3'         07°00.7         -14.3'         54.8'           14         27°39.8         41.0         214°28.3         16.3'         06°46.3         -14.4'         54.8'           15         42°39.9         · 40.0         229°03.6         16.3'         06°32.0         -14.4'         54.8'           16         57°40.1         39.0         243°38.9         16.4'         06°17.6         -14.4'         54.7'           17         72°40.3         38.1         258°14.3         16.4'         06°03.2         -14.4'<								
9         312°38.9         · · 45.9         141°32.4         16.1'         07°57.8         -14.3'         54.8'           10         327°39.1         45.0         156°07.5         16.1'         07°43.5         -14.3'         54.8'           11         342°39.2         44.0         170°42.6         16.2'         07°29.3         -14.3'         54.8'           12         357°39.4         S02°43.0         185°17.8         16.2'         N07°15.0         -14.3'         54.8'           13         12°39.6         42.0         199°53.0         16.3'         07°00.7         -14.3'         54.8'           14         27°39.8         41.0         214°28.3         16.3'         06°46.3         -14.4'         54.8'           15         42°39.9         · 40.0         229°03.6         16.3'         06°32.0         -14.4'         54.8'           16         57°40.1         39.0         243°38.9         16.4'         06°17.6         -14.4'         54.7'           17         72°40.3         38.1         258°14.3         16.4'         06°03.2         -14.4'         54.7'           18         87°40.4         S02°37.1         272°49.7         16.4'         N05°48.8								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		312°38.9						
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17         72°40.3         38.1         258°14.3         16.4'         06°03.2         -14.4'         54.7'           18         87°40.4         \$02°37.1         272°49.7         16.4'         \$05°48.8         -14.4'         54.7'           19         102°40.6         36.1         287°25.1         16.5'         05°34.4         -14.4'         54.7'           20         117°40.8         35.1         302°00.6         16.5'         05°20.0         -14.4'         54.7'           21         132°41.0         34.1         316°36.1         16.5'         05°05.5         -14.5'         54.7'           22         147°41.1         33.1         331°11.7         16.6'         04°51.1         -14.5'         54.7'           23         162°41.3         32.1         345°47.3         16.6'         04°36.6         -14.5'         54.6'	15	42°39.9	• • 40.0	229°03.6	16.3'	06°32.0	-14.4'	54.8'
18     87°40.4     \$02°37.1     272°49.7     16.4'     \$N05°48.8     -14.4'     54.7'       19     102°40.6     36.1     287°25.1     16.5'     05°34.4     -14.4'     54.7'       20     117°40.8     35.1     302°00.6     16.5'     05°20.0     -14.4'     54.7'       21     132°41.0     · · 34.1     316°36.1     16.5'     05°05.5     -14.5'     54.7'       22     147°41.1     33.1     331°11.7     16.6'     04°51.1     -14.5'     54.7'       23     162°41.3     32.1     345°47.3     16.6'     04°36.6     -14.5'     54.6'								
19     102°40.6     36.1     287°25.1     16.5'     05°34.4     -14.4'     54.7'       20     117°40.8     35.1     302°00.6     16.5'     05°20.0     -14.4'     54.7'       21     132°41.0     · 34.1     316°36.1     16.5'     05°05.5     -14.5'     54.7'       22     147°41.1     33.1     331°11.7     16.6'     04°51.1     -14.5'     54.7'       23     162°41.3     32.1     345°47.3     16.6'     04°36.6     -14.5'     54.6'								
20     117°40.8     35.1     302°00.6     16.5'     05°20.0     -14.4'     54.7'       21     132°41.0     34.1     316°36.1     16.5'     05°05.5     -14.5'     54.7'       22     147°41.1     33.1     331°11.7     16.6'     04°51.1     -14.5'     54.7'       23     162°41.3     32.1     345°47.3     16.6'     04°36.6     -14.5'     54.6'								
21 132°41.0 ··· 34.1 316°36.1 16.5' 05°05.5 -14.5' 54.7' 22 147°41.1 33.1 331°11.7 16.6' 04°51.1 -14.5' 54.7' 23 162°41.3 32.1 345°47.3 16.6' 04°36.6 -14.5' 54.6'								
23 162°41.3 32.1 345°47.3 16.6' 04°36.6 -14.5' 54.6'								
SD = 16.1'  d = -1.0' $SD = 15.0'$	23	162°41.3	32.1	345°47.3	16.6'	04°36.6	-14.5'	54.6'
		SD = 16.1'	d = -1.0'	-	SI	O = 15.0'		

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

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

		Sun		Moon			
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	11-13	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	90-98%	
11	10:03	09:55	12:10	22:34	10:11		
12	09:47	09:39	12:10	23:18	10:56		
13	09:31	09:22	12:09	23:58	11:38		

# March 14, 15, 16 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	171°52.0	167°59.3	N10°50.4	60°58.7	N25°14.3	99°40.3	N22°04.2	178°11.3	S04°49.2			
1	171 52.0 186°54.5	183°02.9	50.1	76°00.7	14.2	114°42.4	04.2	176 11.5 193°13.5	49.1	Alpheratz	357°35.0	29° 13.7
2	201°56.9	103 02.9 198°06.5	49.7	91°02.6	14.2	114 42.4 129°44.6	04.3	208° 15.7	49.1	Ankaa	353°07.4	-42° 10.3
			• • 49.4							Schedar	349°31.5	56° 40.5
3	216°59.4	213°10.2		106°04.6	• • 13.9	144°46.7 159°48.9	• • 04.3	223°17.9 238°20.0	• • 48.8	Diphda	348°47.5	-17°51.0
4	232°01.8	228°13.8	49.1	121°06.5	13.7		04.4		48.7	Achernar	335°20.5	-57°06.7
5	247°04.3	243°17.5	48.8	136°08.5	13.6	174°51.0	04.4	253°22.2	48.6	Hamal	327°51.3	23°34.9
6	262°06.8	258°21.1	N10°48.4	151°10.4	N25°13.5	189°53.2	N22°04.5	268° 24.4	S04°48.4	Polaris	$314^{\circ}16.1$	89°22.5
7	277°09.2	273°24.7	48.1	166°12.3	13.3	204°55.4	04.5	283°26.6	48.3	Acamar	315°11.9	-40° 12.4
8	292°11.7	288°28.4	47.8	181°14.3	13.2	219°57.5	04.6	298°28.7	48.2	Menkar	314°06.2	4°11.2
9	307°14.2	303°32.1	• • 47.4	196°16.2	• • 13.0	234°59.7	• • 04.6	313°30.9	• • 48.1	Mirfak	308°28.3	49°57.2
10	322°16.6	318°35.7	47.1	211°18.2	12.9	250°01.8	04.6	328°33.1	48.0	Aldebaran	290°39.5	16°33.6
11	337°19.1	333°39.4	46.7	226°20.1	12.7	265°04.0	04.7	343°35.3	47.8	Rigel	281°03.7	-8° 10.5
12	352°21.6	348°43.0	N10°46.4	241°22.0	N25°12.6	280°06.1	N22°04.7	358° 37.5	S04°47.7	Capella	280°21.7	46°01.5
13	7°24.0	3°46.7	46.0	256°24.0	12.5	295°08.3	04.8	13°39.6	47.6	Bellatrix	278°22.7	6°22.3
14	22°26.5	18°50.4	45.7	271°25.9	12.3	310°10.5	04.8	28°41.8	47.5	Elnath	278°01.7	28° 37.8
15	37°28.9	33°54.0	• • 45.3	286°27.8	· · 12.2	$325^{\circ}12.6$	• • 04.9	43°44.0	• • 47.4	Alnilam	275°37.6	-1°11.2
16	52°31.4	48°57.7	45.0	301°29.8	12.0	340°14.8	04.9	58°46.2	47.2	Betelgeuse	270°51.9	7°24.6
17	67°33.9	64°01.4	44.6	316°31.7	11.9	355°16.9	04.9	73°48.4	47.1	Canopus	263°52.2	-52°42.8
18	82°36.3	79°05.0	N10°44.2	331°33.6	N25°11.7	10°19.1	N22°05.0	88° 50.5	S04°47.0	Sirius	203 52.2 258°26.0	-32 42.6 -16°45.2
19	97°38.8	94°08.7	43.9	346°35.6	11.6	25°21.2	05.0	103°52.7	46.9	!		-10 45.2 -29°00.6
20	112°41.3	109°12.4	43.5	1°37.5	11.5	40°23.4	05.1	118°54.9	46.8	Adhara	255°05.6	
21	127°43.7	124°16.1	• • 43.1	16°39.4	• • 11.3	55°25.5	•• 05.1	133°57.1	• • 46.6	Procyon	244°50.5	5°09.5
22	142°46.2	139°19.8	42.8	31°41.3	11.2	70°27.7	05.2	148°59.3	46.5	Pollux	243°16.9	27°57.9
23	157°48.7	154°23.4	42.4	46°43.3	11.0	85°29.8	05.2	164°01.4	46.4	Avior	234°14.3	-59°35.6
										Suhail	222°45.9	-43°32.2
Mer.p	bass. 12:30	$\nu$ 3.6′ d-0	.3′ m-4.28	$\nu^{1.9'} d^{-0}$	.1′ m0.05	$\nu^{2.2'} d0.$	0′ m-2.21	$\nu^{2.2'} d-0$	.1′ m1.11	Miaplacidus	221°37.6	-69°49.4
										Alphard	217°47.3	-8°46.2
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.0	11°50.5
0	172°51.1	169°27.1	N10° 42.0	61°45.2	N25°10.9	100°32.0	N22°05.2	179°03.6	S04°46.3	Dubhe	193°40.1	61°36.9
1	172 51.1 187°53.6	184°30.8	41.6	76°47.1	10.7	100 32.0 115°34.1	05.3	179 05.0 194°05.8	46.2	Denebola	182°24.5	14°25.7
2	202°56.1	199°34.5		91°49.0	10.7	130°36.3	05.3	209°08.0	46.0	Gienah	175°43.1	-17°41.0
	202 50.1 217°58.5		41.2					209 06.0 224°10.2			172°59.3	-63°14.3
3		214°38.2	• • 40.9	106°51.0	. 10.4	145°38.4	• • 05.4		• • 45.9	Gacrux	171°51.0	-57° 15.3
4	233°01.0	229°41.9	40.5	121°52.9	10.3	160°40.6	05.4	239°12.3	45.8	Alioth	166°12.3	55°49.2
5	248°03.4	244°45.6	40.1	136°54.8	10.2	175°42.7	05.4	254°14.5	45.7	Spica	158°21.9	-11° 17.7
6	263°05.9	259°49.3	N10°39.7	151°56.7	N25°10.0	190°44.9	N22°05.5	269°16.7	S04°45.6	Alkaid	152°51.5	49°11.0
7	278°08.4	274°53.0	39.3	166°58.6	09.9	205°47.0	05.5	284° 18.9	45.4	Hadar	148°35.3	-60°29.6
8	293°10.8	289°56.7	38.9	182°00.5	09.7	220°49.2	05.6	299°21.1	45.3	Menkent	147°57.2	-36° 29.6
9	308°13.3	305°00.4	• • 38.5	197°02.5	• • 09.6	235°51.3	• • 05.6	314°23.2	• • 45.2	Arcturus	145°47.5	19°02.8
10	323°15.8	320°04.1	38.1	212°04.4	09.4	250°53.5	05.7	329°25.4	45.1	Rigil Kent.	139°39.7	-60° 56.3
11	338°18.2	335°07.8	37.7	227°06.3	09.3	265°55.6	05.7	344°27.6	45.0	Kochab	137°19.0	74°02.8
12	353°20.7	350°11.6	N10°37.3	242°08.2	$N25^{\circ}09.1$	280°57.8	N22°05.7	359°29.8	S04°44.8	Zuben'ubi	136°55.6	-16°08.9
13	8°23.2	5°15.3	36.9	$257^{\circ}10.1$	09.0	295°59.9	05.8	14°31.9	44.7	Alphecca	126°03.4	26° 37.5
14	23°25.6	$20^{\circ}19.0$	36.4	272°12.0	08.9	311°02.1	05.8	29°34.1	44.6	Antares	112°15.6	-26°29.3
15	38°28.1	35°22.7	• • 36.0	287°13.9	• • 08.7	326°04.2	• • 05.9	44°36.3	• • 44.5	Atria	107°09.6	-69°04.1
16	53°30.5	50°26.4	35.6	302°15.8	08.6	341°06.4	05.9	59°38.5	44.4	Sabik	102°02.6	-15°45.4
17	68°33.0	65°30.2	35.2	317°17.8	08.4	356°08.5	06.0	74°40.7	44.2	Shaula	96°10.2	-37°07.3
18	83°35.5	80°33.9	N10°34.8	332°19.7	N25°08.3	11°10.7	N22°06.0	89°42.8	S04°44.1	Rasalhague	95°58.4	12°32.2
19	98°37.9	95°37.6	34.3	347°21.6	08.1	26°12.8	06.0	104°45.0	44.0	_	90°42.2	51°28.7
20	113°40.4	110°41.3	33.9	2°23.5	08.0	41°15.0	06.1	119°47.2	43.9	Eltanin	83°32.4	-34°22.3
21	128°42.9	125°45.1	• • 33.5	17°25.4	• • 07.8	56°17.1	• • 06.1	134°49.4	• • 43.8	Kaus Aust.		-34 22.3 38°48.1
22	143°45.3	140°48.8	33.0	32°27.3	07.7	71°19.2	06.2	149°51.6	43.6	Vega	80°33.2	
23	158°47.8	155°52.5	32.6	47°29.2	07.5	86°21.4	06.2	164°53.7	43.5	Nunki	75°47.7	-26°15.9
										Altair	62°00.0	8°55.9
Mer.p	bass. 12:27	$\nu$ 3.7′ d-0	.4′ m-4.22	$\nu$ 1.9′ d-0	$0.1' \; { m m0.07}$	$\nu 2.2' \ d0.$	0′ m-2.20	$\nu 2.2' \ d-0$	.1' m $1.11$	Peacock	53°05.9	-56°39.1
										Deneb	49°26.1	45°21.9
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.9	9°59.3
0	173°50.3	170°56.3	N10°32.2	62°31.1	N25°07.4	101°23.5	N22°06.3	179°55.9	S04°43.4	Al Na'ir	27°33.1	-46°50.4
1	188°52.7	186°00.0	31.7	77°33.0	07.2	101°25.7	06.3	179 55.9 194°58.1	43.3	Fomalhaut	15°14.7	-29°29.4
2	203°55.2	201°03.8	31.7	92°34.9	07.2	131°27.8	06.3	210°00.3	43.2	Scheat	13°45.4	28° 13.0
3	203 55.2 218°57.7	201 03.8 216°07.5	30.8	92 34.9 107°36.8	06.9	131 27.8 146°30.0	06.4	210 00.3 225°02.5	43.0	Markab	13°30.1	15°20.3
4	234°00.1	231°11.3	30.4	107 30.8 122°38.7	06.8	140 30.0 161°32.1	06.4	240°04.6	42.9	Mar 14 Fri	SHA	Mer.pass
5	249°02.6	231 11.3 246°15.0	29.9	122 36.7 137°40.6	06.6	101 32.1 176°34.3	06.5	255°06.8		Venus		12:45
6									42.8 504°42.7	Mars	249°06.7	19:54
	264°05.0	261°18.7	N10° 29.5	152°42.5	N25°06.5	191°36.4	N22°06.5	270°09.0	S04°42.7	Jupiter		
7	279°07.5	276°22.5	29.0	167°44.4	06.4	206°38.5	06.6	285°11.2	42.6	Saturn	6°19.3	17:19
8	294°10.0	291°26.3	28.6	182°46.3	06.2	221°40.7	06.6	300°13.4	42.4	Saturn	υ 19.3	12:05
9	309°12.4	306°30.0	• • 28.1	197°48.1	06.1	236°42.8	• • 06.6	315°15.5	• • 42.3	Mar 15 Sat	SHA	Mer.pass
10	324°14.9	321°33.8	27.6	212°50.0	05.9	251°45.0	06.7	330°17.7	42.2		356°36.0	12:39
11	339°17.4	336°37.5	27.2	227°51.9	05.8	266°47.1	06.7	345°19.9	42.1	Mars		19:50
12	354°19.8	351°41.3	N10°26.7	242°53.8	N25°05.6	281°49.3	N22°06.8	0°22.1	S04°42.0		287°40.9	17:15
13	9°22.3	6°45.0	26.2	257°55.7	05.5	296°51.4	06.8	15°24.3	41.8	Saturn	6°12.5	12:02
14	24°24.8	21°48.8	25.8	272°57.6	05.3	311°53.5	06.9	30°26.4	41.7			
15	39°27.2	36°52.6	• • 25.3	287°59.5	• • 05.2	326°55.7	• • 06.9	45°28.6	• • 41.6	Mar 16 Sun	SHA	Mer.pass
16	54°29.7	51°56.3	24.8	303°01.4	05.0	341°57.8	07.0	60°30.8	41.5		357°06.0	12:33
17	69°32.2	67°00.1	24.3	318°03.3	04.9	357°00.0	07.0	75°33.0	41.4		248°40.8	19:47
18	84°34.6	82°03.9	N10°23.8	333°05.1	N25°04.7	12°02.1	N22°07.0	90°35.1	S04°41.2	Jupiter	287°33.3	17:12
19	99°37.1	97°07.6	23.4	348°07.0	04.6	27°04.2	07.1	105°37.3	41.1	Saturn	6°05.7	11:59
20	114°39.5	112°11.4	22.9	3°08.9	04.4	42°06.4	07.1	120°39.5	41.0		-1 "	
21	129°42.0	127°15.2	• • 22.4	18°10.8	• • 04.3	57°08.5	• • 07.2	135°41.7	• • 40.9	Horizont	al parallax	2 -
22	144°44.5	142°19.0	21.9	33°12.7	04.1	72°10.7	07.2	150°43.9	40.8		Venus:	0.5
23	159°46.9	157°22.7	21.4	48°14.5	04.0	87°12.8	07.3	165°46.0	40.6		Mars:	0.1
1/102 -	pass. 12:23	1/2 7/ 4 0	.4′ m-4.16	1/1 O/ d O	.1′ m0.10	1/2 1/ do	0′ m-2.20	1/2 2/ 4 0	.1′ m1.12			
ivier.p	,uss. 14.43	ν 3.1 u-0		ν1.9 U-0	.1110.10	ν Δ.1 UU.	U 111-2.2U	ν Δ.Δ U-U				

h	Su	n	Moon				
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	177°41.5	S02°31.2	0°22.9	16.6'	$N04^{\circ}22.1$	-14.5'	54.6'
1	192°41.7	30.2	14°58.5	16.7'	04°07.7	-14.5'	54.6'
2	207°41.8 222°42.0	29.2 •• 28.2	29°34.2 44°09.9	16.7' 16.7'	03°53.2 03°38.7	-14.5' -14.5'	54.6' 54.6'
4	237° 42.2	27.2	58°45.6	16.8'	03°24.2	-14.5'	54.6'
5	252° 42.4	26.2	73°21.4	16.8'	03°09.6	-14.5'	54.6'
6	267° 42.5	S02°25.2	$87^{\circ}57.1$	16.8'	N02°55.1	-14.5'	54.6'
7	282°42.7	24.3	102°32.9	16.8'	02°40.6	-14.5'	54.5'
8	297° 42.9 312° 43.0	23.3	117°08.8 131°44.6	16.8' 16.9'	02°26.1 02°11.6	-14.5' -14.5'	54.5' 54.5'
9 10	312°43.0 327°43.2	21.3	131°44.6 146°20.5	16.9'	02°11.6 01°57.0	-14.5' -14.5'	54.5'
11	342°43.4	20.3	160°56.4	16.9'	01°42.5	-14.5'	54.5'
12	357°43.6	S02°19.3	175°32.3	16.9'	N01°28.0	-14.5'	54.5'
13	12°43.7	18.3	190°08.2	16.9'	01°13.5	-14.5'	54.5'
14 15	27°43.9 42°44.1	17.4 •• 16.4	204°44.1 219°20.1	17.0' 17.0'	00°59.0 00°44.4	-14.5' -14.5'	54.5' 54.4'
16	57° 44.3	15.4	219 20.1 233°56.1	17.0'	00° 44.4	-14.5'	54.4'
17	72°44.4	14.4	248°32.1	17.0'	00° 15.4	-14.5'	54.4'
18	87°44.6	S02°13.4	263°08.1	17.0'	N00°00.9	-14.5'	54.4'
19	102°44.8	12.4	277°44.1	17.0'	S00° 13.6	14.5'	54.4'
20	117°45.0 132°45.1	11.4	292°20.1	17.0'	00°28.1 00°42.6	14.5	54.4'
21 22	132°45.1 147°45.3	· · 10.4 09.5	306°56.1 321°32.2	17.0' 17.0'	00°42.6 00°57.0	14.5' 14.5'	54.4' 54.4'
23	162°45.5	08.5	336°08.2	17.1	00° 37.0	14.5	54.4'
-	SD = 16.1'	d = -1.0'			D = 14.9'		
		u — -1.0		اد			
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	177° 45.7 192° 45.9	\$02°07.5 06.5	350°44.3 5°20.3	17.1' 17.1'	\$01°26.0 01°40.4	14.4' 14.4'	54.3' 54.3'
2	207° 46.0	05.5	19°56.4	17.1	01°54.8	14.4	54.3'
3	222° 46.2	• • 04.5	34°32.4	17.1'	02°09.3	14.4	54.3'
4	237°46.4	03.5	49°08.5	17.1'	$02^{\circ}23.7$	14.4'	54.3'
5	252°46.6	02.6	63°44.6	17.1'	02°38.1	14.4'	54.3'
6	267° 46.7 282° 46.9	\$02°01.6 02°00.6	78°20.6 92°56.7	17.1'	\$02°52.4 03°06.8	14.4'	54.3'
7 8	282°46.9 297°47.1	02°00.6 01°59.6	92°56.7 107°32.8	17.1' 17.1'	03°06.8 03°21.1	14.3' 14.3'	54.3' 54.3'
9	312° 47.3	• • 58.6	107 32.8 122°08.8	17.1	03°35.5	14.3	54.3'
10	327°47.4	57.6	136°44.9	17.1'	03°49.8	14.3'	54.2'
11	342°47.6	56.6	151°21.0	17.1'	$04^{\circ}04.1$	14.3'	54.2'
12	357°47.8	S01°55.6	165°57.0	17.0'	S04°18.3	14.2'	54.2'
13 14	12°48.0 27°48.1	54.7 53.7	180°33.1 195°09.1	17.0' 17.0'	04°32.6 04°46.8	14.2' 14.2'	54.2' 54.2'
15	42°48.3	• • 52.7	209°45.1	17.0'	05°01.0	14.2	54.2'
16	57°48.5	51.7	224°21.1	17.0'	05° 15.2	14.2'	54.2'
17	72°48.7	50.7	$238^{\circ}57.1$	17.0'	$05^{\circ}29.4$	14.1'	54.2'
18	87°48.9	S01°49.7	253°33.1	17.0'	\$05°43.5	14.1'	54.2'
19 20	102°49.0 117°49.2	48.7 47.7	268°09.1 282°45.1	17.0' 17.0'	05°57.6 06°11.7	14.1' 14.1'	54.2' 54.2'
21	132°49.4	• • 46.8	297°21.0	16.9'	06°25.7	14.1	54.2
22	147°49.6	45.8	311°57.0	16.9'	06°39.8	14.0'	54.1'
23	162°49.7	44.8	326°32.9	16.9'	06°53.8	14.0'	54.1'
	SD = 16.1'	d = -1.0'		SI	D = 14.8'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	177° 49.9	S01°43.8	341°08.8	16.9'	S07°07.8	13.9'	54.1'
1	192°50.1	42.8	355°44.7	16.9'	$07^{\circ}21.7$	13.9'	54.1'
2	207°50.3	41.8	10°20.6	16.8'	07°35.6	13.9'	54.1'
3 4	222° 50.5 237° 50.6	· · 40.8 39.8	24°56.4 39°32.2	16.8' 16.8'	07°49.5 08°03.3	13.8' 13.8'	54.1' 54.1'
5	252° 50.8	38.9	54°08.0	16.8	08°17.2	13.8'	54.1
6	267°51.0	S01°37.9	68°43.8	16.8'	S08°30.9	13.7'	54.1'
7	282°51.2	36.9	83°19.6	16.7'	08°44.7	13.7'	54.1'
8	297°51.4 312°51.5	35.9	97°55.3	16.7'	08°58.4 09°12.1	13.7'	54.1'
9 10	312°51.5 327°51.7	· · 34.9 33.9	112°31.0 127°06.7	16.7' 16.7'	09°12.1 09°25.7	13.6' 13.6'	54.1' 54.1'
11	342°51.9	32.9	141°42.4	16.6'	09°25.7	13.6'	54.1
12	357°52.1	S01°31.9	156°18.0	16.6'	S09°52.9	13.5'	54.1'
13	12°52.2	31.0	170°53.6	16.6'	10°06.4	13.5'	54.1'
14	27°52.4	30.0	185°29.1	16.5'	10°19.9	13.4'	54.0'
15 16	42°52.6 57°52.8	· · 29.0 28.0	200°04.7 214°40.2	16.5' 16.5'	10°33.3 10°46.7	13.4' 13.4'	54.0' 54.0'
17	72°53.0	27.0	214 40.2 229°15.6	16.4	10 40.7 11°00.1	13.4	54.0'
18	87° 53.1	S01°26.0	243°51.1	16.4'	<b>S</b> 11°13.4	13.3'	54.0'
19	102°53.3	25.0	258°26.5	16.4'	11°26.7	13.2'	54.0'
20	117°53.5	24.0	273°01.8	16.3'	11°39.9	13.2'	54.0'
21 22	132°53.7 147°53.9	· · 23.0 22.1	287°37.1 302°12.4	16.3' 16.2'	11°53.1 12°06.2	13.1' 13.1'	54.0' 54.0'
23	162° 54.0	22.1	302 12.4 316°47.7	16.2'	12 06.2 12°19.3	13.1	54.0'
	SD = 16.1'	d = -1.0'			D = 14.8'	_0.0	
	3D = 10.1	u — -1.U		ા	U — 14.0		

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

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

		Sun			Moon	
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	14-16
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	100-97%
14	09:14	09:06	12:09	-:-	12:18	
15	08:57	08:49	12:09	00:38	12:58	
16	08:40	08:32	12:09	01:17	13:37	

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	174°49.4	172°26.5	N10°20.9	63°16.4	N25°03.8	102°14.9	N22°07.3	180°48.2	S04°40.5			
1	189°51.9	187°30.3	20.4	78°18.3	03.7	117°17.1	07.3	195°50.4	40.4	Alpheratz	357°35.0	29° 13.7
2	204°54.3	202°34.1	19.9	93°20.2	03.5	132°19.2	07.4	210°52.6	40.3	Ankaa	353°07.4	-42°10.3
3	219°56.8	217°37.9	• • 19.4	108°22.1	03.4	147°21.4	•• 07.4	225°54.8	40.2	Schedar	349°31.5	56°40.5
4	234°59.3	232°41.7	18.9	123°23.9	03.4	162°23.5	07.5	240°56.9	40.0	Diphda	348°47.5	-17°51.0
5	250°01.7	247°45.4	18.4	138°25.8	03.2	102 25.5 177°25.6	07.5	255° 59.1	39.9	Achernar	335°20.5	-57°06.7
6	265°04.2	262°49.2	N10° 17.9	150° 25.0° 153° 27.7°	N25°02.9	177 25.0 192°27.8	N22°07.6	271°01.3	504°39.8	Hamal	327°51.3	23°34.9
	280°06.6	202 49.2 277°53.0		168°29.5		207°29.9		271 01.3 286°03.5		Polaris	314°17.2	89°22.5
7			17.3		02.8		07.6		39.7	Acamar	$315^{\circ}11.9$	-40°12.4
8	295°09.1	292°56.8	16.8	183°31.4	02.6	222°32.0	07.6	301°05.7	39.6	Menkar	314°06.2	$4^{\circ}11.2$
9	310°11.6	308°00.6	• • 16.3	198°33.3	• • 02.4	237°34.2	• • 07.7	316°07.8	• • 39.4	Mirfak	308°28.3	49°57.2
10	325°14.0	323°04.4	15.8	213°35.2	02.3	252°36.3	07.7	331°10.0	39.3	Aldebaran	290°39.5	16°33.6
11	340°16.5	338°08.2	15.3	228°37.0	02.1	267°38.4	07.8	346° 12.2	39.2	Rigel	281°03.8	-8° 10.5
12	355°19.0	353°12.0	N10°14.7	243°38.9	N25°02.0	282°40.6	N22°07.8	1° 14.4	S04°39.1	Capella	280°21.7	46°01.5
13	10°21.4	8°15.8	14.2	258°40.8	01.8	297°42.7	07.9	$16^{\circ}16.6$	39.0	Bellatrix	278°22.7	6°22.3
14	25°23.9	23°19.6	13.7	273°42.6	01.7	$312^{\circ}44.8$	07.9	$31^{\circ}18.7$	38.8	Elnath	278°01.7	28° 37.8
15	40°26.4	38°23.4	• • 13.1	288°44.5	· · 01.5	327°47.0	• • 07.9	46°20.9	· · 38.7	Alnilam	275°37.6	-1°11.2
16	55°28.8	53°27.2	12.6	303°46.4	01.4	342°49.1	08.0	61°23.1	38.6		270°51.9	7°24.6
17	70°31.3	68°31.0	12.1	318°48.2	01.2	357°51.3	08.0	76°25.3	38.5	Betelgeuse		
18	85°33.8	83°34.8	N10°11.5	333°50.1	N25°01.1	12°53.4	N22°08.1	91°27.5	504°38.4	Canopus	263°52.3	-52°42.8
19	100°36.2	98°38.6	11.0	348°51.9	00.9	27°55.5	08.1	106°29.6	38.2	Sirius	258°26.0	-16°45.2
20	115°38.7	113°42.4	10.4	3°53.8	00.8	42°57.7	08.2	121°31.8	38.1	Adhara	255°05.6	-29°00.6
21	130°41.1	128°46.2	• • 09.9	18°55.7	00.6	57°59.8	08.2	136°34.0	38.0	Procyon	244°50.5	5°09.5
22	145°43.6	143°50.0	09.3	33°57.5	00.5	73°01.9	08.3	151°36.2	37.9	Pollux	243°16.9	27°57.9
23	160°46.1	158°53.8	09.3	48°59.4	00.3	88°04.0	08.3	166°38.4	37.8	Avior	234°14.3	-59°35.6
23	100 40.1									Suhail	222°45.9	-43°32.2
Mer.p	ass. 12:19	$\nu$ 3.8′ d-0	.5′ m-4.09	$\nu$ 1.9 $^{\prime}$ d-0	0.2′ m0.12	$\nu 2.1' \ d0$	.0′ m-2.19	$\nu$ 2.2' d-0	0.1'  m 1.12	Miaplacidus	221°37.6	-69°49.4
										Alphard	217°47.4	-8°46.2
_			_		_		_		_	Regulus	207°34.0	$11^{\circ}50.5$
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.1	61°36.9
0	175°48.5	173°57.6	$N10^{\circ}08.2$	64°01.2	$N25^{\circ}00.2$	103°06.2	N22°08.3	181°40.5	S04°37.6	Denebola	182°24.5	14° 25.7
1	190°51.0	189°01.5	07.7	79°03.1	25°00.0	118°08.3	08.4	$196^{\circ}42.7$	37.5	Gienah	_	-17°41.0
2	205°53.5	204°05.3	07.1	94°04.9	24°59.8	133°10.4	08.4	211°44.9	37.4		172°59.3	-63°14.3
3	220°55.9	$219^{\circ}09.1$	• • 06.6	109°06.8	• • 59.7	148°12.6	• • 08.5	226°47.1	• • 37.3		171°51.0	-57° 15.3
4	235°58.4	234°12.9	06.0	124°08.6	59.5	163°14.7	08.5	241°49.3	37.2	Alioth	166°12.3	55° 49.2
5	251°00.9	249°16.7	05.4	139°10.5	59.4	178°16.8	08.6	256°51.4	37.0			
6	266°03.3	264°20.5	N10°04.9	154°12.3	N24°59.2	193°19.0	N22°08.6	271°53.6	S04°36.9	Spica	158°21.9	-11°17.7
7	281°05.8	279°24.4	04.3	169°14.2	59.1	208°21.1	08.6	286°55.8	36.8	Alkaid	152°51.4	49°11.0
8	296°08.2	294°28.2	03.7	184°16.0	58.9	223°23.2	08.7	301°58.0	36.7	Hadar	148°35.3	-60°29.6
9	311°10.7	309°32.0	03.1	199°17.9	• • 58.8	238°25.4	08.7	317°00.2	36.6		147°57.1	-36° 29.7
10	326°13.2	324°35.8	02.6	214°19.7	58.6	253°27.5	08.8	332°02.3	36.4	Arcturus	145°47.5	19°02.8
11	341°15.6	339°39.7	02.0	214 19.7 229°21.6	58.4	268°29.6	08.8	347°04.5		Rigil Kent.	139°39.7	-60°56.3
12	356°18.1	354°43.5	N10°01.4	244°23.4	N24°58.3	283°31.7	N22°08.9	2°06.7	36.3 \$04°36.2	Kochab	$137^{\circ}18.9$	74°02.8
										Zuben'ubi	$136^{\circ}55.6$	$-16^{\circ}08.9$
13	11°20.6	9°47.3	00.8	259°25.3	58.1	298°33.9	08.9	17°08.9	36.1	Alphecca	126°03.4	26°37.5
14	26°23.0	24°51.1	10°00.2	274°27.1	58.0	313°36.0	09.0	32°11.1	36.0	Antares	112°15.5	-26°29.3
15	41°25.5	39°55.0	09°59.7	289°29.0	• • 57.8	328°38.1	• • 09.0	47° 13.2	• • 35.8	Atria	107°09.5	-69°04.1
16	56°28.0	54°58.8	59.1	304°30.8	57.7	343°40.3	09.0	62°15.4	35.7	Sabik	102°02.6	-15°45.4
17	71°30.4	70°02.6	58.5	319°32.6	57.5	358°42.4	09.1	77° 17.6	35.6	Shaula	96°10.1	-37°07.3
18	86°32.9	85°06.5	N09°57.9	334°34.5	N24°57.4	13°44.5	N22°09.1	92°19.8	S04°35.5	Rasalhague	95°58.4	12°32.2
19	101°35.4	$100^{\circ}10.3$	57.3	349°36.3	57.2	28°46.6	09.2	107°21.9	35.4	Eltanin	90°42.1	51°28.7
20	116°37.8	$115^{\circ}14.1$	56.7	4°38.2	57.0	43°48.8	09.2	122°24.1	35.2	Kaus Aust.	83°32.4	-34° 22.3
21	131°40.3	130°17.9	• • 56.1	19°40.0	• • 56.9	58°50.9	• • 09.3	137°26.3	• • 35.1		80°33.2	-34° 22.3 38° 48.1
22	146°42.7	145°21.8	55.5	34°41.8	56.7	73°53.0	09.3	152°28.5	35.0	Vega		
23	161°45.2	160°25.6	54.9	49°43.7	56.6	88°55.1	09.4	167°30.7	34.9	Nunki	75°47.7	-26°15.9
										Altair	62°00.0	8°55.9
Mer.p	ass. 12:15	$\nu$ 3.8′ d-0	.6′ m-4.04	$\nu$ 1.9′ d-0	).2′ m0.14	$\nu 2.1' d0$	.0′ m-2.19	$\nu$ 2.2′ d-0	$0.1' \; {\sf m} 1.12$	Peacock	53°05.8	-56°39.1
										Deneb	49°26.0	45°21.9
Wed	GHA	GHA	Doc	GHA	Dec	GHA	Doc	GHA	Doc	Enif	33°38.9	9°59.3
	<b>GПА</b> 176°47.7		<b>Dec</b> N09° 54.3	64°45.5	<b>Dec</b> N24°56.4	103°57.3	<b>Dec</b> N22°09.4	182°32.8	<b>Dec</b> <b>S</b> 04°34.8	Al Na'ir	27°33.1	-46°50.3
0		175°29.5						182 32.8 197°35.0		Fomalhaut	15°14.7	-29°29.4
1	191°50.1	190°33.3	53.7	79°47.3	56.3	118°59.4	09.4		34.6	Scheat	13°45.4	28° 13.0
2	206°52.6	205°37.1	53.0	94°49.2	56.1	134°01.5	09.5	212°37.2	34.5	Markab	13°30.1	15°20.3
3	221°55.1	220°41.0	• • 52.4	109°51.0	55.9	149°03.6	• • 09.5	227°39.4	• • 34.4	Ma:: 17 NA-	CHA	Me:: ====
4	236°57.5	235°44.8	51.8	124°52.8	55.8	164°05.8	09.6	242°41.6	34.3	Mar 17 Mon	SHA	Mer.pass
5	252°00.0	250°48.6	51.2	139°54.7	55.6	179°07.9	09.6	257°43.7	34.2	Venus		12:27
6	267°02.5	265°52.5	N09°50.6	154°56.5	N24°55.5	194°10.0	N22°09.7	272°45.9	S04°34.0	Mars	248°27.0	19:44
7	282°04.9	280°56.3	50.0	169°58.3	55.3	209°12.1	09.7	287°48.1	33.9	Jupiter		17:09
8	297°07.4	296°00.2	49.3	185°00.2	55.1	224°14.3	09.8	302°50.3	33.8	Saturn	5°58.8	11:55
9	312°09.9	311°04.0	• • 48.7	200°02.0	• • 55.0	239°16.4	• • 09.8	317°52.5	• • 33.7	Mar 18 Tue	SHA	Mer.pass
10	$327^{\circ}12.3$	326°07.9	48.1	215°03.8	54.8	254°18.5	09.8	332°54.6	33.6	Venus	358°09.1	12:21
11	$342^{\circ}14.8$	341°11.7	47.4	230°05.6	54.7	269°20.6	09.9	347°56.8	33.4			
12	357°17.2	356°15.5	N09°46.8	245°07.5	N24°54.5	284°22.8	N22°09.9	2°59.0	S04°33.3	Mars	248°12.7	19:41
13	$12^{\circ}19.7$	11°19.4	46.2	260°09.3	54.4	299°24.9	10.0	18°01.2	33.2	Jupiter		17:05
14	27°22.2	26°23.2	45.5	275°11.1	54.2	314°27.0	10.0	33°03.4	33.1	Saturn	5°52.0	11:52
15	42°24.6	41°27.1	• • 44.9	290°12.9	• • 54.0	329°29.1	10.1	48°05.5	33.0	Mar 19 Wed	SHA	Mer.pass
16	57°27.1	56°30.9	44.3	305°14.7	53.9	344°31.2	10.1	63°07.7	32.8	Venus		12:15
17	72°29.6	71°34.8	44.5	320°16.6	53.9	359°33.4	10.1	78°09.9	32.7			
	72 29.0 87°32.0	71 34.8 86°38.6	43.0 N09°43.0	320 16.6 335°18.4	N24°53.6	359 33.4 14°35.5	N22°10.2	93°12.1	504°32.6	Mars	247°57.8	19:39
18										Jupiter		17:02
19	102°34.5	101°42.5	42.3	350°20.2	53.4	29°37.6	10.2	108° 14.3	32.5	Saturn	5°45.2	11:48
20	117°37.0	116°46.3	41.7	5°22.0	53.2	44°39.7	10.3	123°16.4	32.4	Horizont	al parallax	
21	132°39.4	131°50.2	• • 41.0	20°23.8	53.1	59°41.8	10.3	138° 18.6	• • 32.3	1101120111	Venus:	0.5
22	147°41.9	146°54.0	40.4	35°25.7	52.9	74°44.0	10.4	153°20.8	32.1		Mars:	0.5
23	162°44.3	161°57.9	39.7	50°27.5	52.8	89°46.1	10.4	168°23.0	32.0		iviars:	0.1
Mern	ass. 12:11	v3 8' d-0	.6′ m-4.13	$\nu^{1.8'} d_{-1}$	0.2′ m0.17	$\nu^2 \frac{1}{d\Omega}$	.0′ m-2.18	v2 2' d-C	0.1′ m1.13			
ст.р				- 1.0 U-C		- 2.1 00.	2.10					

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	177°54.2	S01°20.1	331°22.9	16.2'	\$12°32.4	13.0'	54.0'
1 2	192°54.4 207°54.6	19.1 18.1	345°58.0 0°33.2	16.1' 16.1'	12°45.4 12°58.3	12.9' 12.9'	54.0' 54.0'
3	207 54.0 222°54.8	17.1	15°08.3	16.0'	13°11.2	12.8'	54.0'
4	237°54.9	16.1	29°43.3	16.0'	$13^{\circ}24.1$	12.8'	54.0'
5	252°55.1	15.1	44°18.3	15.9'	13°36.9	12.7'	54.0'
6 7	267°55.3 282°55.5	S01°14.2 13.2	58°53.2 73°28.1	15.9' 15.9'	\$13°49.6 14°02.3	12.7' 12.6'	54.0' 54.0'
8	297°55.7	12.2	88°03.0	15.8'	14°14.9	12.6'	54.0'
9	312°55.8	• • 11.2	102°37.8	15.8'	14°27.5	12.5'	54.0'
10	327°56.0 342°56.2	10.2	117°12.6 131°47.3	15.7'	14°40.0 14°52.5	12.5'	54.0' 54.0'
11 12	357°56.4	09.2 \$01°08.2	131 47.3 146°21.9	15.7' 15.6'	\$15°04.9	12.4' 12.4'	54.0'
13	12°56.6	07.2	160°56.6	15.6'	15°17.3	12.3'	54.0'
14	27°56.8	06.2	175°31.1	15.5'	15°29.5	12.2'	54.0'
15 16	42°56.9 57°57.1	· · 05.3 04.3	190°05.6 204°40.1	15.5' 15.4'	15°41.8 15°54.0	12.2' 12.1'	54.0' 54.0'
17	72°57.3	03.3	219°14.5	15.3'	16°06.1	12.0'	54.0'
18	87°57.5	S01°02.3	233°48.8	15.3'	<b>S</b> 16°18.1	12.0'	54.0'
19	102°57.7 117°57.8	01.3 01°00.3	248°23.1 262°57.4	15.2'	16°30.1 16°42.0	11.9'	54.0'
20 21	117 57.8 132°58.0	01°00.3 00°59.3	262°57.4 277°31.5	15.2' 15.1'	16°42.0 16°53.9	11.9' 11.8'	54.0' 54.0'
22	147°58.2	58.3	292°05.7	15.1'	17°05.7	11.7'	54.0'
23	162°58.4	57.4	306°39.7	15.0'	17°17.4	11.7'	54.0'
	SD = 16.1'	d = -1.0'		SE	O = 14.7'		
Tue	GHA	Dec	GHA	ν	Dec	d	НР
0	177°58.6	<b>S</b> 00°56.4	321°13.7	14.9'	S17°29.1	11.6'	54.0'
1	192°58.8	55.4	335°47.7	14.9'	17°40.6	11.5'	54.0'
2	207°58.9 222°59.1	54.4 •• 53.4	350°21.6 4°55.4	14.8' 14.8'	17°52.2 18°03.6	11.5' 11.4'	54.0' 54.0'
4	237°59.3	52.4	19°29.1	14.7'	18° 15.0	11.3'	54.0'
5	252°59.5	51.4	34°02.8	14.6'	$18^{\circ}26.3$	11.2'	54.0'
6	267°59.7 282°59.8	\$00° 50.4 49.4	48°36.5 63°10.0	14.6' 14.5'	\$18°37.5 18°48.7	11.2' 11.1'	54.0' 54.0'
7 8	282 59.8 298°00.0	49.4 48.5	77°43.5	14.5 14.4'	18 48.7 18°59.8	11.1	54.0'
9	313°00.2	• • 47.5	92°17.0	14.4'	19°10.8	10.9'	54.0'
10	328°00.4	46.5	106°50.4	14.3'	19°21.8	10.9'	54.0'
11 12	343°00.6 358°00.8	45.5 \$00°44.5	121°23.7 135°56.9	14.2' 14.2'	19°32.6 \$19°43.4	10.8' 10.7'	54.0' 54.0'
13	13°00.9	43.5	150°30.1	14.1'	19°54.1	10.6	54.0'
14	28°01.1	42.5	$165^{\circ}03.2$	14.0'	$20^{\circ}04.7$	10.5'	54.0'
15 16	43°01.3 58°01.5	· · 41.5 40.6	179°36.2 194°09.2	14.0' 13.9'	20°15.3 20°25.8	10.5' 10.4'	54.0' 54.0'
17	73°01.7	39.6	208°42.1	13.8'	20°25.6 20°36.1	10.4	54.0'
18	88°01.9	S00°38.6	223°14.9	13.8'	S20°46.4	10.2'	54.0'
19	103°02.0	37.6	237°47.7 252°20.4	13.7'	20°56.7	10.1'	54.1'
20 21	118°02.2 133°02.4	36.6 •• 35.6	252°20.4 266°53.0	13.6' 13.5'	21°06.8 21°16.8	10.0' 10.0'	54.1' 54.1'
22	148°02.6	34.6	281°25.5	13.5'	21°26.8	9.9'	54.1'
23	163°02.8	33.6	295°58.0	13.4'	21°36.7	9.8'	54.1'
	SD = 16.1'	d = -1.0'		SE	0 = 14.7'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°03.0	<b>S</b> 00°32.6	$310^{\circ}30.4$	13.3'	S21°46.5	9.7'	54.1'
1 2	193°03.1 208°03.3	31.7 30.7	325°02.7 339°35.0	13.2' 13.2'	21°56.2 22°05.8	9.6' 9.5'	54.1' 54.1'
3	208°03.3 223°03.5	30.7 •• 29.7	339°35.0 354°07.1	13.1'	22°15.8	9.5° 9.4'	54.1'
4	238°03.7	28.7	8°39.3	13.0'	22°24.7	9.3'	54.1'
5	253°03.9	27.7	23°11.3	13.0'	22°34.1	9.2'	54.1'
6 7	268°04.1 283°04.2	\$00°26.7 25.7	37°43.2 52°15.1	12.9' 12.8'	\$22°43.3 22°52.4	9.1' 9.0'	54.1' 54.1'
8	298°04.4	24.7	66°46.9	12.7'	23°01.5	9.0'	54.2'
9	313°04.6	• • 23.8	81°18.6	12.6'	23°10.4	8.9'	54.2'
10 11	328°04.8 343°05.0	22.8 21.8	95°50.3 110°21.8	12.6' 12.5'	23°19.3 23°28.0	8.8' 8.7'	54.2' 54.2'
11	343°05.0 358°05.2	21.8 \$00°20.8	110°21.8 124°53.3	12.5'	23°28.0 \$23°36.7	8.6'	54.2'
13	13°05.3	19.8	139°24.8	12.3'	23°45.3	8.5'	54.2'
14	28°05.5	18.8	153°56.1	12.3'	23°53.7	8.4'	54.2'
15 16	43°05.7 58°05.9	· · 17.8 16.8	168°27.4 182°58.5	12.2' 12.1'	24°02.1 24°10.3	8.3' 8.1'	54.2' 54.2'
17	73°06.1	15.8	182 58.5 197°29.7	12.1 12.0'	24 10.3 24°18.5	8.0'	54.2'
18	88°06.3	<b>S</b> 00° 14.9	212°00.7	12.0'	S24°26.5	7.9'	54.3'
19	103°06.5 118°06.6	13.9	226°31.6 241°02.5	11.9' 11.8'	24°34.4 24°42.3	7.8'	54.3' 54.3'
20 21	118°06.6 133°06.8	12.9 •• 11.9	241°02.5 255°33.3	11.8	24°42.3 24°50.0	7.7' 7.6'	54.3'
22	148°07.0	10.9	270°04.0	11.6'	24°57.6	7.5'	54.3'
23	163°07.2	09.9	284°34.7	11.6'	25°05.1	7.4'	54.3'
	SD = 16.1'	d = -1.0'		SE	0 = 14.8'		

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

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

		Sun			Moon	
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	17-19
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	93-81%
17	08:23	08:14	12:08	01:58	14:18	
18	08:06	07:57	12:08	02:40	15:02	
19	07:48	07:39	12:08	03:24	15:48	

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

This   GiA   GiA   Dec   Cit   Dec   Cit   This   Trivial   1979   197	h _	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
1 177-468   177-107   1807-194   672-30   1267-192   1067-192   1067-192   1114   1067-195   1067-1	Thu	GHA	GHA	Dec	GHA	Dec		Dec	GHA	Dec		SHA	Dec
1 192"-093 1 192"05 384 80"31 520 195"11 524 119"935 105 198"775 31 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8													
2 2071-17 2071-17 2071-10 377 1 1071-17 1 1071													
22 225 42											1		
2 2375-507 237111 30.4 1279-85 51.9 1019-507 100 24373.9 51.4 14 1479-86 100 24373.9 51.4 14 1479-86 100 24373.9 51.4 14 1479-86 100 24373.9 51.4 14 1479-86 100 24373.9 51.5 1479-87													
5													
6											Achernar	335°20.6	
28   287   0.1   282   287   3.4   170   2.0   5.15   226   2.0   0.0   2.0											Hamal	$327^{\circ}51.3$	23°34.9
8   1989   10   10   13   13   13   13   13   13											Polaris	$314^{\circ}18.1$	
10   328* 11.5   327** 40.2   321* 40.4   31.0   326* 40.4   31.0   326* 40.4   31.0   326* 40.4   31.0   326* 40.4   31.0   326* 40.4   31.0   326* 40.4   31.0   326* 40.4   31.0   326* 40.4   31.0   326* 40.4   31.0   326* 40.4   31.0   326* 40.4   31.0   326* 40.4   31.0   326* 40.4   326											Acamar	$315^{\circ}11.9$	-40°12.4
10 387115 327402 3.24 2157474 510 295704 100 337470 30.7 646000 207506 30.7 10 10 337470 30.7 64600 30.7 10 10 347130 30.2 64600 30.7 10 10 347130 30.2 64600 30.2 660											Menkar	314°06.2	4°11.2
14   14   15   15   15   15   15   15											Mirfak	308°28.4	49°57.2
19 13 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1											Aldebaran	290°39.6	16°33.6
18   18   18   18   18   18   18   18											1		
11 11 11 11 11 11 11 11 11 11 11 11 11											_		
18 8 88°11. 1 80°60. 2 8°10. 1 80°60. 2 80°10. 1 80°60. 2 80°60. 1 11 8 80°60. 2 80°60. 1 80°60. 2 80°60. 1 11 8 80°60. 2 80°60. 1 11 8 80°60. 2 80													
19											1		
Berlegue											1		
Carogne   203   203   203   203   203   202   203	16		58°03.4	28.3		50.0		11.2		30.0	1		
Simple   S	17	73°28.7	73°07.2	27.6	321°00.0		0°24.2		79°02.2		1		
10   10   10   10   10   10   10   10	18	88°31.2	88°11.1	N09°26.9	336°01.8	N24°49.7	15° 26.3	N22°11.3	94°04.4	S04°29.7			
Procedure   Proc	19	103°33.6	103°14.9	26.2	351°03.6	49.5	30°28.4	11.3	109°06.6	29.6	1		
22 138"36.6 133"227 · 24.8 2"072 · 49.2 60"32.6 · 11.4 154"313 29.3 29.5 23 164"4.5 1018"265 · 241 30"00.0 49.0 97.5 48.6 11.4 154"313 29.3 29.5 23 164"4.5 1018"265 · 241 30"00.0 49.0 97.5 48.5 11.4 154"313 29.3 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5	20	118°36.1	$118^{\circ}18.8$	25.5	6°05.4	49.3	45°30.5	11.4	124°08.8	29.5			
186											,		
163°485													
Mer. pass. 12.07											I		
Fig.   CHA   CHA   CHA   Dec   Dubble   1978-01   1179-042   1079-020   1079-040   1179-05   1179-042				_							1		
Fig.   GHA	Mer.p	ass. 12:07	$\nu$ 3.9′ d-0.	.7′ m-4.18	$\nu$ 1.8′ $d$ -0	0.2′ m0.19	$\nu 2.1' \ d0.$	0′ m-2.17	$\nu 2.2' \ d-0$	.1'  m1.13			
Fig.   GHA											Alphard	217°47.4	-8°46.2
18 18840, 189381 220 81143 485 1209411 116 189197 284 284 18731 175 187417 506*20 0 189509 18		6114	6114	_		_	6114	_	6114	_	Regulus	207°34.0	$11^{\circ}50.5$
18   18   18   18   18   18   18   18											Dubhe	193°40.1	
193 -486 4 9 208 -19 -19 -19 -19 -19 -19 -19 -19 -19 -19											1		
2 208 509 3 208 419 213 90 161 484 135 432 116 214 219 288 3 237 345 237 436 200 1117 9 208 40 215 45 20 20 20 20 20 20 20 20 20 20 20 20 20											Gienah		
3 223 - 51.3   223 - 51.8   223 - 40.6   119   110 - 149.2   150 - 45.3   117   229 - 240   0 - 287   4 288 - 588   2288 - 40.6   199   105 - 107   0 - 40.8   150 - 47.4   11.7   229 - 240   0 - 287   5 283 - 583   238 - 40.6   199   105 - 197   14 - 21.5   47.9   180 - 49.5   11.8   259 - 28.4   28.4   6 269 - 70.7   266 - 57.4   109 - 11.1   14 - 21.5   47.5   21.5   51.6   122 - 11.3   259 - 28.4   28.4   7 284 - 70.2   240 - 70.2   247 - 70.5   17.7   17 - 17.1   17													
4 288*75.8 3 283*79.8 5 199.1 126*19.7 48.0 165*47.4 11.7 244*86.2 28.6 285*28.4 285	3		223°45.8	• • 20.6		• • 48.2		• • 11.7		• • 28.7			
5 253*583   191   141*215   479   180*495   1.18   259*84   284	4	238°55.8	238°49.6	19.9		48.0	165°47.4	11.7	244°26.2	28.6	1		
6 269°00.7 286°07.4 Nop*18.4 156°23.3 N24°47.7 199°51.6 N22°11.8 274°30.6 So4°28.3 Alkiadi 156°23.3 N24°47.7 199°51.6 N22°11.8 274°30.6 So4°28.3 Alkiadi 152°51.4 49°51.0 299°06.1 170 186°26.9 47.4 225°55.9 11.9 304°34.9 28.1 Hardi 188°35.3 6°29.6 Menkent 147°57.1 36°20.7 199°11.1 340°10.1 314°09.9 1.63.3 201°28.7 v.72 240°88.0 11.1 304°31.3 340°10.6 18.8 231°32.2 40.9 27.1 225°50.0 11.2 0 334°30.3 27.8 Rigil Kent. 139°30.6 60°50.5 11.3 344°11.5 340°10.6 14.8 231°32.2 40.9 27.1 226°00.1 12.0 334°30.3 27.8 Rigil Kent. 139°30.6 60°50.5 11.3 344°11.5 390°10.5 Nop°14.1 266°34.0 N24°46.7 286°04.3 N22°12.1 4°43.7 So4°27.6 Kochab 137°18.9 36°55.6 16°08.9 13 14°15.0 14°24.3 13.4 266°34.0 N24°46.7 286°04.3 N22°12.1 19°45.8 27.5 Alphaco 126°03.4 6.5 301°06.4 12.1 19°45.8 27.5 Alphaco 126°03.4 6.5 301°06.4 12.1 19°45.8 27.5 Alphaco 126°03.4 6.5 301°06.4 12.1 19°45.8 27.5 Alphaco 126°03.4 4.6 301°08.5 12.2 34°46.0 27.4 Antares 112°15.5 26°29.3 15 44°22.9 44°32.1 11.9 291°39.3 40°42.2 331°10.6 12.2 34°50.2 27.2 Attra 10°709.5 12.6 50°04.1 1.6 59°29.4 99°39.9 11.2 306°41.1 40.0 346°12.7 12.3 64°52.4 27.1 Sabik 102°02.5 15°50.4 11.1 40.0 346°12.7 12.3 64°52.4 27.1 Sabik 102°02.5 15°50.4 11.1 40.0 346°12.7 12.3 64°52.4 27.1 Sabik 102°02.5 15°50.4 11.1 40.0 346°12.7 12.3 94°50.5 504°20.9 Sabik 102°02.5 15°50.4 11.1 40.0 346°12.7 12.3 94°50.5 504°20.9 Sabik 102°02.5 15°50.4 11.1 40.0 346°12.7 12.3 94°50.5 504°20.9 Sabik 102°02.5 15°50.4 11.1 40.0 346°12.7 12.3 94°50.5 504°20.9 Sabik 102°02.5 15°50.4 11.1 40.0 346°12.7 12.3 94°50.5 504°20.9 Sabik 102°02.5 15°50.4 45.5 31°10.1 12.4 109°89.9 50.6 Eliani 90°42.1 130°0.0 Sabik 102°0.5 11.5 100°0.7 12.0 10°32.2 10°44.2 10°50.9 Sabik 102°0.5 11.5 10°0.7 12.0 10°50.5 10°50.4 11.1 40°50.0 Sabik 102°0.5 11.5 10°0.5	5	253°58.3	253°53.5	19.1	141°21.5	47.9	180°49.5	11.8	259°28.4	28.4	1		
Record   R	6	269°00.7	268°57.4	N09°18.4	156°23.3	N24°47.7	195°51.6	N22°11.8	274°30.6	S04°28.3			
8 299°05, 1 314°08, 9 · 16.3 20°28, 7 · 47.2 240°8, 0 · 11.9 30°34, 9 · 28.1 1 · 28.0 1 · 39°10, 39°10, 39°10, 30°29, 7 · 47.2 240°8, 0 · 11.9 30°34, 3 · 28.1 1 · 28.0 1 · 39°11, 340°13, 32°12, 8 · 15.5 216°30, 4 · 47.0 256°00, 1 · 12.0 343°33, 3 · 27.8 1 · 27.7 1 · 39°30, 6 · 60°56, 3 · 30°31, 3 · 39°13, 3 · 39°13, 3 · 39°13, 3 · 39°13, 3 · 39°13, 3 · 39°13, 3 · 39°13, 3 · 39°13, 3 · 39°13, 3 · 39°13, 3 · 39°13, 3 · 39°13, 3 · 39°13, 3 · 39°13, 3 · 39°13, 3 · 39°13, 3 · 39°13, 3 · 39°14, 3 · 13°14,	7	284°03.2	284°01.2	17.7	171°25.1	47.5	210°53.8	11.8	289°32.8	28.2	1		
93   314°08.1   314°08.2   16.3   201°28.7   · · · · · · · · · · · · · · · · · ·	8	299°05.7	299°05.1	17.0	186°26.9	47.4	225°55.9	11.9	304°34.9	28.1			
10   329°10.6   329°12.8   15.5   216°30.4   47.0   256°00.1   12.0   348°3.3   27.8   Arctural 149°47.5   19°2.6   113°4313   344°16.6   14.8   21°35.8   46.9   27°10.2   12.0   349°4.7   7											1		
11 344°13.1 344°16.6 14.8 231°32.2 46.9 271°02.2 12.0 349°41.5 27.7 Kochab 12.1 246°34.0 NA2*46.7 368°04.3 N22*12.1 4°34°3.5 C4*27.6 Corbab 12.1 19°45.8 27.5 Nog*14.1 12.1 19°45.8 27.5 Nog*14.1 12.1 19°45.8 27.5 Nog*14.1 12.1 19°45.8 12.1 19°45.8 12.1 19°45.8 12.1 19°45.8 12.1 19°45.8 12.1 19°45.8 12.1 19°45.8 12.2 14°40.5 12.2 14°48.0 27.4 Alpheca 12.0 130°55.0 11.2 11.0 19°45.8 12.1 19°45.8 12.2 14°40.2 12.2 14°50.2 72.2 Nog*14.2 11.2 11.2 10°43.4 26°37.5 Nog*14.1 11.2 11.2 11.2 11.2 11.2 11.2 11.2											1		
12   359°15.5   359°12.5   No9°14.1   246°34.0   N24°46.7   286°04.3   N22°12.1   4°43.7   S04°27.6   Colorable   No9°14.1   26°37.6   46.4   30°06.4   12.1   19°48.8   27.5   Alpheca   126°03.4   26°37.6   46.4   316°08.5   12.2   34°48.0   27.4   Antares   126°03.4   26°37.5   44°32.1   11.9   291°39.3   46.2   316°08.5   12.2   34°48.0   27.0   Sabit   107°09.5   66°04.1   46.0   346°12.7   12.3   46°52.4   27.1   5abit   107°09.5   66°04.1   46.0   346°12.7   12.3   46°52.4   27.1   5abit   36°30.3   89°43.6   N09°09.7   336°44.7   N24°45.7   16°17.0   N22°12.3   94°56.5   504°26.9   Sabit   96°58.4   12°32.3   19°40.5   10°40.5   13°40.5   10°40.5   13°40.5   10°40.5   13°40.5   10°40.5   13°40.5   10°40.5   13°40.5   10°40.5   13°40.5   10°40.5   13											"		
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15											Alphecca		
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Mer.pass. 12:03   V3.9' d-0.7' m-4.20   V1.8' d-0.2' m0.21   V2.1' d0.0' m-2.17   V2.2' d-0.1' m1.13	22	149°40.2	149°59.0	06.8	36°51.8	45.0		12.5	155°05.5	26.4	_		
Mer.pass. 12:03   V3.9' d-0.7' m-4.20   V1.8' d-0.2' m0.21   V2.1' d0.0' m-2.17   V2.2' d-0.1' m1.13   Peacok   \$3°05.8   \$-56°39.1   Denb   \$49°2.0   \$45°21.9   C1.7   C1.7	23	164°42.6	$165^{\circ}02.9$	06.0	51°53.6	44.9	91°27.5	12.6	170°07.7	26.3	1		
Sat         GHA         GHA         Dec         GHA         Na**         20	1/10111	12.02		7/ 4.20	1 0/ 4 0	2/ 0 21	2 1/ 40	0/ 2.17		1/ 1 12	1		
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Sat         GHA         GHA         Dec         Hollow         Markab         All Na'ir         27° 33.1         46° 50.3           1         194° 47.6         195° 10.6         04.5         81°57.1         44.5         121° 31.7         12.7         200° 12.0         26.1         Scheat         15° 45.7         229° 29.4         4.2         209° 50.0         210° 14.4         03.8         96° 58.9         44.4         136° 33.8         12.7         215° 14.2         25.9         25.7         25° 25° 18.3         0.30         112° 00.7         44.2         15° 35.0         12.8         245° 18.6         25.7         25.6         0.00         10.5         12° 00.7         44.2         16° 38.0         12.8         245° 18.6         25.7         25.6         0.00         0.00         172° 07.7         43.5         211° 44.3         12.9         290° 25.1         25.6         40° 25.8         Mars         24° 25.8         40° 25.9         315° 37.3         315° 41.4         5.8											1		
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15	14	$30^{\circ}19.6$	31°00.6	54.7	277°20.1	42.3	$316^{\circ}59.1$	13.2	35°40.4	24.5	Saturn	J 31.5	11:41
16       60°24.5       61°08.3       53.1       307°23.6       42.0       347°03.3       13.3       65°44.7       24.3       Venus       0°21.6       11:56         17       75°27.0       76°12.1       52.3       322°25.4       41.8       2°05.4       13.4       80°46.9       24.1       Mars       247°10.2       19:30         18       90°29.4       91°16.0       N08°51.6       337°27.1       N24°41.7       17°07.5       N22°13.4       95°49.1       504°24.0       Jupiter       286°44.5       16:52         19       105°31.9       106°19.8       50.8       352°28.9       41.5       32°09.6       13.5       110°51.3       23.9       23.9       24.7       11:38         20       120°34.4       121°23.7       50.0       7°30.6       41.3       47°11.7       13.5       125°53.5       23.8       23.8       21       135°36.8       136°27.5       · 49.2       22°32.4       · 41.1       62°13.8       · 13.6       140°55.6       · 23.7       23.6       Venus       0.5         23       165°41.8       166°35.2       47.7       52°35.9       40.8       92°18.0       13.7       171°00.0       23.4       Mars:       0.1   <		45°22.1	46°04.4	• • 53.9	292°21.8	• • 42.2	332°01.2				Mar 22 Sat	SHA	Mer.pass
17       75°27.0       76°12.1       52.3       322°25.4       41.8       2°05.4       13.4       80°46.9       24.1       Mars 247°10.2       19:30         18       90°29.4       91°16.0       N08°51.6       337°27.1       N24°41.7       17°07.5       N22°13.4       95°49.1       S04°24.0       Jupiter 286°44.5       16:52         19       105°31.9       106°19.8       50.8       352°28.9       41.5       32°09.6       13.5       110°51.3       23.9       23.9       23.8       21       23.9       23.8       23.8       23.8       23.8       23.8       23.8       23.8       23.8       23.8       23.8       23.8       23.8       23.9       23.8       23.8       23.9       23.8													
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Mer. pass. 11:59 $v3.9' d-0.7' m-4.20$ $v1.8' d-0.2' m0.23$ $v2.1' d0.0' m-2.16$ $v2.2' d-0.1' m1.14$	23	165~41.8	166~35.2	47.7	52~35.9	40.8	92°18.0	13.7	1/1~00.0	23.4		iviars:	0.1
	Mern	ass 11.50	1/3 Q/ A_O	7′ m-4 20	v1.8/ d.0	) 2 <sup>/</sup> m0 23	v2 1/ d0	0′ m-2 16	1/2 2/ d.0	1' m1 14			

h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	НР
0	178°07.4	\$00°08.9	299°05.2	11.5'	S25°12.5	7.3'	54.3'
1	193°07.6	07.9	313°35.7	11.4'	25°19.8	7.2'	54.3'
2	208°07.7 223°07.9	07.0 •• 06.0	328°06.1 342°36.5	11.3' 11.3'	25°27.0 25°34.0	7.1' 6.9'	54.4' 54.4'
4	238°08.1	05.0	357°06.7	11.2'	25°41.0	6.8	54.4'
5	253°08.3	04.0	11°36.9	11.1'	25°47.8	6.7'	54.4'
6	268°08.5	S00°03.0	26°07.0	11.0'	\$25°54.5	6.6'	54.4'
7 8	283°08.7 298°08.9	02.0 01.0	40°37.0 55°07.0	10.9' 10.9'	26°01.1 26°07.6	6.5' 6.4'	54.4' 54.4'
9	313°09.0	S00°00.0	69°36.9	10.8'	26°13.9	6.2'	54.5'
10	328°09.2	N00°01.0	84°06.7	10.7'	$26^{\circ}20.2$	6.1'	54.5'
11	343°09.4 358°09.6	01.9 N00°02.9	98°36.4 113°06.0	10.6'	26°26.3 <b>5</b> 26°32.3	6.0'	54.5'
12 13	358°09.6 13°09.8	03.9	113°06.0 127°35.6	10.6' 10.5'	26°38.2	5.9' 5.8'	54.5' 54.5'
14	28°10.0	04.9	142°05.1	10.4	26°43.9	5.6'	54.5'
15	43°10.2	•• 05.9	156° 34.5	10.4'	26°49.5	5.5'	54.6'
16 17	58°10.3 73°10.5	06.9 07.9	171°03.9 185°33.2	10.3' 10.2'	26°55.0 27°00.4	5.4' 5.3'	54.6' 54.6'
18	73 10.5 88°10.7	07.9 N00°08.9	200°02.4	10.2	\$27°05.7	5.1'	54.6
19	103°10.9	09.8	214°31.5	10.1'	27°10.8	5.0'	54.6'
20	118°11.1	10.8	229°00.6	10.0'	27°15.8	4.9'	54.7'
21	133°11.3 148°11.5	• • 11.8	243°29.6 257°58.5	9.9' 9.9'	27°20.7 27°25.4	4.7'	54.7' 54.7'
22 23	148°11.5 163°11.6	12.8 13.8	257°58.5 272°27.3	9.9° 9.8°	27°25.4 27°30.0	4.6' 4.5'	54.7' 54.7'
-	SD = 16.1'	d = -1.0'			0 = 14.8'		
	JD — 10.1	<u>u – -1.0</u>		JL	- 14.0		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°11.8 193°12.0	N00° 14.8 15.8	286°56.1 301°24.8	9.7' 9.7'	\$27°34.5 27°38.8	4.3' 4.2'	54.7'
1 2	193°12.0 208°12.2	15.8 16.8	301°24.8 315°53.5	9.7° 9.6'	27°43.0	4.2 4.1'	54.7' 54.8'
3	223°12.4	17.7	330°22.1	9.5'	27°47.1	3.9'	54.8'
4	238°12.6	18.7	344°50.6	9.5'	27°51.0	3.8'	54.8'
5	253°12.8 268°12.9	19.7 N00°20.7	359°19.0 13°47.4	9.4' 9.3'	27°54.8 <b>S</b> 27°58.5	3.7' 3.5'	54.8'
6 7	283°13.1	21.7	28° 15.8	9.3 9.3'	28°02.0	3.5 3.4'	54.9' 54.9'
8	298°13.3	22.7	42°44.0	9.2'	28°05.4	3.2'	54.9'
9	313°13.5	• • 23.7	57° 12.2	9.1'	28°08.6	3.1'	54.9'
10 11	328°13.7 343°13.9	24.7 25.6	71°40.4 86°08.5	9.1' 9.0'	28°11.8 28°14.7	3.0' 2.8'	54.9' 55.0'
12	358°14.1	N00°26.6	100°36.5	9.0'	\$28°17.5	2.7'	55.0'
13	13°14.2	27.6	$115^{\circ}04.4$	8.9'	$28^{\circ}20.2$	2.5'	55.0'
14	28°14.4	28.6	129°32.4	8.9'	28°22.8	2.4'	55.0'
15 16	43°14.6 58°14.8	· · 29.6 30.6	144°00.2 158°28.0	8.8' 8.7'	28°25.2 28°27.4	2.3' 2.1'	55.1' 55.1'
17	73°15.0	31.6	172°55.8	8.7'	28°29.5	2.0'	55.1'
18	88°15.2	N00°32.6	187°23.4	8.6'	S28°31.5	1.8'	55.1'
19	103°15.4 118°15.6	33.5 34.5	201°51.1 216°18.7	8.6' 8.5'	28°33.3 28°35.0	1.7' 1.5'	55.2' 55.2'
20 21	118°15.6 133°15.7	34.5 · · 35.5	216° 18.7 230° 46.2	8.5'	28°35.0 28°36.5	1.5	55.2' 55.2'
22	148°15.9	36.5	245° 13.7	8.4'	28°37.9	1.2'	55.2'
23	163°16.1	37.5	259°41.2	8.4'	28°39.1	1.1'	55.3'
	SD = 16.1'	d = 1.0'		SD	0 = 14.9'		
c		D	CUA		Dec	.ı	LIP
Sat 0	<b>GHA</b> 178°16.3	<b>Dec</b> N00°38.5	<b>GHA</b> 274°08.6	ν 8.4'	<b>Sec Sec /b>	<i>d</i> 0.9'	<b>HP</b> 55.3'
1	193°16.5	39.5	288°35.9	8.3'	28°41.1	0.8'	55.3'
2	208°16.7	40.4	303°03.3	8.3'	28°41.9	0.6'	55.3'
3 4	223°16.9 238°17.0	· · 41.4 42.4	317°30.5 331°57.8	8.2' 8.2'	28°42.5 28°43.0	0.5' 0.3'	55.4' 55.4'
5	253°17.2	43.4	346°25.0	8.2'	28°43.3	0.3	55.4'
6	268°17.4	N00°44.4	0°52.1	8.1'	S28°43.5	0.0'	55.4'
7	283°17.6 298°17.8	45.4	15° 19.2 29° 46.3	8.1' 8.1'	28°43.5 28°43.4	-0.1' -0.3'	55.5'
8 9	298°17.8 313°18.0	46.4 •• 47.4	29°46.3 44°13.4	8.1′ 8.0′	28°43.4 28°43.1	-0.3' -0.4'	55.5' 55.5'
10	328°18.2	48.3	58°40.4	8.0'	28°42.7	-0.6'	55.6'
11	343°18.4	49.3	73°07.4	8.0'	28°42.1	-0.8'	55.6'
12 13	358°18.5 13°18.7	N00°50.3 51.3	87°34.3 102°01.3	7.9' 7.9'	\$28°41.3 28°40.4	-0.9' -1.1'	55.6' 55.6'
13 14	28° 18.9	51.3 52.3	102°01.3 116°28.2	7.9° 7.9°	28° 40.4 28° 39.3	-1.1 -1.2'	55.0° 55.7'
15	43°19.1	• • 53.3	$130^{\circ}55.1$	7.9'	$28^{\circ}38.1$	-1.4'	55.7'
16	58°19.3	54.3	145°21.9	7.8'	28°36.8	-1.5'	55.7'
17 18	73°19.5 88°19.7	55.2 N00°56.2	159° 48.8 174° 15.6	7.8' 7.8'	28°35.2 \$28°33.5	-1.7' -1.8'	55.8' 55.8'
19	103°19.9	57.2	174 15.0 188° 42.4	7.8'	28°31.7	-1.6 -2.0'	55.8'
20	118°20.0	58.2	$203^{\circ}09.1$	7.8'	28°29.7	-2.2'	55.9'
21	133°20.2	00°59.2	217°35.9	7.7'	28°27.5	-2.3'	55.9'
22 23	148°20.4 163°20.6	01°00.2 01.2	232°02.6 246°29.3	7.7' 7.7'	28°25.2 28°22.7	-2.5' -2.6'	55.9' 56.0'
23						2.0	30.0
	SD = 16.0'	d = 1.0'		SL	0 = 15.1'		

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

Lat.         Thu         Fri         Sat         Thu         Fri         Sat           N 72°         Image: Second of the content of
N 70°       68°       04:39       05:49         60°       01:50       03:26       04:43       06:25       06:35       07:09         N 58°       01:25       02:49       03:59       06:51       07:12       07:54         56°       01:05       02:23       03:30       07:11       07:38       08:23         54°       00:49       02:03       03:07       07:28       07:59       08:46         52°       00:34       01:46       02:49       07:43       08:16       09:04         50°       00:22       01:31       02:33       07:56       08:31       09:20         45°       ···       01:01       02:01       08:22       09:01       09:51         N 40°       ···       00:38       01:17       09:00       09:44       10:36         30°       ···       00:03       01:00       09:15       10:01       10:53         20°       23:36       ···       00:31       09:41       10:29       11:22         N 10°       23:12       ···       00:06       10:03       10:53       11:47         0°       22:50       23:43       ···       10:24       11:16
68°
66° 03:35
64° 03:35
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S 10°         22:29         23:20         ···         10:45         11:38         12:33           20°         22:05         22:56         23:51         11:07         12:02         12:57           30°         21:38         22:27         23:23         11:33         12:31         13:26
20°         22:05         22:56         23:51         11:07         12:02         12:57           30°         21:38         22:27         23:23         11:33         12:31         13:26
30° 21:38 22:27 23:23 11:33 12:31 13:26
35 21:22 22:10 25:00 11:40 12:47 15:45
40° 21:04 21:50 22:46 12:06 13:07 14:03
45° 20:42 21:26 22:23 12:28 13:31 14:27
<b>S</b> 50° 20:14 20:56 21:52 12:55 14:01 14:58
52° 20:00 20:40 21:32 12:33 14:01 14:58 52° 20:00 20:40 21:37 13:09 14:17 15:13
52 20.00 20.40 21.37 13.09 14.17 15.13 54° 19:44 20:22 21:19 13:24 14:34 15:31
56° 19:25 20:01 20:57 13:43 14:56 15:53
58°   19:02   19:33   20:29   14:05   15:23   16:20
<b>S</b> 60°   18:32   18:53   19:49   14:35   16:03   17:01

		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	73-55%
20	07:30	07:22	12:07	04:12	16:37	
21	07:13	07:04	12:07	05:03	17:29	
22	06:55	06:46	12:07	05:56	18:24	

Simple   Orange	h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
10 1904-42 1871-90 Nover-140 1872-90 Nover-140 1	Sun	GHA			GHA			Dec	GHA			SHA	Dec
1	0	180°44.2	181°39.0	N08°46.9	67°37.6	N24°40.6	$107^{\circ}20.1$	N22°13.7		S04°23.3	Alphoratz	257°25 0	200127
2 2 2 3 1 4 1													
1				45.3		40.3		13.8					
2 29756.4 24976.2 43974.1 100720.5 130.0 100720.5 130.0 200710.5 130.0 200710.5 130.0 200710.5 120720.5 141.4 12748.8 39.3 100720.5 130.0 20171.5 227.5 141.4 12748.9 30.4 22758.8 140.2 20171.4 225.5 141.4 12748.9 30.4 20171.4 20171.5 225.5 141.4 12748.9 30.4 20171.4 20171.5 225.5 141.4 12748.9 30.4 20171.5 225.5 141.4 12748.9 30.4 20171.5 225.5 141.4 12748.9 30.7 20171.5 20171.5 225.5 141.4 12748.9 30.4 20171.5 225.5 141.4 12748.9 30.7 20171.5 20171.5 225.5 141.4 12748.9 30.7 20171.5 20171													
2													
2 20 300 2 20 300 00 70 70 60 197-16 10 197-26													
10													
1													
10 313 08.9 332 17.3 39.0 27751 38.9 27761 142 387624 2216 142 387624 2216 142 387624 2216 142 387624 2216 142 387624 2416 142													
19 967-113 947-121 936 2225-69 937 207-495 10 142 91.50 20.04 94-101 94.05 11.											Mirfak	308°28.4	49°57.1
1											Aldebaran	290°39.6	16°33.6
13 10-10.3 17-28 9.06 020-90.4 384 902-47.4 1.43 22-30.5 2.18 1.55 1.14 1.31 18.7 2.21 1.5 31-18.7 1.21 1.5 31-18.7 1.5 22-27.5 1.5 40-22.2 1.5 32-2.2 1.5 32.5 2.5 32.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5											Rigel	281°03.8	-8°10.5
14   31   18   7   25   25   7   56.8   278   19.1   38.2   317   49.5   14.3   36   27.7   1.7   5   5   6   11.5   6   6   12.7   6   6   4   3   3   5   3   5   5   5   6   14.3   5   3   5   5   5   6   14.3   5   1   3   5   5   6   1   1   1   1   1   1   1   1   1											Capella		
15													
16 6  6  23.7   62   43.3   43.2   309   69.6   50   70   347   53.7   14.4   667   31.1   14.4   667   31.1   14.4   677   31.1   14.4   677   31.1   31.													
17													
18   91°286   92°47   N88°326   338°031   N24°375   27°578   N22°145   90°41.4   50°41.2   21.1   25°55   20.0   21.1   20°121.3											_		
19   106"31.1   107"\$1.8   31.7   33"\$1.6   37.3   32"59.9   14.6   111"\$4.5   21.1   Annual Part Part Part Part Part Part Part Part													
Process   150	19	106°31.1	107°51.8	31.7	353°10.8	37.3	32°59.9	14.6	111°43.6				
Polluc   P	20	121°33.5	122°55.6	30.9	8°12.5	37.2	48°02.0	14.6	126°45.8				
The color of the				• • 30.1									
Sample   1922   198													
Mor. GHA	23	166°40.9	$168^{\circ}07.0$	28.5	53°17.8	36.7	93°08.3	14.7	171°52.3	20.6			
March   CHA   CHA   CHA   Dec   De	Mern	ass 11.55	v3 8' d-0	8′ m-4 20	ν1 8' d-Ω	1.2' m0.25	ν2 1' dΩ	0' m-2 16	v2 21 d-0	1′ m1 14			
Mon	Wici.p	<u> </u>	ν 3.0 · u · 0	.0 111 4.20	ν1.0 α 0	7.2 1110.23	ν2.1 do.	.0 111 2.10	- VZ.Z U O				
Mon GHA GHA GHA Jee CHA JEE C													
1 196°458 198°14.7 26.9 83°21.2 36.3 123°12.5 148 201°56.7 20.3 Color 17°43.1 1.7°43.1 1.7°43.1 31°44.1 32°6°06.8 22°22.3 15°25 2113°24.7 136.0 135°16.7 1.149 23°01.1 20.1 Color 17°43.2 1.17°43.1 31°44.1 32°6°06.8 22°22.3 15°2.5 2113°24.7 136.0 153°16.7 1.149 23°01.1 20.1 Color 17°43.2 1.17°43.1 31°44.1 35.6 168°18.8 15.0 24°70.3 20.0 Color 17°45.2 11°17.7 1.00 1.00 1.00 1.00 1.00 1.00 1.00											_		
2 211°483 218°18.5 26.0 98°23.0 36.1 138°14.6 14.9 216°58.9 20.2 1													
226°59.8   228°22.3   2.52.2   113°24.7   3.60   153°16.7   1.49   232°01.1   2.01   3.60   3.01   3											Gienah	175°43.1	$-17^{\circ}41.1$
4 41°532 243°26.1 244 182°26.4 35.8 168°18.8 15.0 247°03.3 20.0   Alich 166°12.2 \$5°49.4   Alich											Acrux	172°59.3	-63° 14.4
5 26°557, 258°29, 9 23.6 143°28.1 35.6 183°20, 9 15.0 262°05.4 19.9 36 271°17.7 7.0 28°00.6 288°37.5 21.9 173°31.6 35.2 23°35.1 15.1 292°09.8 19.6 19.6 19.6 19.6 19.6 19.0 19.6 19.6 19.0 19.6 19.0 19.6 19.0 19.6 19.0 19.6 19.0 19.0 19.0 19.0 19.0 19.0 19.0 19.0											Gacrux	171°50.9	-57° 15.3
6 211°58.2 213°33.7 No8°22.8 158°29 N24°35.4 198°23.0 N22°15.1 277°07.6 SQ4°19.8 Alkaid 132°5.4 49°11.0 Alkaid 132°5.4 Alkaid 132°5.4 49°11.0 Alkaid 132°5.4 Al											Alioth	$166^{\circ}12.2$	
7 287°00.6 288°37.5 21.9 173°31.6 35.2 213°25.1 15.1 292°9.8 19.6 Alada 148°33.3 90°12.0 19.5 15.0 293°1.0 19.5 15.0 293											Spica		
8 302°03.1 303°41.3 2.1.1 188°33.3 35.1 228°27.2 15.2 307°12.0 19.5 40°10.1 308°10.5 318°45.1 · 20.3 203°35.1 · 349 243°40.9 3 · 15.2 32°14.2 · 19.4 4													
9 317°05.5 318°45.1													
32°08.0 332°08.0 19.5 218°36.8 34.7 258°31.3 15.3 337°16.3 19.3 19.3 17.1 347°10.5 348°52.7 18.6 233°38.5 34.5 273°34. 15.3 332°18.5 19.2 18.6 18.7 18.7 18.7 18.7 18.7 18.7 18.7 18.7													
11 347°10.5 348°52.7 il 6.6 233°38.5 34.5 273°33.4 il 6.3 352°18.5 il 79°0.7 ole*19.0 248°40.2 VA*34.4 288°35. N2°21.5 il 70°0.5 ole*19.0 210°0.3 il 7°15.4 il 9°0.3 il 7°10.6 bole** ole** ole*													
12   2°129   3°565   NO8°178   248°402   N24°944   288°355   N22°153   7°207   S04°100   No8°178   248°402   N26°3402											_		
14 32°179 34°041 161 278°437 340 318°397 15.4 37°551 18.9 Alphecca 126°03.4 22°37.5 16 47°20.3 49°07.0 15.3 293°45.4 3.38 338°397 15.4 37°551 18.8 Alphecca 126°03.4 22°37.5 16 62°22.8 64°11.7 14.5 308°47.1 33.7 348°43.9 15.5 67°29.4 18.6 18.5 340°11.7 14.5 308°47.1 33.7 348°43.9 15.5 67°29.4 18.6 18.5 340°11.7 14.5 308°47.1 33.7 348°43.9 15.5 67°29.4 18.6 18.5 340°11.7 14.5 308°47.1 33.7 348°43.9 15.5 67°29.4 18.6 18.5 340°11.7 14.5 308°47.1 33.7 348°43.9 15.5 67°29.4 18.6 18.5 340°11.7 14.5 340°11.7 14.5 38°49.9 33.5 34°49.0 15.6 62°3.1 18.9 107°30.2 109°23.1 12.0 353°52.3 33.1 18°48.1 N22°15.6 97°33.8 504°18.3 19 107°30.2 109°23.1 12.0 353°52.3 33.1 18°48.1 N22°15.6 97°33.8 504°18.3 18.0 12°02.5 15°45.4 34.2 11.7 14.5 12°35.7 12.8 14.5 14.5 14.5 14.5 14.5 14.5 14.5 14.5													
14 32*17.9 34*04.1 16.1 278*43.7 34.0 318*39.7 15.4 37*25.1 18.8 Antares 112*15.5 26*293.1 15.4 72*03. 49*07.9 1.5.3 293*64.4 133.8 333*41.8 1.5.5 52*73.3 1.18.7 Antares 112*15.5 26*293.1 16 62*22.8 64*11.7 14.5 323*48.9 33.5 3*48.9 33.5 6*4*10.1 16.5 62*22.8 16.6 4*11.7 14.5 323*48.9 33.5 3*48.9 33.5 3*48.9 33.5 3*48.9 33.5 3*48.9 33.5 3*48.9 33.5 3*48.9 33.5 3*48.9 33.5 3*48.9 3*2*7.7 94*19.3 No8*12.8 338*50.6 N24*33.3 118*48.1 N22*15.6 97*33.8 504*18.3 Shalla 92*27.7 94*19.3 No8*12.8 338*50.6 N24*33.3 33*1.8 *48.1 N22*15.6 97*33.8 504*18.3 Shalla 92*27.7 144*26.9 11.1 8*54.0 32.9 48*52.2 15.7 127*38.2 18.1 Etlanin 90*42.1 51*28.2 12*2*37.6 154*34.5 994 38*57.4 32.6 78*56.4 15.8 157*42.5 17.9 40*2.2 152*37.6 154*34.5 994 38*57.4 32.6 78*56.4 15.8 157*42.5 17.9 40*2.2 159*38.2 165*30.1 169*38.2 98.6 55*92.2 32.4 93*58.5 15.8 172*44.7 17.7 MINIKI 75*47.6 26*15.9 Nor. pass. 11:51 92*38.2 18.1 Nor. pass. 11:51 92*38.2 18.1 Nor. pass. 11:51 92*38.2 18.1 Nor. pass. 11:52 19*38.2 18.1 Nor. pass. 11:53 19*39.3 18*39.0 Nor. pass. 11:52 18*39.3 Nor. pass. p		$17^{\circ}15.4$	19°00.3		263°42.0	34.2	303°37.6		22°22.9				
15 47°20.3 49°07.9 15.3 29°45.4 33.8 333′41.8 15.5 52°27.3 18.7   16 62°22.8 64°11.7 14.5 306°47.1 33.7 338° 333′41.8 15.5 52°27.3 18.7   17 7°25.3 79°15.5 13.6 329°48.9 33.8 50.6 12.6 20°2.1 1.8   18 99°27.7 94°19.3 NO8°12.8 338°50.6 N24°33.3 31 818°48.1 N22°15.6 99°33.8 S04°18.3   19 107°30.2 109°23.1 12.0 353°52.3 33.1 33°50.2 15.7 112°36.0 18.2   11 31°35.1 139°30.7 10.3 23°55.7 32.8 63°54.3 15.8 142°40.3 18.0   12 12 12°37.6 154°34.5 09.4 38°57.4 32.6 78°56.4 15.8 157°42.5 17.9   12 12 16°40.0 169°38.2 08.6 53°59.2 32.4 93°58.5 15.8 172°42.7 17.9   14 12 12 12 12 12 12 12 12 12 12 12 12 12	14	$32^{\circ}17.9$	34°04.1	16.1	278°43.7	34.0	$318^{\circ}39.7$	15.4	$37^{\circ}25.1$	18.8			
16 62°228 64°11.7 14.5 338°48.9 33.5 348°43.9 15.5 67°29.4 18.6 Sabik 102°0.25 1.5°45.4 17 77°25.3 79°15.5 13.6 323°48.9 33.5 3°46.0 15.6 82°31.6 18.5 Sabik 102°0.25 1.5°45.4 Sabik 102°0.25 1.2°45.4 Sabik 102°0.25 1.5°45.4 Sabik 102°0.25 1.2°45.4	15	47°20.3	49°07.9	• • 15.3	293°45.4	• • 33.8	333°41.8	• • 15.5	52°27.3	• • 18.7			
17 77°25.7 99°15. 13.6 323°48.9 33.5 3°46.0 15.6 82°31.6 18.5 Shaula 96°10.1 37°07.3 19 107°30.2 109°23.1 12.0 353°52.3 33.1 33°50.2 15.7 112°36.0 18.2 12°32.7 124°6.9 11.1 8°54.0 32.9 48°52.2 15.7 112°36.0 18.2 12°32.7 124°6.9 11.1 8°54.0 32.9 48°52.2 15.7 112°36.0 18.2 12°33.2 137°35.1 139°30.7 · 10.3 23°55.7 · 32.8 63°54.3 · 15.8 142°40.3 · 18.0 42°40.3 · 18.0	16		64°11.7	14.5	308°47.1	33.7		15.5		18.6			
18 9°27.7 94°193.1 10°30.2 10°23.1 12.0 353°50.8 33.1 18'48.1 N22°15.6 97'33.8 504'18.3   Scallague 96'83.3 12°32.3   Scallague 96'83.3 12°32.													
19 107°30.2 109°23.1 12.0 353°52.3 33.1 33°50.2 15.7 112°36.0 18.2   19 107°30.2 109°23.1 12.0 353°52.3 33.1 33°50.2 15.7 112°36.0 18.2   19 137°35.1 139°30.7 · 10.3 23°55.7 · 32.8 63°54.3 · 15.8 142°40.3 · 18.0   19 21 152°37.6 154°34.5 094 38°57.4 32.6 78°56.4 15.8 157°42.5 17.9   19 108°38.2 08.6 53°59.2 32.4 93°58.5 15.8 172°44.7 17.7   10 152°37.6 154°34.5 094 38°57.4 32.6 78°56.4 15.8 157°42.5 17.9   10 152°37.6 154°34.5 094 38°57.4 32.6 78°56.4 15.8 157°42.5 17.9   10 152°37.6 154°34.5 094 38°57.4 32.6 78°56.4 15.8 157°42.5 17.9   10 152°37.6 154°34.5 094 38°59.2 32.4 93°58.5 15.8 172°44.7 17.7   10 152°37.6 154°34.5 094 38°59.2 32.4 93°58.5 15.8 172°44.7 17.7   10 152°37.6 154°34.5 094 38°59.2 32.4 93°58.5 15.8 172°44.7 17.7   10 152°37.6 154°34.5 094 38°59.2 32.4 93°58.5 15.8 172°44.7 17.7   10 152°37.6 154°34.5 094 38°40.2   10 182°42.5 184°42.0 N08°07.8 69°0.9 N24°32.2 109°00.6 N22°15.9 187°46.9 504°17.6   10 182°42.5 184°42.0 N08°07.8 69°0.9 N24°32.2 109°00.6 N22°15.9 187°46.9 504°17.6   10 190°42.1 17.5 15.9 17.4   10 190°45.0 199°45.8 0.9 84°02.6 32.1 124°02.7 15.9 202°49.1 17.5   10 190°45.0 199°45.8 0.9 84°02.6 32.1 124°02.7 15.9 202°49.1 17.5   10 152°47.4 214°49.6 0.6 1. 99°03.3 31.9 139°04.8 16.0 232°53.4 17.3   10 152°47.4 214°49.6 0.4 129°07.7 31.5 169°09.0 16.1 247°55.6 17.2   10 152°49.9 120°49.1 17.5   10 152°49.9 120°49.1 17.5   10 152°49.9 120°49.1 17.5   10 152°49.9 120°49.1 17.5   10 152°49.9 120°49.1 17.5   10 152°49.9 120°49.1 17.5   10 152°49.9 120°49.1 17.5   10 152°49.9 120°49.1 17.5   10 152°49.9 120°49.1 17.5   10 152°49.9 120°49.1 17.5   10 152°49.9 120°49.1 17.5   10 152°49.9 120°49.1 17.5   10 152°49.9 120°49.1 17.5   10 152°49.9 120°49.1 17.5   10 152°49.9 120°49.1 17.5   10 152°49.9 120°49.1 17.5   10 152°49.9 120°49.1 17.5   10 152°49.9 120°49.1 17.5   10 152°49.9 120°49.1 17.5   10 152°49.1 17.5   10 152°49.1 17.5   10 152°49.1 17.5   10 152°49.1 17.5   10 152°49.1 17.5   10 152°49.1 17.5   10 152°49.1 17.5   10 152°49.1 17.5   10 152°49.1 17.5   10 152°49.1 17.5   10 1													
20 122°32.7 124°26.9 11.1 8°54.0 32.9 48°52.2 15.7 127°38.2 18.1 de 30.3 1.30°35.1 139°30.7 \tag{8.5} 10.3 23°55.7 32.8 63°54.3 \tag{8.5} 15.8 127°38.2 18.1 de 30.3 18.0 Vega 80°33.2 38°84.1 130°10.0 169°38.2 08.6 53°59.2 32.4 93°58.5 15.8 15°24.5 17.9 de 15°59.9 85°59.9 80°55.9 de 15.8 15°8 12°40.5 17.9 de 15°59.9 80°53.2 38°84.1 17.3 de 15°59.9 de 15°59.9 80°53.2 38°84.1 17.3 de 15°59.9 de 1											_	90°42.1	
152°37.6   154°34.5   0.94   38°57.4   32.6   78°56.4   15.8   157°42.5   17.9   17.7   17.													
Tue   GHA   GHA   Dec   GHA   Dec   GHA   Dec   GHA   17.5   18.6   17.2   4.7   17.7   17.5   18.6   17.2   4.7   17.7   18.6   18.6   17.2   4.7   17.7   18.6											Vega	80°33.2	38°48.1
Mer.pass   11:51   V3.8' d-0.8' m-4.20   V1.7' d-0.2' m0.28   V2.1' d0.0' m-2.15   V2.2' d-0.1' m1.15   Peacock   53°05.8   56°39.1											Nunki	75°47.6	
Tue GHA GHA Dec GHA GF SCALE STATE SCALE SCALE STATE SCALE	23	107 40.0	109 38.2	08.0	53 59.2	32.4	93 58.5	15.8	172 44.7	17.7	Altair	61°59.9	
Tue         GHA         GHA         Dec         All Nairs         23°38.9         9°9.3         46°90.3           1         182°42.5         184°42.0         N08°07.8         69°00.9         N24°32.2         109°00.6         N22°15.9         187°46.9         504°17.6         Formalhaut         15°14.7         29°29.4         46°803.3         11.5°14.7         29°29.4         46°803.3         11.5°14.7         29°29.4         46°803.3         11.5°14.7         29°29.4         46°803.3         11.5°14.7         29°29.4         46°803.3         11.5°14.7         29°29.5         46°803.3         11.5°14.7         29°29.2         29°23.4         41.7°3.3         41.6°06.0         11.5°46.0         217°51.3         17.4         40.4         11.5°00.7         31.5         169°09.0         16.1         246°55.6         17.2         40.4         40.4         31.3         184°11.0         16.1         26°57.8         17.0         40.4         40.4         31.3         184°11.0         16.1         26°257.8         17.0         40.4         40.4 <t< td=""><td>Mer.p</td><td>ass. 11:51</td><td><math>\nu</math>3.8′ d-0</td><td>.8′ m-4.20</td><td><math>\nu 1.7' \ d-0</math></td><td>.2′ m0.28</td><td><math>\nu 2.1' \ d0.</math></td><td>.0′ m-2.15</td><td><math>\nu</math>2.2′ d-0</td><td>.1'  m1.15</td><td></td><td></td><td></td></t<>	Mer.p	ass. 11:51	$\nu$ 3.8′ d-0	.8′ m-4.20	$\nu 1.7' \ d-0$	.2′ m0.28	$\nu 2.1' \ d0.$	.0′ m-2.15	$\nu$ 2.2′ d-0	.1'  m1.15			
Tue         GHA         Dec         GHA         Powal 197° 45.0         199° 45.8         06.9         0.99° 04.3         31.1         124°02.7         15.9         202° 49.1         17.5         GMar 29° 29.9         4         28° 13.0         21°° 29.9         4         22° 29° 34.4         17.3         Markab         13° 30.1         15° 40.6         23° 23° 53.4         17.3         Markab         13° 30.1         15° 20.3           5         257° 64.8         260° 00.9         0.3.5         144° 90.9         31.3         184° 11.0         16.1         26° 25°.8         17.0         Mars 2 Sun         Markab         13° 30.1         15° 20.3           6         27° 57.3         25° 5° 64.8         260° 00.9         0.3.5         144° 90.9         31.0         214° 15.2         16.2         293° 02.2         16.8         Mars 2 Mor         Mars 2 46° 35.3         11.50           7         287° 59.8         290° 08.5         01.8         17° 12.2													
1 182°42.5 184°42.0 NO8°07.8 60°0.9 N24°32.2 100°00.6 N22°15.9 187°46.9 S04°17.6 197°45.8 06.9 84°02.6 32.1 124°02.7 15.9 202°49.1 17.5 212°47.4 214°49.6 06.1 99°04.3 31.9 139°04.8 16.0 232°53.4 17.3 17.4 28°13.0 17.5 22°2°29.4 24°57.1 04.4 129°07.7 31.5 169°09.0 16.1 247°55.6 17.2 14°40.6 07.3 184°11.0 16.1 247°55.6 17.2 14°40.6 07.3 184°11.0 16.1 247°55.6 17.2 14°40.6 07.3 184°11.0 16.1 247°55.6 17.2 14°40.6 18.3 184°11.0 16.1 247°55.6 17.2 14°40.6 18.3 184°11.0 16.1 247°55.6 17.2 18.3 18.4 11.0 16.1 262°57.8 17.0 18.3 184°11.0 16.1 262°57.8 17.0 18.3 184°11.0 18.1 18.2 18.2 18.2 18.3 18.3 18.3 18.3 18.3 18.3 18.3 18.3	Tue	GΗΔ	GΗΔ	Dec	GΗΔ	Dec	GΗΔ	Dec	GΗΔ	Dec			
1 197°45.0 199°45.8 06.9 84°02.6 32.1 124°02.7 15.9 202°49.1 17.5 212°47.4 214°49.6 06.1 99°04.3 31.9 139°04.8 16.0 217°51.3 17.4 229°53.4 17.3 227°49.9 229°53.4 05.2 114°06.0 31.7 154°06.9 16.0 232°53.4 17.3 4 228°13.0 4 242°52.4 244°57.1 04.4 129°07.7 31.5 169°09.0 16.1 247°55.6 17.2 16.2 257°54.8 260°00.9 03.5 144°09.4 31.3 184°11.0 16.1 262°57.8 17.0 16.2 278°00.0 \$04°16.9 16.2 278°00.0 \$04°16.9 16.2 278°00.0 \$04°16.9 16.3 280°0.2 16.8 293°02.2 16.8 293°02.2 16.8 293°02.2 16.8 293°02.2 16.8 293°02.2 16.8 293°02.2 16.8 293°02.2 16.8 293°02.2 16.8 293°02.2 16.8 293°02.2 16.8 293°07.2 335°19.8 07°59.3 219°18.0 30.4 259°21.5 16.4 338°08.7 16.4 246°36.1 19:24 246°36.1 13°45.4 26°36.1 19:24 246°36.1 13°45.4 26°36.1 19:24 246°36.1 13°45.4 26°36.1 19:24 246°36.1 13°45.4 26°36.1 19:24 246°36.1 15°50.3 16.1 33°17.0 35°34.8 55.9 279°24.8 29.7 319°29.8 16.5 38°17.4 16.0 15°44.8 15.9 16°44.8 15.9 16°44.8 15.9 16°44.8 15.9 16°44.8 15.9 16°44.8 15.9 16°44.8 15.9 16°44.8 15.9 16°44.8 15.9 16°44.8 15.9 16°44.8 15.9 16°44.8 15.9 16°44.8 15.9 16°45.8 15.7 16.8 15°45.3 16.1 16.7 16.8 15°45.8 15.7 16.9 16°45.8 15.7 16.9 16°45.8 15.7 16.9 16°45.8 15.9 16°45.8 15.9 16°45.8 15.9 16°45.8 15.9 16°45.8 15.9 16°45.8 15.9 16°45.8 15.9 16°45.8 15.9 16°45.8 15.9 16°45.8 15.9 16°45.8 15.9 16°45.8 15°57.3 10.7 16°45.8 15°45.1 10.4 15°45.1 10.4 15°45.1 10.4 15°45.1 10.4 15°45.1 10.4 15°45.1 10.4 15°45.1 10.4 15°45.1 10.4 15°45.1 10.4 15°45.1 10.4 15°45.1 10.4 15°45.1 10.4 15°45.1 10.4 15°45.1 10.4 15°45.1 10.4 10.4 10.4 10.4 10.4 10.4 10.4 10													
2 212°47.4 214°49.6 06.1 99°04.3 31.9 139°04.8 16.0 217°51.3 17.4 Markab 13°30.7 25°13.0 227°49.9 229°53.4 · 05.2 114°06.0 · 31.7 154°06.9 · 16.0 222°53.4 · 17.3 4 242°52.4 244°57.1 04.4 129°07.7 31.5 169°09.0 16.1 247°55.6 17.2 5 257°54.8 260°00.9 03.5 144°09.4 31.3 184°11.0 16.1 262°57.8 17.0 Venus 0°54.8 11:50 6 272°57.3 275°04.7 N08°02.7 159°11.2 N24°31.2 199°13.1 N22°16.2 278°00.0 504°16.9 Mars 246°53.4 19:27 7 287°59.8 290°08.5 01.8 174°12.9 31.0 214°15.2 16.2 293°02.2 16.8 303°02.2 305°12.2 01.0 189°14.6 30.8 229°17.3 16.3 308°04.4 16.7 9 318°04.7 320°16.0 08°00.1 204°16.3 · 30.6 244°19.4 · 16.3 323°06.5 · 16.6 10 333°07.2 335°19.8 07°59.3 219°18.0 30.4 259°21.5 16.4 338°08.7 16.4 338°08.7 16.4 338°09.5 58.4 234°19.7 30.3 274°23.6 16.4 353°10.9 16.3 18°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1 318°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1 521°1.2 11:31 1.3 18°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1 521°1.2 11:31 1.3 18°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1 521°1.2 11:31 1.3 18°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1 521°1.2 11:31 1.3 18°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1 521°1.2 11:31 1.3 18°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1 521°1.2 11:31 1.3 18°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1 521°1.2 11:31 1.3 18°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1 521°1.2 11:31 1.3 18°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1 521°1.2 11:31 1.3 18°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1 50.0 16.0 16.0 16.0 16.0 16.0 16.0 16.0 1													
3   227°49.9   229°53.4   · · · · · · · · · · · · · · · · · ·													
5 257°54.8 260°00.9 03.5 144°09.4 31.3 184°11.0 16.1 262°57.8 17.0   6 272°57.3 275°04.7 N08°02.7 159°11.2 N24°31.2 199°13.1 N22°16.2 278°00.0 504°16.9   7 287°59.8 290°08.5 01.8 174°12.9 31.0 214°15.2 16.2 293°02.2 16.8   8 303°02.2 305°12.2 01.0 189°14.6 30.8 229°17.3 16.3 308°04.4 16.7   9 318°04.7 320°16.0 08°00.1 204°16.3 · 30.6 244°19.4 · 16.3 323°06.5 · 16.6   10 333°07.2 335°19.8 07°59.3 219°18.0 30.4 259°21.5 16.4 338°08.7 16.4   11 348°09.6 350°23.5 58.4 234°19.7 30.3 274°23.6 16.4 353°10.9 16.3   12 3°12.1 5°27.3 N07°57.6 249°21.4 N24°30.1 289°25.6 N22°16.4 8°13.1 504°16.2   13 18°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1   14 33°17.0 35°34.8 55.9 279°24.8 29.7 319°29.8 16.5 38°17.4 16.0   15 48°19.5 50°38.6 · 55.0 294°26.5 · 29.5 334°31.9 · 16.6 53°19.6 · 15.9   16 63°21.9 65°42.3 54.2 309°28.2 29.4 349°34.0 16.6 68°21.8 15.7   16 63°21.9 65°42.3 54.2 309°28.2 29.4 349°34.0 16.6 68°21.8 15.7   17 78°24.4 80°46.1 53.3 324°29.9 29.2 4°36.1 16.7 83°24.0 15.6   18 93°26.9 95°49.8 N07°52.4 339°31.6 N24°99.0 19°38.2 N22°16.7 98°26.2 504°15.5   19 108°29.3 110°53.6 51.6 354°33.3 28.8 34°40.2 16.8 113°28.4 15.4   20 123°31.8 125°57.3 50.7 9°35.0 28.6 49°42.3 16.8 128°30.5 15.3   21 138°34.3 141°01.1 · 49.9 24°36.7 · 28.5 64°44.4 · 16.9 143°32.7 · 15.1   22 153°36.7 156°04.8 49.0 39°38.4 28.3 79°46.5 16.9 158°34.9 15.0   23 168°39.2 171°08.6 48.1 54°40.1 28.1 94°48.6 17.0 173°37.1 14.9    11.50 Venus 0°54.8 11:50   Mars 246°35.4 19:27   Mar 24 Mon Venus 0°154.8 11:50   Mars 246°35.4 19:27   Mar 25 Tue SHA Mer.pass 0°16.4   Saturn 5°17.1 11:44   Saturn 5°04.4 11:25   Saturn 5°04.4 1	3	227°49.9	229°53.4	• • 05.2	114°06.0	• • 31.7	$154^{\circ}06.9$	• • 16.0	232°53.4	• • 17.3	IVIAIRAD		13 20.3
6 272°57.3 275°04.7 N08°02.7 159°11.2 N24°31.2 199°13.1 N22°16.2 278°00.0 S04°16.9 7 287°59.8 290°08.5 01.8 174°12.9 31.0 214°15.2 16.2 293°02.2 16.8 8 303°02.2 305°12.2 01.0 189°14.6 30.8 229°17.3 16.3 308°04.4 16.7 9 318°04.7 320°16.0 08°00.1 204°16.3 · 30.6 244°19.4 · 16.3 323°06.5 · 16.6 10 333°07.2 335°19.8 07°59.3 219°18.0 30.4 259°21.5 16.4 338°08.7 16.4 11 348°09.6 350°23.5 58.4 234°19.7 30.3 274°23.6 16.4 353°10.9 16.3 18°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1 14 33°17.0 35°34.8 55.9 279°24.8 29.7 319°29.8 16.5 38°17.4 16.0 15 48°19.5 50°38.6 · 55.0 294°26.5 · 29.5 334°31.9 · 16.6 53°19.6 · 15.9 16 63°21.9 65°42.3 54.2 309°28.2 29.4 349°34.0 16.6 68°21.8 15.7 178°24.4 80°46.1 53.3 324°29.9 29.2 4°36.1 16.7 83°24.0 15.6 16.6 16.6 16.6 16.6 16.6 16.6 16.6				04.4		31.5		16.1		17.2			
7 287°59.8 290°08.5 01.8 174°12.9 31.0 214°15.2 16.2 293°02.2 16.8 8 303°02.2 305°12.2 01.0 189°14.6 30.8 229°17.3 16.3 308°04.4 16.7 9 318°04.7 320°16.0 08°00.1 204°16.3 · 30.6 244°19.4 · 16.3 323°06.5 · 16.6 10 333°07.2 335°19.8 07°59.3 219°18.0 30.4 259°21.5 16.4 338°08.7 16.4 11 348°09.6 350°23.5 58.4 234°19.7 30.3 274°23.6 16.4 353°10.9 16.3 12 3°12.1 5°27.3 N07°57.6 249°21.4 N24°30.1 289°25.6 N22°16.4 8°13.1 S04°16.2 33°15.3 16.1 18°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1 16.1 14 33°17.0 35°34.8 55.9 279°24.8 29.7 319°29.8 16.5 38°17.4 16.0 15 48°19.5 50°38.6 · 55.0 294°26.5 · 29.5 334°31.9 · 16.6 53°19.6 · 15.9 16.6 68°21.8 15.7 17 78°24.4 80°46.1 53.3 324°29.9 29.2 4°36.1 16.7 83°24.0 15.6 15.6 15.6 38°43.3 324°29.9 29.2 4°36.1 16.7 83°24.0 15.6 15.6 15.6 38°43.3 128°3.3 10.9 19°38.2 N22°16.7 98°26.2 S04°15.5 11.38 16.4 138°34.3 141°01.1 · 49.9 24°36.7 · 28.5 64°44.4 · 16.9 143°32.7 · 15.1 14.9 15.0 Mars: 0.5 11.27 11.27 11.27 11.39 11.39 11.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.													
8 303°02.2 305°12.2 01.0 189°14.6 30.8 229°17.3 16.3 308°04.4 16.7 9 318°04.7 320°16.0 08°00.1 204°16.3 · 30.6 244°19.4 · 16.3 323°06.5 · 16.6 10 333°07.2 335°19.8 07°59.3 219°18.0 30.4 259°21.5 16.4 338°08.7 16.4 11 348°09.6 350°23.5 58.4 234°19.7 30.3 274°23.6 16.4 353°10.9 16.3 12 3°12.1 5°27.3 N07°57.6 249°21.4 N24°30.1 289°25.6 N22°16.4 8°13.1 504°16.2 13 18°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1 33°17.0 35°34.8 55.9 279°24.8 29.7 319°29.8 16.5 38°17.4 16.0 15 48°19.5 50°38.6 · 55.0 294°26.5 · 29.5 334°31.9 · 16.6 53°19.6 · 15.9 16.6 53°19.6 · 15.9 16.6 63°21.9 65°42.3 54.2 309°28.2 29.4 349°34.0 16.6 68°21.8 15.7 17 78°24.4 80°46.1 53.3 324°29.9 29.2 4°36.1 16.7 83°24.0 15.6 19.0 15.6 19.0 108°29.3 110°53.6 51.6 354°33.3 28.8 34°40.2 16.8 113°28.4 15.4 20 123°31.8 125°57.3 50.7 9°35.0 28.6 49°42.3 16.8 128°30.5 15.3 21 138°34.3 141°01.1 · 49.9 24°36.7 · 28.5 64°44.4 · 16.9 143°32.7 · 15.1 14.9 15.0 15.0 15.0 15.0 15.0 15.0 15.0 15.0													
9 318°04.7 320°16.0 08°00.1 204°16.3 ·· 30.6 244°19.4 ·· 16.3 323°06.5 ·· 16.6 10 333°07.2 335°19.8 07°59.3 219°18.0 30.4 259°21.5 16.4 338°08.7 16.4 11 348°09.6 350°23.5 58.4 234°19.7 30.3 274°23.6 16.4 353°10.9 16.3 12.1 5°27.3 N07°57.6 249°21.4 N24°30.1 289°25.6 N22°16.4 8°13.1 S04°16.2 11.34 18°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1 14 33°17.0 35°34.8 55.9 279°24.8 29.7 319°29.8 16.5 38°17.4 16.0 15 48°19.5 50°38.6 ·· 55.0 294°26.5 ·· 29.5 334°31.9 ·· 16.6 53°19.6 ·· 15.9 16 63°21.9 66°42.3 54.2 309°28.2 29.4 349°34.0 16.6 68°21.8 15.7 17 78°24.4 80°46.1 53.3 324°29.9 29.2 4°36.1 16.7 83°24.0 15.6 16.6 83°24.0 15.6 18 93°26.9 95°49.8 N07°52.4 339°31.6 N24°29.0 19°38.2 N22°16.7 98°26.2 S04°15.5 19 108°29.3 110°53.6 51.6 354°33.3 28.8 34°40.2 16.8 113°28.4 15.4 20 123°31.8 125°57.3 50.7 9°35.0 28.6 49°42.3 16.8 128°30.5 15.3 10.1 16.42 Saturn 5°04.4 11:27 11:27 11:38 11.38°34.3 141°01.1 ·· 49.9 24°36.7 ·· 28.5 64°44.4 ·· 16.9 143°32.7 ·· 15.1 15.1 15.0 15.0 15.0 15.0 15.0 15.0													
10  333°07.2  335°19.8  07°59.3  219°18.0  30.4  259°21.5  16.4  338°08.7  16.4  16.											Saturn	5°17.9	11:34
10 333°07.2 338°19.8 07°59.3 219°18.0 30.4 259°21.5 16.4 338°08.7 16.4 11 348°09.6 350°23.5 58.4 234°19.7 30.3 274°23.6 16.4 353°10.9 16.3 18°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1 18°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1 16.1 16.1 16.1 16.1 16.1 16.1 16											Mar 24 Mon	SHA	Mer.pass
11 348 '09.6 350 23.5 58.4 234 '19.7 30.3 274 23.6 16.4 353 10.9 16.3 16.2 3°12.1 5°27.3 N07°57.6 249°21.4 N24°30.1 289°25.6 N22°16.4 8°13.1 S04°16.2 13 18°14.5 20°31.1 56.7 264°23.1 29.9 304°27.7 16.5 23°15.3 16.1 29.0 16.4 33°17.0 35°34.8 55.9 279°24.8 29.7 319°29.8 16.5 38°17.4 16.0 15 48°19.5 50°38.6 · 55.0 294°26.5 · 29.5 334°31.9 · 16.6 53°19.6 · 15.9 16.6 53°19.6 · 15.9 16.6 68°21.8 15.7 16.5 23°15.3 16.1 15.7 16.5 23°15.3 16.1 15.7 16.5 23°15.3 16.1 15.7 16.5 23°15.3 16.1 16.7 16.0 16.6 16.0 16.0 16.0 16.0 16.0 16.0													-
12 3*12.1 5*27.3 NOV*57.6 249*21.4 N24*30.1 229*25.6 N22*16.4 8*13.1 SO4*16.2 13 18*14.5 20*31.1 56.7 264*23.1 29.9 304*27.7 16.5 23*15.3 16.1 14 33*17.0 35*34.8 55.9 279*24.8 29.7 319*29.8 16.5 38*17.4 16.0 15 48*19.5 50*38.6 · · 55.0 294*26.5 · · · 29.5 334*31.9 · · · 16.6 53*19.6 · · · 15.9 16 63*21.9 65*42.3 54.2 309*28.2 29.4 349*34.0 16.6 68*21.8 15.7 17 78*24.4 80*46.1 53.3 324*29.9 29.2 4*36.1 16.7 83*24.0 15.6 18 93*26.9 95*49.8 N07*52.4 339*31.6 N24*29.0 19*38.2 N22*16.7 98*26.2 SO4*15.5 19 108*29.3 110*53.6 51.6 354*33.3 28.8 34*40.2 16.8 113*28.4 15.4 20 123*31.8 125*57.3 50.7 9*35.0 28.6 49*42.3 16.8 128*30.5 15.3 21 138*34.3 141*01.1 · · 49.9 24*36.7 · · · 28.5 64*44.4 · · · 16.9 143*32.7 · · · 15.1 22 153*36.7 156*04.8 49.0 39*38.4 28.3 79*46.5 16.9 158*34.9 15.0 23 168*39.2 171*08.6 48.1 54*40.1 28.1 94*48.6 17.0 173*37.1 14.9													
14 33°17.0 35°34.8 55.9 279°24.8 29.7 319°29.8 16.5 38°17.4 16.0 15   15 48°19.5 50°38.6 · · 55.0 294°26.5 · · · 29.5 334°31.9 · · · 16.6 53°19.6 · · · 15.9   16 63°21.9 65°42.3 54.2 309°28.2 29.4 349°34.0 16.6 68°21.8 15.7   17 78°24.4 80°46.1 53.3 324°29.9 29.2 4°36.1 16.7 83°24.0 15.6   18 93°26.9 95°49.8 N07°52.4 339°31.6 N24°29.0 19°38.2 N22°16.7 98°26.2 504°15.5   19 108°29.3 110°53.6 51.6 354°33.3 28.8 34°40.2 16.8 113°28.4 15.4   20 123°31.8 125°57.3 50.7 9°35.0 28.6 49°42.3 16.8 128°30.5 15.3   21 138°34.3 141°01.1 · · 49.9 24°36.7 · · · 28.5 64°44.4 · · · 16.9 143°32.7 · · · 15.1   22 153°36.7 156°04.8 49.0 39°38.4 28.3 79°46.5 16.9 158°34.9 15.0   23 168°39.2 171°08.6 48.1 54°40.1 28.1 94°48.6 17.0 173°37.1 14.9      Saturn 5°11.2 11:31											Jupiter		16:45
15											Saturn	5°11.2	11:31
16       63°21.9       65°42.3       54.2       309°28.2       29.4       349°34.0       16.6       68°21.8       15.7       Venus       1°59.5       11:38         17       78°24.4       80°46.1       53.3       324°29.9       29.2       4°36.1       16.7       83°24.0       15.6       Mars       246°18.4       19:22         18       93°26.9       95°49.8       N07°52.4       339°31.6       N24°29.0       19°38.2       N22°16.7       98°26.2       504°15.5       Jupiter       286°18.1       16:42         19       108°29.3       110°53.6       51.6       354°33.3       28.8       34°40.2       16.8       113°28.4       15.4       Saturn       5°04.4       11:27         20       123°31.8       125°57.3       50.7       9°35.0       28.6       49°42.3       16.8       128°30.5       15.3       15.3       Horizontal parallax         22       153°36.7       156°04.8       49.0       39°38.4       28.3       79°46.5       16.9       158°34.9       15.0       Mars:       0.5         23       168°39.2       171°08.6       48.1       54°40.1       28.1       94°48.6       17.0       173°37.1       14.9       Mars:											Mar 25 Tue	CHV	Mer pace
17       78°24.4       80°46.1       53.3       324°29.9       29.2       4°36.1       16.7       83°24.0       15.6       Mars 246°18.4       19:22         18       93°26.9       95°49.8       N07°52.4       339°31.6       N24°29.0       19°38.2       N22°16.7       98°26.2       S04°15.5       Jupiter 286°18.1       16:42         19       108°29.3       110°53.6       51.6       354°33.3       28.8       34°40.2       16.8       113°28.4       15.4       Saturn 5°04.4       11:27         20       123°31.8       125°57.3       50.7       9°35.0       28.6       49°42.3       16.8       128°30.5       15.3       15.3       133°34.3       141°01.1       · 49.9       24°36.7       · 28.5       64°44.4       · 16.9       143°32.7       · 15.1       Horizontal parallax         22       153°36.7       156°04.8       49.0       39°38.4       28.3       79°46.5       16.9       158°34.9       15.0       Venus: 0.5         23       168°39.2       171°08.6       48.1       54°40.1       28.1       94°48.6       17.0       173°37.1       14.9       Mars: 0.1													-
18 93°26.9 95°49.8 N07°52.4 339°31.6 N24°29.0 19°38.2 N22°16.7 98°26.2 S04°15.5 19 108°29.3 110°53.6 51.6 354°33.3 28.8 34°40.2 16.8 113°28.4 15.4 15.4 20 123°31.8 125°57.3 50.7 9°35.0 28.6 49°42.3 16.8 128°30.5 15.3 21 138°34.3 141°01.1 · · 49.9 24°36.7 · · 28.5 64°44.4 · · 16.9 143°32.7 · · 15.1 22 153°36.7 156°04.8 49.0 39°38.4 28.3 79°46.5 16.9 158°34.9 15.0 23 168°39.2 171°08.6 48.1 54°40.1 28.1 94°48.6 17.0 173°37.1 14.9													
19 108°29.3 110°53.6 51.6 354°33.3 28.8 34°40.2 16.8 113°28.4 15.4 20 123°31.8 125°57.3 50.7 9°35.0 28.6 49°42.3 16.8 128°30.5 15.3 21 138°34.3 141°01.1 · · 49.9 24°36.7 · · 28.5 64°44.4 · · 16.9 143°32.7 · · 15.1 22 153°36.7 156°04.8 49.0 39°38.4 28.3 79°46.5 16.9 158°34.9 15.0 23 168°39.2 171°08.6 48.1 54°40.1 28.1 94°48.6 17.0 173°37.1 14.9													
20 123°31.8 125°57.3 50.7 9°35.0 28.6 49°42.3 16.8 128°30.5 15.3 21 138°34.3 141°01.1 · · 49.9 24°36.7 · · 28.5 64°44.4 · · 16.9 143°32.7 · · 15.1 22 153°36.7 156°04.8 49.0 39°38.4 28.3 79°46.5 16.9 158°34.9 15.0 23 168°39.2 171°08.6 48.1 54°40.1 28.1 94°48.6 17.0 173°37.1 14.9  Horizontal parallax Venus: 0.5 Mars: 0.1													
21       138°34.3       141°01.1       · · 49.9       24°36.7       · · 28.5       64°44.4       · · 16.9       143°32.7       · · 15.1       Horizontal parallax         22       153°36.7       156°04.8       49.0       39°38.4       28.3       79°46.5       16.9       158°34.9       15.0       Venus:       0.5         23       168°39.2       171°08.6       48.1       54°40.1       28.1       94°48.6       17.0       173°37.1       14.9       Mars:       0.1													1
23 168°39.2 171°08.6 48.1 54°40.1 28.1 94°48.6 17.0 173°37.1 14.9 Mars: 0.1											Horizont	•	
25 100 53.2 111 00.0 10.1 20.1 31 10.0 11.0 11.0 11.0				49.0		28.3		16.9		15.0			
Mer.pass. 11:47 $\nu 3.8' \ d$ -0.8' m-4.20 $\nu 1.7' \ d$ -0.2' m0.30 $\nu 2.1' \ d$ 0.0' m-2.14 $\nu 2.2' \ d$ -0.1' m1.15	23	168°39.2	171°08.6	48.1	54°40.1	28.1	94°48.6	17.0	173°37.1	14.9		Mars:	0.1
	Mer.p	ass. 11:47	ν3.8′ d-0	.8′ m-4.20	$\nu 1.7' \ d-0$	0.2′ m0.30	$\nu 2.1' \ d0$	.0′ m-2.14	$\nu 2.2' \ d-0$	.1′ m1.15			

h	Sui	า			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°20.8	N01°02.1	260°56.1	7.7'	\$28°20.1	-2.8'	56.0'
1 2	193°21.0 208°21.2	03.1 04.1	275°22.8 289°49.5	7.7' 7.7'	28°17.3 28°14.3	-3.0' -3.1'	56.0' 56.1'
3	223°21.4	05.1	304°16.1	7.7'	28°11.2	-3.3	56.1
4	238°21.5	06.1	318°42.8	7.7'	28°07.9	-3.4'	56.1'
5	253°21.7	07.1	333°09.5	7.7'	28°04.5	-3.6'	56.2'
6 7	268°21.9 283°22.1	N01°08.1 09.0	347°36.1 2°02.8	7.7' 7.7'	\$28°00.9 27°57.2	-3.7' -3.9'	56.2' 56.2'
8	298°22.3	10.0	16°29.5	7.7'	27°53.3	-3.9 -4.1'	56.3
9	313°22.5	• • 11.0	30°56.1	7.7'	27°49.2	-4.2'	56.3'
10	328°22.7	12.0	45°22.8	7.7'	27°45.0	-4.4'	56.3'
11 12	343°22.9 358°23.0	13.0 N01°14.0	59°49.4 74°16.1	7.7' 7.7'	27°40.6 527°36.0	-4.5' -4.7'	56.4' 56.4'
13	13°23.2	15.0	88°42.8	7.7'	27°31.3	-4.7 -4.9'	56.4
14	28°23.4	15.9	103°09.4	7.7'	27°26.5	-5.0'	56.5
15	43°23.6	• • 16.9	117°36.1	7.7'	27°21.5	-5.2'	56.5'
16	58°23.8 73°24.0	17.9	132°02.8 146°29.5	7.7'	27°16.3 27°10.9	-5.3' -5.5'	56.5'
17 18	73°24.0 88°24.2	18.9 N01°19.9	146° 29.5 160° 56.2	7.7' 7.7'	\$27°10.9	-5.5° -5.7'	56.6' 56.6'
19	103°24.4	20.9	175°23.0	7.7'	26°59.8	-5.8'	56.6'
20	118°24.5	21.9	189°49.7	7.8'	26°54.0	-6.0'	56.7'
21	133°24.7	• • 22.8	204°16.5	7.8'	26°48.0	-6.1'	56.7'
22 23	148°24.9 163°25.1	23.8 24.8	218°43.2 233°10.0	7.8' 7.8'	26°41.9 26°35.6	-6.3' -6.4'	56.8' 56.8'
23			233 10.0			-0.4	50.8
	SD = 16.0'	d = 1.0'		S	D = 15.3'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°25.3	N01°25.8	247°36.8	7.8'	S26°29.2	-6.6'	56.8'
1	193°25.5	26.8	262°03.6	7.8'	26°22.6	-6.8'	56.9'
2 3	208°25.7 223°25.9	27.8 •• 28.7	276°30.5 290°57.3	7.9' 7.9'	26°15.8 26°08.9	-6.9' -7.1'	56.9' 56.9'
3 4	223 25.9 238°26.1	29.7	290 57.3 305°24.2	7.9' 7.9'	26°01.8	-7.1 -7.2'	50.9 57.0'
5	253°26.2	30.7	319°51.1	7.9'	25°54.6	-7.4	57.0'
6	268°26.4	N01°31.7	334°18.1	8.0'	S25°47.2	-7.5'	57.1'
7	283°26.6	32.7	348°45.0	8.0'	25°39.7	-7.7'	57.1'
8 9	298°26.8 313°27.0	33.7 · · 34.7	3°12.0 17°39.0	8.0' 8.0'	25°32.0 25°24.2	-7.8' -8.0'	57.1' 57.2'
10	313 27.0 328°27.2	35.6	32°06.1	8.1'	25°16.2	-8.1'	57.2'
11	343°27.4	36.6	46°33.1	8.1'	25°08.1	-8.3	57.2'
12	358°27.6	N01°37.6	61°00.2	8.1'	S24°59.8	-8.4'	57.3'
13 14	13°27.7 28°27.9	38.6 39.6	75°27.4 89°54.5	8.2' 8.2'	24°51.3 24°42.7	-8.6' -8.7'	57.3' 57.4'
15	43°28.1	• • 40.6	104°21.7	8.2'	24°34.0	-8.9'	57.4'
16	58°28.3	41.5	118°48.9	8.3'	24°25.1	-9.0'	57.4'
17	73°28.5	42.5	133°16.2	8.3'	24°16.1	-9.2'	57.5'
18 19	88°28.7 103°28.9	N01°43.5 44.5	147°43.5 162°10.8	8.3' 8.4'	\$24°06.9 23°57.6	-9.3' -9.5'	57.5' 57.6'
20	103 28.9 118°29.1	44.5 45.5	176°38.2		23°48.1	-9.5 -9.6'	57.6'
21	133°29.2	• • 46.5	191°05.5	8.4'	23°38.4	-9.8'	57.6'
22	148°29.4	47.4	205°33.0	8.5'	23°28.7	-9.9'	57.7'
23	163°29.6	48.4	220°00.4	8.5'	23°18.8	-10.1'	57.7'
	SD = 16.0'	d = 1.0'		S	D = 15.5'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°29.8	N01°49.4	234°27.9	8.5'	S23°08.7	-10.2'	57.8'
1	193°30.0	50.4	248°55.5	8.6'	22°58.5	-10.3'	57.8'
2	208°30.2 223°30.4	51.4 •• 52.4	263°23.1 277°50.7	8.6' 8.7'	22°48.1 22°37.7	-10.5' -10.6'	57.8' 57.9'
3 4	238°30.6	53.3	277 50.7 292°18.3	8.7'	22°27.0	-10.8	57.9'
5	253°30.8	54.3	306°46.0	8.7'	$22^{\circ}16.3$	-10.9'	58.0'
6	268°30.9	N01°55.3	321°13.8	8.8'	\$22°05.3	-11.0'	58.0'
7 8	283°31.1 298°31.3	56.3 57.3	335°41.5 350°09.4	8.8' 8.9'	21°54.3 21°43.1	-11.2' -11.3'	58.0' 58.1'
9	298°31.3 313°31.5	57.3 •• 58.3	4°37.2	8.9'	21°43.1 21°31.8	-11.5'	58.1
10	328°31.7	$01^{\circ}59.2$	19°05.1	8.9'	21°20.4	-11.6'	58.2'
11	343°31.9	02°00.2	33°33.0	9.0'	21°08.8	-11.7'	58.2'
12 13	358°32.1 13°32.3	N02°01.2 02.2	48°01.0 62°29.0	9.0' 9.1'	\$20°57.0 20°45.2	-11.9' -12.0'	58.2' 58.3'
13 14	13°32.3 28°32.4	02.2	76°57.1	9.1'	20°45.2 20°33.2	-12.0 -12.1'	58.3
15	43°32.6	• • 04.1	91°25.2	9.1'	20°21.1	-12.2'	58.4
16	58°32.8	05.1	105°53.3	9.2'	20°08.8	-12.4'	58.4'
17	73°33.0	06.1	120°21.5	9.2'	19°56.5	-12.5'	58.4'
18 19	88°33.2 103°33.4	N02°07.1 08.1	134°49.7 149°18.0	9.3' 9.3'	\$19°44.0 19°31.3	-12.6' -12.8'	58.5' 58.5'
20	118°33.6	09.1	163°46.3	9.3'	19° 18.6	-12.9'	58.6'
21	133°33.8	• • 10.0	178°14.6	9.4'	19°05.7	-13.0'	58.6'
22	148°34.0	11.0	192°43.0	9.4'	18°52.7	-13.1'	58.6'
23	163°34.1	12.0	207°11.4	9.5'	18°39.6	-13.2'	58.7'
	SD = 16.0'	d = 1.0'		S	D = 15.8'		

Lat.  N 72° N 70° 68° 66° 64° 62° 60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° 20°	Naut. 02:51 03:15	Civil	Sunrise	Sunset	Twilight		
N 70° 68° 64° 62° 60° N 58° 56° 52° 50° 45° N 40° 35° 30°			1	Junioct	Civil	Naut.	
68° 66° 64° 62° 60° <b>N</b> 58° 56° 52° 50° 45° <b>N</b> 40° 35° 30°	03.15	04:27	05:37	18:38	19:49	21:27	
66° 64° 62° 60° <b>N</b> 58° 56° 54° 52° 50° 45° <b>N</b> 40° 35° 30°	05.15	04:37	05:40	18:35	19:38	21:02	
64° 62° 60° <b>N</b> 58° 56° 54° 52° 45° <b>N</b> 40° 35° 30°	03:33	04:46	05:42	18:32	19:29	20:43	
62° 60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30°	03:47	04:53	05:44	18:30	19:22	20:28	
60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30°	03:59	04:58	05:46	18:28	19:16	20:16	
N 58° 56° 54° 52° 50° 45° N 40° 35° 30°	04:08	05:03	05:48	18:26	19:11	20:06	
56° 54° 52° 50° 45° <b>N</b> 40° 35° 30°	04:16	05:07	05:49	18:25	19:07	19:58	
54° 52° 50° 45° <b>N</b> 40° 35° 30°	04:23	05:11	05:50	18:23	19:03	19:51	
52° 50° 45° <b>N</b> 40° 35° 30°	04:29	05:14	05:51	18:22	19:00	19:45	
50° 45° <b>N</b> 40° 35° 30°	04:34	05:17	05:52	18:21	18:57	19:39	
45° <b>N</b> 40° 35° 30°	04:39	05:19	05:53	18:20	18:54	19:35	
N 40° 35° 30°	04:43	05:21	05:54	18:20	18:52	19:30	
35° 30°	04:51	05:26	05:55	18:18	18:47	19:22	
30°	04:58	05:30	05:57	18:16	18:43	19:15	
	05:03	05:33	05:58	18:15	18:40	19:10	
20°	05:07	05:35	05:59	18:14	18:38	19:06	
	05:13	05:38	06:00	18:12	18:34	19:00	
N 10°	05:16	05:41	06:02	18:11	18:32	18:56	
0°	05:18	05:42	06:03	18:09	18:30	18:54	
<b>S</b> 10°	05:19	05:43	06:04	18:08	18:29	18:54	
20°	05:17	05:43	06:05	18:07	18:29	18:55	
30°	05:14	05:42	06:06	18:06	18:30	18:58	
35°	05:12	05:41	06:06	18:05	18:31	19:00	
40°	05:09	05:40	06:07	18:05	18:32	19:03	
45°	05:04	05:38	06:08	18:04	18:33	19:07	
<b>S</b> 50°	04:58	05:36	06:08	18:03	18:35	19:13	
52°	04:55	05:35	06:09	18:03	18:36	19:16	
54°	04:52	05:34	06:09	18:02	18:37	19:19	
56°	04:48	05:32	06:09	18:02	18:39	19:22	
58°	04:44	05:31	06:10	18:01	18:40	19:26	
<b>S</b> 60°	04:39	05:29	06:10	18:01	18:42	19:31	
		Moonris	e		Moonset		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue	
N 72°							

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

1			Sun			Moon	
	Day	Eqn.of	Time	Mer.	Mer.	Mer.Pass.	
İ	Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	23-25
		mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	45-25%
	23	06:37	06:28	12:06	06:51	19:19	
İ	24	06:19	06:10	12:06	07:47	20:14	
	25	06:01	05:52	12:06	08:41	21:07	

h _	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	183°41.7	$186^{\circ}12.3$	N07°47.3	69°41.8	N24°27.9	109°50.6	N22°17.0	188°39.3	S04°14.8	Alpheratz	357°35.0	29°13.7
1	198°44.1	201°16.1	46.4	84°43.5	27.7	124°52.7	17.0	203°41.5	14.7	Ankaa	353°07.4	-42° 10.2
2	213°46.6	$216^{\circ}19.8$	45.5	99°45.2	27.5	139°54.8	17.1	218°43.6	14.6	Schedar	349°31.5	56°40.5
3	228°49.0	231°23.5	• • 44.7	114°46.9	• • 27.4	154° 56.9	• • 17.1	233°45.8	• • 14.4	Diphda	348°47.4	-17°51.0
4	243°51.5	246°27.3	43.8	129°48.6	27.2	169°59.0	17.2	248°48.0	14.3	Achernar	335°20.6	-57°06.6
5	258°54.0	261°31.0	42.9	144°50.3	27.0	185°01.1	17.2	263°50.2	14.2	Hamal	327°51.3	23°34.9
6	273°56.4	276°34.7	N07°42.1	159°52.0	N24°26.8	200°03.1	N22°17.3	278°52.4	S04°14.1	Polaris	314°20.0	89°22.4
7	288°58.9	291°38.5	41.2	174°53.7	26.6	215°05.2	17.3	293°54.5	14.0	Acamar	315°11.9	-40°12.4
8	304°01.4	306°42.2	40.3	189°55.4	26.4	230°07.3	17.4	308°56.7	13.9	Menkar	314°06.2	4°11.2
9	319°03.8	321°45.9	• • 39.4	204°57.1	• • 26.3	245°09.4	• • 17.4	323°58.9	· · 13.7	Mirfak	308°28.4	49°57.1
10 11	334°06.3 349°08.8	336°49.6 351°53.3	38.6 37.7	219°58.8 235°00.4	26.1 25.9	260°11.5 275°13.5	17.5	339°01.1 354°03.3	13.6	Aldebaran	290°39.6	16°33.6
12	4°11.2	6°57.1	N07°36.8	250°02.1	N24°25.7	275 13.5 290°15.6	17.5 N22°17.6	9°05.5	13.5 S04°13.4	Rigel	281°03.8	-8° 10.5
13	19°13.7	22°00.8	36.0	265°03.8	25.5	305°17.7	17.6	24°07.6	13.3	Capella	280°21.8	46°01.5
14	34°16.1	37°04.5	35.1	280°05.5	25.3	320°19.8	17.6	39°09.8	13.1	Bellatrix	278°22.8	6°22.3
15	49°18.6	52°08.2	34.2	295°07.2	25.2	335°21.9	• • 17.7	54° 12.0	• • 13.0	Elnath	278°01.7	28°37.8
16	64°21.1	67°11.9	33.3	310°08.9	25.0	350°23.9	17.7	69°14.2	12.9	Alnilam	275°37.6	-1°11.2
17	79°23.5	82°15.6	32.5	325°10.6	24.8	5°26.0	17.8	84° 16.4	12.8	Betelgeuse	270°51.9	7°24.6
18	94°26.0	97°19.3	N07°31.6	340°12.2	N24°24.6	20°28.1	N22°17.8	99°18.6	S04°12.7	Canopus	263°52.3	-52°42.8
19	109°28.5	112°23.0	30.7	355°13.9	24.4	35°30.2	17.9	114°20.7	12.6	Sirius	258°26.1	-16°45.2
20	124°30.9	127°26.7	29.8	10°15.6	24.2	50°32.2	17.9	129°22.9	12.4	Adhara	255°05.7	-29°00.6
21	139°33.4	142°30.4	• • 28.9	25°17.3	24.1	65°34.3	· · 18.0	144°25.1	• • 12.3	Procyon	244°50.6	5°09.5
22	154°35.9	157°34.1	28.1	40°19.0	23.9	80°36.4	18.0	159°27.3	12.2	Pollux	243°17.0	27°58.0
23	169°38.3	172°37.8	27.2	55°20.7	23.7	95°38.5	18.1	$174^{\circ}29.5$	12.1	Avior	234°14.4 222°45.9	-59°35.7
			.9′ m-4.18		.2′ m0.32		.0′ m-2.14		.1′ m1.15	Suhail		-43°32.3 -69°49.4
ivier.p	ass. 11:43	ν3.1 α-0	.9 m-4.18	$\nu$ 1.1 a-0	.∠ mu.32	ν2.1 α0.	υ m-2.14	ν2.2 α-0	.1 m1.15	Miaplacidus Alphard	221°37.7 217°47.4	-69°49.4 -8°46.2
												-6 40.2 11°50.5
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus Dubhe	207°34.0 193°40.1	61°36.9
0	184°40.8	187°41.5	N07°26.3	70°22.3	N24°23.5	110°40.6	N22°18.1	189°31.7	S04°12.0	Denebola	182°24.4	14°25.7
1	199°43.3	202°45.2	25.4	85°24.0	23.3	125°42.6	18.2	204°33.8	11.9	Gienah	175°43.1	-17°41.1
2	214°45.7	217°48.9	24.5	100°25.7	23.1	140°44.7	18.2	$219^{\circ}36.0$	11.7	Acrux	_	-63°14.4
3	229°48.2	232°52.6	• • 23.7	115°27.4	• • 22.9	155°46.8	•• 18.2	234°38.2	•• 11.6		171°50.9	-57° 15.3
4	244°50.6	247°56.3	22.8	130°29.0	22.8	170°48.9	18.3	249°40.4	11.5	Alioth	166°12.2	55°49.2
5	$259^{\circ}53.1$	263°00.0	21.9	145°30.7	22.6	185°50.9	18.3	264°42.6	11.4	Spica	158°21.8	-11°17.7
6	274°55.6	278°03.6	N07°21.0	160°32.4	N24°22.4	200°53.0	N22°18.4	279°44.8	S04°11.3	Alkaid	152°51.4	49°11.0
7	289°58.0	293°07.3	20.1	175°34.1	22.2	215°55.1	18.4	294°46.9	11.1	Hadar	148°35.2	-60°29.6
8	305°00.5	308°11.0	19.2	190°35.7	22.0	230°57.2	18.5	309°49.1	11.0	Menkent	147°57.1	-36°29.7
9	320°03.0	323°14.7	• • 18.3	205°37.4	• • 21.8	245°59.2	• • 18.5	324°51.3	• • 10.9	Arcturus	145°47.5	19°02.8
10	335°05.4	338°18.3	17.5	220°39.1	21.6	261°01.3	18.6	339°53.5	10.8	Rigil Kent.	139°39.6	-60°56.3
11	350°07.9	353°22.0	16.6	235°40.8	21.4	276°03.4	18.6	354°55.7	10.7	Kochab	$137^{\circ}18.8$	74°02.8
12	5°10.4	8°25.7	N07°15.7	250°42.4	N24°21.3	291°05.4	N22°18.7	9°57.9	S04°10.6	Zuben'ubi	136°55.6	-16°08.9
13	20°12.8	23°29.3	14.8	265°44.1	21.1	306°07.5	18.7	25°00.0	10.4	Alphecca	126°03.3	$26^{\circ}37.5$
14	35°15.3	38°33.0	13.9	280°45.8	20.9	321°09.6	18.8	40°02.2	10.3	Antares	$112^{\circ}15.5$	-26°29.3
15	50°17.7	53°36.6	• • 13.0	295°47.4	• • 20.7	336°11.7	• • 18.8	55°04.4	• • 10.2	Atria	$107^{\circ}09.4$	-69°04.1
16	65°20.2	68°40.3	12.1	310°49.1	20.5	351°13.7	18.9	70°06.6	10.1	Sabik	102°02.5	-15°45.4
17 18	80°22.7 95°25.1	83°44.0 98°47.6	11.2 N07°10.4	325°50.8 340°52.4	20.3 N24°20.1	6° 15.8 21° 17.9	18.9 N22°18.9	85°08.8 100°11.0	10.0 \$04°09.9	Shaula	$96^{\circ}10.0$	-37°07.3
19	95 25.1 110°27.6	96 47.0 113°51.3	09.5	355°54.1	19.9	36°20.0	19.0	115° 13.1	09.7	Rasalhague	95°58.3	12°32.2
20	125°30.1	113 51.3 128°54.9	09.5	10°55.8	19.9	51°22.0	19.0	130°15.3	09.7	Eltanin	90°42.0	51°28.7
21	140°32.5	143°58.6	•• 07.7	25°57.4	• • 19.6	66°24.1	19.1	130 13.3 145°17.5	•• 09.5	Kaus Aust.	83°32.3	-34°22.3
22	155°35.0	159°02.2	06.8	40°59.1	19.4	81°26.2	19.1	160° 19.7	09.4	Vega	80°33.1	38°48.0
23	170°37.5	174°05.8	05.9	56°00.8	19.2	96°28.2	19.2	175°21.9	09.3	Nunki	75°47.6	-26°15.9
										Altair	61°59.9	8°55.9
Mer.p	ass. 11:39	$\nu$ 3.7′ d-0	.9′ m-4.13	$\nu 1.7' \ d-0$	.2′ m0.34	$\nu 2.1' d0.$	.0′ m-2.13	$\nu 2.2' \ d-0$	.1' m $1.15$	Peacock	53°05.7	-56°39.1
										Deneb	49°26.0	45°21.9
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.9	9°59.3 -46°50.3
0	185°39.9	189°09.5	N07°05.0	71°02.4	N24°19.0	111°30.3	N22°19.2	190°24.1	S04°09.2	Al Na'ir Fomalhaut	27°33.0 15°14.6	-46°50.3 -29°29.4
1	200°42.4	204°13.1	04.1	86°04.1	18.8	126°32.4	19.3	205°26.2	09.0	Scheat	15 14.6 13°45.4	-29 29.4 28°13.0
2	215°44.9	$219^{\circ}16.7$	03.2	101°05.7	18.6	141°34.5	19.3	220°28.4	08.9	Markab	13°30.0	15° 20.3
3	230°47.3	234°20.4	• • 02.3	$116^{\circ}07.4$	• 18.4	156°36.5	• • 19.4	235°30.6	• • 08.8			10 20.0
4	245°49.8	249°24.0	01.4	$131^{\circ}09.1$	18.2	171°38.6	19.4	250°32.8	08.7	Mar 26 Wed	SHA	Mer.pass
5	$260^{\circ}52.2$	264°27.6	07°00.5	$146^{\circ}10.7$	18.0	186°40.7	19.5	265°35.0	08.6	Venus	2°30.7	11:32
6	275°54.7	279°31.2	N06°59.7	161°12.4	N24°17.9	201°42.7	$N22^{\circ}19.5$	280°37.2	S04°08.5	Mars	246°00.2	19:19
7	290°57.2	294°34.9	58.8	176°14.0	17.7	216°44.8	19.5	295°39.3	08.3	Jupiter	286°09.0	16:38
8	305°59.6	309°38.5	57.9	191°15.7	17.5	231°46.9	19.6	310°41.5	08.2	Saturn	4°57.6	11:24
9	321°02.1	324°42.1	• • 57.0	206°17.3	• • 17.3	246°48.9	• • 19.6	325°43.7	• • 08.1	Mar 27 Thu	SHA	Mer.pass
10	336°04.6	339°45.7	56.1	221°19.0	17.1	261°51.0	19.7	340°45.9	0.80	Venus	3°00.7	11:26
11	351°07.0	354°49.3	55.2	236°20.7	16.9	276°53.1	19.7	355°48.1	07.9	Mars	245°41.5	19:16
12	6°09.5	9°52.9	N06°54.3	251°22.3	N24°16.7	291°55.1	N22°19.8	10°50.3	S04°07.7	Jupiter	285°59.8	16:35
13	21°12.0	24°56.5	53.4	266°24.0	16.5	306°57.2	19.8	25°52.5	07.6	Saturn	4°50.9	11:20
14	36°14.4	40°00.1	52.5	281°25.6	16.3	321°59.3	19.9	40°54.6	07.5			
15	51°16.9	55°03.7	• • 51.6	296°27.3	16.1	337°01.3	• • 19.9	55°56.8	• • 07.4	Mar 28 Fri	SHA	Mer.pass
16	66°19.3	70°07.3	50.7	311°28.9	15.9	352°03.4	20.0	70°59.0	07.3	Venus	3°29.5	11:21
17	81°21.8	85°10.9	49.8	326°30.6	15.8 N24°15.6	7°05.5	20.0 N22°20.1	86°01.2	07.2	Mars	245°22.5	19:14
18	96°24.3	100°14.5	N06°48.9	341°32.2	N24°15.6	22°07.5 37°09.6	N22°20.1	101°03.4 116°05.6	S04°07.0	Jupiter	285°50.4	16:32
19	111°26.7 126°29.2	115°18.1 130°21.7	48.0 47.1	356°33.9 11°35.5	15.4 15.2	52°11.7	20.1	116°05.6 131°07.7	06.9	Saturn	4°44.1	11:17
20 21	126°29.2 141°31.7	130°21.7 145°25.2	47.1 •• 46.2	26°37.2	15.2 •• 15.0	67° 13.7	20.2	131°07.7 146°09.9	06.8 •• 06.7	Horizont	al parallax	
22	141 31.7 156°34.1	145 25.2 160°28.8	45.3	20 37.2 41°38.8	14.8	82° 15.8	20.2	146 09.9 161°12.1	06.6		Venus:	0.5
23	171°36.6	175°32.4	44.4	56°40.4	14.6	97°17.9	20.2	176° 14.3	06.5		Mars:	0.1
										<u> </u>		
Mer.p	ass. 11:35	$\nu$ 3.6′ d-0	.9′ m-4.05	$\nu 1.7'  d-0$	.2′ m0.36	$\nu 2.1' \ d0.$	.0′ m-2.13	$\nu$ 2.2′ d-0	.1'  m1.16			

h	Sur	1			Moon		
			CIIA			-1	LID
Wed	GHA	Dec	GHA	ν	Dec	d 12.4	HP
0	178°34.3	N02°13.0	221°39.9	9.5'	\$18°26.3	-13.4'	58.7'
1	193°34.5	14.0 14.9	236°08.4	9.5'	18°13.0 17°59.5	-13.5'	58.8'
2	208°34.7 223°34.9		250°36.9 265°05.5	9.6'	17°59.5 17°45.9	-13.6'	58.8'
3 4	223 34.9 238°35.1	· · 15.9 16.9	205 05.5 279°34.1	9.6' 9.7'	17 45.9 17°32.2	-13.7' -13.8'	58.8' 58.9'
4 5	258 35.1 253°35.3	16.9 17.9	279 34.1 294°02.8	9.7 9.7'	17 32.2 17°18.4	-13.8 -13.9'	58.9'
6	268° 35.5	N02°18.9	308°31.4	9.7'	517°04.4	-13.9	58.9'
7	283°35.6	19.9	323°00.2	9.8'	16°50.4	-14.1 -14.2'	59.0'
8	298° 35.8	20.8	337°28.9	9.8'	16°36.2	-14.2' -14.3'	59.0'
9	313°36.0	21.8	351°57.7	9.8'	16°21.9	-14.4'	59.1
10	328° 36.2	22.8	6°26.6	9.0	16° 07.5	-14.4 -14.5'	59.1
11	343°36.4	23.8	20°55.5	9.9'	15°53.0	-14.6'	59.1'
12	358°36.6	N02° 24.8	35°24.4	9.9'	S15°38.4	-14.7'	59.2
13	13°36.8	25.7	49°53.3	10.0'	15°23.7	-14.8'	59.2'
14	28°37.0	26.7	64°22.3	10.0'	15°08.9	-14.9'	59.3'
15	43°37.2	27.7	78°51.3	10.0'	14°54.0	-15.0'	59.3'
16	58°37.3	28.7	93°20.3	10.1	14°39.0	-15.1'	59.3'
17	73°37.5	29.7	107°49.4	10.1'	14°23.9	-15.2'	59.4
18	88°37.7	N02°30.6	122° 18.5	10.1'	S14°08.7	-15.3'	59.4'
19	103°37.9	31.6	136° 47.7	10.2'	13°53 4	-15.4'	59.4'
20	118°38.1	32.6	150°47.7	10.2	13°38.0	-15.5'	59.5'
21	133°38.3	33.6	165°46.0	10.2'	13°22.5	-15.6'	59.5'
22	148°38.5	34.6	180° 15.2	10.3	13°06.9	-15.7'	59.5'
23	163°38.7	35.5	194°44.5	10.3'	12°51.2	-15.8'	59.6'
						_0.0	20.0
	SD = 16.0'	d = 1.0'		SI	O = 16.0'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°38.8	N02°36.5	209°13.8	10.3'	S12°35.5	-15.9'	59.6'
1	193°39.0	37.5	223°43.1	10.3'	12°19.6	-15.9'	59.7'
2	208°39.2	38.5	238°12.4	10.4'	12°03.7	-16.0'	59.7'
3	223°39.4	• • 39.4	252°41.8	10.4'	11°47.7	-16.1'	59.7'
4	238°39.6	40.4	$267^{\circ}11.2$	10.4'	11°31.5	-16.2'	59.8'
5	253°39.8	41.4	281°40.6	10.4'	11°15.4	-16.3'	59.8'
6	268°40.0	N02°42.4	296°10.0	10.4'	S10°59.1	-16.3'	59.8'
7	283°40.2	43.4	310°39.4	10.5'	10°42.7	-16.4'	59.9'
8	298°40.3	44.3	325°08.9	10.5'	10°26.3	-16.5'	59.9'
9	313°40.5	• • 45.3	339°38.4	10.5'	10°09.8	-16.6'	59.9'
10	328°40.7	46.3	354°07.9	10.5'	09°53.2	-16.6'	60.0'
11	343°40.9	47.3	8°37.4	10.5'	09°36.6	-16.7'	60.0'
12	358°41.1	N02°48.3	23°07.0	10.6'	509°19.9	-16.8'	60.0'
13	13°41.3	49.2	37°36.5	10.6'	$09^{\circ}03.1$	-16.9'	60.1'
14	28°41.5	50.2	52°06.1	10.6'	08°46.2	-16.9'	60.1'
15	43°41.7	• • 51.2	66°35.7	10.6'	08°29.3	-17.0'	60.1'
16	58°41.9	52.2	81°05.3	10.6'	08°12.3	-17.0'	60.1'
17	73°42.0	53.1	95°34.9	10.6'	07°55.3	-17.1'	60.2'
18	88°42.2	N02°54.1	110°04.5	10.6'	S07°38.2	-17.2'	60.2'
19	103° 42.4	55.1	124°34.1	10.6'	07°21.0		60.2'
20	118°42.6	56.1	139°03.8	10.6'	07°03.8	-17.3'	60.3'
21	133° 42.8	•• 57.1	153°33.4	10.7'	06°46.5	-17.3'	60.3'
22	148°43.0	58.0	168°03.1	10.7'	06°29.1	-17.4'	60.3'
23	163°43.2	59.0	182°32.7	10.7'	06°11.8	-17.4'	60.4'
	SD = 16.0'	d = 1.0'		SI	D = 16.3'		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0 0	178° 43.4	N03°00.0	<b>GПА</b> 197°02.4	u 10.7'	S05°54.3	a -17.5'	60.4'
1	178 43.4 193°43.5	01.0	211°32.1	10.7'	05°36.8	-17.5'	60.4
2	193 43.5 208°43.7	01.0	211 32.1 226°01.7	10.7'	05 36.8 05°19.3	-17.5 -17.6'	60.4
3	208 43.7 223°43.9	• • 02.9	240°31.4	10.7'	05 19.3 05°01.7	-17.6'	60.5
3 4	223 43.9 238°44.1	03.9	240 31.4 255°01.0	10.7'	05 01.7 04°44.1	-17.0 -17.7'	60.5
5	250 44.1 253°44.3	03.9	269° 30.7	10.7	04° 44.1	-17.7'	60.5
6	253 44.3 268°44.5	N03°05.8	284°00.4	10.7'	504°08.7	-17.7'	60.5
7	283°44.7	06.8	298° 30.0	10.7'	03°51.0	-17.7	60.6
8	298° 44.9	07.8	312°59.7	10.6'	03°33.2	-17.8'	60.6
9	313°45.0	• • 08.8	327°29.3	10.6'	03°15.4	-17.8'	60.6
10	328° 45.2	09.8	341°59.0	10.6'	02°57.6	-17.9'	60.6
11	343°45.4	10.7	356°28.6	10.6'	02°39.7	-17.9'	60.7
12	358° 45.6	N03°11.7	10°58.2	10.6'	S02°21.8	-17.9	60.7'
13	13°45.8	12.7	25°27.8	10.6'	02°03.9	-18.0'	60.7'
14	28° 46.0	13.7	39°57.4	10.6'	01°45.9	-18.0'	60.7'
15	43°46.2	. 14.6	54°27.0	10.6'	01°27.9	-18.0'	60.7'
16	58° 46.4	15.6	68°56.6	10.6'	01°09.9	-18.0'	60.8'
17	73°46.5	16.6	83°26.1	10.5'	00°51.9	-18.0'	60.8
18	88°46.7	N03° 17.6	97°55.7	10.5'	S00°33.9	-18.0'	60.8'
19	103°46.9	18.5	112°25.2	10.5'	S00°15.8	-18.1	60.8'
20	118° 47.1	19.5	126°54.7	10.5'	N00°02.2	18.1	60.8
21	133°47.3	• • 20.5	141°24.2	10.5'	00°20.3	18.1'	60.9'
22	148°47.5	21.5	155°53.6	10.4'	00°38.4	18.1'	60.9'
23	163°47.7	22.4	$170^{\circ}23.0$	10.4'	$00^{\circ}56.5$	18.1'	60.9'
	SD = 16.0'	d = 1.0'		SI	D = 16.5'		
	22 10.0			٥.			

N 72°         02:27         04:10         05:21         18:52         20:04         2:           N 70°         02:56         04:22         05:26         18:47         19:51         2:           68°         03:17         04:32         05:30         18:43         19:41         20           66°         03:33         04:40         05:33         18:40         19:33         20           64°         03:46         04:47         05:36         18:37         19:26         20           62°         03:57         04:53         05:38         18:34         19:20         20           60°         04:06         04:58         05:40         18:32         19:14         20           N 58°         04:14         05:02         05:42         18:30         19:10         19           56°         04:21         05:06         05:43         18:28         19:06         19           52°         04:32         05:12         05:45         18:27         19:03         18           50°         04:36         05:15         05:47         18:24         18:57         19           45°         04:46         05:20         05:50         18	aut. 1:51 1:20
N 70°         02:56         04:22         05:26         18:47         19:51         2:           68°         03:17         04:32         05:30         18:43         19:41         20:           66°         03:33         04:40         05:33         18:40         19:33         20:           64°         03:46         04:47         05:36         18:37         19:26         20:           62°         03:57         04:53         05:38         18:34         19:20         20:           60°         04:06         04:58         05:40         18:32         19:14         20:           N 58°         04:14         05:02         05:42         18:30         19:10         19:           56°         04:21         05:06         05:43         18:28         19:06         19:           54°         04:26         05:09         05:45         18:27         19:03         19:           52°         04:32         05:12         05:46         18:26         19:00         19:           50°         04:36         05:15         05:47         18:24         18:57         19:           45°         04:46         05:20         05:50	
68°         03:17         04:32         05:30         18:43         19:41         20           66°         03:33         04:40         05:33         18:40         19:33         20           64°         03:46         04:47         05:36         18:37         19:26         20           62°         03:57         04:53         05:38         18:34         19:20         20           60°         04:06         04:58         05:40         18:32         19:14         20           N 58°         04:14         05:02         05:42         18:30         19:10         19           56°         04:21         05:06         05:43         18:28         19:06         19           54°         04:26         05:09         05:45         18:27         19:03         19           52°         04:32         05:12         05:46         18:26         19:00         19           50°         04:36         05:15         05:47         18:24         18:57         19           45°         04:46         05:20         05:50         18:22         18:51         19           N 40°         04:53         05:25         05:52         18:1	1.20
66°         03:33         04:40         05:33         18:40         19:33         20           64°         03:46         04:47         05:36         18:37         19:26         20           62°         03:57         04:53         05:38         18:34         19:20         20           60°         04:06         04:58         05:40         18:32         19:14         20           N 58°         04:14         05:02         05:42         18:30         19:10         19           56°         04:21         05:06         05:43         18:28         19:06         19           54°         04:26         05:09         05:45         18:27         19:03         19           52°         04:32         05:12         05:46         18:26         19:00         19           50°         04:36         05:15         05:47         18:24         18:57         19           45°         04:46         05:20         05:50         18:22         18:51         19           N 40°         04:53         05:25         05:52         18:19         18:46         19	1.20
64°         03:46         04:47         05:36         18:37         19:26         20           62°         03:57         04:53         05:38         18:34         19:20         20           60°         04:06         04:58         05:40         18:32         19:14         20           N 58°         04:14         05:02         05:42         18:30         19:10         19           56°         04:21         05:06         05:43         18:28         19:06         19           54°         04:26         05:09         05:45         18:27         19:03         18           52°         04:32         05:12         05:46         18:26         19:00         19           50°         04:36         05:15         05:47         18:24         18:57         19           45°         04:46         05:20         05:50         18:22         18:51         19           N 40°         04:53         05:25         05:52         18:19         18:46         19	0:58
62°         03:57         04:53         05:38         18:34         19:20         20           60°         04:06         04:58         05:40         18:32         19:14         20           N 58°         04:14         05:02         05:42         18:30         19:10	0:41
60°         04:06         04:58         05:40         18:32         19:14         20           N 58°         04:14         05:02         05:42         18:30         19:10 <th>0:27</th>	0:27
N 58°         04:14         05:02         05:42         18:30         19:10 <th< th=""><th>0:16</th></th<>	0:16
56°         04:21         05:06         05:43         18:28         19:06         19:00         19:06         19:00         1	0:07
54°         04:26         05:09         05:45         18:27         19:03         19:53         1	9:59
52°         04:32         05:12         05:46         18:26         19:00         19:50         1	9:52
50°         04:36         05:15         05:47         18:24         18:57         19           45°         04:46         05:20         05:50         18:22         18:51         19           N 40°         04:53         05:25         05:52         18:19         18:46         19	9:46
45°         04:46         05:20         05:50         18:22         18:51         19           N 40°         04:53         05:25         05:52         18:19         18:46         19	9:40
<b>N</b> 40° 04:53 05:25 05:52 18:19 18:46 19	9:36
	9:26
	9:19
	9:13
	9:08
	9:01
	3:56
0° 05:17 05:41 06:02 18:09 18:29 18	3:53
	3:52
	3:52
	3:54
	3:56
	3:58
45° 05:08 05:42 06:11 17:58 18:27 19	9:02
	9:06
	9:08
	9:11
	9:14
<b>S</b> 60° 04:47 05:36 06:17 17:52 18:33 19	9:18

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

		Sun			Moon	
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	26-28
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	16-3%
26	05:43	05:34	12:06	09:33	21:59	
27	05:25	05:16	12:05	10:24	22:49	(1986)
28	05:07	04:58	12:05	11:15	23:40	

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	$186^{\circ}39.1$	190°36.0	N06°43.5	71°42.1	N24°14.4	$112^{\circ}19.9$	$N22^{\circ}20.3$	$191^{\circ}16.5$	504°06.3	Alpheratz	357°35.0	29° 13.7
1	201°41.5	205°39.5	42.6	86°43.7	14.2	127°22.0	20.4	206°18.7	06.2	Ankaa	353°07.4	-42° 10.2
2	216°44.0	220°43.1	41.7	101°45.4	14.0	142°24.1	20.4	221°20.9	06.1	Schedar	349°31.5	56° 40.5
3	231°46.5	235°46.7	• • 40.8	116°47.0	• • 13.8	157°26.1	• • 20.5	236°23.0	• • 06.0	Diphda	348°47.4	-17°51.0
4	246°48.9	250°50.2	39.9	131°48.7	13.6	172°28.2	20.5	251°25.2	05.9	Achernar	335°20.6	-57°06.6
5	261°51.4	265°53.8	39.0	146°50.3	13.4	187°30.3	20.6	266°27.4	05.8	Hamal	327°51.3	23°34.9
6	276°53.8	280°57.4	N06°38.1	161°51.9	N24°13.2	202°32.3	N22°20.6	281°29.6	S04°05.6	Polaris	314°21.1	89°22.4
7	291°56.3	296°00.9	37.2	176°53.6	13.0	217°34.4	20.7	296°31.8	05.5	Acamar	315°12.0	-40° 12.4
8	306°58.8	311°04.5	36.3	191°55.2	12.9	232°36.4	20.7	311°34.0	05.4	Menkar	314°06.2	4°11.2
9	322°01.2	326°08.0	• • 35.4	206°56.9	• • 12.7	247°38.5	• • 20.8	326°36.1	• • 05.3	Mirfak	308°28.4	49°57.1
10	337°03.7	341°11.6	34.5	221°58.5	12.5	262°40.6	20.8	341°38.3	05.2	Aldebaran	290°39.6	16°33.6
11	352°06.2	356°15.1	33.6	237°00.1	12.3	277°42.6	20.9	356°40.5	05.1	Rigel	281°03.8	-8° 10.5
12	7°08.6	11°18.6	N06°32.8	252°01.8	N24°12.1	292°44.7	N22°20.9	11°42.7	S04°04.9	Capella	280°21.8	46°01.5
13 14	22°11.1 37°13.6	26°22.2 41°25.7	31.9 31.0	267°03.4 282°05.1	11.9 11.7	307°46.8 322°48.8	20.9 21.0	26°44.9 41°47.1	04.8 04.7	Bellatrix	278°22.8	6°22.3
15	52°16.0	56°29.2	30.1	297°06.7	• • 11.5	337°50.9	21.0	56°49.3	•• 04.6	Elnath	278°01.8	28° 37.8
16	67°18.5	71°32.8	29.2	312°08.3	11.3	352°52.9	21.1	71°51.4	04.5	Alnilam	275°37.6	$-1^{\circ}11.2$
17	82°21.0	86°36.3	28.3	327°10.0	11.1	7°55.0	21.1	86°53.6	04.3	Betelgeuse	270°52.0	$7^{\circ}24.6$
18	97°23.4	101°39.8	N06° 27.4	342°11.6	N24°10.9	22°57.1	N22°21.2	101°55.8	504°04.2	Canopus	263°52.4	-52°42.8
19	112°25.9	116°43.3	26.5	357°13.2	10.7	37°59.1	21.2	116° 58.0	04.1	Sirius	258°26.1	-16°45.2
20	127°28.3	131°46.9	25.6	12°14.8	10.7	53°01.2	21.3	132°00.2	04.0	Adhara	255°05.7	-29°00.6
21	142°30.8	146°50.4	• • 24.7	27°16.5	. 10.3	68°03.2	. 21.3	147°02.4	03.9	Procyon	244°50.6	5°09.5
22	157°33.3	161°53.9	23.8	42°18.1	10.3	83°05.3	21.4	162°04.5	03.8	Pollux	243°17.0	27°58.0
23	172°35.7	176°57.4	22.9	57°19.7	09.9	98°07.4	21.4	177°06.7	03.7	Avior	234°14.4	-59°35.7
			_							Suhail	222°46.0	-43°32.3
Mer.p	ass. 11:32	$\nu$ 3.6′ d-0	.9′ m-4.06	$\nu 1.6' d-0$	.2′ m0.38	$\nu 2.1' \ d0.$	.0′ m-2.12	$\nu$ 2.2′ d-0	$.1^\prime$ m $1.16$	Miaplacidus	221°37.8	-69°49.5
										Alphard	217°47.4	-8°46.2
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.0	11°50.6
0	187°38.2	192°00.9	N06°22.0	72°21.4	N24°09.7	113°09.4	N22°21.5	192°08.9	S04°03.5	Dubhe	193°40.1	61°36.9
1	202°40.7	207°04.4	21.1	87°23.0	09.5	128°11.5	21.5	207°11.1	03.4	Denebola	182°24.5	14°25.7
2	217°43.1	222°07.9	20.2	102°24.6	09.3	143°13.5	21.6	222°13.3	03.3	Gienah	175°43.1	-17°41.1
3	232°45.6	237°11.4	19.3	117°26.2	09.1	158°15.6	21.6	237° 15.5	03.2	Acrux	172°59.3	-63°14.4
4	247°48.1	252°14.9	18.4	132°27.9	08.9	173°17.7	21.6	252° 17.7	03.1	Gacrux	171°50.9	-57° 15.4
5	262°50.5	267°18.4	17.5	147°29.5	08.7	188°19.7	21.7	267° 19.8	03.0	Alioth	166°12.2	55°49.3
6	277°53.0	282°21.9	N06° 16.6	162°31.1	N24°08.5	203°21.8	N22°21.7	282°22.0	504°02.9	Spica	158°21.8	-11°17.7
7	292°55.4	297°25.3	15.7	177°32.7	08.3	218°23.8	21.8	297°24.2	02.7	Alkaid	152°51.4	49°11.0
8	307°57.9	312°28.8	14.8	192°34.4	08.1	233°25.9	21.8	312°26.4	02.6	Hadar	148°35.2	-60°29.7
9	323°00.4	327°32.3	• • 13.9	207°36.0	• • 07.9	248°28.0	• • 21.9	327°28.6	• • 02.5	Menkent	147°57.1	-36°29.7
10	338°02.8	342°35.8	13.0	222°37.6	07.7	263°30.0	21.9	342°30.8	02.4	Arcturus Rigil Kent.	145°47.4 139°39.5	19°02.9 -60°56.3
11	353°05.3	357°39.2	12.1	237°39.2	07.5	278°32.1	22.0	357°33.0	02.3	Kochab	139° 39.3 137° 18.8	74°02.8
12	8°07.8	12°42.7	N06°11.2	252°40.9	N24°07.3	293°34.1	N22°22.0	12°35.1	S04°02.2	Zuben'ubi	136°55.6	-16°08.9
13	23°10.2	27°46.2	10.3	267°42.5	07.1	308°36.2	22.1	27°37.3	02.0	Alphecca	126°03.3	26°37.5
14	$38^{\circ}12.7$	42°49.6	09.4	282°44.1	06.9	323°38.2	22.1	42°39.5	01.9	Antares	112° 15.4	-26°29.3
15	53°15.2	57°53.1	• • 08.5	297°45.7	• • 06.7	338°40.3	• • 22.2	57°41.7	•• 01.8	Atria	107°09.3	-69°04.2
16	68°17.6	72°56.6	07.6	312°47.3	06.5	353°42.3	22.2	72°43.9	01.7	Sabik	102°02.5	-15° 45.4
17	83°20.1	88°00.0	06.7	327°48.9	06.3	8°44.4	22.3	87°46.1	01.6	Shaula	96°10.0	-37°07.3
18	98°22.6	103°03.5	N06°05.8	342°50.6	N24°06.1	23°46.5	N22°22.3	102°48.3	S04°01.5	Rasalhague	95°58.3	12°32.3
19	113°25.0	118°06.9	04.9	357°52.2	05.9	38°48.5	22.3	117°50.4	01.3	Eltanin	90°42.0	51°28.7
20	128°27.5	133°10.3	04.0	12°53.8	05.7	53°50.6	22.4	132°52.6	01.2	Kaus Aust.	83°32.3	-34°22.3
21	143°29.9	148°13.8	• • 03.1	27°55.4	• • 05.5	68°52.6	• • 22.4	147° 54.8	• • 01.1	Vega	80°33.1	38°48.0
22	158°32.4	163°17.2	02.3	42°57.0	05.3	83°54.7	22.5	162°57.0	01.0	Nunki	75°47.6	-26° 15.9
23	173°34.9	178°20.6	01.4	57°58.6	05.1	98°56.7	22.5	177° 59.2	00.9	Altair	61°59.9	8°55.9
Mer.p	ass. 11:28	$\nu 3.5' \ d-0$	.9′ m-4.12	$\nu 1.6' \ d-0$	0.2′ m0.40	$\nu 2.1' d0.$	.0′ m-2.12	$\nu 2.2' \ d-0$	.1′ m1.16	Peacock	53°05.7	$-56^{\circ}39.1$
										Deneb	49°25.9	45°21.9
			_		_		_		_	Enif	33°38.9	9°59.3
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.0	-46° 50.3
0	188°37.3	193°24.1	N06°00.5	73°00.2	N24°04.9	113°58.8	N22°22.6	193°01.4	S04°00.8	Fomalhaut	$15^{\circ}14.6$	-29°29.4
1	203°39.8	208°27.5	05°59.6	88°01.9	04.7	129°00.8	22.6	208°03.6	00.6	Scheat	13°45.4	28° 13.0
2	218°42.3 233°44.7	223°30.9 238°34.3	58.7 •• 57.8	103°03.5 118°05.1	04.5 · · 04.3	144°02.9 159°04.9	22.7	223°05.7 238°07.9	00.5 •• 00.4	Markab	13°30.0	15°20.3
3							• • 22.7			Mar 29 Sat	SHA	Mor pass
4 5	248°47.2 263°49.7	253°37.8 268°41.2	56.9 56.0	133°06.7 148°08.3	04.1 03.9	174°07.0 189°09.0	22.8 22.8	253°10.1 268°12.3	00.3 00.2	Venus	<b>зпа</b> 3°56.9	Mer.pass 11:15
6	263°49.7 278°52.1	268°41.2 283°44.6	N05°55.1	148°08.3 163°09.9	03.9 N24°03.7	204°11.1	N22°22.9	268° 12.3 283° 14.5	00.2 S04°00.1	Mars	3 50.9 245°03.0	19:11
7	276 52.1 293°54.6	203 44.0 298°48.0	54.2	103 09.9 178°11.5	03.5	219°13.2	22.9	203 14.5 298°16.7	03°59.9	Jupiter	285°40.9	16:28
8	308°57.0	313°51.4	53.3	176 11.5 193°13.1	03.3	234°15.2	23.0	313° 18.9	59.8	Saturn	4°37.4	11:13
9	323°59.5	328°54.8	• • 52.4	208°14.7	•• 03.1	249°17.3	• • 23.0	328°21.0	59.7			
10	339°02.0	343°58.2	51.5	223°16.3	02.9	264°19.3	23.0	343°23.2	59.6	Mar 30 Sun	SHA	Mer.pass
11	354°04.4	359°01.6	50.7	238°17.9	02.7	279°21.4	23.1	358° 25.4	59.5	Venus	4°22.7	11:09
12	9°06.9	14°05.0	N05°49.8	253°19.5	N24°02.5	294°23.4	N22°23.1	13°27.6	S03°59.4	Mars	244°43.2	19:09
13	24°09.4	29°08.4	48.9	268°21.1	02.3	309°25.5	23.2	28°29.8	59.3	Jupiter	285°31.2	16:25
14	39°11.8	44°11.8	48.0	283°22.7	02.1	324°27.5	23.2	43°32.0	59.1	Saturn	4°30.7	11:10
15	54°14.3	59°15.1	• • 47.1	298°24.3	• • 01.9	339°29.6	23.3	58°34.2	• • 59.0	Mar 31 Mon	SHA	Mer.pass
16	69°16.8	74°18.5	46.2	313°25.9	01.7	354°31.6	23.3	73°36.3	58.9	Venus	4°46.7	11:04
17	84°19.2	89°21.9	45.3	328°27.6	01.5	9°33.7	23.4	88°38.5	58.8	Mars	244°22.9	19:06
18	99°21.7	104°25.3	N05°44.4	343°29.2	N24°01.3	24°35.7	N22°23.4	103°40.7	S03°58.7	Jupiter	285°21.4	16:22
19	114°24.2	119°28.6	43.5	358°30.8	01.1	39°37.8	23.5	118°42.9	58.6	Saturn	4°24.0	11:06
20	129°26.6	134°32.0	42.7	13°32.4	00.9	54°39.8	23.5	133°45.1	58.4			
21	144°29.1	149°35.3	• • 41.8	28°33.9	• • 00.7	69°41.9	• • 23.6	148°47.3	• • 58.3	Horizont	al parallax	
22	159°31.5	164°38.7	40.9	43°35.5	00.5	84°43.9	23.6	163°49.5	58.2		Venus:	0.5
23	174°34.0	179°42.1	40.0	$58^{\circ}37.1$	00.3	99°46.0	23.7	178°51.7	58.1		Mars:	0.1
Mare	11.24	1/3 1/ 4 0	0/ m / 10	1/1 6/ 4 0	1.2/ m0.42	1/2 1/ 40	0' m 2 11	1/2 2/ 4 0	1/ m1 16			
ivier.p	ass. 11:24	ν3.4 a-U	.9′ m-4.18	$\nu$ 1.0 $a$ -0	).2′ m0.42	νZ.1 aU.	.0′ m-2.11	ν Ζ.Ζ' <b>α-</b> υ	.1'  m1.16			

h	Sui	1			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°47.9	$N03^{\circ}23.4$	$184^{\circ}52.5$	10.4'	N01°14.6	18.1'	60.9'
1	193°48.0	24.4	199°21.8	10.4'	01°32.7	18.1'	60.9'
2	208°48.2 223°48.4	25.4 •• 26.3	213°51.2 228°20.5	10.3' 10.3'	01°50.8 02°08.9	18.1' 18.1'	60.9' 61.0'
4	238°48.6	27.3	242°49.8	10.3'	02°26.9	18.1'	61.0'
5	253°48.8	28.3	$257^{\circ}19.1$	10.2'	02°45.0	18.1'	61.0'
6	268°49.0 283°49.2	N03°29.3 30.2	271°48.3 286°17.5	10.2' 10.2'	N03°03.1 03°21.2	18.1' 18.1'	61.0' 61.0'
7 8	283 49.2 298°49.4	31.2	280 17.5 300°46.7	10.2	03 21.2 03°39.2	18.0'	61.0'
9	313°49.5	32.2	315°15.8	10.1'	03°57.3	18.0'	61.0'
10	328°49.7	33.1	329°44.9	10.1'	04°15.3	18.0'	61.0'
11 12	343°49.9 358°50.1	34.1 N03°35.1	344°14.0 358°43.0	10.0' 10.0'	04°33.3 N04°51.3	18.0' 18.0'	61.1' 61.1'
13	13°50.3	36.1	13°12.0	9.9'	05°09.3	17.9	61.1
14	28°50.5	37.0	27°40.9	9.9'	05°27.2	17.9'	61.1'
15	43°50.7	• • 38.0	42°09.8	9.8'	05°45.2	17.9'	61.1'
16 17	58°50.8 73°51.0	39.0 40.0	56°38.6 71°07.4	9.8' 9.8'	06°03.1 06°20.9	17.9' 17.8'	61.1' 61.1'
18	88°51.2	N03°40.9	85°36.2	9.7'	N06°38.8	17.8'	61.1'
19	103°51.4	41.9	100°04.9	9.7'	06°56.6	17.8'	61.1'
20 21	118°51.6 133°51.8	42.9 • • 43.8	114°33.6 129°02.2	9.6' 9.6'	07°14.3 07°32.0	17.7' 17.7'	61.1' 61.1'
22	133 51.6 148°52.0	44.8	129 02.2 143°30.7	9.0 9.5'	07 32.0 07°49.7	17.6	61.1
23	163°52.2	45.8	157°59.2	9.5'	08° 07.3	17.6'	61.1'
	SD = 16.0'	d = 1.0'		SE	O = 16.6'		
Sun	<b>GHA</b> 178°52.3	<b>Dec</b> N03°46.8	GHA	$\nu$	<b>Dec</b> N08° 24.9	d 17 5'	HP
0 1	178°52.3 193°52.5	N03°46.8 47.7	172°27.7 186°56.1	9.4' 9.3'	08° 42.5	17.5' 17.5'	61.1' 61.1'
2	208°52.7	48.7	201°24.4	9.3'	09°00.0	17.4	61.1'
3	223°52.9	• • 49.7	215°52.7	9.2'	09°17.4	17.4'	61.1'
4 5	238°53.1 253°53.3	50.6 51.6	230°20.9 244°49.1	9.2' 9.1'	09°34.8 09°52.1	17.3' 17.3'	61.1' 61.1'
6	268° 53.5	N03°52.6	259°17.2	9.1'	N10°09.4	17.3	61.1
7	283°53.6	53.6	273°45.3	9.0'	10°26.6	17.2'	61.1'
8	298°53.8	54.5	288°13.3	8.9'	10°43.8	17.1'	61.1'
9 10	313°54.0 328°54.2	· · 55.5 56.5	302°41.2 317°09.1	8.9' 8.8'	11°00.9 11°17.9	17.0' 16.9'	61.1' 61.1'
11	343°54.4	57.4	331°36.9	8.7'	11°34.8	16.9'	61.1'
12	358°54.6	N03°58.4	346°04.6	8.7'	N11°51.7	16.8'	61.1'
13 14	13°54.8 28°55.0	03°59.4 04°00.4	0°32.3 14°59.9	8.6' 8.5'	12°08.5 12°25.2	16.7' 16.7'	61.1' 61.1'
15	43°55.1	01.3	29°27.4	8.5'	12° 41.9	16.6'	61.1'
16	58°55.3	02.3	43°54.9	8.4'	12°58.5	16.5'	61.1'
17	73°55.5	03.3	58°22.3	8.3'	13°15.0	16.4	61.1'
18 19	88°55.7 103°55.9	N04°04.2 05.2	72°49.6 87°16.8	8.3' 8.2'	N13°31.4 13°47.7	16.3' 16.2'	61.1' 61.1'
20	118°56.1	06.2	101°44.0	8.1'	14°03.9	16.1	61.1'
21	133°56.3	•• 07.1	$116^{\circ}11.1$	8.0'	14°20.0	16.0'	61.1'
22 23	148°56.4 163°56.6	08.1 09.1	130°38.2 145°05.1	8.0' 7.9'	14°36.1 14°52.1	16.0' 15.9'	61.1' 61.1'
23			145 05.1			15.9	01.1
	SD = 16.0'	d = 1.0'		SL	O = 16.7'		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°56.8	N04°10.0	159°32.0	7.8'	N15°07.9	15.8'	61.1'
1 2	193°57.0 208°57.2	11.0 12.0	173°58.8 188°25.6	7.7' 7.7'	15°23.7 15°39.3	15.7' 15.6'	61.0' 61.0'
3	208 57.2 223°57.4	12.0	202°52.2	7.7 7.6'	15 39.3 15°54.9	15.0 15.4'	61.0'
4	238°57.6	13.9	$217^{\circ}18.8$	7.5'	16° 10.3	15.3'	61.0'
5	253°57.7	14.9	231°45.3	7.4'	16°25.7	15.2'	61.0'
6 7	268°57.9 283°58.1	N04°15.9 16.8	246°11.8 260°38.1	7.4' 7.3'	N16° 40.9 16° 56.0	15.1' 15.0'	61.0' 61.0'
8	298°58.3	17.8	275°04.4	7.2'	17° 11.0	14.9'	61.0'
9	313°58.5	• 18.8	289°30.6	7.1'	17° 25.9	14.8'	60.9'
10 11	328°58.7 343°58.9	19.7 20.7	303°56.7 318°22.7	7.0' 7.0'	17° 40.7 17° 55.3	14.7' 14.5'	60.9' 60.9'
12	343°58.9 358°59.0	20.7 N04°21.7	318°22.7 332°48.7	6.9	17°55.3 N18°09.8	14.5	60.9
13	13°59.2	22.6	$347^{\circ}14.6$	6.8'	18°24.3	14.3'	60.9'
14	28°59.4	23.6	1°40.4	6.7'	18°38.5	14.2'	60.9'
15 16	43°59.6 58°59.8	· · 24.6 25.5	16°06.1 30°31.7	6.6' 6.6'	18°52.7 19°06.7	14.0' 13.9'	60.8' 60.8'
17	74°00.0	26.5	44°57.3	6.5	19° 20.6	13.8'	60.8
18	89°00.2	N04°27.5	59°22.8	6.4'	N19°34.4	13.6'	60.8'
19 20	104°00.3 119°00.5	28.4 29.4	73°48.2 88°13.5	6.3' 6.2'	19°48.0 20°01.5	13.5' 13.3'	60.8' 60.7'
20	119°00.5 134°00.7	30.4	88°13.5 102°38.7	6.2'	20° 14.8	13.3	60.7'
22	149°00.9	31.3	$117^{\circ}03.9$	6.1'	20°28.0	13.1'	60.7'
23	164°01.1	32.3	131°29.0	6.0'	20°41.1	12.9'	60.7'
	SD = 16.0'	d=1.0'		SE	0 = 16.7'		

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

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

		Sun			Moon	
Day	Eqn.of	Time	Mer.	Mer.Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	0-2
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	0-4%
29	04:49	04:40	12:05	12:05	-:-	
30	04:31	04:22	12:04	12:58	00:31	
31	04:13	04:04	12:04	13:53	01:25	

h	Aries	,	nus	•	ars	Jur	oiter	Sat	urn		Stars	
-												_
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	189°36.5	194°45.4	N05°39.1	73°38.7	N24°00.1 23°59.9	114°48.0	N22°23.7	193°53.8	\$03°58.0	Alpheratz	357°35.0	29°13.7
1	204°38.9	209°48.8	38.2	88°40.3		129°50.1 144°52.1	23.7	208°56.0	57.9	Ankaa	353°07.4	-42°10.2
2	219°41.4 234°43.9	224°52.1 239°55.4	37.4 •• 36.5	103°41.9 118°43.5	59.7 •• 59.5	159°54.1	23.8	223°58.2 239°00.4	57.8 •• 57.6	Schedar	349°31.5	56°40.5
4	249°46.3	254°58.8	35.6	133°45.1	59.3	174°56.2	23.9	254°02.6	57.5	Diphda	348°47.4	-17°51.0
5	264° 48.8	270°02.1	34.7	148°46.7	59.1	189°58.2	23.9	269°04.8	57.4	Achernar	335°20.6	-57°06.6
6	279°51.3	285°05.4	N05°33.8	163°48.3	N23°58.8	205°00.3	N22°24.0	284°07.0	\$03°57.3	Hamal	327°51.3	23°34.8
7	294° 53.7	300°08.8	32.9	178°49.9	58.6	220°02.3	24.0	299°09.1	57.2	Polaris	314°21.6	89°22.4
8	309°56.2	315°12.1	32.1	193°51.5	58.4	235°04.4	24.1	314°11.3	57.1	Acamar	315°12.0	-40°12.4
9	324°58.7	330°15.4	• • 31.2	208°53.1	• • 58.2	250°06.4	• • 24.1	329°13.5	• • 56.9	Menkar	314°06.2	4°11.2
10	$340^{\circ}01.1$	345°18.7	30.3	223°54.7	58.0	265°08.5	24.2	344°15.7	56.8	Mirfak	308°28.4	49°57.1
11	$355^{\circ}03.6$	0°22.0	29.4	238°56.3	57.8	$280^{\circ}10.5$	24.2	$359^{\circ}17.9$	56.7	Aldebaran	290°39.6 281°03.8	16°33.6 -8°10.5
12	$10^{\circ}06.0$	15°25.3	N05°28.5	253°57.8	N23°57.6	295°12.6	N22°24.3	14°20.1	S03°56.6	Rigel Capella	280°21.8	-6 10.5 46°01.5
13	$25^{\circ}08.5$	30°28.6	27.7	268°59.4	57.4	$310^{\circ}14.6$	24.3	29°22.3	56.5	Bellatrix	278°22.8	6°22.3
14	40°11.0	45°32.0	26.8	284°01.0	57.2	325°16.7	24.4	44°24.5	56.4	Elnath	278°01.8	28°37.8
15	55° 13.4	60°35.2	• • 25.9	299°02.6	• • 57.0	340°18.7	• • 24.4	59°26.6	• • 56.2	Alnilam	275°37.7	-1°11.2
16	70° 15.9	75°38.5	25.0	314°04.2	56.8	355°20.7	24.4	74°28.8	56.1	Betelgeuse	270°52.0	7°24.6
17	85° 18.4	90°41.8	24.2	329°05.8	56.6	10°22.8	24.5	89°31.0	56.0	Canopus	263°52.4	-52°42.8
18	100° 20.8	105°45.1	N05°23.3	344°07.4	N23°56.4	25°24.8	N22°24.5	104°33.2	S03°55.9	Sirius	258°26.1	-16°45.2
19	115°23.3	120°48.4	22.4	359°09.0	56.2	40°26.9	24.6	119°35.4	55.8	Adhara	255°05.7	-29°00.6
20	130° 25.8	135°51.7	21.5	14°10.5	55.9	55°28.9	24.6	134°37.6	55.7	Procyon	244°50.6	5°09.5
21	145°28.2 160°30.7	150°55.0 165°58.2	20.7	29°12.1 44°13.7	· · 55.7	70°31.0 85°33.0	• • 24.7	149°39.8	· · 55.6	Pollux	243°17.0	27°58.0
22 23	160° 30.7 175° 33.1	165°58.2 181°01.5	19.8	44°13.7 59°15.3	55.5 55.3	85°33.0 100°35.1	24.7	164°42.0 179°44.1	55.4 55.3	Avior	$234^{\circ}14.5$	-59°35.7
			18.9		55.3		24.8		55.3	Suhail	$222^{\circ}46.0$	-43°32.3
Mer.p	ass. 11:20	$\nu$ 3.3′ d-0	.9′ m-4.24	$\nu$ 1.6′ d-0	.2′ m0.44	$\nu 2.0' \ d0.$	0' m-2.11	$\nu$ 2.2′ d-0	$.1^\prime$ m $1.16$	Miaplacidus	221°37.8	-69°49.5
		-						-		Alphard	217°47.4	-8°46.2
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.0	11°50.6
0	190° 35.6	196°04.8	N05°18.1	74°16.9	N23°55.1	115°37.1	N22°24.8	194°46.3	\$03°55.2	Dubhe	193°40.2	61°37.0
1	205°38.1	211°08.0	17.2	89°18.4	54.9	130°39.1	24.9	209°48.5	55.1	Denebola	182°24.5	14°25.7
2	220°40.5	226°11.3	16.3	104°20.0	54.7	145°41.2	24.9	224°50.7	55.0	Gienah	175°43.1	-17°41.1
3	235°43.0	241°14.6	. 15.5	119°21.6	• • 54.5	160°43.2	• • 25.0	239°52.9	54.9	Acrux	172°59.3	-63°14.4
4	250° 45.5	256°17.8	14.6	134°23.2	54.3	175°45.3	25.0	254°55.1	54.8	Gacrux	171°50.9	-57°15.4
5	265°47.9	271°21.1	13.7	149°24.8	54.1	190°47.3	25.1	269°57.3	54.6	Alioth Spica	166° 12.2 158° 21.8	55°49.3 -11°17.7
6	280°50.4	286°24.3	N05° 12.8	164°26.3	N23°53.9	205°49.4	N22°25.1	284°59.5	S03°54.5	Alkaid	150° 21.0° 152° 51.4	49°11.1
7	$295^{\circ}52.9$	301°27.5	12.0	$179^{\circ}27.9$	53.7	220°51.4	25.1	$300^{\circ}01.6$	54.4	Hadar	148° 35.2	-60°29.7
8	$310^{\circ}55.3$	316°30.8	11.1	194°29.5	53.4	235°53.4	25.2	315°03.8	54.3	Menkent	147°57.1	-36°29.7
9	325°57.8	331°34.0	• • 10.3	209°31.1	• • 53.2	250°55.5	• • 25.2	330°06.0	• • 54.2	Arcturus	145°47.4	19°02.9
10	341°00.3	346°37.2	09.4	224°32.6	53.0	265°57.5	25.3	345°08.2	54.1	Rigil Kent.	139°39.5	-60°56.3
11	356°02.7	1°40.5	08.5	239°34.2	52.8	280°59.6	25.3	0°10.4	53.9	Kochab	137° 18.7	74°02.8
12	11°05.2	16°43.7	N05°07.7	254°35.8	N23°52.6	296°01.6	N22°25.4	15°12.6	S03°53.8	Zuben'ubi	136°55.5	-16°08.9
13	26°07.6	31°46.9	06.8	269°37.4	52.4	311°03.6	25.4	30°14.8	53.7	Alphecca	$126^{\circ}03.3$	$26^{\circ}37.5$
14	41°10.1	46°50.1	05.9	284°38.9	52.2	326°05.7	25.5	45°17.0	53.6	Antares	112° 15.4	-26°29.3
15	56° 12.6 71° 15.0	61°53.3 76°56.6	05.1	299°40.5 314°42.1	• • 52.0	341°07.7	• • 25.5	60°19.1 75°21.3	53.5	Atria	$107^{\circ}09.3$	-69°04.2
16 17	86° 17.5	91°59.8	04.2 03.4	314 42.1 329°43.7	51.8 51.5	356°09.8 11°11.8	25.6 25.6	90°23.5	53.4 53.3	Sabik	102°02.4	-15°45.4
18	101°20.0	107°03.0	N05°02.5	344°45.2	N23°51.3	26°13.8	N22°25.7	105°25.7	503°53.1	Shaula	96° 10.0	-37°07.3
19	116° 22.4	122°06.2	01.7	359°46.8	51.1	41°15.9	25.7	120°27.9	53.0	Rasalhague	95°58.3	12°32.3
20	131°24.9	137°09.4	05°00.8	14°48.4	50.9	56°17.9	25.8	135°30.1	52.9	Eltanin	90°42.0	51°28.7
21	146° 27.4	152°12.5	04°59.9	29°49.9	50.7	71°19.9	• • 25.8	150°32.3	52.8	Kaus Aust.	83°32.2	-34°22.3
22	161°29.8	167°15.7	59.1	44°51.5	50.5	86°22.0	25.8	165°34.5	52.7	Vega	80°33.1	38°48.1
23	176°32.3	182°18.9	58.2	59°53.1	50.3	101°24.0	25.9	180°36.7	52.6	Nunki Altair	75°47.5 61°59.9	-26°15.9 8°55.9
Marn	200 11:16	2/ 4 0	.9′ m-4.30	1 6' d C	.2′ m0.46	1,2 0/ 40	0′ m-2.10		.1′ m1.16	Peacock	53°05.7	-56°39.1
ivier.p	ass. 11:16	ν3.3 α-0	.9 m-4.30	$\nu$ 1.0 $a$ -0	7.2 mu.40	ν2.0 do.	.U M-2.10	ν2.2 α-0	.1 m1.10	Deneb	49°25.9	45°21.9
										Enif	33°38.8	9°59.3
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.0	-46°50.3
0	191°34.8	197°22.1	N04°57.4	74°54.6	N23°50.1	116°26.1	N22°25.9	195°38.8	S03°52.5	Fomalhaut	15°14.6	-29°29.4
1	206° 37.2	212°25.3	56.5	89°56.2	49.8	131°28.1	26.0	210°41.0	52.3	Scheat	13°45.4	28°13.0
2	221°39.7	227°28.4	55.7	104°57.8	49.6	146°30.1	26.0	225°43.2	52.2	Markab	13°30.0	15°20.3
3	236° 42.1	242°31.6	• • 54.8	119°59.3	• • 49.4	161°32.2	• • 26.1	240°45.4	52.1	Apr 01 Tue	CHA	Mor nos-
4	251°44.6	257°34.8 272°37.9	54.0 52.1	135°00.9	49.2	176°34.2	26.1	255°47.6 270°49.8	52.0 51.0	Apr 01 Tue Venus	<b>SHA</b> 5°08.9	Mer.pass 10:59
5	266° 47.1 281° 49.5	272°37.9 287°41.1	53.1 N04°52.3	150°02.5 165°04.0	49.0 N23°48.8	191°36.2 206°38.3	26.2 N22°26.2	270°49.8 285°52.0	51.9 S03°51.8	Venus	5 08.9 244°02.3	10:59
6 7	281 49.5 296°52.0	287 41.1 302°44.2	NU4 52.3 51.4	180°05.6	N23 48.8 48.6	200 38.3 221°40.3	26.3	285 52.0 300°54.2	51.7	Jupiter	285°11.5	16:19
<i>1</i> 8	290 52.0 311°54.5	302 44.2 317°47.4	51.4 50.6	180 05.6 195°07.1	48.4	221 40.3 236°42.4	26.3	300 54.2 315°56.4	51.7 51.5	Saturn	4°17.4	11:03
9	326° 56.9	332°50.5	• • 49.7	210°08.7	• • 48.1	251°44.4	26.4	330°58.5	51.4			
10	341°59.4	347°53.7	48.9	225°10.3	47.9	266°46.4	26.4	346°00.7	51.3	Apr 02 Wed	SHA	Mer.pass
11	357°01.9	2°56.8	48.1	240°11.8	47.7	281°48.5	26.5	1°02.9	51.2	Venus	5°29.2	10:53
12	12°04.3	18°00.0	N04°47.2	255°13.4	N23°47.5	296°50.5	N22°26.5	16°05.1	503°51.1	Mars	243°41.3	19:01
13	$27^{\circ}06.8$	33°03.1	46.4	$270^{\circ}14.9$	47.3	311°52.5	26.6	31°07.3	51.0	Jupiter	285°01.5 4°10.7	16:15
14	$42^{\circ}09.3$	48°06.2	45.5	$285^{\circ}16.5$	47.1	326°54.6	26.6	46°09.5	50.9	Saturn	+ 10.7	10:59
15	57° 11.7	63°09.3	• • 44.7	300°18.1	• • 46.9	341°56.6	• • 26.6	61°11.7	• • 50.7	Apr 03 Thu	SHA	Mer.pass
16	72°14.2	78°12.5	43.9	315°19.6	46.6	356°58.6	26.7	76°13.9	50.6	Venus	5°47.3	10:48
17	87°16.6	93°15.6	43.0	330°21.2	46.4	12°00.7	26.7	91°16.1	50.5	Mars	243°19.9	18:58
18	102°19.1	108°18.7	N04° 42.2	345°22.7	N23°46.2	27°02.7	N22°26.8	106°18.2	\$03°50.4	Jupiter	284°51.3	16:12
19	117°21.6	123°21.8	41.3	0°24.3	46.0	42°04.7	26.8	121°20.4	50.3	Saturn	4°04.1	10:56
20	132°24.0	138°24.9	40.5	15°25.8	45.8	57°06.8	26.9	136°22.6	50.2	Horizon	al parallax	
21 22	147° 26.5 162° 29.0	153°28.0 168°31.1	· · 39.7	30°27.4 45°28.9	· · 45.6	72°08.8 87°10.8	· · 26.9 27.0	151°24.8 166°27.0	· · 50.1	1.01120111	Venus:	0.5
23	162 29.0 177°31.4	183°34.2	38.8 38.0	45 28.9 60°30.5	45.3 45.1	87 10.8 102°12.9	27.0 27.0	181°29.2	49.9 49.8		Mars:	0.1
										L		
Mer.p	ass. 11:12	$\nu$ 3.2′ d-0	.9′ m-4.35	$\nu$ 1.6' d-0	.2′ m0.48	$\nu 2.0' \ d0.$	.0′ m-2.10	$\nu 2.2' \ d-0$	$.1^\prime$ m $1.16$			

h	Sui	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°01.3	N04°33.3	145°54.0	5.9'	N20°54.0	12.8'	60.7'
1	194°01.4	34.2	$160^{\circ}18.9$	5.9'	$21^{\circ}06.8$	12.6'	60.6'
2	209°01.6	35.2	174°43.8	5.8'	21°19.4	12.5'	60.6'
3	224°01.8 239°02.0	36.1	189°08.6	5.7'	21°31.9	12.3'	60.6'
4 5	239°02.0 254°02.2	37.1 38.1	203°33.3 217°57.9	5.6' 5.5'	21°44.2 21°56.4	12.2' 12.0'	60.6' 60.6'
6	269°02.4	N04°39.0	232°22.4	5.5'	N22°08.4	11.9'	60.5
7	284°02.6	40.0	246°46.9	5.4	22°20.2	11.7'	60.5
8	299°02.7	41.0	261°11.3	5.3'	22°31.9	11.5'	60.5
9	314°02.9	• • 41.9	275°35.7	5.3'	22°43.5	11.4'	60.5'
10	329°03.1	42.9	289°59.9	5.2'	22°54.8	11.2'	60.4
11	344°03.3 359°03.5	43.9 N04°44.8	304°24.1 318°48.2	5.1' 5.0'	23°06.1 N23°17.1	11.0' 10.9'	60.4' 60.4'
12 13	359 03.5 14°03.7	1NU4 44.8 45.8	318 48.2 333°12.3	5.0'	23°28.0	10.9	60.4
14	29° 03.8	46.8	347°36.2	4.9'	23°38.7	10.7	60.3
15	44°04.0	• • 47.7	2°00.1	4.8'	23°49.2	10.4	60.3
16	59°04.2	48.7	16°24.0	4.8'	23°59.6	10.2'	60.3'
17	74°04.4	49.6	30° 47.8	4.7'	24°09.8	10.0'	60.2'
18	89°04.6	N04°50.6	45°11.5	4.7'	N24° 19.9	9.9'	60.2'
19 20	104°04.8 119°05.0	51.6 52.5	59°35.1 73°58.7	4.6' 4.5'	24°29.7 24°39.4	9.7' 9.5'	60.2' 60.2'
21	134°05.1	53.5	88°22.2	4.5'	24 39.4 24°48.9	9.3'	60.1
22	149° 05.3	54.5	102°45.7	4.4'	24°58.2	9.1'	60.1
23	164°05.5	55.4	117°09.1	4.4'	25°07.4	9.0'	60.1'
	SD = 16.0'	d = 1.0'		S	D = 16.5'		
Wed	GHA	Daa	GHA		Dec	d	НР
vved 0	<b>GHA</b> 179°05.7	<b>Dec</b> N04°56.4	131°32.5	ν 4.3'	Dec N25° 16.4	a 8.8'	60.0'
1	194°05.9	57.3	145°55.8	4.3'	25°25.1	8.6'	60.0
2	209°06.1	58.3	$160^{\circ}19.0$	4.2'	25°33.7	8.4'	60.0'
3	224°06.2	04°59.3	174°42.2	4.2'	25°42.2	8.2'	60.0'
4	239°06.4 254°06.6	05°00.2 01.2	189°05.4 203°28.5	4.1' 4.1'	25°50.4 25°58.5	8.1' 7.9'	59.9'
5 6	269° 06.8	N05°02.1	203 28.5 217°51.6	4.1	25 58.5 N26°06.3	7.9 7.7'	59.9' 59.9'
7	284°07.0	03.1	232°14.6	4.0'	26° 14.0	7.5'	59.8'
8	299°07.2	04.1	246°37.6	3.9'	$26^{\circ}21.5$	7.3'	59.8'
9	314°07.3	• • 05.0	261°00.5	3.9'	26°28.8	7.1'	59.8'
10 11	329°07.5 344°07.7	06.0 06.9	275°23.4 289°46.3	3.9' 3.8'	26°35.9 26°42.8	6.9' 6.7'	59.7' 59.7'
12	359° 07.9	N05°07.9	304°09.1	3.8'	N26°49.5	6.5	59.7
13	14°08.1	08.9	318°31.9	3.8'	26°56.1	6.3	59.6'
14	29°08.3	09.8	$332^{\circ}54.7$	3.7'	27°02.4	6.1'	59.6'
15	44°08.4	• • 10.8	347°17.4	3.7'	27°08.6	6.0'	59.6'
16 17	59°08.6 74°08.8	11.7 12.7	1°40.1 16°02.8	3.7' 3.7'	27°14.5 27°20.3	5.8' 5.6'	59.5' 59.5'
18	89°09.0	N05° 13.7	30°25.5	3.7'	N27°25.9	5.4	59.5
19	104°09.2	14.6	44°48.2	3.6'	27°31.2	5.2'	59.4'
20	119°09.4	15.6	59°10.8	3.6'	27°36.4	5.0'	59.4'
21	134°09.5	• • 16.5	73°33.4	3.6'	27°41.4	4.8'	59.4'
22 23	149°09.7 164°09.9	17.5 18.5	87°56.0 102°18.6	3.6' 3.6'	27°46.2 27°50.8	4.6' 4.4'	59.3' 59.3'
23	SD = 16.0'	d = 1.0'	102 16.0		D = 16.4'	4.4	59.5
	<u>JD = 10.0</u>	<u>u = 1.0</u>			D = 10.4		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	179°10.1 194°10.3	N05°19.4 20.4	116°41.2 131°03.8	3.6' 3.6'	N27°55.2 27°59.3	4.2' 4.0'	59.3' 59.2'
2	209° 10.4	20.4	131 03.8 145°26.4	3.6'	27 59.3 28°03.3	4.0 3.8'	59.2'
3	224° 10.4	22.3	159°49.0	3.6'	28° 07.1	3.6'	59.2'
4	239° 10.8	23.2	174°11.6	3.6'	28°10.8	3.4'	59.1'
5	254°11.0	24.2	188°34.2	3.6'	$28^{\circ}14.2$	3.2'	59.1'
6	269°11.2	N05°25.2	202°56.8	3.6'	N28° 17.4	3.0'	59.1'
7 8	284°11.4 299°11.5	26.1 27.1	217°19.5 231°42.1	3.6' 3.7'	28°20.4 28°23.2	2.8' 2.6'	59.0' 59.0'
9	299 11.5 314°11.7	28.0	231 42.1 246°04.8	3.7'	28° 25.8	2.4	59.0 58.9'
10	329° 11.9	29.0	260°27.4	3.7'	28°28.3	2.2'	58.9'
11	344°12.1	29.9	274°50.1	3.7'	28°30.5	2.0'	58.9'
12	359°12.3	N05°30.9	289°12.8	3.7'	N28° 32.5	1.8'	58.8'
13 14	14° 12.5 29° 12.6	31.8 32.8	303°35.6 317°58.3	3.8' 3.8'	28°34.4 28°36.0	1.6' 1.5'	58.8' 58.8'
14 15	29° 12.6 44° 12.8	32.8 · · 33.8	317°58.3 332°21.1	3.8'	28° 36.0 28° 37.5	1.5	58.8'
16	59° 13.0	34.7	346°44.0	3.9'	28°38.7	1.1'	58.7'
17	74°13.2	35.7	1°06.8	3.9'	28°39.8	0.9'	58.7'
18	89° 13.4	N05°36.6	15°29.7	3.9'	N28°40.7	0.7'	58.6'
19	104°13.5 119°13.7	37.6	29°52.7 44°15.7	4.0'	28°41.3 28°41.8	0.5'	58.6'
20 21	119°13.7 134°13.9	38.5 •• 39.5	44°15.7 58°38.7	4.0' 4.1'	28°41.8 28°42.1	0.3' 0.1'	58.6' 58.5'
22	134 13.9 149°14.1	40.4	73°01.8	4.1'	28° 42.1	-0.1	58.5'
23	164°14.3	41.4	87°24.9	4.2'	28°42.1	-0.3	58.5
	SD = 16.0'	d = 1.0'		S	D = 16.2'		

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

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

		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%	
01	03:55	03:46	12:04	14:52	02:22		
02	03:37	03:28	12:03	15:53	03:22		
03	03:20	03:11	12:03	16:55	04:24		

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Fri –	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	192°33.9	198° 37.3	N04°37.2	75°32.0	N23°44.9	117° 14.9	N22°27.1	196°31.4	S03°49.7			
		190 37.3								Alpheratz	357°34.9	29°13.6
1	207°36.4	213°40.4	36.3	90°33.6	44.7	132° 16.9	27.1	211°33.6	49.6	Ankaa	353°07.4	-42°10.2
2	222°38.8	228°43.5	35.5	105°35.1	44.5	147° 19.0	27.2	226°35.8	49.5	Schedar	349°31.4	56°40.5
3	237°41.3	243°46.5	• • 34.7	120°36.7	• • 44.3	162°21.0	• • 27.2	241°37.9	• • 49.4	Diphda	348°47.4	-17°51.0
4	252°43.8	258°49.6	33.9	135°38.2	44.0	177°23.0	27.3	256°40.1	49.3	Achernar	335°20.6	-57°06.6
5	267°46.2	273°52.7	33.0	150°39.8	43.8	192°25.1	27.3	271°42.3	49.1	Hamal	327°51.3	23°34.8
6	282°48.7	288°55.7	N04°32.2	165°41.3	N23°43.6	$207^{\circ}27.1$	N22°27.3	286°44.5	S03°49.0	Polaris	314°22.1	89°22.4
7	297°51.1	303°58.8	31.4	180°42.9	43.4	222°29.1	27.4	301°46.7	48.9		315°12.0	-40°12.4
8	312°53.6	$319^{\circ}01.9$	30.6	195°44.4	43.2	237°31.2	27.4	316°48.9	48.8	Acamar		
9	327°56.1	334°04.9	• • 29.7	210°46.0	• • 43.0	252°33.2	• • 27.5	331°51.1	• • 48.7	Menkar	314°06.2	4°11.2
10	342°58.5	349°08.0	28.9	225°47.5	42.7	267°35.2	27.5	346°53.3	48.6	Mirfak	308°28.4	49°57.1
11	358°01.0	4°11.0	28.1	240°49.1	42.5	282°37.2	27.6	1°55.5	48.5	Aldebaran	290°39.6	16°33.6
12	13°03.5	19° 14.1	N04°27.3	255°50.6	N23°42.3	297°39.3	N22°27.6	16°57.7	S03°48.3	Rigel	281°03.8	-8°10.5
13	28°05.9	34° 17.1	26.5	270°52.2	42.1	312°41.3	27.7	31°59.8	48.2	Capella	280°21.8	46°01.5
14	43°08.4	49°20.1	25.6	285°53.7	41.9	327°43.3	27.7	47°02.0	48.1	Bellatrix	278°22.8	6°22.3
15	58°10.9	64°23.2	. 24.8	300°55.3	41.6	342°45.4	27.8	62°04.2	• • 48.0	Elnath	278°01.8	28°37.8
	73°13.3	79°26.2			41.4	357° 47.4	27.8	77°06.4		Alnilam	275°37.7	$-1^{\circ}11.2$
16			24.0	315°56.8					47.9	Betelgeuse	270°52.0	7°24.6
17	88°15.8	94°29.2	23.2	330°58.3	41.2	12°49.4	27.9	92°08.6	47.8	Canopus	263°52.4	-52°42.8
18	103°18.3	109°32.2	N04°22.4	345°59.9	N23°41.0	27°51.5	N22°27.9	107°10.8	S03°47.7	Sirius	258°26.1	-16°45.2
19	118°20.7	124°35.3	21.6	1°01.4	40.8	42°53.5	28.0	122°13.0	47.5	Adhara	255°05.7	-29°00.6
20	133°23.2	139°38.3	20.8	16°03.0	40.6	57°55.5	28.0	137°15.2	47.4	Procyon	244°50.6	5°09.5
21	148°25.6	154°41.3	• • 20.0	31°04.5	• • 40.3	72° 57.5	• • 28.0	152°17.4	• • 47.3	Pollux	244 50.0 243°17.0	27°58.0
22	$163^{\circ}28.1$	169°44.3	19.2	46°06.0	40.1	87°59.6	28.1	$167^{\circ}19.6$	47.2			
23	178°30.6	184°47.3	18.3	61°07.6	39.9	103°01.6	28.1	182°21.7	47.1	Avior	234°14.5	-59°35.7
										Suhail	222°46.0	-43°32.3
Mer.p	ass. 11:08	$\nu 3.1' \ d-0$	.8′ m-4.40	$\nu$ 1.6′ $d$ -0	.2′ m0.50	$\nu$ 2.0′ d0.	.0′ m-2.09	$\nu$ 2.2′ $d$ -0	.1'  m1.16	Miaplacidus	221°37.8	-69°49.5
										Alphard	217°47.4	-8°46.2
Cat.	CHV	CHV	Doc	CHV	Doc	CHV	Doc	CHV	Doc	Regulus	207°34.0	$11^{\circ}50.6$
Sat	GHA 102°22 0	GHA	Dec	GHA 76°00 1	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.2	61°37.0
0	193°33.0	199°50.3	N04°17.5	76°09.1	N23°39.7	118°03.6	N22°28.2	197°23.9	S03°47.0	Denebola	182°24.4	14°25.7
1	208°35.5	214°53.3	16.7	91°10.7	39.5	133°05.6	28.2	212°26.1	46.9	Gienah	175°43.1	$-17^{\circ}41.1$
2	223°38.0	229°56.3	15.9	106°12.2	39.2	148°07.7	28.3	227°28.3	46.7		172°59.3	-63°14.5
3	238°40.4	244°59.3	• • 15.1	121°13.7	• • 39.0	163°09.7	• • 28.3	242°30.5	• • 46.6		171°50.9	-57°15.4
4	253°42.9	260°02.2	14.3	136° 15.3	38.8	178°11.7	28.4	257°32.7	46.5	Alioth	166°12.2	55°49.3
5	268°45.4	275°05.2	13.5	151° 16.8	38.6	193°13.8	28.4	272°34.9	46.4	Spica	158°21.8	-11°17.7
6	283°47.8	290°08.2	N04°12.7	166°18.3	N23°38.3	208°15.8	N22°28.5	287°37.1	S03°46.3		150° 21.6 152° 51.4	49°11.1
7	298°50.3	$305^{\circ}11.2$	11.9	181° 19.9	38.1	223° 17.8	28.5	302°39.3	46.2	Alkaid		
8	313°52.7	320° 14.1	11.1	196°21.4	37.9	238° 19.8	28.6	317°41.5	46.1	Hadar	148°35.2	-60°29.7
9	328°55.2	335°17.1	. 10.3	211°22.9	• • 37.7	253°21.9	28.6	332°43.6	• • 46.0		147°57.0	-36°29.7
10	343°57.7	350°20.1	09.5	211 22.9 226°24.5	37.7	268°23.9	28.7	347°45.8	45.8	Arcturus	145°47.4	19°02.9
11	343 57.7 359°00.1	5°23.0	09.5 08.8	241°26.0	37.5 37.2	208 23.9 283°25.9	28.7 28.7	347 45.8 2°48.0	45.8 45.7	Rigil Kent.	139°39.5	-60°56.4
										Kochab	$137^{\circ}18.7$	74°02.8
12	14°02.6	20°26.0	N04°08.0	256° 27.5	N23°37.0	298°27.9	N22°28.7	17°50.2	S03°45.6	Zuben'ubi	136°55.5	-16°08.9
13	29°05.1	35°28.9	07.2	271°29.1	36.8	313°30.0	28.8	32°52.4	45.5	Alphecca	126°03.3	26°37.5
14	44°07.5	50°31.8	06.4	286°30.6	36.6	328° 32.0	28.8	47°54.6	45.4	Antares	112°15.4	-26°29.3
15	59°10.0	65°34.8	• • 05.6	301°32.1	• • 36.3	343°34.0	• • 28.9	62°56.8	• • 45.3	Atria	107°09.2	-69°04.2
16	74°12.5	80°37.7	04.8	316°33.7	36.1	358°36.0	28.9	77°59.0	45.2	Sabik	102°02.4	-15°45.4
17	89°14.9	95°40.7	04.0	331°35.2	35.9	13°38.1	29.0	93°01.2	45.0	Shaula	96°10.0	-37°07.3
18	104°17.4	110°43.6	N04°03.2	346°36.7	N23°35.7	28°40.1	N22°29.0	108°03.4	503°44.9	Rasalhague	95°58.3	12°32.3
19	$119^{\circ}19.9$	125°46.5	02.4	1°38.2	35.5	43°42.1	29.1	123°05.6	44.8	_		
20	134°22.3	140°49.4	01.7	16°39.8	35.2	58°44.1	29.1	138°07.7	44.7	Eltanin	90°41.9	51°28.7
21	149°24.8	155° 52.3	• • 00.9	31°41.3	• • 35.0	73°46.2	• • 29.2	153°09.9	• • 44.6	Kaus Aust.	83°32.2	-34°22.3
22	164°27.2	170°55.3	04°00.1	46° 42.8	34.8	88°48.2	29.2	168°12.1	44.5	Vega	80°33.0	38°48.1
23	179°29.7	185°58.2	03°59.3	61°44.3	34.6	103°50.2	29.3	183°14.3	44.4	Nunki	75°47.5	-26°15.9
23	119 29.1	103 30.2		01 44.5	34.0	103 30.2	29.5	105 14.5	44.4	Altair	61°59.8	8°55.9
Mer.p	ass. 11:04	$\nu$ 3.0′ d-0	.8′ m-4.45	$\nu$ 1.5 $^{\prime}$ d-0	.2′ m0.52	$\nu 2.0' \ d0.$	.0′ m-2.09	$\nu$ 2.2′ d-0	.1' m $1.16$	Peacock	53°05.6	$-56^{\circ}39.1$
										Deneb	49°25.9	45°21.9
_			_		_		_		_	Enif	33°38.8	9°59.3
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°33.0	-46°50.3
0	194°32.2	201°01.1	N03°58.6	76°45.9	N23°34.3	118°52.2	N22°29.3	198°16.5	S03°44.3	Fomalhaut	15°14.6	-29°29.3
1	209°34.6	216°04.0	57.8	91°47.4	34.1	133°54.2	29.4	213°18.7	44.1	Scheat	13°45.3	28°13.0
2	224°37.1	231°06.9	57.0	106°48.9	33.9	148° 56.3	29.4	228°20.9	44.0	Markab	13°30.0	15°20.3
3	239°39.6	246°09.8	• • 56.2	121°50.4	• • 33.7	163°58.3	• • 29.4	243°23.1	• • 43.9			
4	254°42.0	$261^{\circ}12.6$	55.5	136°52.0	33.4	179°00.3	29.5	258°25.3	43.8	Apr 04 Fri	SHA	Mer.pass
5	269°44.5	$276^{\circ}15.5$	54.7	151°53.5	33.2	194°02.3	29.5	273°27.5	43.7	Venus	6°03.4	10:43
6	284°47.0	291°18.4	N03°53.9	166°55.0	N23°33.0	209°04.3	N22°29.6	288°29.7	S03°43.6	Mars	242°58.1	18:56
7	299°49.4	306°21.3	53.1	181°56.5	32.8	224°06.4	29.6	303°31.9	43.5	Jupiter	284°41.0	16:09
8	314°51.9	321°24.2	52.4	196°58.0	32.5	239°08.4	29.7	318°34.0	43.4	Saturn	3°57.5	10:52
9	329°54.4	336° 27.0	51.6	211°59.6	• • 32.3	254° 10.4	• • 29.7	333°36.2	• • 43.2			
10	344°56.8	351°29.9	50.8	227°01.1	32.1	269° 12.4	29.8	348°38.4	43.1	Apr 05 Sat	SHA	Mer.pass
11	359°59.3	6°32.8	50.1	242°02.6	31.9	284° 14.5	29.8	3°40.6	43.0	Venus	6°17.3	10:39
12	15°01.7	0 32.6 21°35.6	N03°49.3	242 02.0 257°04.1	N23°31.6	204 14.5 299° 16.5	N22° 29.9	18°42.8	503°42.9	Mars	$242^{\circ}36.1$	18:53
		21 35.6 36°38.5			N23 31.0 31.4					Jupiter	284°30.6	16:06
13	30°04.2		48.6	272°05.6		314° 18.5	29.9	33°45.0	42.8	Saturn	3°50.9	10:49
14	45°06.7	51°41.3	47.8	287°07.2	31.2	329°20.5	30.0	48°47.2	42.7			
15	60°09.1	66° 44.2	• • 47.0	302°08.7	• • 31.0	344°22.5	• • 30.0	63°49.4	• • 42.6	Apr 06 Sun	SHA	Mer.pass
16	75°11.6	81°47.0	46.3	317° 10.2	30.7	359°24.6	30.1	78°51.6	42.4	Venus	6°28.9	10:34
17	$90^{\circ}14.1$	96°49.8	45.5	332°11.7	30.5	14° 26.6	30.1	93°53.8	42.3	Mars	242°13.7	18:51
18	105°16.5	111°52.7	N03°44.8	347° 13.2	N23°30.3	29°28.6	N22°30.1	108°56.0	S03°42.2	Jupiter		16:02
19	120°19.0	126°55.5	44.0	2°14.7	30.0	44°30.6	30.2	123°58.2	42.1	Saturn	3°44.3	10:45
20	135°21.5	141°58.3	43.3	17° 16.2	29.8	59°32.6	30.2	139°00.3	42.0	Jutuill	2 11.5	25.15
21	150°23.9	157°01.1	• • 42.5	32° 17.8	29.6	74°34.6	30.3	154°02.5	• • 41.9	Horizont	tal parallax	
22	165°26.4	172°04.0	41.8	47° 19.3	29.4	89°36.7	30.3	169°04.7	41.8		Venus:	0.5
23	180°28.9	187°06.8	41.0	62°20.8	29.1	104°38.7	30.4	184°06.9	41.7		Mars:	0.1
25	100 20.9											
Mer.p	ass. 11:00	$\nu$ 2.9′ d-0	.8′ m-4.49	$ u$ 1.5 $^{\prime}$ $d$ -0	.2′ m0.54	$\nu 2.0' \ d0.$	0′ m-2.08	$\nu$ 2.2' d-0	.1′ m1.17			

h	Sui	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	179°14.4	N05°42.3	$101^{\circ}48.1$	4.2'	N28°41.9	-0.5'	58.4'
1	194°14.6 209°14.8	43.3 44.3	116°11.3 130°34.6	4.3' 4.3'	28°41.4 28°40.7	-0.7'	58.4'
2	209 14.8 224°15.0	· · 45.2	130 34.6 144°57.9	4.3 4.4'	28° 39.9	-0.8' -1.0'	58.3' 58.3'
4	239°15.2	46.2	159°21.3	4.5'	28°38.9	-1.2	58.3'
5	254°15.4	47.1	173°44.8	4.5'	28°37.7	-1.4'	58.2'
6	269°15.5 284°15.7	N05°48.1 49.0	188°08.4 202°32.0	4.6' 4.7'	N28°36.3 28°34.7	-1.6' -1.8'	58.2' 58.2'
7 8	204 15.7 299°15.9	50.0	202 32.0 216°55.6	4.7'	28° 32.9	-1.6 -1.9'	56.2 58.1'
9	314°16.1	• • 50.9	231°19.4	4.8'	28°31.0	-2.1'	58.1'
10	329°16.3	51.9	245°43.2	4.9'	28°28.9 28°26.6	-2.3'	58.1'
11 12	344°16.4 359°16.6	52.8 N05°53.8	260°07.1 274°31.0	5.0' 5.0'	28° 26.6 N28° 24.1	-2.5' -2.7'	58.0' 58.0'
13	14°16.8	54.7	288°55.1	5.1'	28°21.4	-2.8'	58.0'
14	29°17.0	55.7	303°19.2	5.2'	28° 18.6	-3.0'	57.9'
15 16	44°17.2 59°17.3	· · 56.6 57.6	317°43.4 332°07.7	5.3' 5.4'	28°15.6 28°12.4	-3.2' -3.3'	57.9' 57.8'
17	74°17.5	57.0 58.5	346°32.1	5.4 5.5'	28°09.1	-s.s -3.5'	57.8'
18	89°17.7	N05°59.5	0°56.6	5.6'	N28°05.6	-3.7'	57.8'
19	104°17.9	06°00.4	15°21.1	5.6'	28°01.9	-3.9'	57.7'
20 21	119°18.1 134°18.2	01.4 •• 02.3	29°45.8 44°10.5	5.7' 5.8'	27°58.0 27°54.0	-4.0' -4.2'	57.7' 57.7'
22	149°18.4	03.3	58°35.3	5.0 5.9'	27°49.8	-4.2 -4.4'	57.6'
23	164°18.6	04.2	73°00.3	6.0'	27°45.4	-4.5'	57.6'
	SD = 16.0'	d = 1.0'		SI	D = 15.9'		
C -+	GHA	Dos	GHA		Doc	٦.	НР
Sat 0	GHA 179°18.8	<b>Dec</b> N06°05.2	<b>GHA</b> 87°25.3	u  6.1'	<b>Dec</b> N27° 40.9	d -4.7'	<b>нР</b> 57.6'
1	194°19.0	06.1	101°50.4	6.2'	$27^{\circ}36.2$	-4.8'	57.5'
2	209°19.1	07.1	116°15.6	6.3'	27°31.4	-5.0'	57.5'
3 4	224°19.3 239°19.5	· · 08.0 09.0	130°40.9 145°06.3	6.4' 6.5'	27°26.4 27°21.2	-5.2' -5.3'	57.5' 57.4'
5	254°19.7	09.9	159°31.9	6.6'	27°15.9	-5.5'	57.4'
6	269°19.8	N06°10.9	173°57.5	6.7'	N27° 10.5	-5.6'	57.4'
7	284°20.0 299°20.2	11.8 12.8	188°23.2 202°49.0	6.8' 6.9'	27°04.8 26°59.1	-5.8'	57.3' 57.3'
8 9	299 20.2 314°20.4	. 13.7	202 49.0 217°15.0	6.9 7.0'	26°53.1	-5.9' -6.1'	57.3'
10	329°20.6	14.7	231°41.0	7.2'	26°47.1	-6.2	57.2'
11	344°20.7	15.6	246°07.2	7.3'	26°40.8	-6.4	57.2'
12 13	359°20.9 14°21.1	N06°16.6 17.5	260°33.4 274°59.8	7.4' 7.5'	N26°34.5 26°28.0	-6.5' -6.7'	57.2' 57.1'
14	29°21.3	18.5	289°26.3	7.6'	26°21.3	-6.8'	57.1'
15	44°21.5	• • 19.4	303°52.9	7.7'	$26^{\circ}14.5$	-6.9'	57.1'
16	59°21.6 74°21.8	20.3	318°19.6 332°46.4	7.8'	26°07.6 26°00.5	-7.1' -7.2'	57.0'
17 18	74 21.8 89°22.0	21.3 N06°22.2	332 46.4 347°13.3	7.9' 8.0'	26 00.5 N25°53.3	-7.2' -7.3'	57.0' 57.0'
19	104°22.2	23.2	1°40.3	8.1'	25°45.9	-7.5	56.9'
20	119°22.3	24.1	16°07.5		25°38.4	-7.6'	56.9'
21 22	134°22.5 149°22.7	· · 25.1 26.0	30°34.8 45°02.1	8.4' 8.5'	25°30.8 25°23.1	-7.7' -7.9'	56.9' 56.8'
23	164°22.9	27.0	59°29.6	8.6'	25° 15.2	-8.0'	56.8
	SD = 16.0'	d = 0.9'		SI	D = 15.7'		
Sun	GHA	Dec	GHA		Dec	d	НР
0	179°23.1	N06°27.9	73°57.2	ν 8.7'	N25°07.2	-8.1'	56.8'
1	194°23.2	28.9	88°24.9	8.8'	$24^{\circ}59.1$	-8.3'	56.7'
2	209°23.4	29.8	102°52.8	8.9'	24°50.8	-8.4'	56.7'
3 4	224°23.6 239°23.8	· · 30.7	117°20.7 131°48.8	9.1' 9.2'	24°42.4 24°33.9	-8.5' -8.6'	56.7' 56.7'
5	254°23.9	32.6	146°17.0	9.3'	24°25.3	-8.7'	56.6'
6	269°24.1	N06°33.6	160°45.2	9.4'	N24°16.6	-8.9'	56.6'
7 8	284°24.3 299°24.5	34.5 35.5	175°13.6 189°42.2	9.5' 9.6'	24°07.7 23°58.7	-9.0' -9.1'	56.6' 56.5'
9	314°24.7	36.4	204°10.8	9.7'	23°49.6	-9.2'	56.5
10	329°24.8	37.3	218°39.5	9.9'	23°40.4	-9.3'	56.5'
11 12	344°25.0 359°25.2	38.3 N06°39.2	233°08.4 247°37.4	10.0' 10.1'	23°31.1 N23°21.7	-9.4' -9.5'	56.4' 56.4'
13	359 25.2 14°25.4	40.2	247 37.4 262°06.5	10.1	23°12.1	-9.5 -9.6'	56.4'
14	29°25.5	41.1	276°35.7	10.3'	23°02.5	-9.8'	56.4'
15	44°25.7	• • 42.1	291°05.0	10.4'	22°52.7	-9.9'	56.3'
16 17	59°25.9 74°26.1	43.0 43.9	305°34.4 320°03.9	10.5' 10.6'	22°42.9 22°32.9	-10.0' -10.1'	56.3' 56.3'
18	89°26.2	N06°44.9	334°33.6	10.8	N22°22.9	-10.1	56.2'
19	104°26.4	45.8	349°03.3	10.9'	22°12.7	-10.3'	56.2'
20	119°26.6 134°26.8	46.8	3°33.2 18°03.2	11.0'	22°02.4 21°52.1	-10.4'	56.2'
21 22	134°26.8 149°26.9	· · 47.7 48.6	18°03.2 32°33.2	11.1' 11.2'	21° 52.1 21° 41.6	-10.5' -10.5'	56.2' 56.1'
23	164°27.1	49.6	47°03.4	11.3'	21°31.1	-10.6'	56.1'
	SD = 16.0'	d = 0.9'		SI	D = 15.5'		

$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Twilight		
N 70°         01:43         03:34         04:43         19:25         20:           68°         02:21         03:50         04:51         19:16         20:           66°         02:47         04:03         04:58         19:09         20:           64°         03:06         04:13         05:04         19:03         19:           62°         03:21         04:22         05:08         18:58         19:           60°         03:34         04:29         05:13         18:54         19:           N 58°         03:45         04:36         05:16         18:50         19:           56°         03:54         04:41         05:20         18:47         19:           54°         04:02         04:46         05:23         18:44         19:           52°         04:09         04:51         05:25         18:41         19:           50°         04:15         04:55         05:28         18:38         19:           45°         04:27         05:03         05:33         18:33         19:	vil Naut.		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	:56 ////		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	:35 22:31		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	:18 21:50		
62°         03:21         04:22         05:08         18:58         19:60°           60°         03:34         04:29         05:13         18:54         19:70°           N 58°         03:45         04:36         05:16         18:50         19:70°           56°         03:54         04:41         05:20         18:47         19:70°           54°         04:02         04:46         05:23         18:44         19:70°           52°         04:09         04:51         05:25         18:41         19:70°           50°         04:15         04:55         05:28         18:38         19:70°           45°         04:27         05:03         05:33         18:33         19:70°	:05 21:23		
60°         03:34         04:29         05:13         18:54         19:           N 58°         03:45         04:36         05:16         18:50         19:           56°         03:54         04:41         05:20         18:47         19:           54°         04:02         04:46         05:23         18:44         19:           52°         04:09         04:51         05:25         18:41         19:           50°         04:15         04:55         05:28         18:38         19:           45°         04:27         05:03         05:33         18:33         19:	:55 21:03		
N 58°         03:45         04:36         05:16         18:50         19:50           56°         03:54         04:41         05:20         18:47         19:50           54°         04:02         04:46         05:23         18:44         19:50           52°         04:09         04:51         05:25         18:41         19:50           50°         04:15         04:55         05:28         18:38         19:40           45°         04:27         05:03         05:33         18:33         19:50	:46 20:47		
56°         03:54         04:41         05:20         18:47         19:           54°         04:02         04:46         05:23         18:44         19:           52°         04:09         04:51         05:25         18:41         19:           50°         04:15         04:55         05:28         18:38         19:           45°         04:27         05:03         05:33         18:33         19:	:38 20:34		
54°     04:02     04:46     05:23     18:44     19:       52°     04:09     04:51     05:25     18:41     19:       50°     04:15     04:55     05:28     18:38     19:       45°     04:27     05:03     05:33     18:33     19:	:31 20:23		
52°         04:09         04:51         05:25         18:41         19:           50°         04:15         04:55         05:28         18:38         19:           45°         04:27         05:03         05:33         18:33         19:	:25 20:13		
50° 04:15 04:55 05:28 18:38 19: 45° 04:27 05:03 05:33 18:33 19:	:20 20:05		
45° 04:27 05:03 05:33 18:33 19:	:16 19:58		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	:12 19:52		
	:03 19:39		
<b>N</b> 40° 04:37 05:10 05:37 18:28 18:	:56 19:29		
35° 04:45 05:16 05:41 18:25 18:	:50 19:21		
	:45 19:14		
	:38 19:04		
	:32 18:56		
0° 05:14 05:39 05:59 18:06 18:	:27 18:51		
	:23 18:47		
	:19 18:44		
	:16 18:43		
	:14 18:43		
	:13 18:44		
45° 05:19 05:53 06:23 17:42 18:	:11 18:45		
	:10 18:47		
	:09 18:48		
	:08 18:49		
	:08 18:51		
	:07 18:52		
<b>S</b> 60° 05:09 05:57 06:39 17:25 18:	:06 18:54		

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

		Sun		Moon			
Day	Eqn.of	Eqn.of Time		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	38-60%	
04	03:02	02:54	12:03	17:56	05:26		
05	02:45	02:36	12:03	18:53	06:25		
06	02:28	02:19	12:02	19:45	07:20		

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Mon -	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
			N03°40.3		N23°28.9	119°40.7						Dec
0	195°31.3	202°09.6		77°22.3		119 40.7 134°42.7	N22°30.4	199°09.1	S03°41.5	Alpheratz	357°34.9	29°13.6
1	210°33.8	217°12.4	39.5	92°23.8	28.7		30.5	214°11.3	41.4	Ankaa	353°07.3	-42°10.2
2	225°36.2 240°38.7	232°15.2 247°18.0	38.8	107°25.3 122°26.8	28.4 •• 28.2	149°44.7 164°46.7	30.5	229°13.5 244°15.7	41.3	Schedar	349°31.4	56°40.5
		247 18.0 262°20.8	38.1	122 20.8 137°28.3			• • 30.6		• • 41.2	Diphda	348°47.4	-17°51.0
4	255°41.2 270°43.6		37.3		28.0	179°48.8	30.6	259°17.9 274°20.1	41.1	Achernar	335°20.6	-57°06.6
5 6	270 45.0 285°46.1	277°23.6 292°26.4	36.6 N03°35.8	152°29.8 167°31.4	27.8 N23°27.5	194°50.8 209°52.8	30.7 N22°30.7	289°22.3	41.0 S03°40.9	Hamal	327°51.3	23°34.8
7	300°48.6	307°29.1	35.1	182° 32.9	27.3	209 52.8 224°54.8	30.8	304°24.5	40.8	Polaris	314°22.8	89°22.4
8	315°51.0	307 29.1 322°31.9	34.4	102 32.9 197°34.4	27.3	239°56.8	30.8	319°26.7	40.6	Acamar	$315^{\circ}12.0$	-40°12.3
9	330°53.5	322 31.9 337°34.7	• • 33.6	212° 35.9	26.8	254°58.8	30.8	334°28.8	• • 40.5	Menkar	$314^{\circ}06.2$	$4^{\circ}11.2$
10	345° 56.0	352°37.5	32.9	212 33.9 227°37.4	26.6	270°00.9	30.0	349°31.0	40.4	Mirfak	308°28.4	$49^{\circ}57.1$
11	0°58.4	7°40.2	32.9	242°38.9	26.4	285°02.9	30.9	4°33.2	40.4	Aldebaran	290°39.6	16°33.6
12	16°00.9	22°43.0	N03°31.4	257° 40.4	N23°26.2	300°04.9	N22°31.0	19°35.4	\$03°40.2	Rigel	281°03.8	-8°10.5
13	31°03.3	37°45.7	30.7	272°41.9	25.9	315°06.9	31.0	34°37.6	40.1	Capella	$280^{\circ}21.8$	$46^{\circ}01.5$
14	46°05.8	52°48.5	30.7	287°43.4	25.7	330°08.9	31.1	49°39.8	40.0	Bellatrix	278°22.8	6°22.3
15	61°08.3	67°51.2	29.3	302°44.9	. 25.5	345°10.9	31.1	64°42.0	39.9	Elnath	278°01.8	28°37.8
16	76° 10.7	82°54.0	28.5	317°46.4	25.2	0°13.0	31.2	79°44.2	39.8	Alnilam	275°37.7	-1°11.2
17	91° 13.2	97°56.7	27.8	332°47.9	25.0	15°15.0	31.2	94°46.4	39.6	Betelgeuse	270°52.0	7°24.7
18	106° 15.7	112°59.5	N03°27.1	347°49.4	N23°24.8	30°17.0	N22°31.3	109°48.6	S03°39.5	Canopus	263°52.4	-52°42.8
19	121° 18.1	128°02.2	26.4	2°50.9	24.5	45°19.0	31.3	124°50.8	39.4	Sirius	258°26.1	-16°45.2
20	136° 20.6	143°04.9	25.7	17°52.4	24.3	60°21.0	31.4	139°53.0	39.3	Adhara	255°05.7	-29°00.6
21	151°23.1	158°07.7	• • 24.9	32°53.9	24.1	75°23.0	31.4	154°55.2	39.2	Procyon	244°50.6	5°09.5
22	166°25.5	173°10.4	24.2	47°55.4	23.8	90°25.0	31.4	169°57.4	39.1	Pollux	243°17.0	27°58.0
23	181°28.0	188°13.1	23.5	62°56.9	23.6	105°27.0	31.5	184°59.6	39.0	Avior	234°14.5	-59°35.7
										Suhail	222°46.0	-43°32.3
Mer.p	ass. 10:56	$\nu^{2.8'} d-0$	.7′ m-4.53	$\nu$ 1.5′ d-0	0.2′ m0.55	$\nu 2.0' d0.$	.0′ m-2.08	$\nu^{2.2'} d-0$	.1′ m1.17	Miaplacidus	221°37.9	-69°49.5
										Alphard	217°47.4	-8°46.2
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.0	11°50.6
0	196° 30.5	203°15.8	N03°22.8	77°58.4	N23°23.4	120°29.1	N22°31.5	200°01.7	\$03°38.9	Dubhe	193°40.2	61°37.0
1	211°32.9	218°18.5	22.1	92°59.9	23.1	135°31.1	31.6	215°03.9	38.7	Denebola	182°24.4	14°25.8
2	226°35.4	233°21.2	21.4	108°01.4	22.9	150°33.1	31.6	230°06.1	38.6	Gienah	175°43.1	-17°41.1
3	241°37.8	248°23.9	20.7	123°02.9	22.7	165°35.1	31.7	245°08.3	• • 38.5	Acrux	172°59.3	-63°14.5
4	256°40.3	263°26.6	20.0	138°04.4	22.4	180°37.1	31.7	260°10.5	38.4		171°50.9	-57°15.4
5	271°42.8	278°29.3	19.3	153°05.9	22.2	195°39.1	31.8	275°12.7	38.3	Alioth	166°12.2	55°49.3
6	286°45.2	293°32.0	N03°18.6	168° 07.4	N23°22.0	210°41.1	N22°31.8	290°14.9	S03°38.2	Spica	158°21.8	-11°17.7
7	301°47.7	308°34.7	17.9	183°08.9	21.7	225°43.1	31.9	305°17.1	38.1	Alkaid	152°51.3	49°11.1
8	316°50.2	323°37.4	17.2	198° 10.4	21.5	240°45.2	31.9	320°19.3	38.0	Hadar	148°35.2	-60°29.7
9	331°52.6	338°40.1	. 16.5	213°11.9	21.3	255°47.2	• • 32.0	335°21.5	37.8		147°57.0	-36°29.7
10	346°55.1	353°42.7	15.8	228° 13.4	21.0	270°49.2	32.0	350°23.7	37.7	Arcturus	145°47.4	19°02.9
11	1°57.6	8°45.4	15.1	243°14.9	20.8	285°51.2	32.0	5°25.9	37.6	Rigil Kent.	139°39.5	-60°56.4
12	17°00.0	23°48.1	N03°14.4	258° 16.4	N23°20.6	300°53.2	N22°32.1	20°28.1	S03°37.5	Kochab	137°18.7	74°02.9
13	32°02.5	38°50.7	13.7	273° 17.9	20.3	315°55.2	32.1	35°30.3	37.4	Zuben'ubi	136°55.5	-16°08.9
14	47°04.9	53°53.4	13.0	288° 19.3	20.1	330°57.2	32.2	50°32.5	37.3	Alphecca	126°03.3	26°37.5
15	62°07.4	68°56.1	12.3	303°20.8	. 19.9	345°59.2	32.2	65°34.7	37.2	Antares	112°15.4	-26°29.3
16	77°09.9	83°58.7	11.6	318°22.3	19.6	1°01.2	32.3	80°36.8	37.1	Atria	107°09.1	-69°04.2 -15°45.4
17	92°12.3	99°01.4	10.9	333°23.8	19.4	16°03.2	32.3	95°39.0	37.0	Sabik	102°02.4	
18	107° 14.8	114°04.0	N03°10.2	348°25.3	N23°19.2	31°05.3	N22°32.4	110°41.2	S03°36.8	Shaula	96°09.9	-37°07.3
19	$122^{\circ}17.3$	129°06.6	09.6	3°26.8	18.9	46°07.3	32.4	125°43.4	36.7	Rasalhague	95°58.2	12°32.3
20	137° 19.7	144°09.3	08.9	18°28.3	18.7	61°09.3	32.5	140°45.6	36.6	Eltanin	90°41.9	51°28.7 -34°22.3
21	152° 22.2	159°11.9	08.2	33°29.8	• • 18.5	76°11.3	• • 32.5	155°47.8	• • 36.5	Kaus Aust.	83°32.2 80°33.0	
22	$167^{\circ}24.7$	174°14.5	07.5	48°31.3	18.2	91°13.3	32.6	170°50.0	36.4	Vega		38°48.1
23	182°27.1	189°17.1	06.8	63°32.7	18.0	106°15.3	32.6	185°52.2	36.3	Nunki	75°47.5	-26°15.9
	10.50	0.7/ / 0	7/ 4.56		0/ 0.57		0/ 0.07	2.0/ 1.0	1/ 1.17	Altair	61°59.8 53°05.6	8°55.9 -56°39.0
Mer.p	ass. 10:52	$\nu$ 2.7 d-0	.7′ m-4.56	$\nu$ 1.5° $d$ -0	0.2′ m0.57	$\nu$ 2.0′ d0.	.0′ m-2.07	$\nu$ 2.2′ <b>d</b> -0	.1′ m1.17	Peacock		
										Deneb Enif	49°25.9 33°38.8	45°21.9 9°59.3
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	33°38.8 27°33.0	-46°50.2
0	197° 29.6	204°19.8	N03°06.2	78°34.2		121°17.3	N22°32.7	200°54.4	503°36.2	Fomalhaut	27 33.0 15°14.6	-40 50.2 -29°29.3
1	$212^{\circ}32.1$	219°22.4	05.5	93°35.7	17.5	136°19.3	32.7	215°56.6	36.1	Scheat	13°45.3	-29° 29.3 28° 13.0
2	$227^{\circ}34.5$	234°25.0	04.8	108°37.2	17.3	151°21.3	32.7	230°58.8	36.0	Markab	13°30.0	15°20.3
3	242°37.0	249°27.6	• • 04.1	123°38.7	• • 17.0	$166^{\circ}23.3$	• • 32.8	246°01.0	• • 35.8	ividiNdD		13 20.3
4	$257^{\circ}39.4$	264°30.2	03.5	138°40.2	16.8	181°25.3	32.8	261°03.2	35.7	Apr 07 Mon	SHA	Mer.pass
5	$272^{\circ}41.9$	279°32.8	02.8	153°41.7	16.6	$196^{\circ}27.3$	32.9	276°05.4	35.6	Venus	$6^{\circ}38.3$	10:29
6	287°44.4	294°35.4	N03°02.1	168°43.1	N23°16.3	211°29.4	N22°32.9	291°07.6	S03°35.5	Mars		18:49
7	$302^{\circ}46.8$	309°38.0	01.5	183°44.6	16.1	226°31.4	33.0	306°09.8	35.4	Jupiter	284°09.4	15:59
8	$317^{\circ}49.3$	324°40.6	8.00	$198^{\circ}46.1$	15.9	241°33.4	33.0	321°12.0	35.3	Saturn	3°37.8	10:42
9	$332^{\circ}51.8$	339°43.2	$03^{\circ}00.1$	213°47.6	• • 15.6	$256^{\circ}35.4$	• • 33.1	336°14.2	• • 35.2	Apr. 00 T.:	CHA	Me:: ====
10	$347^{\circ}54.2$	354°45.7	$02^{\circ}59.5$	$228^{\circ}49.1$	15.4	271°37.4	33.1	351°16.3	35.1	Apr 08 Tue	SHA 6°45.4	Mer.pass
11	$2^{\circ}56.7$	9°48.3	58.8	243°50.6	15.1	286°39.4	33.2	6°18.5	35.0	Venus	6°45.4	10:25
12	$17^{\circ}59.2$	24°50.9	N02°58.2	258°52.0	N23°14.9	301°41.4	N22°33.2	21°20.7	S03°34.8		241°28.0 283°58.6	18:46
13	$33^{\circ}01.6$	39°53.5	57.5	273°53.5	14.7	316°43.4	33.3	$36^{\circ}22.9$	34.7	Jupiter Saturn		15:56 10:38
14	$48^{\circ}04.1$	54°56.0	56.9	288°55.0	14.4	331°45.4	33.3	51°25.1	34.6	Saturn	3°31.3	10:38
15	63°06.6	69°58.6	• • 56.2	$303^{\circ}56.5$	• • 14.2	$346^{\circ}47.4$	• • 33.3	66°27.3	• • 34.5	Apr 09 Wed	SHA	Mer.pass
16	78°09.0	85°01.1	55.5	318°58.0	13.9	1°49.4	33.4	81°29.5	34.4	Venus	6°50.2	10:21
17	$93^{\circ}11.5$	100°03.7	54.9	333°59.4	13.7	$16^{\circ}51.4$	33.4	96°31.7	34.3	Mars		18:44
18	$108^{\circ}13.9$	115°06.2	N02°54.3	349°00.9	N23° 13.5	31°53.4	N22°33.5	111°33.9	503°34.2	Jupiter		15:53
19	$123^{\circ}16.4$	130°08.8	53.6	4°02.4	13.2	46°55.4	33.5	126°36.1	34.1	Saturn	3°24.8	10:35
20	138° 18.9	145°11.3	53.0	19°03.9	13.0	61°57.4	33.6	141°38.3	34.0			
21	153° 21.3	160°13.9	• • 52.3	34°05.3	• • 12.7	76°59.4	• • 33.6	156°40.5	• • 33.8	Horizont	al parallax	
22	168°23.8	175°16.4	51.7	49°06.8	12.5	92°01.4	33.7	171°42.7	33.7		Venus:	0.5
23	183°26.3	190°18.9	51.0	64°08.3	12.3	107°03.4	33.7	186°44.9	33.6		Mars:	0.1
Mers	ass. 10:48	u2 6/ d 0	.7′ m-4.59	1/1 5/ d C	0.2′ m0.59	1/2 N/ 40	.0′ m-2.07	1/2 2/ 4 0	.1′ m1.17			
wiei.p	uss. 10.40	ν2.0 u-0	111-4.33	ν 1.5 u-C	1110.33	ν Δ.υ uU.	111-2.01	ν ∠.∠ u-0				

h	Sui	า			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°27.3	N06°50.5	61°33.7	11.4'	N21°20.4	-10.7'	56.1'
1 2	194°27.5 209°27.6	51.5 52.4	76°04.1 90°34.7	11.5' 11.6'	21°09.7 20°58.9	-10.8' -10.9'	56.0' 56.0'
3	209 27.0 224°27.8	53.3	105°05.3	11.7'	20° 48.0	-10.9	56.0'
4	239°28.0	54.3	$119^{\circ}36.0$	11.8'	$20^{\circ}37.0$	-11.1'	56.0'
5	254°28.2	55.2	134°06.8	11.9'	20°25.9	-11.2'	55.9'
6 7	269°28.3 284°28.5	N06°56.2 57.1	148°37.8 163°08.8	12.0' 12.1'	N20°14.7 20°03.5	-11.3' -11.3'	55.9' 55.9'
8	299°28.7	58.0	177°39.9	12.1	19°52.1	-11.4'	55.9'
9	314°28.9	• • 59.0	192°11.2	12.3'	19°40.7	-11.5'	55.8'
10	329°29.0 344°29.2	06°59.9 07°00.9	206°42.5 221°14.0	12.4'	19°29.2 19°17.7	-11.6'	55.8'
11 12	344 29.2 359°29.4	07 00.9 N07°01.8	221 14.0 235°45.5	12.5' 12.6'	19 17.7 N19°06.0	-11.7' -11.7'	55.8' 55.8'
13	14°29.6	02.7	250°17.2	12.7'	18° 54.3	-11.8'	55.7'
14	29°29.7	03.7	264°48.9	12.8'	18°42.5	-11.9'	55.7'
15 16	44°29.9 59°30.1	· · 04.6 05.5	279°20.7 293°52.7	12.9' 13.0'	18° 30.6 18° 18.6	-11.9' -12.0'	55.7' 55.7'
17	74°30.3	06.5	293 52.7 308°24.7	13.1'	18°06.6	-12.1'	55.6'
18	89°30.4	N07°07.4	322°56.8	13.2'	N17°54.5	-12.2'	55.6'
19	104°30.6	08.3	337°29.0	13.3'	17°42.4	-12.2'	55.6'
20 21	119°30.8 134°31.0	09.3 •• 10.2	352°01.3 6°33.7	13.4' 13.5'	17°30.1 17°17.9	-12.3' -12.4'	55.6' 55.5'
22	149°31.1	11.2	21°06.2	13.6'	17 17.9 17°05.5	-12.4'	55.5'
23	164°31.3	12.1	35°38.8	13.7'	16°53.1	-12.5'	55.5'
	SD = 16.0'	d = 0.9'		SI	O = 15.3'		
Tue	GHA	Doc	GHA		Dec	d	НР
Tue 0	<b>GHA</b> 179°31.5	<b>Dec</b> N07°13.0	БНА 50°11.4	u 13.8'	<b>Dec</b> N16° 40.6	a -12.5'	<b>нР</b> 55.5'
1	194°31.7	14.0	64°44.2	13.8'	16°28.1	-12.6'	55.4'
2	209°31.8	14.9	79°17.0	13.9'	16° 15.5	-12.7'	55.4'
3 4	224°32.0 239°32.2	· · 15.8 16.8	93°50.0 108°23.0	14.0' 14.1'	16°02.8 15°50.1	-12.7' -12.8'	55.4' 55.4'
5	254°32.3	17.7	100°25.0° 122°56.0	14.1	15° 37.3	-12.8'	55.4'
6	269°32.5	N07°18.6	137°29.2	14.3'	N15°24.5	-12.9'	55.3'
7	284°32.7	19.6	152°02.5	14.3'	15° 11.6	-12.9'	55.3'
8 9	299°32.9 314°33.0	20.5 •• 21.4	166°35.8 181°09.2	14.4' 14.5'	14°58.6 14°45.6	-13.0' -13.0'	55.3' 55.3'
10	329°33.2	22.4	195°42.7	14.6'	14° 32.6	-13.1'	55.2'
11	344°33.4	23.3	$210^{\circ}16.3$	14.6'	$14^{\circ}19.5$	-13.1'	55.2'
12	359°33.6	N07°24.2	224°49.9 239°23.6	14.7'	N14°06.4 13°53.2	-13.2'	55.2'
13 14	14°33.7 29°33.9	25.2 26.1	239°23.6 253°57.4	14.8' 14.9'	13°53.2 13°39.9	-13.2' -13.3'	55.2' 55.2'
15	44°34.1	• • 27.0	268°31.3	14.9'	13°26.6	-13.3'	55.1'
16	59°34.2	27.9	283°05.2	15.0'	13°13.3	-13.4'	55.1'
17 18	74°34.4 89°34.6	28.9 N07°29.8	297°39.2 312°13.3	15.1' 15.1'	12°59.9 N12°46.5	-13.4' -13.5'	55.1' 55.1'
19	104°34.8	30.7	326°47.4	15.2'	12°33.1	-13.5'	55.1
20	119°34.9	31.7	341°21.6		$12^{\circ}19.6$	-13.5'	55.0'
21	134°35.1	• • 32.6	355°55.9	15.3'	12°06.0	-13.6'	55.0'
22 23	149°35.3 164°35.4	33.5 34.5	10°30.2 25°04.6	15.4' 15.5'	11°52.4 11°38.8	-13.6' -13.7'	55.0' 55.0'
25	SD = 16.0'	d = 0.9'	23 04.0		D = 15.1'	-13.1	
Wed 0	<b>GHA</b> 179°35.6	<b>Dec</b> N07°35.4	<b>GHA</b> 39°39.1	u 15.5'	<b>Dec</b> N11° 25.2	d -13.7'	<b>HP</b> 55.0'
1	179 35.0 194°35.8	36.3	59° 59.1 54° 13.6	15.6'	11°11.5	-13.7'	55.0'
2	209°36.0	37.3	68°48.2	15.6'	10°57.8	-13.8'	54.9'
3	224°36.1	• • 38.2	83°22.9	15.7'	10°44.0	-13.8'	54.9'
4 5	239°36.3 254°36.5	39.1 40.0	97°57.6 112°32.3	15.8' 15.8'	10°30.2 10°16.4	-13.8' -13.9'	54.9' 54.9'
6	269°36.6	N07°41.0	127°07.1	15.9'	$N10^{\circ}02.5$	-13.9'	54.9'
7	284°36.8	41.9	141°42.0	15.9'	09°48.6	-13.9'	54.8'
8 9	299°37.0 314°37.1	42.8 •• 43.7	156°16.9 170°51.9	16.0' 16.0'	09°34.7 09°20.8	-13.9' -14.0'	54.8' 54.8'
10	314 37.1 329°37.3	44.7	170 51.9 185°26.9	16.1'	09 20.8 09°06.8	-14.0'	54.8'
11	344°37.5	45.6	200°02.0	16.1'	08°52.8	-14.0'	54.8'
12	359°37.7	N07°46.5	214°37.1	16.2'	N08°38.8	-14.0'	54.8'
13 14	14°37.8 29°38.0	47.5 48.4	229°12.3 243°47.5	16.2' 16.3'	08°24.7 08°10.7	-14.1' -14.1'	54.7' 54.7'
15	44°38.2	• • 49.3	258°22.8	16.3'	07°56.6	-14.1	54.7'
16	59°38.3	50.2	272°58.1	16.4'	07°42.5	-14.1'	54.7'
17	74°38.5	51.2	287°33.5	16.4'	07°28.3	-14.2'	54.7'
18 19	89°38.7 104°38.8	N07°52.1 53.0	302°08.9 316°44.3	16.4' 16.5'	N07°14.2 07°00.0	-14.2' -14.2'	54.7' 54.6'
20	119°39.0	53.9	331°19.8	16.5	06°45.8	-14.2'	54.6'
21	134°39.2	• • 54.9	345°55.3	16.6'	06°31.6	-14.2'	54.6'
22 23	149°39.3 164°39.5	55.8 56.7	0°30.9 15°06.4	16.6' 16.6'	06°17.3 06°03.1	-14.2' -14.3'	54.6' 54.6'
23		$\frac{56.7}{d=0.9'}$	15 00.4		D = 15.0'	-14.5	54.0
	SD = 16.0'	$a = 0.9^{\circ}$		51	υ = 15.0′		

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

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

		Sun		Moon			
Day	Eqn.of 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	70-86%	
07	02:11	02:02	12:02	20:33	08:10		
08	01:54	01:46	12:02	21:17	08:55		
09	01:38	01:29	12:01	21:58	09:38		

April 10, 11, 12 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	198°28.7	205°21.4	N02°50.4	79°09.8	N23°12.0	122°05.4	N22° 33.8	201°47.1	S03°33.5			
1	213°31.2	200° 24.0	49.8	94°11.2	11.8	137°07.4	33.8	216°49.3	33.4	Alpheratz	357°34.9	29°13.6
2	213° 31.2 228° 33.7	235°26.5	49.1	109° 12.7	11.5	152°09.4	33.9	231°51.5	33.3	Ankaa	353°07.3	-42°10.1
3	243°36.1	250°29.0	• • 48.5	124° 14.2	11.3	167°11.5	33.9	246°53.7	33.2	Schedar	349°31.4	56°40.4
4	258° 38.6	265°31.5	47.9	139° 15.7	11.1	182° 13.5	33.9	261°55.9	33.1	Diphda	348°47.4	-17°51.0
5	273°41.0	280°34.0	47.3	154° 17.1	10.8	102 15.5 197° 15.5	34.0	276°58.1	33.0	Achernar	$335^{\circ}20.6$	-57°06.6
6	288°43.5	295°36.5	N02°46.6	169° 18.6	N23° 10.6	212° 17.5	N22° 34.0	292°00.3	S03°32.8	Hamal	$327^{\circ}51.3$	23°34.8
7	303°46.0	310°39.0	46.0	184° 20.1	10.3	212 17.5 227°19.5	34.1	307°02.5	32.7	Polaris	314°23.5	89°22.4
8	318°48.4	325°41.5		199°21.5	10.3	242°21.5		307 02.5 322°04.7		Acamar	$315^{\circ}12.0$	-40°12.3
9		340°44.0	45.3	214°23.0	09.9	242 21.5 257°23.5	34.1	337°06.8	32.6	Menkar	314°06.2	4°11.2
	333°50.9	355°46.5	• • 44.7				• • 34.2		· · 32.5	Mirfak	308°28.4	49°57.1
10	348°53.4		44.1	229°24.5 244°26.0	09.6	272°25.5	34.2	352°09.0	32.4	Aldebaran	290°39.6	16°33.6
11	3°55.8	10°49.0	43.5 N02°42.9		09.4	287°27.5	34.3	7°11.2	32.3	Rigel	281°03.9	-8°10.5
12	18°58.3	25°51.4		259°27.4	N23°09.1	302°29.5	N22°34.3	22°13.4	S03°32.2	Capella	280°21.9	46°01.5
13	34°00.8	40°53.9	42.2	274°28.9	08.9	317°31.5	34.4	37°15.6	32.1	Bellatrix	278°22.8	6°22.3
14	49°03.2	55°56.4	41.6	289°30.4	08.6	332°33.5	34.4	52°17.8	32.0	Elnath	278°01.8	28°37.8
15	64°05.7	70°58.8	• • 41.0	304°31.8	• • 08.4	347°35.5	• • 34.4	67°20.0	• • 31.9	Alnilam	275°37.7	-1°11.2
16	79°08.2	86°01.3	40.4	319°33.3	08.2	2°37.5	34.5	82°22.2	31.7	Betelgeuse	270°52.0	7°24.7
17	94°10.6	101°03.8	39.8	334°34.8	07.9	17°39.5	34.5	97°24.4	31.6	Canopus	263°52.5	-52°42.8
18	109°13.1	116°06.2	N02°39.2	349°36.2	N23°07.7	32°41.5	N22°34.6	112°26.6	S03°31.5	Sirius	258°26.1	-16°45.2
19	124°15.5	131°08.7	38.6	4°37.7	07.4	47°43.5	34.6	127°28.8	31.4	Adhara	255°05.8	-29°00.6
20	139°18.0	146°11.1	38.0	19°39.2	07.2	62°45.5	34.7	142°31.0	31.3	Procyon	244°50.6	5°09.5
21	154°20.5	161°13.6	• • 37.4	34°40.6	• • 06.9	77°47.5	• • 34.7	157°33.2	• • 31.2	Pollux	243°17.0	27°58.0
22	169°22.9	176°16.0	36.8	49°42.1	06.7	92°49.5	34.8	172°35.4	31.1	Avior	234°14.6	-59°35.7
23	184°25.4	191°18.4	36.2	64°43.6	06.5	107°51.5	34.8	187°37.6	31.0	Suhail	222°46.0	-43°32.3
Mer.n	ass. 10:44	$\nu 2.5' d-0$	.6′ m-4.62	$\nu$ 1.5 $^{\prime}$ d-0	0.2' m0.61	$\nu 2.0' d0$	.0′ m-2.06	$\nu 2.2' d-0$	0.1' m1.17	Miaplacidus	221°37.9	-69°49.5
										Alphard	217°47.4	-8°46.2
										Regulus	207°34.0	11°50.6
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.2	61°37.0
0	199°27.9	206°20.9	N02°35.6	79°45.0	N23°06.2	122°53.5	N22°34.9	202°39.8	S03°30.9	Denebola	182°24.5	14°25.8
1	214°30.3	221°23.3	35.0	94°46.5	06.0	137°55.5	34.9	217°42.0	30.7	Gienah	_	-17°41.1
2	229°32.8	236°25.7	34.4	109°47.9	05.7	152° 57.5	35.0	232°44.2	30.6	Acrux		-63°14.5
3	244°35.3	251°28.1	• • 33.8	124°49.4	• • 05.5	167°59.5	• • 35.0	247°46.4	• • 30.5		171°50.9	-57°15.4
4	259°37.7	266°30.5	33.2	139°50.9	05.2	183°01.5	35.0	262°48.6	30.4	Alioth	166°12.2	55°49.3
5	274°40.2	281°33.0	32.6	154° 52.3	05.0	198°03.5	35.1	277°50.8	30.3	Spica	158°21.8	-11°17.7
6	289°42.6	296°35.4	N02°32.0	169°53.8	N23°04.7	213°05.5	$N22^{\circ}35.1$	292°53.0	S03°30.2	Alkaid	152°51.3	49°11.1
7	$304^{\circ}45.1$	311°37.8	31.4	184°55.2	04.5	228°07.5	35.2	307°55.2	30.1	Hadar	148° 35.1	-60°29.7
8	319°47.6	326°40.2	30.8	199°56.7	04.2	243°09.4	35.2	322°57.4	30.0		147°57.0	-36°29.7
9	334°50.0	341°42.6	• • 30.2	214°58.2	• • 04.0	258°11.4	• • 35.3	337°59.6	• • 29.9	Arcturus	147 37.0 145° 47.4	19°02.9
10	349°52.5	356°45.0	29.7	229°59.6	03.8	273°13.4	35.3	353°01.8	29.8	Rigil Kent.		-60°56.4
11	4°55.0	11°47.3	29.1	245°01.1	03.5	288°15.4	35.4	8°04.0	29.6	Kochab	137° 18.6	74°02.9
12	19°57.4	26°49.7	N02°28.5	260°02.5	N23°03.3	303°17.4	N22°35.4	23°06.2	S03°29.5	1	136°55.5	-16°08.9
13	34°59.9	41°52.1	27.9	275°04.0	03.0	318° 19.4	35.5	38°08.4	29.4	Zuben'ubi Alphecca	130 55.5 126°03.3	-16 08.9 26°37.5
14	50°02.4	56° 54.5	27.4	290°05.5	02.8	333°21.4	35.5	53°10.6	29.3			
15	65°04.8	71°56.9	• • 26.8	305°06.9	• • 02.5	348°23.4	• • 35.5	68°12.8	• • 29.2	Antares	112°15.4 107°09.1	-26°29.3
16	80°07.3	86° 59.2	26.2	320°08.4	02.3	3°25.4	35.6	83°15.0	29.1	Atria	107°09.1 102°02.4	-69°04.2
17	95°09.8	102°01.6	25.6	335°09.8	02.0	18°27.4	35.6	98°17.2	29.0	Sabik		-15°45.4 -37°07.3
18	110°12.2	117°04.0	N02°25.1	350°11.3	N23°01.8	33°29.4	N22°35.7	113°19.3	S03°28.9	Shaula	96°09.9	
19	125°14.7	132°06.3	24.5	5°12.7	01.5	48°31.4	35.7	128°21.5	28.8	Rasalhague	95°58.2	12°32.3
20	140°17.1	147°08.7	23.9	20° 14.2	01.3	63°33.4	35.8	143°23.7	28.7	Eltanin	90°41.9	51°28.7
21	155°19.6	162°11.0	· · 23.4	35° 15.6	• • 01.0	78°35.4	• • 35.8	158°25.9	28.6	Kaus Aust.	83°32.1	-34°22.3
22	170°22.1	177° 13.4	22.8	50° 17.1	00.8	93°37.4	35.9	173°28.1	28.4	Vega	80°33.0	38°48.1
23	185°24.5	192° 15.7	22.2	65° 18.5	00.5	108°39.4	35.9	188°30.3	28.3	Nunki	75°47.5	-26°15.9
										Altair	61°59.8	8°55.9
Mer.p	ass. 10:40	$\nu^{2.4'} d-0$	.6′ m-4.65	$\nu^{1.5'} d$ -0	0.2′ m0.63	$\nu^{2.0'} d0$	.0′ m-2.06	$\nu^{2.2'} d-0$	0.1' m1.17	Peacock	53°05.5	-56°39.0
										Deneb	49°25.8	45°21.9
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.8	9°59.3
0	200°27.0	207° 18.0	N02°21.7	80°20.0	N23°00.3	123°41.4	N22°36.0	203°32.5	S03°28.2	Al Na'ir	27°32.9	-46°50.2
1	215°29.5	222° 20.4	21.1	95°21.4	23°00.0	138° 43.4	36.0	218°34.7	28.1	Fomalhaut	15°14.6	-29°29.3
2	230°31.9	237°22.7	20.6	110°22.9	22°59.8	153° 45.4	36.1	233°36.9	28.0	Scheat	13°45.3	28°13.0
3	245°34.4	252°25.0	20.0	125°24.4	59.5	168° 47.4	36.1	248°39.1	27.9	Markab	13°30.0	15°20.3
4	260°36.9	267° 27.4	19.5	140°25.8	59.3	183°49.4	36.1	263°41.3	27.8	Apr 10 Thu	SHA	Mer.pass
5	275°39.3	282°29.7	18.9	155°27.3	59.0	198°51.3	36.2	278°43.5	27.7	Venus	6°52.7	10:17
6	290°41.8	297° 32.0	N02°18.4	170°28.7	N22°58.8	213°53.3	N22°36.2	293°45.7	S03°27.6	Mars		18:42
7	305°44.2	312°34.3	17.8	185°30.1	58.5	228°55.3	36.3	308°47.9	27.5	Jupiter	283°36.7	15:50
8	320°46.7	327° 36.6	17.3	200°31.6	58.3	243°57.3	36.3	323°50.1	27.3	Saturn	3°18.4	10:31
9	335°49.2	342°38.9	. 16.7	215°33.0	• • 58.0	258° 59.3	• • 36.4	338°52.3	27.2			
10	350°51.6	357°41.2	16.2	230°34.5	57.8	274°01.3	36.4	353°54.5	27.1	Apr 11 Fri	SHA	Mer.pass
11	5°54.1	12°43.5	15.7	245°35.9	57.5	289°03.3	36.5	8°56.7	27.0	Venus	6°53.0	10:13
12	20°56.6	27°45.8	N02°15.1	260°37.4	N22°57.3	304°05.3	N22°36.5	23°58.9	S03°26.9	Mars		18:39
13	35°59.0	42°48.1	14.6	275°38.8	57.0	319°07.3	36.6	39°01.1	26.8	Jupiter	283°25.6	15:46
14	51°01.5	57° 50.4	14.0	290°40.3	56.8	334°09.3	36.6	54°03.3	26.7	Saturn	3°11.9	10:28
15	66°04.0	72°52.7	13.5	305°41.7	56.5	349°11.3	36.6	69°05.5	26.6	Apr 12 Sat	SHA	Mer.pass
16	81°06.4	87° 54.9	13.0	320°43.2	56.3	4°13.3	36.7	84°07.7	26.5	Venus	5ПА 6°51.0	10:09
17	96°08.9	102°57.2	12.5	335°44.6	56.0	19° 15.3	36.7	99°09.9	26.4	Mars		18:37
18	111°11.4	117°59.5	N02°11.9	350°46.1	N22°55.8	34° 17.2	N22°36.8	114°12.1	S03°26.3	Jupiter		15:43
19	126°13.8	133°01.8	11.4	5° 47.5	55.5	49° 19.2	36.8	129°14.3	26.1	Saturn	3°05.5	10:24
20	141°16.3	148°04.0	10.9	20°48.9	55.3	64°21.2	36.9	144°16.5	26.0	Jatuin	3 00.0	10.24
21	156°18.7	163°06.3	•• 10.4	35° 50.4	• • 55.0	79°23.2	36.9	159°18.7	25.9	Horizont	al parallax	
22	171°21.2	178°08.5	09.8	50°51.8	54.8	94°25.2	37.0	174°20.9	25.8		Venus:	0.4
23	186°23.7	193° 10.8	09.3	65°53.3	54.5	109°27.2	37.0	189°23.1	25.7		Mars:	0.1
Mer.p	ass. 10:36	$\nu$ 2.3′ d-0	.6′ m-4.67	$ u$ 1.5 $^{\prime}$ $d$ -0	).2′ m0.64	$\nu 2.0' \ d0.$	.0′ m-2.05	$\nu$ 2.2' d-0	).1′ m1.17			

h	Sui	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	179°39.7	N07°57.6	29°42.1	16.7'	N05°48.8	-14.3'	54.6'
1 2	194°39.9 209°40.0	58.6 07°59.5	44°17.7 58°53.4	16.7' 16.7'	05°34.5 05°20.3	-14.3' -14.3'	54.6' 54.5'
3	209 40.0 224°40.2	07 59.5 08°00.4	73°29.2	16.8'	05° 05.9	-14.3'	54.5'
4	239°40.4	01.3	88°04.9	16.8'	04°51.6	-14.3'	54.5'
5	254°40.5	02.2	102°40.7	16.8'	04°37.3	-14.3'	54.5'
6 7	269°40.7 284°40.9	N08°03.2 04.1	117°16.5 131°52.4	16.8' 16.9'	N04°23.0 04°08.6	-14.3' -14.4'	54.5' 54.5'
8	299°41.0	05.0	146°28.3	16.9'	03°54.3	-14.4'	54.5'
9	314°41.2	• • 05.9	$161^{\circ}04.2$	16.9'	03°39.9	-14.4'	54.5'
10	329°41.4	06.9	175°40.1	17.0'	03°25.5	-14.4'	54.4'
11 12	344°41.5 359°41.7	07.8 N08°08.7	190°16.0 204°52.0	17.0' 17.0'	03°11.1 N02°56.8	-14.4' -14.4'	54.4' 54.4'
13	14°41.9	09.6	219°28.0	17.0'	02°42.4	-14.4'	54.4'
14	29°42.0	10.5	234°04.0	17.0'	02°28.0	-14.4'	54.4'
15 16	44°42.2 59°42.4	· · 11.5 12.4	248°40.1 263°16.1	17.1' 17.1'	02°13.6 01°59.2	-14.4' -14.4'	54.4' 54.4'
17	74°42.5	13.3	203 10.1 277°52.2	17.1	01°44.8	-14.4'	54.4'
18	89°42.7	N08°14.2	292°28.3	17.1'	N01°30.4	-14.4'	54.3'
19	104°42.9	15.1	307°04.4	17.1'	01°16.0	-14.4'	54.3'
20 21	119°43.0 134°43.2	16.1 •• 17.0	321°40.5 336°16.6	17.1' 17.1'	01°01.6 00°47.2	-14.4' -14.4'	54.3' 54.3'
22	149°43.4	17.0	350°52.8	17.2	00° 47.2	-14.4'	54.3
23	164°43.5	18.8	5°28.9	17.2'	00°18.4	-14.4'	54.3'
	SD = 16.0'	d = 0.9'		SI	D = 14.9'		
E!	СПУ	Dee	GHA		Dec	الد	НР
Fri 0	<b>GHA</b> 179°43.7	<b>Dec</b> N08°19.7	GHA 20°05.1	u 17.2'	Dec N00° 04.0	d -14.4'	HP 54.3'
1	194°43.9	20.7	34°41.2	17.2'	S00°10.4	14.4'	54.3'
2	209°44.0	21.6	49°17.4	17.2'	00°24.8	14.4'	54.3'
3 4	224°44.2 239°44.4	· · 22.5 23.4	63°53.6 78°29.8	17.2' 17.2'	00°39.1 00°53.5	14.4' 14.4'	54.2' 54.2'
5	254°44.5	24.3	93°06.0	17.2'	00° 55.5 01° 07.8	14.4	54.2
6	269°44.7	N08°25.2	107°42.2	17.2'	S01°22.2	14.3'	54.2'
7	284°44.8	26.2	122°18.4	17.2'	01°36.5	14.3'	54.2'
8 9	299°45.0 314°45.2	27.1 •• 28.0	136°54.6 151°30.8	17.2' 17.2'	01°50.9 02°05.2	14.3' 14.3'	54.2' 54.2'
10	329°45.3	28.9	166°07.0	17.2'	02° 19.5	14.3'	54.2'
11	344°45.5	29.8	180°43.2	17.2'	02°33.8	14.3'	54.2'
12	359°45.7 14°45.8	N08°30.7	195°19.4 209°55.6	17.2'	\$02°48.1 03°02.3	14.3'	54.2'
13 14	14°45.8 29°46.0	31.7 32.6	209°55.6 224°31.8	17.2' 17.2'	03°02.3 03°16.6	14.3' 14.2'	54.2' 54.1'
15	44°46.2	• • 33.5	239°08.0	17.2'	03°30.8	14.2'	54.1'
16	59°46.3	34.4	253°44.2	17.2'	03°45.1	14.2'	54.1'
17 18	74°46.5 89°46.6	35.3 N08°36.2	268°20.3 282°56.5	17.2' 17.2'	03°59.3 504°13.4	14.2' 14.2'	54.1' 54.1'
19	104°46.8	37.1	202 50.5 297°32.6	17.2 17.1'	04°27.6	14.2 14.1'	54.1'
20	119°47.0	38.1	312°08.8		04°41.8	14.1'	54.1'
21	134°47.1	• • 39.0	326°44.9	17.1'	04°55.9	14.1'	54.1'
22 23	149°47.3 164°47.5	39.9 40.8	341°21.0 355°57.1	17.1' 17.1'	05°10.0 05°24.1	14.1' 14.1'	54.1' 54.1'
23	SD = 16.0'	d = 0.9'			D = 14.8'	11.1	
		<u>u = 0.9</u>			J = 14.0		
Sat	<b>GHA</b> 179°47.6	<b>Dec</b> N08°41.7	<b>GHA</b> 10°33.2	ν 17 1'	Dec \$05°38.1	d 14.0'	HP
0 1	179°47.6 194°47.8	N08°41.7 42.6	10°33.2 25°09.3	17.1' 17.1'	05°52.2	14.0' 14.0'	54.1' 54.1'
2	209°47.9	43.5	39°45.4	17.0'	06°06.2	14.0'	54.1'
3	224°48.1	• • 44.4	54°21.4	17.0'	06°20.2	14.0'	54.0'
4 5	239°48.3 254°48.4	45.4 46.3	68°57.4 83°33.4	17.0' 17.0'	06°34.2 06°48.1	13.9' 13.9'	54.0' 54.0'
6	269°48.6	N08°47.2	98°09.4	17.0'	507°02.0	13.9'	54.0'
7	284°48.8	48.1	112°45.4	16.9'	$07^{\circ}15.9$	13.9'	54.0'
8 9	299°48.9 314°49.1	49.0 •• 49.9	127°21.3 141°57.3	16.9' 16.9'	07°29.8 07°43.6	13.8' 13.8'	54.0' 54.0'
10	314 49.1 329 49.2	50.8	141°57.3 156°33.1	16.9'	07°43.6 07°57.4	13.8'	54.0'
11	344°49.4	51.7	171°09.0	16.8'	08°11.2	13.7'	54.0'
12	359°49.6	N08°52.6	185°44.9	16.8'	\$08°24.9	13.7'	54.0'
13 14	14°49.7 29°49.9	53.5 54.5	200°20.7 214°56.5	16.8' 16.8'	08°38.6 08°52.3	13.7' 13.6'	54.0' 54.0'
15	44°50.0	• • 55.4	214 30.3 229°32.2	16.7	08 52.5 09°05.9	13.6'	54.0'
16	59°50.2	56.3	244°08.0	16.7'	$09^{\circ}19.5$	13.6'	54.0'
17	74°50.4 89°50.5	57.2 N08°58.1	258°43.7 273°19.3	16.7'	09°33.1 \$09°46.6	13.5'	54.0'
18 19	89°50.5 104°50.7	N08°58.1 59.0	273°19.3 287°55.0	16.6' 16.6'	10° 00.1	13.5' 13.5'	54.0' 54.0'
20	119°50.8	$08^{\circ}59.9$	302°30.6	16.6'	10°13.5	13.4'	54.0'
21	134°51.0	09°00.8	317°06.1	16.5'	10°27.0	13.4'	54.0'
22 23	149°51.2 164°51.3	01.7 02.6	331°41.7 346°17.2	16.5' 16.5'	10°40.3 10°53.7	13.3' 13.3'	53.9' 53.9'
23		d = 0.9'	J+0 11.2		D = 14.7'	13.3	33.3
	SD = 16.0'	$a = 0.9^{\circ}$		51	$\nu = 14.7$		

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

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

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.Pass.		Age	
uy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	12-14	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	92-99%	
10	01:21	01:13	12:01	22:37	10:18		
11	01:05	00:57	12:01	23:17	10:57		
12	00:50	00:42	12:01	23:56	11:36		

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

h	Aries	Venus		Mars		Jupiter		Saturn		Stars		
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	201°26.1	208°13.0	N02°08.8	80° 54.7	N22°54.3	124°29.2	N22°37.1	204°25.3	S03°25.6			
1	201 20.1 216°28.6	200°15.0 223°15.3	08.3	95° 56.2	54.0	139°31.2	37.1	219°27.5	25.5	Alpheratz	357°34.9	29°13.6
2	231°31.1	238°17.5	07.8	110° 57.6	53.8	154°33.2	37.1	219 27.5 234°29.7	25.4	Ankaa	353°07.3	-42°10.1
3	246° 33.5	253°19.7	07.3	125°59.0	53.5	169°35.2	37.2	249°31.9	25.3	Schedar	349°31.4	56°40.4
4	261°36.0	268°22.0	06.7	141°00.5	53.3	184°37.1	37.2	264°34.1	25.2	Diphda	348°47.4	-17°51.0
5	276°38.5	283°24.2	06.2	156°01.9	53.0	199°39.1	37.3	279°36.3	25.1	Achernar	335°20.6	-57°06.5
6	291°40.9	298°26.4	N02°05.7	171°03.4	N22°52.7	214°41.1	N22°37.3	294°38.5	S03°25.0	Hamal	327°51.3	23°34.8
7	306°43.4	313°28.7	05.2	186°04.8	52.5	229°43.1	37.4	309°40.7	24.8	Polaris	314°24.0	89°22.3
8	321°45.9	328°30.9	04.7	201°06.2	52.2	244°45.1	37.4	324°42.9	24.7	Acamar	315°12.0	-40°12.3
9	336°48.3	343°33.1	04.2	216°07.7	• • 52.0	259°47.1	• • 37.5	339°45.1	24.6	Menkar	314°06.2	4°11.2
10	351°50.8	358°35.3	03.7	231°09.1	51.7	274°49.1	37.5	354°47.3	24.5	Mirfak	308°28.4	49°57.1
11	6°53.2	13°37.5	03.2	246° 10.5	51.5	289°51.1	37.5	9°49.5	24.4	Aldebaran	290°39.6	16°33.6
12	21°55.7	28°39.7	N02°02.7	261°12.0	N22°51.2	304°53.1	N22°37.6	24°51.7	S03°24.3	Rigel	281°03.9	-8°10.5
13	36°58.2	43°41.9	02.2	276° 13.4	51.0	319°55.0	37.6	39°53.9	24.2	Capella	280°21.9	46°01.5
14	52°00.6	58°44.1	01.7	291°14.8	50.7	334°57.0	37.7	54°56.1	24.1	Bellatrix	278°22.8	6°22.3
15	67°03.1	73°46.3	01.2	306° 16.3	• • 50.5	349°59.0	• • 37.7	69°58.3	24.0	Elnath	278°01.8	28°37.8
16	82°05.6	88°48.5	8.00	321°17.7	50.2	5°01.0	37.8	85°00.5	23.9	Alnilam	275°37.7	-1°11.2
17	97°08.0	103°50.7	02°00.3	336° 19.1	49.9	20°03.0	37.8	100°02.7	23.8	Betelgeuse	270°52.0	7°24.7
18	112° 10.5	118°52.8	N01°59.8	351°20.6	N22°49.7	35°05.0	N22°37.9	115°04.9	S03°23.6	Canopus	263°52.5	-52°42.8
19	127° 13.0	133°55.0	59.3	6°22.0	49.4	50°07.0	37.9	130°07.1	23.5	Sirius	258°26.2	-16°45.2
20	142° 15.4	148°57.2	58.8	21°23.4	49.2	65°08.9	38.0	145°09.3	23.4	Adhara	255°05.8	-29°00.6
21	157° 17.9	163°59.4	• • 58.3	36°24.9	• • 48.9	80°10.9	• • 38.0	160°11.5	• • 23.3	Procyon	244°50.6	5°09.5
22	172°20.3	179°01.5	57.9	51°26.3	48.7	95°12.9	38.0	175°13.7	23.2	Pollux	243°17.1	27°58.0
23	187°22.8	194°03.7	57.4	66°27.7	48.4	110°14.9	38.1	190°15.9	23.1	Avior	234°14.6	-59°35.7
			_							Suhail	222°46.0	-43°32.3
Mer.p	ass. 10:33	$\nu$ 2.2′ d-0	.5′ m-4.69	$\nu$ 1.4′ d-0	.3′ m0.66	$\nu^{2.0'} d^{0}$	0′ m-2.05	$\nu$ 2.2′ d-0	.1′ m1.17	Miaplacidus	221°38.0	-69°49.5
										Alphard	217°47.4	-8°46.2
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.0	11°50.6
0	202°25.3	209°05.9	N01°56.9	81°29.2	N22°48.2	125°16.9	N22°38.1	205°18.1	S03°23.0	Dubhe	193°40.2	61°37.0
1	217° 27.7	224°08.0	56.4	96°30.6	47.9	140°18.9	38.2	220°20.3	22.9	Denebola	182°24.5	14°25.8
2	232°30.2	239°10.2	56.0	111°32.0	47.6	155°20.9	38.2	235°22.5	22.8	Gienah	175°43.1	-17°41.1
3	247°32.7	254°12.3	• • 55.5	126°33.5	• • 47.4	170°22.8	• • 38.3	250°24.7	22.7	Acrux	172°59.3	-63°14.5
4	262°35.1	269°14.4	55.0	141°34.9	47.1	185°24.8	38.3	265°26.9	22.6	Gacrux	171°50.9	-57°15.4
5	277°37.6	284°16.6	54.6	156° 36.3	46.9	200°26.8	38.4	280°29.1	22.5	Alioth	166°12.2 158°21.8	55°49.3 -11°17.7
6	292°40.1	299°18.7	N01°54.1	171°37.7	N22°46.6	215°28.8	N22°38.4	295°31.3	503°22.3	Spica Alkaid	150 21.0 152°51.3	49°11.1
7	307°42.5	314°20.9	53.6	186°39.2	46.3	230°30.8	38.5	310°33.5	22.2	Hadar	152 51.5 148°35.1	-60°29.7
8	322°45.0	329°23.0	53.2	201°40.6	46.1	245°32.8	38.5	325°35.7	22.1	Menkent	146 35.1 147°57.0	-36°29.8
9	337°47.5	344°25.1	• • 52.7	216°42.0	• • 45.8	260°34.8	• • 38.5	340°37.9	• • 22.0	Arcturus	147 57.0 145°47.4	19°02.9
10	352°49.9	359°27.2	52.2	231°43.5	45.6	275°36.7	38.6	355°40.1	21.9	Rigil Kent.	145 47.4 139°39.4	-60°56.4
11	7°52.4	14°29.4	51.8	246°44.9	45.3	290°38.7	38.6	10°42.3	21.8	Kochab	139 39.4 137°18.6	74°02.9
12	22°54.8	29°31.5	N01°51.3	261°46.3	N22°45.1	305°40.7	N22°38.7	25°44.5	S03°21.7	Zuben'ubi	136°55.5	-16°08.9
13	37°57.3	44°33.6	50.9	276°47.7	44.8	320°42.7	38.7	40°46.7	21.6	Alphecca	130° 55.5 126° 03.3	26°37.5
14	52°59.8	59°35.7	50.4	291°49.2	44.5	335°44.7	38.8	55°48.9	21.5	Antares	112° 15.3	-26°29.3
15	68°02.2	74°37.8	• • 50.0	306°50.6	• • 44.3	350°46.6	• • 38.8	70°51.1	• • 21.4	Antares	112 15.3 107°09.1	-20 29.3 -69°04.2
16	83°04.7	89°39.9	49.5	321°52.0	44.0	5°48.6	38.9	85°53.3	21.3	Sabik	102°02.4	-15°45.4
17	98°07.2	104°42.0	49.1	336°53.4	43.8	20°50.6	38.9	100°55.5	21.2	Shaula	96°09.9	-37°07.3
18	113°09.6	119°44.1	N01°48.6	351°54.8	N22°43.5	35°52.6	N22°38.9	115°57.7	503°21.1	Rasalhague	95°58.2	12°32.3
19	$128^{\circ}12.1$	134°46.2	48.2	$6^{\circ}56.3$	43.2	50°54.6	39.0	130°59.9	20.9	Eltanin	90°41.9	51°28.8
20	143° 14.6	149°48.3	47.8	21°57.7	43.0	65°56.6	39.0	146°02.1	20.8	Kaus Aust.	83°32.1	-34°22.3
21	$158^{\circ}17.0$	164°50.3	• • 47.3	$36^{\circ}59.1$	• • 42.7	80°58.5	• • 39.1	161°04.3	• • 20.7	Vega	80°33.0	38°48.1
22	173° 19.5	179°52.4	46.9	52°00.5	42.5	96°00.5	39.1	176°06.5	20.6	Nunki	75°47.4	-26°15.9
23	188°21.9	194°54.5	46.5	67°02.0	42.2	111°02.5	39.2	191°08.7	20.5	Altair	61°59.8	8°55.9
Mern	ass. 10:29	1/2 2' d-0	.5′ m-4.70	11 1' d-C	.3′ m0.68	1/2 0/ d0	0′ m-2.05	1/2 2' d-0	.1′ m1.17	Peacock	53°05.5	-56°39.0
- IVICI.P	ass. 10.29	ν2.2 u-0	.5 111-4.70	ν1. <del>+</del> u-0		ν2.0 do.	0 111-2.03	ν2.2 u-0		Deneb	49°25.8	45°21.9
										Enif	33°38.8	9°59.3
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.9	-46°50.2
0	203°24.4	209°56.6	N01°46.0	82°03.4	N22°41.9	126°04.5	N22°39.2	206°10.9	S03°20.4	Fomalhaut	15°14.6	-29°29.3
1	218°26.9	224°58.6	45.6	97°04.8	41.7	141°06.5	39.3	221°13.1	20.3	Scheat	13°45.3	28°13.0
2	233°29.3	240°00.7	45.2	112°06.2	41.4	156°08.4	39.3	236°15.3	20.2	Markab	13°30.0	15°20.3
3	248°31.8	255°02.8	• • 44.7	127°07.6	• • 41.1	171°10.4	• • 39.3	251°17.5	20.1			
4	263°34.3	270°04.8	44.3	142°09.1	40.9	186°12.4	39.4	266°19.7	20.0	Apr 13 Sun	SHA	Mer.pass
5	278°36.7	285°06.9	43.9	157° 10.5	40.6	201°14.4	39.4	281°21.9	19.9	Venus	6°46.9	10:06
6	293°39.2	300°08.9	N01°43.5	172°11.9	N22°40.4	216°16.4	N22°39.5	296°24.2	S03°19.8	Mars	239°28.6	18:35
7	308°41.7	315°11.0	43.0	187°13.3	40.1	231°18.3	39.5	311°26.4	19.7	Jupiter	283°03.0	15:40
8	323°44.1	330°13.0	42.6	202°14.7	39.8	246°20.3	39.6	326°28.6	19.5	Saturn	2°59.2	10:21
9	338°46.6	345°15.0	• • 42.2	217°16.1	• • 39.6	261°22.3	• • 39.6	341°30.8	• 19.4	Apr 14 Mon	SHA	Mer.pass
10	353°49.1	0°17.1	41.8	232°17.6	39.3	276°24.3	39.7	356°33.0	19.3	Venus	6°40.6	10:02
11	8°51.5	15°19.1	41.4	247°19.0	39.0	291°26.3	39.7	11°35.2	19.2	Mars	239°03.9	18:32
12	23°54.0	30°21.1	N01°41.0	262°20.4	N22°38.8	306°28.2	N22°39.8	26°37.4	S03°19.1	Jupiter	282°51.6	15:37
13	38°56.4	45°23.2	40.6	277°21.8	38.5	321°30.2	39.8	41°39.6	19.0	Saturn	2°52.8	10:17
14	53°58.9	60°25.2	40.1	292°23.2	38.3	336°32.2	39.8	56°41.8	18.9			
15	69°01.4	75°27.2	• • 39.7	307°24.6	• • 38.0	351°34.2	• • 39.9	71°44.0	• • 18.8	Apr 15 Tue	SHA	Mer.pass
16	84°03.8	90°29.2	39.3	322°26.0	37.7	6°36.2	39.9	86°46.2	18.7	Venus	6°32.1	09:59
17	99°06.3	105°31.2	38.9	337°27.5	37.5	21°38.1	40.0	101°48.4	18.6	Mars	238°39.0	18:30
18	114°08.8	120°33.2	N01°38.5	352°28.9	N22°37.2	36°40.1	N22°40.0	116°50.6	\$03°18.5	Jupiter	282°40.1	15:34
19	129°11.2	135°35.2	38.1	7°30.3	36.9	51°42.1	40.1	131°52.8	18.4	Saturn	2°46.5	10:14
20	144° 13.7	150°37.2	37.7 · · 37.3	22°31.7	36.7	66°44.1	40.1	146°55.0	18.3	Horizont	al parallax	
21	159° 16.2	165°39.2		37°33.1	· · 36.4	81°46.1	40.2	161°57.2	18.2	1.01120111	Venus:	0.4
22	174° 18.6	180°41.2	36.9 36.5	52°34.5	36.1	96°48.0	40.2	176°59.4	18.1		Mars:	0.4
23	189°21.1	195°43.2	36.5	67°35.9	35.9	111°50.0	40.2	192°01.6	17.9		141013.	V.1
Mer.p	ass. 10:25	$\nu 2.1' \ d-0$	.4′ m-4.72	$\nu$ 1.4 $^{\prime}$ d-0	.3′ m0.70	$\nu 2.0' \ d0.$	0′ m-2.04	$\nu$ 2.2′ d-0	.1′ m1.17			

h	Sui	Moon					
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°51.5	N09°03.5	0°52.6	16.4'	S11°07.0	13.3'	53.9'
1	194°51.6	04.4	15°28.0	16.4'	11°20.2	13.2'	53.9'
2 3	209°51.8 224°52.0	05.3 •• 06.2	30°03.4 44°38.8	16.3' 16.3'	11°33.4 11°46.6	13.2' 13.1'	53.9' 53.9'
4	239°52.1	07.1	59°14.1	16.3'	11°59.7	13.1'	53.9'
5	254°52.3	08.1	73°49.3	16.2'	12° 12.8	13.0'	53.9'
6	269°52.4	N09°09.0	88°24.6	16.2'	<b>S</b> 12°25.8	13.0'	53.9'
7	284°52.6	09.9	102°59.7	16.1'	12°38.8	12.9'	53.9'
8	299°52.7 314°52.9	10.8 •• 11.7	117°34.9 132°10.0	16.1' 16.0'	12°51.7 13°04.6	12.9' 12.8'	53.9' 53.9'
9 10	314 52.9 329°53.1	12.6	132 10.0 146°45.0	16.0'	13 04.6 13°17.4	12.8'	53.9'
11	344°53.2	13.5	161°20.0	16.0'	13°30.2	12.7'	53.9'
12	359°53.4	N09°14.4	175°55.0	15.9'	<b>S</b> 13°43.0	12.7'	53.9'
13	14°53.5	15.3	190°29.9	15.9'	13°55.6	12.6'	53.9'
14	29°53.7 44°53.9	16.2 •• 17.1	205°04.7 219°39.5	15.8' 15.8'	14°08.3 14°20.8	12.6'	53.9'
15 16	59°54.0	18.0	219 39.5 234°14.3	15.7'	14 20.6 14°33.4	12.5' 12.5'	53.9' 53.9'
17	74°54.2	18.9	248°49.0	15.7'	14°45.8	12.4'	53.9'
18	89°54.3	N09°19.8	263°23.7	15.6'	S14°58.2	12.4'	53.9'
19	104°54.5	20.7	277°58.3	15.6'	15° 10.6	12.3'	53.9'
20	119°54.6	21.6	292°32.8	15.5'	15°22.9	12.2'	53.9'
21 22	134°54.8 149°54.9	· · 22.5 23.4	307°07.3 321°41.8	15.4' 15.4'	15° 35.1 15° 47.3	12.2' 12.1'	53.9' 53.9'
23	164°55.1	24.3	336°16.1	15.4	15 47.3 15°59.4	12.1'	53.9'
	SD = 15.9'	d = 0.9'			0 = 14.7'		
	JD — 15.9°	u = 0.9		)L	) — 14. <i>1</i>		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°55.3	N09°25.2	350°50.5	15.3' 15.2'	\$16° 11.5 16° 23.5	12.0'	53.9'
1 2	194°55.4 209°55.6	26.1 27.0	5°24.7 19°59.0	15.2' 15.2'	16°23.5 16°35.4	11.9' 11.9'	53.9' 53.9'
3	209 55.0 224°55.7	27.9	34°33.1	15.1'	16° 47.3	11.8'	53.9
4	239°55.9	28.8	49°07.2	15.0'	16°59.1	11.7'	53.9'
5	254°56.0	29.7	63°41.3	15.0'	$17^{\circ}10.8$	11.7'	53.9'
6	269°56.2	N09°30.6	78°15.3	14.9'	\$17°22.5	11.6'	53.9'
7 8	284°56.3 299°56.5	31.5 32.4	92°49.2 107°23.0	14.9' 14.8'	17° 34.1 17° 45.6	11.5' 11.5'	53.9' 53.9'
9	314°56.7	33.3	107 25.0 121°56.8	14.6	17 45.0 17°57.1	11.5	53.9'
10	329°56.8	34.2	136°30.6	14.7'	18°08.4	11.3'	53.9'
11	344°57.0	35.1	151°04.2	14.6'	$18^{\circ}19.8$	11.2'	53.9'
12	359°57.1	N09°36.0	165°37.9	14.5'	518°31.0	11.2'	53.9'
13 14	14°57.3 29°57.4	36.9 37.8	180°11.4 194°44.9	14.5' 14.4'	18° 42.2 18° 53.3	11.1' 11.0'	53.9' 53.9'
15	44°57.6	• • 38.7	209°18.3	14.4'	10° 04.3	11.0'	53.9
16	59°57.7	39.6	223°51.6	14.3'	19° 15.3	10.9'	53.9'
17	74°57.9	40.5	238°24.9	14.2'	19°26.1	10.8'	53.9'
18	89°58.0 104°58.2	N09°41.3	252°58.1	14.2'	\$19°36.9 19°47.7	10.7'	53.9'
19 20	104 58.2 119°58.3	42.2 43.1	267°31.3 282°04.4	14.1'	19°47.7 19°58.3	10.6' 10.6'	53.9' 53.9'
21	134°58.5	• • 44.0	296°37.4	13.9'	20°08.9	10.5	53.9'
22	149°58.6	44.9	311°10.3	13.9'	20°19.3	10.4'	53.9'
23	164°58.8	45.8	325°43.2	13.8'	20°29.7	10.3'	54.0'
	SD = 15.9'	d = 0.9'		SE	0 = 14.7'		
Tue	GHA	Dec	GHA	ν	Dec	d	НР
o 0	GHA 179°59.0	N09°46.7	340°16.0	u 13.7'	S20°40.0	a 10.2'	<b>пР</b> 54.0'
1	194°59.1	47.6	354°48.8	13.7'	20°50.3	10.1	54.0'
2	209°59.3	48.5	9°21.4	13.6'	21°00.4	10.1'	54.0'
3	224°59.4	· · 49.4 50.3	23°54.0 38°26.6	13.5'	21°10.5	10.0'	54.0'
4 5	239°59.6 254°59.7	50.3 51.2	38°26.6 52°59.0	13.5' 13.4'	21°20.4 21°30.3	9.9' 9.8'	54.0' 54.0'
6	269°59.9	N09°52.1	67°31.4	13.4	S21°40.1	9.7'	54.0'
7	285°00.0	53.0	82°03.7	13.2'	21°49.8	9.6'	54.0'
8	300°00.2	53.8	96°36.0	13.2'	21°59.4	9.5'	54.0'
9	315°00.3 330°00.5	• • 54.7 55.6	111°08.1 125°40.2	13.1' 13.0'	22°09.0 22°18.4	9.4' 9.3'	54.0'
10 11	330°00.5 345°00.6	55.6 56.5	125°40.2 140°12.2	13.0'	22°18.4 22°27.7	9.3'	54.0' 54.0'
12	0°00.8	N09°57.4	154°44.2	12.9'	S22°37.0	9.1'	54.0'
13	15°00.9	58.3	169°16.1	12.8'	22°46.1	9.1'	54.0'
14	30°01.1	09°59.2	183°47.9	12.7'	22°55.2	9.0'	54.0'
15 16	45°01.2 60°01.4	10°00.1 01.0	198°19.6 212°51.3	12.7' 12.6'	23°04.1 23°13.0	8.9' 8.8'	54.0' 54.0'
16 17	75°01.5	01.0	212°51.3 227°22.8	12.5'	23° 13.0 23° 21.8	8.8	54.0 54.1'
18	90°01.7	N10°02.7	241°54.4	12.4'	\$23°30.4	8.6'	54.1'
19	105°01.8	03.6	256°25.8	12.4'	23°39.0	8.5'	54.1'
20	120°02.0	04.5	270°57.2	12.3'	23°47.4	8.4'	54.1'
21 22	135°02.1 150°02.3	· · 05.4 06.3	285°28.4 299°59.7	12.2' 12.1'	23°55.8 24°04.0	8.3' 8.1'	54.1' 54.1'
23	165°02.4	06.3	299 59.7 314°30.8	12.1'	24 04.0 24°12.2	8.0'	54.1'
	SD = 15.9'	d = 0.9'			0 = 14.7'		-

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

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

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.Pass.		Age	
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	15-17	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	100-96%	
13	00:34	00:26	12:00	-:-	12:17		
14	00:19	00:12	12:00	00:38	12:59		
15	00:04	00:03	12:00	01:21	13:44		

April 16, 17, 18 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	204° 23.6	210°45.2	N01°36.2	82°37.3	N22°35.6	126°52.0	N22°40.3	207°03.8	S03°17.8			
1	219° 26.0	210° 43.2 225° 47.2	35.8	97°38.8	35.3	141°54.0	40.3	222°06.0	17.7	Alpheratz	357°34.9	29°13.6
2	234°28.5	240°49.2	35.4	112°40.2	35.1	156°55.9	40.4	237°08.2	17.6	Ankaa	353°07.3	-42°10.1
3	249°30.9	255°51.1	35.0	127°41.6	• • 34.8	171°57.9	• • 40.4	252°10.4	17.5	Schedar	349°31.4	56°40.4
4	264°33.4	270°53.1	34.6	142°43.0	34.5	186°59.9	40.5	267°12.6	17.4	Diphda	348°47.4	-17°50.9
5	279°35.9	285°55.1	34.2	157°44.4	34.3	202°01.9	40.5	282°14.8	17.3	Achernar	335°20.6	-57°06.5
6	294°38.3	300°57.0	N01°33.9	172°45.8	N22°34.0	217°03.8	N22°40.6	297°17.0	S03°17.2	Hamal	327°51.3	23°34.8
7	309°40.8	315°59.0	33.5	187°47.2	33.8	232°05.8	40.6	312°19.2	17.1	Polaris	314°24.2	89°22.3
8	324° 43.3	331°01.0	33.1	202°48.6	33.5	247°07.8	40.6	327°21.4	17.0	Acamar	315°12.0	-40°12.3
9	339° 45.7	346°02.9	• • 32.7	217°50.0	• • 33.2	262°09.8	• • 40.7	342°23.6	• • 16.9	Menkar	314°06.2	4°11.2
10	354°48.2	1°04.9	32.3	232°51.4	33.0	$277^{\circ}11.7$	40.7	357°25.8	16.8	Mirfak	308°28.4	49°57.1 16°33.6
11	9°50.7	16°06.8	32.0	247°52.8	32.7	292°13.7	40.8	12°28.0	16.7	Aldebaran	290°39.6 281°03.9	-8°10.5
12	24°53.1	31°08.8	N01°31.6	262°54.2	N22°32.4	307°15.7	N22°40.8	27°30.2	S03°16.6	Rigel Capella	281 03.9 280°21.9	-8 10.5 46°01.5
13	39°55.6	46°10.7	31.2	277°55.6	32.1	322°17.7	40.9	42°32.5	16.4	Bellatrix	278° 22.9	6°22.3
14	54°58.1	61°12.6	30.9	292°57.0	31.9	337°19.6	40.9	57°34.7	16.3	Elnath	278°01.8	28°37.8
15	70°00.5	76°14.6	• • 30.5	307°58.5	• • 31.6	352°21.6	• • 41.0	72°36.9	• • 16.2	Alnilam	275°37.7	-1°11.2
16	85°03.0	91°16.5	30.1	322°59.9	31.3	7°23.6	41.0	87°39.1	16.1	Betelgeuse	270°52.0	7°24.7
17	100°05.4	106°18.4	29.8	338°01.3	31.1	22°25.6	41.0	102°41.3	16.0	Canopus	263°52.5	-52°42.8
18	115°07.9	121°20.4	N01°29.4	353°02.7	N22°30.8	37°27.5	N22°41.1	117°43.5	S03°15.9	Sirius	258° 26.2	-16°45.2
19	130° 10.4	136°22.3	29.1	8°04.1	30.5	52°29.5	41.1	132°45.7	15.8	Adhara	255°05.8	-29°00.6
20	145°12.8	151°24.2	28.7	23°05.5	30.3	67°31.5	41.2	147°47.9	15.7	Procyon	244°50.7	5°09.5
21	160°15.3	166°26.1	•• 28.4	38°06.9	30.0	82°33.5	• • 41.2	162°50.1	• • 15.6	Pollux	243°17.1	27°58.0
22	175° 17.8	181°28.0	28.0	53°08.3	29.7	97°35.4	41.3	177°52.3	15.5	Avior	234°14.6	-59°35.7
23	190°20.2	196°29.9	27.7	68°09.7	29.5	112°37.4	41.3	192°54.5	15.4	Suhail	222°46.0	-43°32.3
Mer.p	ass. 10:21	$\nu$ 2.0′ d-0	.4′ m-4.73	$\nu$ 1.4 $^{\prime}$ d-0	0.3′ m0.71	$\nu$ 2.0′ d0.	0' m-2.04	$\nu$ 2.2′ d-0	.1' m $1.17$	Miaplacidus	221°38.0	-69°49.5
										Alphard	$217^{\circ}47.4$	-8°46.2
Thu	GHA	GHA	Doc	GHA	Doc	GHA	Doc	GHA	Doc	Regulus	207°34.0	11°50.6
I nu O	205°22.7	дна 211°31.8	<b>Dec</b> N01°27.3	83°11.1	<b>Dec</b> N22°29.2	127°39.4	<b>Dec</b> N22°41.4	207°56.7	<b>Dec</b> \$03°15.3	Dubhe	193°40.2	61°37.0
0 1	205° 22.7 220° 25.2	211 31.8 226°33.7	NU1 - 27.3 27.0	98°12.5	N22 29.2 28.9	127° 39.4 142° 41.3	N22 41.4 41.4	207°56.7 222°58.9	503 15.3 15.2	Denebola	182°24.5	14°25.8
2	235° 27.6	241°35.6	26.6	113°13.9	28.7	157°43.3	41.4	238°01.1	15.2	Gienah	175°43.1	-17°41.1
3	250°30.1	256°37.5	• • 26.3	128°15.3	• • 28.4	172°45.3	. 41.5	253°03.3	15.0			-63°14.5
4	265°32.5	271°39.4	25.9	143°16.7	28.1	172 45.3 187°47.3	41.5	268°05.5	14.9		171°50.9	-57°15.5
5	280°35.0	286°41.3	25.6	158°18.1	27.8	202°49.2	41.6	283°07.7	14.7	Alioth	166°12.2	55°49.3
6	295°37.5	301°43.2	N01°25.3	173°19.5	N22°27.6	217°51.2	N22°41.6	298°09.9	S03°14.6	Spica	158°21.8	-11°17.7
7	310°39.9	316°45.1	24.9	188°20.9	27.3	232°53.2	41.7	313°12.1	14.5	Alkaid	152°51.3	49°11.1
8	325° 42.4	331°46.9	24.6	203°22.3	27.0	247°55.2	41.7	328°14.3	14.4	Hadar	148°35.1	-60°29.7
9	340°44.9	346°48.8	24.3	218°23.7	• • 26.8	262°57.1	• • 41.7	343°16.5	. 14.3		147°57.0	-36°29.8
10	355° 47.3	1°50.7	23.9	233°25.1	26.5	277°59.1	41.8	358°18.8	14.2	Arcturus	145°47.4	19°02.9
11	10°49.8	16°52.6	23.6	248°26.5	26.2	293°01.1	41.8	13°21.0	14.1	Rigil Kent.	139°39.4	-60°56.4
12	25°52.3	31°54.4	N01°23.3	263°27.9	N22°25.9	308°03.0	N22°41.9	28°23.2	S03°14.0	Kochab	137° 18.6 136° 55.5	74°02.9 -16°08.9
13	40°54.7	46°56.3	23.0	278°29.2	25.7	323°05.0	41.9	43°25.4	13.9	Zuben'ubi Alphecca	130° 55.5 126° 03.2	26°37.6
14	55°57.2	61°58.1	22.6	293°30.6	25.4	338°07.0	42.0	58°27.6	13.8		120 03.2 112° 15.3	-26°29.3
15	$70^{\circ}59.7$	77°00.0	• • 22.3	308°32.0	• • 25.1	353°08.9	• • 42.0	73°29.8	• • 13.7	Antares Atria	112 15.3 107°09.0	-20°29.3 -69°04.2
16	86°02.1	92°01.8	22.0	323°33.4	24.9	8°10.9	42.1	88°32.0	13.6	Sabik	107 09.0 102°02.3	-15°45.4
17	$101^{\circ}04.6$	107°03.7	21.7	338°34.8	24.6	23°12.9	42.1	103°34.2	13.5	Shaula	96°09.9	-37°07.3
18	$116^{\circ}07.0$	122°05.5	N01°21.4	353°36.2	N22°24.3	38°14.9	N22°42.1	118°36.4	S03°13.4	Rasalhague	95°58.2	12°32.3
19	131°09.5	137°07.4	21.0	8°37.6	24.0	53°16.8	42.2	133°38.6	13.3	Eltanin	90°41.8	51°28.8
20	$146^{\circ}12.0$	152°09.2	20.7	23°39.0	23.8	68°18.8	42.2	148°40.8	13.2	Kaus Aust.	83°32.1	-34°22.3
21	$161^{\circ}14.4$	$167^{\circ}11.0$	• • 20.4	38°40.4	• • 23.5	83°20.8	• • 42.3	163°43.0	• • 13.1	Vega	80°33.0	38°48.1
22	176° 16.9	182°12.9	20.1	53°41.8	23.2	98°22.7	42.3	178°45.2	13.0	Nunki	75°47.4	-26°15.9
23	191°19.4	197°14.7	19.8	68°43.2	22.9	113°24.7	42.4	193°47.4	12.8	Altair	61°59.8	8°55.9
Mer n	ass. 10:17	v1 9' d-0	.3′ m-4.74	v1 4' d-0	0.3′ m0.73	$\nu^2 0' d0$	0′ m-2.03	v2 2' d-0	.1′ m1.17	Peacock	53°05.5	-56°39.0
				ν I. ι α σ						Deneb	49°25.8	45°21.9
										Enif	33°38.8	9°59.3
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.9	-46°50.2
0	206°21.8	212°16.5	N01° 19.5	83°44.6	N22°22.7	128°26.7	N22°42.4	208°49.6	S03°12.7	Fomalhaut	$15^{\circ}14.5$	-29°29.3
1	221°24.3	227°18.3	19.2	98°46.0	22.4	143°28.6	42.5	223°51.8	12.6	Scheat	13°45.3	28°13.0
2	236° 26.8	242°20.2	18.9	113°47.4	22.1	158°30.6	42.5	238°54.0	12.5	Markab	13°29.9	15°20.3
3	251°29.2	257°22.0	18.6	128°48.7	• • 21.8	173°32.6	• • 42.5	253°56.3 268°58.5	12.4	Apr 16 Wed	SHA	Mer.pass
4 5	266°31.7 281°34.2	272°23.8 287°25.6	18.3	143°50.1 158°51.5	21.6	188°34.5 203°36.5	42.6 42.6	268°58.5 284°00.7	12.3 12.2	Venus	5ПА 6°21.7	09:56
5 6	281° 34.2 296° 36.6	287°25.6 302°27.4	18.0 N01°17.7	158°51.5 173°52.9	21.3 N22°21.0	203°36.5 218°38.5	42.6 N22°42.7	284°00.7 299°02.9	12.2 S03°12.1	Mars		18:28
7	296°36.6 311°39.1	302°27.4 317°29.2	N01° 17.7 17.4	173°52.9 188°54.3	20.7	218° 38.5 233° 40.4	N22°42.7 42.7	299°02.9 314°05.1	12.0	Jupiter	282°28.4	15:30
8	311 39.1 326°41.5	317 29.2 332°31.0	17.4 17.1	203°55.7	20.7	233 40.4 248°42.4	42.7 42.8	314 05.1 329°07.3	12.0	Saturn	2°40.3	10:10
9	341°44.0	347°32.8	• • 16.8	203 55.7 218°57.1	20.2	263°44.4	• • 42.8	344°09.5	•• 11.8			
10	356° 46.5	2°34.6	16.5	233°58.5	19.9	278°46.3	42.8	359°11.7	11.7	Apr 17 Thu	SHA	Mer.pass
11	11°48.9	17°36.4	16.3	248°59.9	19.6	293°48.3	42.8	14°13.9	11.7	Venus	6°09.1	09:53
12	26°51.4	32°38.2	N01° 16.0	264°01.2	N22°19.4	308°50.3	N22°42.9	29°16.1	S03°11.5		237°48.4	18:26
13	41°53.9	47°39.9	15.7	279°02.6	19.1	323°52.2	43.0	44°18.3	11.4	Jupiter	282°16.7	15:27
14	56° 56.3	62°41.7	15.4	294°04.0	18.8	338°54.2	43.0	59°20.5	11.3	Saturn	2°34.0	10:07
15	71°58.8	77°43.5	15.1	309°05.4	• • 18.5	353°56.2	• • 43.1	74°22.7	11.2	Apr 18 Fri	SHA	Mer.pass
16	87°01.3	92°45.3	14.8	324°06.8	18.3	8°58.1	43.1	89°24.9	11.1	Venus	5°54.7	09:50
17	102°03.7	107°47.0	14.6	339°08.2	18.0	24°00.1	43.2	104°27.1	11.0	Mars		18:23
18	117°06.2	122°48.8	N01° 14.3	354°09.6	N22°17.7	39°02.1	N22°43.2	119°29.4	503°10.8		282°04.8	15:24
19	132°08.7	137°50.6	14.0	9°10.9	17.4	54°04.0	43.2	134°31.6	10.7	Saturn	2°27.8	10:03
20	$147^{\circ}11.1$	152°52.3	13.7	24°12.3	17.2	69°06.0	43.3	149°33.8	10.6			
21	$162^{\circ}13.6$	167°54.1	• • 13.5	39°13.7	• • 16.9	84°08.0	• • 43.3	164°36.0	• • 10.5	Horizont	al parallax	
22	$177^{\circ}16.0$	182°55.8	13.2	54°15.1	16.6	99°09.9	43.4	$179^{\circ}38.2$	10.4		Venus:	0.4
23	192°18.5	197°57.6	12.9	69°16.5	16.3	114°11.9	43.4	194°40.4	10.3		Mars:	0.1
Mern	ass. 10:13	v1 8′ d₋∩	.3′ m-4.74	ν1 Δ' d.C	0.3′ m0.74	ν2 Ω' dΩ	.0′ m-2.03	1/2 2/ d. 0	.1′ m1.17			
- vici.p		ν 1.0 u-0	.5 7.17	ν 1. τ U-C		- Z.O UO.	2.05	- Z.Z U-U				

h	Sun						
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°02.6	$N10^{\circ}08.1$	$329^{\circ}01.9$	12.0'	S24°20.2	7.9'	54.1'
1	195°02.7 210°02.8	09.0	343°32.9 358°03.8	11.9'	24°28.2 24°36.0	7.8'	54.1'
2 3	210°02.8 225°03.0	09.8 •• 10.7	358°03.8 12°34.6	11.8' 11.8'	24° 36.0 24° 43.7	7.7' 7.6'	54.1' 54.1'
4	240°03.1	11.6	27°05.4	11.7'	24°51.3	7.5	54.1'
5	255°03.3	12.5	41°36.1	11.6'	24°58.8	7.4'	54.1'
6 7	270°03.4 285°03.6	N10°13.4 14.3	56°06.8 70°37.3	11.6' 11.5'	\$25°06.2 25°13.5	7.3' 7.2'	54.2' 54.2'
8	300°03.7	15.1	85° 07.8	11.4'	25°20.7	7.1	54.2'
9	315°03.9	•• 16.0	99°38.2	11.3'	25°27.7	6.9'	54.2'
10	330°04.0 345°04.2	16.9	114°08.6 128°38.8	11.3'	25°34.7 25°41.5	6.8'	54.2' 54.2'
11 12	0°04.3	17.8 N10°18.7	128° 38.8 143° 09.0	11.2' 11.1'	25°41.5 S25°48.2	6.7' 6.6'	54.2'
13	15°04.5	19.6	157° 39.2	11.1'	25°54.8	6.5	54.2'
14	30°04.6	20.4	172°09.2	11.0'	26°01.3	6.4'	54.2'
15 16	45°04.8 60°04.9	· · 21.3 22.2	186°39.2 201°09.1	10.9' 10.9'	26°07.6 26°13.8	6.2' 6.1'	54.3' 54.3'
17	75°05.0	23.1	201 09.1 215°39.0	10.9	26°20.0	6.0'	54.3'
18	90°05.2	N10°24.0	230°08.8	10.7'	S26°25.9	5.9'	54.3'
19	105°05.3	24.9	244°38.5	10.6'	26°31.8	5.7'	54.3'
20 21	120°05.5 135°05.6	25.7 •• 26.6	259°08.1 273°37.7	10.6' 10.5'	26°37.6 26°43.2	5.6' 5.5'	54.3' 54.3'
22	150°05.8	27.5	288°07.2	10.5'	26°48.7	5.4	54.3'
23	165°05.9	28.4	302°36.7	10.4'	$26^{\circ}54.1$	5.2'	54.4'
	SD = 15.9'	d = 0.9'		SD	0 = 14.8'		
Thu 0	<b>GHA</b> 180°06.1	<b>Dec</b> N10°29.3	<b>GHA</b> 317°06.1	u  10.3'	Dec \$26°59.3	<i>d</i> 5.1'	<b>HP</b> 54.4'
1	195°06.2	30.1	331° 35.4	10.3	27°04.4	5.0'	54.4'
2	210°06.3	31.0	346°04.6	10.2'	$27^{\circ}09.4$	4.9'	54.4'
3	225°06.5	• • 31.9	0°33.8	10.1'	27°14.3	4.7'	54.4
4 5	240°06.6 255°06.8	32.8 33.6	15°03.0 29°32.0	10.1' 10.0'	27°19.0 27°23.6	4.6' 4.5'	54.4' 54.4'
6	270°06.9	N10°34.5	44°01.0	10.0'	S27°28.1	4.3'	54.4
7	285°07.1	35.4	58°30.0	9.9'	27°32.4	4.2'	54.5'
8 9	300°07.2 315°07.4	36.3 · · · 37.2	72°58.9 87°27.7	9.8' 9.8'	27°36.6 27°40.7	4.1' 3.9'	54.5' 54.5'
10	330°07.5	38.0	101°56.5	9.6 9.7'	27°44.7	3.8'	54.5'
11	345°07.6	38.9	116°25.2	9.7'	27°48.5	3.7'	54.5'
12	0°07.8	N10°39.8	130°53.9	9.6'	\$27°52.1	3.5'	54.5'
13 14	15°07.9 30°08.1	40.7 41.5	145°22.5 159°51.1	9.6' 9.5'	27°55.7 27°59.1	3.4' 3.3'	54.6' 54.6'
15	45°08.2	• • 42.4	174° 19.6	9.5'	28°02.3	3.1'	54.6'
16	60°08.3	43.3	188°48.0	9.4'	28°05.5	3.0'	54.6'
17 18	75°08.5 90°08.6	44.2 N10°45.0	203°16.4 217°44.8	9.4' 9.3'	28°08.4 <b>5</b> 28°11.3	2.8' 2.7'	54.6' 54.6'
19	105° 08.8	45.9	232° 13.1	9.3'	28°14.0	2.6'	54.7
20	120°08.9	46.8	246°41.4	9.2'	$28^{\circ}16.6$	2.4'	54.7'
21	135°09.1	• • 47.7	261°09.6	9.2'	28°19.0	2.3'	54.7'
22 23	150°09.2 165°09.3	48.5 49.4	275°37.7 290°05.9	9.1' 9.1'	28°21.3 28°23.4	2.1' 2.0'	54.7' 54.7'
23	SD = 15.9'	d = 0.9'			0 = 14.8'	2.0	<u> </u>
	$\frac{3D = 15.9}{}$	a = 0.9		31	7 = 14.0		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°09.5	N10°50.3	304°34.0	9.0'	\$28°25.4	1.9'	54.7'
1 2	195°09.6 210°09.8	51.1 52.0	319°02.0 333°30.0	9.0' 9.0'	28°27.3 28°29.0	1.7' 1.6'	54.8' 54.8'
3	225°09.9	• • 52.9	347°58.0	8.9'	28°30.5	1.4'	54.8'
4	240°10.0	53.8	2°25.9	8.9'	28°32.0	1.3'	54.8'
5 6	255° 10.2 270° 10.3	54.6 N10°55.5	16°53.8 31°21.6	8.9' 8.8'	28°33.3 <b>5</b> 28°34.4	1.1' 1.0'	54.8' 54.9'
7	285° 10.4	56.4	45°49.5	8.8'	28°35.4	0.8'	54.9'
8	300°10.6	57.2	60° 17.2	8.8'	28°36.2	0.7'	54.9'
9	315°10.7	58.1	74°45.0	8.7'	28°36.9	0.5'	54.9'
10 11	330° 10.9 345° 11.0	59.0 10°59.8	89° 12.7 103° 40.4	8.7' 8.7'	28°37.5 28°37.9	0.4' 0.3'	54.9' 55.0'
12	0°11.1	N11°00.7	118°08.1	8.6'	S28°38.1	0.1	55.0'
13	15°11.3	01.6	132°35.7	8.6'	28°38.2	-0.0'	55.0'
14 15	30°11.4 45°11.6	02.5 · · 03.3	147°03.3 161°30.9	8.6' 8.6'	28°38.2 28°38.0	-0.2' -0.3'	55.0' 55.0'
16	45 11.0 60°11.7	04.2	101 30.9 175°58.5	8.6'	28°37.6	-0.5'	55.1'
17	75°11.8	05.1	190°26.1	8.5'	28°37.1	-0.6'	55.1'
18	90°12.0	N11°05.9	204°53.6	8.5'	\$28°36.5	-0.8'	55.1'
19 20	105° 12.1 120° 12.2	06.8 07.7	219°21.1 233°48.6	8.5' 8.5'	28°35.7 28°34.8	-0.9' -1.1'	55.1' 55.2'
21	135°12.4	08.5	$248^{\circ}16.1$	8.5'	28°33.7	-1.2'	55.2'
22	150°12.5	09.4	262°43.5	8.5'	28°32.4	-1.4'	55.2'
23	165°12.6	10.2	277°11.0	8.4'	28°31.0	-1.5'	55.2'
	SD = 15.9'	d = 0.9'		SD	0 = 14.9'		

			2025	April 1	6 to Ap	or. 18 l
Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Julitise	Juliset	Civil	Naut.
N 72°	////	01:35	03:26	20:37	22:35	////
<b>N</b> 70°	////	02:19	03:45	20:17	21:46	////
68°	17777	02:47	04:00	20:02	21:16	////
66°	01:22	03:09	04:11	19:50	20:54	22:46
64°	02:01	03:25	04:21	19:40	20:37	22:03
62°	02:27	03:39	04:30	19:31	20:23	21:36
60°	02:47	03:50	04:37	19:24	20:11	21:15
N 58°	03:03	04:00	04:43	19:17	20:01	20:59
56°	03:16	04:08	04:49	19:11	19:52	20:45
54°	03:10	04:06	04:54	19:11	19:45	20:43
52°	03:20	04:10	04:59	19:01	19:43	20:33
50°	03:46	04:28	05:03	18:57	19:32	20:25
45°	04:03	04:20	05:03	18:48	19:32	19:57
N 40°	04:17	04:51	05:19	18:41	19:09	19:43
35°	04:28	04:59	05:25	18:34	19:00	19:32
30°	04:37	05:06	05:31	18:29	18:53	19:22
20°	04:51	05:18	05:40	18:19	18:41	19:08
N 10°	05:02	05:27	05:49	18:11	18:32	18:57
0°	05:11	05:35	05:56	18:03	18:24	18:48
<b>S</b> 10°	05:18	05:42	06:04	17:55	18:17	18:41
$20^{\circ}$	05:23	05:49	06:12	17:47	18:10	18:35
30°	05:28	05:56	06:20	17:38	18:02	18:30
35°	05:30	06:00	06:25	17:33	17:59	18:28
40°	05:32	06:04	06:31	17:27	17:55	18:26
45°	05:34	06:08	06:38	17:21	17:50	18:25
<b>S</b> $50^{\circ}$	05:35	06:13	06:46	17:13	17:45	18:23
52°	05:36	06:15	06:49	17:09	17:43	18:23
54°	05:36	06:17	06:53	17:05	17:41	18:22
56°	05:36	06:19	06:58	17:00	17:39	18:22
58°	05:36	06:22	07:03	16:55	17:36	18:21
<b>S</b> 60°	05:37	06:25	07:08	16:50	17:33	18:21
		Moonris	.0		Moonset	
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
NI 700						
N 72°						
<b>N</b> 70°						
68°						
66°						
64°	00:42			03:23		
62°		01:58		04:07	03:51	
60°		01:05	02:30	04:37	04:44	05:08
N 58°		00:33	01:48	05:00	05:17	05:50
56°		00:09	01:20	05:18	05:41	06:18
54°	23:50		00:58	05:34	06:00	06:41
52°	23:34		00:40	05:47	06:17	06:59
50°	23:20		00:24	05:59	06:31	07:14
45°	22:52	23:53		06:24	07:00	07:45
<b>N</b> 40°	22:30	23:29		06:43	07:22	08:10
					· · ·	00.10

1	Lat.			•					
	Lat.	Wed	Thu	Fri	Wed	Thu	Fri		
ĺ	N 72°								
ı	N 70°								
	68°								
ı	66°								
İ	64°	00:42			03:23				
	62°		01:58		04:07	03:51			
	60°		01:05	02:30	04:37	04:44	05:08		
	<b>N</b> 58°		00:33	01:48	05:00	05:17	05:50		
١	56°		00:09	01:20	05:18	05:41	06:18		
	54°	23:50		00:58	05:34	06:00	06:41		
ı	52°	23:34		00:40	05:47	06:17	06:59		
	50°	23:20		00:24	05:59	06:31	07:14		
	45°	22:52	23:53		06:24	07:00	07:45		
	<b>N</b> 40°	22:30	23:29		06:43	07:22	08:10		
ı	35°	22:11	23:10		07:00	07:41	08:30		
	30°	21:56	22:53	23:47	07:14	07:57	08:47		
ı	20°	21:29	22:24	23:18	07:39	08:25	09:15		
İ	N $10^{\circ}$	21:07	22:00	22:54	08:00	08:48	09:40		
	0°	20:45	21:37	22:31	08:20	09:10	10:03		
	<b>S</b> 10°	20:24	21:15	22:08	08:40	09:32	10:26		
İ	20°	20:02	20:50	21:43	09:01	09:56	10:50		
	30°	19:36	20:22	21:15	09:26	10:23	11:19		
١	35°	19:21	20:05	20:58	09:40	10:40	11:36		
ı	40°	19:03	19:46	20:38	09:57	10:59	11:56		
	45°	18:42	19:23	20:14	10:18	11:22	12:20		
	<b>S</b> 50°	18:15	18:53	19:43	10:44	11:51	12:51		
	52°	18:02	18:38	19:28	10:56	12:06	13:06		
	54°	17:47	18:21	19:10	11:11	12:23	13:24		
	56°	17:30	18:00	18:48	11:28	12:44	13:46		
	58°	17:09	17:34	18:20	11:48	13:10	14:14		
1	<b>S</b> 60°	16:43	16:58	17:39	12:14	13:46	14:55		

		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	92-79%	
16	00:10	00:17	12:00	02:08	14:32		
17	00:24	00:31	11:59	02:58	15:24		
18	00:38 00:45		11:59	03:50 16:17			

April 19, 20, 21 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
	207°21.0	212°59.3	N01°12.7	84° 17.9	N22° 16.0	129°13.9	N22°43.5	209°42.6	S03°10.2			Dec
0	207 21.0 222°23.4	212 59.5 228°01.1		99°19.2		129 15.9 144°15.8		209 42.0 224°44.8		Alpheratz	357°34.9	29°13.6
1	222 23.4 237°25.9	243°02.8	12.4	114°20.6	15.8	159°17.8	43.5	239°47.0	10.1	Ankaa	353°07.3	-42°10.1
2	251° 25.9 252° 28.4		12.2 •• 11.9		15.5	174°19.8	43.5 • • 43.6	259 47.0 254°49.2	10.0	Schedar	349°31.4	56°40.4
3		258°04.5		129°22.0	15.2			254 49.2 269°51.4	•• 09.9	Diphda	348°47.4	$-17^{\circ}50.9$
4	267°30.8	273°06.3	11.6	144°23.4	14.9	189°21.7	43.6		09.8	Achernar	335°20.6	-57°06.5
5	282°33.3	288°08.0	11.4	159°24.8	14.7	204°23.7	43.7	284°53.6	09.7	Hamal	327°51.3	23°34.8
6	297°35.8	303°09.7	N01°11.1	174°26.1	N22°14.4	219°25.7	N22°43.7	299°55.8	S03°09.6	Polaris	314°24.4	89°22.3
7	312°38.2	318°11.5	10.9	189°27.5	14.1	234°27.6	43.8	314°58.1	09.5	Acamar	315°12.0	-40°12.3
8	327°40.7	333°13.2	10.6	204°28.9	13.8	249°29.6	43.8	330°00.3	09.4	Menkar	314°06.2	4°11.2
9	342°43.1	348°14.9	• • 10.4	219°30.3	• • 13.5	264°31.5	• • 43.8	345°02.5	• • 09.3	Mirfak	308°28.4	49°57.1
10	357°45.6	3°16.6	10.1	234°31.7	13.3	279°33.5	43.9	0°04.7	09.2	Aldebaran	290°39.6	16°33.6
11	12°48.1	18°18.3	09.9	249°33.0	13.0	294°35.5	43.9	15°06.9	09.1	Rigel	281°03.9	-8°10.5
12	27°50.5	33°20.0	N01°09.6	264°34.4	N22° 12.7	309°37.4	N22°44.0	30°09.1	S03°09.0	Capella	280°21.9	46°01.5
13	42°53.0	48°21.7	09.4	279°35.8	12.4	324°39.4	44.0	45°11.3	08.9	Bellatrix	278°22.9	6°22.3
14	57° 55.5	63°23.4	09.2	294°37.2	12.1	339°41.4	44.1	60°13.5	8.80	Elnath	278°01.8	28°37.8
15	72°57.9	78°25.1	• • 08.9	309°38.5	• • 11.9	354°43.3	• • 44.1	75°15.7	• • 08.7	Alnilam	275°37.7	-1°11.2
16	88°00.4	93°26.8	08.7	324°39.9	11.6	9°45.3	44.2	90°17.9	08.5	Betelgeuse	270°52.0	7°24.7
17	103°02.9	108°28.5	08.5	339°41.3	11.3	24°47.2	44.2	105°20.1	08.4	Canopus	263°52.5	-52°42.8
18	118°05.3	123°30.2	N01°08.2	354°42.7	N22°11.0	39°49.2	N22°44.2	120°22.4	S03°08.3	Sirius	258°26.2	-16°45.2
19	133°07.8	138°31.9	0.80	9°44.0	10.7	54°51.2	44.3	135°24.6	08.2	Adhara	255°05.8	-29°00.6
20	148° 10.3	153°33.6	07.8	24°45.4	10.4	69°53.1	44.3	150°26.8	08.1	Procyon	244°50.7	5°09.5
21	163° 12.7	168°35.3	• • 07.5	39°46.8	• • 10.2	84°55.1	• • 44.4	165°29.0	• • 08.0	Pollux	243°17.1	27°58.0
22	178° 15.2	183°36.9	07.3	54°48.2	09.9	99°57.0	44.4	180°31.2	07.9	Avior	234°14.6	-59°35.7
23	193° 17.6	198°38.6	07.1	69°49.5	09.6	114°59.0	44.5	195°33.4	07.8	Suhail	222°46.1	-43°32.3
Mern	ass. 10:09	ν1 7' d-0	.3′ m-4.75	ν1 4' d-C	0.3′ m0.76	ν2 0' d0	0′ m-2.03	ν2 2' d=0	.1′ m1.17	Miaplacidus	221°38.0	-43° 32.5 -69° 49.5
ν.σι.ρ		ν 1.1 U-U	.5 7.15	ν 1.¬ U-C		- 2.0 u0.	- 111 2.00	- Z.Z U-U		Alphard	217°47.4	-8°46.2
										Regulus	207°34.1	11°50.6
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.2	61°37.0
0	208°20.1	213°40.3	N01°06.9	84°50.9	N22°09.3	130°01.0	N22°44.5	210°35.6	<b>S</b> 03°07.7	Denebola	182°24.5	14°25.8
1	223°22.6	228°42.0	06.6	99°52.3	09.0	145°02.9	44.5	225°37.8	07.6	Gienah	175°43.1	-17°41.1
2	238° 25.0	243°43.6	06.4	114°53.7	8.80	160°04.9	44.6	240°40.0	07.5	Acrux	173° 59.3	-63°14.5
3	253° 27.5	258°45.3	• • 06.2	129°55.0	• • 08.5	175°06.9	• • 44.6	255°42.2	• • 07.4		171°50.9	-57°15.5
4	268°30.0	273°46.9	06.0	144°56.4	08.2	190°08.8	44.7	270°44.4	07.3	Alioth	166°12.2	55°49.3
5	283°32.4	288°48.6	05.8	159° 57.8	07.9	$205^{\circ}10.8$	44.7	285°46.7	07.2	Spica	158°21.8	-11°17.7
6	298°34.9	303°50.3	N01°05.6	174°59.1	N22°07.6	220°12.7	N22°44.8	300°48.9	S03°07.1	Alkaid	152°51.3	49°11.1
7	$313^{\circ}37.4$	$318^{\circ}51.9$	05.4	190°00.5	07.3	235°14.7	44.8	315°51.1	07.0	Hadar	148°35.1	-60°29.8
8	328°39.8	333°53.6	05.1	205°01.9	07.1	$250^{\circ}16.7$	44.8	330°53.3	06.9		147°57.0	-36°29.8
9	343°42.3	348°55.2	• • 04.9	220°03.3	• • 06.8	265°18.6	• • 44.9	345°55.5	• • 06.8	Arcturus	145°47.4	19°02.9
10	358°44.8	3°56.8	04.7	235°04.6	06.5	280°20.6	44.9	0°57.7	06.7	Rigil Kent.	139°39.4	-60°56.4
11	13°47.2	18°58.5	04.5	250°06.0	06.2	295°22.5	45.0	15°59.9	06.6	Kochab	137°18.6	74°02.9
12	28°49.7	34°00.1	N01°04.3	265°07.4	N22°05.9	310°24.5	N22°45.0	31°02.1	S03°06.5	Zuben'ubi	136°55.5	-16°08.9
13	43°52.1	49°01.7	04.1	280°08.7	05.6	325°26.4	45.1	46°04.3	06.4		130° 55.5 126° 03.2	26°37.6
14	58° 54.6	64°03.4	03.9	295°10.1	05.3	340°28.4	45.1	61°06.5	06.3	Alphecca		
15	73°57.1	79°05.0	• • 03.7	310°11.5	•• 05.1	355°30.4	• • 45.1	76°08.8	• • 06.2	Antares	112°15.3	-26°29.3
16	88°59.5	94°06.6	03.5	$325^{\circ}12.8$	04.8	10°32.3	45.2	91°11.0	06.1	Atria	107°08.9	-69°04.2
17	$104^{\circ}02.0$	109°08.2	03.3	340°14.2	04.5	25°34.3	45.2	106°13.2	06.0	Sabik	102°02.3	-15°45.4 -37°07.3
18	119°04.5	124°09.9	N01°03.2	355° 15.6	N22°04.2	40°36.2	N22°45.3	121°15.4	S03°05.8	Shaula	96°09.8	
19	134°06.9	139°11.5	03.0	10° 16.9	03.9	55°38.2	45.3	136°17.6	05.7	Rasalhague	95°58.1	12°32.3
20	149°09.4	154°13.1	02.8	25° 18.3	03.6	70°40.2	45.4	151°19.8	05.6	Eltanin	90°41.8	51°28.8
21	164°11.9	169°14.7	02.6	40° 19.7	• • 03.3	85°42.1	• • 45.4	166°22.0	05.5	Kaus Aust.	83°32.1	-34°22.3
22	179° 14.3	184°16.3	02.4	55°21.0	03.1	100°44.1	45.4	181°24.2	05.4	Vega	80°32.9	38°48.1
23	194° 16.8	199°17.9	02.2	70°22.4	02.8	115°46.0	45.5	196°26.4	05.3	Nunki	75°47.4	-26°15.9
										Altair	61°59.7	8°55.9
Mer.p	ass. 10:05	$\nu 1.7' d-0$	.2′ m-4.75	$\nu$ 1.4' d-0	0.3′ m0.78	$\nu^{2.0'} d0.$	.0′ m-2.02	$\nu^{2.2'} d-0$	.1′ m1.17	Peacock	53°05.4	-56°39.0
										Deneb	49°25.7	45°21.9
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.7	9°59.3
0	209° 19.3	214°19.5	N01°02.0	85°23.8	N22°02.5	130°48.0	N22°45.5	211°28.6	S03°05.2	Al Na'ir	27°32.9	-46°50.2
1	224°21.7	229°21.1	01.9	100°25.1	02.2	145°49.9	45.6	226°30.9	05.1	Fomalhaut	15°14.5 13°45.3	-29°29.3
2	239°24.2	244°22.7	01.7	115° 26.5	01.9	160°51.9	45.6	241°33.1	05.0	Scheat		28°13.0
3	254°26.6	259°24.3	01.5	130°27.9	01.6	175°53.8	• • 45.7	256°35.3	• • 04.9	Markab	13°29.9	15°20.3
4	269°29.1	274°25.9	01.3	145°29.2	01.3	190°55.8	45.7	271°37.5	04.8	Apr 19 Sat	SHA	Mer.pass
5	284°31.6	289°27.4	01.2	160°30.6	01.1	205°57.8	45.7	286°39.7	04.7	Venus	5°38.4	09:47
6	299° 34.0	304°29.0	N01°01.0	175°31.9	N22°00.8	220°59.7	N22°45.8	301°41.9	S03°04.6	Mars		18:21
7	314°36.5	319°30.6	00.8	190°33.3	00.5	236°01.7	45.8	316°44.1	04.5	Jupiter	281°52.9	15:21
8	329°39.0	334°32.2	00.7	205°34.7	22°00.2	251°03.6	45.9	331°46.3	04.4	Saturn	2°21.6	10:00
9	344°41.4	349°33.8	00.5	220°36.0	21°59.9	266°05.6	• • 45.9	346°48.5	• • 04.3			
10	359°43.9	4°35.3	00.3	235°37.4	59.6	281°07.5	46.0	1°50.8	04.2	Apr 20 Sun	SHA	Mer.pass
11	14°46.4	19°36.9	00.2	250°38.8	59.3	296°09.5	46.0	16°53.0	04.1	Venus	5°20.2	09:44
12	29°48.8	34°38.5	N01°00.0	265°40.1	N21°59.0	311°11.4	N22°46.0	31°55.2	503°04.0	Mars		18:19
13	44°51.3	49°40.0	00°59.8	280°41.5	58.7	326°13.4	46.1	46°57.4	03.9	Jupiter	281°40.9	15:18
14	59° 53.7	64°41.6	59.7	295°42.8	58.5	341°15.4	46.1	61°59.6	03.8	Saturn	2°15.5	09:56
15	74°56.2	79°43.1	59.5	310°44.2	• • 58.2	356°17.3	• • 46.2	77°01.8	03.7	Apr 21 Mon	SHA	Mer.pass
16	89°58.7	94°44.7	59.4	325°45.5	57.9	11°19.3	46.2	92°04.0	03.6	Venus	5°00.2	09:42
17	105°01.1	109°46.2	59.2	340°46.9	57.6	26°21.2	46.3	107°06.2	03.5	Mars		18:17
18	120°03.6	124°47.8	N00°59.1	355°48.3	N21°57.3	41°23.2	N22°46.3	122°08.5	S03°03.4	Jupiter		15:15
19	135°06.1	139°49.3	58.9	10°49.6	57.0	56°25.1	46.3	137°10.7	03.3	Saturn	2°09.4	09:53
20	150°08.5	154°50.9	58.8	25°51.0	56.7	71°27.1	46.4	152°12.9	03.2	Jatuill	_ 55.7	05.55
21	165°11.0	169°52.4	• • 58.6	40°52.3	• • 56.4	86°29.0	• • 46.4	167°15.1	03.1	Horizont	al parallax	
22	180° 13.5	184°53.9	58.5	55°53.7	56.1	101°31.0	46.5	182°17.3	03.0		Venus:	0.4
23	$195^{\circ}15.9$	199°55.5	58.3	70°55.1	55.8	116°32.9	46.5	197°19.5	02.9		Mars:	0.1
												_
ivler.p	ass. 10:01	$\nu$ 1.6′ $d$ -0	.2′ m-4.76	$\nu$ 1.4' $d$ -0	0.3′ m0.79	$\nu$ 2.0′ d0.	0′ m-2.02	$\nu$ 2.2′ d-0	.1′ m1.17			

h	Sur	า	Moon					
Sat	GHA	Dec	GHA	ν	Dec	d	HP	
0	180°12.8	N11°11.1	291°38.4	8.4	S28°29.5	-1.7'	55.3'	
1	195°12.9	12.0	306°05.9	8.4'	28°27.8	-1.8'	55.3'	
2	210°13.1	12.8	320°33.3	8.4'	28°25.9	-2.0'	55.3'	
3	225°13.2	• • 13.7	335°00.7	8.4'	28°23.9	-2.1'	55.3'	
4	240°13.3	14.6	349°28.1	8.4'	28°21.8	-2.3'	55.4'	
5 6	255°13.5 270°13.6	15.4 N11°16.3	3°55.5 18°22.9	8.4' 8.4'	28° 19.5 528° 17.0	-2.5' -2.6'	55.4' 55.4'	
7	285°13.7	17.2	32°50.3	8.4	28° 14.4	-2.8'	55.4'	
8	300°13.9	18.0	47°17.7	8.4'	28°11.7	-2.9'	55.5'	
9	315°14.0	• • 18.9	61°45.1	8.4'	28°08.8	-3.1'	55.5'	
10	330°14.1	19.7	$76^{\circ}12.5$	8.4'	28°05.7	-3.2'	55.5'	
11	345°14.3	20.6	90°39.9	8.4'	28°02.5	-3.4'	55.5'	
12	0°14.4	N11°21.5	105°07.3	8.4'	\$27°59.1	-3.5'	55.6'	
13 14	15°14.5 30°14.7	22.3 23.2	119°34.7 134°02.1	8.4' 8.4'	27°55.6 27°52.0	-3.7' -3.8'	55.6' 55.6'	
15	45°14.8	24.0	134 02.1 148°29.5	8.4'	27°48.2	-3.6 -4.0'	55.6'	
16	60°14.9	24.9	162°57.0	8.4'	27° 44.2	-4.1'	55.7'	
17	75°15.1	25.8	177°24.4	8.5'	27°40.1	-4.3'	55.7'	
18	90°15.2	N11°26.6	191°51.9	8.5'	S27°35.8	-4.4'	55.7'	
19	105°15.3	27.5	$206^{\circ}19.3$	8.5'	$27^{\circ}31.4$	-4.6'	55.8'	
20	120°15.5	28.3	220°46.8	8.5'	27°26.8	-4.7'	55.8'	
21	135°15.6	• • 29.2	235°14.3	8.5'	27°22.1	-4.9'	55.8'	
22 23	150°15.7 165°15.8	30.1 30.9	249°41.8 264°09.3	8.5' 8.5'	27° 17.2 27° 12.2	-5.0' -5.2'	55.8' 55.9'	
23			204 09.3			-5.2	33.9	
	SD = 15.9'	d = 0.9'		SI	O = 15.1'			
Sun	GHA	Dec	GHA	ν	Dec	d	HP	
0 1	180°16.0 195°16.1	N11°31.8 32.6	278°36.9 293°04.4	8.6' 8.6'	\$27°07.0 27°01.7	-5.3' -5.5'	55.9' 55.9'	
2	210°16.2	32.6 33.5	293°04.4 307°32.0	8.6'	26°56.2	-5.5° -5.6'	55.9° 56.0'	
3	225°16.4	34.3	321°59.6	8.6'	26°50.6	-5.8'	56.0'	
4	240°16.5	35.2	336°27.3	8.6'	26°44.9	-5.9'	56.0'	
5	255°16.6	36.1	350°54.9	8.7'	26°39.0	-6.1'	56.0'	
6	270°16.8	N11°36.9	5°22.6	8.7'	S26°32.9	-6.2'	56.1'	
7	285°16.9	37.8	19°50.3	8.7'	26°26.7	-6.4	56.1'	
8	300°17.0	38.6	34°18.0	8.7'	26°20.3	-6.5'	56.1'	
9 10	315°17.2 330°17.3	· · 39.5 40.3	48°45.7 63°13.5	8.8' 8.8'	26°13.8 26°07.2	-6.6' -6.8'	56.2' 56.2'	
11	345°17.4	40.3	77°41.3	o.o 8.8'	26°00.4	-6.9'	56.2'	
12	0°17.5	N11°42.0	92°09.2	8.9'	\$25°53.5	-7.1	56.3	
13	15°17.7	42.9	106°37.0	8.9'	25°46.4	-7.2	56.3	
14	30°17.8	43.7	121°04.9	8.9'	$25^{\circ}39.1$	-7.4'	56.3'	
15	45°17.9	• • 44.6	135°32.8	9.0'	25°31.8	-7.5'	56.4'	
16	60°18.1	45.4	150°00.8	9.0'	25°24.3	-7.7'	56.4	
17 18	75°18.2 90°18.3	46.3 N11°47.1	164°28.8 178°56.8	9.0' 9.1'	25°16.6 \$25°08.8	-7.8' -7.9'	56.4' 56.5'	
19	105°18.4	48.0	193°24.9	9.1'	25°00.9	-7.9 -8.1'	56.5	
20	120°18.6	48.8	207°53.0	9.1'	24°52.8	-8.2	56.5'	
21	135°18.7	• • 49.7	222°21.1	9.2'	24°44.6	-8.4'	56.6'	
22	150°18.8	50.5	236°49.3	9.2'	$24^{\circ}36.2$	-8.5'	56.6'	
23	165°18.9	51.4	251°17.5	9.2'	24°27.7	-8.6'	56.6'	
	SD = 15.9'	d = 0.9'		SE	0 = 15.2'			
Mon	GHA	Dec	GHA	ν	Dec	d	НР	
0	180° 19.1	N11°52.2	265°45.7	9.3'	S24° 19.1	-8.8'	56.7'	
1	195°19.2	53.1	$280^{\circ}14.0$	9.3'	24°10.3	-8.9'	56.7'	
2	210°19.3	53.9	294°42.3	9.3'	$24^{\circ}01.4$	-9.1'	56.7'	
3	225°19.5	• • 54.8	309°10.6	9.4'	23°52.3	-9.2'	56.8'	
4	240°19.6 255°19.7	55.6	323°39.0	9.4'	23°43.1	-9.3'	56.8'	
5 6	255°19.7 270°19.8	56.5 N11°57.3	338°07.4 352°35.9	9.5' 9.5'	23°33.8 <b>5</b> 23°24.3	-9.5' -9.6'	56.8' 56.9'	
7	270 19.8 285°20.0	58.2	7°04.4	9.5'	23° 14.7	-9.0 -9.7'	56.9'	
8	300°20.1	59.0	21°32.9	9.6'	23°05.0	-9.9'	56.9'	
9	315°20.2	11°59.9	$36^{\circ}01.5$	9.6'	$22^{\circ}55.1$	-10.0'	57.0'	
10	330°20.3	12°00.7	50°30.1	9.7'	22°45.2	-10.1'	57.0'	
11	345°20.5	01.6	64°58.8	9.7'	22°35.0	-10.3'	57.1'	
12 13	0°20.6 15°20.7	N12°02.4 03.3	79°27.5 93°56.2	9.7' 9.8'	\$22°24.8 22°14.4	-10.4' -10.5'	57.1' 57.1'	
13 14	30°20.8	03.3 04.1	93°56.2 108°25.0	9.8'	22°14.4 22°03.9	-10.5° -10.6°	57.1° 57.2'	
15	45°20.9	04.9	122°53.9	9.9'	21°53.2	-10.8	57.2'	
16	60°21.1	05.8	$137^{\circ}22.7$	9.9'	21°42.5	-10.9'	57.2'	
17	75°21.2	06.6	151°51.6	9.9'	21°31.6	-11.0'	57.3'	
18	90°21.3	N12°07.5	166°20.6	10.0'	S21°20.5	-11.1'	57.3'	
19	105°21.4 120°21.6	08.3 09.2	180°49.5	10.0' 10.1'	21°09.4 20°58.1	-11.3'	57.3' 57.4'	
20 21	120°21.6 135°21.7	· · 10.0	195°18.6 209°47.6	10.1'	20°58.1 20°46.7	-11.4' -11.5'	57.4° 57.4°	
22	150°21.8	10.8	209 47.0 224°16.7	10.1	20° 46.7 20° 35.2	-11.5 -11.6'	57.4 57.5'	
23	165°21.9	11.7	238°45.9	10.2'	20°23.5	-11.8'	57.5'	
	SD = 15.9'	d = 0.8'		SI	O = 15.5'			

			2025	April 19	to Ap	r. 21
Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Juliset	Civil	Naut.
N 72°	////	00:52	03:08	20:54	23:30	////
<b>N</b> 70°	////	01:55	03:30	20:32	22:09	////
68°	////	02:30	03:46	20:14	21:33	////
66°	00:45	02:54	04:00	20:00	21:07	23:34
64°	01:41	03:13	04:11	19:49	20:48	22:23
62°	02:12	03:28	04:20	19:39	20:32	21:50
60°	02:34	03:40	04:28	19:31	20:19	21:27
N 58°	02:52	03:51	04:35	19:24	20:08	21:08
56°	03:07	04:00	04:42	19:17	19:59	20:53
54°	03:19	04:08	04:47	19:12	19:51	20:41
52°	03:29	04:16	04:52	19:07	19:43	20:30
50°	03:39	04:22	04:57	19:02	19:37	20:20
45°	03:58	04:35	05:07	18:52	19:23	20:01
<b>N</b> 40°	04:12	04:46	05:15	18:44	19:12	19:46
35°	04:24	04:55	05:22	18:37	19:03	19:34
30°	04:34	05:03	05:28	18:30	18:55	19:25
20°	04:49	05:15	05:38	18:20	18:42	19:09
N 10°	05:01	05:26	05:47	18:11	18:32	18:57
0°	05:10	05:34	05:55	18:02	18:23	18:48
<b>S</b> 10°	05:18	05:42	06:04	17:54	18:15	18:40
20°	05:24	05:50	06:12	17:45	18:07	18:33
30°	05:30	05:58	06:22	17:35	17:59	18:27
35°	05:32	06:02	06:28	17:29	17:55	18:25
40°	05:35	06:07	06:34	17:23	17:51	18:22
45°	05:37	06:11	06:41	17:16	17:46	18:20
<b>S</b> 50°	05:39	06:17	06:50	17:07	17:40	18:18
52°	05:40	06:20	06:54	17:03	17:37	18:17
54°	05:41	06:22	06:59	16:58	17:35	18:16
56°	05:42	06:25	07:04	16:53	17:32	18:15
58°	05:42	06:28	07:09	16:48	17:28	18:14
<b>S</b> 60°	05:43	06:32	07:15	16:41	17:25	18:13
1		Moonris	ie		Moonset	i.
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
<b>N</b> 72°						
<b>N</b> 70°	_					
68°						
66°			05:43			07:32
64°			04:44			08:30
62°		04:23	04:10		07:00	09:04
60°	03:21	03:39	03:45	06:09	07:44	09:28
<b>N</b> 58°	02:41	03:10	03:25	06:49	08:12	09:47
56°	02:13	02:48	03:09	07:17	08:35	10:03
54°	01:51	02:29	02:54	07:38	08:53	10:17
52°	01.33	02:14	02.42	07:56	กด-กล	10.29

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

١			Sun		Moon			
	Day	Eqn.of Time		Mer.	Mer.	Pass.	Age	
١	,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	21-23	
L		mm:ss	mm:ss hh:mr		hh:mm	hh:mm	70-51%	
	19	00:51	00:58	11:59	04:44	17:11		
ĺ	20	01:04	01:10	11:59	05:38	18:04		
l	21	01:16	01:22	11:59	06:31	18:57		

h	Aries	•	nus	•	ars	lue	oiter	Sat	urn		Stars	
-												
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	210° 18.4	214°57.0	N00°58.2	85°56.4	N21°55.6	131°34.9	N22°46.6	212°21.7	S03°02.8	Alpheratz	357°34.9	29°13.6
1	225°20.9	229°58.5	58.1	100°57.8	55.3	146°36.8	46.6	227°23.9	02.7	Ankaa	353°07.3	-42°10.1
2	240°23.3	245°00.0	57.9	115°59.1	55.0	161°38.8	46.6	242°26.1	02.6	Schedar	349°31.4	56°40.4
3	255°25.8	260°01.6	• • 57.8	131°00.5	• • 54.7	176°40.8	• • 46.7	257°28.4	•• 02.5	Diphda	348°47.4	-17°50.9
4	270°28.2	275°03.1	57.6	146°01.8	54.4	191°42.7	46.7	272°30.6	02.4	Achernar	335°20.6	-57°06.5
5	285°30.7	290°04.6	57.5	161°03.2	54.1	206°44.7	46.8	287°32.8	02.3	Hamal	327°51.3	23°34.8
6	300°33.2	305°06.1	N00° 57.4	176°04.5	N21°53.8	221°46.6	N22°46.8	302°35.0	S03°02.2	Polaris	314°24.7	89°22.3
7	315°35.6	320°07.6	57.3	191°05.9	53.5	236°48.6	46.8	317°37.2	02.0	Acamar	315° 12.0	-40°12.3
8	330°38.1	335°09.1	57.1	206°07.2	53.2	251°50.5	46.9	332°39.4	01.9	Menkar	314°06.2	4°11.3
9	345°40.6	350°10.6	• • 57.0	221°08.6	• • 52.9	266°52.5	• • 46.9	347°41.6	• • 01.8	Mirfak	308°28.4	49°57.1
10	0°43.0	5°12.1	56.9	236°10.0	52.6	281°54.4	47.0	2°43.9	01.7	Aldebaran	290°39.6	16°33.6
11	15° 45.5	20°13.6	56.7	251°11.3	52.3	296°56.4	47.0	17°46.1	01.6	Rigel	281°03.9	-8°10.4
12	30°48.0	35°15.1	N00° 56.6	266°12.7	N21°52.0	311°58.3	N22°47.1	32°48.3	S03°01.5	Capella	280°21.9	46°01.5
13	45°50.4	50°16.6	56.5	281°14.0	51.8	327°00.3	47.1	47°50.5	01.4	Bellatrix	278°22.9	6°22.3
14	60°52.9	65°18.1	56.4	296°15.4	51.5	342°02.2	47.1	62°52.7	01.3	Elnath	278°01.8	28°37.8
15	75°55.4	80°19.6	• • 56.3	311°16.7	• • 51.2	357°04.2	• • 47.2	77°54.9	• • 01.2	Alnilam	275°37.7	-1°11.2
16	90°57.8	95°21.1	56.2	326°18.1	50.9	12°06.1	47.2	92°57.1	01.1	Betelgeuse	270°52.0	7°24.7
17	106°00.3	110°22.6	56.0	341°19.4	50.6	27°08.1	47.3	107°59.3	01.0	Canopus	263°52.6	-52°42.8
18	121°02.7	125°24.0	N00°55.9	356°20.8	N21°50.3	42°10.0	N22°47.3	123°01.6	S03°00.9	Sirius	258°26.2	-16°45.2
19	136°05.2	140°25.5	55.8	11°22.1	50.0	57°12.0	47.4	138°03.8	8.00	Adhara	255°05.8	-29°00.6
20	151°07.7	155°27.0	55.7	26°23.5	49.7	72°13.9	47.4	153°06.0	00.7	Procyon	244°50.7	5°09.5
21	$166^{\circ}10.1$	170°28.5	• • 55.6	41°24.8	• • 49.4	87°15.9	• • 47.4	168°08.2	• • 00.6	Pollux	243°17.1	27°58.0
22	181°12.6	185°29.9	55.5	56°26.2	49.1	102°17.8	47.5	183°10.4	00.5	Avior	234°14.7	-59°35.7
23	$196^{\circ}15.1$	200°31.4	55.4	71°27.5	48.8	117°19.8	47.5	198°12.6	00.4	Suhail	234 14.7 222°46.1	-43°32.3
Mern	ass. 09:57	v1 5' d 0	.1′ m-4.76	v1 4' d C	0.3' m0.81	1/2 N/ d0	0′ m-2.01	1/2 2' d O	.1′ m1.17	Miaplacidus	221°38.1	-43° 32.3
-νιει.ρ		ν1.5 U-U	10	ν 1.¬ U-0	1110.01	ν 2.0 u0.	U 111-2.U1	ν 2.2 u-0		Alphard	221 36.1 217°47.5	-8°46.2
										Regulus	217 47.5 207°34.1	11°50.6
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.3	61°37.0
0	211° 17.5	$215^{\circ}32.9$	N00°55.3	86°28.9	N21°48.5	132°21.7	N22°47.6	213°14.8	S03°00.3	Denebola	182°24.5	14°25.8
1	226°20.0	230°34.3	55.2	101°30.2	48.2	147°23.7	47.6	$228^{\circ}17.1$	00.2	Gienah	175°43.1	-17°41.1
2	241°22.5	245°35.8	55.1	116°31.5	47.9	$162^{\circ}25.6$	47.6	243°19.3	00.1	Acrux	173° 43.1	-63°14.5
3	256° 24.9	260°37.2	• • 55.0	131°32.9	• • 47.6	177°27.6	• • 47.7	258°21.5	03°00.0	Gacrux	172 59.5 171°50.9	-03 14.5 -57°15.5
4	271°27.4	275°38.7	54.9	146°34.2	47.3	192°29.5	47.7	273°23.7	02°59.9	Alioth	166° 12.2	55°49.4
5	286°29.9	290°40.1	54.8	161°35.6	47.0	207°31.5	47.8	288°25.9	59.8	Spica	158°21.8	-11°17.7
6	301°32.3	305°41.6	N00°54.7	176°36.9	N21°46.7	222°33.4	N22°47.8	303°28.1	S02°59.7	Alkaid	150° 21.0° 152° 51.3	49°11.1
7	$316^{\circ}34.8$	320°43.0	54.6	191°38.3	46.4	237°35.4	47.9	318°30.3	59.6	Hadar	148°35.1	-60°29.8
8	331°37.2	335°44.5	54.5	206°39.6	46.1	252°37.3	47.9	333°32.6	59.5	Menkent	146 35.1 147°57.0	-36°29.8
9	346°39.7	350°45.9	• • 54.5	221°41.0	• • 45.8	267°39.3	• • 47.9	348°34.8	• • 59.4			
10	1°42.2	5°47.3	54.4	236°42.3	45.6	282°41.2	48.0	3°37.0	59.3	Arcturus	145°47.4	19°02.9 -60°56.4
11	16°44.6	20°48.8	54.3	251°43.7	45.3	297°43.1	48.0	18°39.2	59.2	Rigil Kent. Kochab	139°39.4 137°18.6	74°02.9
12	31°47.1	35°50.2	N00°54.2	266°45.0	N21°45.0	312°45.1	N22°48.1	33°41.4	S02°59.1	Zuben'ubi	136°55.4	-16°08.9
13	46°49.6	50°51.6	54.1	281°46.3	44.7	327°47.0	48.1	48°43.6	59.0		136° 03.4	26°37.6
14	61°52.0	65°53.0	54.0	296°47.7	44.4	342°49.0	48.1	63°45.8	58.9	Alphecca		-26°29.3
15	76° 54.5	80°54.5	• • 54.0	311°49.0	• • 44.1	357°50.9	• • 48.2	78°48.1	• • 58.8	Antares	112°15.3	
16	91°57.0	95°55.9	53.9	326°50.4	43.8	12°52.9	48.2	93°50.3	58.7	Atria	107°08.9	-69°04.2
17	106°59.4	110°57.3	53.8	341°51.7	43.5	27°54.8	48.3	108°52.5	58.6	Sabik	102°02.3	-15°45.4
18	122°01.9	125°58.7	N00°53.7	356°53.1	N21°43.2	42°56.8	N22°48.3	123°54.7	S02°58.5	Shaula	96°09.8 95°58.1	-37°07.3
19	137°04.3	141°00.1	53.7	11°54.4	42.9	57°58.7	48.4	138°56.9	58.4	Rasalhague	90°41.8	12°32.3 51°28.8
20	152°06.8	156°01.5	53.6	26°55.7	42.6	73°00.7	48.4	153°59.1	58.3	Eltanin Kaus Aust.	90 41.8 83°32.0	-34°22.3
21	167°09.3	171°02.9	• • 53.5	41°57.1	• • 42.3	88°02.6	• • 48.4	169°01.4	• • 58.2		80°32.9	-34 22.3 38°48.1
22	$182^{\circ}11.7$	186°04.3	53.5	56°58.4	42.0	103°04.6	48.5	184°03.6	58.1	Vega		-26°15.9
23	$197^{\circ}14.2$	201°05.7	53.4	71°59.8	41.7	118°06.5	48.5	199°05.8	58.0	Nunki Altair	75°47.4 61°59.7	-20 15.9 8°55.9
					2/ 0.00			2.0/ 1.0				-56°39.0
ivier.p	ass. 09:53	$\nu$ 1.5 a-0	.1′ m-4.76	$\nu$ 1.3 a-0	0.3′ m0.82	$\nu$ 1.9° $a$ 0.	.0′ m-2.01	$\nu$ 2.2 a-0	.1′ m1.17	Peacock Deneb	53°05.4 49°25.7	-50 39.0 45°21.9
										Enif	33°38.7	9°59.3
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.8	-46°50.2
0	$212^{\circ}16.7$	216°07.1	N00°53.3	87°01.1		133°08.5	N22°48.6	214°08.0	502°57.9	Fomalhaut	27 32.0 15°14.5	-40 50.2 -29°29.3
1	$227^{\circ}19.1$	231°08.5	53.3	$102^{\circ}02.4$	41.1	148°10.4	48.6	229°10.2	57.8	Scheat	13°45.2	28°13.0
2	242°21.6	246°09.9	53.2	117°03.8	40.8	163°12.3	48.6	244°12.4	57.7	Markab	13° 29.9	26 13.0 15°20.3
3	257°24.1	261°11.3	• • 53.2	132°05.1	• • 40.5	178°14.3	• • 48.7	259°14.6	• • 57.6	ividikaD	13 29.9	10 20.3
4	272°26.5	276°12.7	53.1	147°06.5	40.2	193°16.2	48.7	274°16.9	57.5	Apr 22 Tue	SHA	Mer.pass
5	287°29.0	291°14.1	53.1	162°07.8	39.9	208°18.2	48.8	289°19.1	57.4	Venus	4°38.6	09:39
6	302°31.5	306°15.5	N00°53.0	177°09.1	N21°39.6	223°20.1	N22°48.8	304°21.3	S02°57.3	Mars	235°38.0	18:15
7	317°33.9	321°16.9	52.9	192°10.5	39.3	238°22.1	48.9	319°23.5	57.2	Jupiter	$281^{\circ}16.5$	15:12
8	332°36.4	336°18.2	52.9	$207^{\circ}11.8$	39.0	253°24.0	48.9	334°25.7	57.1	Saturn	$2^{\circ}03.3$	09:49
9	347°38.8	351°19.6	• • 52.8	$222^{\circ}13.1$	• • 38.7	268°26.0	• • 48.9	349°27.9	• • 57.0	A 22 14/ 1	CIIA	Ma::::
10	2°41.3	6°21.0	52.8	237°14.5	38.4	283°27.9	49.0	4°30.2	56.9	Apr 23 Wed	SHA	Mer.pass
11	17°43.8	21°22.3	52.8	252°15.8	38.1	298°29.8	49.0	19°32.4	56.8	Venus	4°15.3	09:37
12	32°46.2	36°23.7	N00°52.7	267°17.2	N21°37.8	313°31.8	N22°49.1	34°34.6	S02°56.7	Mars	235°11.3	18:12
13	47° 48.7	51°25.1	52.7	282°18.5	37.5	328°33.7	49.1	49°36.8	56.6	Jupiter	281°04.2	15:09
14	62°51.2	66°26.4	52.6	297°19.8	37.2	343°35.7	49.1	64°39.0	56.5	Saturn	1°57.3	09:46
15	77°53.6	81°27.8	• • 52.6	312°21.2	36.9	358°37.6	• • 49.2	79°41.2	• • 56.4	Apr 24 Thu	SHA	Mer.pass
16	92°56.1	96°29.2	52.6	327°22.5	36.5	13°39.6	49.2	94°43.5	56.3	Venus	3°50.5	09:35
17	107°58.6	111°30.5	52.5	342°23.8	36.2	28°41.5	49.3	109°45.7	56.2	Mars	234°44.4	18:10
18	123°01.0	126°31.9	N00° 52.5	357°25.2	N21°35.9	43°43.4	N22°49.3	124°47.9	S02°56.1	Jupiter	280°51.8	15:05
19	138°03.5	141°33.2	52.4	12°26.5	35.6	58°45.4	49.3	139°50.1	56.0	Saturn	1°51.3	09:42
20	153°05.9	156°34.6	52.4	27°27.8	35.3	73°47.3	49.4	154°52.3	55.9	Jatuill	1 31.3	03.42
21	168°08.4	171°35.9	• • 52.4	42°29.2	• • 35.0	88°49.3	• • 49.4	169°54.5	• • 55.8	Horizon	tal parallax	
22	183° 10.9	186°37.2	52.4	57°30.5	34.7	103°51.2	49.5	184°56.8	55.7		Venus:	0.4
23	198° 13.3	201°38.6	52.3	72°31.8	34.4	118°53.2	49.5	199°59.0	55.6		Mars:	0.1
ivler.p	ass. 09:49	$\nu$ 1.4′ $d$ -0	.1' m-4.75	$\nu$ 1.3' $d$ -0	).3′ m0.84	$\nu$ 1.9′ $d0$ .	.0′ m-2.01	ν2.2′ d-0	.1' m $1.17$			

h	Sur	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°22.0	N12° 12.5	253° 15.1	10.2'	S20°11.8	-11.9'	57.5'
1 2	195°22.2 210°22.3	13.4 14.2	267°44.3 282°13.5	10.3' 10.3'	19°59.9 19°47.9	-12.0' -12.1'	57.6' 57.6'
3	210 22.3 225° 22.4	15.0	202 13.5 296°42.8	10.3	19 47.9 19°35.8	-12.1 -12.2'	57.6'
4	240° 22.5	15.9	311°12.2	10.4'	19°23.5	-12.4'	57.7'
5	255° 22.7	16.7	325°41.6	10.4'	19°11.2	-12.5'	57.7'
6	270°22.8 285°22.9	N12° 17.6 18.4	340°11.0 354°40.4	10.5' 10.5'	\$18°58.7 18°46.1	-12.6' -12.7'	57.8' 57.8'
7 8	300° 23.0	19.2	9°09.9	10.5	18°33.4	-12.1' -12.8'	57.8'
9	315°23.1	20.1	23°39.5	10.6'	18°20.6	-12.9'	57.9'
10	330°23.3	20.9	38°09.0	10.6'	18°07.7	-13.0'	57.9'
11 12	345°23.4 0°23.5	21.7 N12°22.6	52°38.6 67°08.3	10.6' 10.7'	17°54.7 \$17°41.5	-13.1' -13.3'	58.0' 58.0'
13	15° 23.6	23.4	81°37.9	10.7'	17°28.3	-13.4	58.0'
14	30°23.7	24.3	96°07.6	10.7'	$17^{\circ}14.9$	-13.5'	58.1'
15	45°23.9	• • 25.1	110°37.4	10.8'	17°01.4	-13.6'	58.1'
16 17	60°24.0 75°24.1	25.9 26.8	125°07.1 139°37.0	10.8' 10.8'	16°47.9 16°34.2	-13.7' -13.8'	58.1' 58.2'
18	90° 24.2	N12°27.6	154°06.8	10.0	\$16°20.4	-13.9'	58.2'
19	105°24.3	28.4	168° 36.7	10.9'	16°06.5	-14.0'	58.3'
20	120°24.4 135°24.6	29.3	183°06.6 197°36.5	10.9'	15°52.5 15°38.5	-14.1'	58.3'
21 22	135°24.6 150°24.7	· · 30.1 30.9	197°36.5 212°06.5	11.0' 11.0'	15° 38.5 15° 24.3	-14.2' -14.3'	58.3' 58.4'
23	165° 24.8	31.8	226°36.4	11.0'	15°10.0	-14.4'	58.4'
	SD = 15.9'	d = 0.8'		SI	D = 15.7'		
			-				
Wed	<b>GHA</b> 180°24.9	<b>Dec</b> N12°32.6	<b>GHA</b> 241° 06.5	u  11.0'	<b>Dec</b> \$14°55.6	d -14.5'	<b>HP</b> 58.5'
0 1	180 24.9 195°25.0	33.4	241 00.5 255°36.5	11.1'	14°41.1	-14.5 -14.6'	58.5'
2	210° 25.1	34.3	270°06.6	11.1'	14°26.6	-14.7'	58.5'
3	225° 25.3	•• 35.1	284°36.7	11.1'	14°11.9	-14.8'	58.6'
4	240°25.4 255°25.5	35.9	299°06.8 313°36.9	11.1' 11.2'	13°57.1 13°42.3	-14.9'	58.6'
5 6	255 25.5 270° 25.6	36.8 N12°37.6	313 30.9 328°07.1	11.2'	13 42.3 \$13°27.3	-14.9' -15.0'	58.7' 58.7'
7	285° 25.7	38.4	342°37.3	11.2'	13°12.3	-15.1'	58.7'
8	300° 25.8	39.2	357°07.5	11.2'	12°57.2	-15.2'	58.8'
9 10	315°26.0 330°26.1	• • 40.1	11°37.8 26°08.0	11.3' 11.3'	12°42.0 12°26.7	-15.3' -15.4'	58.8' 58.9'
11	330 26.1 345°26.2	40.9 41.7	40°38.3	11.3	12 20.7 12°11.3	-15.4 -15.5'	58.9'
12	0°26.3	N12°42.6	55°08.6	11.3'	S11°55.9	-15.5'	58.9'
13	15°26.4	43.4	69°38.9	11.3'	11°40.3	-15.6'	59.0'
14 15	30°26.5 45°26.6	44.2 •• 45.0	84°09.2 98°39.6	11.3' 11.4'	11°24.7 11°09.0	-15.7' -15.8'	59.0' 59.0'
16	60° 26.7	45.9	113°09.9	11.4'	10°53.2	-15.9'	59.1
17	75°26.9	46.7	$127^{\circ}40.3$	11.4'	$10^{\circ}37.4$	-15.9'	59.1'
18	90°27.0 105°27.1	N12°47.5	142°10.7 156°41.0	11.4'	\$10°21.4 10°05.4	-16.0'	59.2' 59.2'
19 20	105 27.1 120° 27.2	48.3 49.2	150 41.0 171°11.4	11.4' 11.4'	10 05.4 09°49.4	-16.1' -16.2'	59.2'
21	135° 27.3	• • 50.0	185°41.9	11.4'	09°33.2	-16.2'	59.3'
22	150° 27.4	50.8	200°12.3	11.4'	09°17.0	-16.3'	59.3'
23	165°27.5	51.6	214°42.7	11.4'	09°00.7	-16.4'	59.3'
	SD = 15.9'	d = 0.8'		SI	O = 15.9'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°27.6	N12°52.5	229°13.1	11.4'	S08°44.3	-16.4	59.4'
1 2	195°27.8 210°27.9	53.3 54.1	243°43.6 258°14.0	11.4' 11.4'	08°27.9 08°11.4	-16.5' -16.6'	59.4' 59.5'
3	210 27.9 225°28.0	• • 54.9	272°44.4	11.4'	06 11.4 07°54.9	-16.6'	59.5'
4	240°28.1	55.8	$287^{\circ}14.9$	11.4'	07°38.2	-16.7'	59.5'
5	255°28.2	56.6	301°45.3	11.4'	07°21.6	-16.7'	59.6'
6 7	270°28.3 285°28.4	N12°57.4 58.2	316° 15.8 330° 46.2	11.4' 11.4'	\$07°04.8 06°48.0	-16.8' -16.8'	59.6' 59.6'
8	300°28.5	59.0	345°16.6	11.4'	06°31.2	-16.9	59.7'
9	315°28.6	12°59.9	359°47.1	11.4'	$06^{\circ}14.3$	-17.0'	59.7'
10	330°28.8 345°28.9	13°00.7	14° 17.5	11.4'	05°57.3	-17.0'	59.7'
11 12	345°28.9 0°29.0	01.5 N13°02.3	28°47.9 43°18.3	11.4' 11.4'	05°40.3 \$05°23.3	-17.1' -17.1'	59.8' 59.8'
13	15°29.1	03.1	57°48.7	11.4'	$05^{\circ}06.2$	-17.2	59.9'
14	30°29.2	04.0	72°19.1	11.4'	04°49.0	-17.2'	59.9'
15 16	45°29.3 60°29.4	· · 04.8 05.6	86°49.5 101°19.8	11.4' 11.3'	04°31.8 04°14.5	-17.2' -17.3'	59.9' 60.0'
16 17	60°29.4 75°29.5	05.6 06.4	101° 19.8 115° 50.2	11.3'	04°14.5 03°57.3	-17.3' -17.3'	60.0°
18	90°29.6	N13°07.2	130°20.5	11.3'	S03°39.9	-17.4'	60.0'
19	105°29.7	08.1	144°50.8	11.3'	03°22.6	-17.4'	60.1
20 21	120°29.8 135°29.9	08.9 •• 09.7	159°21.1 173°51.4	11.3' 11.3'	03°05.2 02°47.7	-17.4' -17.5'	60.1' 60.1'
22	150°30.1	10.5	173 51.4 188° 21.6	11.3	02 47.7 02°30.2	-17.5'	60.1
23	165°30.2	11.3	202°51.9	11.2'	02°12.7	-17.5'	60.2'
	SD = 15.9'	d = 0.8'		SI	O = 16.2'		

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Mer.Pass.		
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	24-26	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	40-20%	
22	01:28	01:34	11:58	07:22	19:47		
23	01:40	01:45	11:58	08:12	20:36		
24	01:51	01:56	11:58	09:01	21:25		

h	Aries	Venu	ıs	M	ars	Jup	oiter	Sat	urn		Stars	
Fri _	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	213°15.8		N00°52.3	87°33.2	N21°34.1	133°55.1	N22°49.6	215°01.2	S02°55.5			
										Alpheratz	357°34.9	29°13.6
1	228°18.3	231°41.3	52.3	102°34.5	33.8	148°57.0	49.6	230°03.4	55.4	Ankaa	353°07.3	-42°10.1
2	243°20.7	246° 42.6	52.3	117°35.8	33.5	163°59.0	49.6	245°05.6	55.3	Schedar	349°31.3	56°40.4
3	258°23.2	261°43.9	• • 52.2	132° 37.2	• • 33.2	179°00.9	• • 49.7	260°07.9	• • 55.2	Diphda	348°47.4	-17°50.9
4	273°25.7	276°45.2	52.2	147°38.5	32.9	194°02.9	49.7	275°10.1	55.1	Achernar	335°20.6	-57°06.5
5	288°28.1	291°46.6	52.2	162°39.8	32.6	209°04.8	49.8	290°12.3	55.0	Hamal	327°51.3	23°34.8
6	303°30.6	306°47.9	N00°52.2	$177^{\circ}41.1$	N21°32.3	224°06.7	N22°49.8	305°14.5	502°54.9			89°22.3
7	318°33.1	321°49.2	52.2	192°42.5	32.0	239°08.7	49.8	320°16.7	54.8	Polaris	314°25.0	
8	333°35.5	336° 50.5	52.2	207°43.8	31.7	254° 10.6	49.9	335°18.9	54.7	Acamar	315°12.0	-40°12.3
9	348°38.0	351°51.8	• • 52.1	222°45.1	• • 31.4	269°12.6	• • 49.9	350°21.2	• • 54.6	Menkar	314°06.2	4°11.3
10	3°40.4	6°53.1	52.1	237°46.5	31.1	284° 14.5	50.0	5°23.4	54.5	Mirfak	308°28.4	49°57.1
11	18°42.9	21°54.5	52.1	252°47.8	30.8	299° 16.5	50.0	20°25.6	54.4	Aldebaran	290°39.7	$16^{\circ}33.6$
			N00°52.1		N21°30.5			35°27.8	S02°54.3	Rigel	281°03.9	-8°10.4
12	33°45.4			267°49.1		314°18.4	N22°50.0			Capella	280°21.9	$46^{\circ}01.5$
13	48°47.8	51°57.1	52.1	282°50.4	30.1	329°20.3	50.1	50°30.0	54.2	Bellatrix	278°22.9	6°22.3
14	63°50.3	66°58.4	52.1	297°51.8	29.8	344°22.3	50.1	65°32.3	54.1	Elnath	278°01.9	28°37.7
15	78°52.8	81°59.7	• • 52.1	312°53.1	• • 29.5	359° 24.2	• • 50.2	80°34.5	• • 54.0	Alnilam	275°37.7	-1°11.2
16	93°55.2	$97^{\circ}01.0$	52.1	327°54.4	29.2	14°26.1	50.2	95°36.7	53.9	Betelgeuse	270°52.1	7°24.7
17	108°57.7	112°02.3	52.1	342°55.8	28.9	29°28.1	50.2	110°38.9	53.8	-		
18	124°00.2	127°03.5	N00°52.1	357°57.1	N21°28.6	44°30.0	N22°50.3	125°41.1	S02°53.7	Canopus	263°52.6	-52°42.8
19	139°02.6	142°04.8	52.1	12°58.4	28.3	59°32.0	50.3	140°43.3	53.6	Sirius	258°26.2	-16°45.2
20	154°05.1	157°06.1	52.1	27°59.7	28.0	74°33.9	50.4	155°45.6	53.5	Adhara	255°05.8	-29°00.6
21	169°07.5	172°07.4	• 52.1	43°01.1	• • 27.7	89°35.8	50.4	170°47.8	• • 53.4	Procyon	244°50.7	5°09.6
	184°10.0					89 35.8 104°37.8		170 47.8 185°50.0		Pollux	243°17.1	27°58.0
22		187°08.7	52.1	58°02.4	27.4		50.4		53.3	Avior	234°14.7	-59°35.7
23	199°12.5	202°10.0	52.2	73°03.7	27.1	119°39.7	50.5	200°52.2	53.2	Suhail	222°46.1	-43°32.3
Mern	ass. 09:45	$\nu 1.3' \ d$ -0.0'	m-4 75	$\nu 1.3' d.0$	.3′ m0.85	$\nu^{1}$ 9' $d^{0}$	0′ m-2.00	v2 2' d-0	.1′ m1.17	Miaplacidus	221°38.1	-69°49.5
- Wici.p		ν 1.5 · u 0.0		ν1.5 u 0	.5 1110.05	ν1.5 do.		ν Z.Z α 0		Alphard	217°47.5	-8°46.2
										Regulus	207°34.1	11°50.6
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.3	61°37.0
0	214°14.9	217° 11.2	N00°52.2	88°05.0	N21°26.8	134°41.7	N22°50.5	215°54.4	S02°53.1	Denebola	182°24.5	14°25.8
1	229°17.4	$232^{\circ}12.5$	52.2	103°06.4	26.5	149°43.6	50.6	230°56.7	53.0			
2	244°19.9	247°13.8	52.2	118°07.7	26.1	164° 45.5	50.6	245°58.9	52.9	Gienah	175°43.1	-17°41.1
3	259°22.3	262° 15.1	52.2	133°09.0	25.8	179° 47.5	• • 50.6	261°01.1	• • 52.8	Acrux	172°59.3	-63°14.6
4	274°24.8	277° 16.3	52.2	148° 10.3	25.5	194°49.4	50.7	276°03.3	52.7	Gacrux		-57°15.5
5	289°27.3	292° 17.6			25.2	209°51.3	50.7	291°05.5		Alioth	166°12.2	55°49.4
			52.2	163°11.7					52.6	Spica	158°21.8	-11°17.7
6	304°29.7		N00°52.3	178°13.0	N21°24.9	224°53.3	N22°50.8	306°07.8	S02°52.5	Alkaid	152°51.3	49°11.2
7	319°32.2	322°20.1	52.3	193° 14.3	24.6	239°55.2	50.8	321°10.0	52.4	Hadar	148°35.1	-60°29.8
8	334°34.7	337°21.4	52.3	208° 15.6	24.3	254°57.2	50.9	336°12.2	52.3	Menkent	147°57.0	-36°29.8
9	349°37.1	352°22.6	• • 52.3	223°16.9	• • 24.0	$269^{\circ}59.1$	• • 50.9	351°14.4	• • 52.2	Arcturus	145°47.4	19°02.9
10	4°39.6	7°23.9	52.4	238° 18.3	23.7	285°01.0	50.9	$6^{\circ}16.6$	52.1	Rigil Kent.	139°39.4	-60°56.5
11	19°42.0	22°25.1	52.4	253°19.6	23.4	300°03.0	51.0	21°18.9	52.0	"	139° 39.4 137° 18.6	74°03.0
12	34°44.5		N00°52.4	268°20.9	N21°23.0	315°04.9	N22°51.0	36°21.1	S02°51.9	Kochab		
13	49°47.0	52°27.6	52.5	283°22.2	22.7	330°06.8	51.1	51°23.3	51.8	Zuben'ubi	136°55.4	-16°08.9
14	64°49.4	67°28.9	52.5	298°23.5	22.4	345°08.8	51.1	66°25.5	51.7	Alphecca	126°03.2	26°37.6
15	79°51.9	82°30.1	52.5	313°24.9	22.1	0° 10.7	51.1	81°27.7	• • 51.6	Antares	112°15.3	-26°29.3
16	94°54.4	97°31.4	52.6	328°26.2	21.8	15° 12.7	51.2	96°30.0	51.5	Atria	107°08.9	-69°04.2
17	109°56.8	112°32.6	52.6	343°27.5	21.5	30° 14.6	51.2	111°32.2	51.4	Sabik	102°02.3	-15°45.4
18	124°59.3		N00°52.6	358°28.8	N21°21.2	45° 16.5	N22°51.3	126°34.4	S02°51.3	Shaula	96°09.8	-37°07.3
19	140°01.8	142° 35.1	52.7	13° 30.1	20.9	60° 18.5	51.3	141°36.6		Rasalhague	95°58.1	12°32.3
	155°04.2								51.2	Eltanin	90°41.8	51°28.8
20		157° 36.3	52.7	28°31.5	20.5	75°20.4	51.3	156°38.8	51.1	Kaus Aust.	83°32.0	-34°22.3
21	170°06.7	172°37.5	• • 52.8	43°32.8	20.2	90°22.3	• • 51.4	171°41.1	• • 51.0	Vega	80°32.9	38°48.1
22	185°09.2	187°38.7	52.8	58°34.1	19.9	105°24.3	51.4	186°43.3	50.9	Nunki	75°47.3	-26°15.9
23	200°11.6	202°40.0	52.8	73°35.4	19.6	120°26.2	51.5	201°45.5	50.8	Altair	61°59.7	8°55.9
Mern	ass. 09:41	$\nu 1.3' \ d0.0'$	m-4 75	v1 3' d-0	.3′ m0.87	v1 9' d0	0′ m-2.00	v2 2' d-0	.1′ m1.17	Peacock	53°05.3	-56°39.0
- IVICI.P	7433. 03.41	ν1.5 do.0		ν1.5 u 0	.5 1110.07	ν1.5 do.		ν Z.Z α 0		Deneb	49°25.7	45°21.9
										Enif	33°38.7	9°59.3
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.8	-46°50.2
0	215°14.1		N00°52.9	88°36.7	N21°19.3	135°28.1	N22°51.5	216°47.7	S02°50.7		27 32.8 15°14.5	-40 50.2 -29°29.3
1	230°16.5	232°42.4	52.9	103°38.0	19.0	150° 30.1	51.5	231°49.9	50.6	Fomalhaut		
2	245°19.0	247°43.6	53.0	118°39.4	18.7	165°32.0	51.6	246°52.2	50.5	Scheat	13°45.2	28°13.0
3	245 19.0 260°21.5	262°44.8	• • 53.0	116 39.4 133°40.7	. 18.4	180°33.9	51.6	240 52.2 261°54.4	50.4	Markab	13°29.9	15°20.3
										Apr 25 Fri	SHA	Mornos
4	275°23.9	277°46.0	53.1	148°42.0	18.0	195°35.9	51.7	276°56.6	50.3			Mer.pass
5	290°26.4	292°47.3	53.2	163°43.3	17.7	210°37.8	51.7	291°58.8	50.2	Venus	3°24.1	09:32
6	305°28.9		N00°53.2	178°44.6	N21°17.4	225°39.7	N22°51.7	307°01.1	S02°50.2	Mars		18:08
7	320°31.3	322°49.7	53.3	193°45.9	17.1	240°41.7	51.8	322°03.3	50.1	Jupiter	280°39.3	15:02
8	335°33.8	337°50.9	53.3	208°47.3	16.8	255°43.6	51.8	337°05.5	50.0	Saturn	1°45.4	09:38
9	350°36.3	$352^{\circ}52.1$	• • 53.4	223°48.6	•• 16.5	270°45.5	•• 51.9	352°07.7	• • 49.9	A 26 C	СПУ	Me:
10	5°38.7	7°53.3	53.4	238°49.9	16.2	285°47.5	51.9	7°09.9	49.8	Apr 26 Sat	SHA	Mer.pass
11	20°41.2	22°54.5	53.5	253°51.2	15.8	300°49.4	51.9	22°12.2	49.7	Venus	2°56.3	09:30
12	35°43.6		N00°53.6	268°52.5	N21°15.5	315°51.3	N22°52.0	37°14.4	S02°49.6	Mars		18:06
13	50°46.1	52°56.8	53.6	283°53.8	15.2	330°53.3	52.0	52°16.6	49.5	Jupiter	280°26.7	14:59
14	65°48.6	67°58.0	53.7	298°55.1	14.9	345°55.2	52.0	67°18.8	49.4	Saturn	1°39.5	09:35
15	80°51.0	82°59.2	• • 53.8	313°56.4	• • 14.6	0°57.1	• • 52.1	82°21.0	• • 49.3	Apr 27 Sun	SHA	Mer.pass
16	95°53.5	98°00.4	53.9	328°57.8	14.3	15°59.1	52.1	97°23.3	49.2	Venus	2°27.1	09:28
17	110°56.0	113°01.6	53.9	343°59.1	13.9	31°01.0	52.2	112°25.5	49.1	Mars		18:04
18	125°58.4		N00°54.0	359°00.4	N21° 13.6	46°02.9	N22°52.2	112 23.3 127°27.7	S02°49.0	l l		
19	141°00.9	143°03.9	54.1	14°01.7	13.3	61°04.9	52.2	142°29.9	48.9	Jupiter		14:56
										Saturn	1°33.6	09:31
20	156°03.4	158°05.1	54.2	29°03.0	13.0	76°06.8	52.3	157°32.2	48.8	Horizont	al parallax	
21	171°05.8	173°06.3	• • 54.2	44°04.3	• • 12.7	91°08.7	• • 52.3	172°34.4	• • 48.7	HORIZON	-	0.2
22	186°08.3	188°07.5	54.3	59°05.6	12.4	106° 10.7	52.4	187°36.6	48.6		Venus:	0.3
23	201°10.8	203°08.6	54.4	74°06.9	12.0	121°12.6	52.4	202°38.8	48.5		Mars:	0.1
Mern	pass. 09:37	$\nu$ 1.2' d0.0'	m-4 7/	v1 3/ d.0	.3′ m0.88	v1 0/ d0	.0′ m-2.00	1/2 2/ d. f.	.1′ m1.17			
.vici.p		ν 1.2 UU.U	т. т	v 1.5 U-0		ν 1.5 UU.	2.00	ν 2.2 u-0				

h	Sui	า			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°30.3	N13°12.1	217°22.1	11.2'	S01°55.2	-17.6'	60.2'
1 2	195°30.4 210°30.5	12.9 13.8	231°52.2 246°22.4	11.2' 11.1'	01°37.6 01°20.0	-17.6' -17.6'	60.2' 60.3'
3	225°30.6	. 14.6	260°52.5	11.1'	01°02.4	-17.0 -17.7'	60.3
4	240°30.7	15.4	275°22.6	11.1'	00°44.7	-17.7'	60.3'
5	255°30.8	16.2	289°52.7	11.0'	00°27.1	-17.7'	60.4'
6 7	270°30.9 285°31.0	N13°17.0 17.8	304°22.7 318°52.7	11.0' 11.0'	\$00°09.4 N00°08.4	-17.7' 17.7'	60.4' 60.4'
8	300°31.1	18.6	333°22.7	10.9'	00°26.1	17.7'	60.5
9	315°31.2	• • 19.5	$347^{\circ}52.6$	10.9'	00°43.8	17.8'	60.5'
10	330°31.3 345°31.4	20.3	2°22.5 16°52.4	10.9'	01°01.6 01°19.4	17.8'	60.5'
11 12	0°31.5	21.1 N13°21.9	31°22.2	10.8' 10.8'	01 19.4 N01°37.1	17.8' 17.8'	60.5' 60.6'
13	15°31.6	22.7	45°52.0	10.7'	01°54.9	17.8'	60.6
14	30°31.7	23.5	60°21.7	10.7'	02°12.7	17.8'	60.6'
15 16	45°31.8 60°31.9	· · 24.3 25.1	74°51.4 89°21.0	10.6' 10.6'	02°30.5 02°48.3	17.8' 17.8'	60.6' 60.7'
17	75°32.0	25.1	103°50.6	10.5	02°46.3	17.8	60.7
18	90°32.1	N13°26.7	118°20.2	10.5'	N03°23.9	17.8'	60.7'
19	105°32.3	27.5	132°49.7	10.4	03°41.7	17.8'	60.7'
20 21	120°32.4 135°32.5	28.4 •• 29.2	147°19.1 161°48.5	10.4' 10.3'	03°59.5 04°17.3	17.8' 17.8'	60.8' 60.8'
22	150°32.6	30.0	176°17.9	10.3	04°17.3	17.8	60.8
23	165°32.7	30.8	190°47.2	10.2'	04°52.9	17.8'	60.8'
	SD = 15.9'	d = 0.8'		SI	D = 16.4'		
C-+	CUA	De-	CUA		D	اد.	un.
Sat 0	<b>GHA</b> 180°32.8	<b>Dec</b> N13°31.6	<b>GHA</b> 205°16.4	u  10.2'	<b>Dec</b> N05° 10.6	d 17.7'	<b>HP</b> 60.9'
1	195°32.9	32.4	219°45.6	10.1'	05°28.4	17.7'	60.9'
2	210°33.0	33.2	234°14.7	10.1'	05°46.1	17.7'	60.9'
3 4	225°33.1 240°33.2	· · 34.0 34.8	248°43.8 263°12.7	10.0' 9.9'	06°03.8 06°21.5	17.7' 17.7'	60.9' 60.9'
5	255°33.3	35.6	203 12.7 277°41.7	9.9'	06°39.1	17.6	61.0'
6	270°33.4	N13°36.4	292°10.6	9.8'	N06° 56.7	17.6'	61.0'
7	285°33.5	37.2	306°39.4	9.7'	07°14.3	17.6'	61.0'
8 9	300°33.6 315°33.7	38.0 •• 38.8	321°08.1 335°36.8	9.7' 9.6'	07°31.9 07°49.5	17.5' 17.5'	61.0' 61.0'
10	330°33.8	39.6	350°05.4	9.5'	08°07.0	17.5	61.1
11	345°33.9	40.4	4°33.9	9.5'	08°24.4	17.4'	61.1'
12	0°34.0	N13°41.2	19°02.4 33°30.8	9.4'	N08°41.9 08°59.2	17.4	61.1'
13 14	15°34.1 30°34.2	42.0 42.8	33°30.8 47°59.1	9.3' 9.2'	08°59.2 09°16.6	17.3' 17.3'	61.1' 61.1'
15	45°34.3	• • 43.6	62°27.3	9.2'	09°33.9	17.3'	61.1'
16	60°34.4	44.4	76°55.5	9.1'	09°51.2	17.2'	61.2'
17 18	75°34.5 90°34.5	45.2 N13°46.0	91°23.6 105°51.6	9.0' 8.9'	10°08.4 N10°25.5	17.2' 17.1'	61.2' 61.2'
19	105°34.6	46.8	100°19.5	8.9'	10° 42.6	17.1 17.0'	61.2'
20	120°34.7	47.6	$134^{\circ}47.4$	8.8'	10°59.7		61.2'
21	135°34.8	• • 48.4	149°15.2	8.7'	11°16.6 11°33.6	16.9' 16.9'	61.2'
22 23	150°34.9 165°35.0	49.2 50.0	163°42.9 178°10.5	8.6' 8.5'	11° 33.6 11° 50.4	16.9	61.2' 61.2'
20	SD = 15.9'	d = 0.8'			D = 16.6'	10.0	01.2
		<u>u = 0.0</u>			3 – 10.0		
Sun	<b>GHA</b> 180°35.1	<b>Dec</b> N13°50.8	<b>GHA</b> 192°38.0	ν 9 Δ'	<b>Dec</b> N12°07.2	d 16.7'	HP 61.2'
0 1	180°35.1 195°35.2	N13°50.8 51.6	192°38.0 207°05.4	8.4' 8.4'	12°23.9	16.7' 16.7'	61.3'
2	210°35.3	52.4	221°32.8	8.3'	12°40.6	16.6'	61.3'
3	225°35.4	• • 53.2	236°00.1	8.2'	12°57.2	16.5	61.3'
4 5	240°35.5 255°35.6	54.0 54.8	250°27.2 264°54.3	8.1' 8.0'	13°13.7 13°30.1	16.4' 16.4'	61.3' 61.3'
6	270°35.7	N13°55.6	279°21.3	7.9'	N13°46.5	16.3	61.3
7	285°35.8	56.4	293°48.2	7.8'	14°02.8	16.2'	61.3'
8 9	300°35.9 315°36.0	57.2 •• 58.0	308°15.0 322°41.8	7.7' 7.6'	14°18.9 14°35.0	16.1' 16.0'	61.3' 61.3'
10	315°36.0 330°36.1	58.7	322°41.8 337°08.4	7.6° 7.5'	14° 35.0 14° 51.1	16.0 15.9'	61.3
11	345°36.2	13°59.5	351°34.9	7.4'	15°07.0	15.8'	61.3'
12	0°36.3	N14°00.3	6°01.4	7.4'	N15°22.8	15.7'	61.3'
13 14	15°36.4 30°36.4	01.1 01.9	20°27.7 34°54.0	7.3' 7.2'	15°38.5 15°54.2	15.6' 15.5'	61.3' 61.3'
15	45°36.5	•• 02.7	49°20.2	7.2 7.1'	16°09.7	15.5 15.4'	61.3
16	60°36.6	03.5	63°46.2	7.0'	$16^{\circ}25.2$	15.3'	61.3'
17	75°36.7	04.3 N14°05.1	78°12.2 92°38.1	6.9'	16°40.5	15.2'	61.3'
18 19	90°36.8 105°36.9	N14°05.1 05.9	92°38.1 107°03.8	6.8' 6.7'	N16°55.7 17°10.8	15.1' 15.0'	61.3' 61.3'
20	120°37.0	06.6	121°29.5	6.6'	17°25.8	14.9	61.3
21	135°37.1	• • 07.4	135°55.1	6.5'	17°40.7	14.8'	61.3'
22 23	150°37.2 165°37.3	08.2 09.0	150°20.6 164°45.9	6.4' 6.3'	17°55.5 18°10.1	14.7' 14.5'	61.3' 61.3'
23			104 45.9			14.5	01.3
	SD = 15.9'	d = 0.8'		SI	D = 16.7'		

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

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

		Sun		Moon				
Day	Eqn.of	f Time	Mer.	Mer.Pass.		Age		
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	27-0		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	12-1%		
25	02:01	02:06	11:58	09:50	22:15			
26	02:11	02:16	11:58	10:41	23:08			
27	02:21	02:25	11:58	11:35	-:-			

h _	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	$216^{\circ}13.2$	$218^{\circ}09.8$	N00°54.5	89°08.2	$N21^{\circ}11.7$	$136^{\circ}14.5$	N22°52.4	$217^{\circ}41.1$	S02°48.4	Alpheratz	357°34.8	29°13.6
1	231°15.7	233°11.0	54.6	104°09.6	11.4	$151^{\circ}16.5$	52.5	232°43.3	48.3	Ankaa	353°07.3	-42°10.0
2	$246^{\circ}18.1$	$248^{\circ}12.1$	54.6	$119^{\circ}10.9$	11.1	166°18.4	52.5	247°45.5	48.2	Schedar	349°31.3	56°40.4
3	261°20.6	263°13.3	• • 54.7	$134^{\circ}12.2$	• • 10.8	181°20.3	• • 52.6	262°47.7	• • 48.1	Diphda	348°47.4	-17°50.9
4	276°23.1	278° 14.4	54.8	149°13.5	10.5	196°22.3	52.6	277°49.9	48.0	Achernar	335°20.6	-17 30.9 -57°06.4
5	291°25.5	293°15.6	54.9	164°14.8	10.1	211°24.2	52.6	292°52.2	47.9	Hamal	327°51.3	23°34.8
6	306°28.0	308° 16.7	N00°55.0	$179^{\circ}16.1$	N21°09.8	226°26.1	N22°52.7	307°54.4	S02°47.8	Polaris	314°24.9	89°22.3
7	321°30.5	323°17.9	55.1	194°17.4	09.5	241°28.0	52.7	322°56.6	47.7	Acamar	315°12.0	-40°12.2
8	336°32.9	338° 19.0	55.2	209°18.7	09.2	256°30.0	52.8	337°58.8	47.6	Menkar	314°06.2	4°11.3
9	351°35.4	353°20.2	• • 55.3	224°20.0	• • 08.9	271°31.9	• • 52.8	353°01.1	• • 47.5	Mirfak	308°28.4	49°57.0
10	6°37.9	8°21.3	55.4	239°21.3	08.5	286°33.8	52.8	8°03.3	47.4	Aldebaran	290°39.7	16°33.6
11	21°40.3	23°22.5	55.5	254°22.6	08.2	301°35.8	52.9	23°05.5	47.3	Rigel	281°03.9	-8°10.4
12	36°42.8	38°23.6	N00°55.6	269°23.9	N21°07.9	316°37.7	N22°52.9	38°07.7	S02°47.2	Capella	280°21.9	46°01.5
13	51°45.3	53°24.8	55.7	284°25.2	07.6	331°39.6	53.0	53°10.0	47.1	Bellatrix	278°22.9	6°22.3
14	66°47.7	68°25.9	55.8	299°26.6	07.3	346°41.6	53.0	68°12.2	47.0	Elnath	278°01.9	28°37.7
15	81°50.2	83°27.0	• • 55.9	314°27.9	• • 06.9	1°43.5	• • 53.0	83°14.4	• • 46.9	Alnilam	275°37.7	-1°11.2
16	96°52.6	98°28.2	56.0	329°29.2	06.6	16°45.4	53.1	98°16.6	46.8	Betelgeuse	270°52.1	7°24.7
17	111°55.1	113°29.3	56.1	344°30.5	06.3	31°47.3	53.1	113°18.9	46.7	Canopus	263°52.6	-52°42.7
18	126°57.6	128°30.4	N00°56.2	359°31.8	N21°06.0	46°49.3	N22°53.1	128°21.1	S02°46.7	Sirius	258°26.2	-16°45.2
19	142°00.0	143°31.5	56.3	14°33.1	05.7	61°51.2	53.2	143°23.3	46.6	Adhara	255°05.9	-29°00.6
20	157°02.5	158°32.7	56.4	29°34.4	05.3	76°53.1	53.2	158°25.5	46.5	Procyon	244°50.7	5°09.6
21	172°05.0	173°33.8	• • 56.5	44°35.7	• • 05.0	91°55.1	• • 53.3	173°27.8	• • 46.4	Pollux	243°17.1	27°58.0
22	187°07.4	188°34.9	56.6	59°37.0	04.7	106°57.0	53.3	188°30.0	46.3	Avior	234°14.7	-59°35.7
23	202°09.9	203°36.0	56.8	74°38.3	04.4	121°58.9	53.3	203°32.2	46.2	Suhail	222°46.1	-43°32.3
Mern	ass. 09:34	v1 2/ d0	1' m-4.74	v1 3' d.C	0.3' m0.90	1/1 Q <sup>1</sup> d0	.0′ m-1.99	ν2 2' d.Ω	.1′ m1.17	Miaplacidus	221°38.2	-43° 32.5
ivici.p	a33. 03.5+	ν 1.2 do.	1 111 7.77	ν1.5 u c	7.5 1110.50	ν1.5 do.	.0 111 1.33	ν 2.2 α O	.1 1111.17	Alphard	217°47.5	-8°46.2
										Regulus	217 47.3 207°34.1	11°50.6
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.3	61°37.1
0	$217^{\circ}12.4$	218°37.1	N00°56.9	89°39.6	N21°04.0	137°00.8	N22°53.4	218°34.4	S02°46.1	Denebola	182°24.5	14°25.8
1	232°14.8	233°38.2	57.0	104°40.9	03.7	152°02.8	53.4	233°36.7	46.0	Gienah	175°43.1	-17°41.1
2	247°17.3	248°39.3	57.1	119°42.2	03.4	167°04.7	53.5	248°38.9	45.9	Acrux	172°59.3	-63°14.6
3	262°19.7	263°40.5	• • 57.2	134°43.5	• • 03.1	182°06.6	• • 53.5	263°41.1	• • 45.8	Gacrux	171°50.9	-57°15.5
4	277°22.2	278°41.6	57.4	149°44.8	02.8	197°08.5	53.5	278°43.3	45.7	Alioth	166°12.2	55°49.4
5	292°24.7	293°42.7	57.5	164°46.1	02.4	212°10.5	53.6	293°45.6	45.6	Spica	158°21.8	-11°17.7
6	307°27.1	308°43.8	N00°57.6	179°47.4	N21°02.1	227°12.4	N22°53.6	308°47.8	S02°45.5	Alkaid	152°51.3	49°11.2
7	322°29.6	323°44.9	57.7	194°48.7	01.8	242°14.3	53.7	323°50.0	45.4	Hadar	148°35.1	-60°29.8
8	337°32.1	338°46.0	57.9	209°50.0	01.5	257°16.3	53.7	338°52.2	45.3	Menkent	147°57.0	-36°29.8
9	352°34.5	353°47.1	• • 58.0	224°51.3	•• 01.1	272°18.2	• • 53.7	353°54.5	• • 45.2	Arcturus	145°47.4	19°02.9
10	7°37.0	8°48.2	58.1	239°52.6	00.8	287°20.1	53.8	8°56.7	45.1	Rigil Kent.	139°39.4	-60°56.5
11	22°39.5	23°49.2	58.2	254°53.9	00.5	302°22.0	53.8	23°58.9	45.0	Kochab	137°18.6	74°03.0
12	37°41.9	38°50.3	N00°58.4	269°55.2	N21°00.2	317°24.0	N22°53.8	39°01.1	S02°44.9	Zuben'ubi	136°55.4	-16°08.9
13	52°44.4	53°51.4	58.5	284°56.5	20°59.8	332°25.9	53.9	54°03.4	44.8	Alphecca	126°03.2	26°37.6
14	67°46.9	68°52.5	58.7	299°57.8	59.5	347°27.8	53.9	69°05.6	44.7	Antares	112°15.2	-26°29.3
15	82°49.3	83°53.6	• • 58.8	314°59.1	• • 59.2	2°29.7	• • 54.0	84°07.8	• • 44.6	Atria	107°08.8	-69°04.2
16	97°51.8	98°54.7	58.9	330°00.4	58.9	17°31.7	54.0	99°10.0	44.5	Sabik	102°02.3	-15°45.4
17	112°54.2	113°55.7	59.1	345°01.7	58.5	32°33.6	54.0	114°12.3	44.4	Shaula	96°09.8	-37°07.3
18	127°56.7	128°56.8	N00°59.2	0°03.0	N20°58.2	47°35.5	N22°54.1	129°14.5	S02°44.3	Rasalhague	95°58.1	12°32.3
19	142°59.2	143°57.9	59.4	15°04.3	57.9	62°37.4	54.1	144°16.7	44.3	Eltanin	90°41.7	51°28.8
20	158°01.6	158° 59.0	59.5	30°05.6	57.6	77°39.4	54.2	159°18.9	44.2	Kaus Aust.	83°32.0	-34°22.3
21	173°04.1	174°00.0	• • 59.6	45°06.9	• • 57.2	92°41.3	• • 54.2	174°21.2	• • 44.1	Vega	80°32.9	38°48.1
22	188°06.6	189°01.1	59.8	60°08.2	56.9	107°43.2	54.2	189°23.4	44.0	Nunki	75°47.3	-26°15.9
23	203°09.0	204°02.2	59.9	75°09.5	56.6	122°45.1	54.3	204°25.6	43.9	Altair	61°59.7	8°55.9
Mer.pa	ass. 09:30	$\nu 1.1' \ d0.$	1' m-4.73	$\nu$ 1.3 $^{\prime}$ d-0	0.3'  m 0.91	$\nu 1.9' \ d0.$	.0′ m-1.99	$\nu$ 2.2′ d-0	.1' m $1.17$	Peacock	53°05.3	-56°39.0
										Deneb	49°25.7	45°21.9
	G114	G11.4	_		_		_	6114	_	Enif	33°38.7	9°59.3
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	<b>Dec</b> \$02°43.8	Al Na'ir	27°32.8	-46°50.2
0 1	218°11.5 233°14.0	219°03.2 234°04.3	N01°00.1 00.2	90°10.8 105°12.1	N20°56.3 55.9	137°47.1 152°49.0	N22°54.3 54.3	219°27.8 234°30.1	\$02°43.8 43.7	Fomalhaut	15°14.5	-29°29.2
										Scheat	13°45.2	28°13.0
2	248°16.4	249°05.4	00.4	120°13.4	55.6	167°50.9	54.4	249°32.3	43.6	Markab	13°29.9	15°20.3
3	263°18.9 278°21.4	264°06.4	00.5	135°14.7	· · 55.3	182°52.8	· · 54.4	264°34.5	· · 43.5	Apr 28 Mon	CHV	Mor page
4		279°07.5	00.7	150°16.0	54.9	197°54.8	54.5	279°36.8	43.4	Venus	<b>SHA</b> 1°56.6	Mer.pass 09:27
5	293°23.8	294°08.5	00.9	165°17.3	54.6 N20°54.2	212°56.7	54.5	294°39.0 309°41.2	43.3	Venus	232°55.0	18:02
6 7	308°26.3	309°09.6	N01°01.0	180°18.5	N20°54.3	227°58.6	N22°54.5		S02°43.2			14:53
7	323°28.7	324°10.6	01.2	195°19.8	54.0 53.6	243°00.5	54.6	324°43.4	43.1	Jupiter Saturn	280°01.3 1°27.8	
8	338°31.2	339°11.7	01.3	210°21.1	53.6	258°02.5	54.6	339°45.7	43.0	Saturn	1 21.8	09:28
9	353°33.7	354°12.7	•• 01.5	225°22.4	53.3	273°04.4	• • 54.6	354°47.9	• • 42.9	Apr 29 Tue	SHA	Mer.pass
10	8°36.1	9°13.8	01.7	240°23.7	53.0	288°06.3	54.7	9°50.1	42.8	Venus	1°24.8	09:25
11	23°38.6	24°14.8	01.8	255°25.0	52.6	303°08.2	54.7	24°52.3	42.7	Mars	232°27.2	18:00
12	38°41.1 53°43.5	39° 15.9 54° 16.9	N01°02.0	270°26.3 285°27.6	N20°52.3	318°10.2 333°12.1	N22°54.8	39°54.6 54°56.8	S02°42.6	Jupiter	279°48.5	14:50
		69° 17.9	02.1		52.0 51.7		54.8	54°56.8 69°59.0	42.5 42.4	Saturn	$1^{\circ}22.1$	09:24
13			02.3	300°28.9	51.7	348°14.0 3°15.9	54.8		42.4	A 20		
13 14	68°46.0		00 5		• • 51.3	3 15.9	•• 54.9	85°01.3	• • 42.4	Apr 30 Wed	SHA	Mer.pass
13 14 15	68°46.0 83°48.5	$84^{\circ}19.0$	•• 02.5	315°30.2			E 4 O	100002 5	40.0		00	
13 14 15 16	68°46.0 83°48.5 98°50.9	84°19.0 99°20.0	02.7	$330^{\circ}31.5$	51.0	$18^{\circ}17.8$	54.9	100°03.5	42.3	Venus	0°51.7	09:23
13 14 15 16 17	68°46.0 83°48.5 98°50.9 113°53.4	84°19.0 99°20.0 114°21.0	02.7 02.8	330°31.5 345°32.8	51.0 50.7	18°17.8 33°19.8	55.0	115°05.7	42.2	Venus Mars	$231^{\circ}59.3$	17:58
13 14 15 16 17	68° 46.0 83° 48.5 98° 50.9 113° 53.4 128° 55.9	84°19.0 99°20.0 114°21.0 129°22.1	02.7 02.8 N01°03.0	330°31.5 345°32.8 0°34.1	51.0 50.7 N20°50.3	18°17.8 33°19.8 48°21.7	55.0 N22°55.0	115°05.7 130°07.9	42.2 \$02°42.1	Venus Mars Jupiter	231°59.3 279°35.6	17:58 14:47
13 14 15 16 17 18 19	68°46.0 83°48.5 98°50.9 113°53.4 128°55.9 143°58.3	84°19.0 99°20.0 114°21.0 129°22.1 144°23.1	02.7 02.8 N01°03.0 03.2	330°31.5 345°32.8 0°34.1 15°35.3	51.0 50.7 N20°50.3 50.0	18°17.8 33°19.8 48°21.7 63°23.6	55.0 N22°55.0 55.0	115°05.7 130°07.9 145°10.2	42.2 \$02°42.1 42.0	Venus Mars	$231^{\circ}59.3$	17:58
13 14 15 16 17 18 19 20	68°46.0 83°48.5 98°50.9 113°53.4 128°55.9 143°58.3 159°00.8	84°19.0 99°20.0 114°21.0 129°22.1 144°23.1 159°24.1	02.7 02.8 N01°03.0 03.2 03.4	330°31.5 345°32.8 0°34.1 15°35.3 30°36.6	51.0 50.7 N20°50.3 50.0 49.7	18°17.8 33°19.8 48°21.7 63°23.6 78°25.5	55.0 N22°55.0 55.0 55.1	115°05.7 130°07.9 145°10.2 160°12.4	42.2 \$02°42.1 42.0 41.9	Venus Mars Jupiter Saturn	231°59.3 279°35.6 1°16.3	17:58 14:47
13 14 15 16 17 18 19 20 21	68°46.0 83°48.5 98°50.9 113°53.4 128°55.9 143°58.3 159°00.8 174°03.2	84° 19.0 99° 20.0 114° 21.0 129° 22.1 144° 23.1 159° 24.1 174° 25.1	02.7 02.8 N01°03.0 03.2 03.4	330°31.5 345°32.8 0°34.1 15°35.3 30°36.6 45°37.9	51.0 50.7 N20°50.3 50.0 49.7 • • 49.3	18°17.8 33°19.8 48°21.7 63°23.6 78°25.5 93°27.5	55.0 N22°55.0 55.0 55.1	115°05.7 130°07.9 145°10.2 160°12.4 175°14.6	42.2 \$02°42.1 42.0 41.9 •• 41.8	Venus Mars Jupiter Saturn	231°59.3 279°35.6 1°16.3	17:58 14:47 09:21
13 14 15 16 17 18 19 20 21 22	68°46.0 83°48.5 98°50.9 113°53.4 128°55.9 143°58.3 159°00.8 174°03.2 189°05.7	84° 19.0 99° 20.0 114° 21.0 129° 22.1 144° 23.1 159° 24.1 174° 25.1 189° 26.2	02.7 02.8 N01°03.0 03.2 03.4 · · 03.5 03.7	330°31.5 345°32.8 0°34.1 15°35.3 30°36.6 45°37.9 60°39.2	51.0 50.7 N20°50.3 50.0 49.7 • 49.3 49.0	18°17.8 33°19.8 48°21.7 63°23.6 78°25.5 93°27.5 108°29.4	55.0 N22°55.0 55.0 55.1 •• 55.1 55.1	115°05.7 130°07.9 145°10.2 160°12.4 175°14.6 190°16.9	42.2 \$02° 42.1 42.0 41.9 · · 41.8 41.7	Venus Mars Jupiter Saturn	231°59.3 279°35.6 1°16.3 tal parallax Venus:	17:58 14:47 09:21
13 14 15 16 17 18 19 20 21	68°46.0 83°48.5 98°50.9 113°53.4 128°55.9 143°58.3 159°00.8 174°03.2	84° 19.0 99° 20.0 114° 21.0 129° 22.1 144° 23.1 159° 24.1 174° 25.1	02.7 02.8 N01°03.0 03.2 03.4	330°31.5 345°32.8 0°34.1 15°35.3 30°36.6 45°37.9	51.0 50.7 N20°50.3 50.0 49.7 • • 49.3	18°17.8 33°19.8 48°21.7 63°23.6 78°25.5 93°27.5	55.0 N22°55.0 55.0 55.1	115°05.7 130°07.9 145°10.2 160°12.4 175°14.6	42.2 \$02°42.1 42.0 41.9 •• 41.8	Venus Mars Jupiter Saturn	231°59.3 279°35.6 1°16.3	17:58 14:47 09:21

h	Sui	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°37.4 195°37.5	N14°09.8 10.6	179°11.2 193°36.4	6.2' 6.1'	N18°24.6 18°39.1	14.4' 14.3'	61.3' 61.3'
1 2	210°37.5	10.6 11.4	193°36.4 208°01.5	6.0'	18° 53.3	14.3 14.2'	61.3
3	225°37.6	• • 12.2	222°26.5	5.9'	19°07.5	14.0'	61.3'
4	240°37.7	12.9	236°51.4	5.8'	19°21.5	13.9'	61.3'
5 6	255°37.8 270°37.9	13.7 N14 <sup>o</sup> 14.5	251°16.2 265°40.8	5.7' 5.6'	19°35.4 N19°49.2	13.8' 13.6'	61.3' 61.3'
7	285°38.0	15.3	280°05.4	5.5'	20°02.8	13.5'	61.3
8	300°38.1	16.1	294°29.9	5.4'	$20^{\circ}16.3$	13.3'	61.2'
9	315°38.2 330°38.3	• • 16.9	308°54.3 323°18.6	5.3'	20°29.6 20°42.8	13.2'	61.2'
10 11	330 38.3 345°38.4	17.6 18.4	323 18.0 337°42.8	5.2' 5.1'	20 42.8 20°55.8	13.0' 12.9'	61.2' 61.2'
12	0°38.4	N14°19.2	352°06.9	5.0'	N21°08.7	12.8'	61.2'
13	15°38.5	20.0	6°31.0	4.9'	21°21.5	12.6'	61.2'
14 15	30°38.6 45°38.7	20.8 •• 21.6	20°54.9 35°18.7	4.8' 4.7'	21°34.1 21°46.5	12.4' 12.3'	61.2' 61.2'
16	60°38.8	22.3	49°42.4	4.6'	21°58.8	12.1'	61.2
17	75°38.9	23.1	64°06.1	4.5'	22°11.0	12.0'	61.1'
18 19	90°39.0 105°39.0	N14°23.9 24.7	78°29.6 92°53.1	4.5' 4.4'	N22°22.9 22°34.7	11.8' 11.6'	61.1' 61.1'
20	120°39.1	25.4	107°16.4	4.3'	22°46.4	11.5'	61.1
21	135°39.2	• • 26.2	121°39.7	4.2'	22°57.9	11.3'	61.1'
22	150°39.3 165°39.4	27.0	136°02.9 150°26.0	4.1' 4.0'	23°09.2 23°20.3	11.1' 11.0'	61.1'
23		27.8	150 20.0			11.0	61.0'
	SD = 15.9'	d = 0.8'		5	D = 16.7'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°39.5	N14°28.6	164°49.0	3.9'	N23°31.3	10.8'	61.0'
1 2	195°39.6 210°39.6	29.3 30.1	179°11.9 193°34.8	3.8' 3.8'	23°42.1 23°52.7	10.6' 10.4'	61.0' 61.0'
3	225°39.7	30.9	207°57.5	3.7'	24°03.2	10.3	61.0'
4	240°39.8	31.7	222°20.2	3.6'	24°13.4	10.1'	61.0'
5 6	255°39.9 270°40.0	32.4 N14°33.2	236°42.8 251°05.3	3.5' 3.5'	24°23.5 N24°33.4	9.9' 9.7'	60.9' 60.9'
7	285°40.1	34.0	265°27.8	3.4'	24°43.2	9.5'	60.9
8	300°40.2	34.8	279°50.2	3.3'	24°52.7	9.4'	60.9'
9 10	315°40.2 330°40.3	· · 35.5 36.3	294°12.5 308°34.7	3.2' 3.2'	25°02.1 25°11.2	9.2' 9.0'	60.8' 60.8'
11	345°40.4	30.3 37.1	306 34.7 322°56.9	3.1'	25°11.2	9.0 8.8'	60.8
12	0°40.5	N14°37.9	337°19.0	3.0'	N25°29.0	8.6'	60.8'
13	15°40.6 30°40.7	38.6	351°41.1 6°03.0	3.0'	25°37.6 25°46.0	8.4' 8.2'	60.8' 60.7'
14 15	30 40.7 45°40.7	39.4 •• 40.2	0 03.0 20°25.0	2.9' 2.9'	25 46.0 25°54.2	8.2 8.0'	60.7'
16	60°40.8	40.9	34°46.8	2.8'	26°02.2	7.8'	60.7'
17	75°40.9	41.7	49°08.6	2.8'	26°10.0	7.6'	60.7'
18 19	90°41.0 105°41.1	N14°42.5 43.2	63°30.4 77°52.1	2.7' 2.7'	N26°17.6 26°25.0	7.4' 7.2'	60.6' 60.6'
20	120°41.1	44.0	92°13.8		26°32.3	7.0'	60.6
21	135°41.2	• • 44.8	106°35.4	2.6'	26°39.3	6.8'	60.5
22 23	150°41.3 165°41.4	45.5 46.3	120°56.9 135°18.5	2.5' 2.5'	26°46.1 26°52.7	6.6' 6.4'	60.5' 60.5'
23	SD = 15.9'	d = 0.8'	133 10.3		D = 16.6'	0.1	00.5
	<u> </u>	<u>u = 0.0</u>			D = 10.0		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	180°41.5 195°41.5	N14°47.1 47.8	149°40.0 164°01.4	2.5' 2.4'	N26°59.1 27°05.3	6.2' 6.0'	60.5' 60.4'
2	210°41.6	48.6	178°22.9	2.4'	27°11.3	5.8'	60.4'
3 4	225°41.7 240°41.8	· · 49.4 50.1	192°44.3 207°05.6	2.4' 2.3'	27°17.1 27°22.7	5.6' 5.4'	60.4' 60.3'
4 5	240 41.8 255°41.9	50.1 50.9	207 05.6 221°27.0	2.3'	27°28.1	5.4 5.2'	60.3
6	270°41.9	N14°51.7	235°48.3	2.3'	N27°33.3	5.0'	60.3'
7	285°42.0	52.4	250°09.6	2.3'	27°38.2	4.8'	60.2'
8	300°42.1 315°42.2	53.2 •• 54.0	264°30.9 278°52.2	2.3' 2.3'	27°43.0 27°47.5	4.5' 4.3'	60.2' 60.2'
10	330°42.2	54.7	293°13.4	2.3'	27°51.9	4.1'	60.2
11	345°42.3	55.5	307°34.7	2.3'	27°56.0	3.9'	60.1
12 13	0°42.4 15°42.5	N14°56.3 57.0	321°56.0 336°17.2	2.3' 2.3'	N27°59.9 28°03.6	3.7' 3.5'	60.1' 60.1'
14	30°42.6	57.0 57.8	350°38.5	2.3'	28°07.1	3.3'	60.0'
15	45°42.6	• • 58.5	4°59.8	2.3'	28°10.4	3.1'	60.0'
16 17	60°42.7 75°42.8	14°59.3 15°00.1	19°21.0 33°42.3	2.3' 2.3'	28°13.5 28°16.4	2.9' 2.7'	60.0' 59.9'
18	75°42.8 90°42.9	N15°00.1	48°03.6	2.3'	N28°19.1	2.7	59.9'
19	105°42.9	01.6	62°24.9	2.3'	28°21.5	2.2'	59.8'
20 21	120°43.0 135°43.1	02.3 · · 03.1	76°46.3 91°07.6	2.4' 2.4'	28°23.8 28°25.8	2.0' 1.8'	59.8' 59.8'
21	135°43.1 150°43.2	03.1	91°07.6 105°29.0	2.4'	28°25.8 28°27.6	1.6'	59.8° 59.7'
23	165°43.2	04.6	119°50.4	2.5'	28°29.2	1.4'	59.7'
	SD = 15.9'	d = 0.8'		S	D = 16.5'		

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

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

			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	0-7%		
2	28	02:29	02:34	11:57	12:33	00:03			
2	29	02:38	02:42	11:57	13:35	01:03			
3	30	02:46	02:50	11:57	14:39	02:07			

h _	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	$219^{\circ}10.6$	219°28.2	N01°04.1	90°41.8	N20°48.4	138°33.2	N22°55.2	220°21.3	S02°41.5	Alpheratz	357°34.8	29°13.6
1	234°13.1	234°29.2	04.3	105°43.1	48.0	153°35.1	55.3	235°23.5	41.4	Ankaa	353° 07.2	-42°10.0
2	249°15.6	249°30.2	04.4	120°44.4	47.7	168°37.1	55.3	250°25.8	41.3	Schedar	349°31.3	56°40.4
3	264°18.0	264°31.2	• • 04.6	135°45.7	• • 47.4	183°39.0	• • 55.3	265°28.0	• • 41.2	Diphda	348°47.3	-17°50.9
4 5	279°20.5 294°23.0	279°32.2 294°33.2	04.8 05.0	150°47.0 165°48.2	47.0 46.7	198°40.9 213°42.8	55.4 55.4	280°30.2 295°32.5	41.1 41.0	Achernar	$335^{\circ}20.5$	-57°06.4
6	309°25.4	309°34.3	N01°05.2	180°49.5	N20°46.4	213 42.8 228°44.8	N22°55.4	310°34.7	\$02°40.9	Hamal	327°51.3	23°34.8
7	324°27.9	324°35.3	05.4	195°50.8	46.0	243°46.7	55.5	325°36.9	40.8	Polaris	314°24.6	89°22.3
8	339°30.4	339°36.3	05.6	210°52.1	45.7	258°48.6	55.5	340°39.1	40.7	Acamar	315°12.0	-40°12.2
9	354°32.8	354°37.3	• • 05.8	225°53.4	• • 45.4	273°50.5	• • 55.6	355°41.4	• • 40.7	Menkar	314°06.2	4°11.3
10	9°35.3	9°38.3	06.0	240°54.7	45.0	288°52.4	55.6	10°43.6	40.6	Mirfak Aldebaran	308°28.4 290°39.7	49°57.0 16°33.6
11	24°37.7	24°39.2	06.2	255°56.0	44.7	303°54.4	55.6	25°45.8	40.5	Rigel	281°03.9	-8°10.4
12	39°40.2	39°40.2	N01°06.3	270°57.3	N20°44.4	318°56.3	N22°55.7	40°48.1	S02°40.4	Capella	280°21.9	46°01.5
13	54°42.7	54°41.2	06.5	285°58.5	44.0	333°58.2	55.7	55°50.3	40.3	Bellatrix	278°22.9	6°22.3
14 15	69°45.1 84°47.6	69°42.2 84°43.2	06.7 •• 06.9	300°59.8 316°01.1	43.7 •• 43.4	349°00.1 4°02.0	55.7 •• 55.8	70°52.5 85°54.8	40.2	Elnath	278°01.9	28°37.7
16	99°50.1	99°44.2	07.1	331°02.4	43.0	4 02.0 19°04.0	55.8	05 54.6 100°57.0	• • 40.1 40.0	Alnilam	275°37.7	-1°11.2
17	114°52.5	114° 45.2	07.1	346°03.7	42.7	34°05.9	55.9	115°59.2	39.9	Betelgeuse	270°52.1	7°24.7
18	129°55.0	129°46.2	N01°07.6	1°05.0	N20°42.4	49°07.8	N22°55.9	131°01.4	S02°39.8	Canopus	263°52.6	-52°42.7
19	144°57.5	144°47.1	07.8	16°06.3	42.0	64°09.7	55.9	146°03.7	39.7	Sirius	258°26.2	-16°45.2
20	159°59.9	159°48.1	08.0	31°07.5	41.7	79°11.6	56.0	161°05.9	39.6	Adhara	255°05.9 244°50.7	-29°00.6 5°09.6
21	175°02.4	174°49.1	• • 08.2	46°08.8	• • 41.4	94°13.5	• • 56.0	$176^{\circ}08.1$	• • 39.5	Procyon Pollux	244 50.7 243°17.1	27°58.0
22	190°04.9	189°50.1	08.4	$61^{\circ}10.1$	41.0	109°15.5	56.0	191°10.4	39.4	Avior	234° 14.8	-59°35.7
23	205°07.3	204°51.0	08.6	76°11.4	40.7	124°17.4	56.1	206°12.6	39.3	Suhail	222°46.1	-43°32.3
Mer.p	pass. 09:22	$\nu 1.0' d0.$	2′ m-4.72	$\nu 1.3' \ d-0$	.3′ m0.94	$\nu 1.9' d0$	.0′ m-1.98	$\nu 2.2' \ d-0$	.1′ m1.17	Miaplacidus	221°38.2	-69°49.5
										Alphard	217°47.5	-8°46.2
E:	GHA	CHA	Doo	GHA	Doo	GHA	Doo	GHA	Dee	Regulus	$207^{\circ}34.1$	11°50.6
Fri 0	220°09.8	<b>GHA</b> 219°52.0	<b>Dec</b> N01° 08.8	91°12.7	<b>Dec</b> N20°40.4	139°19.3	<b>Dec</b> N22°56.1	221°14.8	Dec \$02°39.2	Dubhe	193°40.3	61°37.1
1	235°12.2	219 52.0 234°53.0	09.0	91 12.7 106°14.0	40.4	159 19.5 154°21.2	56.1	236°17.1	39.2	Denebola	182°24.5	14°25.8
2	250°14.7	249°54.0	09.2	121°15.2	39.7	169°23.1	56.2	251°19.3	39.1	Gienah	175°43.1	-17°41.1
3	265°17.2	264°54.9	09.5	136°16.5	39.3	184°25.1	56.2	266°21.5	39.0	Acrux	172°59.3	-63°14.6
4	280°19.6	279°55.9	09.7	151°17.8	39.0	199°27.0	56.3	281°23.8	38.9		171°50.9 166°12.2	-57°15.5 55°49.4
5	295°22.1	294°56.8	09.9	$166^{\circ}19.1$	38.7	214°28.9	56.3	296°26.0	38.8	Alioth Spica	158° 21.7	-11°17.7
6	310°24.6	309°57.8	N01°10.1	181°20.4	N20°38.3	229°30.8	N22°56.3	311°28.2	S02°38.7	Alkaid	150° 21.7 152° 51.3	49°11.2
7	325°27.0	324°58.8	10.3	196°21.6	38.0	244°32.7	56.4	326°30.4	38.6	Hadar	148°35.1	-60°29.8
8	340°29.5	339°59.7	10.6	211°22.9	37.7	259°34.6	56.4	341°32.7	38.5	Menkent	147°57.0	-36°29.8
9	355°32.0	355°00.7	· · 10.8	226°24.2	• • 37.3	274°36.6	• • 56.4	356°34.9	• • 38.4	Arcturus	145°47.4	19°02.9
10	10°34.4	10°01.6	11.0	241°25.5	37.0	289°38.5 304°40.4	56.5	11°37.1 26°39.4	38.3	Rigil Kent.	139°39.3	-60°56.5
11 12	25°36.9 40°39.4	25°02.6 40°03.5	11.2 N01°11.5	256°26.8 271°28.0	36.6 N20°36.3	304 40.4 319°42.3	56.5 N22°56.6	20 39.4 41°41.6	38.2 \$02°38.1	Kochab	137° 18.6	74°03.0
13	55°41.8	55° 04.5	11.7	286°29.3	36.0	334°44.2	56.6	56°43.8	38.0	Zuben'ubi	136°55.4	-16°08.9
14	70°44.3	70°05.4	11.9	301°30.6	35.6	349°46.2	56.6	71°46.1	37.9	Alphecca	126°03.2	26°37.6
15	85°46.7	85°06.4	. 12.2	316°31.9	• • 35.3	4°48.1	56.7	86°48.3	37.9	Antares	112°15.2	-26°29.3
16	100°49.2	100°07.3	12.4	331°33.2	35.0	19°50.0	56.7	101°50.5	37.8	Atria Sabik	107°08.8 102°02.2	-69°04.3 -15°45.4
17	115°51.7	115°08.2	12.6	$346^{\circ}34.4$	34.6	34°51.9	56.7	116°52.8	37.7	Shaula	96°09.7	-13 45.4 -37°07.3
18	130°54.1	130°09.2	N01°12.9	1°35.7	N20°34.3	49°53.8	N22°56.8	131°55.0	S02°37.6	Rasalhague	95°58.1	12°32.3
19	145°56.6	145° 10.1	13.1	16°37.0	33.9	64°55.7	56.8	146°57.2	37.5	Eltanin	90°41.7	51°28.8
20	160°59.1	160°11.1	13.3	31°38.3	33.6	79°57.6	56.8	161°59.5	37.4	Kaus Aust.	83°32.0	-34°22.3
21	176°01.5	175°12.0	• • 13.6	46°39.6	• • 33.3	94°59.6	• • 56.9	177°01.7	• • 37.3	Vega	80°32.8	38°48.1
22	191°04.0	190°12.9	13.8	61°40.8	32.9	110°01.5	56.9	192°03.9	37.2	Nunki	75°47.3	-26°15.9
23	206°06.5	205°13.8	14.0	76°42.1	32.6	125°03.4	57.0	207°06.2	37.1	Altair	61°59.6	8°55.9
Mer.p	ass. 09:18	$\nu 1.0' \ d0.$	2′ m-4.71	$\nu 1.3' \ d$ -0	.3′ m0.95	$\nu 1.9' \ d0.$	.0′ m-1.98	$\nu$ 2.2′ d-0	.1' m $1.17$	Peacock	53°05.3	-56°39.0
										Deneb	49°25.6	45°21.9
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.6	9°59.3
0	221°08.9	220° 14.8	N01°14.3	91°43.4	N20°32.2	140°05.3	N22°57.0	222°08.4	S02°37.0	Al Na'ir Fomalhaut	27°32.7 15°14.4	-46°50.1 -29°29.2
1	236°11.4	235° 15.7	14.5	106°44.7	31.9	155°07.2	57.0	237°10.6	36.9	Scheat	13°45.2	-29 29.2 28°13.0
2	251°13.8	$250^{\circ}16.6$	14.8	121°45.9	31.6	$170^{\circ}09.1$	57.1	$252^{\circ}12.9$	36.8	Markab	13° 29.8	15°20.3
3	266°16.3	265° 17.5	•• 15.0	136°47.2	• • 31.2	185°11.1	•• 57.1	267°15.1	• • 36.7			
4	281°18.8	280°18.5	15.3	151°48.5	30.9	200°13.0	57.1	282°17.3	36.7	May 01 Thu	SHA	Mer.pass
5	296°21.2	295°19.4	15.5	166°49.8	30.5	215°14.9	57.2	297°19.6	36.6	Venus	0°17.6	09:21
6	311°23.7	310°20.3	N01°15.8	181°51.1	N20°30.2	230°16.8	N22°57.2	312°21.8	S02°36.5	Mars	231°31.2	17:56
7	326°26.2	325°21.2	16.0	196°52.3	29.9	245°18.7	57.2	327°24.0 342°26.3	36.4	Jupiter Saturn	279°22.6 1°10.7	14:44 09:17
8 9	341°28.6 356°31.1	340°22.1 355°23.0	16.3 •• 16.5	211°53.6 226°54.9	29.5 •• 29.2	260°20.6 275°22.5	57.3 •• 57.3	342°26.3 357°28.5	36.3 · · 36.2		1 10.7	09:17
9 10	11°33.6	10°24.0	16.8	241°56.2	28.8	275 22.5 290°24.5	57.4	12°30.7	36.1	May 02 Fri	SHA	Mer.pass
11	26°36.0	25°24.9	17.0	256°57.4	28.5	305°26.4	57.4	27°33.0	36.0	Venus	359°42.2	09:20
12	41°38.5	40°25.8	N01°17.3	271°58.7	N20°28.1	320°28.3	N22°57.4	42°35.2	S02°35.9	Mars	231°02.9	17:54
13	56°41.0	55° 26.7	17.6	287°00.0	27.8	335°30.2	57.5	57°37.4	35.8	Jupiter	279°09.5	14:41
14	71°43.4	$70^{\circ}27.6$	17.8	$302^{\circ}01.2$	27.5	$350^{\circ}32.1$	57.5	$72^{\circ}39.7$	35.7	Saturn	1°05.1	09:14
15	86°45.9	85°28.5	•• 18.1	317°02.5	•• 27.1	5°34.0	•• 57.5	87°41.9	• • 35.6	May 03 Sat	SHA	Mer.pass
16	101°48.3	100°29.4	18.3	332°03.8	26.8	20°35.9	57.6	102°44.1	35.6	Venus	$359^{\circ}05.9$	09:18
17	116°50.8	115°30.3	18.6	347°05.1	26.4	35°37.9	57.6	117°46.4	35.5	Mars	$230^{\circ}34.5$	17:52
18	131°53.3	130°31.2	N01°18.9	2°06.3	N20°26.1	50°39.8	N22°57.6	132°48.6	\$02°35.4	Jupiter		14:38
19	146°55.7	145°32.1	19.1	17°07.6	25.7	65°41.7	57.7	147°50.8	35.3	Saturn	0°59.5	09:10
20 21	161°58.2 177°00.7	160°33.0 175°33.8	19.4 •• 19.7	32°08.9	25.4 •• 25.1	80°43.6 95°45.5	57.7	162°53.1 177°55.3	35.2	Horizont	al parallax	
22	177°00.7 192°03.1	175°33.8 190°34.7	19.7	47°10.2 62°11.4	24.7	95°45.5 110°47.4	• • 57.8 57.8	177°55.3 192°57.5	· · 35.1 35.0		Venus:	0.3
23	207°05.6	205°35.6	20.2	77°12.7	24.4	125°49.3	57.8	207°59.8	34.9		Mars:	0.1
Mer.p	ass. 09:14	$\nu$ 0.9′ $d$ 0.	2′ m-4.70	$\nu$ 1.3′ d-0	.3′ m0.97	$\nu$ 1.9′ d0.	.0′ m-1.98	$\nu$ 2.2′ d-0	.1'  m1.17			

h	Sui	า			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°43.3	$N15^{\circ}05.4$	$134^{\circ}11.9$	2.5'	$N28^{\circ}30.7$	1.2'	59.7'
1	195°43.4	06.1	148°33.4	2.5'	28°31.9	1.0'	59.6'
2	210°43.5	06.9	162°54.9	2.6'	28°32.9	0.8'	59.6'
3 4	225°43.5 240°43.6	· · 07.6 08.4	177°16.5 191°38.1	2.6' 2.7'	28°33.7 28°34.3	0.6' 0.4'	59.6' 59.5'
4 5	240 43.6 255°43.7	08.4	205°59.7	2.7'	28°34.6	0.4	59.5'
6	270°43.8	N15°09.9	200°21.5	2.8'	N28° 34.8	-0.0'	59.5
7	285°43.8	10.6	234°43.2	2.8'	28°34.8	-0.2	59.4'
8	300°43.9	11.4	249°05.0	2.9'	28°34.6	-0.4'	59.4'
9	315°44.0	• • 12.1	263°26.9	2.9'	28°34.2	-0.6'	59.3'
10	330°44.0	12.9	277°48.9	3.0'	28°33.5	-0.8'	59.3'
11	345°44.1	13.7	292°10.9	3.1'	28°32.7	-1.0'	59.3'
12	0°44.2 15°44.3	N15°14.4	306°32.9 320°55.1	3.1'	N28°31.7 28°30.5	-1.2'	59.2'
13 14	15°44.3 30°44.3	15.2 15.9	320°55.1 335°17.3	3.2' 3.3'	28° 30.5 28° 29.0	-1.4' -1.6'	59.2' 59.1'
15	45°44.4	. 16.7	349°39.6	3.4'	28°27.4	-1.8'	59.1
16	60°44.5	17.4	4°01.9	3.4'	28°25.6	-2.0'	59.1'
17	75°44.5	18.2	18°24.4	3.5'	28°23.6	-2.2'	59.0'
18	90°44.6	N15°18.9	32°46.9	3.6'	N28°21.4	-2.4'	59.0'
19	105°44.7	19.6	47°09.5	3.7'	28°19.1	-2.6'	59.0'
20	120°44.8	20.4	61°32.2	3.8'	28°16.5	-2.8'	58.9'
21	135°44.8	· · 21.1	75°55.0 90°17.8	3.9'	28°13.7	-2.9'	58.9'
22 23	150°44.9 165°45.0	21.9 22.6	90°17.8 104°40.8	4.0' 4.1'	28°10.8 28°07.6	-3.1' -3.3'	58.8' 58.8'
23			104 40.8			-3.3	58.8
	SD = 15.9'	d = 0.8'		S	D = 16.3'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°45.0	N15°23.4	119°03.9	4.2'	N28°04.3	-3.5'	58.8'
1	195°45.1	24.1	133°27.0	4.3'	28°00.8	-3.7'	58.7'
2	210°45.2	24.9	147°50.3	4.4'	27°57.2	-3.9'	58.7'
3	225°45.2 240°45.3	• • 25.6	162°13.6 176°37.1	4.5'	27°53.3 27°49.3	-4.0'	58.6'
4 5	240°45.3 255°45.4	26.4 27.1	176°37.1 191°00.6	4.6' 4.7'	27°49.3 27°45.0	-4.2' -4.4'	58.6' 58.6'
6	270°45.4	N15°27.8	205°24.3	4.7	N27°40.7	-4.4 -4.6'	58.5
7	285°45.5	28.6	219°48.1	4.9'	27°36.1	-4.7'	58.5'
8	300°45.6	29.3	234°12.0	5.0'	27°31.4	-4.9'	58.4'
9	315°45.6	• • 30.1	248°36.0	5.1'	27°26.5	-5.1'	58.4'
10	330°45.7	30.8	263°00.1	5.2'	27°21.4	-5.2'	58.4'
11	345°45.8	31.6	277°24.3	5.3'	27°16.1	-5.4'	58.3'
12	0°45.8	N15°32.3	291°48.7	5.5'	N27°10.7	-5.6'	58.3'
13	15°45.9	33.0	306°13.1 320°37.7	5.6'	27°05.2	-5.7'	58.2'
14 15	30°46.0 45°46.0	33.8 · · 34.5	320° 37.7 335° 02.4	5.7' 5.8'	26°59.4 26°53.6	-5.9' -6.0'	58.2' 58.2'
16	60°46.1	35.3	349°27.2	5.9'	26°47.5	-6.2'	58.1'
17	75°46.2	36.0	3°52.1	6.1'	26°41.3	-6.4	58.1'
18	90°46.2	N15°36.7	18°17.2	6.2'	N26°34.9	-6.5'	58.0'
19	105°46.3	37.5	32°42.4	6.3'	26°28.4	-6.7'	58.0'
20	120°46.4	38.2	47°07.7	6.4'	26°21.8	-6.8'	58.0'
21	135°46.4	• • 38.9	61°33.1	6.6'	26°15.0	-7.0'	57.9'
22 23	150°46.5 165°46.6	39.7 40.4	75°58.6 90°24.3	6.7' 6.8'	26°08.0 26°00.9	-7.1' -7.3'	57.9' 57.8'
23	SD = 15.9'	d = 0.7'	90 24.3		D = 16.0'	-1.3	37.0
	3D = 15.9	u = 0.7			D = 10.0		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°46.6	N15°41.2	104°50.1	6.9'	N25°53.6	-7.4'	57.8'
1 2	195°46.7 210°46.7	41.9 42.6	119°16.1 133°42.1	7.1' 7.2'	25°46.2 25°38.7	-7.5' -7.7'	57.8' 57.7'
3	210°46.7 225°46.8	42.6 •• 43.4	133°42.1 148°08.3	7.2	25°38.7 25°31.0	-7.7' -7.8'	57.7'
3 4	240°46.9	44.1	162°34.6	7.4'	25°23.2	-7.6 -8.0'	57.7'
5	255°46.9	44.8	177°01.1	7.6'	25°15.2	-8.1	57.6'
6	270°47.0	N15°45.6	191°27.6	7.7'	N25°07.2	-8.2'	57.6'
7	285°47.1	46.3	205°54.3	7.8'	24°58.9	-8.3'	57.5'
8	300°47.1	47.0	220°21.2	8.0'	24°50.6	-8.5'	57.5
9	315°47.2	• • 47.7	234°48.1	8.1'	24°42.1	-8.6'	57.5'
10	330°47.2 345°47.3	48.5	249°15.2 263°42.4	8.2'	24°33.5 24°24.8	-8.7'	57.4'
11 12	345 47.3 0°47.4	49.2 N15°49.9	263°42.4 278°09.8	8.4' 8.5'	24°24.8 N24°15.9	-8.9' -9.0'	57.4' 57.3'
13	15°47.4	50.7	292°37.3	8.6'	24°07.0	-9.0 -9.1'	57.3'
14	30°47.5	51.4	307°04.9	8.7'	23°57.9	-9.2'	57.3
15	45°47.5	• • 52.1	321°32.6	8.9'	23°48.6	-9.3'	57.2'
16	60°47.6	52.9	336°00.5	9.0'	23°39.3	-9.4'	57.2'
17	75°47.7	53.6	350°28.5	9.1'	23°29.9	-9.6'	57.2'
18	90°47.7	N15°54.3	4°56.6	9.3'	N23°20.3	-9.7'	57.1'
19 20	105°47.8 120°47.8	55.0 55.8	19°24.9 33°53.3	9.4' 9.5'	23°10.6 23°00.9	-9.8' -9.9'	57.1' 57.0'
20	120°47.8 135°47.9	55.8 •• 56.5	33°53.3 48°21.8	9.6'	23°00.9 22°51.0	-9.9' -10.0'	57.0° 57.0°
22	150°48.0	57.2	48 21.8 62°50.4	9.6 9.8'	22°41.0	-10.0	57.0'
23	165°48.0	57.9	77°19.2	9.9'	22°30.9	-10.1	56.9'
	SD = 15.9'	d = 0.7'		S	D = 15.8'		

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

Lat.		Moonris	e		Moonset	;
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°						
<b>N</b> 70°						
68°						
66°			06.06			04.10
64° 62°		04:57	06:26 07:15		03:36	04:10 03:20
60°	04:37	06:00	07:15	01:45	03:30	03:20
N 58°	05:17	06:34	08:10	01:05	01:59	02:25
56°	05:45	06:59	08:28	00:37	01:34	02:25
54°	06:06	07:19	08:44	00:16	01:13	01:49
52°	06:24	07:36	08:58		00:56	01:35
50°	06:40	07:50	09:09		00:42	01:23
45°	07:11	08:20	09:34		00:12	00:57
N 40°	07:35	08:42	09:53	23:49		00:37
35°	07:55	09:01	10:10	23:29		00:20
30° 20°	08:12 08:40	09:17 09:45	10:23 10:47	23:13 22:45	23:40	00:05
N 10°	09:05	10:08	11:08	22:45	23:40	
0°	09:28	10:30	11:27	21:58	22:58	23:52
<b>S</b> 10°	09:51	10:52	11:46	21:35	22:37	23:35
20°	10:16	11:15	12:06	21:11	22:15	23:16
30°	10:45	11:42	12:29	20:43	21:49	22:54
35°	11:02	11:58	12:43	20:26	21:34	22:42
40°	11:22	12:16	12:59	20:06	21:16	22:27
45°	11:46	12:39	13:17	19:42	20:54	22:09
<b>S</b> 50°	12:17	13:07	13:40	19:11	20:27	21:48
52° 54°	12:33 12:51	13:21 13:36	13:51 14:04	18:55 18:37	20:13 19:58	21:37 21:25
56°	13:13	13:55	14:04	18:15	19:58 19:40	21:25
58°	13:42	14:18	14:35	17:47	19:40	20:55
<b>S</b> 60°	14:24	14:48	14:55	17:05	18:47	20:36

		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	15-34%		
01	02:53	02:57	11:57	15:43	03:11			
02	03:00	03:03	11:57	16:44	04:14			
03	03:06	03:09	11:57	17:39	05:12			

h _	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	222°08.1	220°36.5	N01°20.5	92°14.0	N20°24.0	140°51.2	N22°57.9	223°02.0	S02°34.8	Alpheratz	357°34.8	29°13.6
1	$237^{\circ}10.5$	235°37.4	20.7	107° 15.2	23.7	155°53.2	57.9	238°04.2	34.7	Ankaa	353°07.2	-42° 10.0
2	252°13.0	250°38.3	21.0	$122^{\circ}16.5$	23.3	170°55.1	57.9	253°06.5	34.6	Schedar	349°31.3	56° 40.4
3	267°15.5	265°39.1	• • 21.3	137° 17.8	• • 23.0	185°57.0	• • 58.0	268°08.7	• • 34.5	Diphda	349° 47.3	-17° 50.9
4	282°17.9	280°40.0	21.6	$152^{\circ}19.1$	22.6	200°58.9	58.0	283°11.0	34.5	Achernar	335°20.5	-17 30.9 -57°06.4
5	297°20.4	295°40.9	21.9	167°20.3	22.3	$216^{\circ}00.8$	58.0	298°13.2	34.4	Hamal	327°51.3	23°34.8
6	312°22.8	310°41.8	N01°22.1	$182^{\circ}21.6$	N20°21.9	231°02.7	N22°58.1	313°15.4	S02°34.3	Polaris	314°24.5	89°22.2
7	327°25.3	325°42.7	22.4	$197^{\circ}22.9$	21.6	246°04.6	58.1	328°17.7	34.2	Acamar	314°24.5	-40°12.2
8	342°27.8	340°43.5	22.7	212°24.1	21.3	261°06.5	58.1	343°19.9	34.1	Menkar	314°06.2	4°11.3
9	357°30.2	355°44.4	• • 23.0	227° 25.4	• • 20.9	276°08.5	• • 58.2	358°22.1	• • 34.0	Mirfak	308°28.4	49°57.0
10	12°32.7	10°45.3	23.3	242°26.7	20.6	291°10.4	58.2	13°24.4	33.9	Aldebaran	290°39.7	16°33.6
11	27°35.2	25°46.1	23.5	257°27.9	20.2	306°12.3	58.3	28°26.6	33.8	Rigel	281°03.9	-8° 10.4
12	42°37.6	40°47.0	N01°23.8	272°29.2	N20° 19.9	321°14.2	N22°58.3	43°28.8	S02°33.7	Capella	280°21.9	46°01.5
13	57°40.1	55°47.9	24.1	287°30.5	19.5	$336^{\circ}16.1$	58.3	58°31.1	33.6	Bellatrix	278°22.9	6°22.3
14	72°42.6	70°48.7	24.4	302°31.8	19.2	351°18.0	58.4	73°33.3	33.5	Elnath	278°01.9	28°37.7
15	87°45.0	85°49.6	• • 24.7	317°33.0	• • 18.8	$6^{\circ}19.9$	• • 58.4	88°35.5	• • 33.5	Alnilam	275°37.7	-1°11.2
16	102°47.5	100°50.4	25.0	332°34.3	18.5	21°21.8	58.4	103°37.8	33.4	Betelgeuse	270°52.1	7°24.7
17	117°50.0	115°51.3	25.3	347°35.6	18.1	36°23.7	58.5	118°40.0	33.3	Canopus	263°52.6	-52°42.7
18	132°52.4	130°52.1	N01°25.6	2°36.8	N20°17.8	51°25.7	N22°58.5	133°42.3	S02°33.2	Sirius	258°26.2	-16°45.2
19	147°54.9	145°53.0	25.9	$17^{\circ}38.1$	17.4	66°27.6	58.5	148°44.5	33.1		255°05.9	-10° 43.2
20	162°57.3	160°53.9	26.2	32°39.4	17.1	81°29.5	58.6	163°46.7	33.0	Adhara Procyon	255 05.9 244°50.7	-29 00.6 5°09.6
21	$177^{\circ}59.8$	175°54.7	• • 26.5	47°40.6	• • 16.7	96°31.4	• • 58.6	178°49.0	• • 32.9	,	244°50.7 243°17.1	5°09.6 27°58.0
22	193°02.3	190°55.5	26.8	62°41.9	16.4	111°33.3	58.6	193°51.2	32.8	Pollux		
23	208°04.7	205°56.4	27.1	77°43.2	16.0	126°35.2	58.7	208°53.4	32.7	Avior	234°14.8	-59°35.7
	00:10		_		_				.1′ m1.17	Suhail	222°46.1	-43°32.3
ıvıer.p	ass. 09:10	$\nu_{0.9}$ d0.	3′ m-4.69	$\nu$ 1.3 d-0	0.3′ m0.98	$\nu$ 1.9' $a$ 0.	.0′ m-1.97	$\nu$ 2.2 d-0	.ı mı.1/	Miaplacidus	221°38.3	-69°49.5
										Alphard	217°47.5	-8°46.2
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.1	11°50.6
0	223°07.2	220°57.2	N01°27.4	92°44.4	N20° 15.7	141°37.1	N22°58.7	223°55.7	S02°32.6	Dubhe	193°40.3	61°37.1
1	238°09.7	235°58.1	27.7	107°45.7	15.3	156°39.0	58.7	238°57.9	32.6	Denebola	182°24.5	14°25.8
2	253°12.1	250°58.9	28.0	122°47.0	15.0	171°40.9	58.8	254°00.2	32.5	Gienah	175°43.1	-17°41.1
3	268°14.6	265°59.8	28.3	137°48.2	• • 14.6	186°42.8	• • 58.8	269°02.4	32.4	Acrux	172°59.3	-63°14.6
4	283°17.1	281°00.6	28.6	152°49.5	14.3	201°44.8	58.9	284°04.6	32.3	Gacrux	171°50.9	-57° 15.5
5	298°19.5	296°01.4	28.9	167° 50.7	13.9	216°46.7	58.9	299°06.9	32.2	Alioth	166°12.2	55°49.4
6	313°22.0	311°02.3	N01°29.2	182°52.0	N20° 13.6	231°48.6	N22°58.9	314°09.1	S02°32.1	Spica	158°21.7	-11°17.8
7	328°24.4	326°03.1	29.5	197°53.3	13.2	246°50.5	59.0	329°11.3	32.0	Alkaid	152°51.3	49°11.2
8	343°26.9	341°03.9	29.8	212°54.5	12.9	261°52.4	59.0	344°13.6	31.9	Hadar	148°35.1	-60°29.8
9	358°29.4	356°04.8	30.1	227°55.8	. 12.5	276°54.3	• • 59.0	359°15.8	31.8	Menkent	147°56.9	-36°29.8
10	13°31.8	11°05.6	30.4	242°57.1	12.2	291°56.2	59.1	14°18.1	31.7	Arcturus	145°47.3	19°02.9
11	28°34.3	26°06.4	30.7	257°58.3	11.8	306°58.1	59.1	29°20.3	31.7	Rigil Kent.	139°39.3	-60°56.5
12	43°36.8	41°07.3	N01°31.0	272°59.6	N20° 11.5	322°00.0	N22°59.1	44°22.5	S02°31.6	Kochab	137°18.6	74°03.0
13	58°39.2	56°08.1	31.4	288°00.9	11.1	337°01.9	59.2	59°24.8	31.5	Zuben'ubi	136°55.4	-16°08.9
14	73°41.7	71°08.9	31.7	303°02.1	10.8	352°03.8	59.2	74°27.0	31.4	Alphecca	126°03.2	26° 37.6
15	88°44.2	86°09.7	32.0	318°03.4	10.4	7°05.7	59.2	89°29.2	31.3	Antares	112°15.2	-26°29.3
16	103°46.6	101°10.5	32.3	333°04.6	10.4	22°07.7	59.3	104°31.5	31.3	Atria	107°08.7	-69°04.3
17	118°49.1	116°11.4	32.6	348° 05.9	09.7	37°09.6	59.3	119°33.7	31.1	Sabik	102°02.2	-15°45.4
18	133°51.6	131°12.2	N01°33.0		N20°09.4	52°11.5	N22°59.3	134°36.0	S02°31.0	Shaula	96°09.7	-37°07.3
19	148°54.0	146°13.0	33.3	18°08.4	09.0	67°13.4	59.4	149°38.2	30.9	Rasalhague	95°58.1	12°32.3
20	163°56.5	161°13.8	33.6	33°09.7	08.7	82°15.3	59.4	164°40.4	30.8	Eltanin	90°41.7	51°28.8
21	178°58.9	176°14.6	33.9	48°11.0	08.3	97°17.2	59.4	179°42.7	30.8	Kaus Aust.	83°31.9	-34°22.3
22	194°01.4	191°15.4	34.2	63°12.2	08.0	112°19.1	59.5	194°44.9	30.7	Vega	80°32.8	38°48.1
23	209°03.9	206°16.2	34.6	78° 13.5	07.6	112 19.1 127°21.0	59.5	209°47.2	30.6	Nunki	75°47.3	-26° 15.9
23	209 03.9							209 41.2	30.0	Altair	61°59.6	8°55.9
Mer.p	ass. 09:06	$\nu$ 0.8′ d0.	3′ m-4.68	$\nu$ 1.3 $^{\prime}$ d-0	0.3′ m0.99	$\nu$ 1.9 $^{\prime}$ d0.	.0′ m-1.97	$\nu$ 2.2′ d-0	.1' m1.16	Peacock	53°05.2	-56°39.0
										Deneb	49°25.6	45°21.9
Tura	CHA	СПФ	Daa	CHA	Dan	CUA	Daz.	CHA	Daa	Enif	33°38.6	9°59.3
Tue	<b>GHA</b> 224°06.3	<b>GHA</b> 221°17.0	<b>Dec</b> N01°34.9	<b>GHA</b> 93° 14.7	<b>Dec</b> N20°07.3	<b>GHA</b> 142°22.9	<b>Dec</b> N22°59.5	<b>GHA</b> 224°49.4	<b>Dec</b> \$02°30.5	Al Na'ir	27°32.7	-46°50.1
0	224°06.3 239°08.8					142°22.9 157°24.8		224 49.4 239°51.6		Fomalhaut	15°14.4	-29°29.2
1		236°17.8	35.2	108° 16.0	06.9		59.6		30.4	Scheat	13°45.2	28° 13.0
2	254°11.3 269°13.7	251°18.6 266°19.4	35.6	123°17.3	06.6	172°26.7 187°28.6	59.6	254°53.9	30.3	Markab	13°29.8	15°20.3
3			· · 35.9	138° 18.5	· · 06.2		· · 59.7	269°56.1 284°58.4	· · 30.2	May 04 Sun	SHA	Mor noce
4	284°16.2	281°20.2 296°21.0	36.2	153° 19.8	05.8 05.5	202°30.5	59.7		30.1	Venus	358°28.4	Mer.pass 09:17
5	299°18.7		36.6	168°21.0	05.5 N20°05.1	217°32.4	59.7	300°00.6	30.0	Mars	230°05.9	17:50
6	314°21.1	311°21.8	N01°36.9	183°22.3	N20°05.1	232°34.4	N22°59.8	315°02.8	S02°30.0			
7	329°23.6	326°22.6	37.2	198°23.6	04.8	247°36.3	59.8	330°05.1	29.9	Jupiter Saturn	278°43.2	14:35
8	344°26.1	341°23.4	37.6	213°24.8	04.4	262°38.2	59.8	345°07.3	29.8	Jaturn	0°54.0	09:07
9	359°28.5 14°31.0	356°24.2	• • 37.9	228°26.1	04.1	277°40.1	59.9	0°09.6	• • 29.7	May 05 Mon	SHA	Mer.pass
10	14 31 ()	11°25.0	38.2	243°27.3	03.7	292°42.0	59.9	15°11.8	29.6	Venus	357°50.0	09:16
10			38.6	258°28.6 273°29.8	03.4	307°43.9	22°59.9	30°14.0	29.5	Mars	229°37.2	17:48
11	29°33.4	26°25.8			N20°03.0	322°45.8	N23°00.0	45°16.3 60°18.5	S02°29.4	Jupiter	278°29.9	14:32
11 12	29°33.4 44°35.9	41°26.6	N01°38.9		00.0		0.00		29.3			09:03
11 12 13	29°33.4 44°35.9 59°38.4	41°26.6 56°27.4	39.3	$288^{\circ}31.1$	02.6	337°47.7				Saturn	0°48.5	09.03
11 12 13 14	29°33.4 44°35.9 59°38.4 74°40.8	41°26.6 56°27.4 71°28.2	39.3 39.6	288°31.1 303°32.4	02.3	$352^{\circ}49.6$	0.00	$75^{\circ}20.8$	29.2			
11 12 13 14 15	29°33.4 44°35.9 59°38.4 74°40.8 89°43.3	41°26.6 56°27.4 71°28.2 86°28.9	39.3 39.6 · · 39.9	288°31.1 303°32.4 318°33.6	02.3 · · 01.9	352°49.6 7°51.5	00.0 · · 00.1	75°20.8 90°23.0	29.2 · · 29.2	May 06 Tue	SHA	Mer.pass
11 12 13 14 15 16	29°33.4 44°35.9 59°38.4 74°40.8 89°43.3 104°45.8	41°26.6 56°27.4 71°28.2 86°28.9 101°29.7	39.3 39.6 · · 39.9 40.3	288°31.1 303°32.4 318°33.6 333°34.9	02.3 · · 01.9 01.6	352°49.6 7°51.5 22°53.4	00.0 · · 00.1 00.1	75°20.8 90°23.0 105°25.2	29.2 •• 29.2 29.1	May 06 Tue Venus	<b>SHA</b> 357°10.7	Mer.pass 09:14
11 12 13 14 15 16 17	29°33.4 44°35.9 59°38.4 74°40.8 89°43.3 104°45.8 119°48.2	41°26.6 56°27.4 71°28.2 86°28.9 101°29.7 116°30.5	39.3 39.6 · · 39.9 40.3 40.6	288° 31.1 303° 32.4 318° 33.6 333° 34.9 348° 36.1	02.3 · · 01.9 01.6 01.2	352°49.6 7°51.5 22°53.4 37°55.3	00.0 · · 00.1 00.1 00.1	75°20.8 90°23.0 105°25.2 120°27.5	29.2 •• 29.2 29.1 29.0	May 06 Tue Venus Mars	<b>SHA</b> 357°10.7 229°08.4	Mer.pass 09:14 17:46
11 12 13 14 15 16 17	29°33.4 44°35.9 59°38.4 74°40.8 89°43.3 104°45.8 119°48.2 134°50.7	41°26.6 56°27.4 71°28.2 86°28.9 101°29.7 116°30.5 131°31.3	39.3 39.6 · · 39.9 40.3 40.6 N01°41.0	288° 31.1 303° 32.4 318° 33.6 333° 34.9 348° 36.1 3° 37.4	02.3 · · 01.9 01.6 01.2 N20° 00.9	352°49.6 7°51.5 22°53.4 37°55.3 52°57.2	00.0 · · 00.1 00.1 00.1 N23°00.2	75°20.8 90°23.0 105°25.2 120°27.5 135°29.7	29.2 · · 29.2 29.1 29.0 \$02°28.9	May 06 Tue Venus Mars Jupiter	SHA 357°10.7 229°08.4 278°16.6	Mer.pass 09:14 17:46 14:29
11 12 13 14 15 16 17 18 19	29°33.4 44°35.9 59°38.4 74°40.8 89°43.3 104°45.8 119°48.2 134°50.7 149°53.2	41°26.6 56°27.4 71°28.2 86°28.9 101°29.7 116°30.5 131°31.3 146°32.0	39.3 39.6 · · 39.9 40.3 40.6 N01°41.0 41.3	288° 31.1 303° 32.4 318° 33.6 333° 34.9 348° 36.1 3° 37.4 18° 38.6	02.3 · · 01.9 01.6 01.2 N20° 00.9 00.5	352°49.6 7°51.5 22°53.4 37°55.3 52°57.2 67°59.1	00.0 · · 00.1 00.1 00.1 N23°00.2 00.2	75°20.8 90°23.0 105°25.2 120°27.5 135°29.7 150°32.0	29.2 · · 29.2 29.1 29.0 \$02°28.9 28.8	May 06 Tue Venus Mars	<b>SHA</b> 357°10.7 229°08.4	Mer.pass 09:14 17:46 14:29
11 12 13 14 15 16 17 18 19 20	29° 33.4 44° 35.9 59° 38.4 74° 40.8 89° 43.3 104° 45.8 119° 48.2 134° 50.7 149° 53.2 164° 55.6	41°26.6 56°27.4 71°28.2 86°28.9 101°29.7 116°30.5 131°31.3 146°32.0 161°32.8	39.3 39.6 ·· 39.9 40.3 40.6 N01°41.0 41.3 41.7	288° 31.1 303° 32.4 318° 33.6 333° 34.9 348° 36.1 3° 37.4 18° 38.6 33° 39.9	02.3 · · 01.9 01.6 01.2 N20°00.9 00.5 20°00.2	352°49.6 7°51.5 22°53.4 37°55.3 52°57.2 67°59.1 83°01.0	00.0 · · 00.1 00.1 00.1 N23°00.2 00.2 00.2	75°20.8 90°23.0 105°25.2 120°27.5 135°29.7 150°32.0 165°34.2	29.2 · · 29.2 29.1 29.0 \$02°28.9 28.8 28.7	May 06 Tue Venus Mars Jupiter Saturn	SHA 357°10.7 229°08.4 278°16.6 0°43.1	Mer.pass 09:14 17:46 14:29 08:59
11 12 13 14 15 16 17 18 19 20 21	29° 33.4 44° 35.9 59° 38.4 74° 40.8 89° 43.3 104° 45.8 119° 48.2 134° 50.7 149° 53.2 164° 55.6 179° 58.1	41°26.6 56°27.4 71°28.2 86°28.9 101°29.7 116°30.5 131°31.3 146°32.0 161°32.8 176°33.6	39.3 39.6 ·· 39.9 40.3 40.6 N01°41.0 41.3 41.7 ·· 42.0	288° 31.1 303° 32.4 318° 33.6 333° 34.9 348° 36.1 3° 37.4 18° 38.6 33° 39.9 48° 41.2	02.3 · · 01.9 01.6 01.2 N20°00.9 00.5 20°00.2 19°59.8	352°49.6 7°51.5 22°53.4 37°55.3 52°57.2 67°59.1 83°01.0 98°02.9	00.0 · · 00.1 00.1 00.1 N23° 00.2 00.2 00.2 · · 00.3	75° 20.8 90° 23.0 105° 25.2 120° 27.5 135° 29.7 150° 32.0 165° 34.2 180° 36.4	29.2 · · 29.2 29.1 29.0 \$02°28.9 28.8 28.7 · · 28.6	May 06 Tue Venus Mars Jupiter Saturn	SHA 357°10.7 229°08.4 278°16.6 0°43.1	Mer.pass 09:14 17:46 14:29 08:59
11 12 13 14 15 16 17 18 19 20 21 22	29° 33.4 44° 35.9 59° 38.4 74° 40.8 89° 43.3 104° 45.8 119° 48.2 134° 50.7 149° 53.2 164° 55.6 179° 58.1 195° 00.5	41°26.6 56°27.4 71°28.2 86°28.9 101°29.7 116°30.5 131°31.3 146°32.0 161°32.8 176°33.6 191°34.4	39.3 39.6 · · 39.9 40.3 40.6 N01°41.0 41.3 41.7 · · 42.0 42.4	288° 31.1 303° 32.4 318° 33.6 333° 34.9 348° 36.1 3° 37.4 18° 38.6 33° 39.9 48° 41.2 63° 42.4	02.3 · · 01.9 01.6 01.2 N20°00.9 00.5 20°00.2 19°59.8 59.4	352°49.6 7°51.5 22°53.4 37°55.3 52°57.2 67°59.1 83°01.0 98°02.9 113°04.8	00.0 · · 00.1 00.1 00.1 N23° 00.2 00.2 00.2 · · 00.3 00.3	75° 20.8 90° 23.0 105° 25.2 120° 27.5 135° 29.7 150° 32.0 165° 34.2 180° 36.4 195° 38.7	29.2 · · 29.2 29.1 29.0 S02°28.9 28.8 28.7 · · 28.6 28.5	May 06 Tue Venus Mars Jupiter Saturn	SHA 357°10.7 229°08.4 278°16.6 0°43.1 al parallax Venus:	Mer.pass 09:14 17:46 14:29 08:59
11 12 13 14 15 16 17 18 19 20 21	29° 33.4 44° 35.9 59° 38.4 74° 40.8 89° 43.3 104° 45.8 119° 48.2 134° 50.7 149° 53.2 164° 55.6 179° 58.1	41°26.6 56°27.4 71°28.2 86°28.9 101°29.7 116°30.5 131°31.3 146°32.0 161°32.8 176°33.6	39.3 39.6 ·· 39.9 40.3 40.6 N01°41.0 41.3 41.7 ·· 42.0	288° 31.1 303° 32.4 318° 33.6 333° 34.9 348° 36.1 3° 37.4 18° 38.6 33° 39.9 48° 41.2	02.3 · · 01.9 01.6 01.2 N20°00.9 00.5 20°00.2 19°59.8	352°49.6 7°51.5 22°53.4 37°55.3 52°57.2 67°59.1 83°01.0 98°02.9	00.0 · · 00.1 00.1 00.1 N23° 00.2 00.2 00.2 · · 00.3	75° 20.8 90° 23.0 105° 25.2 120° 27.5 135° 29.7 150° 32.0 165° 34.2 180° 36.4	29.2 · · 29.2 29.1 29.0 \$02°28.9 28.8 28.7 · · 28.6	May 06 Tue Venus Mars Jupiter Saturn	SHA 357°10.7 229°08.4 278°16.6 0°43.1	Mer.pass 09:14 17:46 14:29 08:59

h	Sun	1			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°48.1	$N15^{\circ}58.7$	91°48.1	10.0'	$N22^{\circ}20.7$	-10.3'	56.9'
1	195°48.1	15°59.4	106° 17.1	10.1'	22° 10.4	-10.4'	56.9'
2	210°48.2	16°00.1	120°46.2	10.3'	22°00.0	-10.5'	56.8'
3	225°48.3	00.8	135°15.5	10.4'	21°49.5	-10.6'	56.8'
4	240°48.3 255°48.4	01.6 02.3	149°44.9 164°14.4	10.5' 10.6'	21°38.9 21°28.2	-10.7'	56.8' 56.7'
5 6	255 48.4 270°48.4	02.3 N16°03.0	104 14.4 178°44.0	10.8	N21°17.4	-10.8' -10.9'	56.7
7	285°48.5	03.7	176 44.0 193°13.8	10.6	21°06.5	-10.9	56.6
8	300°48.5	04.4	207°43.7	11.0'	21° 00.5 20° 55.5	-11.1'	56.6
9	315°48.6	• • 05.2	222°13.7	11.1'	20°44.5	-11.1'	56.6'
10	330°48.6	05.9	236°43.8	11.2'	20°33.3	-11.2'	56.5'
11	345°48.7	06.6	251°14.0	11.4'	20°22.1	-11.3'	56.5'
12	0°48.8	N16°07.3	265°44.4	11.5'	N20° 10.8	-11.4'	56.5'
13	15°48.8	08.0	280°14.8	11.6'	19°59.4	-11.5'	56.4'
14	30°48.9	08.7	294°45.4	11.7'	19°47.9	-11.6'	56.4'
15	45°48.9	• • 09.5	309°16.1	11.8'	19°36.3	-11.6'	56.4'
16	60°49.0	10.2	323°46.9	11.9'	19°24.7	-11.7'	56.3'
17	75°49.0	10.9	338°17.9	12.0'	19°13.0	-11.8'	56.3'
18	90°49.1	N16°11.6	352°48.9	12.2'	N19°01.2	-11.9'	56.3'
19	105°49.1 120°49.2	12.3 13.0	7°20.1 21°51.3	12.3' 12.4'	18° 49.3 18° 37.4	-11.9'	56.2' 56.2'
20 21	120°49.2 135°49.2	13.0	21°51.3 36°22.7	12.4	18° 37.4 18° 25.4	-12.0' -12.1'	56.2'
22	135 49.2 150°49.3	14.5	50° 54.2	12.5 12.6'	18° 13.3	-12.1 -12.2'	56.2 56.1
23	150 49.3 165°49.4	14.5 15.2	50 54.2 65°25.7	12.7'	18 13.3 18°01.1	-12.2'	56.1'
23			- 33 23.1			14.4	50.1
	SD = 15.9'	d = 0.7'		SI	O = 15.5'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°49.4	$N16^{\circ}15.9$	79°57.4	12.8'	$N17^{\circ}48.9$	-12.3'	56.1'
1	195°49.5	16.6	94°29.2	12.9'	17°36.6	-12.4'	56.0'
2	210°49.5	17.3	109°01.1	13.0'	17°24.3	-12.4'	56.0'
3	225°49.6	• • 18.0	123°33.1	13.1'	17° 11.9	-12.5'	56.0'
4	240°49.6	18.7	138°05.2	13.2'	16°59.4	-12.5'	56.0'
5	255°49.7	19.5	152°37.4	13.3'	16°46.9	-12.6'	55.9'
6	270°49.7	N16°20.2	167°09.7	13.4'	N16°34.3	-12.7'	55.9'
7 8	285°49.8 300°49.8	20.9 21.6	181°42.1 196°14.6	13.5' 13.6'	16°21.6 16°08.9	-12.7' -12.8'	55.9' 55.8'
9	315°49.9	22.3	210°47.2	13.7'	15°56.1	-12.8'	55.8'
10	330°49.9	23.0	210 47.2 225°19.9	13.8'	15°43.3	-12.9'	55.8'
11	345°50.0	23.7	239°52.7	13.9'	15° 30.4	-12.9'	55.7'
12	0°50.0	N16°24.4	254°25.6	14.0'	N15° 17.5	-13.0'	55.7'
13	15°50.1	25.1	268°58.5	14.1'	15°04.5	-13.0'	55.7'
14	30°50.1	25.8	283°31.6	14.1'	14°51.5	-13.1'	55.7'
15	45°50.2	• • 26.5	298°04.7	14.2'	14°38.4	-13.1'	55.6'
16	60°50.2	27.2	312°37.9	14.3'	14°25.3	-13.2'	55.6'
17	75°50.3	27.9	327°11.2	14.4'	14° 12.1	-13.2'	55.6'
18	90°50.3	N16°28.6	341°44.6	14.5'	N13°58.9	-13.3'	55.5'
19	105°50.4	29.4	356°18.1		13°45.6		55.5'
20	120°50.4	30.1	10°51.7	14.6'	13°32.3	-13.4'	55.5'
21	135°50.4 150°50.5	· · 30.8 31.5	25°25.3 39°59.1	14.7' 14.8'	13° 18.9 13° 05.5	-13.4' -13.4'	55.5' 55.4'
22 23	165°50.5	32.2	54°32.9	14.0	13 05.5 12°52.1	-13.4	55.4'
23	SD = 15.9'	$\frac{32.2}{d=0.7'}$	J+ J2.9		D = 15.3'	-13.3	55.4
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°50.6	N16°32.9	69°06.7	15.0'	N12°38.6	-13.5'	55.4'
1	195°50.6 210°50.7	33.6	83°40.7 98°14.7	15.0' 15.1'	12°25.1 12°11.6	-13.6'	55.4' 55.3'
2	210°50.7 225°50.7	34.3 · · 35.0	98°14.7 112°48.8	15.1° 15.2'	12°11.6 11°58.0	-13.6' -13.6'	55.3'
3 4	240°50.8	35.7	112 48.8 127°23.0	15.2'	11 58.0 11°44.4	-13.0 -13.7'	55.3'
5	255°50.8	36.4	127 23.0 141°57.2	15.2	11°44.4 11°30.7	-13.7'	55.3'
6	270°50.9	N16°37.1	141 57.2 156°31.6	15.4	N11°17.0	-13.7'	55.2
7	285°50.9	37.8	171°05.9	15.5'	11°03.3	-13.8'	55.2'
8	300°51.0	38.5	185°40.4	15.5'	10°49.5	-13.8'	55.2'
9	315°51.0	• • 39.2	200°14.9	15.6'	10°35.8	-13.8'	55.2'
10	330°51.0	39.9	214°49.5	15.6'	$10^{\circ}21.9$	-13.8'	55.1'
11	345°51.1	40.6	229°24.1	15.7'	10°08.1	-13.9'	55.1'
12	0°51.1	N16°41.2	243°58.9	15.8'	N09°54.2	-13.9'	55.1'
13	15°51.2	41.9	258°33.6	15.8'	09°40.3	-13.9'	55.1'
14	30°51.2	42.6	273°08.4	15.9'	09°26.4	-13.9'	55.0'
15	45°51.3	• • 43.3	287°43.3	15.9'	09°12.5	-14.0'	55.0'
16	60°51.3	44.0	302°18.3	16.0'	08°58.5	-14.0'	55.0'
17	75°51.3	44.7	316°53.3	16.1'	08°44.5	-14.0'	55.0'
18 19	90°51.4 105°51.4	N16°45.4 46.1	331°28.3 346°03.4	16.1' 16.2'	N08° 30.5 08° 16.4	-14.0' -14.1'	54.9' 54.9'
20	105°51.4 120°51.5	46.1 46.8	0°38.6	16.2'	08° 16.4 08° 02.4	-14.1' -14.1'	54.9' 54.9'
20	120 51.5 135°51.5	40.8 •• 47.5	0 38.0 15°13.8	16.2	08 02.4 07°48.3	-14.1 -14.1'	54.9'
22	150°51.6	48.2	29°49.1	16.3'	07 46.3 07°34.2	-14.1'	54.9'
23	165°51.6	48.9	44°24.4	16.4	07°20.1	-14.1'	54.8'
	SD = 15.8'	d = 0.7'			D = 15.1'		
	2D = 12.8.	u = 0.7		51	r = 10.1		

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

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

		Sun		Moon				
Day	Eqn.of	f Time	Mer.	Mer.Pass.		Age		
Duy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper Lower		7-9		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	44-64%		
04	03:12	03:15	11:57	18:30	06:05			
05	03:18	03:20	11:57	19:15	06:53			
06	03:22	03:25	11:57	19:57	07:37			

h	Aries	Ver	านร	М	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	225°05.5	221°35.9	N01°43.1	93°44.9	N19°58.7	143°08.6	N23°00.4	225°43.2	S02°28.4			Dec
	240°07.9	221 35.9 236°36.7	43.4	93 44.9 108°46.2		143 06.0 158° 10.5	00.4	240°45.4		Alpheratz	357°34.8	29°13.6
1	255°10.4	250 30.7 251°37.4		100 40.2 123°47.4	58.4	173° 12.5		240 45.4 255°47.6	28.3	Ankaa	353°07.2	-42°10.0
2			43.8		58.0		00.4		28.2	Schedar	349°31.2	56°40.4
3	270°12.9	266° 38.2	• • 44.2	138°48.7	• • 57.6	188°14.4	• • 00.5	270°49.9	28.1	Diphda	348°47.3	-17°50.9
4	285°15.3	281°39.0	44.5	153°49.9	57.3	203°16.3	00.5	285°52.1	28.0	Achernar	335°20.5	-57°06.4
5	300°17.8	296° 39.7	44.9	168°51.2	56.9	218°18.2	00.5	300°54.4	27.9	Hamal	327°51.3	23°34.8
6	315°20.3	311°40.5	N01°45.2	183°52.4	N19°56.6	233°20.1	N23°00.6	315°56.6	S02°27.8	Polaris	314°24.5	89°22.2
7	330°22.7	326°41.2	45.6	198°53.7	56.2	248°22.0	00.6	330°58.9	27.7	Acamar	315°12.0	-40°12.2
8	345°25.2	341°42.0	46.0	213°55.0	55.9	263°23.9	00.6	$346^{\circ}01.1$	27.7	Menkar	314°06.2	4°11.3
9	0°27.7	356° 42.8	• • 46.3	228°56.2	• • 55.5	278°25.8	• • 00.7	1°03.3	• • 27.6	Mirfak	308°28.4	49°57.0
10	15°30.1	11°43.5	46.7	243°57.5	55.1	293°27.7	00.7	16°05.6	27.5	1		
11	30°32.6	26°44.3	47.1	258°58.7	54.8	308°29.6	00.7	31°07.8	27.4	Aldebaran	290°39.7	16°33.6
12	45°35.0	41°45.0	N01°47.4	274°00.0	N19°54.4	323°31.5	N23°00.8	46°10.1	S02°27.3	Rigel	281°03.9	-8°10.4
13	60°37.5	56°45.8	47.8	289°01.2	54.1	338°33.4	8.00	61°12.3	27.2	Capella	280°21.9	46°01.5
14	75°40.0	71°46.5	48.2	304°02.5	53.7	353°35.3	00.8	76°14.6	27.1	Bellatrix	278°22.9	6°22.3
15	90°42.4	86°47.3	• • 48.5	319°03.7	• • 53.3	8°37.2	00.9	91°16.8	27.0	Elnath	278°01.9	28°37.7
16	105°44.9	101°48.0	48.9	334°05.0	53.0	23°39.1	00.9	106°19.0	27.0	Alnilam	275°37.7	-1°11.2
17	120°47.4	116° 48.7	49.3	349°06.2	52.6	38°41.0	00.9	121°21.3	26.9	Betelgeuse	$270^{\circ}52.1$	7°24.7
18	135°49.8	131° 49.5	N01°49.6	4°07.5	N19°52.2	53°42.9	N23°01.0	136°23.5	S02°26.8	Canopus	263°52.7	-52°42.7
										Sirius	258°26.2	-16°45.2
19	150°52.3	146° 50.2	50.0	19°08.7	51.9	68°44.8	01.0	151°25.8	26.7	Adhara	255°05.9	-29°00.5
20	165°54.8	161°51.0	50.4	34° 10.0	51.5	83°46.7	01.0	166°28.0	26.6	Procyon	244°50.7	5°09.6
21	180°57.2	176°51.7	• • 50.8	49°11.2	• • 51.2	98°48.6	• • 01.1	181°30.3	• • 26.5	Pollux	243°17.1	27°58.0
22	195°59.7	191°52.4	51.2	64° 12.5	50.8	113°50.5	01.1	196°32.5	26.4	Avior	234°14.8	-59°35.7
23	211°02.1	206°53.2	51.5	79° 13.7	50.4	128°52.4	01.1	211°34.7	26.3	Suhail	222°46.2	-43°32.3
Mern	ass. 08:58	ν0.8′ d0.4	4′ m-4.66	1/1 3/ d C	0.4' m1.02	1/1 0/ do	.0′ m-1.97	1/2 2 <sup>1</sup> d 0	.1′ m1.16	Miaplacidus	221°38.3	-43° 32.5
ivier.p	ass. U0.30	νυ.ο αυ.	T 111-4.00	ν1.3 <i>α</i> -0	,. <del>+</del> 1111.U2	ν1.9 α0.	.0 111-1.97	ν ∠.∠ u-0	.1111.10		221 38.3 217°47.5	-8°46.2
										Alphard	217°47.5 207°34.1	-8°46.2 11°50.6
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus		
0	226°04.6	221°53.9	N01°51.9	94° 15.0	N19°50.1	143°54.3	N23°01.2	226°37.0	S02°26.3	Dubhe	193°40.4	61°37.1
1	241°07.1	236° 54.6	52.3	109° 16.2	49.7	158°56.2	01.2	241°39.2	26.2	Denebola	182°24.5	14°25.8
2	256°09.5	251°55.4	52.7	124° 17.5	49.4	173°58.1	01.2	256°41.5	26.1	Gienah	175°43.1	-17°41.1
										Acrux	172°59.3	-63°14.6
3	271°12.0	266°56.1	• • 53.1	139° 18.7	• • 49.0	189°00.0	• • 01.3	271°43.7	• • 26.0	Gacrux	171°51.0	-57°15.5
4	286°14.5	281°56.8	53.4	154°20.0	48.6	204°01.9	01.3	286°46.0	25.9	Alioth	$166^{\circ}12.2$	55°49.4
5	301°16.9	296° 57.6	53.8	169°21.2	48.3	219°03.8	01.3	301°48.2	25.8	Spica	158°21.7	-11°17.8
6	316°19.4	311°58.3	N01°54.2	184° 22.5	N19°47.9	234°05.7	N23°01.4	316°50.5	S02°25.7	Alkaid	152°51.3	49°11.2
7	$331^{\circ}21.9$	326°59.0	54.6	$199^{\circ}23.7$	47.5	249°07.6	01.4	331°52.7	25.6	Hadar	148°35.1	-60°29.9
8	346°24.3	341°59.7	55.0	214°25.0	47.2	264°09.5	01.4	346°54.9	25.6		147°57.0	-36°29.8
9	1°26.8	357°00.4	• • 55.4	229°26.2	• • 46.8	279°11.4	•• 01.5	1°57.2	• • 25.5	Arcturus	145°47.3	19°02.9
10	16°29.3	12°01.2	55.8	244°27.5	46.4	294°13.3	01.5	16°59.4	25.4	Rigil Kent.	139°39.3	-60°56.5
11	31°31.7	$27^{\circ}01.9$	56.2	259°28.7	46.1	309°15.2	01.5	32°01.7	25.3	Kochab	137°18.6	74°03.0
12	46°34.2	42°02.6	N01°56.5	274°30.0	N19°45.7	324°17.1	N23°01.6	47°03.9	S02°25.2			
13	61°36.6	57°03.3	56.9	289°31.2	45.3	339°19.0	01.6	62°06.2	25.1	Zuben'ubi	136°55.4	-16°08.9
14	76°39.1	72°04.0	57.3	304°32.5	45.0	354°20.9	01.6	77°08.4	25.0	Alphecca	126°03.2	26°37.6
15	91°41.6	87°04.7	• • 57.7	319°33.7	• • 44.6	9°22.8	01.7	92°10.7	25.0	Antares	112°15.2	-26°29.3
16	106°44.0	102°05.4	58.1	334°35.0	44.3	24°24.7	01.7	107°12.9	24.9	Atria	107°08.7	-69°04.3
17	100°44.0 121°46.5	102 05.4 117°06.2	58.5	349°36.2	43.9	39°26.6	01.7	107 12.9 122°15.1		Sabik	102°02.2	-15°45.4
									24.8	Shaula	96°09.7	-37°07.3
18	136°49.0	132°06.9	N01°58.9	4°37.5	N19°43.5	54°28.5	N23°01.8	137°17.4	S02°24.7	Rasalhague	95°58.0	12°32.3
19	151°51.4	147°07.6	59.3	19°38.7	43.2	69°30.4	01.8	152°19.6	24.6	Eltanin	90°41.7	51°28.8
20	166°53.9	162°08.3	01°59.7	34°40.0	42.8	84°32.3	01.8	167°21.9	24.5	Kaus Aust.	83°31.9	-34°22.3
21	181°56.4	177°09.0	02°00.1	49°41.2	• • 42.4	99°34.2	• • 01.9	182°24.1	• • 24.4	Vega	80°32.8	38°48.1
22	196°58.8	192°09.7	00.5	64°42.4	42.1	114°36.1	01.9	197°26.4	24.4	Nunki	75°47.2	-26°15.9
23	212°01.3	$207^{\circ}10.4$	00.9	79°43.7	41.7	129°38.0	01.9	212°28.6	24.3	Altair	61°59.6	8°55.9
1/1011	00.E4	ν0.7′ d0.4	1/ ma 1 6E	1 2/ .1 0	0.4' m1.03	1 0/ 40	0/ 1.06		1/1 16	Peacock	53°05.2	-56°39.0
ivier.p	ass. 08:54	νυ.τ αυ.	+ 111-4.05	ν1.3 d-0	7.4 IIII.U3	$\nu_{1.9} \ a_{0.}$	.0′ m-1.96	ν2.2 a-0	.1′ m1.16	Deneb	49°25.6	-50 39.0 45°21.9
										Enif	49 25.6 33°38.6	45 21.9 9°59.3
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec			
0	227°03.8	222° 11.1		94° 44.9	N19°41.3	144°39.9	N23°02.0	227°30.9	S02°24.2	Al Na'ir	27°32.7 15°14.4	-46°50.1
1	242°06.2	237° 11.8	01.7	109°46.2	41.0	159°41.8	02.0	242°33.1	24.1	Fomalhaut		-29°29.2
2	257°08.7	252° 12.5	02.1	124° 47.4	40.6	174°43.7	02.0	257°35.4	24.0	Scheat	13°45.1	28°13.0
3	272°11.1	267° 13.2	02.1	139°48.7	• • 40.0	174 45.7 189°45.6	02.0	272°37.6	•• 23.9	Markab	13°29.8	15°20.3
4	272 11.1 287°13.6	282° 13.9	03.0	159 46.7 154°49.9	39.9	204°47.5	02.1	212 31.0 287°39.9	23.8	May 07 Wed	SHA	Mer.pass
	302°16.1	282 13.9 297°14.5	03.0			204 47.5 219°49.4		287 39.9 302°42.1	23.8	Venus		09:13
5				169°51.2	39.5		02.1			Mars	228°39.4	17:44
6	317°18.5	312° 15.2	N02°03.8	184°52.4	N19°39.1	234°51.3	N23°02.1	317°44.3	S02°23.7			
7	332°21.0	327° 15.9	04.2	199°53.6	38.8	249°53.2	02.2	332°46.6	23.6		278°03.2	14:26
8	347°23.5	342°16.6	04.6	214°54.9	38.4	264°55.1	02.2	347°48.8	23.5	Saturn	0°37.7	08:56
9	2°25.9	357° 17.3	• • 05.0	229°56.1	• • 38.0	279°57.0	• • 02.2	2°51.1	• • 23.4	May 08 Thu	SHA	Mer.pass
10	17°28.4	$12^{\circ}18.0$	05.4	244°57.4	37.6	294°58.9	02.3	17°53.3	23.3	Venus		09:12
11	32°30.9	27° 18.7	05.8	259°58.6	37.3	310°00.8	02.3	32°55.6	23.2	1		
12	47°33.3	42° 19.3	N02°06.3	274°59.9	N19°36.9	325°02.7	N23°02.3	47°57.8	S02°23.2	Mars		17:42
13	62°35.8	57°20.0	06.7	290°01.1	36.5	340°04.6	02.4	63°00.1	23.1	Jupiter		14:23
14	77°38.2	72°20.7	07.1	305°02.4	36.2	355°06.5	02.4	78°02.3	23.0	Saturn	0°32.4	08:52
15	92°40.7	87°21.4	• • 07.5	320°03.6	• • 35.8	10°08.4	02.4	93°04.6	22.9	May 09 Fri	SHA	Mer pace
16	107°43.2	102°22.1	07.9	335°04.8	35.4	25°10.3	02.4	108°06.8	22.8		355°07.3	Mer.pass
17	107 45.2 122°45.6	102 22.1 117°22.7	07.9	350°06.1	35.4	40°12.2	02.5	108 00.8 123°09.1	22.6			09:11
	122 45.0 137°48.1				35.1 N19°34.7			123 09.1 138°11.3		Mars		17:40
18		132°23.4	N02°08.8	5°07.3		55°14.1	N23°02.5		S02°22.6		277°36.2	14:20
19	152°50.6	147°24.1	09.2	20°08.6	34.3	70°16.0	02.6	153°13.6	22.6	Saturn	0°27.1	08:49
20	167°53.0	162°24.8	09.6	35°09.8	33.9	85°17.9	02.6	168°15.8	22.5	ا مادما	al parallas	
21	182°55.5	177°25.4	• • 10.1	50°11.0	• • 33.6	100°19.8	• • 02.6	183°18.1	• • 22.4	HORIZONI	al parallax	0.2
22	197°58.0	192°26.1	10.5	65°12.3	33.2	115°21.7	02.7	198°20.3	22.3		Venus:	0.3
23	213°00.4	207°26.8	10.9	80° 13.5	32.8	130°23.6	02.7	213°22.6	22.2		Mars:	0.1
Mern	ass. 08:50	ν0.7′ d0.4	4′ m-4.64	1/1 2/ d C	0.4' m1.04	1/1 0/ d0	.0′ m-1.96	ν2.2′ d-0	1' m1 15			
ivier.p	ass. 00:50	νυ.ι αυ.	+ 111-4.04	$\nu$ 1.2 a-C	7.4 III1.U4	$\nu$ 1.9° $a$ 0.	.0 111-1.90	ν2.2 a-0	.1111.15			

h	Sui	า			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°51.6	N16°49.6	58°59.7	16.4'	N07°05.9	-14.2'	54.8'
1 2	195°51.7 210°51.7	50.2 50.9	73°35.1 88°10.6	16.4' 16.5'	06°51.8 06°37.6	-14.2' -14.2'	54.8' 54.8'
3	225°51.8	. 51.6	102°46.1	16.5'	06°23.4	-14.2'	54.8'
4	240°51.8	52.3	$117^{\circ}21.6$	16.6'	$06^{\circ}09.2$	-14.2'	54.7'
5	255°51.8	53.0	131°57.2	16.6'	05°55.0	-14.2'	54.7'
6 7	270°51.9 285°51.9	N16°53.7 54.4	146°32.8 161°08.4	16.6' 16.7'	N05°40.8 05°26.6	-14.2' -14.2'	54.7' 54.7'
8	300°52.0	55.1	175° 44.1	16.7	05°12.3	-14.3'	54.7'
9	315°52.0	•• 55.7	190°19.8	16.8'	04°58.1	-14.3'	54.7'
10 11	330°52.0 345°52.1	56.4 57.1	204°55.6 219°31.4	16.8' 16.8'	04°43.8 04°29.5	-14.3' -14.3'	54.6' 54.6'
12	0°52.1	N16°57.8	219 31.4 234°07.2	16.9	N04°15.3	-14.3'	54.6
13	15° 52.2	58.5	248°43.1	16.9'	04°01.0	-14.3'	54.6'
14	30°52.2	59.2	263°18.9	16.9'	03°46.7	-14.3'	54.6'
15 16	45° 52.2 60° 52.3	16°59.8 17°00.5	277°54.9 292°30.8	16.9' 17.0'	03°32.4 03°18.1	-14.3' -14.3'	54.5' 54.5'
17	75°52.3	01.2	307°06.8	17.0'	03°03.8	-14.3'	54.5'
18	90°52.3	$N17^{\circ}01.9$	321°42.8	17.0'	N02°49.5	-14.3'	54.5'
19 20	105° 52.4 120° 52.4	02.6 03.2	336° 18.8 350° 54.8	17.0' 17.1'	02°35.1 02°20.8	-14.3' -14.3'	54.5' 54.5'
21	120 52.4 135°52.4	03.2	5°30.9	17.1'	02 20.8 02°06.5	-14.3'	54.5'
22	150° 52.5	04.6	20°07.0	17.1'	01°52.2	-14.3'	54.4'
23	165°52.5	05.3	34°43.1	17.1'	01°37.9	-14.3'	54.4'
	SD = 15.8'	d = 0.7'		SI	O = 15.0'		
Thu	GHA	Dec	GHA	ν	Dec	d	НР
0	180°52.6	N17°06.0	49° 19.2	$\frac{\nu}{17.1'}$	N01°23.6	-14.3'	54.4'
1	195° 52.6	06.6	63°55.3	17.2'	01°09.2	-14.3'	54.4'
2	210° 52.6 225° 52.7	07.3 •• 08.0	78°31.5 93°07.7	17.2'	00°54.9 00°40.6	-14.3'	54.4'
3 4	225 52.7 240°52.7	· · 08.0 08.7	93 07.7 107°43.8	17.2' 17.2'	00°40.6	-14.3' -14.3'	54.4' 54.3'
5	255° 52.7	09.3	122°20.0	17.2'	N00°12.0	-14.3'	54.3'
6	270°52.8	N17° 10.0	136°56.2	17.2'	500°02.3	14.3'	54.3'
7 8	285° 52.8 300° 52.8	10.7 11.4	151°32.5 166°08.7	17.2' 17.2'	00°16.6 00°30.9	14.3' 14.3'	54.3' 54.3'
9	315° 52.9	•• 12.0	180° 44.9	17.2'	00°45.1	14.3'	54.3
10	330°52.9	12.7	195°21.2	17.2'	00°59.4	14.3'	54.3'
11	345°52.9	13.4	209°57.4	17.3'	01°13.7	14.2'	54.3'
12 13	0°53.0 15°53.0	N17°14.1 14.7	224°33.7 239°09.9	17.3' 17.3'	S01°27.9 01°42.1	14.2' 14.2'	54.2' 54.2'
14	30° 53.0	15.4	253°46.2	17.3'	01°56.4	14.2'	54.2'
15	45°53.1	16.1	268° 22.4	17.3'	02°10.6	14.2'	54.2'
16 17	60°53.1 75°53.1	16.7 17.4	282°58.7 297°34.9	17.3' 17.3'	02°24.8 02°39.0	14.2' 14.2'	54.2' 54.2'
18	90°53.1	N17° 18.1	312°11.2	17.3'	S02°53.1	14.2'	54.2'
19	105°53.2	18.8	326° 47.5	17.2'	03°07.3	14.1'	54.2'
20 21	120°53.2 135°53.2	19.4 •• 20.1	341°23.7 355°59.9	17.2' 17.2'	03°21.5 03°35.6	14.1' 14.1'	54.2' 54.2'
22	150°53.3	20.1	10°36.2	17.2'	03°49.7	14.1	54.2 54.1'
23	165°53.3	21.4	25°12.4	17.2'	04°03.8	14.1'	54.1'
	SD = 15.8'	d = 0.7'		SI	D = 14.8'		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°53.3	N17°22.1	39°48.6	17.2'	504°17.9	14.1'	54.1'
1	195°53.4	22.8	54°24.9	17.2'	04°31.9	14.0'	54.1'
2	210° 53.4 225° 53.4	23.4	69°01.1 83°37.2	17.2' 17.2'	04°46.0 05°00.0	14.0' 14.0'	54.1' 54.1'
4	240°53.4	24.1	98° 13.4	17.2'	05°14.0	14.0'	54.1'
5	255°53.5	25.4	112°49.6	17.1'	05°28.0	14.0'	54.1'
6	270° 53.5 285° 53.5	N17°26.1 26.7	127°25.7 142°01.9	17.1' 17.1'	\$05°41.9 05°55.8	13.9'	54.1' 54.1'
7 8	285°53.5 300°53.6	26.7 27.4	142°01.9 156°38.0	17.1' 17.1'	05°55.8 06°09.7	13.9' 13.9'	54.1'
9	315°53.6	28.1	171°14.1	17.1'	06°23.6	13.9'	54.0'
10	330°53.6	28.7	185°50.2	17.1'	06°37.5	13.8'	54.0'
11 12	345°53.6 0°53.7	29.4 N17°30.0	200°26.2 215°02.3	17.0' 17.0'	06°51.3 \$07°05.1	13.8' 13.8'	54.0' 54.0'
13	15°53.7	30.7	229°38.3	17.0'	07°18.9	13.7'	54.0'
14	30°53.7	31.4	244°14.3	17.0'	07°32.6	13.7'	54.0'
15 16	45° 53.7 60° 53.8	· · 32.0 32.7	258°50.2 273°26.2	16.9' 16.9'	07°46.4 08°00.1	13.7' 13.7'	54.0' 54.0'
16 17	60°53.8 75°53.8	32.7 33.3	273°26.2 288°02.1	16.9'	08°00.1 08°13.7	13.7	54.0' 54.0'
18	90°53.8	N17°34.0	302°38.0	16.9'	S08°27.3	13.6'	54.0'
19	105°53.8	34.6	317°13.8	16.8'	08°40.9	13.6'	54.0'
20 21	120°53.9 135°53.9	35.3 · · 36.0	331°49.7 346°25.5	16.8' 16.8'	08°54.5 09°08.0	13.5' 13.5'	54.0' 54.0'
22	150°53.9	36.6	1°01.3	16.7	09°08.0	13.5'	54.0'
23	165°53.9	37.3	15°37.0	16.7'	09°35.0	13.4'	54.0'
	SD = 15.8'	d = 0.7'		SI	O = 14.8'		

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

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

		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	73-88%
07	03:27	03:28	11:57	20:37	08:18	
08	03:30	03:32	11:56	21:16	08:57	
09	03:33	03:35	11:56	21:56	09:36	

5 90 315-2 97 307 -15 1 70 210 306 20 49 9 02 9 303 -50 1 77	h _	Aries	Ven	us	M	ars	Jup	oiter	Sat	urn		Stars	
1 23/05.4 237/28.1 1.18 11/16.0 2.11 15/07.4 0.12 24/27.0 1.20 2.0 0.18 PARTINIS SALES SAL	Sat	GHA	GHA	Dec	GHA		GHA	Dec	GHA	Dec		SHA	Dec
1 23/05.4 237/28.1 1.18 11/16.0 2.11 15/07.4 0.12 24/27.0 1.20 2.0 0.18 PARTINIS SALES SAL	0	228°02.9	222°27.4	N02°11.3	95°14.8	N19°32.5	145°25.5	N23°02.7	228°24.8	S02°22.1		2570240	00012.6
2 28°07.8 22°38.8 12.2 18°17.3 3.7 17°28.2 0.8 28°39.3 22°0 6. Ambient 10°2.5 18°17.7 18°18.2 18°18.2 18°19.2	1	243°05.4	237°28.1	11.8	110° 16.0		160°27.4	02.8	243°27.0	22.0			
3 277103 207794 - 126											1		
2													
5 98715.2 29719.7 13.5 17072.0 90.0 22734 0.0 98 93750.0 1.7											Diphda		
18   18   17   19   19   19   19   19   19   19											Achernar	335°20.5	-57°06.4
3 387-201 3277-20 14.4 207-23.4 29.9 5097-38.7 0.29 337-05.5 21.5   Chem. 37.0.29 33.9 0.20											Hamal	$327^{\circ}51.3$	23°34.8
8 386 226 347 327 149 215 247 295 005 406 0 30 386 428 215 46 American Series 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1											Polaris	314°24.3	89°22.2
9 37251 357734 1.55 249727 2.047 30734 3.03 37450 2.14 3.00 37450 2.14 3.00 37450 2.14 3.00 37450 2.14 3.00 37450 2.14 3.00 37450 2.15 3.00 37450 2.10 37450 2.10 3.00 37450 2.10 3.00 37450 2.10 3.00 37450 2.10 3.00 37450 2.10 3.00 37450 2.10 3.00 37450 2.10 3.00 37450 2.10 3.00 37450 2.10 3.00 37450 2.10 3.00 37450 2.10 3.00 37450 2.10 3.00 37450 3.10 3.10 3.00 3.00 3.10 3.10 3.00 3.0											Acamar	315°12.0	-40°12.2
10 18 27.5 12 34 0 15 7 28 27 2.2 28 7 295 44 1 30 18 47 3 21.3 46 20 18 18 47 3 21.3 46 20 17 18 18 18 18 18 20 17 20 18 20 18 18 18 18 18 18 18 18 18 18 18 18 18											Menkar	314°06.2	4°11.3
101 1 29 75 0											Mirfak	308°28.4	49°57.0
1.5   1.5											Aldebaran	290°39.7	16°33.6
19											1		
10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1											_		
1													
19													
1	15			• • 17.9		· · 26.9		• • 03.2		• • 20.9			
18 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	16	108°42.3	102°37.9	18.3	335°34.6	26.5	25°55.8	03.2	109°00.8	20.8			
Simple   S	17	123°44.8	117°38.5	18.8	350° 35.8	26.1	40°57.7	03.3	124°03.0	20.7	_		
10 153 492 11939 110 23 485 20 60 60 20 10 10 10 10 10 10 10 10 10 10 10 10 10	18	138°47.2	132°39.2	N02°19.2	5°37.1	N19°25.8	55°59.6	N23°03.3	139°05.3	S02°20.6			
20 1 188°52 2 102°40 5 20.1 35°39 5 250 88°03 4 03.3 196°08 2 04 4 Person 20.4 1 189°07 1 199°67 1 199°67 1 190°6 1 170°61 1 190°6 1 100°63 2 03.4 189°12 0 20.4 1 190°67 1 1	19	153°49.7	147°39.8	19.7	20°38.3	25.4	71°01.5	03.3	154°07.5	20.5	1		
11 183°54.6 177°41.1 - 20.6 59°40.8 - 24.6 101°05.3 - 03.4 184°12.0 - 20.4 A 187°12.0 105°4.0 - 24.5 100°02.3 - 03.4 189°14.3 - 20.3 A 190°14.3 A											1		
23   215   296   277   42   47   210   65   42.0   24.3   116   70   20   34   214   155   20.2   34   146   157   20.3   34   34   146   35   20.3   34   34   146   35   20.3   34   34   146   35   34   34   34   34   34   34   34													
Mer.pass													27°58.0
Mer.   Dec.													-59°35.7
Sim   GHA   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   Dubb   193°404   11°506   10°50	23	213 39.0		_							Suhail	222°46.2	-43°32.3
Sim   CHA   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   Duble   193°404   11°506   11°506   11	Mer.p	ass. 08:46	$\nu$ 0.7′ d0.4	′ m-4.63	$\nu$ 1.2′ d-0	0.4′ m1.05	$\nu$ 1.9′ d0.	0′ m-1.96	$\nu$ 2.2′ d-0	$.1^\prime$ m $1.15$	Miaplacidus	221°38.4	-69°49.6
Sun GHA											Alphard	217°47.5	-8°46.2
Sun GHA	_		c	_		_		_		_			11°50.6
29 29 20 20 27 43.0 NOZ 21 99 5445 NIP 235 140 109 N23 03.5 249 188 SUZ 201   29 29 07.0 27 43.0 22.4 116 45.7 23.1 16 12.8 0.55 247 21.0 2.00   30 29 40.0 36 40 27 41 2 2.0 125 47.0 22.7 176 14.7 0.35 29 23.3 19.9   30 27 40.0 36 27 41 2 2.0 125 47.0 22.7 176 14.7 0.35 29 23.3 19.9   30 27 40.0 36 27 41 2 2.0 125 47.0 22.7 176 14.7 0.35 29 23.3 19.9   30 27 41 3 22.8 10 125 47.0 22.7 176 14.7 0.35 29 23.3 19.9   30 27 41 3 20 27 41 3 20 28 125 47.0 22.7 176 14.7 0.35 29 23.3 19.9   30 27 41 3 20 28 1 20 27 3 20 20 20 20 20 20 20 20 20 20 20 20 20				Dec							Dubhe	193°40.4	
1 244'045 22 259'740 257'449 - 223 110'457 23.1 10'128 0.05 244'21.0 20.0													14°25.8
2 299'070	1	244°04.5		22.4	110°45.7	23.1	161°12.8	03.5	244°21.0	20.0	1		
3 274'094 267'449 221'3 140'482 - 224 10'16'6 - 036 274'255 - 19.9   6acrux 171'510 - 57'556   6 201'191'16   209'16   277'461   24.2 170'507   21.6 21'120'4   036' 304'30.0   19.7   6acrux 171'510 - 57'556   036' 304'14'3 97'461   24.2 170'507   21.6 21'120'4   036' 304'30.0   19.7   6pc's 304'14'3 97'461   24.2 170'507   21.6 21'120'4   03.6 34'30'30   19.7   6pc's 30'34'19'3   37'47'4   25.1 200'53.1   20.9 21'42.2   236'22.3   828'03.7   334'34'5   19.5   6pc's 30'34'19'3   37'47'4   25.1 200'53.1   20.9 21'42.2   236'22.3   828'03.7   334'34'5   19.5   6pc's 30'35'6   20.1 20'80   20.3   20'80'6   20.3   20'80'6   20.3   20'80'6   20.3   20'80'6   20.3   20'80'6   20.3   20'80'6   2	2	259°07.0	252°44.3	22.8		22.7	176°14.7	03.5	259°23.3	19.9			
4 289°11-9 289°14-9 3 297°461 24.2 ITO*50.7 21.6 221°20.4 03.6 03.6 289°27.8 19.8 19.8 19.8 19.8 19.8 19.8 19.8 19	3	274°09.4	267°44.9	• • 23.3	140°48.2	• • 22.4	191°16.6	• • 03.6	274°25.5	• • 19.9			
5 304"14.3 297"46.1 327"46.8 N02"246 188"519 N19"521.2 236"22.3 N23"037 316"323 202"16.6 N34"19.3 316"323 202"16.6 N34"19.3 316"323 202"16.6 N34"19.3 316"323 202"16.6 N34"19.3 316"323 202"16.6 N34"19.3 N23"19.3 N23"03.8	4	$289^{\circ}11.9$	282°45.5	23.7	155°49.4	22.0	$206^{\circ}18.5$	03.6	289°27.8	19.8	1		
8 319°18.8 312°48.8 N02°46.6 185°51.9 N19°21.2 236°22.3 N23°03.7 310°32.3 502°19.6 Alkald 132°51.3 49°1.7 342°48.0 200°53.1 209 251°22.2 20.3 343°34.5 19.5 Hadar 148°51.3 49°1.7 342°48.0 25.6 215°54.4 20.5 266°26.1 281°28.0 .03.7 4°39.0 19.4 Alkald 132°51.3 49°1.1 19°1.2 10°19°26.7 12°49.3 26.5 245°56.8 19.7 266°29.0 38.8 19°4.1 3 19.3 19.3 19.3 11 34°29.1 27°49.9 26.9 260°58.1 19.4 311°31.8 03.8 34°43.6 19.2 12°40.1 21°240.3 260°58.1 19.4 311°31.8 03.8 34°43.6 19.2 12°40°1.6 42°50.5 N02°74. 275°93.9 N19°10.0 326°33.7 N22°03.8 49°45.8 502°19.1 40°31.6 42°50.5 N02°74. 275°93.9 N19°10.0 326°33.7 N22°03.8 49°45.8 502°19.1 40°50.5 N02°74. 275°93.9 N19°10.0 326°33.7 N22°03.8 49°45.8 502°19.1 40°50.5 N02°74.0 275°93.9 N19°10.0 326°33.7 N22°03.8 49°45.8 502°19.1 40°50.5 N22°04.0 N29°0.5 N29°0.5 N22°04.0 N29°0.5 N29°0.5 N22°04.0 N29°0.5 N29°0.5 N22°04.0 N29°0.5 N29°0.5 N22°04.0 N29°0.5 N29°0.5 N22°04.0 N29°0.5 N22°04.0 N29°0.5 N29°0.5 N22°04.0 N29°0.5 N29°0.5 N29°0.5 N29°0.5 N22°0.5 N22°0.0 N29°0.5 N29°0.5 N22°0.0 N29°0.5 N20°0.5 N22°0.0 N29°0.5 N20°0.5 N22°0.0 N20°0.5 N22°0.0 N20°0.5 N22°0.0 N20°0.0	5	304°14.3	297°46.1	24.2	170°50.7	21.6	221°20.4	03.6	304°30.0	19.7	1		
7 34*19.3 37*47.4 25.1 206*53.1 20.9 251*24.2 03.7 334*34.5 19.5 8 349*21.7 342*48.0 25.6 215*54.4 20.5 266*26.1 03.7 340*36.8 19.4 9 4*24.2 35*7*48.6 : 26.0 230*55.6 : 20.1 281*28.0 :	6		312°46.8	N02°24.6			236°22.3		319°32.3				
8 49°21.7 342°48.0 256 215°54.4 20.5 266°26.1 03.7 349°36.8 19.4 Merkent 147°570 36°29.8 10 19°26.7 12°49.3 230°556.6 20.1 281°28.0 0.3.7 4°39.0 19.4 Merkent 147°570 36°29.8 10 19°26.7 12°49.3 26.5 245°568. 19.7 296°29.9 03.8 19°41.3 19.3 19.3 19.3 19.3 19.3 19.3 19.3 1	7										1		
9 4°242 35°648 6 220 230°556 201 281°280 · 0.37, 4°390 · 19.4 Arturus 145°7.0 38 23.4 Brill 19.3 265°7 12°493 26.5 245°568 19.7 26°29.9 0.83 19°413 6 19°3 24°3 26.5 19°4 31°3 19°3 34°43.6 19°3 21°4 24°4 16.5 16°0.8 19°4 31°3 18.0 38.8 34°43.6 19°3 31°3 31°3 00°56.5 19°4 31°3 19°4 25°6 18°4 19°4 31°3 19°4 25°6 18°4 19°4 31°3 19°4 25°6 18°4 19°4 19°4 25°6 18°4 19°4 19°4 25°6 18°4 19°4 19°4 19°4 19°4 19°4 19°4 19°4 19													
10 19°26.7 12°49.3 26.5 245°56.8 19.7 296°29.9 0.3.8 19°41.3 19.3 19.3 AFCEUTIAL 113°47.3 19.3 34°41.3 19.3 19.3 19.3 19.3 19.3 19.3 19.3 1											1		
11 34°29.1 22°49.9 26.9 260°8.1 19.4 311°31.8 03.8 34°43.6 19.2 18.7 19.6 19.4 19.0 19.4 19.5 19.1 19.4 19.5 19.1 19.4 19.5 19.1 19.4 19.1 19.6 19.5 19.1 19.4 19.5 19.1 19.1 19.1 19.1 19.1 19.1 19.1											1		
12 49°31.6 42°50.5 N02°27.4 275°50.3 N10°19.0 326°33.7 N23°03.8 49°48.8 S02°10.1 Zuben'ubi 137 lb.9 14.0 16°08.8 13.6 42°50.5 N02°30.1 278 112°50.3 9.6 478.8 19.0 Napheres 126°03.2 26°37.6 16°08.8 14.1 30°0.5 Napheres 126°03.2 26°37.6 16°08.8 14.1 30°0.5 Napheres 126°03.2 26°37.6 Napheres 126°03.2 Napheres 126°03.2 26°37.6 Napheres 126°03.2 Nap											_		
13 64°34.1 57°51.1 27.9 291°00.5 18.6 341°38.6 03.9 64°48.1 19.0 Alpheces 14.7 96°55.7 28.3 306°01.8 18.2 356°37.4 03.9 79°50.3 18.9 Alpheces 15.0 40°39.0 87°52.3 · · · · · · · · · · · · · · · · · · ·											Kochab	$137^{\circ}18.6$	74°03.0
14											Zuben'ubi	136°55.4	$-16^{\circ}08.9$
15 94°39.0 87°52.3 · 28.8 321°03.0 · 17.8 11°39.3 · 0.39 94°52.6 · 18.9 161 10°00.7 · 0.9											Alphecca	126°03.2	26°37.6
16 109°41.5 102°53.0 29.3 336°04.3 17.5 26°41.2 04.0 109°54.8 18.8 18.8 18.8 17.1 124°3.9 117°3.6 29.7 351°05.5 17.1 41°43.1 04.0 124°57.1 18.7 18.7 18.7 18.7 18.7 18.7 18.7 1											Antares	112°15.2	-26°29.3
17 124°43.9 117°53.6 29.7 351°05.5 17.1 41°43.1 0.40 124°57.1 18.7 18.7 18.1 18.1 18.1 18.1 18.1 1											Atria	107°08.7	-69°04.3
17 124°43.9 117°53.6 29.7 331°105.5 17.1 41°43.1 04.0 124°57.1 18.7   18 139°46.4 132°54.2 N02°30.2 6°06.7 N19°16.7 56°45.0 N23°04.0 139°59.3 502°18.6   18 139°48.8 147°54.8 30.7 21°07.9 16.3 71°46.9 04.1 155°01.6 18.5   18 139°48.8 147°54.8 30.7 21°07.9 16.3 71°46.9 04.1 155°01.6 18.5   18 139°48.8 147°54.8 30.7 21°07.9 16.3 71°46.9 04.1 155°01.6 18.5   18 139°48.8 147°54.0 30.7 21°07.9 16.3 71°46.9 04.1 155°01.6 18.5   18 139°48.8 147°54.0 30.7 21°07.9 16.3 71°46.9 04.1 185°06.1 .18.4   18 139°55.2 21 184°53.8 177°56.0 31.6 51°10.4 15.6 101°50.7 04.1 185°06.1 18.4   19 14 15 15 15 16 15 12 16°52.6 04.1 200°08.3 18.3   18 139°48.7 200°57.2 32.5 61°12.9 14.8 131°54.5 04.2 215°10.6 18.2   18 140°58.7 200°57.2 32.5 61°12.9 14.8 131°54.5 04.2 215°10.6 18.2   18 140°58.7 200°57.2 32.5 61°12.9 14.8 131°54.5 04.2 215°10.6 18.2   18 140°58.7 200°57.2 32.5 61°12.9 14.8 131°54.5 04.2 215°10.6 18.2   18 140°58.7 200°57.2 32.5 61°12.9 14.8 131°54.5 04.2 215°10.6 18.2   18 140°58.7 200°57.2 32.5 61°12.9 14.8 131°54.5 04.2 215°10.6 18.2   18 140°58.7 200°57.2 32.5 61°12.9 14.8 131°54.5 04.2 215°10.6 18.2   18 140°58.7 200°57.2 32.5 61°12.9 14.8 131°54.5 04.2 215°10.6 18.2   18 140°58.7 200°57.2 32.5 61°12.9 14.8 131°54.5 04.2 215°10.6 18.2   18 140°58.7 200°59.0 34.0 126°16.6 13.7 177°00.1 04.3 276°10.6 17.9   18 140°58.7 200°59.0 34.0 126°16.6 13.7 177°00.1 04.3 276°10.6 17.9   18 140°59.1 310°59.0 34.0 126°16.6 13.7 177°00.1 04.3 276°10.6 17.9   18 140°59.1 310°59.0 34.0 126°16.6 13.7 177°00.1 04.3 276°10.6 17.9   18 140°59.1 310°59.0 34.0 126°16.6 13.7 177°00.1 04.3 276°10.6 17.9   18 140°59.1 310°59.0 34.0 126°16.6 13.7 177°00.1 04.3 276°10.6 17.9   18 140°59.1 310°59.0 34.0 126°16.6 13.7 177°00.1 04.3 36°26.1 17.9   18 140°59.1 310°59.0 34.0 126°16.6 13.7 177°00.1 04.3 36°26.1 17.9   18 140°59.1 310°59.0 34.0 126°16.6 13.7 177°00.1 04.3 36°26.1 17.9   18 140°59.1 310°59.0 34.0 126°16.6 13.7 177°00.1 04.3 36°26.1 17.9   18 140°59.1 310°59.0 34.0 126°16.6 13.7 177°00.1 04.3 36°26.1 17.9   18 140°50.1 310°											I		
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19 154*48.8	18	139°46.4	132°54.2	N02°30.2	6°06.7	N19° 16.7	56°45.0	N23°04.0		S02°18.6			
20 169*51.3 162*55.4 31.1 36*09.2 15.9 86*48.8 04.1 170*03.8 18.4 Vega 80*32.9 34.9 5.6 19.9 16.5 10.1 16*50.7 0.4.1 185*06.1 1.18.4 Vega 80*32.8 38*842.2 199*56.2 192*56.6 32.1 66*01.6 15.2 116*52.6 04.1 200*08.3 18.3 Nunki 75*47.2 -26*15.9 Mer.pass. 08:42	19	154°48.8	147°54.8	30.7	21°07.9	16.3	71°46.9	04.1	$155^{\circ}01.6$	18.5			
21 184*53.8 177*56.0 · · · · · · · · · · · · · · · · · · ·	20	169°51.3	162°55.4	31.1	36°09.2	15.9	86°48.8	04.1	170°03.8	18.4			
23 214*98.7 207*97.2 32.5 81*12.9 14.8 131*54.5 04.2 215*10.6 18.2    Mer.pass. 08:42   \(\nu \) 0.6' \(\dot \) 0.5' \(mu \) -4.62   \(\nu \) 1.2' \(\dot \) 0.4' \(mu \) 1.07   \(\nu \) 1.9' \(\dot \) 0.0' \(mu \) -1.96   \(\nu \) 2.3' \(\dot \) 0.1' \(mu \) 1.15   \(\delta \) 22*5 7.8 \(\dot \) 0.2' \(\dot \) 0.0' \(mu \) -1.9' \(\dot \) 0.0' \(mu \) -1.96   \(\dot \) 2.3' \(\dot \) 0.1' \(mu \) 1.15   \(\delta \) 22*0 *01.2   \(222^{\circ 5.78} \) 8.02*33.0   \(\dot \) 96*14.1   \(\dot \) 110*15.3   \(\dot \) 14.0   \(\dot \) 16*58.3   \(\dot \) 0.42   \(245^{\circ 5.15} \) 1   \(\dot \) 20*0*10.2   \(222^{\circ 5.78} \) 8.02*30.3   \(\dot \) 96*14.1   \(\dot \) 110*15.3   \(\dot \) 14.0   \(\dot \) 16*58.3   \(\dot \) 0.42   \(245^{\circ 5.15} \) 1   \(\dot \) 8.02*15.1   \(\dot \) 18.0   \(250^{\circ 0.1} \) 22*0*59.0   \(\dot \) 3.4   \(\dot \) 126*16.6   \(\dot \) 13.7   \(\dot \) 17*0*0.1   \(\dot \) 0.3   \(\dot \) 27*0.13   \(\dot \) 17*0*0.1   \(\dot \) 3.3   \(\dot \) 27*0.13   \(\dot \) 17*0*0.1   \(\dot \) 300*15.9   \(\dot \) 330*0.15   \(\dot \) 330*0.2   \(\dot \) 3.4   \(\dot \) 17*0.3   \(\dot \) 12.5   \(\dot \) 222*0.8   \(\dot \) 0.4   \(\dot \) 305*24.1   \(\dot \) 17.7   \(\dot \) 335*18.4   \(\dot \) 32*0.2   \(\dot \) 3.6   \(\dot \) 29*0.2   \(\dot \) 3.3   \(\dot \) 300*24.1   \(\dot \) 300*25.8   \(\dot \) 330*0.3   \(\dot \) 36*20.3   \(\dot \) 36*20.3   \(\dot \) 36*20.3   \(\dot \) 36*20.3   \(\dot \) 36*20.5   \(\dot \) 300*25.8   \(\dot \) 300	21	184°53.8	177°56.0	• • 31.6	51° 10.4	• • 15.6	101°50.7	• • 04.1	185°06.1	• • 18.4			
Mor. pass. 08:42   \( \nu \) 0.06' \( \nu \) 0.5' \( m \) -6.62   \( \nu \) 1.2' \( \nu \) -0.4' \( m \) 1.07   \( \nu \) 1.95' \( \nu \) 0.00' \( \nu \) -1.96   \( \nu \) 2.3' \( \nu \) -0.1' \( m \) 1.15   \( \nu \) 2.30' \( \nu \) 1.7   \( \nu \) 1.	22	199°56.2	192°56.6	32.1	66°11.6	15.2	116°52.6	04.1	200°08.3	18.3	_		
Mon         GHA         Dec         L1.2' d-0.4' m1.07         L1.9' d0.0' m-1.96         L2.3' d-0.1' m1.15         Peacock         55°05.1         55°03.0           Mon         GHA         Dec         GHA         L26'96.6         13.7         110'15.3         14.0         1616'58.3         04.2         245'15.1         18.0         25'09.0         34.0         126'16.6         13.7         177'00.1         04.3         25'09.15.6         17.9         4         290'11.0         283'80.2         34.9         156'19.0         12.9         207'03.9         04.3         25'01.1         17.7         Markab         13°2.9.8         15°2.0.3           6         320'15.9         313°01.4         N02°35.9         186'21.5         N19'12.1         237'07.7         N23'04.4         350'26.4         50'217.6		214°58.7				14.8	131°54.5		215°10.6		1		
Mon   GHA   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   N3°01.2   222°57.8   N02°33.0   96°14.1   N19°14.4   146°56.4   N23°04.2   230°12.8   S02°18.1   S02°											1		
Mon GHA GHA   Dec GHA	Mer.p	ass. 08:42	$\nu_{0.6'} d0.5'$	m-4.62	$\nu$ 1.2′ d-0	0.4′ m1.07	$\nu$ 1.9′ $d$ 0.	u′ m-1.96	$\nu$ 2.3′ d-0	.1′ m1.15	1		
Mon   GHA   GHA   Dec   GHA   GHA   Dec   GHA   GHA   Dec   GHA											I		
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12 50°30.7 43°05.0 N02°38.8 276°28.9 N19°09.9 327°19.1 N23°04.6 50°39.9 S02°17.1 13 65°33.2 58°05.5 39.3 291°30.1 09.5 342°20.9 04.6 65°42.1 17.0 14 80°35.7 73°06.1 39.7 306°31.3 09.1 357°22.8 04.6 80°44.4 17.0 15 95°38.1 88°06.7 · · · 40.2 321°32.6 · · · 08.7 12°24.7 · · · 04.7 95°46.6 · · 16.9 110°40.6 103°07.3 40.7 336°33.8 08.3 27°26.6 04.7 110°48.9 16.8 17 125°43.1 118°07.9 41.2 351°35.0 07.9 42°28.5 04.7 125°51.1 16.7 18 140°45.5 133°08.5 N02°41.7 6°36.3 N19°07.6 57°30.4 N23°04.7 140°53.4 S02°16.6 19 155°48.0 148°09.0 42.2 21°37.5 07.2 72°32.3 04.8 155°55.7 16.6 19 155°48.0 148°09.0 42.2 21°37.5 07.2 72°32.3 04.8 155°55.7 16.6 19 155°48.0 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 16.5 16.5 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 16.5 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 16.5 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 16.5 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 16.5 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 16.5 16.5 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 16.5 16.5 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 16.5 16.5 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 16.5 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 16.5 16.5 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 16.5 16.5 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 16.5 16.5 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 16.5 16.5 16.5 16.5 16.5 16.5 16.5	11	35°28.3	28°04.4	38.3	261°27.7	10.2	312°17.2	04.5	35°37.6	17.2	1		
13 65°33.2 58°05.5 39.3 291°30.1 09.5 342°20.9 04.6 65°42.1 17.0 14 80°35.7 73°06.1 39.7 306°31.3 09.1 357°22.8 04.6 80°44.4 17.0 15 95°38.1 88°06.7 · · · 40.2 321°32.6 · · 08.7 12°24.7 · · · 04.7 95°46.6 · · 16.9 110°40.6 103°07.3 40.7 336°33.8 08.3 27°26.6 04.7 110°48.9 16.8 17.0 125°43.1 118°07.9 41.2 351°35.0 07.9 42°28.5 04.7 125°51.1 16.7 18 140°45.5 133°08.5 N02°41.7 6°36.3 N19°07.6 57°30.4 N23°04.7 140°53.4 S02°16.6 19 155°48.0 148°09.0 42.2 21°37.5 07.2 72°32.3 04.8 155°55.7 16.6 20 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 21 185°52.9 178°10.2 · · · 43.2 51°39.9 · · · 06.4 102°36.1 · · · 04.8 186°00.2 · · 16.4 22 200°55.4 193°10.8 43.7 66°41.2 06.0 117°38.0 04.9 201°02.4 16.3 23 215°57.8 208°11.4 44.2 81°42.4 05.6 132°39.8 04.9 216°04.7 16.2 Mars: 0.1	12	50°30.7	43°05.0	N02°38.8	276°28.9	$N19^{\circ}09.9$	327°19.1	N23°04.6	50°39.9	S02°17.1	1		
14 80°35.7 73°06.1 39.7 306°31.3 09.1 357°22.8 04.6 80°44.4 17.0 15 95°38.1 88°06.7 · · 40.2 321°32.6 · · 08.7 12°24.7 · · 04.7 95°46.6 · · 16.9 16 110°40.6 103°07.3 40.7 336°33.8 08.3 27°26.6 04.7 110°48.9 16.8 17 125°43.1 118°07.9 41.2 351°35.0 07.9 42°28.5 04.7 125°51.1 16.7 18 140°45.5 133°08.5 N02°41.7 6°36.3 N19°07.6 57°30.4 N23°04.7 140°53.4 S02°16.6 19 155°48.0 148°09.0 42.2 21°37.5 07.2 72°32.3 04.8 155°55.7 16.6 20 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 21 185°52.9 178°10.2 · · 43.2 51°39.9 · · 06.4 102°36.1 · · 04.8 186°00.2 · · 16.4 22 200°55.4 193°10.8 43.7 66°41.2 06.0 117°38.0 04.9 201°02.4 16.3 23 215°57.8 208°11.4 44.2 81°42.4 05.6 132°39.8 04.9 216°04.7 16.2	13	65°33.2	58°05.5	39.3	291°30.1	09.5	342°20.9	04.6	65°42.1	17.0			
15 95°38.1 88°06.7 · · · 40.2 321°32.6 · · · 08.7 12°24.7 · · · 04.7 95°46.6 · · · 16.9 110°40.6 103°07.3 40.7 336°33.8 08.3 27°26.6 04.7 110°48.9 16.8 110°40.6 103°07.3 40.7 336°33.8 08.3 27°26.6 04.7 110°48.9 16.8 16.8 110°48.9 16.8 16.8 110°48.9 16.8 16.8 16.8 16.8 110°48.9 16.8 16.8 16.8 16.8 16.8 16.8 16.8 16.8											Saturn	Ω-10.8	U8:41
16 110°40.6 103°07.3 40.7 336°33.8 08.3 27°26.6 04.7 110°48.9 16.8 110°48.1 118°07.9 41.2 351°35.0 07.9 42°28.5 04.7 125°51.1 16.7 125°43.1 118°07.9 41.2 351°35.0 07.9 42°28.5 04.7 125°51.1 16.7 16.7 18 140°45.5 133°08.5 N02°41.7 6°36.3 N19°07.6 57°30.4 N23°04.7 140°53.4 S02°16.6 19 155°48.0 148°09.0 42.2 21°37.5 07.2 72°32.3 04.8 155°55.7 16.6 20 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 21 185°52.9 178°10.2 · · 43.2 51°39.9 · · 06.4 102°36.1 · · 04.8 186°00.2 · · 16.4 22 200°55.4 193°10.8 43.7 66°41.2 06.0 117°38.0 04.9 201°02.4 16.3 23 215°57.8 208°11.4 44.2 81°42.4 05.6 132°39.8 04.9 216°04.7 16.2 16.3 16.2 Mars: 0.1											May 12 Mon	SHA	Mer nass
17 125°43.1 118°07.9 41.2 351°35.0 07.9 42°28.5 04.7 125°51.1 16.7 18 140°45.5 133°08.5 N02°41.7 6°36.3 N19°07.6 57°30.4 N23°04.7 140°53.4 S02°16.6 19 155°48.0 148°09.0 42.2 21°37.5 07.2 72°32.3 04.8 155°55.7 16.6 20 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 21 185°52.9 178°10.2 · · 43.2 51°39.9 · · 06.4 102°36.1 · · 04.8 186°00.2 · · 16.4 22 200°55.4 193°10.8 43.7 66°41.2 06.0 117°38.0 04.9 201°02.4 16.3 23 215°57.8 208°11.4 44.2 81°42.4 05.6 132°39.8 04.9 216°04.7 16.2 Mars 226°12.9 17:34  Horizontal parallax Venus: 0.3  Mars 226°12.9 17:34  Jupiter 276°55.2 14:10  Saturn 0°11.7 08:38  Venus: 0.3  Mars: 0.1											1 -		
18 140°45.5 133°08.5 N02°41.7 6°36.3 N19°07.6 57°30.4 N23°04.7 140°53.4 S02°16.6 19 155°48.0 148°09.0 42.2 21°37.5 07.2 72°32.3 04.8 155°55.7 16.6 20 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 21 185°52.9 178°10.2 · · 43.2 51°39.9 · · 06.4 102°36.1 · · 04.8 186°00.2 · · 16.4 22 200°55.4 193°10.8 43.7 66°41.2 06.0 117°38.0 04.9 201°02.4 16.3 23 215°57.8 208°11.4 44.2 81°42.4 05.6 132°39.8 04.9 216°04.7 16.2											1		
19 155°48.0 148°09.0 42.2 21°37.5 07.2 72°32.3 04.8 155°55.7 16.6 20 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 21 185°52.9 178°10.2 · · 43.2 51°39.9 · · 06.4 102°36.1 · · 04.8 186°00.2 · · 16.4 22 200°55.4 193°10.8 43.7 66°41.2 06.0 117°38.0 04.9 201°02.4 16.3 23 215°57.8 208°11.4 44.2 81°42.4 05.6 132°39.8 04.9 216°04.7 16.2 Mars: 0.1													
20 170°50.4 163°09.6 42.7 36°38.7 06.8 87°34.2 04.8 170°57.9 16.5 21 185°52.9 178°10.2 · · 43.2 51°39.9 · · 06.4 102°36.1 · · 04.8 186°00.2 · · 16.4 22 200°55.4 193°10.8 43.7 66°41.2 06.0 117°38.0 04.9 201°02.4 16.3 23 215°57.8 208°11.4 44.2 81°42.4 05.6 132°39.8 04.9 216°04.7 16.2 Horizontal parallax Venus: 0.3 Mars: 0.1													
21       185°52.9       178°10.2       · · 43.2       51°39.9       · · 06.4       102°36.1       · · 04.8       186°00.2       · · 16.4       Horizontal parallax         22       200°55.4       193°10.8       43.7       66°41.2       06.0       117°38.0       04.9       201°02.4       16.3       Venus:       0.3         23       215°57.8       208°11.4       44.2       81°42.4       05.6       132°39.8       04.9       216°04.7       16.2       Mars:       0.1											Saturn	U~11.7	08:38
22 200°55.4 193°10.8 43.7 66°41.2 06.0 117°38.0 04.9 201°02.4 16.3 Venus: 0.3 23 215°57.8 208°11.4 44.2 81°42.4 05.6 132°39.8 04.9 216°04.7 16.2 Mars: 0.1											Horizont	al narallav	
23 215°57.8 208°11.4 44.2 81°42.4 05.6 132°39.8 04.9 216°04.7 16.2 Mars: 0.1											1.01120111	•	N 3
25 215 51.0 260 11.1 11.2 51 12.1 55.0 51.5 210 51.7 15.2													
Mer.pass. 08:39 $\nu 0.6' \ d0.5' \ \text{m-}4.61$ $\nu 1.2' \ d-0.4' \ \text{m}1.08$ $\nu 1.9' \ d0.0' \ \text{m-}1.95$ $\nu \overline{2.3' \ d-0.1' \ \text{m}1.14}$	23	215-57.8	208-11.4	44.2	81-42.4	05.6	132-39.8	04.9	∠10 · U4. /	16.2		ividi 3.	0.1
	Mer.p	ass. 08:39	$\nu$ 0.6′ d0.5	′ m-4.61	$\nu$ 1.2′ d-0	0.4′ m1.08	$\nu 1.9' \ d0.$	0′ m-1.95	$\nu 2.3' \ d-0$	.1′ m1.14			

h	Sur	า			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	180°54.0	N17°37.9	$30^{\circ}12.7$	16.7'	S09°48.4	13.4'	54.0'
1	195°54.0	38.6	44°48.4	16.6'	10°01.8	13.4'	54.0'
2	210°54.0 225°54.0	39.2 •• 39.9	59°24.0 73°59.6	16.6' 16.6'	10° 15.2 10° 28.5	13.3' 13.3'	54.0' 53.9'
4	240°54.1	40.5	88°35.2	16.5	10° 20.3	13.2'	53.9'
5	255°54.1	41.2	$103^{\circ}10.7$	16.5'	$10^{\circ}55.0$	13.2'	53.9'
6	270°54.1	N17°41.8	117°46.2	16.5'	<b>S</b> 11°08.2	13.2'	53.9'
7 8	285°54.1 300°54.1	42.5 43.1	132°21.7 146°57.1	16.4' 16.4'	11°21.3 11°34.4	13.1' 13.1'	53.9' 53.9'
9	315°54.2	• • 43.8	161°32.4	16.3'	11°47.5	13.0'	53.9'
10	330°54.2	44.4	$176^{\circ}07.8$	16.3'	$12^{\circ}00.5$	13.0'	53.9'
11	345°54.2 0°54.2	45.1 N17°45.7	190°43.1 205°18.3	16.2'	12°13.5 512°26.4	12.9'	53.9'
12 13	15°54.2	N17 45.7 46.4	205°18.3 219°53.5	16.2' 16.2'	12°39.3	12.9' 12.8'	53.9' 53.9'
14	30°54.3	47.0	234°28.6	16.1'	12°52.2	12.8'	53.9'
15	45°54.3	• • 47.7	249°03.7	16.1'	13°05.0	12.7'	53.9'
16	60°54.3	48.3	263°38.8	16.0'	13° 17.7	12.7'	53.9'
17 18	75°54.3 90°54.3	49.0 N17°49.6	278°13.8 292°48.8	16.0' 15.9'	13° 30.4 \$13° 43.1	12.6' 12.6'	53.9' 53.9'
19	105°54.4	50.2	307°23.7	15.9'	13°55.7	12.5'	53.9'
20	120°54.4	50.9	321°58.5	15.8'	14°08.2	12.5'	53.9'
21	135°54.4	• • 51.5	336°33.3	15.8'	14°20.7	12.4'	53.9'
22 23	150°54.4 165°54.4	52.2 52.8	351°08.1 5°42.8	15.7' 15.6'	14°33.1 14°45.5	12.4' 12.3'	53.9' 53.9'
	SD = 15.8'	d = 0.7'	- 12.0		0 = 14.7'	5	- 5.5
	טט = דו	u = 0.7		5L	<i>σ</i> = 14. <i>Γ</i> ′		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°54.5	N17°53.5	20°17.5	15.6'	S14°57.8	12.3'	53.9'
1 2	195°54.5 210°54.5	54.1 54.7	34°52.0 49°26.6	15.5' 15.5'	15° 10.1 15° 22.3	12.2' 12.2'	53.9' 53.9'
3	210 54.5 225°54.5	54.7 •• 55.4	49 20.0 64°01.1	15.5 15.4'	15 22.3 15°34.5	12.2	53.9'
4	240°54.5	56.0	78°35.5	15.4'	15°46.6	12.0'	53.9'
5	255°54.5	56.6	93°09.9	15.3'	15°58.6	12.0'	53.9'
6 7	270°54.6 285°54.6	N17°57.3 57.9	107°44.2 122°18.4	15.2' 15.2'	\$16° 10.6 16° 22.5	11.9' 11.9'	53.9' 53.9'
8	300°54.6	57.9 58.6	136°52.6	15.2 15.1'	16° 34.4	11.8'	53.9'
9	315°54.6	• • 59.2	151°26.7	15.1'	16°46.2	11.7'	53.9'
10	330°54.6	17°59.8	166°00.8	15.0'	16°57.9	11.7'	53.9'
11	345°54.6 0°54.6	18°00.5 N18°01.1	180°34.8 195°08.7	14.9' 14.9'	17°09.6 \$17°21.2	11.6'	53.9'
12 13	0 54.6 15°54.7	N18 01.1 01.7	209°42.6	14.9 14.8'	17°32.7	11.5' 11.5'	53.9' 53.9'
14	30°54.7	02.4	224°16.4	14.8'	17°44.2	11.4'	53.9'
15	45°54.7	• • 03.0	238°50.2	14.7'	17°55.6	11.3'	53.9'
16 17	60°54.7 75°54.7	03.6 04.3	253°23.9 267°57.5	14.6' 14.6'	18° 06.9 18° 18.2	11.3' 11.2'	53.9' 53.9'
18	90°54.7	N18°04.9	282°31.1	14.5'	518° 29.3	11.1'	53.9'
19	105°54.7	05.5	297°04.5	14.4'	$18^{\circ}40.5$	11.0'	53.9'
20	120°54.8	06.2	311°38.0		18°51.5		53.9'
21 22	135°54.8 150°54.8	· · 06.8 07.4	326°11.3 340°44.6	14.3' 14.2'	19°02.5 19°13.4	10.9' 10.8'	53.9' 53.9'
23	165°54.8	08.1	355°17.8	14.1'	19°24.2	10.7	53.9'
	SD = 15.8'	d = 0.6'			0 = 14.7'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	180°54.8 195°54.8	N18°08.7 09.3	9°51.0 24°24.0	14.1' 14.0'	\$19° 34.9 19° 45.6	10.7' 10.6'	54.0' 54.0'
2	210°54.8	09.5	38°57.0	13.9'	19° 56.2	10.5	54.0'
3	225°54.8	• • 10.6	53°30.0	13.9'	20°06.7	10.4'	54.0'
4	240°54.8	11.2	68°02.8	13.8'	20° 17.1	10.3'	54.0'
5 6	255°54.9 270°54.9	11.8 N18°12.4	82°35.6 97°08.4	13.7' 13.6'	20°27.4 \$20°37.7	10.3' 10.2'	54.0' 54.0'
7	285°54.9	13.1	111°41.0	13.6'	20°47.8	10.1	54.0'
8	300°54.9	13.7	126°13.6	13.5'	20°57.9	10.0'	54.0'
9	315°54.9	• • 14.3	140°46.1	13.4'	21°07.9	9.9'	54.0'
10 11	330°54.9 345°54.9	14.9 15.6	155°18.5 169°50.9	13.4' 13.3'	21°17.9 21°27.7	9.8' 9.7'	54.0' 54.0'
12	0°54.9	N18°16.2	184°23.1	13.2'	S21°37.4	9.7	54.0'
13	15°54.9	16.8	198°55.4	13.1'	21°47.1	9.6'	54.0'
14	30°54.9	17.4	213°27.5 227°59.5	13.1'	21°56.7 22°06.1	9.5'	54.0'
15 16	45°55.0 60°55.0	· · 18.1 18.7	227°59.5 242°31.5	13.0' 12.9'	22°06.1 22°15.5	9.4' 9.3'	54.0' 54.0'
17	75°55.0	19.3	257°03.4	12.8'	22°24.8	9.3	54.0'
18	90°55.0	N18°19.9	271°35.3	12.8'	S22°34.0	9.1'	54.0'
19	105°55.0	20.5	286°07.0 300°38.7	12.7'	22°43.1 22°52.1	9.0'	54.1'
20 21	120°55.0 135°55.0	21.1 · · 21.8	300°38.7 315°10.3	12.6' 12.5'	22°52.1 23°01.0	8.9' 8.8'	54.1' 54.1'
22	150°55.0	22.4	329°41.9	12.5'	23°09.8	8.7'	54.1
23	165°55.0	23.0	344°13.3	12.4'	$23^{\circ}18.5$	8.6'	54.1'
	SD = 15.8'	d = 0.6'		SE	0 = 14.7'		

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

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

		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	94-99%
10	03:36	03:37	11:56	22:36	10:16	
11	03:38	03:39	11:56	23:19	10:58	
12	03:39	03:40	11:56	-:-	11:42	

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
T	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Doo		SHA	Das
Tue									Dec		эпа	Dec
0	231°00.3	223°11.9	N02°44.7	96°43.6	N19°05.3	147°41.7	N23°04.9	231°06.9	S02°16.1	Alpheratz	357°34.7	29°13.6
1	246°02.8	238° 12.5	45.2	111°44.9	04.9	162°43.6	04.9	246°09.2	16.1	Ankaa	353°07.2	-42°10.0
2	261°05.2	253° 13.1	45.7	126°46.1	04.5	177°45.5	05.0	261°11.4	16.0	Schedar	349°31.2	56°40.4
3	276°07.7	268° 13.6	• • 46.1	141°47.3	•• 04.1	192°47.4	• • 05.0	276°13.7	• • 15.9	Diphda	348°47.3	-17°50.8
4	291°10.2	283°14.2	46.6	156°48.5	03.7	207°49.3	05.0	291°16.0	15.8	Achernar	335°20.5	-57°06.4
5	$306^{\circ}12.6$	298° 14.8	47.1	171°49.8	03.3	222°51.2	05.1	306°18.2	15.7	Hamal	327°51.2	23°34.8
6	321°15.1	313° 15.3	N02°47.6	186°51.0	N19°02.9	237°53.1	N23°05.1	321°20.5	S02°15.7	I		89°22.2
7	336°17.6	328° 15.9	48.1	201°52.2	02.6	252°54.9	05.1	336°22.7	15.6	Polaris	314°23.7	
8	351°20.0	343°16.5	48.6	216°53.4	02.2	267°56.8	05.1	351°25.0	15.5	Acamar	315°12.0	-40°12.2
9	6°22.5	358° 17.0	• • 49.2	231°54.7	• • 01.8	282°58.7	• • 05.2	6°27.2	• • 15.4	Menkar	314°06.2	4°11.3
10	21°24.9	13° 17.6	49.7	246°55.9	01.4	298°00.6	05.2	21°29.5	15.3	Mirfak	308°28.4	49°57.0
11	36°27.4	28° 18.2	50.2	261°57.1	01.0	313°02.5	05.2	36°31.8	15.2	Aldebaran	290°39.7	16°33.6
12	51°29.9	43° 18.7	N02°50.7	276°58.3	N19°00.6	328°04.4	N23°05.3	51°34.0	S02°15.2	Rigel	281°03.9	-8°10.4
										Capella	280°21.9	46°01.4
13	66°32.3	58° 19.3	51.2	291°59.6	19°00.2	343°06.3	05.3	66°36.3	15.1	Bellatrix	278°22.9	6°22.3
14	81°34.8	73° 19.8	51.7	307°00.8	18°59.9	358°08.2	05.3	81°38.5	15.0	Elnath	278°01.9	28°37.7
15	96°37.3	88°20.4	• • 52.2	322°02.0	• • 59.5	13°10.1	• • 05.4	96°40.8	• • 14.9	Alnilam	275°37.8	-1°11.2
16	111°39.7	103°20.9	52.7	337°03.2	59.1	28°11.9	05.4	111°43.0	14.8	Betelgeuse	270°52.1	7°24.7
17	126°42.2	118°21.5	53.2	352°04.5	58.7	43°13.8	05.4	126°45.3	14.8			-52°42.7
18	141°44.7	133°22.0	N02°53.7	7°05.7	N18°58.3	58°15.7	N23°05.4	141°47.5	S02°14.7	Canopus	263°52.7	
19	156°47.1	148°22.6	54.2	22°06.9	57.9	73°17.6	05.5	156°49.8	14.6	Sirius	258°26.3	-16°45.2
20	171°49.6	163°23.1	54.7	37°08.1	57.5	88°19.5	05.5	171°52.1	14.5	Adhara	255°05.9	-29°00.5
21	186°52.1	178°23.7	• • 55.3	52°09.4	• • 57.1	103°21.4	• • 05.5	186°54.3	. 14.4	Procyon	244°50.7	5°09.6
										Pollux	243°17.2	27°58.0
22	201°54.5	193°24.2	55.8	67°10.6	56.8	118°23.3	05.6	201°56.6	14.4	Avior	234°14.9	-59°35.7
23	216°57.0	208°24.8	56.3	82°11.8	56.4	133°25.2	05.6	216°58.8	14.3	Suhail	222°46.2	-43°32.3
Mern	ass. 08:35	ν0 6' d0	5′ m-4.60	v1 2' d.C	.4' m1.09	v1 0/ d0	.0′ m-1.95	1/2 3/ d. f.	.1′ m1.14	Miaplacidus	221°38.4	-69°49.6
IVIEL.P	ass. 00.33	νο.ο αο.	3 111-4.00	ν1.2 u-0	.4 1111.09	ν1.9 do.	.0 111-1.93	ν2.5 u-0	.1 1111.14	Alphard	217°47.5	-8°46.2
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.1	11°50.6
0	231°59.4	223°25.3	N02°56.8	97° 13.0	N18°56.0	148°27.0	N23°05.6	232°01.1	S02°14.2	Dubhe	193°40.4	61°37.1
1	247°01.9	238°25.9	57.3	112°14.3	55.6	163°28.9	05.6	247°03.4	14.1	Denebola	182°24.5	14°25.8
										Gienah	175°43.1	$-17^{\circ}41.1$
2	262°04.4	253°26.4	57.8	127° 15.5	55.2	178°30.8	05.7	262°05.6	14.0	Acrux	172°59.4	-63°14.6
3	277°06.8	268°27.0	• • 58.3	142° 16.7	• • 54.8	193°32.7	• • 05.7	277°07.9	• • 14.0	Gacrux	171°51.0	$-57^{\circ}15.6$
4	292°09.3	283° 27.5	58.9	157° 17.9	54.4	208°34.6	05.7	292°10.1	13.9	Alioth	166°12.3	55°49.4
5	$307^{\circ}11.8$	298°28.0	59.4	$172^{\circ}19.2$	54.0	223°36.5	05.8	307°12.4	13.8	Spica	158°21.8	-11°17.7
6	322°14.2	313°28.6	N02°59.9	187°20.4	N18°53.6	238°38.4	N23°05.8	322°14.6	S02°13.7			49°11.2
7	$337^{\circ}16.7$	$328^{\circ}29.1$	03°00.4	202°21.6	53.2	253°40.2	05.8	337°16.9	13.6	Alkaid	152°51.3	
8	352°19.2	343°29.6	00.9	217°22.8	52.9	268°42.1	05.8	352°19.2	13.6	Hadar	148°35.1	-60°29.9
9	7°21.6	358° 30.2	01.5	232°24.0	• • 52.5	283°44.0	• • 05.9	7°21.4	13.5	Menkent	147°56.9	-36°29.8
										Arcturus	145°47.3	19°03.0
10	22°24.1	13°30.7	02.0	247°25.3	52.1	298°45.9	05.9	22°23.7	13.4	Rigil Kent.	139°39.3	-60°56.5
11	37°26.5	28°31.2	02.5	262°26.5	51.7	313°47.8	05.9	37°25.9	13.3	Kochab	137°18.6	74°03.1
12	52°29.0	43°31.8	N03°03.0	277° 27.7	N18°51.3	328°49.7	N23°06.0	52°28.2	S02°13.2	Zuben'ubi	136°55.4	-16°08.9
13	67°31.5	58° 32.3	03.6	292°28.9	50.9	343°51.6	06.0	67°30.5	13.2	Alphecca	126°03.1	26°37.7
14	82°33.9	73°32.8	04.1	307°30.2	50.5	358°53.4	06.0	82°32.7	13.1			
15	97°36.4	88°33.4	• • 04.6	322°31.4	• • 50.1	13°55.3	• • 06.0	97°35.0	• • 13.0	Antares	112°15.2	-26°29.3
16	112°38.9	103°33.9	05.2	337°32.6	49.7	28°57.2	06.1	112°37.2	12.9	Atria	107°08.6	-69°04.3
17	127°41.3	118° 34.4	05.7	352°33.8	49.3	43°59.1	06.1	127°39.5	12.8	Sabik	102°02.2	-15°45.4
18	142°43.8	133°34.9	N03°06.2	7°35.0	N18°48.9	59°01.0	N23°06.1	142°41.8	S02°12.8	Shaula	96°09.7	-37°07.3
			06.7							Rasalhague	95°58.0	12°32.3
19	157°46.3	148°35.5	06.7	22°36.3	48.6	74°02.9	06.1	157°44.0	12.7	Eltanin	90°41.6	51°28.9
20	172°48.7	163°36.0	07.3	37°37.5	48.2	89°04.8	06.2	172°46.3	12.6	Kaus Aust.	83°31.9	-34°22.3
21	187°51.2	178°36.5	• • 07.8	52°38.7	• • 47.8	104°06.6	• • 06.2	187°48.5	• • 12.5	Vega	80°32.7	38°48.2
22	202°53.7	193°37.0	08.3	67°39.9	47.4	119°08.5	06.2	202°50.8	12.4	Nunki	75°47.2	-26°15.9
23	$217^{\circ}56.1$	208° 37.5	08.9	82°41.1	47.0	134°10.4	06.3	217°53.1	12.4	Altair	61°59.5	8°56.0
	00.01	0.5/ 10	F/ 4 FO	1.0/ 1.0		1.0/.10	0/ 1.05	0.0/ 1.0	1/ 114			
Mer.p	ass. 08:31	$\nu$ 0.5′ $d$ 0.	5′ m-4.59	$\nu$ 1.2' $d$ -0	1.4'  m 1.10	$\nu$ 1.9' $d0$	.0′ m-1.95	$\nu$ 2.3′ $d$ -0	$.1^\prime$ m $1.14$	Peacock	53°05.1	-56°39.0
										Deneb	49°25.5	45°21.9
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.5	9°59.3
	232°58.6	223°38.1	N03°09.4	97° 42.4	N18° 46.6	149°12.3	N23°06.3	232°55.3	502°12.3	Al Na'ir	27°32.6	-46°50.1
0										Fomalhaut	15°14.3	-29°29.2
1	248°01.0	238°38.6	10.0	112°43.6	46.2	164°14.2	06.3	247°57.6	12.2	Scheat	13°45.1	28°13.0
2	263°03.5	253°39.1	10.5	127°44.8	45.8	179°16.1	06.3	262°59.8	12.1	Markab	13°29.8	15°20.3
3	278°06.0	268°39.6	• • 11.0	142°46.0	• • 45.4	194°17.9	• • 06.4	278°02.1	• • 12.0		<u></u>	
4	293°08.4	283°40.1	11.6	157° 47.2	45.0	209°19.8	06.4	293°04.4	12.0	May 13 Tue	SHA	Mer.pass
5	$308^{\circ}10.9$	298°40.6	12.1	172°48.5	44.6	224°21.7	06.4	308°06.6	11.9		352°11.6	09:07
6	323°13.4	313°41.1	N03°12.6	187°49.7	N18°44.2	239°23.6	N23°06.5	323°08.9	S02°11.8	Mars	225°43.3	17:32
7	338°15.8	328°41.7	13.2	202°50.9	43.8	254°25.5	06.5	338°11.1	11.7	Jupiter	276°41.4	14:07
8	353°18.3	343°42.2	13.7	217°52.1	43.4	269°27.4	06.5	353°13.4	11.7	Saturn	0°06.6	08:34
9	8°20.8	358° 42.7	•• 14.3	232°53.3	• • 43.0	284°29.3	. 06.5	8°15.7	• • 11.6	5444.11	2 30.0	
	23°23.2	13° 43.2		232 55.5 247° 54.5		204 29.3 299°31.1		23°17.9		May 14 Wed	SHA	Mer.pass
10			14.8		42.6		06.6		11.5	Venus	351°25.9	09:06
11	38°25.7	28° 43.7	15.4	262°55.8	42.3	314°33.0	06.6	38°20.2	11.4	Mars	225°13.6	17:30
12	53°28.2	43°44.2	N03° 15.9	277° 57.0	N18°41.9	329°34.9	N23°06.6	53°22.4	S02°11.3	Jupiter		14:04
13	68°30.6	58° 44.7	16.4	292°58.2	41.5	344°36.8	06.6	68°24.7	11.3	Saturn	0°01.7	08:31
14	83°33.1	73°45.2	17.0	307°59.4	41.1	359°38.7	06.7	83°27.0	11.2	Jaturn	0 01.7	00.31
15	98°35.5	88°45.7	• • 17.5	323°00.6	• • 40.7	14°40.6	• • 06.7	98°29.2	• • 11.1	May 15 Thu	SHA	Mer.pass
16	113°38.0	103°46.2	18.1	338°01.9	40.3	29°42.4	06.7	113°31.5	11.0		350°39.5	09:05
17	128°40.5	118° 46.7	18.6	353°03.1	39.9	44°44.3	06.8	128°33.8	10.9		224°43.8	
	143°42.9	133° 47.2	N03° 19.2	8°04.3	N18°39.5	59°46.2	N23°06.8	143°36.0	502°10.9	Mars		17:28
18										Jupiter		14:01
19	158°45.4	148° 47.7	19.7	23°05.5	39.1	74°48.1	06.8	158°38.3	10.8	Saturn	359°56.7	08:27
20	173°47.9	163°48.2	20.3	38°06.7	38.7	89°50.0	06.8	173°40.5	10.7	ш!	al navalla.	
21	188°50.3	178° 48.7	• • 20.8	53°07.9	• • 38.3	104°51.8	• • 06.9	188°42.8	• • 10.6	Horizont	al parallax	0.5
22	203°52.8	193°49.2	21.4	68°09.2	37.9	119°53.7	06.9	203°45.1	10.6		Venus:	0.3
23	218°55.3	208°49.7	21.9	83°10.4	37.5	134°55.6	06.9	218°47.3	10.5		Mars:	0.1
										<u> </u>		<u></u>
Mer.p	ass. 08:27	$\nu$ 0.5′ $d$ 0.	5′ m-4.58	$\nu$ 1.2′ $d$ -0	.4′ m1.11	$\nu$ 1.9′ d0.	.0′ m-1.95	$\nu$ 2.3′ d-0	$.1^\prime$ m $1.14$			

h	Sui	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°55.0	N18°23.6	358° 44.7	12.3'	S23°27.1	8.5'	54.1'
1	195°55.0	24.2	13°16.0	12.2'	23°35.6	8.4'	54.1'
2	210°55.0	24.8	27° 47.2	12.2'	23°44.0	8.3'	54.1'
3	225°55.0	• • 25.5	42°18.4	12.1'	23°52.3	8.2'	54.1'
4 5	240° 55.0 255° 55.0	26.1 26.7	56°49.5 71°20.5	12.0' 11.9'	24°00.5 24°08.6	8.1' 8.0'	54.1' 54.1'
6	255 55.0 270°55.0	20.7 N18°27.3	71 20.5 85°51.4	11.9'	\$24°16.6	7.9	54.1
7	285° 55.0	27.9	100° 22.3	11.8'	24°24.5	7.8'	54.1
8	300°55.1	28.5	114°53.1	11.7'	24°32.2	7.7'	54.1'
9	315°55.1	• • 29.1	129°23.8	11.6'	24°39.9	7.6'	54.2'
10	330°55.1	29.7	143°54.4	11.6'	24°47.5	7.4'	54.2'
11	345°55.1	30.4	158°25.0	11.5'	24°54.9 \$25°02.2	7.3'	54.2'
12 13	0°55.1 15°55.1	N18°31.0 31.6	172°55.4 187°25.9	11.4' 11.3'	525°02.2 25°09.4	7.2' 7.1'	54.2' 54.2'
14	30° 55.1	32.2	201°56.2	11.3'	25°16.5	7.1	54.2'
15	45°55.1	• • 32.8	216°26.5	11.2'	25°23.5	6.9'	54.2'
16	60°55.1	33.4	230°56.7	11.1'	25°30.4	6.8'	54.2'
17	75°55.1	34.0	$245^{\circ}26.8$	11.1'	25°37.2	6.6'	54.2'
18	90°55.1	N18°34.6	259°56.8	11.0'	S25°43.8	6.5'	54.2'
19	105°55.1	35.2	274°26.8	10.9'	25°50.3	6.4'	54.2'
20 21	120°55.1 135°55.1	35.8 •• 36.4	288°56.7 303°26.6	10.8' 10.8'	25°56.7 26°03.0	6.3' 6.2'	54.3' 54.3'
21	135°55.1 150°55.1	37.0	303°26.6 317°56.4	10.8	26°03.0 26°09.2	6.0'	54.3'
23	165°55.1	37.6	332°26.1	10.7	26°15.2	5.9'	54.3'
	SD = 15.8'	d = 0.6'			0 = 14.8'		
		<u>u = 0.0</u>		JL	/ — 14.0		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°55.1	N18°38.2	346°55.7	10.6'	\$26°21.2	5.8'	54.3'
1 2	195° 55.1 210° 55.1	38.8 39.4	1°25.3 15°54.8	10.5' 10.4'	26°27.0 26°32.6	5.7' 5.5'	54.3' 54.3'
3	210 55.1 225°55.1	. 40.0	15 54.8 30°24.2	10.4	26°38.2	5.4'	54.3'
4	240°55.1	40.6	44° 53.6	10.4	26°43.6	5.3	54.3
5	255°55.1	41.2	59°22.9	10.2'	26°48.9	5.2'	54.4'
6	270°55.1	N18°41.8	73°52.1	10.2'	S26°54.1	5.0'	54.4'
7	285°55.1	42.4	88°21.3	10.1'	$26^{\circ}59.1$	4.9'	54.4'
8	300°55.1	43.0	102°50.4	10.1'	27°04.0	4.8'	54.4'
9	315°55.1	• • 43.6	117° 19.5	10.0'	27°08.8 27°13.5	4.7'	54.4'
10 11	330° 55.1 345° 55.1	44.2 44.8	131°48.5 146°17.4	9.9' 9.9'	27°13.5 27°18.0	4.5' 4.4'	54.4' 54.4'
12	0°55.1	N18°45.4	160°46.3	9.8'	\$27°22.4	4.4	54.4
13	15°55.1	46.0	175° 15.1	9.8'	27°26.6	4.1'	54.5
14	30°55.0	46.6	189°43.9	9.7'	27°30.7	4.0'	54.5'
15	45°55.0	• • 47.2	$204^{\circ}12.6$	9.7'	27°34.7	3.9'	54.5'
16	60°55.0	47.8	218°41.3	9.6'	27°38.6	3.7'	54.5'
17	75°55.0 90°55.0	48.4 N18°49.0	233°09.9 247°38.4	9.6'	27°42.3 \$27°45.9	3.6' 3.4'	54.5' 54.5'
18 19	105°55.0	49.6	262°06.9	9.5' 9.5'	27°49.3	3.4	54.5'
20	120°55.0	50.2	276°35.4	9.4'	27°52.6	3.2'	54.5'
21	135°55.0	• • 50.8	291°03.8	9.4'	27°55.8	3.0'	54.6'
22	150°55.0	51.4	$305^{\circ}32.2$	9.3'	27°58.8	2.9'	54.6'
23	165°55.0	52.0	320°00.5	9.3'	28°01.7	2.8'	54.6'
	SD = 15.8'	d = 0.6'		SE	0 = 14.8'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°55.0	N18°52.5	$334^{\circ}28.7$	9.2'	\$28°04.5	2.6'	54.6'
1	195°55.0	53.1	348°57.0	9.2'	28°07.1	2.5'	54.6'
2	210°55.0	53.7	3°25.1	9.1'	28°09.6	2.3'	54.6'
3 4	225° 55.0 240° 55.0	· · 54.3 54.9	17°53.3 32°21.4	9.1' 9.1'	28°11.9 28°14.1	2.2' 2.0'	54.6' 54.7'
5	255° 55.0	55.5	32 21.4 46°49.4	9.1	28°16.1	2.0 1.9'	54.7'
6	270° 55.0	N18° 56.1	61° 17.4	9.0'	\$28°18.0	1.8'	54.7'
7	285°55.0	56.7	75°45.4	8.9'	28°19.8	1.6'	54.7'
8	300° 54.9	57.2	90°13.4	8.9'	28°21.4	1.5'	54.7'
9	315°54.9	• • 57.8	104°41.3	8.9'	28°22.8	1.3'	54.7'
10 11	330° 54.9 345° 54.9	58.4 59.0	119°09.2 133°37.0	8.9' 8.8'	28°24.2 28°25.3	1.2' 1.0'	54.8' 54.8'
11	0°54.9	59.0 N18°59.6	133° 37.0 148° 04.8	8.8'	28°25.3 \$28°26.4	0.9	54.8
13	15° 54.9	19°00.2	162°32.6	8.8'	28°27.3	0.7	54.8'
14	30°54.9	00.7	177°00.4	8.7'	28°28.0	0.6'	54.8'
15	45°54.9	•• 01.3	191°28.1	8.7'	28°28.6	0.4'	54.8'
16	60°54.9	01.9	205°55.9	8.7'	28°29.0	0.3'	54.8'
17	75°54.9	02.5	220°23.5	8.7'	28°29.3	0.1'	54.9'
18 19	90° 54.8 105° 54.8	N19°03.1 03.6	234°51.2 249°18.9	8.7' 8.6'	\$28°29.5 28°29.5	0.0' -0.1'	54.9' 54.9'
20	105 54.8 120° 54.8	03.6	249 18.9 263°46.5	8.6'	28°29.3	-0.1 -0.3'	54.9'
21	135° 54.8	• • 04.8	278° 14.1	8.6'	28°29.0	-0.4	54.9'
22	150° 54.8	05.4	292°41.7	8.6'	28°28.6	-0.6'	54.9'
23	165°54.8	06.0	307°09.3	8.6'	28°28.0	-0.7'	55.0'
	SD = 15.8'	d = 0.6'		SE	0 = 14.9'		

			2025	May 13	B to Ma	ay. 15
Lat.		light	Sunrise	Sunset		ilight
	Naut.	Civil			Civil	Naut.
N 72°						
<b>N</b> 70°	////	////	00:51	23:15	////	////
68°	////	////	01:51	22:06	////	////
66°	////	////	02:25	21:31	////	////
64°	////	01:14	02:50	21:05	22:45	////
62°	////	01:55	03:09	20:46	22:02	////
60°	////	02:22	03:24	20:30	21:34	////
<b>N</b> 58°	01:06	02:42	03:37	20:17	21:12	22:52
56°	01:43	02:59	03:49	20:05	20:55	22:13
54°	02:09	03:13	03:59	19:55	20:41	21:46
52°	02:28	03:25	04:07	19:46	20:28	21:26
50°	02:44	03:36	04:15	19:38	20:18	21:10
45°	03:15	03:58	04:32	19:21	19:56	20:39
<b>N</b> 40°	03:37	04:15	04:46	19:08	19:38	20:16
35°	03:55	04:29	04:57	18:56	19:24	19:58
30°	04:10	04:41	05:07	18:46	19:12	19:43
20°	04:33	05:01	05:24	18:29	18:52	19:20
N 10°	04:51	05:17	05:39	18:14	18:36	19:02
0°	05:06	05:31	05:53	18:00	18:22	18:47
<b>S</b> 10°	05:19	05:44	06:06	17:46	18:08	18:34
20°	05:19	05:58	06:21	17:40	17:55	18:22
30°	05:43	06:12	06:37	17:32	17:35	18:09
35°	05:43	06:12	06:47	17:15	17:40	18:03
35 40°	05:49	06:20	06:58	16:55	17:33	17:57
40 45°	l					
	06:03	06:38	07:10	16:42	17:14	17:49
<b>S</b> 50°	06:11	06:50	07:26	16:27	17:02	17:42
52°	06:14	06:55	07:33	16:19	16:57	17:38
54°	06:18	07:01	07:41	16:11	16:51	17:34
56°	06:21	07:07	07:50	16:02	16:45	17:31
58°	06:26	07:14	08:00	15:52	16:38	17:26
<b>S</b> 60°	06:30	07:22	08:12	15:40	16:30	17:22
1		Moonris	se		Moonse	t
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
N 70°						
68°						
66°				00:48		
64°				01:50		
62°	23:27			02:24	02:14	
60°	23:27		00:15	02:24	02:14	03:13
N 58°						
NI 58°	22.18	22.27		U3·U0	U3·34	03.23

Lat.		Moonris	е		Moonset	t
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°				_		
N 70°						
68°						
66°				00:48		
64°				01:50		
62°	23:27			02:24	02:14	
60°	22:46		00:15	02:49	02:55	03:13
N 58°	22:18	23:37		03:09	03:24	03:52
56°	21:56	23:10		03:26	03:46	04:19
54°	21:38	22:49	23:47	03:40	04:04	04:40
52°	21:23	22:32	23:29	03:53	04:19	04:58
50°	21:10	22:17	23:14	04:04	04:33	05:13
45°	20:43	21:46	22:43	04:27	05:00	05:43
<b>N</b> 40°	20:22	21:23	22:19	04:45	05:22	06:07
35°	20:05	21:04	21:59	05:01	05:40	06:27
30°	19:50	20:47	21:42	05:15	05:56	06:43
20°	19:24	20:19	21:14	05:38	06:22	07:12
N 10°	19:02	19:55	20:49	05:58	06:45	07:36
0°	18:42	19:33	20:26	06:17	07:06	07:59
S 10°	18:22	19:11	20:04	06:36	07:28	08:21
20°	18:00	18:47	19:39	06:56	07:51	08:46
30°	17:35	18:20	19:11	07:20	08:17	09:14
35°	17:21	18:04	18:54	07:33	08:33	09:31
40° 45°	17:04	17:45	18:34	07:50	08:52	09:50
	16:44	17:22	18:10	08:09	09:14	10:14
<b>S</b> 50°	16:19	16:53	17:40	08:33	09:42	10:45
52°	16:07	16:39	17:24	08:45	09:56	11:00
54°	15:53	16:22	17:06	08:58	10:13	11:18
56°	15:37	16:03	16:45	09:14	10:32	11:39
58° <b>S</b> 60°	15:18 14:54	15:38 15:06	16:17 15:38	09:32 09:55	10:56 11:28	12:07 12:46
3 00	14:54	15:00	13:30	09:55	11:20	12:40

		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	100-95%
13	03:40	03:40	11:56	00:05	12:29	
14	03:40	03:40	11:56	00:54	13:20	
15	03:40	03:40	11:56	01:46	14:12	

h _	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	233°57.7	223°50.2	N03°22.5	98°11.6	N18°37.1	149°57.5	N23°06.9	233°49.6	S02°10.4	A1.1.	2570247	00012.6
1	249°00.2	238° 50.6	23.1	113°12.8	36.7	164°59.4	07.0	248°51.9	10.3	Alpheratz	357°34.7	29°13.6
2	264°02.7	253°51.1	23.6	128°14.0	36.3	180°01.3	07.0	263°54.1	10.2	Ankaa	353°07.1	-42°10.0
3	279°05.1	268°51.6	• • 24.2	143°15.2	• • 35.9	195°03.1	• • 07.0	278°56.4	• • 10.2	Schedar	349°31.2	56°40.4
4	294°07.6	283°52.1	24.7	158°16.4	35.5	210°05.0	07.1	293°58.6	10.1	Diphda	348°47.3	-17°50.8
5	309°10.0	298°52.6	25.3	173° 17.7	35.1	225°06.9	07.1	309°00.9	10.1	Achernar	335°20.5	-57°06.3
6	324°12.5	313°53.1	N03° 25.8	188°18.9		240°08.8		324°03.2		Hamal	$327^{\circ}51.2$	23°34.8
					N18°34.7		N23°07.1		S02°09.9	Polaris	314°23.1	89°22.2
7	339°15.0	328°53.6	26.4	203°20.1	34.3	255°10.7	07.1	339°05.4	09.9	Acamar	315°12.0	-40°12.1
8	354°17.4	343°54.0	27.0	218°21.3	33.9	270°12.6	07.2	354°07.7	09.8	Menkar	314°06.2	4°11.3
9	9°19.9	358° 54.5	• • 27.5	233°22.5	• • 33.5	285°14.4	• • 07.2	9°10.0	• • 09.7	Mirfak	308°28.4	49°57.0
10	24°22.4	13°55.0	28.1	248°23.7	33.1	300°16.3	07.2	24°12.2	09.6	Aldebaran	290°39.6	16°33.6
11	39°24.8	28°55.5	28.6	263°25.0	32.7	315°18.2	07.2	39°14.5	09.5	Rigel	281°03.9	-8°10.4
12	54°27.3	43°56.0	N03°29.2	278°26.2	N18°32.3	330°20.1	N23°07.3	54°16.8	S02°09.5	Capella	280°21.9	46°01.4
13	69°29.8	58° 56.4	29.8	293°27.4	31.9	345°22.0	07.3	69°19.0	09.4	Bellatrix	278°22.9	6°22.3
14	84°32.2	73°56.9	30.3	308°28.6	31.5	0°23.8	07.3	84°21.3	09.3			
15	99°34.7	88°57.4	• • 30.9	323°29.8	• • 31.1	15°25.7	• • 07.3	99°23.5	• • 09.2	Elnath	278°01.9	28°37.7
16	114°37.2	103°57.9	31.5	338°31.0	30.7	30°27.6	07.4	114°25.8	09.2	Alnilam	275°37.8	-1°11.2
17	129°39.6	118°58.3	32.0	353°32.2	30.3	45°29.5	07.4	129°28.1	09.1	Betelgeuse	270°52.1	7°24.7
18	144°42.1	133°58.8	N03°32.6	8°33.4	N18°29.9	60°31.4	N23°07.4	144°30.3	S02°09.0	Canopus	263°52.7	-52°42.7
19	159°44.5	148° 59.3	33.2	23°34.7	29.5	75°33.2	07.5	159°32.6	08.9	Sirius	258°26.3	-16°45.2
										Adhara	255°05.9	-29°00.5
20	174°47.0	163°59.7	33.7	38°35.9	29.1	90°35.1	07.5	174°34.9	08.9	Procyon	244°50.7	5°09.6
21	189°49.5	179°00.2	• • 34.3	53°37.1	• • 28.7	105°37.0	• • 07.5	189°37.1	. 08.8	Pollux	243°17.2	27°58.0
22	204°51.9	194°00.7	34.9	68°38.3	28.3	120°38.9	07.5	204°39.4	08.7	Avior	234°14.9	-59°35.7
23	219°54.4	209°01.2	35.5	83°39.5	27.9	135°40.8	07.6	219°41.7	08.6	Suhail	222°46.2	-43°32.3
Mars	ass. 08:23	1/0 E/ 40	6′ m-4.57	1/1 O/ A O	.4′ m1.12	1/1 0/ do	.0′ m-1.94	1/2 3/ 4 0	.1′ m1.13	Miaplacidus	221°38.4	-43° 32.3
ivier.p	ass. U0.23	$\nu$ 0.5 $a$ 0.	0 111-4.57	ν1.∠ U-U	.+ 1111.12	ν1.9 <i>a</i> 0.	.0 111-1.94	ν2.3 U-U	.1111.13	Alphard	221 38.4 217°47.5	-8°46.2
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.1	11°50.6
0	234°56.9	224°01.6	N03°36.0	98°40.7	N18°27.5	150°42.6	N23°07.6	234°43.9	S02°08.5	Dubhe	193°40.4	61°37.1
1	249°59.3	239°02.1	36.6	113°41.9	27.1	165°44.5	07.6	249°46.2	08.5	Denebola	182°24.5	14°25.8
2	265°01.8	254°02.5	37.2	128°43.1	26.7	180°46.4	07.6	264°48.5	08.4	Gienah	175°43.1	-17°41.1
						195°48.3				Acrux	172°59.4	-63°14.7
3	280°04.3	269°03.0	• • 37.7	143°44.4	• • 26.3		•• 07.7	279°50.7	• • 08.3	Gacrux	171°51.0	-57°15.6
4	295°06.7	284°03.5	38.3	158°45.6	25.9	210°50.2	07.7	294°53.0	08.2	Alioth	166°12.3	55°49.5
5	310°09.2	299°03.9	38.9	173°46.8	25.5	225°52.0	07.7	309°55.3	08.2	Spica	158°21.7	-11°17.7
6	325°11.7	314°04.4	N03°39.5	188°48.0	N18°25.1	240°53.9	N23°07.7	324°57.5	S02°08.1	Alkaid	152°51.3	49°11.2
7	340°14.1	329°04.8	40.0	203°49.2	24.7	255°55.8	07.8	339°59.8	08.0	Hadar	148°35.0	-60°29.9
8	$355^{\circ}16.6$	344°05.3	40.6	218°50.4	24.3	270°57.7	07.8	355°02.1	07.9	Menkent	147°56.9	-36°29.8
9	$10^{\circ}19.0$	359°05.8	• • 41.2	233°51.6	• • 23.9	285°59.6	• • 07.8	10°04.3	• • 07.9	Arcturus	145°47.3	19°03.0
10	25°21.5	14°06.2	41.8	248°52.8	23.5	301°01.4	07.8	25°06.6	07.8	l l	139°39.3	-60°56.5
11	40°24.0	29°06.7	42.4	263°54.0	23.1	316°03.3	07.9	40°08.9	07.7	Rigil Kent.		
12	55°26.4	44°07.1	N03°42.9	278°55.3	N18°22.7	331°05.2	N23°07.9	55°11.1	502°07.6	Kochab	137°18.6	74°03.1
13	70°28.9	59°07.6	43.5	293°56.5	22.3	346°07.1	07.9	70°13.4	07.5	Zuben'ubi	136°55.4	-16°08.9
14	85°31.4	74° 08.0	44.1	308°57.7	21.9	1°09.0	07.9	85°15.7	07.5	Alphecca	126°03.1	26°37.7
15	100°33.8	89°08.5	• • 44.7	323°58.9	. 21.5	16°10.8	08.0	100°17.9	07.4	Antares	112°15.1	-26°29.3
										Atria	107°08.6	-69°04.3
16	115°36.3	104°08.9	45.3	339°00.1	21.1	31°12.7	0.80	115°20.2	07.3	Sabik	$102^{\circ}02.1$	-15°45.4
17	130°38.8	119°09.4	45.9	354°01.3	20.6	46°14.6	0.80	130°22.5	07.2	Shaula	96°09.6	-37°07.3
18	145°41.2	134°09.8	N03°46.4	9°02.5	N18°20.2	61°16.5	N23°08.0	145°24.7	S02°07.2	Rasalhague	95°58.0	12°32.4
19	160°43.7	149° 10.3	47.0	24°03.7	19.8	76°18.4	08.1	160°27.0	07.1	Eltanin	90°41.6	51°28.9
20	175°46.1	$164^{\circ}10.7$	47.6	39°04.9	19.4	91°20.2	08.1	175°29.3	07.0	Kaus Aust.	83°31.8	-34°22.3
21	190°48.6	$179^{\circ}11.1$	• • 48.2	54°06.1	• • 19.0	$106^{\circ}22.1$	• • 08.1	190°31.5	• • 06.9	Vega	80°32.7	38°48.2
22	205°51.1	194°11.6	48.8	69°07.4	18.6	121°24.0	08.2	205°33.8	06.9	_	75°47.2	-26°15.9
23	220°53.5	209°12.0	49.4	84°08.6	18.2	136°25.9	08.2	220°36.1	06.8	Nunki		8°56.0
		0.5/ 10	<u> </u>	10/10						Altair	61°59.5	
Mer.p	ass. 08:19	$\nu$ 0.5′ d0.	6′ m-4.55	$\nu$ 1.2′ d-0	.4′ m1.14	$\nu 1.9' d0.$	.0′ m-1.94	$\nu$ 2.3′ d-0	.1' m $1.13$	Peacock	53°05.1	-56°39.0
										Deneb	49°25.5	45°21.9
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.5	9°59.3
	235°56.0	224° 12.5	N03°50.0	99°09.8	N18°17.8	151°27.7	N23°08.2	235°38.3	S02°06.7	Al Na'ir	27°32.6	-46°50.1
0	250°58.5	239° 12.9	50.6			166°29.6		250°40.6		Fomalhaut	15°14.3	-29°29.2
1				114°11.0	17.4		08.2		06.6	Scheat	13°45.1	28°13.0
2	266°00.9	254°13.4	51.2	129°12.2	17.0	181°31.5	08.3	265°42.9	06.6	Markab	13°29.7	15°20.3
3	281°03.4	269°13.8	• • 51.7	144°13.4	• • 16.6	196°33.4	• • 08.3	280°45.1	• • 06.5	NA 40 = 1	C	
4	296°05.9	284°14.2	52.3	159°14.6	16.2	211°35.3	08.3	295°47.4	06.4	May 16 Fri	SHA	Mer.pass
5	311°08.3	299°14.7	52.9	174°15.8	15.8	226°37.1	08.3	310°49.7	06.3	Venus	349°52.4	09:04
6	$326^{\circ}10.8$	314° 15.1	N03°53.5	189°17.0	N18°15.4	241°39.0	N23°08.4	325°51.9	S02°06.3	Mars	224°13.9	17:26
7	$341^{\circ}13.3$	329° 15.5	54.1	204°18.2	15.0	256°40.9	08.4	340°54.2	06.2	Jupiter	275°59.8	13:58
8	356°15.7	344°16.0	54.7	219°19.4	14.6	271°42.8	08.4	355°56.5	06.1	Saturn	359°51.9	08:23
0		359° 16.4	• • 55.3	234°20.6	• • 14.1	286°44.6	• • 08.4	10°58.8	• • 06.0			
	11°18.2			249°21.8	13.7	301°46.5	08.5	26°01.0	06.0	May 17 Sat	SHA	Mer.pass
9			22.4			10.5				Venus	349°04.8	09:04
9 10	$26^{\circ}20.6$	$14^{\circ}16.8$	55.9 56.5		13 3	316°48 4	ווא ח	41°03 3	()5 4			
9 10 11	26°20.6 41°23.1	14° 16.8 29° 17.3	56.5	$264^{\circ}23.1$	13.3 N18°12.0	316°48.4	08.5 N23°08.5	41°03.3	05.9 \$02°05.8	Mars	223°43.9	17:24
9 10 11 12	26°20.6 41°23.1 56°25.6	14°16.8 29°17.3 44°17.7	56.5 N03°57.1	264°23.1 279°24.3	N18°12.9	331°50.3	N23°08.5	56°05.6	S02°05.8			17:24 13:55
9 10 11 12 13	26°20.6 41°23.1 56°25.6 71°28.0	14°16.8 29°17.3 44°17.7 59°18.1	56.5 N03°57.1 57.7	264°23.1 279°24.3 294°25.5	N18°12.9 12.5	331°50.3 346°52.2	N23°08.5 08.5	56°05.6 71°07.8	\$02°05.8 05.7	Mars	223°43.9	
9 10 11 12 13 14	26°20.6 41°23.1 56°25.6 71°28.0 86°30.5	14°16.8 29°17.3 44°17.7 59°18.1 74°18.5	56.5 N03° 57.1 57.7 58.3	264°23.1 279°24.3 294°25.5 309°26.7	N18°12.9 12.5 12.1	331°50.3 346°52.2 1°54.0	N23°08.5 08.5 08.6	56°05.6 71°07.8 86°10.1	\$02°05.8 05.7 05.7	Mars Jupiter Saturn	223°43.9 275°45.8 359°47.1	13:55 08:20
9 10 11 12 13 14 15	26°20.6 41°23.1 56°25.6 71°28.0 86°30.5 101°33.0	14° 16.8 29° 17.3 44° 17.7 59° 18.1 74° 18.5 89° 19.0	56.5 N03° 57.1 57.7 58.3 · · 58.9	264°23.1 279°24.3 294°25.5 309°26.7 324°27.9	N18°12.9 12.5 12.1 ·· 11.7	331°50.3 346°52.2 1°54.0 16°55.9	N23°08.5 08.5 08.6 •• 08.6	56°05.6 71°07.8 86°10.1 101°12.4	\$02°05.8 05.7 05.7 •• 05.6	Mars Jupiter Saturn May 18 Sun	223°43.9 275°45.8 359°47.1	13:55 08:20 Mer.pass
9 10 11 12 13 14 15 16	26°20.6 41°23.1 56°25.6 71°28.0 86°30.5 101°33.0 116°35.4	14° 16.8 29° 17.3 44° 17.7 59° 18.1 74° 18.5 89° 19.0 104° 19.4	56.5 N03° 57.1 57.7 58.3 •• 58.9 03° 59.5	264°23.1 279°24.3 294°25.5 309°26.7 324°27.9 339°29.1	N18°12.9 12.5 12.1 ·· 11.7 11.3	331°50.3 346°52.2 1°54.0 16°55.9 31°57.8	N23° 08.5 08.5 08.6 •• 08.6 08.6	56°05.6 71°07.8 86°10.1 101°12.4 116°14.6	\$02°05.8 05.7 05.7 •• 05.6 05.5	Mars Jupiter Saturn May 18 Sun	223°43.9 275°45.8 359°47.1	13:55 08:20
9 10 11 12 13 14 15	26°20.6 41°23.1 56°25.6 71°28.0 86°30.5 101°33.0	14° 16.8 29° 17.3 44° 17.7 59° 18.1 74° 18.5 89° 19.0	56.5 N03° 57.1 57.7 58.3 · · 58.9	264°23.1 279°24.3 294°25.5 309°26.7 324°27.9 339°29.1 354°30.3	N18°12.9 12.5 12.1 ·· 11.7	331°50.3 346°52.2 1°54.0 16°55.9	N23°08.5 08.5 08.6 •• 08.6	56°05.6 71°07.8 86°10.1 101°12.4 116°14.6 131°16.9	\$02°05.8 05.7 05.7 •• 05.6	Mars Jupiter Saturn May 18 Sun	223°43.9 275°45.8 359°47.1 SHA 348°16.5	13:55 08:20 Mer.pass
9 10 11 12 13 14 15 16	26°20.6 41°23.1 56°25.6 71°28.0 86°30.5 101°33.0 116°35.4	14° 16.8 29° 17.3 44° 17.7 59° 18.1 74° 18.5 89° 19.0 104° 19.4	56.5 N03° 57.1 57.7 58.3 •• 58.9 03° 59.5	264°23.1 279°24.3 294°25.5 309°26.7 324°27.9 339°29.1	N18°12.9 12.5 12.1 ·· 11.7 11.3	331°50.3 346°52.2 1°54.0 16°55.9 31°57.8	N23° 08.5 08.5 08.6 •• 08.6 08.6	56°05.6 71°07.8 86°10.1 101°12.4 116°14.6	\$02°05.8 05.7 05.7 •• 05.6 05.5	Mars Jupiter Saturn May 18 Sun Venus	223°43.9 275°45.8 359°47.1 SHA 348°16.5 223°13.8	13:55 08:20 <b>Mer.pass</b> 09:03 17:22
9 10 11 12 13 14 15 16 17	26°20.6 41°23.1 56°25.6 71°28.0 86°30.5 101°33.0 116°35.4 131°37.9 146°40.4	14° 16.8 29° 17.3 44° 17.7 59° 18.1 74° 18.5 89° 19.0 104° 19.4 119° 19.8 134° 20.2	56.5 N03° 57.1 57.7 58.3 · · 58.9 03° 59.5 04° 00.1	264°23.1 279°24.3 294°25.5 309°26.7 324°27.9 339°29.1 354°30.3 9°31.5	N18°12.9 12.5 12.1 ·· 11.7 11.3 10.9	331°50.3 346°52.2 1°54.0 16°55.9 31°57.8 46°59.7 62°01.5	N23° 08.5 08.5 08.6 •• 08.6 08.6 08.6	56°05.6 71°07.8 86°10.1 101°12.4 116°14.6 131°16.9 146°19.2	\$02°05.8 05.7 05.7 · 05.6 05.5 05.4 \$02°05.4	Mars Jupiter Saturn  May 18 Sun Venus Mars Jupiter	223°43.9 275°45.8 359°47.1 <b>SHA</b> 348°16.5 223°13.8 275°31.7	13:55 08:20 <b>Mer.pass</b> 09:03 17:22 13:52
9 10 11 12 13 14 15 16 17 18	26°20.6 41°23.1 56°25.6 71°28.0 86°30.5 101°33.0 116°35.4 131°37.9 146°40.4 161°42.8	14° 16.8 29° 17.3 44° 17.7 59° 18.1 74° 18.5 89° 19.0 104° 19.4 119° 19.8 134° 20.2 149° 20.7	56.5 N03° 57.1 57.7 58.3 · · 58.9 03° 59.5 04° 00.1 N04° 00.7 01.3	264°23.1 279°24.3 294°25.5 309°26.7 324°27.9 339°29.1 354°30.3 9°31.5 24°32.7	N18°12.9 12.5 12.1 •• 11.7 11.3 10.9 N18°10.5 10.1	331°50.3 346°52.2 1°54.0 16°55.9 31°57.8 46°59.7 62°01.5 77°03.4	N23°08.5 08.5 08.6 · · · 08.6 08.6 08.6 N23°08.7 08.7	56°05.6 71°07.8 86°10.1 101°12.4 116°14.6 131°16.9 146°19.2 161°21.4	\$02°05.8 05.7 05.7 · · 05.6 05.5 05.4 \$02°05.4 05.3	Mars Jupiter Saturn  May 18 Sun Venus Mars	223°43.9 275°45.8 359°47.1 <b>SHA</b> 348°16.5 223°13.8	13:55 08:20 <b>Mer.pass</b> 09:03 17:22
9 10 11 12 13 14 15 16 17 18 19 20	26°20.6 41°23.1 56°25.6 71°28.0 86°30.5 101°33.0 116°35.4 131°37.9 146°40.4 161°42.8 176°45.3	14° 16.8 29° 17.3 44° 17.7 59° 18.1 74° 18.5 89° 19.0 104° 19.4 119° 19.8 134° 20.2 149° 20.7 164° 21.1	56.5 N03° 57.1 57.7 58.3 • 58.9 03° 59.5 04° 00.1 N04° 00.7 01.3 01.9	264°23.1 279°24.3 294°25.5 309°26.7 324°27.9 339°29.1 354°30.3 9°31.5 24°32.7 39°33.9	N18°12.9 12.5 12.1 •• 11.7 11.3 10.9 N18°10.5 10.1 09.6	331°50.3 346°52.2 1°54.0 16°55.9 31°57.8 46°59.7 62°01.5 77°03.4 92°05.3	N23°08.5 08.5 08.6 · · 08.6 08.6 08.6 N23°08.7 08.7	56°05.6 71°07.8 86°10.1 101°12.4 116°14.6 131°16.9 146°19.2 161°21.4 176°23.7	\$02°05.8 05.7 05.7 · · 05.6 05.5 05.4 \$02°05.4 05.3 05.2	Mars Jupiter Saturn  May 18 Sun Venus Mars Jupiter Saturn	223°43.9 275°45.8 359°47.1 <b>SHA</b> 348°16.5 223°13.8 275°31.7	13:55 08:20 <b>Mer.pass</b> 09:03 17:22 13:52
9 10 11 12 13 14 15 16 17 18 19 20 21	26°20.6 41°23.1 56°25.6 71°28.0 86°30.5 101°33.0 116°35.4 131°37.9 146°40.4 161°42.8 176°45.3 191°47.8	14° 16.8 29° 17.3 44° 17.7 59° 18.1 74° 18.5 89° 19.0 104° 19.4 119° 19.8 134° 20.2 149° 20.7 164° 21.1 179° 21.5	56.5 N03° 57.1 57.7 58.3 · 58.9 03° 59.5 04° 00.1 N04° 00.7 01.3 01.9 · 02.5	264°23.1 279°24.3 294°25.5 309°26.7 324°27.9 339°29.1 354°30.3 9°31.5 24°32.7 39°33.9 54°35.1	N18°12.9 12.5 12.1 ·· 11.7 11.3 10.9 N18°10.5 10.1 09.6 ·· 09.2	331°50.3 346°52.2 1°54.0 16°55.9 31°57.8 46°59.7 62°01.5 77°03.4 92°05.3 107°07.2	N23°08.5 08.5 08.6 · 08.6 08.6 08.6 08.7 08.7 08.7	56°05.6 71°07.8 86°10.1 101°12.4 116°14.6 131°16.9 146°19.2 161°21.4 176°23.7 191°26.0	\$02°05.8 05.7 05.7 05.6 05.5 05.4 \$02°05.4 05.3 05.2 05.1	Mars Jupiter Saturn  May 18 Sun Venus Mars Jupiter Saturn	223°43.9 275°45.8 359°47.1 SHA 348°16.5 223°13.8 275°31.7 359°42.3	13:55 08:20 Mer.pass 09:03 17:22 13:52 08:16
9 10 11 12 13 14 15 16 17 18 19 20 21 22	26°20.6 41°23.1 56°25.6 71°28.0 86°30.5 101°33.0 116°35.4 131°37.9 146°40.4 161°42.8 176°45.3 191°47.8 206°50.2	14° 16.8 29° 17.3 44° 17.7 59° 18.1 74° 18.5 89° 19.0 104° 19.4 119° 19.8 134° 20.2 149° 20.7 164° 21.1 179° 21.5 194° 21.9	56.5 N03° 57.1 57.7 58.3 · 58.9 03° 59.5 04° 00.1 N04° 00.7 01.3 01.9 · 02.5 03.1	264°23.1 279°24.3 294°25.5 309°26.7 324°27.9 339°29.1 354°30.3 9°31.5 24°32.7 39°33.9 54°35.1 69°36.3	N18°12.9 12.5 12.1 ·· 11.7 11.3 10.9 N18°10.5 10.1 09.6 ·· 09.2 08.8	331°50.3 346°52.2 1°54.0 16°55.9 31°57.8 46°59.7 62°01.5 77°03.4 92°05.3 107°07.2 122°09.0	N23° 08.5 08.5 08.6 · 08.6 08.6 08.6 N23° 08.7 08.7 · 08.7 08.8	56°05.6 71°07.8 86°10.1 101°12.4 116°14.6 131°16.9 146°19.2 161°21.4 176°23.7 191°26.0 206°28.3	\$02°05.8 05.7 05.7 05.6 05.5 05.4 \$02°05.4 05.3 05.2 05.1	Mars Jupiter Saturn  May 18 Sun Venus Mars Jupiter Saturn	223°43.9 275°45.8 359°47.1 SHA 348°16.5 223°13.8 275°31.7 359°42.3 tal parallax Venus:	13:55 08:20 Mer.pass 09:03 17:22 13:52 08:16
9 10 11 12 13 14 15 16 17 18 19 20 21	26°20.6 41°23.1 56°25.6 71°28.0 86°30.5 101°33.0 116°35.4 131°37.9 146°40.4 161°42.8 176°45.3 191°47.8	14° 16.8 29° 17.3 44° 17.7 59° 18.1 74° 18.5 89° 19.0 104° 19.4 119° 19.8 134° 20.2 149° 20.7 164° 21.1 179° 21.5	56.5 N03° 57.1 57.7 58.3 · 58.9 03° 59.5 04° 00.1 N04° 00.7 01.3 01.9 · 02.5	264°23.1 279°24.3 294°25.5 309°26.7 324°27.9 339°29.1 354°30.3 9°31.5 24°32.7 39°33.9 54°35.1	N18°12.9 12.5 12.1 ·· 11.7 11.3 10.9 N18°10.5 10.1 09.6 ·· 09.2	331°50.3 346°52.2 1°54.0 16°55.9 31°57.8 46°59.7 62°01.5 77°03.4 92°05.3 107°07.2	N23°08.5 08.5 08.6 · 08.6 08.6 08.6 08.7 08.7 08.7	56°05.6 71°07.8 86°10.1 101°12.4 116°14.6 131°16.9 146°19.2 161°21.4 176°23.7 191°26.0	\$02°05.8 05.7 05.7 05.6 05.5 05.4 \$02°05.4 05.3 05.2 05.1	Mars Jupiter Saturn  May 18 Sun Venus Mars Jupiter Saturn	223°43.9 275°45.8 359°47.1 SHA 348°16.5 223°13.8 275°31.7 359°42.3	13:55 08:20 <b>Mer.pass</b> 09:03 17:22 13:52 08:16

h	Sur	า	Moon					
Fri	GHA	Dec	GHA	ν	Dec	d	HP	
0	180°54.8	N19°06.5	321°36.9	8.6'	528°27.2	-0.9'	55.0'	
1	195°54.8	07.1	$336^{\circ}04.5$	8.6'	28°26.3	-1.0'	55.0'	
2	210°54.8	07.7	350°32.0	8.6'	28°25.3	-1.2'	55.0'	
3	225°54.7	• • 08.3	4°59.6	8.5'	28°24.1	-1.3'	55.0'	
4 5	240°54.7 255°54.7	08.8 09.4	19°27.1 33°54.7	8.5' 8.5'	28°22.8 28°21.3	-1.5' -1.6'	55.1' 55.1'	
6	270°54.7	N19°10.0	48°22.2	8.5'	528°19.6	-1.8'	55.1'	
7	285°54.7	10.6	62°49.7	8.5'	28°17.9	-1.9'	55.1'	
8	300°54.7	11.1	77°17.3	8.5'	28°15.9	-2.1'	55.1'	
9	315°54.7	• • 11.7	91°44.8	8.5'	28°13.8	-2.2'	55.2'	
10	330°54.6	12.3	106°12.3	8.5'	28°11.6	-2.4'	55.2'	
11	345°54.6	12.8	120°39.9 135°07.4	8.5'	28°09.2	-2.5'	55.2'	
12 13	0°54.6 15°54.6	N19°13.4 14.0	135°07.4 149°35.0	8.6' 8.6'	\$28°06.7 28°04.0	-2.7' -2.8'	55.2' 55.2'	
14	30°54.6	14.5	164°02.5	8.6'	28°01.2	-3.0'	55.2'	
15	45°54.6	•• 15.1	178°30.1	8.6'	27°58.2	-3.1'	55.3'	
16	60°54.6	15.7	192°57.7	8.6'	27°55.0	-3.3'	55.3'	
17	75°54.5	16.2	$207^{\circ}25.3$	8.6'	27°51.8	-3.4'	55.3'	
18	90°54.5	N19°16.8	221°52.9	8.6'	S27°48.3	-3.6'	55.3'	
19	105°54.5	17.4	236°20.5	8.6'	27°44.7	-3.7'	55.4'	
20	120°54.5	17.9 •• 18.5	250°48.1	8.6'	27°41.0	-3.9'	55.4'	
21 22	135°54.5 150°54.5	· · 18.5	265°15.8 279°43.4	8.7' 8.7'	27°37.1 27°33.1	-4.0' -4.2'	55.4' 55.4'	
23	150 54.5 165°54.4	19.1	279 43.4 294°11.1	8.7'	27°29.0	-4.2 -4.3'	55.4'	
		d = 0.6'				5		
	SD = 15.8′	a = 0.0		51	O = 15.0'			
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	180°54.4 195°54.4	N19°20.2 20.8	308°38.8 323°06.5	8.7'	\$27°24.6 27°20.2	-4.5'	55.5'	
1 2	195 54.4 210°54.4	20.8	323°06.5 337°34.3	8.8' 8.8'	27°20.2 27°15.6	-4.6' -4.8'	55.5' 55.5'	
3	210 54.4 225°54.4	. 21.3	357 34.3 352°02.1	8.8'	27 15.6 27°10.8	-4.8 -4.9'	55.5'	
4	240°54.3	22.4	6°29.9	8.8'	27°05.9	-5.0'	55.5'	
5	255°54.3	23.0	20°57.7	8.9'	27°00.9	-5.2'	55.6'	
6	270°54.3	N19°23.6	35°25.6	8.9'	S26°55.7	-5.3'	55.6'	
7	285°54.3	24.1	49°53.4	8.9'	26°50.3	-5.5'	55.6'	
8	300°54.3	24.7	64°21.4	8.9'	26°44.8	-5.6'	55.6'	
9 10	315°54.2 330°54.2	· · 25.2 25.8	78°49.3 93°17.3	9.0' 9.0'	26°39.2 26°33.4	-5.8' -5.9'	55.7' 55.7'	
11	345°54.2	25.6	93 17.3 107°45.3	9.0'	26°27.5	-5.9 -6.1'	55.7'	
12	0°54.2	N19°26.9	122°13.3	9.1'	S26°21.5	-6.2	55.7'	
13	15°54.2	27.5	136°41.4	9.1'	26°15.3	-6.3'	55.8'	
14	30°54.1	28.0	151°09.5	9.1'	26°08.9	-6.5'	55.8'	
15	45°54.1	• • 28.6	165°37.7	9.2'	26°02.5	-6.6'	55.8'	
16	60°54.1 75°54.1	29.1 29.7	180°05.8 194°34.1	9.2' 9.3'	25°55.9 25°49.1	-6.8'	55.8' 55.8'	
17 18	75 54.1 90°54.0	29.7 N19°30.2	194 34.1 209°02.3	9.3'	25 49.1 S25°42.2	-6.9' -7.0'	55.8'	
19	105°54.0	30.8	223°30.6	9.3'	25°35.2	-7.2'	55.9'	
20	120°54.0	31.3	237°59.0	9.4'	25°28.0	-7.3	55.9'	
21	135°54.0	• • 31.9	252°27.3	9.4'	25°20.7	-7.4'	55.9'	
22	150°54.0	32.4	266°55.8	9.5'	25°13.2	-7.6'	56.0'	
23	165°53.9	33.0	281°24.2	9.5'	25°05.6	-7.7'	56.0'	
	SD = 15.8'	d = 0.6'		SI	O = 15.1'			
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	180°53.9	N19°33.5	295°52.7	9.5'	\$24°57.9	-7.9'	56.0'	
1	195°53.9	34.1	$310^{\circ}21.3$	9.6'	$24^{\circ}50.1$	-8.0'	56.0'	
2	210°53.9	34.6	324°49.9	9.6'	24°42.1	-8.1'	56.1'	
3	225°53.8 240°53.8	• • 35.2	339°18.5	9.7'	24°33.9	-8.3'	56.1'	
4 5	240°53.8 255°53.8	35.7 36.3	353°47.2 8°15.9	9.7' 9.8'	24°25.7 24°17.3	-8.4' -8.5'	56.1' 56.2'	
6	255 53.8 270°53.8	30.3 N19°36.8	8 15.9 22°44.7	9.8'	24 17.3 \$24°08.8	-8.5'	56.2'	
7	285°53.7	37.4	37°13.5	9.9'	24°00.1	-8.8'	56.2'	
8	300°53.7	37.9	51°42.4	9.9'	23°51.4	-8.9'	56.2'	
9	315°53.7	•• 38.5	66°11.3	10.0'	23°42.4	-9.0'	56.3'	
10	330°53.7	39.0	80°40.3	10.0'	23°33.4	-9.2'	56.3'	
11	345°53.6	39.5 N19°40.1	95°09.3	10.1'	23°24.2	-9.3'	56.3'	
12 13	0°53.6 15°53.6	N19°40.1 40.6	109°38.3 124°07.4	10.1' 10.1'	\$23°14.9 23°05.5	-9.4' -9.5'	56.3' 56.4'	
14	30°53.5	40.6	124 07.4 138°36.6	10.1	23 05.5 22°56.0	-9.5 -9.7'	56.4'	
15	45°53.5	• • 41.7	153°05.8	10.2'	22°46.3	-9.8'	56.4	
16	60°53.5	42.3	167°35.0	10.3'	22°36.5	-9.9'	56.5'	
17	75°53.5	42.8	182°04.3	10.3'	22°26.6	-10.0'	56.5'	
18	90°53.4	N19°43.3	196°33.6	10.4	\$22°16.6	-10.2'	56.5'	
19	105°53.4 120°53.4	43.9 44.4	211°03.0 225°32.5	10.4'	22°06.4 21°56.1	-10.3'	56.5'	
20 21	120°53.4 135°53.3	44.4 •• 44.9	225°32.5 240°02.0	10.5' 10.5'	21°56.1 21°45.7	-10.4' -10.5'	56.6' 56.6'	
22	150°53.3	45.5	254° 31.5	10.6'	21°35.2	-10.5	56.6'	
23	165°53.3	46.0	269°01.1	10.6'	21°24.6	-10.8'	56.7'	
	SD = 15.8'	d = 0.5'		SI	D = 15.3'			

			2025	May 16	to ivia	iy. 10
Lat.	<b>Twilight</b> Naut. Civil		Sunrise	Sunset		light
NI 70°		CIVII			Civil	Naut
N 72°						
N 70°						
68°	////	////	01:34	22:24	////	////
$66^{\circ}$	////	////	02:13	21:43	////	////
64°	////	00:50	02:40	21:15	23:12	////
62°	////	01:42	03:01	20:54	22:15	////
60°	////	02:12	03:17	20:37	21:43	////
N 58°	00:45	02:34	03:31	20:23	21:20	23:1
56°	01:32	02:52	03:43	20:11	21:02	22:2
54°	02:00	03:07	03:54	20:00	20:47	21:5
52°	02:21	03:20	04:03	19:51	20:34	21:3
50°	02:38	03:31	04:11	19:42	20:22	21:1
45°	02:30	03:54	04:11	19:42	19:59	20:4
N 40°	03:34	04:12	04:43	19:10	19:41	20:2
35°	03:52	04:27	04:55	18:58	19:27	20:0
30°	04:07	04:39	05:05	18:48	19:14	19:4
20°	04:31	04:59	05:23	18:30	18:54	19:2
N 10°	04:50	05:16	05:39	18:14	18:37	19:0
0°	05:05	05:31	05:53	18:00	18:22	18:4
<b>S</b> 10°	05:19	05:45	06:07	17:46	18:08	18:3
20°	05:32	05:59	06:22	17:31	17:54	18:2
30°	05:45	06:14	06:39	17:13	17:39	18:0
35°	05:51	06:22	06:49	17:03	17:31	18:0
40°	05:58	06:31	07:00	16:52	17:21	17:5
45°	06:06	06:41	07:14	16:39	17:11	17:4
<b>S</b> 50°	06:14	06:54	07:30	16:23	16:59	17:3
52°	06:18	06:59	07:37	16:15	16:53	17:3
54°	06:22	07:05	07:46	16:07	16:47	17:3
56°	06:26	07:12	07:55	15:57	16:40	17:2
58°	06:30	07:19	08:06	15:46	16:33	17:2
<b>S</b> 60°	06:35	07:28	08:18	15:34	16:24	17:1
Lat.	Fri	Moonris Sat	s <b>e</b> Sun	Fri	Moonset Sat	t Sun
N 72°		Jac			Jat	Juli
				_		
<b>N</b> 70°				_		
68°				_		
66°				_		
64°			03:04	_		05:5
62°		02:36	02:22	_	04:36	06:4
60°	01:18	01:44	01:54	04:02	05:28	07:0
<b>N</b> 58°	00:37	01:13	01:31	04:43	05:59	07:3
56°	00:09	00:49	01:13	05:11	06:23	07:4
54°		00:29	00:58	05:33	06:42	08:0
52°		00:13	00:45	05:51	06:58	08:1
50°	23:59		00:33	06:06	07:12	08:2
45°	23:30		00:08	06:37	07:40	08:5
		22.40	••••			09:0
N 40°	23:08	23:49		07:01	08:02	
35°	22:49	23:32		07:20	08:20	09:2
30°	22:33	23:18	23:58	07:37	08:36	09:3
20°	22:06	22:54	23:38	08:05	09:02	10:0
N 10°	21:42	22:33	23:21	08:30	09:25	10:2
0°	21:20	22:13	23:05	08:52	09:46	10:3
S $10^{\circ}$	20:58	21:53	22:48	09:15	10:07	10:5
	20:35	21:32	22:31	09:39	10:29	11:1
20°	20:07	21:08	22:10	10:07	10:55	11:3
		20:53	21:58	10:24	11:10	11:5
20°	19:51			10:43	11:28	12:0
20° 30°	19:51 19:32	20:36	21:44			12.0
20° 30° 35°	19:32			1		
20° 30° 35° 40° 45°	19:32 19:09	20:16	21:28	11:06	11:49	12:2
20° 30° 35° 40° 45° <b>S</b> 50°	19:32 19:09 18:39	20:16 19:50	21:28 21:08	11:06 11:36	11:49 12:15	12:2 12:4
20° 30° 35° 40° 45° <b>S</b> 50° 52°	19:32 19:09 18:39 18:25	20:16 19:50 19:38	21:28 21:08 20:58	11:06 11:36 11:51	11:49 12:15 12:28	12:2 12:4 12:5
20° 30° 35° 40° 45° <b>S</b> 50° 52° 54°	19:32 19:09 18:39 18:25 18:08	20:16 19:50 19:38 19:23	21:28 21:08 20:58 20:47	11:06 11:36 11:51 12:08	11:49 12:15 12:28 12:43	12:2 12:4 12:5 13:0
20° 30° 35° 40° 45° <b>S</b> 50° 52°	19:32 19:09 18:39 18:25	20:16 19:50 19:38	21:28 21:08 20:58	11:06 11:36 11:51	11:49 12:15 12:28	12:2 12:4 12:5

		Sun			Moon	
Day		f Time	Mer.	Mer.	Pass.	Age
3	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	19-21
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	90-75%
16	03:39	03:38	11:56	02:39	15:06	
17	03:38	03:37	11:56	03:33	16:00	
18	03:36	03:34	11:56	04:26	16:51	

20:20

12:54

13:21

13:35

17:47 17:22

58°

18:47

18:21

Map	h	Aries	Venus	S	M	ars	Jup	oiter	Sat	urn		Stars	
2 287551 22722	Mon	GHA	GHA	Dec	GHA	Dec	GHA		GHA	Dec		SHA	Dec
1 2 25757.0 29972.2 048 114738 07.0 10714.7 08.8 29173.1 048 55767.1 27973.1 1562.2 20770.2 12714.5 06.9 20773.1 048 55767.1 27970.4 17970.2 12714.5 06.9 20773.1 048 55767.1 27970.4 17970.5 12											A I +		
2000	1	251°57.6	239°23.2	04.9	114°39.9	07.6	167°14.7	8.80	251°35.1	04.8			
3 22°20°25 20°26°26°30°36°40°30°10°11°44°43°30°08°30°39°30°30°30°30°30°30°30°30°30°30°30°30°30°					129°41.1						1		
1	3	282°02.5	269°24.0 ·	• • 06.1	144°42.3	• • 06.8	197°18.4	• • 08.9	281°39.6	• • 04.7			
1	4	297°05.0	284°24.4	06.8	159°43.5	06.4	212°20.3	08.9	296°41.9	04.6			
Section   1985	5	312°07.5	299°24.8	07.4	174°44.7	06.0	227°22.2	08.9	311°44.2	04.5			
1	6	327°09.9	314°25.2 No	04°08.0		N18°05.5	242°24.1	N23°08.9	326°46.4	S02°04.5	1		
13 1711	7	$342^{\circ}12.4$		08.6	204°47.2	05.1	257°25.9	09.0	341°48.7	04.4			
19 1 27-108	8			09.2		04.7		09.0					
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	9			• • 09.8		• • 04.3		• • 09.0		• • 04.2	1		
1													
14   177, 177, 187, 187, 187, 187, 187, 187,											1		
14   16   17   17   18   18   18   18   18   18											_		
15 107°921 99°93 1.135 92°938 0.145 1749 9.092 107°091 0.339 1.88 1749 1.092 107°091 0.339 1.88 1749 1.092 1.391 1.391													
1.1   1.1   1.2													
17 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1													
1.0   1.0													
19											_		
Again   177-44.4   164-30.9   16.6   0.070.8   177-98.8   927-50.3   0.03.1   177-18.2   0.03.4   0.071.2   0.071.													
192"   192"   192"   193"   13   17.2   17.8   17.0   2.5   2.5   3.1   3.1   2.5   3.1											Adhara	255°05.9	-29°00.5
22   207°494   19°437   118   80°605   589   122°41   1093   207°22   1032   104   207°406   4   207°406   104   207°406   4   207°406   104   207°406   4   207°406   104   207°406   4   207°406   104   207°406   4   207°406   104   207°406   4   207°406   104   207°406   4   207											1	244°50.7	
Mer.pass   08:11													
Metrpass   Metrpass													
Mer pass	23	222~51.8	209~32.1	18.4	გ5 <sup>~</sup> 06.4	58.5	137~55.9	09.4					
The Character   Character	Mer.p	ass. 08:11	$ u$ 0.4 $^{\prime}$ d0.6 $^{\prime}$ i	m-4.53	$\nu$ 1.2' d-0	.4' m1.16	$\nu 1.9' \ d0.$	0′ m-1.94	$\nu 2.3' \ d-0$	.1′ m1.12	1		
Tue GHA GHA GHA Dec GHA DEC G	· ·										Alphard	217°47.5	-8°46.2
0 227°943 224°32, NO4*191 100°076 N17*981 112*578 N37*904 237°773 S02*031 December 112*29*296 31.1 12*29*296 31.1 12*29*296 31.1 12*29*296 31.1 12*29*296 31.1 12*29*296 31.1 12*29*296 31.1 12*29*296 31.1 12*29*296 31.1 12*29*296 31.1 12*29*296 31.1 12*29*296 31.1 12*29*296 31.1 12*29*296 31.1 12*29*296 31.1 12*29*29*296 31.1 12*296 31.1 12	т	CIIA	CIIA	Da-	CUA	D	CUA	D	CHA	D	Regulus	$207^{\circ}34.1$	
1 22°2°567 23°3°29 19.7 115°08 57.7 107°507 09.4 22°2°26 03.1											Dubhe		
2 967°592 294°332 2 023 130°100 57.3 183°01.5 09.4 267°31.9 03.0 0.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1											Denebola	182°24.5	14°25.8
3 23°01.7 20°33.6 · 20.9 145°11.2 · 56.9 188°03.4 · 0.05. 22°34.1 · 0.09   4 288°04.1 284°34.0 21.5 10°11.24 56.4 213°03.0 0.5 20°36.4 0.09   5 313°06.6 29°34.4 21.5 10°12.4 56.6 243°03.0 0.95 312°36.7 0.8   6 338°06.1 334°34.8 N04°22.8 190°14.8 N17°56.6 243°09.0 N23°06.5 312°36.7 0.8   8 358°14.0 344°35.6 24.0 220°17.2 54.4 25°51.0 0.5 5.2 258°10.9 0.5 342°43.2 0.6   9 13°16.5 359°36.0 24.7 235°18.4 · 54.4 288°14.7 · 0.06 12°47.8 · 0.25   10 28°18.9 14°93.6 25.3 25°19.6 55.9 383°16.5 0.06 27°50.1 0.4   10 28°18.9 14°93.6 25.3 25°19.6 55.9 383°16.5 0.06 42°52.3 0.3   13 73°26.3 59°37.5 27.2 295°23.2 52.7 348°22.2 0.07 72°54.6 50°20.3   13 73°26.3 59°37.5 27.2 295°23.2 52.7 348°22.2 0.07 72°54.6 50°20.3   13 73°26.3 59°37.5 27.2 295°23.2 52.7 348°22.2 0.07 72°54.0 0.0   13 73°26.3 59°37.5 27.2 295°23.2 52.7 348°22.2 0.0 7 72°54.0 0.0   13 73°36.3 59°37.5 07.2 295°23.2 52.7 348°22.2 0.0 7 72°54.0 0.0   13 73°36.3 59°37.5 07.2 295°23.2 52.7 348°22.2 0.0 7 72°54.0 0.0   13 73°36.3 59°37.5 07.2 295°23.2 52.7 348°22.2 0.0 7 72°54.0 0.0   13 73°36.3 59°37.5 07.2 295°23.2 52.7 348°22.2 0.0   15 103°31.2 89°38.3 28.5 325°25.6 51.9 18°25.9 0.0   16 118°35.4 108°39.3 0.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0											Gienah	175°43.1	$-17^{\circ}41.1$
4 298°94.1 288°34.0 21.5 160°112.4 56.4 213°05.3 09.5 297°36.4 0.99 5 313°06. 299°34.4 02.2 175°13.6 56.0 288°07.2 09.5 312°36.7 0.99 6 328°09.1 314°34.8 N04°22.8 190°14.8 N17°55.6 243°09.0 N23°09.5 327°41.0 502°02.7 AKaid 152°51.3 49°13.0 8 386°14.0 34°35.6 02.4 020°17.2 54.8 027°12.8 09.6 35°49.5 0.6 9 13°16.5 399°36.0 024.7 235°18.4 54.4 288°14.7 09.6 12°47.8 0.05°6 10 28°18.9 14°36.3 05.3 250°19.6 53.9 303°16.5 09.6 27°50.1 02.4 Market 147°49.0 11.1 147°12.1 117°18.1 147°19.1 117°18.1 118°18.7 118°18.1 118											Acrux	172°59.4	-63°14.7
5 333°06.6 299°34.4 22.2 15°13.6 56.0 28°07.2 09.5 312°38.7 0.28 5 313°06.6 299°34.6 313°06.6 299°34.6 313°07.6 313°37.6 30°39.5 23°37.6 318°21.7 11°17.8 313°36.1 314°34.8 104°23.8 109°18.8 118°36.6 24.0 20°18.9 313°16.5 35°37.5 20.2 4 32°17.2 54.8 273°12.8 00.6 37°45.5 0.0 6 40.0 20°18.9 13°16.5 35°37.6 24.0 20°18.9 313°16.5 35°37.6 24.0 20°18.9 13°16.5 35°37.6 24.0 20°18.9 13°16.5 35°37.6 25.0 20°18.6 53.9 303°16.5 00.6 27°50.1 0.2 28°18.9 14°36.3 25.3 25°18.6 53.9 303°16.5 00.6 27°50.1 0.2 28°18.9 14°36.3 25.3 25°18.6 53.9 303°16.5 00.6 27°50.1 0.2 28°18.9 14°36.3 25.3 25°18.6 53.9 303°16.5 00.6 27°50.1 0.2 28°18.9 14°36.3 15°18.6 74°7.1 10°19.0 11°18.9 14°30.3 15°18.6 74°7.1 10°19.0 11°18.9 14°30.3 15°18.6 74°7.1 10°19.0 11°18.9 14°30.3 15°18.6 74°7.1 10°19.0 11°18.9 14°30.3 15°18.6 74°7.1 10°19.0 11°18.9 14°30.3 10°19.0 11°18.9 14°30.3 10°24.9 15°2.3 133°20.0 10°19.0 11°19.0 10°19.0 11°19.0 11°19.0 11°19.0 11°19.0 11°19.0 11°19.0 11°19.0 10°19.0 11°19.0 1											Gacrux	171°51.0	$-57^{\circ}15.6$
18   18   18   19   19   19   19   19											Alioth	$166^{\circ}12.3$	
7 343°11.5 329°35.2 23.4 206°16.0 55.2 288°10.9 0.9.5 342°34.3 2 0.26  Alama 146°35.0 6 0.729.9  9 13°16.5 396°36.0 2.47 228°18.4 54.4 288°14.7 0.9.6 12°47.8 0.25  10 28°18.9 14°36.3 25.3 250°19.6 53.9 303°16.5 0.9.6 12°47.8 0.25  11 43°21.4 29°36.7 25.9 266°20.8 53.5 318°18.4 0.9.6 22°50.1 0.24  Rigit Ret. 139°39.3 .00°56.6 12°47.8 0.9											Spica	158°21.7	
8 388°14.0 34°35.6 24.0 220°17.2 54.8 273°12.8 09.6 357°45.5 02.6 Markin 147°56.9 36°29.9 130°16.5 399°30.0 ·24.7 225°18.4 ·288°14.7 ·09.6 12°47.8 ·02.5 Markin 147°56.9 36°29.9 36°29.9 10 28°18.9 14°36.3 25°3.5 318°18.4 09.6 42°52.3 02.3 Kochab 137°18.6 74°03.1 12°43.6 3°29.9 65°20.8 53.5 318°18.4 09.6 42°52.3 02.3 Kochab 137°18.6 74°03.1 12°32.8 39°33.5 27.2 290°32.2 25.7 348°22.2 09.7 55°46.5 02°02.3 Kochab 137°18.6 74°03.1 13°32.3 12°32.9 09.7 55°46.5 02°02.3 Kochab 137°18.6 74°03.1 13°32.9 39°33.5 27.2 290°32.2 25.7 348°22.2 09.7 55°46.5 02°02.3 Kochab 137°18.6 74°03.1 15°137°13.1 08°26.6 290°32.2 55°.7 348°22.2 09.7 75°56.9 02.2 Alpheca 126°03.1 26°37.6 16°09.9 14°36.8 14°37.9 10°30.1 4°36.0 291.3 30°26.8 51.4 33°27.8 09.8 118°03.7 02.0 Alpheca 126°03.1 26°37.1 13°36.2 119°30.0 29.7 35°58.0 51.0 48°59.6 09.8 118°03.7 02.0 Saltin 126°03.1 13°57.8 18°14.8 18°148°36 134°39.4 N04°03.3 10°29.2 N17°50.6 63°31.5 N25°9.8 145°03.5 00.9 Saltin 126°02.1 15°45.4 Saltin 149°38.8 31.0 22°50.4 49.8 93°35.3 09.8 165°10.5 01.8 Rashape 95°56.0 12°22.4 20°40.5 14°40.9 32.2 55°32.8 49.8 193°35.3 09.8 165°10.5 01.8 Rashape 95°50.6 12°22.4 20°40.5 12°40.9 Saltin 149°40.9 32.2 55°32.8 49.3 108°37.1 09.9 130°15.1 01.6 Numit 75°47.1 22°15.9 Numit 75°40.5 12°22.4 Saltin 149°38.8 41°40.9 32.2 55°32.8 145°40.9 09.9 130°15.1 01.6 Numit 75°47.1 22°15.9 Numit 75°40.5 12°24.4 15°40.9 32.2 55°32.8 145°40.9 09.9 130°15.1 01.6 Numit 75°47.1 22°15.9 Numit 75°40.5 12°24.4 15°40.9 32.2 55°32.8 145°40.9 09.9 130°15.1 01.6 Numit 75°47.1 22°15.9 Numit 75°40.5 12°24.4 15°40.9 32.2 55°32.8 145°40.9 09.9 130°15.1 01.6 Numit 75°47.1 22°15.9 Numit 75°40.5 12°24.4 15°40.9 Numit 75°40.5 12°24.4 15°40.9 Numit 75°47.1 11.2 12°24.0 Numit 75°47.1 11.2 12°24.0 Numit 75°47.1 11.2 12°24.0 Numit 75°47.1 11.2 12°24.0 Numit 75°47.1 11.2 12°24.0 Numit 75°47.1 11.2 12°24.0 Numit 75°47.1 11.2 12°24.0 Numit 75°47.1 11.2 12°24.0 Numit 75°47.1 11.2 12°24.0 Numit 75°47.1 11.3 13°45.0 12°47.1 Numit 75°47.1 11.3 13°45.0 12°47.9 Numit 75°47.1 11.3 13°45.0 12°47.9 Numit 75°											Alkaid		
9 13°16.5 350°36.0 · 24.7 235°18.4 · 54.4 288°14.7 · . 09.6 12°47.8 · . 02.5   Menkent 147.60 · 30° 230° 100 28°18.9 14°26.3 25.3 250°19.6 5.39 303°15.5 09.6 27°50.1 02.4   Rigif Kent. 139°39.3 - 60°56.6   Rigif Kent. 139°39.3 - 60											Hadar		
10											Menkent	147°56.9	-36°29.9
11 43°21.4 29°36.7 25.9 265°20.8 53.5 318°18.4 09.6 42°52.3 02.3   Name   139°39.6   139°30.8   139											Arcturus		
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Mer.pass   08:07   V0.4' d0.6' m-4.52   V1.2' d-0.4' m1.17   V1.9' d0.0' m-1.94   V2.3' d-0.1' m1.12   Peacock   53°05.0   55°30.0   5											1		
Wed         GHA         GHA         Dec         Al Na"is         238°53.4         224°41.6         N04°34.2         100°364         N17°48.1         153°42.8         N23°09.9         238°21.9         S02°01.4         Fomalhaut         15°41.3         29°9.93.2           2         268°58.4         254°42.4         35.4         130°38.8         47.3         183°46.5         10.0         268°26.5         01.3         Scheat         15°14.3         29°92.1           4         299°0.3.3         284°43.1         36.7         160°41.2         46.4         213°50.2         10.0         298°31.0         01.1         Markab         13°29.7         15°20.4           5         314°05.7         299°43.5         37.3         175°42.4         46.0         228°52.1         10.1         313°33.8         00.0         Wenus         347°27.6         09:02           6         329°62.2         314°34.8         80°93.3         29°41.5         36.6         205°44.8         45.2	23	223 31.0									1		
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Wed         GHA         Dec         All Na'ir         27°32.6         46°50.1           1         253°55.9         239°42.0         34.8         115°37.6         47.7         168°44.6         10.0         253°24.2         01.3         Scheat         56°64.2         35.4         130°38.8         47.3         183°46.5         10.0         268°26.5         01.3         Markab         28°13.0         01.1         Markab         13°29.7         15°20.4           4         299°03.3         284°43.1         36.7         160°41.2         46.4         213°50.2         10.0         298°31.0         01.1         Markab         13°29.7         15°20.4           8         329°08.2         314°05.7         299°43.5         37.3         175°42.4         46.0         228°55.1         10.1         313°33.3         01.0         Mars         222°43.6         172°0           7         344°10.7         329°44.2         38.6         205°48.8         45.2         258°55.9         10.1         343°37.8         00.9         Jupiter         275°17.7<											I		
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19 164°40.2 149°48.5 46.4 25°59.1 40.1 79°18.3 10.4 164°05.2 00.1 20 179°42.7 164°48.9 47.0 41°00.3 39.7 94°20.2 10.4 179°07.5 02°00.0 21 194°45.2 179°49.2 · · 47.7 56°01.5 · · 39.2 109°22.1 · · 10.4 194°09.7 01°59.9 22 209°47.6 194°49.6 48.3 71°02.7 38.8 124°23.9 10.4 209°12.0 59.8 23 224°50.1 209°49.9 48.9 86°03.9 38.4 139°25.8 10.5 224°14.3 59.8 4 Mars: 0.1													
20 179°42.7 164°48.9 47.0 41°00.3 39.7 94°20.2 10.4 179°07.5 02°00.0 21 194°45.2 179°49.2 · 47.7 56°01.5 · 39.2 109°22.1 · 10.4 194°09.7 01°59.9 22 209°47.6 194°49.6 48.3 71°02.7 38.8 124°23.9 10.4 209°12.0 59.8 23 224°50.1 209°49.9 48.9 86°03.9 38.4 139°25.8 10.5 224°14.3 59.8  Horizontal parallax Venus: 0.2 Mars: 0.1													
21 194°45.2 179°49.2 ··· 47.7 56°01.5 ··· 39.2 109°22.1 ··· 10.4 194°09.7 01°59.9 Horizontal parallax 22 209°47.6 194°49.6 48.3 71°02.7 38.8 124°23.9 10.4 209°12.0 59.8 Venus: 0.2 23 224°50.1 209°49.9 48.9 86°03.9 38.4 139°25.8 10.5 224°14.3 59.8 Mars: 0.1													
22       209°47.6       194°49.6       48.3       71°02.7       38.8       124°23.9       10.4       209°12.0       59.8       Venus: 0.2         23       224°50.1       209°49.9       48.9       86°03.9       38.4       139°25.8       10.5       224°14.3       59.8       Mars: 0.1											Horizont	•	
25 221 30.1 205 35.5 10.5 00 00.5 30.1 155 25.0 10.5 221 11.5 35.0	22	209°47.6	194°49.6	48.3					$209^{\circ}12.0$				
Mor page 08:03	23	$224^{\circ}50.1$	209°49.9	48.9	86°03.9	38.4	139°25.8	10.5	224°14.3	59.8		Mars:	0.1
	Mar	3cc 00·03	10 N 40 El .	m / 51	11 2/ d C	1 // m1 10	1/1 0/ d0	0/ m 1 02	1/2 2/ 4 0	1/ m1 12			

h	Sur	า	Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°53.3	N19°46.5	283°30.7	10.7'	S21°13.8	-10.9'	56.7'
1 2	195°53.2 210°53.2	47.1 47.6	298°00.4 312°30.1	10.7' 10.8'	21°02.9 20°51.9	-11.0' -11.1'	56.7' 56.7'
3	225°53.2	48.2	326°59.9	10.8'	20°40.8	-11.2'	56.8'
4	240°53.1	48.7	341°29.7	10.9'	20° 29.6	-11.3'	56.8'
5	255°53.1 270°53.1	49.2	355°59.6	10.9'	20° 18.3 \$20° 06.9	-11.4'	56.8'
6 7	270°53.1 285°53.0	N19°49.7 50.3	10°29.5 24°59.5	11.0' 11.0'	19°55.3	-11.6' -11.7'	56.9' 56.9'
8	300°53.0	50.8	39°29.5	11.1'	19°43.6	-11.8'	56.9'
9	315°53.0	• • 51.3	53°59.5	11.1'	19°31.9	-11.9'	56.9'
10 11	330°52.9 345°52.9	51.9 52.4	68°29.6 82°59.8	11.1' 11.2'	19°20.0 19°08.0	-12.0' -12.1'	57.0' 57.0'
12	0°52.9	N19°52.9	97°30.0	11.2'	\$18°55.9	-12.1	57.0'
13	15°52.8	53.5	112°00.2	11.3'	18°43.7	-12.3'	57.1'
14	30°52.8	54.0	126°30.5	11.3'	18°31.4	-12.4'	57.1'
15 16	45°52.8 60°52.7	• • 54.5 55.0	141°00.8 155°31.2	11.4' 11.4'	18° 19.0 18° 06.5	-12.5' -12.6'	57.1' 57.2'
17	75°52.7	55.6	170°01.6	11.5'	17°53.9	-12.7'	57.2'
18	90°52.7	N19°56.1	184°32.1	11.5'	\$17°41.2	-12.8'	57.2'
19 20	105°52.6 120°52.6	56.6 57.1	199°02.6 213°33.1	11.5' 11.6'	17°28.3 17°15.4	-12.9' -13.0'	57.3' 57.3'
21	135°52.6	57.7	213 33.1 228°03.7	11.6'	17 15.4 17°02.4	-13.1'	57.3'
22	150°52.5	58.2	242°34.3	11.7'	16°49.3	-13.2'	57.4'
23	165°52.5	58.7	257°04.9	11.7'	16°36.1	-13.3'	57.4'
	SD = 15.8'	d = 0.5'		SI	O = 15.5'		
Tue	GHA	Dec	GHA	ν	Dec	d	НР
0	180°52.5	N19°59.2	271°35.6	11.7'	S16°22.8	-13.4	57.4
1	195°52.4	19°59.7	286°06.4	11.8'	16°09.4	-13.5'	57.4
2	210°52.4 225°52.4	20°00.3 •• 00.8	300°37.1 315°07.9	11.8' 11.8'	15°55.9 15°42.4	-13.6' -13.7'	57.5' 57.5'
3 4	240°52.3	01.3	315 07.9 329°38.8	11.8	15 42.4 15°28.7	-13.7 -13.8'	57.5'
5	255°52.3	01.8	344°09.6	11.9'	15° 14.9	-13.8'	57.6'
6	270°52.2	N20°02.3	358°40.5	11.9'	\$15°01.1	-13.9'	57.6'
7 8	285°52.2 300°52.2	02.9 03.4	13°11.5 27°42.5	12.0' 12.0'	14°47.1 14°33.1	-14.0' -14.1'	57.6' 57.7'
9	315°52.1	03.9	42°13.5	12.0'	14° 19.0	-14.2'	57.7'
10	330°52.1	04.4	56°44.5	12.1'	14°04.8	-14.3'	57.7'
11 12	345°52.1 0°52.0	04.9 N20°05.4	71°15.6 85°46.7	12.1' 12.1'	13°50.5 \$13°36.2	-14.4' -14.4'	57.8' 57.8'
13	15°52.0	N20 05.4 05.9	85 46.7 100°17.8	12.1'	13°21.7	-14.4 -14.5'	57.8'
14	30°51.9	06.5	114°48.9	12.2'	13°07.2	-14.6'	57.9'
15	45°51.9	• • 07.0	129°20.1	12.2'	12°52.6	-14.7'	57.9'
16 17	60°51.9 75°51.8	07.5 08.0	143°51.3 158°22.5	12.2' 12.2'	12°37.9 12°23.2	-14.8' -14.8'	57.9' 58.0'
18	90°51.8	N20°08.5	172°53.8	12.3'	\$12°08.3	-14.9'	58.0'
19	105°51.7	09.0	187°25.0	12.3'	11°53.4	-15.0'	58.0'
20 21	120°51.7 135°51.7	09.5 •• 10.0	201°56.3 216°27.6	12.3' 12.3'	11°38.4 11°23.4	-15.1' -15.1'	58.1' 58.1'
22	150°51.6	10.5	210°27.0°230°58.9	12.3'	11°08.3	-15.1 -15.2'	58.1
23	165°51.6	11.0	245°30.3	12.4'	$10^{\circ}53.1$	-15.3'	58.2'
	SD = 15.8'	d = 0.5'		SI	O = 15.7'		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°51.5	$N20^{\circ}11.6$	260°01.6	12.4'	<b>S</b> 10°37.8	-15.3'	58.2'
1	195°51.5	12.1 12.6	274°33.0	12.4'	10°22.4 10°07.0	-15.4'	58.2'
2 3	210°51.5 225°51.4	12.6	289°04.4 303°35.8	12.4' 12.4'	10°07.0 09°51.6	-15.5' -15.5'	58.3' 58.3'
4	240°51.4	13.6	318°07.2	12.4'	09°36.0	-15.6'	58.3'
5	255°51.3	14.1	332°38.7	12.4'	09°20.4	-15.7'	58.4'
6 7	270°51.3 285°51.2	N20°14.6 15.1	347°10.1 1°41.5	12.4' 12.5'	\$09°04.7 08°49.0	-15.7' -15.8'	58.4' 58.4'
8	300°51.2	15.6	16°13.0	12.5'	08°33.2	-15.9'	58.5
9	315°51.2	· · 16.1	30°44.5	12.5'	08° 17.4	-15.9'	58.5'
10 11	330°51.1 345°51.1	16.6 17.1	45°15.9 59°47.4	12.5' 12.5'	08°01.5 07°45.5	-16.0' -16.0'	58.5' 58.6'
12	0°51.0	N20°17.6	74°18.9	12.5'	S07°29.5	-16.1	58.6
13	15°51.0	18.1	88°50.3	12.5'	07° 13.4	-16.1'	58.6'
14 15	30°50.9 45°50.9	18.6 •• 19.1	103°21.8 117°53.3	12.5' 12.5'	06° 57.3 06° 41.1	-16.2' -16.2'	58.7' 58.7'
15 16	45 50.9 60°50.8	19.6	117 53.3 132°24.7	12.5'	06° 41.1	-16.2 -16.3	58.7'
17	75°50.8	20.1	$146^{\circ}56.2$	12.5'	$06^{\circ}08.6$	-16.3'	58.8'
18	90°50.7	N20°20.6	161°27.7	12.5'	S05°52.2	-16.4'	58.8'
19 20	105°50.7 120°50.7	21.1 21.6	175°59.1 190°30.6	12.4' 12.4'	05° 35.8 05° 19.4	-16.4' -16.5'	58.8' 58.9'
21	135°50.6	• • 22.1	205°02.0	12.4'	05°02.9	-16.5'	58.9'
22	150°50.6	22.6	219°33.4	12.4'	04°46.4	-16.6'	58.9'
23	165°50.5	23.1	234°04.9	12.4'	04°29.9	-16.6'	59.0'
	SD = 15.8'	d = 0.5'		SI	O = 15.9'		

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

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

		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	66-45%
19	03:33	03:32	11:56	05:17	17:41	
20	03:30	03:28	11:57	06:05	18:29	
21	03:26	03:24	11:57	06:53	19:17	

h	Aries	Venus	, Mars	Jupiter	Saturn	Stars
Thu —	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
		224°50.3 N04°49.6	101°05.1 N17°38.0	154°27.7 N23°10.5	239°16.6 <b>S</b> 01°59.7	SHA Dec
0	239°52.6					Alpheratz 357°34.7 29°13.6
1	254°55.0		116°06.3 37.6			Ankaa 353°07.1 -42°09.9
2	269°57.5	254°51.0 50.9	131°07.5 37.1	184°31.4 10.5	269°21.1 59.6	Schedar 349°31.1 56°40.3
3	285°00.0	269°51.3 · · 51.6	146°08.7 · · 36.7	199°33.3 · · 10.5	284°23.4 · · 59.5	Diphda 348°47.2 -17°50.8
4	300°02.4	284°51.6 52.2	161°09.9 36.3	214°35.1 10.6	299°25.7 59.4	Achernar 335°20.4 -57°06.3
5	315°04.9	299°52.0 52.9	176°11.1 35.9	229°37.0 10.6	314°28.0 59.3	Hamal 327°51.2 23°34.8
6	330°07.3	314°52.3 N04°53.5	191°12.3 N17°35.4	244°38.9 N23°10.6	329°30.2 <b>S</b> 01°59.3	Polaris 314°22.3 89°22.2
7	345°09.8	329°52.7 54.2	206°13.5 35.0	259°40.8 10.6	344°32.5 59.2	Acamar 315°12.0 -40°12.1
8	0°12.3	344°53.0 54.8	221°14.7 34.6	274°42.6 10.7	359°34.8 59.1	Menkar 314°06.2 4°11.3
9	15°14.7	359°53.4 · · 55.5	236°15.9 · · 34.2	289°44.5 · · 10.7	14°37.1 · · 59.1	Mirfak 308°28.4 49°57.0
10	30°17.2	14°53.7 56.1	251°17.1 33.7	304°46.4 10.7	29°39.4 59.0	Aldebaran 290°39.6 16°33.6
11	45°19.7	29°54.0 56.8	266°18.2 33.3	319°48.2 10.7	44°41.6 58.9	Rigel 281°03.9 -8°10.4
12	60°22.1	44°54.4 N04°57.4	281°19.4 N17°32.9	334°50.1 N23°10.7	59°43.9 S01°58.9	S .
13	75°24.6	59°54.7 58.1	296°20.6 32.5	349°52.0 10.8	74°46.2 58.8	·
14	90°27.1	74°55.1 58.8	311°21.8 32.0	4°53.8 10.8	89°48.5 58.7	Bellatrix 278°22.9 6°22.3
15	105°29.5	89°55.4 04°59.4	326°23.0 · · 31.6	19°55.7 · · 10.8	104°50.8 · · 58.6	Elnath 278°01.9 28°37.7
16	120°32.0	104°55.7 05°00.1	341°24.2 31.2	34°57.6 10.8	119°53.0 58.6	Alnilam 275°37.8 -1°11.2
17	135°34.5	119°56.1 00.7	356°25.4 30.8	49°59.5 10.8	134°55.3 58.5	Betelgeuse 270°52.1 7°24.7
18	150°36.9	134°56.4 N05°01.4	11°26.6 N17°30.3	65°01.3 N23°10.9	149°57.6 <b>S</b> 01°58.4	Canopus 263°52.7 -52°42.7
19	165°39.4	149°56.7 02.1	26°27.8 29.9	80°03.2 10.9	164°59.9 58.4	Sirius 258°26.3 -16°45.1
20	180°41.8	164°57.1 02.7	41°29.0 29.5	95°05.1 10.9	180°02.2 58.3	Adhara 255°05.9 -29°00.5
21	195°44.3	179°57.4 · · 03.4	56°30.2 · · 29.0	110°06.9 · · 10.9	195°04.4 · · 58.2	Procyon 244°50.8 5°09.6
22	210°46.8	194°57.7 04.0	71°31.4 28.6	125°08.8 11.0	210°06.7 58.2	Pollux 243°17.2 27°58.0
23	210 46.8 225°49.2	209° 58.1 04.7	86°32.6 28.2		210 06.7 58.2 225°09.0 58.1	Avior 234°15.0 -59°35.7
						Suhail 222°46.3 -43°32.3
Mer.p	ass. 07:59	$ u 0.3' \ d0.7' \ \text{m-4.50} $	$\nu 1.2' \ d\text{-}0.4' \ \text{m}1.19$	$\nu 1.9' \ d0.0' \ \text{m-}1.93$	$\nu 2.3' \ d\text{-}0.1' \ \text{m}1.11$	Miaplacidus 221°38.5 -69°49.5
						Alphard 217°47.6 -8°46.2
		GUA =				Regulus 207°34.1 11°50.6
Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°40.5 61°37.1
0	240°51.7	224°58.4 N05°05.4	101°33.7 N17°27.8	155°12.5 N23°11.0	240°11.3 <b>S</b> 01°58.0	Denebola 182°24.5 14°25.8
1	255°54.2	239°58.7 06.0	116°34.9 27.3	170°14.4 11.0	255°13.6 58.0	Gienah 175°43.1 -17°41.1
2	270°56.6	254°59.0 06.7	131°36.1 26.9	185°16.3 11.0	270°15.9 57.9	Acrux 172°59.4 -63°14.7
3	285°59.1	269°59.4 · · 07.4	146°37.3 · · 26.5	200°18.1 · · 11.1	285°18.1 · · 57.8	Gacrux 171°51.0 -57°15.6
4	301°01.6	284°59.7 08.0	161°38.5 26.1	215°20.0 11.1	300°20.4 57.7	Alioth 166°12.3 55°49.5
5	316°04.0	300°00.0 08.7	176°39.7 25.6	230°21.9 11.1	315°22.7 57.7	Spica 158°21.8 -11°17.7
6	331°06.5	315°00.3 N05°09.4	191°40.9 N17°25.2	245°23.7 N23°11.1	330°25.0 <b>S</b> 01°57.6	•
7	346°08.9	330°00.7 10.0	206°42.1 24.8	260°25.6 11.1	345°27.3 57.5	
8	1°11.4	345°01.0 10.7	221°43.3 24.3	275°27.5 11.2	0°29.5 57.5	Hadar 148°35.1 -60°29.9
9	16°13.9	0°01.3 · · 11.4	236°44.5 · · 23.9	290°29.3 · · 11.2	15°31.8 · · 57.4	Menkent 147°56.9 -36°29.9
10	31°16.3	15°01.6 12.0	251°45.7 23.5	305°31.2 11.2	30°34.1 57.3	Arcturus 145°47.3 19°03.0
11	46°18.8	30°01.9 12.7	266°46.8 23.0	320°33.1 11.2	45°36.4 57.3	Rigil Kent. 139°39.3 -60°56.6
12	61°21.3	45°02.3 N05°13.4	281°48.0 N17°22.6	335°35.0 N23°11.2	60°38.7 S01°57.2	Kochab 137°18.6 74°03.1
13	76°23.7	60°02.6 14.0	296°49.2 22.2	350°36.8 11.3		Zuben'ubi 136°55.4 -16°08.9
	91°26.2		311°50.4 21.8			Alphecca 126°03.1 26°37.7
14						Antares 112°15.1 -26°29.4
15	106°28.7	90°03.2 · · 15.4	326°51.6 · · 21.3	20°40.6 · · 11.3	105°45.5 · · 57.0	Atria 107°08.5 -69°04.3
16	121°31.1	105°03.5 16.1	341°52.8 20.9	35°42.4 11.3	120°47.8 56.9	Sabik 102°02.1 -15°45.4
17	136°33.6	120°03.8 16.7	356°54.0 20.5	50°44.3 11.3	135°50.1 56.9	Shaula 96°09.6 -37°07.3
18	151°36.1	135°04.1 N05°17.4	11°55.2 N17°20.0	65°46.2 N23°11.4	150°52.4 S01°56.8	Rasalhague 95°58.0 12°32.4
19	166°38.5	150°04.5 18.1	26°56.4 19.6	80°48.0 11.4	165°54.7 56.7	Eltanin 90°41.6 51°28.9
20	181°41.0	165°04.8 18.7	41°57.5 19.2	95°49.9 11.4	180°56.9 56.7	Kaus Aust. 83°31.8 -34°22.3
21	196°43.4	$180^{\circ}05.1$ •• 19.4	56°58.7 · · 18.7	110°51.8 · · 11.4	195°59.2 • • 56.6	Vega 80°32.7 38°48.2
22	211°45.9	$195^{\circ}05.4$ 20.1	71°59.9 18.3	125°53.6 11.5	211°01.5 56.5	Nunki 75°47.1 -26°15.9
23	226°48.4	210°05.7 20.8	87°01.1 17.9	140°55.5 11.5	226°03.8 56.4	Altair 61°59.5 8°56.0
Marn	255 07:55	ν0.3' d0.7' m-4.49	ν1.2' d-0.4' m1.20	$\nu 1.9' \ d0.0' \ \text{m-}1.93$	$\nu 2.3' \ d$ -0.1' m1.11	Peacock 53°05.0 -56°39.0
ivier.p	ass. 07:55	νυ.5 αυ.1 III-4.49	ν1.∠ U-U.4 III1.∠U	ν1.9 d0.0 III-1.93	ν2.3 U-U.1 III1.11	Deneb 49°25.4 45°22.0
						Enif 33°38.5 9°59.4
Sat	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°32.5 -46°50.1
0	241°50.8	225°06.0 N05°21.4	102°02.3 N17°17.4	155°57.4 N23°11.5	241°06.1	Fomalhaut 15°14.3 -29°29.2
1	256°53.3	240°06.3 22.1	117°03.5 17.0	170°59.2 11.5	256°08.4 56.3	
2	271°55.8	255°06.6 22.8	132°04.7 16.6	186°01.1 11.5	271°10.7 56.2	
3	286°58.2	270°06.9 · · 23.5	147°05.9 · · 16.1	201°03.0 · · 11.6	286°12.9 · · 56.2	Markab 13°29.7 15°20.4
4	302°00.7	285°07.2 24.2	162°07.1 15.7	216°04.8 11.6	301°15.2 56.1	May 22 Thu SHA Mer.pass
5	317°03.2	300°07.5 24.8	177°08.2 15.3	231°06.7 11.6	316°17.5 56.0	Venus 344°57.7 09:00
6	332°05.6	315°07.8 N05°25.5	192°09.4 N17°14.8	246°08.6 N23°11.6	331°19.8 S01°56.0	Mars 221°12.5 17:14
7	347°08.1	330°08.1 26.2	207°10.6 14.4	261°10.4 11.6	346°22.1 55.9	Jupiter 274°35.1 13:40
8	2°10.5	345°08.4 26.9	207 10.0 14.4 222°11.8 14.0	276°12.3 11.7	1°24.4 55.8	Saturn 359°24.0 08:02
	2°10.5 17°13.0					Jatum 333 24.0 00:02
9		0°08.7 · · 27.6	237°13.0 · · 13.5			May 23 Fri SHA Mer.pass
10	32°15.5	15°09.0 28.2	252°14.2 13.1	306°16.0 11.7	31°28.9 55.7	Venus 344°06.7 09:00
11	47°17.9	30°09.3 28.9	267°15.4 12.7	321°17.9 11.7	46°31.2 55.6	Mars 220°42.0 17:12
12	62°20.4	45°09.6 N05°29.6	282°16.6 N17°12.2	336°19.8 N23°11.7	61°33.5 S01°55.6	Jupiter 274°20.8 13:37
13	77°22.9	60°09.9 30.3	297°17.7 11.8	351°21.6 11.7	76°35.8 55.5	Saturn 359°19.6 07:58
14	92°25.3	75°10.2 31.0	312°18.9 11.4	6°23.5 11.8	91°38.1 55.4	
15	107°27.8	90°10.5 · · 31.6	327°20.1 · · 10.9	21°25.4 · · 11.8	106°40.4 · · 55.4	May 24 Sat SHA Mer.pass
16	122°30.3	105°10.8 32.3	342°21.3 10.5	36°27.2 11.8	121°42.6 55.3	Venus 343°15.2 08:59
17	137°32.7	120°11.1 33.0	357°22.5 10.1	51°29.1 11.8	136°44.9 55.2	Mars 220°11.5 17:10
18	152°35.2	135°11.4 N05°33.7	12°23.7 N17°09.6	66°30.9 N23°11.8	151°47.2 <b>S</b> 01°55.2	Jupiter 274°06.5 13:34
19	167°37.7	150°11.7 34.4	27°24.9 09.2	81°32.8 11.9	166°49.5 55.1	Saturn 359°15.2 07:54
20	$182^{\circ}40.1$	165°12.0 35.1	42°26.0 08.8	96°34.7 11.9	181°51.8 55.0	
21	197°42.6	180°12.3 · · 35.8	57°27.2 · · 08.3	111°36.5 · · 11.9	196°54.1 •• 55.0	Horizontal parallax
22	212°45.0	195°12.6 36.4	72°28.4 07.9	126°38.4 11.9	211°56.4 54.9	Venus: 0.2
23	227°47.5	210°12.9 37.1	87°29.6 07.5	141°40.3 11.9	226°58.7 54.8	Mars: 0.1
ivier.p	ass. 07:51	$ u 0.3' \ d0.7' \ \text{m-4.48} $	$ u 1.2' \ d$ -0.4' m1.21	$\nu 1.9' \ d0.0' \ \text{m-}1.93$	$ u 2.3' \ d$ -0.1' m1.11	

h	Sur	า			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°50.5	N20°23.5	248°36.3	12.4'	S04°13.3	-16.6'	59.0'
1 2	195°50.4 210°50.4	24.0 24.5	263°07.7 277°39.0	12.4' 12.4'	03°56.6 03°40.0	-16.7' -16.7'	59.0' 59.1'
3	210 50.4 225°50.3	. 25.0	277 39.0 292°10.4	12.4	03°23.2	-10.7 -16.8'	59.1'
4	240°50.3	25.5	306°41.7	12.3'	03°06.5	-16.8'	59.1'
5	255°50.2	26.0	321°13.1	12.3'	02°49.7	-16.8'	59.2'
6	270°50.2 285°50.1	N20°26.5 27.0	335°44.4 350°15.6	12.3' 12.3'	\$02°32.9 02°16.0	-16.9' -16.9'	59.2' 59.2'
7 8	285 50.1 300°50.1	27.0 27.5	350 15.0 4°46.9	12.3	02 16.0 01°59.1	-16.9'	59.2 59.3'
9	315°50.0	• • 28.0	19°18.1	12.2'	01°42.2	-16.9'	59.3'
10	330°50.0	28.4	33°49.3	12.2'	01°25.3	-17.0'	59.3'
11 12	345°49.9 0°49.9	28.9 N20°29.4	48°20.5 62°51.7	12.1' 12.1'	01°08.3 \$00°51.3	-17.0' -17.0'	59.4' 59.4'
13	15°49.8	29.9	77°22.8	12.1	00°34.3	-17.0'	59.4'
14	30°49.8	30.4	91°53.9	12.1'	00°17.3	-17.1'	59.5'
15	45°49.7	• • 30.9	106°24.9	12.0'	S00°00.3	-17.1'	59.5'
16 17	60°49.7 75°49.6	31.3 31.8	120°55.9 135°26.9	12.0' 11.9'	N00°16.8 00°33.9	17.1' 17.1'	59.5' 59.6'
18	90°49.6	N20°32.3	149°57.8	11.9	N00°51.0	17.1	59.6'
19	105°49.5	32.8	164°28.7	11.9'	01°08.1	17.1'	59.6'
20	120°49.5	33.3	178°59.6	11.8'	01°25.3	17.1'	59.6'
21 22	135°49.4 150°49.4	· · 33.7 34.2	193°30.4 208°01.2	11.8' 11.7'	01°42.4 01°59.6	17.2' 17.2'	59.7' 59.7'
23	165°49.3	34.2 34.7	208 01.2 222°31.9	11.7' 11.7'	01 59.6 02°16.7	17.2'	59.7' 59.7'
	SD = 15.8'	d = 0.5'			D = 16.1'		
	JD — 13.0°	u = 0.5		اد	J — 10.1		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°49.3	N20°35.2 35.7	237°02.6	11.6'	N02°33.9	17.2'	59.8'
1 2	195°49.2 210°49.2	35.7 36.1	251°33.3 266°03.9	11.6' 11.5'	02°51.1 03°08.2	17.2' 17.2'	59.8' 59.8'
3	225°49.1	36.6	280°34.4	11.5'	03°25.4	17.2	59.9'
4	240°49.0	37.1	295°04.9	11.4'	03°42.6	17.2'	59.9'
5	255°49.0	37.6	309°35.3	11.4'	03°59.8	17.2	59.9'
6 7	270°48.9 285°48.9	N20°38.0 38.5	324°05.7 338°36.0	11.3' 11.3'	N04°16.9 04°34.1	17.2' 17.2'	59.9' 60.0'
8	300°48.8	39.0	353°06.3	11.2	04°51.2	17.1	60.0
9	315°48.8	• • 39.5	7°36.5	11.1'	05°08.4	17.1'	60.0'
10	330°48.7	39.9	22°06.6	11.1'	05°25.5	17.1'	60.0'
11 12	345°48.7 0°48.6	40.4 N20°40.9	36°36.7 51°06.7	11.0' 11.0'	05°42.7 N05°59.8	17.1' 17.1'	60.1' 60.1'
13	15°48.6	41.3	65°36.7	10.9'	06° 16.9	17.1'	60.1
14	30°48.5	41.8	80°06.5	10.8'	06°33.9	17.1'	60.2'
15	45°48.4	• • 42.3	94°36.4	10.7'	06°51.0	17.0'	60.2'
16 17	60°48.4 75°48.3	42.7 43.2	109°06.1 123°35.8	10.7' 10.6'	07°08.0 07°25.1	17.0' 17.0'	60.2' 60.2'
18	90°48.3	N20°43.7	138°05.4	10.5	N07°42.1	17.0'	60.3
19	105°48.2	44.1	$152^{\circ}34.9$	10.5'	$07^{\circ}59.0$	16.9'	60.3'
20	120°48.2	44.6	167°04.4		08°15.9	16.9'	60.3'
21 22	135°48.1 150°48.0	• • 45.1 45.5	181°33.8 196°03.1	10.3' 10.2'	08°32.9 08°49.7	16.9' 16.8'	60.3' 60.4'
23	165°48.0	46.0	210°32.3	10.1	09°06.6	16.8'	60.4
	SD = 15.8'	d = 0.5'		SI	D = 16.3'		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0 1	180°47.9 195°47.9	N20°46.5 46.9	225°01.4 239°30.5	10.1' 10.0'	N09°23.4 09°40.1	16.8' 16.7'	60.4' 60.4'
2	210°47.8	47.4	253°59.5	9.9'	09°56.8	16.7	60.4
3	225°47.7	• • 47.9	268°28.4	9.8'	10°13.5	16.6'	60.5'
4	240°47.7	48.3	282°57.2	9.7'	10°30.2	16.6'	60.5'
5 6	255°47.6 270°47.6	48.8 N20°49.2	297°25.9 311°54.6	9.6' 9.5'	10°46.7 N11°03.3	16.5' 16.5'	60.5' 60.5'
7	285°47.5	49.7	326°23.1	9.5	$11^{\circ}19.8$	16.4	60.5
8	300°47.4	50.2	340°51.6	9.4'	11°36.2	16.4'	60.6'
9	315°47.4 330°47.3	• • 50.6	355°19.9 9°48.2	9.3' 9.2'	11°52.6 12°08.9	16.3'	60.6'
10 11	330°47.3 345°47.3	51.1 51.5	9°48.2 24°16.4	9.2	12°08.9 12°25.2	16.3' 16.2'	60.6' 60.6'
12	0°47.2	N20°52.0	38°44.5	9.0'	N12°41.4	16.1	60.6
13	15°47.1	52.4	53°12.5	8.9'	12°57.5	16.1'	60.7'
14 15	30°47.1 45°47.0	52.9 •• 53.3	67°40.3 82°08.1	8.8' 8.7'	13°13.6 13°29.6	16.0' 15.9'	60.7' 60.7'
15 16	45°47.0 60°47.0	53.8	96°35.8	8. <i>1</i> ′ 8.6′	13° 29.6 13° 45.5	15.9' 15.9'	60.7'
17	75°46.9	54.2	111°03.4	8.5	14°01.4	15.8'	60.7'
18	90°46.8	N20°54.7	125°30.9	8.4'	N14°17.2	15.7'	60.7'
19 20	105°46.8 120°46.7	55.2 55.6	139°58.3 154°25.6	8.3' 8.2'	14°32.9 14°48.5	15.6' 15.6'	60.8' 60.8'
20	120°46.7 135°46.6	55.6 •• 56.1	154° 25.6 168° 52.8	8.2 8.1'	14° 48.5 15° 04.1	15.5	60.8
22	150°46.6	56.5	$183^{\circ}19.9$	8.0'	15° 19.5	15.4'	60.8'
23	165°46.5	57.0	197°46.8	7.9'	15°34.9	15.3'	60.8'
	SD = 15.8'	d = 0.5'		SI	D = 16.5'		

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Mer.Pass.		
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	ass Upper Lower		25-27	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	34-14%	
22	03:22	03:20	11:57	07:40	20:04		
23	03:17	03:14	11:57	08:29	20:54		
24	03:12	03.00	11.57	09.19	21.46		

h	Aries	Venu		,	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0 0	242°50.0		V05°37.8	102°30.8	N17°07.0	156°42.1	N23°12.0	242°00.9	S01°54.8			
	242 50.0 257°52.4	240°13.4	38.5	102 30.6 117°32.0		171°44.0		242 00.9 257°03.2		Alpheratz	357°34.6	29°13.6
1					06.6		12.0		54.7	Ankaa	353°07.1	-42°09.9
2	272°54.9	255°13.7	39.2	132°33.2	06.1	186°45.9	12.0	272°05.5	54.6	Schedar	349°31.1	56°40.3
3	287°57.4		• • 39.9	147°34.3	• • 05.7	201°47.7	• • 12.0	287°07.8	• • 54.6	Diphda	348°47.2	$-17^{\circ}50.8$
4	302°59.8	285°14.3	40.6	162°35.5	05.3	216°49.6	12.0	302°10.1	54.5	Achernar	335°20.4	-57°06.3
5	318°02.3	300°14.6	41.3	177°36.7	04.8	231°51.5	12.1	317°12.4	54.4	Hamal	$327^{\circ}51.2$	23°34.8
6	333°04.8		N05°41.9	192°37.9	N17°04.4	246°53.3	N23°12.1	332°14.7	S01°54.4	Polaris	$314^{\circ}21.6$	89°22.1
7	348°07.2	330°15.1	42.6	207°39.1	04.0	261°55.2	12.1	347°17.0	54.3	Acamar	$315^{\circ}11.9$	$-40^{\circ}12.1$
8	3°09.7	345°15.4	43.3	222°40.3	03.5	276°57.1	12.1	2°19.2	54.2	Menkar	314°06.2	4°11.3
9	18°12.2		• • 44.0	237°41.5	03.1	291°58.9	12.1	17°21.5	• • 54.2	Mirfak	308°28.3	49°57.0
10	33°14.6	15°16.0	44.7	252°42.6	02.6	307°00.8	12.2	32°23.8	54.1	Aldebaran	290°39.6	16°33.6
11	48°17.1	30°16.3	45.4	267°43.8	02.2	322°02.7	12.2	47°26.1	54.0	Rigel	281°03.9	-8°10.4
12	63°19.5		N05°46.1	282°45.0	N17°01.8	337°04.5	N23°12.2	62°28.4	S01°54.0	Capella	280°21.9	46°01.4
13	78°22.0	60°16.8	46.8	297°46.2	01.3	352°06.4	12.2	77°30.7	53.9	Bellatrix	278°22.9	6°22.3
14	93°24.5	75°17.1	47.5	312°47.4	00.9	7°08.2	12.2	92°33.0	53.8	Elnath	278°01.9	28°37.7
15	108°26.9		• • 48.2	327°48.6	• • 00.5	22°10.1	• • 12.2	107°35.3	• • 53.8	Alnilam	275°37.8	$-1^{\circ}11.2$
16	123°29.4	105°17.7	48.9	342°49.7	17°00.0	37°12.0	12.3	122°37.6	53.7	Betelgeuse	270°52.1	7°24.7
17	138°31.9	120°17.9	49.6	357°50.9	16°59.6	52°13.8	12.3	137°39.8	53.6	Canopus	263°52.8	-52° 42.6
18	153°34.3		N05°50.3	12°52.1	N16°59.1	67°15.7	N23°12.3	152°42.1	S01°53.6	Sirius	258°26.3	-16°45.1
19	168°36.8	150°18.5	51.0	27°53.3	58.7	82°17.6	12.3	167°44.4	53.5	Adhara	255°05.9	-29°00.5
20	183°39.3	165°18.7	51.7	42°54.5	58.3	97°19.4	12.3	182°46.7	53.4	Procyon	244°50.8	5°09.6
21	198°41.7		• • 52.4	57°55.7	• • 57.8	112°21.3	• • 12.4	197°49.0	• • 53.4	Pollux	243°17.2	27°58.0
22	213°44.2	195°19.3	53.1	72°56.8	57.4	127°23.2	12.4	212°51.3	53.3	Avior	234°15.0	-59°35.7
23	228°46.7	210°19.6	53.8	87°58.0	56.9	142°25.0	12.4	227°53.6	53.2	Suhail	222°46.3	-43°32.3
Mer.p	ass. 07:47	ν0.3' d0.7'	m-4.47	$\nu$ 1.2' d-0	).4′ m1.22	$\nu 1.9' \ d0$	0′ m-1.93	$\nu 2.3' \ d-0$	.1′ m1.11	Miaplacidus	221°38.6	-69°49.5
										Alphard	217°47.6	-8°46.2
	CIIA	CIIA	р.	C114	Б	C114	Б	CILL	В	Regulus	207°34.2	$11^{\circ}50.6$
Mon	GHA	GHA	<b>Dec</b> \05°54.5	GHA	<b>Dec</b> N16° 56.5	GHA	Dec	GHA	Dec CO1°E2 2	Dubhe	193°40.5	61°37.1
0	243°49.1			102°59.2		157°26.9	N23°12.4	242°55.9	S01°53.2	Denebola	182°24.5	14°25.8
1	258°51.6	240°20.1	55.2	118°00.4	56.1	172°28.7	12.4	257°58.2	53.1	Gienah	175°43.1	$-17^{\circ}41.1$
2	273°54.0	255°20.4	55.9	133°01.6	55.6	187°30.6	12.5	273°00.4	53.1	Acrux	172°59.4	-63°14.7
3	288°56.5		56.6	148°02.7	• • 55.2	202°32.5	• • 12.5	288°02.7	• • 53.0	Gacrux	171°51.0	-57° 15.6
4	303°59.0	285°20.9	57.3	163°03.9	54.7	217°34.3	12.5	303°05.0	52.9	Alioth	$166^{\circ}12.3$	55°49.5
5	319°01.4	300°21.2	58.0	178°05.1	54.3	232°36.2	12.5	318°07.3	52.9	Spica	158°21.8	$-11^{\circ}17.7$
6	334°03.9		N05°58.7	193°06.3	N16°53.8	247°38.1	N23°12.5	333°09.6	S01°52.8	Alkaid	152°51.4	49°11.3
7	349°06.4		05°59.4	208°07.5	53.4	262°39.9	12.5	348°11.9	52.7	Hadar	148°35.1	-60°29.9
8	4°08.8	345°22.0 0°22.2	06°00.1	223°08.7	53.0	277°41.8 292°43.7	12.6	3°14.2	52.7	Menkent	147°56.9	-36°29.9
9	19°11.3		00.8	238°09.8	• • 52.5		• • 12.6	18°16.5	• • 52.6	Arcturus	145°47.3	19°03.0
10	34°13.8 49°16.2	15°22.5 30°22.7	01.5 02.2	253°11.0 268°12.2	52.1	307°45.5 322°47.4	12.6	33°18.8 48°21.1	52.5	Rigil Kent.	139°39.3	-60°56.6
11 12	49 16.2 64°18.7		02.2 N06°02.9	283°13.4	51.6	322 47.4 337°49.2	12.6 N23°12.6	48 21.1 63°23.4	52.5	Kochab	$137^{\circ}18.7$	74°03.1
13	79°21.1	60°23.3	03.6	298°14.6	N16°51.2 50.7	352°51.1	12.7	78°25.6	S01°52.4 52.3	Zuben'ubi	136°55.4	-16°08.9
14	94°23.6	75°23.5	03.0	313°15.7	50.7	7°53.0	12.7	93°27.9	52.3 52.3	Alphecca	126°03.1	26°37.7
15	109°26.1		05.0	328° 16.9	• • 49.9	22°54.8	• • 12.7	108°30.2	• • 52.2	Antares	$112^{\circ}15.1$	-26°29.4
16	109°20.1	105°24.0	05.7	343° 18.1	49.4	37°56.7	12.7	100 30.2 123°32.5	52.2	Atria	107°08.5	-69°04.4
17	139°31.0	120°24.3	06.4	358° 19.3	49.4	52°58.6	12.7	138°34.8	52.1	Sabik	102°02.1	-15°45.4
18	154°33.5		00.4 N06°07.1	13°20.5	N16°48.5	68°00.4	N23°12.7	150° 34.0	S01°52.0	Shaula	96°09.6	-37°07.3
19	169°35.9	150°24.8	07.8	28°21.6	48.1	83°02.3	12.8	168°39.4	52.0	Rasalhague	95°58.0	12°32.4
										Eltanin	90°41.5	51°28.9
20	184°38.4	165°25.0	08.5	43°22.8	47.6	98°04.1	12.8	183°41.7	51.9 •• 51.8	Kaus Aust.	83°31.8	-34°22.3
21	199°40.9		09.2	58°24.0	• • 47.2	113°06.0	• • 12.8	198°44.0		Vega	80°32.7	38°48.2
22	214°43.3 229°45.8	195°25.6	09.9	73°25.2	46.8	128°07.9	12.8	213°46.3	51.8	Nunki	$75^{\circ}47.1$	-26°15.9
23	229 45.0	210°25.8	10.6	88°26.4	46.3	143°09.7	12.8	228°48.6	51.7	Altair	$61^{\circ}59.5$	8°56.0
Mer.p	ass. 07:43	$\nu$ 0.3′ d0.7′	m-4.45	$\nu 1.2' \ d-0$	).4′ m1.23	$\nu 1.9' \ d0.$	0′ m-1.92	$\nu 2.3' \ d-0$	.1' m $1.10$	Peacock	53°05.0	-56°39.0
										Deneb	49°25.4	45°22.0
т	CHA	CHV	Des	CHA	Das	GHA	Dee	CHA	Daa	Enif	33°38.5	9°59.4
Tue 0	<b>GHA</b> 244°48.3	<b>GHA</b> 225°26.1 N	<b>Dec</b> \06°11.3	<b>GHA</b> 103°27.5	<b>Dec</b> N16° 45.9	БНА 158°11.6	<b>Dec</b> N23°12.8	<b>GHA</b> 243°50.9	<b>Dec</b> \$01°51.6	Al Na'ir	27°32.5	-46°50.1
1	244 48.3 259°50.7	240°26.3	12.1	103 27.5 118°28.7	N10 45.9 45.4	158 11.6 173°13.4	N23 12.8 12.9	243 50.9 258°53.2	51.6	Fomalhaut	15°14.2	-29°29.1
2	259 50.7 274°53.2	240 26.3 255°26.6	12.1	118 28.7 133°29.9	45.4 45.0	173 13.4 188°15.3	12.9	258 55.2 273°55.4	51.6 51.5	Scheat	13°45.0	28° 13.0
3	274 53.2 289°55.6		12.8	133 29.9 148°31.1	45.0 •• 44.5	203°17.2	12.9	273 55.4 288°57.7	51.5 •• 51.4	Markab	13°29.7	15°20.4
3 4	289 55.0 304°58.1	270 26.8 285°27.0	14.2	148 31.1 163°32.3	44.1	203 17.2 218°19.0	12.9	288 57.7 304°00.0	51.4	May 25 Sun	SHA	Mer.pass
5	320°00.6	300°27.3	14.2	103 32.3 178°33.4	43.6	218 19.0 233°20.9	12.9	319°02.3	51.4	Venus	342°23.2	08:59
6	335°03.0		14.9 N06°15.6	176 33.4 193°34.6	N16°43.2	248°22.8	N23°12.9	334°04.6	51.5 S01°51.2	Mars		17:09
7	350°05.0	330°27.8	16.3	208° 35.8	42.7	263°24.6	13.0	349°06.9	51.2	Jupiter		13:32
8	5°08.0	345°28.0	17.0	200° 35.0 223° 37.0	42.7	278°26.5	13.0	4°09.2	51.2	Saturn	359°11.0	07:51
9	20°10.4		17.7	238°38.2	• • 41.9	293°28.3	. 13.0	19°11.5	• • 51.1			
10	35°12.9	15°28.5	18.5	253°39.3	41.4	308°30.2	13.0	34°13.8	51.0	May 26 Mon	SHA	Mer.pass
11	50°15.4	30°28.8	19.2	268° 40.5	41.0	323°32.1	13.0	49°16.1	50.9	Venus		08:59
12	65°17.8		V06°19.9	283°41.7	N16°40.5	338°33.9	N23°13.1	64°18.4	S01°50.9		219°10.1	17:07
13	80°20.3	60°29.2	20.6	298° 42.9	40.1	353°35.8	13.1	79°20.7	50.8	Jupiter	273°37.8	13:29
14	95°22.8	75°29.5	21.3	313°44.0	39.6	8°37.6	13.1	94°23.0	50.7	Saturn	359°06.8	07:47
15	110°25.2		22.0	328° 45.2	39.2	23°39.5	13.1	109°25.3	50.7	May 27 Tue	SHA	Mer.pass
16	125°27.7	105°30.0	22.7	343°46.4	38.7	38°41.4	13.1	124°27.6	50.6		340°37.8	08:58
17	140°30.1	120°30.2	23.5	358° 47.6	38.3	53°43.2	13.1	139°29.9	50.6		218°39.3	17:05
18	155°32.6		N06°24.2	13°48.8	N16°37.8	68°45.1	N23°13.2	154°32.2	S01°50.5	Jupiter		13:26
19	170°35.1	150°30.7	24.9	28°49.9	37.4	83°47.0	13.2	169°34.5	50.4	Saturn	359°02.6	07:43
20	185°37.5	165°30.9	25.6	43°51.1	36.9	98°48.8	13.2	184°36.7	50.4	Jatuill	333 32.0	51.75
21	200°40.0		26.3	58°52.3	36.5	113°50.7	13.2	199°39.0	50.3	Horizont	al parallax	
22	215°42.5	195°31.4	27.0	73°53.5	36.0	128°52.5	13.2	214°41.3	50.2		Venus:	0.2
23	230°44.9	210°31.6	27.8	88°54.6	35.6	143°54.4	13.2	229°43.6	50.2		Mars:	0.1
ivier.p	ass. 07:40	$\nu$ 0.2′ d0.7′	111-4.44	$\nu$ 1.2 $a$ -(	).4′ m1.24	$\nu$ 1.9 $a$ 0.	.0′ m-1.92	$\nu$ 2.5 $a$ -0	$.1^\prime$ m $1.10$			

h	Sui	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°46.5	N20°57.4	212°13.7	7.8'	N15°50.2	15.2'	60.8'
1 2	195°46.4 210°46.3	57.8 58.3	226°40.5 241°07.1	7.7' 7.5'	16°05.4 16°20.5	15.1' 15.0'	60.8' 60.9'
3	225°46.3	• • 58.7	255°33.7	7.4'	16°35.6	14.9'	60.9
4	240°46.2	59.2	270°00.1	7.3'	16°50.5	14.8'	60.9'
5 6	255°46.1 270°46.1	20°59.6 N21°00.1	284°26.4 298°52.6	7.2' 7.1'	17°05.3 N17°20.0	14.7' 14.6'	60.9' 60.9'
7	285°46.0	00.5	313°18.7	7.1	17°34.6	14.5	60.9
8	300°45.9	01.0	327°44.7	6.9'	17°49.2	14.4'	60.9'
9	315°45.9 330°45.8	• • 01.4	342°10.6 356°36.4	6.8'	18°03.6 18°17.9	14.3'	60.9' 60.9'
10 11	345°45.7	01.8 02.3	350 30.4 11°02.0	6.7' 6.5'	18 17.9 18°32.0	14.2' 14.1'	60.9
12	0°45.7	N21°02.7	25°27.6	6.4'	N18°46.1	13.9'	61.0'
13	15°45.6	03.2	39°53.0	6.3'	19°00.0	13.8'	61.0'
14 15	30°45.5 45°45.5	03.6 •• 04.0	54°18.3 68°43.5	6.2' 6.1'	19°13.9 19°27.6	13.7' 13.6'	61.0' 61.0'
16	60°45.4	04.5	83°08.6	6.0'	19°41.2	13.5'	61.0'
17	75°45.3	04.9	97°33.6	5.9'	19°54.6	13.3'	61.0'
18 19	90°45.3 105°45.2	N21°05.4 05.8	111°58.5 126°23.2	5.8' 5.6'	N20°07.9 20°21.1	13.2' 13.1'	61.0' 61.0'
20	120°45.1	06.2	140°47.9	5.5'	20°34.2	12.9'	61.0'
21	135°45.1	• • 06.7	155°12.4	5.4'	20°47.1	12.8'	61.0'
22 23	150°45.0 165°44.9	07.1 07.5	169°36.8 184°01.1	5.3' 5.2'	20°59.9 21°12.5	12.6' 12.5'	61.0' 61.0'
25	SD = 15.8'	d = 0.4'	104 01.1		D = 16.6'	12.5	01.0
	$5D = 15.8^{\circ}$	$a = 0.4^{\circ}$		3	$D = 10.0^{\circ}$		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	180°44.9 195°44.8	N21°08.0 08.4	198°25.3 212°49.4	5.1' 5.0'	N21°25.1 21°37.4	12.4' 12.2'	61.0' 61.0'
2	210°44.7	08.8	212 49.4 227°13.3	5.0 4.9'	21°49.6	12.1	61.0'
3	225°44.6	• • 09.3	241°37.2	4.7'	22°01.7	11.9'	61.0'
4	240°44.6	09.7	256°00.9	4.6'	22°13.6	11.8'	61.0'
5 6	255°44.5 270°44.4	10.1 N21°10.6	270°24.6 284°48.1	4.5' 4.4'	22°25.3 N22°36.9	11.6' 11.4'	61.0' 61.0'
7	285°44.4	11.0	299°11.5	4.3'	22°48.4	11.3'	61.0'
8	300°44.3	11.4	313°34.8	4.2'	22°59.7	11.1'	61.0'
9 10	315°44.2 330°44.2	· · 11.8 12.3	327°58.1 342°21.2	4.1' 4.0'	23°10.8 23°21.7	11.0' 10.8'	61.0' 61.0'
11	345°44.1	12.7	356°44.2	3.9'	23°32.5	10.6'	61.0'
12	0°44.0	N21°13.1	11°07.1	3.8'	N23°43.2	10.5'	61.0'
13 14	15°43.9 30°43.9	13.5 14.0	25°29.9 39°52.6	3.7' 3.6'	23°53.6 24°03.9	10.3' 10.1'	61.0' 61.0'
15	45°43.8	•• 14.4	54°15.2	3.5'	24°14.0	9.9'	61.0'
16	60°43.7	14.8	68°37.7	3.4'	24°23.9	9.8'	60.9'
17 18	75°43.7 90°43.6	15.2 N21°15.7	83°00.1 97°22.5	3.3' 3.2'	24°33.7 N24°43.2	9.6' 9.4'	60.9' 60.9'
19	105°43.5	16.1	97 22.5 111°44.7	3.1'	24°52.6	9.4	60.9
20	120°43.4	16.5	126°06.8	3.1'	25°01.8	9.0'	60.9'
21 22	135°43.4 150°43.3	· · 16.9 17.3	140°28.9 154°50.9	3.0' 2.9'	25°10.9 25°19.7	8.8' 8.6'	60.9' 60.9'
23	165°43.2	17.3	169°12.7	2.8'	25°28.4	8.5	60.9
	SD = 15.8'	d = 0.4'		S	D = 16.6'		
_							
Tue 0	<b>GHA</b> 180°43.1	<b>Dec</b> N21°18.2	<b>GHA</b> 183°34.5	ν 2.7'	<b>Dec</b> N25°36.8	d 8.3'	<b>HP</b> 60.9'
1	195°43.1	18.6	197°56.3	2.6'	25°45.1	8.1	60.9
2	210°43.0	19.0	212°17.9	2.6'	25°53.1	7.9'	60.8'
3 4	225°42.9 240°42.8	· · 19.4 19.8	226°39.5 241°01.0	2.5' 2.4'	26°01.0 26°08.7	7.7' 7.5'	60.8' 60.8'
5	255°42.8	20.2	255°22.4	2.4'	26°16.2	7.3'	60.8
6	270°42.7	N21°20.7	269°43.8	2.3'	N26°23.5	7.1'	60.8'
7 8	285°42.6 300°42.5	21.1 21.5	284°05.1 298°26.3	2.2' 2.2'	26°30.6 26°37.5	6.9' 6.7'	60.8' 60.8'
9	315°42.5	21.9	312°47.5	2.1'	26°44.1	6.5	60.7
10	330°42.4	22.3	327°08.6	2.1'	26°50.6	6.3'	60.7'
11 12	345°42.3 0°42.2	22.7 N21°23.1	341°29.7 355°50.7	2.0' 2.0'	26°56.9 N27°03.0	6.1' 5.9'	60.7' 60.7'
13	15°42.2	23.5	10°11.7	1.9'	27°08.8	5.7'	60.7
14	30°42.1	24.0	24°32.6	1.9'	27°14.5	5.4'	60.6
15 16	45°42.0 60°41.9	· · 24.4 24.8	38°53.5 53°14.3	1.8' 1.8'	27°19.9 27°25.2	5.2' 5.0'	60.6' 60.6'
17	75°41.8	25.2	67°35.1	1.8'	27°30.2	4.8'	60.6
18	90°41.8	N21°25.6	81°55.9	1.7'	N27°35.0	4.6'	60.6'
19 20	105°41.7 120°41.6	26.0 26.4	96°16.6 110°37.3	1.7' 1.7'	27°39.6 27°44.0	4.4' 4.2'	60.5' 60.5'
21	135°41.5	. 26.8	110 37.3 124°58.0	1.7'	27°48.2	4.2	60.5
22	150°41.5	27.2	139°18.7	1.6'	27°52.1	3.8'	60.5'
23	165°41.4	27.6	153°39.4	1.6'	27°55.9	3.5'	60.5'
	SD = 15.8'	d = 0.4'		S	D = 16.6'		

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

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

		Sun		Moon			
Day	Eqn.o	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	7-0%	
25	03:06	03:03	11:57	10:14	22:43		
26	02:59	02:56	11:57	11:14	23:45		
27	02:53	02:49	11:57	12:17	-:-		

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
vvea 0	<b>GПА</b> 245°47.4	225°31.8	N06° 28.5	103°55.8	N16° 35.1	158°56.3	N23°13.3	<b>GПА</b> 244°45.9	S01°50.1			
										Alpheratz	357°34.6	29°13.7
1	260°49.9	240°32.1	29.2	118°57.0	34.7	173°58.1	13.3	259°48.2	50.1	Ankaa	353°07.0	-42°09.9
2	275°52.3	255°32.3	29.9	133°58.2	34.2	189°00.0	13.3	274°50.5	50.0	Schedar	349°31.0	56°40.3
3	290°54.8	270°32.5	• • 30.6	148°59.3	• • 33.8	204°01.8	• • 13.3	289°52.8	• • 49.9	Diphda	348°47.2	-17°50.8
4	305°57.3	285° 32.8	31.3	164°00.5	33.3	219°03.7	13.3	304°55.1	49.9	Achernar	335°20.4	-57°06.3
5	320°59.7	300°33.0	32.1	179°01.7	32.9	234°05.6	13.3	319°57.4	49.8	Hamal	327°51.1	23°34.8
6	336°02.2	315°33.2	N06°32.8	194°02.9	N16°32.4	249°07.4	N23°13.4	334°59.7	S01°49.7	1	314°20.5	89°22.1
7	351°04.6	330°33.4	33.5	209°04.0	32.0	264°09.3	13.4	350°02.0	49.7	Polaris		
8	6°07.1	345°33.7	34.2	224°05.2	31.5	279°11.1	13.4	5°04.3	49.6	Acamar	315°11.9	-40°12.1
9	21°09.6	0°33.9	35.0	239°06.4	31.1	294°13.0	• • 13.4	20°06.6	• • 49.6	Menkar	314°06.1	4°11.3
10	36°12.0	15°34.1	35.7	254°07.6	30.6	309°14.9	13.4	35°08.9	49.5	Mirfak	308°28.3	49°57.0
11	51°14.5	30°34.3	36.4	269°08.7	30.2	324°16.7	13.4	50°11.2	49.4	Aldebaran	290°39.6	16°33.6
	66°17.0	45°34.6	N06° 37.1	284°09.9	N16° 29.7	339°18.6	N23°13.4	65°13.5	S01°49.4	Rigel	281°03.9	-8°10.4
12										Capella	280°21.9	46°01.4
13	81°19.4	60°34.8	37.8	299°11.1	29.3	354°20.4	13.5	80°15.8	49.3	Bellatrix	278°22.9	6°22.3
14	96°21.9	75°35.0	38.6	314°12.3	28.8	9°22.3	13.5	95°18.1	49.2	Elnath	278°01.9	28°37.7
15	111°24.4	90°35.2	• • 39.3	329° 13.4	• • 28.4	24°24.2	• • 13.5	110°20.4	• • 49.2	Alnilam	275°37.7	-1°11.2
16	126°26.8	105°35.4	40.0	$344^{\circ}14.6$	27.9	39°26.0	13.5	125°22.7	49.1	Betelgeuse	270°52.1	7°24.7
17	141°29.3	120°35.7	40.7	359° 15.8	27.5	54°27.9	13.5	140°25.0	49.1	Canopus	263°52.8	-52°42.6
18	156°31.8	135°35.9	N06°41.5	14°17.0	$N16^{\circ}27.0$	69°29.7	N23°13.5	155°27.3	S01°49.0		258°26.3	-16°45.1
19	171°34.2	150°36.1	42.2	29°18.1	26.6	84°31.6	13.6	170°29.6	48.9	Sirius		
20	186°36.7	165°36.3	42.9	44°19.3	26.1	99°33.5	13.6	185°31.9	48.9	Adhara	255°05.9	-29°00.5
21	201°39.1	180°36.5	• • 43.6	59° 20.5	• • 25.7	114°35.3	• • 13.6	200°34.2	• • 48.8	Procyon	244°50.8	5°09.6
22	216°41.6	195°36.7	44.4	74°21.7	25.2	129°37.2	13.6	215°36.5	48.8	Pollux	243°17.2	27°58.0
23	231°44.1	210° 37.0	45.1	89°22.8	24.8	144°39.0	13.6	230°38.8	48.7	Avior	234°15.0	-59°35.7
			_							Suhail	222°46.3	-43°32.3
Mer.p	ass. 07:36	$\nu$ 0.2′ d0.	.7′ m-4.43	$\nu$ 1.2' d-0	).4′ m1.25	$\nu$ 1.9 $^{\prime}$ d0.	.0′ m-1.92	$\nu 2.3' \ d-0$	.1' m $1.10$	Miaplacidus	221°38.6	-69°49.5
		-		-		-				Alphard	217°47.6	-8°46.2
			_		_		_		_	Regulus	207°34.2	11°50.6
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.5	61°37.1
0	246°46.5	225° 37.2	N06°45.8	104°24.0	N16°24.3	159°40.9	N23°13.6	245°41.1	S01°48.6	Denebola	182°24.5	14°25.8
1	261°49.0	240°37.4	46.5	119°25.2	23.8	174°42.7	13.7	260°43.4	48.6	Gienah	175°43.1	-17°41.1
2	276°51.5	255° 37.6	47.3	134°26.4	23.4	189°44.6	13.7	275°45.7	48.5	Acrux	173° 43.1	-63°14.7
3	291°53.9	270°37.8	• • 48.0	$149^{\circ}27.5$	• • 22.9	204°46.5	• • 13.7	290°48.0	• • 48.4			-57°15.6
4	306°56.4	285°38.0	48.7	164°28.7	22.5	219°48.3	13.7	305°50.3	48.4	1	171°51.0	
5	321°58.9	300°38.2	49.5	179°29.9	22.0	234°50.2	13.7	320°52.6	48.3	Alioth	166°12.3	55°49.5
6	337°01.3	315°38.4	N06° 50.2	194°31.1	N16°21.6	249°52.0	N23°13.7	335°54.9	S01°48.3	Spica	158°21.8	-11°17.7
7	352°03.8	330°38.7	50.9	209° 32.2	21.1	264°53.9	13.7	350°57.2	48.2	Alkaid	152°51.4	49°11.3
8	7°06.3	345°38.9	51.6	209 32.2 224°33.4	20.7	279°55.8	13.7	5°59.5	48.1	Hadar	148°35.1	-60°29.9
										Menkent	147°56.9	-36°29.9
9	22°08.7	0°39.1	• • 52.4	239°34.6	• • 20.2	294°57.6	• • 13.8	21°01.8	• • 48.1	Arcturus	145°47.3	19°03.0
10	37°11.2	15°39.3	53.1	254°35.8	19.8	309°59.5	13.8	36°04.1	48.0	Rigil Kent.	139°39.3	-60°56.6
11	52°13.6	30°39.5	53.8	269°36.9	19.3	325°01.3	13.8	51°06.4	48.0	Kochab	$137^{\circ}18.7$	74°03.1
12	67°16.1	45°39.7	N06° 54.6	284° 38.1	N16° 18.8	340°03.2	N23°13.8	66°08.7	S01°47.9	Zuben'ubi	136°55.4	-16°08.9
13	$82^{\circ}18.6$	60°39.9	55.3	299°39.3	18.4	$355^{\circ}05.1$	13.8	$81^{\circ}11.0$	47.8	Alphecca	126°03.1	26°37.7
14	97°21.0	75°40.1	56.0	314°40.4	17.9	10°06.9	13.9	96°13.3	47.8	Antares	112° 15.1	-26°29.4
15	112°23.5	90°40.3	• • 56.8	329°41.6	• • 17.5	25°08.8	• • 13.9	111°15.6	• • 47.7	Atria	107°08.5	-69°04.4
16	127°26.0	105°40.5	57.5	344°42.8	17.0	40°10.6	13.9	126°17.9	47.7		107 08.5 102°02.1	
17	142°28.4	120°40.7	58.2	359°44.0	16.6	55°12.5	13.9	141°20.2	47.6	Sabik		-15°45.4
18	157°30.9	135°40.9	N06° 59.0	14°45.1	N16° 16.1	70°14.3	N23°13.9	156°22.5	S01°47.5	Shaula	96°09.5	-37°07.3
19	172°33.4	150°41.1	06°59.7	29°46.3	4	85°16.2	13.9	171°24.8	4	Rasalhague	95°57.9	12°32.4
	187°35.8	165°41.3	00° 39.7 07° 00.4	44° 47.5	15.7	100°18.1		171 24.0 186°27.1	47.5	Eltanin	90°41.5	51°28.9
20					15.2		13.9		47.4	Kaus Aust.	83°31.7	-34°22.3
21	202°38.3	180°41.5	•• 01.2	59°48.6	• • 14.7	115°19.9	• • 14.0	201°29.4	• • 47.4	Vega	80°32.6	38°48.2
22	217°40.8	195°41.7	01.9	74°49.8	14.3	130°21.8	14.0	216°31.7	47.3	Nunki	75°47.1	-26°15.9
23	232°43.2	210°41.9	02.6	89°51.0	13.8	145°23.6	14.0	231°34.0	47.2	Altair	61°59.4	8°56.0
Mern	ass. 07:32	v0.2'.d0	.7′ m-4.42	v1 2' d-0	).5′ m1.26	v1 9' d0	.0′ m-1.92	1/2 3' d-0	.1′ m1.09	Peacock	53°04.9	-56°39.0
- vici.p		- 5.2 00.	., 7.72	ν1.2 U-(		- 1.5 UU	1.32	- 2.5 U-0		Deneb	49°25.4	45°22.0
										Enif	33°38.4	9°59.4
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.5	-46°50.1
0	247°45.7	225°42.1		104°52.2	N16° 13.4	160°25.5	N23°14.0	246°36.3	S01°47.2	Fomalhaut	15°14.2	-40° 30.1 -29° 29.1
1	262°48.1	240°42.3	04.1	119°53.3	12.9	175°27.4	14.0	261°38.6	47.1	I	15 14.2 13°45.0	-29 29.1 28°13.0
2	277°50.6	255° 42.5	04.8	134°54.5	12.5	190°29.2	14.0	276°40.9	47.1	Scheat		
3	292°53.1	270° 42.7	• • 05.6	149°55.7	12.0	205°31.1	14.0	291°43.2	• • 47.0	Markab	13°29.6	15°20.4
4	307°55.5	285° 42.9	06.3	164° 56.8	11.5	200°32.9	14.1	306°45.5	46.9	May 28 Wed	SHA	Mer.pass
5	307 55.5 322°58.0	300°43.1	00.3	179° 58.0		220 32.9 235°34.8	14.1	300 45.5 321°47.8	46.9 46.9	1 -	339°44.4	08:58
					11.1 N16°10.6					Mars		17:03
6	338°00.5	315°43.3	N07° 07.8	194°59.2	N16° 10.6	250°36.6	N23°14.1	336°50.1	501°46.8	1		
7	353°02.9	330°43.5	08.5	210°00.4	10.2	265°38.5	14.1	351°52.4	46.8		273°08.9	13:23
8	8°05.4	345°43.6	09.3	225°01.5	09.7	280°40.4	14.1	6°54.7	46.7	Saturn	358°58.5	07:40
9	23°07.9	0°43.8	• • 10.0	240°02.7	• • 09.2	295°42.2	• • 14.1	21°57.0	• • 46.6	May 29 Thu	SHA	Mer.pass
10	$38^{\circ}10.3$	15°44.0	10.7	255°03.9	8.80	310°44.1	14.1	36°59.3	46.6			
11	53°12.8	30°44.2	11.5	270°05.0	08.3	325°45.9	14.2	52°01.6	46.5		338°50.6	08:57
12	68°15.3	45° 44.4	N07° 12.2	285°06.2	N16°07.9	340°47.8	N23°14.2	67°03.9	S01°46.5		217°37.5	17:01
13	83°17.7	60°44.6	12.9	300°07.4	07.4	355°49.6	14.2	82°06.2	46.4		272°54.4	13:20
14	98°20.2	75° 44.8	13.7	315°08.5	06.9	10°51.5	14.2	97°08.5	46.3	Saturn	358°54.5	07:36
15	113°22.6	90°45.0	• • 14.4	330°09.7	• • 06.5	25°53.4	. 14.2	112°10.8	• • 46.3	May 20 E :	CHA	Me:: ====
										May 30 Fri	SHA	Mer.pass
16	128°25.1	105° 45.2	15.2	345°10.9	06.0	40°55.2	14.2	127°13.1	46.2		337°56.4	08:57
17	143°27.6	120°45.3	15.9	0°12.1	05.6	55°57.1	14.2	142°15.4	46.2		217°06.5	16:59
18	158°30.0	135° 45.5	N07°16.6	15°13.2	N16°05.1	70°58.9	N23°14.3	157°17.7	S01°46.1		272°39.8	13:17
19	173°32.5	150° 45.7	17.4	30° 14.4	04.6	86°00.8	14.3	172°20.0	46.1	Saturn	358°50.6	07:32
20	188°35.0	165°45.9	18.1	$45^{\circ}15.6$	04.2	101°02.6	14.3	187°22.3	46.0			
21	203°37.4	$180^{\circ}46.1$	• • 18.9	$60^{\circ}16.7$	• • 03.7	$116^{\circ}04.5$	• • 14.3	202°24.6	• • 45.9	Horizont	al parallax	
22	218°39.9	195°46.2	19.6	75°17.9	03.3	131°06.3	14.3	$217^{\circ}27.0$	45.9		Venus:	0.2
23	233°42.4	210°46.4	20.4	$90^{\circ}19.1$	02.8	146°08.2	14.3	232°29.3	45.8		Mars:	0.1
Mer.p	ass. 07:28	$\nu$ 0.2′ d0.	.7′ m-4.41	$\nu$ 1.2' d-0	).5′ m1.27	$\nu$ 1.9′ d0.	.0′ m-1.92	$\nu 2.3' \ d-0$	.1' m $1.09$			

h	Sui	ı			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°41.3	N21°28.0	168°00.0	1.6'	N27°59.4	3.3'	60.4'
1 2	195°41.2 210°41.1	28.4 28.8	182°20.6 196°41.2	1.6' 1.6'	28°02.8 28°05.9	3.1' 2.9'	60.4' 60.4'
3	225°41.1	29.2	211°01.8	1.6'	28°08.8	2.7'	60.4
4	240°41.0	29.6	225° 22.5	1.6'	28° 11.5	2.5'	60.3'
5	255°40.9	30.0	239°43.1	1.6'	28°13.9	2.3'	60.3'
6 7	270°40.8 285°40.7	N21°30.4 30.8	254°03.7 268°24.3	1.6' 1.6'	N28°16.2 28°18.2	2.0' 1.8'	60.3' 60.3'
8	300° 40.7	31.2	282°45.0	1.7'	28° 20.0	1.6'	60.2
9	315°40.6	• • 31.6	297°05.6	1.7'	28°21.6	1.4'	60.2'
10 11	330° 40.5 345° 40.4	32.0 32.4	311°26.3 325°47.0	1.7' 1.7'	28°23.0 28°24.2	1.2' 1.0'	60.2' 60.2'
12	0°40.3	N21°32.8	340°07.7	1.8'	N28° 25.2	0.8	60.1
13	15°40.3	33.2	$354^{\circ}28.5$	1.8'	28°25.9	0.5'	60.1'
14 15	30°40.2 45°40.1	33.6 •• 34.0	8°49.3 23°10.1	1.8' 1.9'	28°26.5 28°26.8	0.3' 0.1'	60.1' 60.0'
16	60° 40.0	34.4	25 10.1 37°31.0	1.9'	28°26.9	-0.1	60.0
17	75°39.9	34.7	51°51.9	2.0'	28°26.8	-0.3	60.0'
18	90°39.9	N21°35.1	66°12.9	2.0'	N28° 26.5 28° 26.0	-0.5	59.9'
19 20	105°39.8 120°39.7	35.5 35.9	80°33.9 94°54.9	2.1' 2.1'	28°26.0 28°25.3	-0.7' -0.9'	59.9' 59.9'
21	135°39.6	36.3	109° 16.0	2.2'	28°24.4	-1.1'	59.9'
22	150° 39.5	36.7	123°37.2	2.2'	28°23.2	-1.3'	59.8'
23	165°39.4	37.1	137° 58.5	2.3'	28°21.9	-1.5'	59.8'
	SD = 15.8'	d = 0.4'		SI	D = 16.5'		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°39.4	N21°37.5	$152^{\circ}19.8$	2.4'	N28°20.3	-1.8'	59.8'
1	195°39.3 210°39.2	37.9 38.2	166°41.1 181°02.6	2.4' 2.5'	28° 18.6 28° 16.6	-2.0' -2.2'	59.7' 59.7'
2	210 39.2 225°39.1	38.6	181 02.6 195°24.1	2.5'	28°14.5	-2.2 -2.4'	59.7' 59.7'
4	240°39.0	39.0	209°45.7	2.7'	28°12.1	-2.6'	59.6'
5	255° 38.9	39.4	224°07.3	2.8'	28°09.6	-2.8'	59.6'
6 7	270°38.8 285°38.8	N21°39.8 40.2	238°29.1 252°50.9	2.8' 2.9'	N28°06.8 28°03.8	-3.0' -3.1'	59.6' 59.5'
8	300°38.7	40.5	267°12.9	3.0'	28°00.7	-3.3	59.5'
9	315° 38.6	• • 40.9	281°34.9	3.1'	27°57.4	-3.5'	59.5'
10 11	330°38.5 345°38.4	41.3 41.7	295°57.0 310°19.2	3.2' 3.3'	27°53.8 27°50.1	-3.7' -3.9'	59.4' 59.4'
12	0°38.3	N21°42.1	324°41.5	3.4	N27°46.2	-4.1'	59.3
13	15°38.3	42.4	339°03.9	3.5'	27° 42.1	-4.3'	59.3'
14 15	30°38.2 45°38.1	42.8 •• 43.2	353°26.4 7°49.0	3.6' 3.7'	27°37.8 27°33.3	-4.5' -4.7'	59.3' 59.2'
16	60°38.0	43.6	7 49.0 22°11.7	3.8'	27°28.6	-4.1' -4.8'	59.2'
17	75°37.9	43.9	$36^{\circ}34.5$	3.9'	$27^{\circ}23.8$	-5.0'	59.2'
18 19	90°37.8 105°37.7	N21°44.3 44.7	50° 57.5 65° 20.5	4.0' 4.2'	N27° 18.8 27° 13.6	-5.2' -5.4'	59.1' 59.1'
20	105 37.7 120° 37.6	44.7 45.1	79°43.7		27°13.0		59.1'
21	135°37.6	• • 45.4	94°06.9	4.4'	27°02.6	-5.7'	59.0'
22 23	150°37.5 165°37.4	45.8 46.2	108°30.3 122°53.8	4.5' 4.6'	26°56.9 26°51.0	-5.9' -6.1'	59.0' 58.9'
23	SD = 15.8'	d = 0.4'	122 55.6		D = 16.3'	-0.1	36.9
		u = 0.4			J = 10.5		
Fri	<b>GHA</b> 180°37.3	<b>Dec</b> N21°46.6	<b>GHA</b> 137° 17.5	ν	<b>Dec</b> N26° 45.0	d -6.2'	<b>HP</b> 58.9'
0 1	180° 37.3 195° 37.2	N21 46.6 46.9	137°17.5 151°41.2	4.8' 4.9'	26° 38.7	-6.4'	58.9'
2	210°37.1	47.3	$166^{\circ}05.1$	5.0'	26°32.3	-6.6'	58.8'
3 4	225°37.0 240°36.9	· · 47.7 48.0	180°29.1 194°53.2	5.1' 5.3'	26°25.8 26°19.0	-6.7' -6.9'	58.8' 58.8'
5	255° 36.9	48.4	209° 17.5	5.4'	26°12.1	-0.9 -7.0'	58.7
6	270°36.8	N21°48.8	223°41.9	5.5'	N26°05.1	-7.2'	58.7'
7	285°36.7	49.1	238°06.4	5.6'	25°57.9	-7.4'	58.6'
8 9	300°36.6 315°36.5	49.5 •• 49.9	252°31.0 266°55.8	5.8' 5.9'	25°50.5 25°43.0	-7.5' -7.7'	58.6' 58.6'
10	330°36.4	50.2	$281^{\circ}20.7$	6.0'	$25^{\circ}35.4$	-7.8'	58.5'
11	345°36.3	50.6	295°45.8	6.2'	25°27.6	-8.0'	58.5'
12 13	0°36.2 15°36.1	N21°51.0 51.3	310°10.9 324°36.2	6.3' 6.4'	N25°19.6 25°11.5	-8.1' -8.2'	58.5' 58.4'
14	30°36.0	51.7	339°01.7	6.6	25°03.3	-8.4	58.4
15	45°36.0	• • 52.0	353°27.3	6.7'	24°54.9	-8.5'	58.3'
16 17	60°35.9 75°35.8	52.4 52.8	7°53.0 22°18.8	6.9' 7.0'	24°46.3 24°37.7	-8.7' -8.8'	58.3' 58.3'
18	90°35.7	N21°53.1	36°44.8	7.1'	N24°28.9	-8.9'	58.2'
19	105°35.6	53.5	51°10.9	7.3'	24°20.0	-9.1'	58.2'
20 21	120°35.5 135°35.4	53.8 •• 54.2	65°37.2 80°03.6	7.4' 7.5'	24°10.9 24°01.7	-9.2' -9.3'	58.1' 58.1'
22	150°35.3	54.5	94°30.2	7.5 7.7'	24 01.7 23°52.4	-9.3 -9.4'	58.1
23	165°35.2	54.9	108°56.8	7.8'	23°43.0	-9.6'	58.0'
	SD = 15.8'	d = 0.4'		SI	D = 16.1'		

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

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

		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	1-12%
28	02:45	02:41	11:57	13:23	00:50	
29	02:37	02:33	11:57	14:27	01:56	
30	02:29	02:25	11:58	15:27	02:58	

h	Aries	Venus	,	Mars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	248°44.8	225°46.6 N07°2			161°10.1	N23°14.3	247°31.6	S01°45.8			
1	263°47.3		1.8 120°21.	.4 01.9	176°11.9	14.4	262°33.9	45.7	Alpheratz	357°34.6 353°07.0	29°13.7 -42°09.9
2	278°49.8		2.6 135°22.		191°13.8	14.4	277°36.2	45.6	Ankaa Schedar	349°31.0	56° 40.3
3	293°52.2	270°47.1 · · · 2			206°15.6	• • 14.4	292°38.5	• • 45.6	Diphda	348°47.1	-17°50.8
4	308°54.7		4.1 165°24.		221°17.5	14.4	307°40.8	45.5	Achernar	335°20.3	-57°06.3
5 6	323°57.1 338°59.6	300°47.5 2 315°47.7 N07°2	4.8 180°26. 5.6 195°27.		236°19.3 251°21.2	14.4 N23°14.4	322°43.1 337°45.4	45.5 \$01°45.4	Hamal	$327^{\circ}51.1$	23°34.8
7	354°02.1		6.3 210°28.		266°23.1	14.4	352°47.7	45.4	Polaris	314°19.7	89°22.1
8	9°04.5		7.0 225°29.		281°24.9	14.5	7°50.0	45.3	Acamar	315°11.9	-40°12.1
9	24°07.0	0°48.2 · · 2			296°26.8	• • 14.5	22°52.3	• • 45.2	Menkar	314°06.1 308°28.3	4°11.3
10	39°09.5	15°48.4 2	8.5 255°31.	.9 57.7	311°28.6	14.5	37°54.6	45.2	Mirfak Aldebaran	290°39.6	49°57.0 16°33.6
11	54°11.9		9.3 270°33.		326°30.5	14.5	52°56.9	45.1	Rigel	290 39.0 281°03.9	-8° 10.4
12	69°14.4	45°48.7 N07°3			341°32.3	N23°14.5	67°59.2	S01°45.1	Capella	280°21.9	46°01.4
13 14	84°16.9 99°19.3		0.8 300°35. 1.5 315°36.	.4 56.3 .6 55.9	356°34.2 11°36.0	14.5 14.5	83°01.5 98°03.8	45.0	Bellatrix	278°22.9	6°22.3
14 15	99 19.3 114°21.8	90°49.2 · · 3			26°37.9	. 14.5	96 03.6 113°06.2	45.0 •• 44.9	Elnath	278°01.8	28°37.7
16	129°24.2		3.0 345°38.		41°39.8	14.6	128°08.5	44.8	Alnilam	275°37.7	-1°11.2
17	144°26.7		3.8 0°40.		56°41.6	14.6	143°10.8	44.8	Betelgeuse	270°52.1	7°24.7
18	159°29.2	135°49.7 N07°3		.3 N15°54.0	71°43.5	N23°14.6	158°13.1	S01°44.7	Canopus Sirius	263°52.8 258°26.3	-52°42.6 -16°45.1
19	174°31.6		5.3 30°42.		86°45.3	14.6	173°15.4	44.7	Adhara	255°05.9	-10 45.1 -29°00.5
20	189°34.1		6.0 45°43.		101°47.2	14.6	188°17.7	44.6	Procyon	244°50.8	5°09.6
21	204°36.6	180°50.2 · · 3			116°49.0	• • 14.6	203°20.0	• • 44.6	Pollux	243°17.2	27°58.0
22 23	219°39.0 234°41.5		7.5 75°45. 8.2 90°47.		131°50.9 146°52.7	14.6 14.7	218°22.3 233°24.6	44.5 44.4	Avior	234°15.0	-59° 35.7
									Suhail	222°46.3	-43°32.3
Mer.p	ass. 07:24	$ u 0.2' \ d0.7' \ \text{m-4} $	.40 $\nu 1.2' c$	<i>d</i> -0.5′ m1.28	$\nu 1.9' \ d0$	.0′ m-1.92	$\nu 2.3' \ d-0$	$.1^\prime$ m1.09	Miaplacidus	221°38.6	-69°49.5
									Alphard	217°47.6	-8°46.2
Sun	GHA	GHA Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus Dubhe	207°34.2 193°40.5	11°50.6 61°37.1
0	249°44.0	225°50.7 N07°3	9.0 105°48.	.3 N15°51.2	161°54.6	N23°14.7	248°26.9	S01°44.4	Denebola	182°24.5	14° 25.8
1	264°46.4		9.7 120°49.		176°56.5	14.7	263°29.2	44.3	Gienah	175°43.1	-17°41.1
2	279°48.9		0.5 135°50.		191°58.3	14.7	278°31.5	44.3	Acrux	172°59.5	-63°14.7
3 4	294°51.4 309°53.8	270°51.2 · · · 4 285°51.3 · · · 4	1.2 150°51. 2.0 165°52.		207°00.2 222°02.0	· · 14.7 14.7	293°33.8 308°36.2	• • 44.2	Gacrux	$171^{\circ}51.0$	-57° 15.6
5	309 55.6 324°56.3		2.0 105 52. 2.7 180°54.		222 02.0 237°03.9	14.7	300 30.2 323°38.5	44.2 44.1	Alioth	166°12.4	55° 49.5
6	339°58.7	315°51.7 N07°4			252°05.7	N23°14.7	338°40.8	S01°44.0	Spica	158°21.8	-11°17.7
7	355°01.2		4.2 210°56.		267°07.6	14.8	353°43.1	44.0	Alkaid	152°51.4 148°35.1	49°11.3 -60°29.9
8	$10^{\circ}03.7$		5.0 225°57.		282°09.4	14.8	8°45.4	43.9	Hadar Menkent	148 35.1 147°56.9	-80° 29.9 -36° 29.9
9	$25^{\circ}06.1$	0°52.1 · · 4			297°11.3	• • 14.8	23°47.7	• • 43.9	Arcturus	145°47.3	19°03.0
10	40°08.6		6.5 255°59.		312°13.2	14.8	38°50.0	43.8	Rigil Kent.	139°39.3	-60°56.6
11	55°11.1		7.3 271°01. 8.0 286°02.		327°15.0	14.8	53°52.3	43.8 \$01°43.7	Kochab	$137^{\circ}18.7$	74°03.1
12 13	70°13.5 85°16.0		8.0 280 02. 8.8 301°03.		342°16.9 357°18.7	N23°14.8 14.8	68°54.6 83°56.9	43.6	Zuben'ubi	136°55.4	-16°08.9
14	100°18.5		9.5 316°04.		12°20.6	14.8	98°59.2	43.6	Alphecca	126°03.1	26°37.7
15	115°20.9	90°53.1 · · 5			27°22.4	• • 14.9	114°01.6	• • 43.5	Antares	112°15.1	-26°29.4
16	130°23.4		1.0 346°06.		42°24.3	14.9	129°03.9	43.5	Atria Sabik	107°08.4 102°02.1	-69°04.4 -15°45.4
17	145°25.9	120°53.4 5	1.8 1°08.		57°26.1	14.9	$144^{\circ}06.2$	43.4	Shaula	96°09.5	-37°07.3
18	160°28.3	135°53.5 N07°5			72°28.0	N23°14.9	159°08.5	S01°43.4	Rasalhague	95°57.9	12°32.4
19	175°30.8		3.3 31°10.		87°29.8	14.9	174°10.8	43.3	Eltanin	90°41.5	51°29.0
20	190°33.2 205°35.7	165°53.8 5 180°54.0 · · 5	4.0 46°11. 4.8 61°12.		102°31.7 117°33.6	14.9	189°13.1 204°15.4	43.3	Kaus Aust.	83°31.7	-34°22.3
21 22	205 35.7 220°38.2		5.5 76°13.		117 35.0 132°35.4	· · 14.9 14.9	204 15.4 219°17.7	· · 43.2 43.1	Vega	80°32.6	38°48.3
23	235°40.6		6.3 91°15.		147°37.3	15.0	234°20.0	43.1	Nunki	75°47.0	-26°15.9
									Altair	61°59.4 53°04.9	8°56.0 -56°39.0
ivier.p	ass. 07:20	ν0.2′ d0.7′ m-4	$\frac{1.39}{1.2}$ $\frac{\nu_{1.2}}{\sigma_{1.2}}$	d-0.5′ m1.29	$\nu$ 1.9° $a$ 0	.0′ m-1.91	$\nu$ 2.3 a-0	.1′ m1.08	Peacock Deneb	49°25.3	45° 22.0
									Enif	33°38.4	9°59.4
Mon	GHA	GHA Dec		Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.4	-46°50.1
0	250°43.1	225°54.4 N07°5		.2 N15°40.0	162°39.1	N23°15.0	249°22.4	S01°43.0	Fomalhaut	$15^{\circ}14.2$	-29°29.1
1 2	265°45.6 280°48.0		7.8 121°17. 8.6 136°18.		177°41.0 192°42.8	15.0 15.0	264°24.7 279°27.0	43.0 42.9	Scheat	13°44.9	28°13.0
3	295°50.5	270°54.8 07°5			207°44.7	15.0	294°29.3	• • 42.9	Markab	13°29.6	15°20.4
4	310°53.0	285°55.0 08°0			222°46.5	15.0	309°31.6	42.8	May 31 Sat	SHA	Mer.pass
5	$325^{\circ}55.4$		0.8 181°22.	.1 37.6	237°48.4	15.0	324°33.9	42.8		337°01.8	08:57
6	340°57.9	315°55.3 N08°0			252°50.2	N23°15.0	339°36.2	S01°42.7	Mars	216°35.4	16:57
7	356°00.3		2.3 211°24.		267°52.1	15.0	354°38.5	42.6	Jupiter		13:14
8	11°02.8		3.1 226°25.		282°53.9	15.1	9°40.8	42.6	Saturn	358°46.7	07:29
9 10	26°05.3 41°07.7	0°55.7 · · 0 15°55.8 0	3.9 241°26. 4.6 256°27.		297°55.8 312°57.7	· · 15.1 15.1	24°43.2 39°45.5	· · 42.5 42.5	Jun 01 Sun	SHA	Mer.pass
11	56°10.2		5.4 271°29.		312 57.7 327°59.5	15.1	59 45.5 54°47.8	42.5	Venus	336°06.7	08:57
12	71°12.7	45°56.1 N08°0			343°01.4	N23°15.1	69°50.1	S01°42.4	Mars	216°04.3	16:55
13	86°15.1		6.9 301°31.		358°03.2	15.1	84°52.4	42.3	Jupiter	272°10.6	13:11
14	101°17.6		7.6 316°32.		13°05.1	15.1	99°54.7	42.3	Saturn	358°43.0	07:25
15	116°20.1	90°56.5 · · 0			28°06.9	• • 15.1	114°57.0	• • 42.2	Jun 02 Mon	SHA	Mer.pass
16	131°22.5		9.2 346°34.		43°08.8	15.1	129°59.4	42.2	Venus	335°11.3	08:56
17	146°25.0		9.9 1°36. 0.7 16°37.		58°10.6 73°12.5	15.2	145°01.7	42.1		215°33.1	16:54
18 19	161°27.5 176°29.9		0.7 16°37. 1.4 31°38.		73°12.5 88°14.3	N23°15.2 15.2	160°04.0 175°06.3	\$01°42.0 42.0		271°56.0	13:08
20	170 29.9 191°32.4		2.2 46°39.		103°16.2	15.2	175 00.5 190°08.6	41.9	Saturn	358°39.3	07:21
21	206°34.8	180° 57.3 · · · 1			118°18.0	15.2	205°10.9	. 41.9	Horizont	al parallax	
22	221°37.3	195°57.4 1	3.7 76°41.	.8 29.6	133°19.9	15.2	220°13.2	41.8		Venus:	0.2
23	236°39.8	210°57.6 1	4.5 91°43.	.0 29.1	148°21.8	15.2	235°15.5	41.8		Mars:	0.1
Mer.p	ass. 07:16	ν0.1' d0.8' m-4	.38 $\nu 1.2' c$	d-0.5′ m1.29	$\nu 1.9' \ d0$	.0′ m-1.91	$\nu 2.3' \ d-0$	.1′ m1.08			

h	Sui	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	180°35.1	N21°55.3	123°23.6	8.0'	N23°33.4	-9.7'	58.0'
1 2	195°35.0 210°34.9	55.6 56.0	137°50.6 152°17.7	8.1' 8.2'	23°23.7 23°13.9	-9.8' -9.9'	57.9' 57.9'
3	225°34.9	• • 56.3	166°44.9	8.4	23°04.0	-9.9 -10.0'	57.9'
4	240°34.8	56.7	181°12.3	8.5'	$22^{\circ}53.9$	-10.2'	57.8'
5	255°34.7	57.0	195°39.8	8.6'	22°43.8	-10.3'	57.8'
6 7	270°34.6 285°34.5	N21°57.4 57.7	210°07.4 224°35.2	8.8' 8.9'	N22°33.5 22°23.1	-10.4' -10.5'	57.7' 57.7'
8	300°34.4	58.1	239°03.1	9.0'	22°12.7	-10.6'	57.7'
9	315°34.3	• • 58.4	253°31.1	9.2'	22°02.1	-10.7'	57.6'
10 11	330°34.2 345°34.1	58.8 59.1	267°59.3 282°27.6	9.3' 9.4'	21°51.4 21°40.6	-10.8' -10.9'	57.6' 57.6'
12	0°34.0	N21°59.5	296°56.1	9.4	N21°29.7	-10.9	57.5'
13	15°33.9	21°59.8	311°24.7	9.7'	21° 18.7	-11.1'	57.5'
14	30°33.8	22°00.2	325°53.4	9.8'	21°07.6	-11.2'	57.4
15 16	45°33.7 60°33.6	· · 00.5 00.8	340°22.2 354°51.2	10.0' 10.1'	20°56.4 20°45.1	-11.3' -11.4'	57.4' 57.4'
17	75°33.5	01.2	9°20.3	10.2'	20°33.7	-11.5'	57.3'
18	90°33.4	N22°01.5	23°49.5	10.4'	N20°22.3	-11.6'	57.3'
19 20	105°33.4 120°33.3	01.9 02.2	38°18.9 52°48.4	10.5' 10.6'	20° 10.7 19° 59.1	-11.6' -11.7'	57.2'
20	120 33.3 135°33.2	• • 02.6	52 48.4 67°18.0	10.6	19 59.1 19°47.4	-11.7 -11.8'	57.2' 57.2'
22	150°33.1	02.9	81°47.8	10.9'	19°35.5	-11.9'	57.1'
23	165°33.0	03.2	96°17.6	11.0'	19°23.7	-12.0'	57.1'
	SD = 15.8′	d = 0.4'		SI	O = 15.8'		
Sun	GHA	Dec	GHA	ν	Dec	d	НР
0	180°32.9	N22°03.6	110°47.6	11.1'	$N19^{\circ}11.7$	-12.0'	57.1
1	195°32.8	03.9	125°17.8	11.2'	18° 59.6	-12.1'	57.0'
2 3	210°32.7 225°32.6	04.3 •• 04.6	139°48.0 154°18.4	11.4' 11.5'	18° 47.5 18° 35.3	-12.2' -12.3'	57.0' 56.9'
4	240°32.5	04.9	168°48.8	11.6'	18° 23.0	-12.3'	56.9'
5	255°32.4	05.3	183°19.5	11.7'	18° 10.7	-12.4'	56.9'
6	270°32.3	N22°05.6	197°50.2	11.8'	N17°58.3	-12.5'	56.8'
7 8	285°32.2 300°32.1	05.9 06.3	212°21.0 226°52.0	12.0' 12.1'	17°45.8 17°33.2	-12.6' -12.6'	56.8' 56.8'
9	315°32.0	• • 06.6	241°23.0	12.2'	17°20.6	-12.7'	56.7'
10	330°31.9	06.9	255°54.2	12.3'	17°07.9	-12.7'	56.7'
11 12	345°31.8 0°31.7	07.3 N22°07.6	270°25.5 284°56.9	12.4' 12.5'	16°55.2 N16°42.4	-12.8' -12.9'	56.6' 56.6'
13	15°31.6	07.9	204 50.9 299°28.5	12.6'	16°29.5	-12.9' -12.9'	56.6'
14	30°31.5	08.3	314°00.1	12.7'	$16^{\circ}16.6$	-13.0'	56.5'
15	45°31.4	• • 08.6	328°31.8	12.8'	16°03.6	-13.0'	56.5'
16 17	60°31.3 75°31.2	08.9 09.2	343°03.7 357°35.6	12.9' 13.1'	15°50.5 15°37.4	-13.1' -13.2'	56.5' 56.4'
18	90°31.1	N22°09.6	12°07.7	13.2'	N15°24.3	-13.2'	56.4
19	105°31.0	09.9	26°39.8	13.3'	15° 11.1	-13.3'	56.4'
20 21	120°30.9 135°30.8	10.2 •• 10.5	41°12.1 55°44.4	13.4' 13.5'	14°57.8 14°44.5	-13.3' -13.4'	56.3' 56.3'
22	150°30.7	10.9	70°16.9	13.6'	14° 44.5	-13.4'	56.3
23	165°30.6	11.2	84°49.4	13.7'	14° 17.8	-13.4'	56.2'
	SD = 15.8'	d = 0.3'		SI	D = 15.6'		
Mon	GHA	Dec	GHA	ν	Dec	d	НР
0	180°30.5	N22°11.5	99°22.1	13.7'	N14°04.3	-13.5'	56.2'
1	195°30.4	11.8	113°54.8	13.8'	13°50.8	-13.5'	56.2'
2	210°30.3 225°30.2	12.2 •• 12.5	128°27.7 143°00.6	13.9' 14.0'	13°37.3 13°23.7	-13.6' -13.6'	56.1' 56.1'
3 4	240°30.1	12.5	143 00.6 157°33.6	14.0 14.1'	13° 23.7 13° 10.1	-13.0 -13.7'	56.1'
5	255°30.0	13.1	172°06.8	14.2'	12°56.5	-13.7'	56.0'
6	270°29.9 285°29.8	N22°13.4	186°40.0 201°13.2	14.3'	N12°42.8 12°29.1	-13.7'	56.0'
7 8	285°29.8 300°29.7	13.8 14.1	201°13.2 215°46.6	14.4' 14.5'	12°29.1 12°15.3	-13.8' -13.8'	56.0' 55.9'
9	315°29.6	• • 14.4	230°20.1	14.5'	$12^{\circ}01.5$	-13.8'	55.9'
10	330°29.5	14.7	244°53.6	14.6'	11°47.7	-13.9'	55.9'
11 12	345°29.4 0°29.3	15.0 N22°15.3	259°27.2 274°01.0	14.7' 14.8'	11°33.8 N11°19.9	-13.9' -13.9'	55.8' 55.8'
13	15°29.2	15.7	288°34.7	14.9'	11°06.0	-14.0'	55.8'
14	30°29.1	16.0	303°08.6	14.9'	10°52.0	-14.0'	55.7'
15 16	45°29.0 60°28.9	· · 16.3	317°42.5 332°16.5	15.0'	10°38.0 10°24.0	-14.0'	55.7'
16 17	60°28.9 75°28.8	16.6 16.9	332°16.5 346°50.6	15.1' 15.2'	10°24.0 10°10.0	-14.0' -14.1'	55.7' 55.7'
18	90°28.7	N22°17.2	1°24.8	15.2'	N09°55.9	-14.1'	55.6'
19	105°28.6	17.5	15°59.0	15.3'	09°41.8	-14.1'	55.6'
20 21	120°28.5 135°28.4	17.8 •• 18.1	30°33.3 45°07.7	15.4' 15.4'	09°27.7 09°13.6	-14.1' -14.2'	55.6' 55.5'
22	150°28.3	18.5	59°42.1	15.5'	08°59.4	-14.2'	55.5
23	165°28.2	18.8	74°16.6	15.6'	08°45.2	-14.2'	55.5'
	SD = 15.8'	d = 0.3'		SI	O = 15.3'		

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	4-6	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	20-39%	
31	02:21	02:16	11:58	16:21	03:55		
01	02:11	02:07	11:58	17:10	04:46		
02	02:02	01.57	11.58	17.54	05:33		

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	251°42.2	225°57.7 N08°15.2	106°44.1 N15°28.7	163°23.6 N23°15.2	250°17.9 <b>S</b> 01°41.7	
1	266°44.7	240°57.8 16.0	121°45.3 28.2	178°25.5 15.2	265°20.2 41.7	Alpheratz 357°34.6 29°13.7
2	281°47.2	255°58.0 16.8	136°46.5 27.7	193°27.3 15.3	280°22.5 41.6	Ankaa 353°07.0 -42°09.9
3	296°49.6	270°58.1 · · 17.5	151°47.6 · · 27.2	208°29.2 · · 15.3		Schedar 349°31.0 56°40.3
	311°52.1					Diphda 348°47.1 -17°50.8
4			166°48.8 26.8		310°27.1 41.5	Achernar 335°20.3 -57°06.2
5	326°54.6	300°58.3 19.1	181°50.0 26.3	238°32.9 15.3	325°29.4 41.5	Hamal 327°51.1 23°34.8
6	341°57.0	315°58.5 N08°19.8	196°51.1 N15°25.8	253°34.7 N23°15.3	340°31.7 S01°41.4	Polaris 314°19.0 89°22.1
7	356°59.5	330°58.6 20.6	211°52.3 25.3	268°36.6 15.3	355°34.1 41.3	Acamar 315°11.9 -40°12.0
8	12°02.0	345°58.7 21.3	226°53.4 24.9	283°38.4 15.3	10°36.4 41.3	Menkar 314°06.1 4°11.3
9	27°04.4	0°58.8 · · 22.1	241°54.6 · · 24.4	298°40.3 · · 15.3	25°38.7 · · 41.2	Mirfak 308°28.3 49°57.0
10	42°06.9	15°59.0 22.9	256°55.8 23.9	313°42.1 15.3	40°41.0 41.2	Aldebaran 290°39.6 16°33.6
11	57°09.3	30°59.1 23.6	271°56.9 23.4	328°44.0 15.4	55°43.3 41.1	Rigel 281°03.9 -8°10.3
12	72°11.8	45°59.2 N08°24.4	286°58.1 N15°23.0	343°45.8 N23°15.4	70°45.6 <b>S</b> 01°41.1	Capella 280°21.9 46°01.4
13	87°14.3	60°59.3 25.2	301°59.2 22.5	358°47.7 15.4	85°48.0 41.0	Bellatrix 278°22.9 6°22.3
14	$102^{\circ}16.7$	75°59.4 25.9	317°00.4 22.0	13°49.5 15.4	100°50.3 41.0	Elnath 278°01.8 28°37.7
15	$117^{\circ}19.2$	90°59.6 · · 26.7	332°01.6 · · 21.5	28°51.4 · · 15.4	115°52.6 · · 40.9	Alnilam 275°37.7 -1°11.2
16	132°21.7	105°59.7 27.4	347°02.7 21.1	43°53.2 15.4	130°54.9 40.9	
17	$147^{\circ}24.1$	120°59.8 28.2	2°03.9 20.6	58°55.1 15.4	145°57.2 40.8	
18	162°26.6	135°59.9 N08°29.0	17°05.1 N15°20.1	73°57.0 N23°15.4	160°59.5 <b>S</b> 01°40.8	Canopus 263°52.8 -52°42.6
19	177°29.1	151°00.0 29.7	32°06.2 19.6	88°58.8 15.4	176°01.9 40.7	Sirius 258°26.3 -16°45.1
20	192°31.5	166°00.2 30.5	47°07.4 19.2	104°00.7 15.4	191°04.2 40.7	Adhara 255°06.0 -29°00.5
21	207°34.0	181°00.3 · · 31.3	62°08.5 · · 18.7	119°02.5 · · 15.5	206°06.5 · · 40.6	Procyon 244°50.8 5°09.6
22	222°36.4	196°00.4 32.0	77°09.7 18.2	134°04.4 15.5	221°08.8 40.5	Pollux 243°17.2 27°58.0
23	237°38.9	211°00.5 32.8	92°10.9 17.7	149°06.2 15.5	236°11.1 40.5	Avior 234°15.0 -59°35.6
						Suhail 222°46.3 -43°32.3
Mer.p	ass. 07:12	$ u 0.1' \ d0.8' \ \text{m-4.37}$	$\nu 1.2' \ d$ -0.5' m1.30	$ u 1.9' \ d0.0' \ \text{m-}1.91$	$\nu 2.3' \ d\text{-}0.1' \ \text{m}1.08$	Miaplacidus 221°38.7 -69°49.5
						Alphard 217°47.6 -8°46.2
	c	CIIA =	CIIA =	CIIA -	CUA	Regulus 207°34.2 11°50.6
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°40.6 61°37.1
0	252°41.4	226°00.6 N08°33.6	107°12.0 N15°17.3	164°08.1 N23°15.5	251°13.4 S01°40.4	Denebola 182°24.5 14°25.8
1	267°43.8	241°00.7 34.3	122°13.2 16.8	179°09.9 15.5	266°15.8 40.4	Gienah 175°43.1 -17°41.1
2	282°46.3	256°00.8 35.1	137°14.3 16.3	194°11.8 15.5	281°18.1 40.3	Acrux 172°59.5 -63°14.7
3	297°48.8	271°00.9 · · 35.9	152°15.5 • • 15.8	209°13.6 · · 15.5	296°20.4 · · 40.3	Gacrux 171°51.1 -57°15.6
4	312°51.2	286°01.1 36.6	167°16.7 15.3	224°15.5 15.5	311°22.7 40.2	Alioth 166°12.4 55°49.5
5	327°53.7	301°01.2 37.4	182°17.8 14.9	239°17.3 15.5	326°25.0 40.2	Spica 158°21.8 -11°17.7
6	342°56.2	316°01.3 N08°38.2	197°19.0 N15°14.4	254°19.2 N23°15.5	341°27.4 <b>S</b> 01°40.1	Alkaid 152°51.4 49°11.3
7	357°58.6	331°01.4 38.9	212°20.1 13.9	269°21.0 15.6	356°29.7 40.1	
8	13°01.1	346°01.5 39.7	227°21.3 13.4	284°22.9 15.6	11°32.0 40.0	
9	28°03.6	1°01.6 · · 40.5	242°22.4 · · 12.9	299°24.7 · · 15.6	26°34.3 · · 40.0	Menkent 147°56.9 -36°29.9
10	43°06.0	16°01.7 41.2	257°23.6 12.5	314°26.6 15.6	41°36.6 39.9	Arcturus 145°47.3 19°03.0
11	58°08.5	31°01.8 42.0	272°24.8 12.0	329°28.4 15.6	56°38.9 39.9	Rigil Kent. 139°39.3 -60°56.6
12	73°10.9	46°01.9 N08°42.8	287°25.9 N15°11.5	344°30.3 N23°15.6	71°41.3 S01°39.8	Kochab 137°18.7 74°03.1
13	88°13.4	61°02.0 43.5	302°27.1 11.0	359°32.1 15.6	86°43.6 39.8	Zuben'ubi 136°55.4 -16°08.9
14	103°15.9	76°02.1 44.3	317°28.2 10.5	14°34.0 15.6	101°45.9 39.7	Alphecca 126°03.1 26°37.7
	103 15.9 118°18.3					Antares 112°15.1 -26°29.4
15		91°02.2 · · 45.1	332°29.4 · · 10.1	29°35.8 · · 15.6	116°48.2 · · 39.7	Atria 107°08.4 -69°04.4
16	133°20.8	106°02.3 45.8	347°30.6 09.6	44°37.7 15.6	131°50.5 39.6	Sabik 102°02.1 -15°45.4
17	148°23.3	121°02.4 46.6	2°31.7 09.1	59°39.5 15.6	146°52.9 39.6	Shaula 96°09.5 -37°07.3
18	163°25.7	136°02.5 N08°47.4	17°32.9 N15°08.6	74°41.4 N23°15.7	161°55.2 S01°39.5	Rasalhague 95°57.9 12°32.4
19	178°28.2	151°02.6 48.1	32°34.0 08.1	89°43.2 15.7	176°57.5 39.5	Eltanin 90°41.5 51°29.0
20	193°30.7	166°02.7 48.9	47°35.2 07.7	104°45.1 15.7	191°59.8 39.4	Kaus Aust. 83°31.7 -34°22.3
21	208°33.1	181°02.8 · · 49.7	62°36.4 · · 07.2	119°46.9 · · 15.7	207°02.1 · · 39.4	Vega 80°32.6 38°48.3
22	223°35.6	196°02.9 50.5	77°37.5 06.7	134°48.8 15.7	222°04.5 39.3	Nunki 75°47.0 -26°15.9
23	238°38.1	211°03.0 51.2	92°38.7 06.2	149°50.7 15.7	237°06.8 39.3	Altair 61°59.4 8°56.0
Morn	ass. 07:08	$\nu$ 0.1' d0.8' m-4.36	$\nu 1.2' \ d$ -0.5' m1.31	$\nu 1.9' \ d0.0' \ \text{m-}1.91$	ν2.3' d-0.1' m1.07	Peacock 53°04.8 -56°39.0
- wier.p		VO.1 00.0 III-4.30	V1.2 U-U.J III1.J1	UO.U III-1.31	ν2.5 α-0.1 III1.01	Deneb 49°25.3 45°22.0
						Enif 33°38.4 9°59.4
Thu	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Al Na'ir 27°32.4 -46°50.1
0	253°40.5	226°03.1 N08°52.0	107°39.8 N15°05.7	164°52.5 N23°15.7	252°09.1 <b>S</b> 01°39.2	Fomalhaut 15°14.2 -29°29.1
1	268°43.0	241°03.2 52.8	122°41.0 05.3	179°54.4 15.7	267°11.4 39.2	Scheat 13°44.9 28°13.1
2	283°45.4	256°03.3 53.5	137°42.1 04.8	194°56.2 15.7	282°13.7 39.1	Markab 13°29.6 15°20.4
3	298°47.9	271°03.4 · · 54.3	152°43.3 · · 04.3	209°58.1 · · 15.7	297°16.1 · · 39.0	IVIGINAD 13 29.0 13 20.4
4	313°50.4	286°03.5 55.1	167°44.5 03.8	224°59.9 15.7	312°18.4 39.0	Jun 03 Tue SHA Mer.pass
5	328°52.8	301°03.6 55.8	182°45.6 03.3	240°01.8 15.8	327°20.7 38.9	Venus 334°15.5 08:56
6	343°55.3	316°03.7 N08°56.6	197°46.8 N15°02.8	255°03.6 N23°15.8	342°23.0 S01°38.9	Mars 215°01.9 16:52
7	358°57.8	331°03.8 57.4	212°47.9 02.4	270°05.5 15.8	357°25.4 38.8	Jupiter 271°41.4 13:05
8	14°00.2	346°03.9 58.2	212 47.9 02.4 227°49.1 01.9	285°07.3 15.8	12°27.7 38.8	Saturn 358°35.6 07:18
9	29°02.7	1°04.0 · · 58.9	242°50.2 · · 01.4	300°09.2 · · 15.8	27°30.0 · · 38.7	
	44°05.2	16°04.1 08°59.7				Jun 04 Wed SHA Mer.pass
10						Venus 333°19.2 08:56
11	59°07.6	31°04.2 09°00.5	272°52.6 15°00.4	330°12.9 15.8	57°34.6 38.6	Mars 214°30.6 16:50
12	74°10.1	46°04.2 N09°01.2	287°53.7 N14°59.9	345°14.7 N23°15.8	72°37.0 S01°38.6	Jupiter 271°26.7 13:02
13	89°12.5	61°04.3 02.0	302°54.9 59.5	0°16.6 15.8	87°39.3 38.5	Saturn 358°32.1 07:14
14	104°15.0	76°04.4 02.8	317°56.0 59.0	15°18.4 15.8	102°41.6 38.5	
15	119°17.5	91°04.5 · · 03.6	332°57.2 · · 58.5	30°20.3 · · 15.8	117°43.9 · · 38.4	Jun 05 Thu SHA Mer.pass
16	$134^{\circ}19.9$	106°04.6 04.3	347°58.3 58.0	45°22.1 15.9	132°46.3 38.4	Venus 332°22.6 08:56
17	149°22.4	121°04.7 05.1	2°59.5 57.5	60°24.0 15.9	147°48.6 38.3	Mars 213°59.3 16:48
18	164°24.9	136°04.8 N09°05.9	18°00.7 N14°57.0	75°25.8 N23°15.9	162°50.9 <b>S</b> 01°38.3	Jupiter 271°12.0 12:59
19	179°27.3	151°04.8 06.6	33°01.8 56.6	90°27.7 15.9	177°53.2 38.2	Saturn 358°28.6 07:10
20	194°29.8	166°04.9 07.4	48°03.0 56.1	105°29.5 15.9	192°55.5 38.2	
21	209°32.3	181°05.0 · · 08.2	63°04.1 · · 55.6	120°31.4 · · 15.9	207°57.9 · · 38.1	Horizontal parallax
22	224°34.7	196°05.1 09.0	78°05.3 55.1	135°33.2 15.9	223°00.2 38.1	Venus: 0.2
23	239°37.2	211°05.2 09.7	93°06.4 54.6	150°35.1 15.9	238°02.5 38.0	Mars: 0.1
Mer.p	ass. 07:04	$ u 0.1' \ d0.8' \ \text{m-4.35}$	$\nu 1.2' \ d$ -0.5' m1.32	$ u 1.9' \; d0.0' \; \text{m-}1.91$	$ u 2.3' \; d$ -0.1' m1.07	

h	Sui	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°28.1	$N22^{\circ}19.1$	$88^{\circ}51.2$	15.6'	$N08^{\circ}31.0$	-14.2'	55.5'
1	195°28.0 210°27.9	19.4	103°25.8 118°00.5	15.7'	08°16.8 08°02.6	-14.2'	55.4'
2 3	210 27.9 225°27.8	19.7 •• 20.0	118 00.5 132°35.2	15.7' 15.8'	08 02.6 07°48.3	-14.2' -14.3'	55.4' 55.4'
4	240°27.7	20.3	147° 10.1	15.9'	07°34.1	-14.3'	55.3'
5	255°27.6	20.6	$161^{\circ}44.9$	15.9'	$07^{\circ}19.8$	-14.3'	55.3'
6	270°27.4	N22°20.9	176°19.8	16.0'	N07°05.5	-14.3'	55.3'
7 8	285°27.3 300°27.2	21.2 21.5	190°54.8 205°29.8	16.0' 16.1'	06°51.2 06°36.9	-14.3' -14.3'	55.3' 55.2'
9	315° 27.1	. 21.8	220°04.9	16.1	06°22.5	-14.3'	55.2'
10	330°27.0	22.1	$234^{\circ}40.1$	16.2'	$06^{\circ}08.2$	-14.4'	55.2'
11	345°26.9	22.4	249°15.2	16.2'	05°53.8	-14.4'	55.2'
12 13	0°26.8 15°26.7	N22°22.7 23.0	263°50.5 278°25.7	16.3' 16.3'	N05°39.5 05°25.1	-14.4' -14.4'	55.1' 55.1'
14	30° 26.6	23.3	293°01.1	16.4	05°10.7	-14.4'	55.1'
15	45°26.5	• • 23.6	$307^{\circ}36.4$	16.4'	$04^{\circ}56.3$	-14.4'	55.1'
16	60°26.4	23.9	322°11.8	16.4'	04°42.0	-14.4'	55.0'
17 18	75°26.3 90°26.2	24.2 N22° 24.5	336° 47.3 351° 22.8	16.5' 16.5'	04°27.6 N04°13.2	-14.4' -14.4'	55.0' 55.0'
19	105°26.1	24.8	5°58.3	16.6'	03°58.8	-14.4'	55.0'
20	120° 26.0	25.1	20°33.9	16.6'	03°44.3	-14.4'	54.9'
21	135° 25.9	• • 25.3	35°09.5	16.6'	03°29.9	-14.4'	54.9'
22	150°25.8	25.6	49°45.1	16.7'	03°15.5 03°01.1	-14.4'	54.9'
23	165°25.7	25.9	64°20.8	16.7'		-14.4'	54.9'
	SD = 15.8'	d = 0.3'		SI	D = 15.1'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°25.5	N22°26.2	$78^{\circ}56.5$	16.7'	N02°46.7	-14.4'	54.9'
1	195°25.4	26.5	93°32.2	16.8'	02°32.3	-14.4'	54.8'
2	210°25.3 225°25.2	26.8 •• 27.1	108° 08.0 122° 43.8	16.8' 16.8'	02°17.9 02°03.5	-14.4' -14.4'	54.8' 54.8'
4	240° 25.1	27.1	137°19.6	16.8'	02 03.3 01°49.1	-14.4'	54.8'
5	255°25.0	27.7	$151^{\circ}55.5$	16.9'	$01^{\circ}34.7$	-14.4'	54.8'
6	270°24.9	N22°27.9	166°31.3	16.9'	N01°20.3	-14.4'	54.7'
7 8	285°24.8 300°24.7	28.2 28.5	181°07.2 195°43.1	16.9' 16.9'	01°05.9 00°51.5	-14.4' -14.4'	54.7' 54.7'
9	315° 24.6	. 28.8	210° 19.1	17.0'	00°37.1	-14.4'	54.7
10	330° 24.5	29.1	224°55.0	17.0'	00°22.8	-14.4'	54.7'
11	345°24.4	29.4	239°31.0	17.0'	N00°08.4	-14.4'	54.6'
12 13	0°24.2 15°24.1	N22°29.7 29.9	254°07.0 268°43.0	17.0' 17.0'	\$00°05.9 00°20.3	14.3' 14.3'	54.6' 54.6'
13 14	30° 24.1	30.2	208 43.0 283°19.1	17.0'	00°20.3	14.3	54.6'
15	45° 23.9	30.5	297°55.1	17.1'	00°48.9	14.3'	54.6'
16	60°23.8	30.8	312°31.1	17.1'	01°03.2	14.3'	54.5'
17 18	75°23.7 90°23.6	31.1 N22°31.3	327°07.2 341°43.3	17.1' 17.1'	01°17.5 S01°31.8	14.3' 14.3'	54.5' 54.5'
19	90 23.0 105°23.5	31.6	356° 19.4	17.1'	01°46.1	14.3	54.5'
20	120°23.4	31.9	10°55.5	17.1'	02°00.3	14.2'	54.5'
21	135° 23.3	• • 32.2	25°31.6	17.1'	02°14.6	14.2'	54.5'
22	150°23.2	32.4 32.7	40°07.7 54°43.8	17.1'	02°28.8	14.2'	54.4'
23	165°23.0		54-43.8	17.1'	02°43.0	14.2'	54.4'
	SD = 15.8'	d = 0.3'		SI	D = 15.0'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°22.9	N22°33.0	69°19.9	17.1'	S02°57.2	14.2'	54.4'
1 2	195°22.8 210°22.7	33.3 33.5	83°56.0 98°32.1	17.1' 17.1'	03°11.4 03°25.5	14.2' 14.1'	54.4' 54.4'
3	210 22.7 225°22.6	33.8	98 32.1 113°08.2	17.1'	03 25.5 03°39.7	14.1'	54.4'
4	240°22.5	34.1	127°44.3	17.1'	03°53.8	14.1'	54.4'
5	255° 22.4	34.3	142°20.4	17.1'	04°07.9	14.1'	54.3'
6	270°22.3 285°22.2	N22°34.6 34.9	156° 56.5 171° 32.6	17.1' 17.1'	\$04°22.0 04°36.0	14.1' 14.0'	54.3' 54.3'
7 8	285°22.2 300°22.0	34.9 35.2	171°32.6 186°08.7	17.1' 17.1'	04°36.0 04°50.1	14.0'	54.3'
9	315°21.9	35.4	200°44.8	17.1	05°04.1	14.0'	54.3'
10	330°21.8	35.7	215°20.9	17.1'	$05^{\circ}18.1$	14.0'	54.3'
11	345°21.7	36.0	229°56.9	17.1'	05°32.0	13.9'	54.3'
12 13	0°21.6 15°21.5	N22°36.2 36.5	244°33.0 259°09.0	17.0' 17.0'	\$05°46.0 05°59.9	13.9' 13.9'	54.3' 54.2'
14	30°21.4	36.7	273°45.1	17.0'	05° 13.8	13.9'	54.2'
15	45°21.3	• • 37.0	$288^{\circ}21.1$	17.0'	$06^{\circ}27.6$	13.8'	54.2'
16	60°21.1	37.3	302°57.1	17.0'	06°41.5	13.8'	54.2'
17 18	75°21.0 90°20.9	37.5 N22° 37.8	317°33.1 332°09.0	17.0' 16.9'	06°55.3 \$07°09.0	13.8' 13.7'	54.2' 54.2'
19	105°20.8	38.1	346°45.0	16.9'	07°22.8	13.7'	54.2'
20	120°20.7	38.3	1°20.9	16.9'	$07^{\circ}36.5$	13.7'	54.2'
21	135°20.6	• • 38.6	15° 56.8	16.9'	07°50.2	13.7'	54.2'
22 23	150°20.5 165°20.4	38.8 39.1	30°32.7 45°08.5	16.9' 16.8'	08°03.8 08°17.5	13.6' 13.6'	54.2' 54.1'
23	SD = 15.8'	d = 0.3'			D = 14.8'	13.0	J <del>-</del> 1.1
	שט = דף.אַ	$a = 0.3^{\circ}$		51	74.8 = ر		

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

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

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
- Fri	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA
0	254°39.7	226°05.3 N09°10.5	108°07.6 N14°54.1	165°36.9 N23°15.9	253°04.8 S01°38.0	
1	269°42.1	241°05.3 11.3	123°08.7 53.6	180°38.8 15.9	268°07.2 37.9	Alpheratz 357°34.5
2	284°44.6	256°05.4 12.1	138°09.9 53.2	195°40.6 15.9	283°09.5 37.9	Ankaa 353°07.0
3	299°47.0	271°05.5 · · 12.8	153°11.1 · · 52.7	210°42.5 · · 15.9	298°11.8 · · 37.8	Schedar 349°30.9 Diphda 348°47.1
4	$314^{\circ}49.5$	286°05.6 13.6	168°12.2 52.2	225°44.3 15.9	313°14.1 37.8	Achernar 335°20.3
5	329°52.0	301°05.7 14.4	183°13.4 51.7	240°46.2 16.0	328°16.5 37.7	Hamal 327°51.1
6	344°54.4	316°05.7 N09°15.2	198°14.5 N14°51.2	255°48.0 N23°16.0	343°18.8 S01°37.7	Polaris 314°18.1
7 8	359°56.9 14°59.4	331°05.8 15.9 346°05.9 16.7	213°15.7 50.7 228°16.8 50.2	270°49.9 16.0 285°51.7 16.0	358°21.1 37.6 13°23.4 37.6	Acamar 315°11.9
9	30°01.8	1°06.0 · · 17.5	243°18.0 · · 49.8	285°51.7 16.0 300°53.6 · · 16.0	13°23.4 37.6 28°25.8 · · 37.6	Menkar 314°06.1
10	45°04.3	16°06.0 18.3	258°19.1 49.3	315°55.4 16.0	43°28.1 37.5	Mirfak 308°28.3
11	60°06.8	31°06.1 19.0	273°20.3 48.8	330°57.3 16.0	58°30.4 37.5	Aldebaran 290°39.6 Rigel 281°03.9
12	75°09.2	46°06.2 N09°19.8	288°21.5 N14°48.3	345°59.1 N23°16.0	73°32.7 <b>S</b> 01°37.4	Rigel 281°03.9 Capella 280°21.9
13	90°11.7	61°06.3 20.6	303°22.6 47.8	1°01.0 16.0	88°35.1 37.4	Bellatrix 278°22.9
14	105°14.2	76°06.3 21.4	318°23.8 47.3	16°02.8 16.0	103°37.4 37.3	Elnath 278°01.8
15	120°16.6	91°06.4 · · 22.1	333°24.9 · · 46.8	31°04.7 · · 16.0	118°39.7 · · 37.3	Alnilam 275°37.7
16 17	135°19.1 150°21.5	106°06.5 22.9 121°06.5 23.7	348°26.1 46.3 3°27.2 45.9	46°06.5 16.0 61°08.4 16.0	133°42.0 37.2 148°44.4 37.2	Betelgeuse 270°52.1
18	165°24.0	136°06.6 N09°24.5	18°28.4 N14°45.4	76°10.2 N23°16.1	163°46.7 S01°37.1	Canopus 263°52.8
19	180°26.5	151°06.7 25.2	33°29.5 44.9	91°12.1 16.1	178°49.0 37.1	Sirius 258°26.3
20	195°28.9	166°06.7 26.0	48°30.7 44.4	106°13.9 16.1	193°51.3 37.0	Adhara 255°06.0
21	210°31.4	181°06.8 · · 26.8	63°31.8 · · 43.9	121°15.8 · · 16.1	208°53.7 · · 37.0	Procyon 244°50.8 Pollux 243°17.2
22	225°33.9	196°06.9 27.6	78°33.0 43.4	136°17.6 16.1	223°56.0 36.9	Avior 234°15.1
23	240°36.3	211°06.9 28.3	93°34.2 42.9	151°19.5 16.1	238°58.3 36.9	Suhail 222°46.3
Mer.p	ass. 07:00	ν0.1' d0.8' m-4.34	ν1.2' d-0.5' m1.33	$\nu 1.9' \ d0.0' \ \text{m-}1.91$	ν2.3' d-0.0' m1.06	Miaplacidus 221°38.7
						Alphard 217°47.6
Cat	CHA	GHA Dec	CHA Dos	CHA Dos	GHA Dec	Regulus 207°34.2
Sat 0	<b>GHA</b> 255°38.8	<b>GHA Dec</b> 226°07.0 N09°29.1	<b>GHA Dec</b> 108°35.3 N14°42.4	<b>GHA Dec</b> 166°21.3 N23°16.1	<b>GHA Dec</b> 254°00.7 <b>S</b> 01°36.8	Dubhe 193°40.6
1	270°41.3	241°07.1 29.9	123°36.5 41.9	181°23.2 16.1	269°03.0 36.8	Denebola 182°24.6
2	285°43.7	256°07.1 30.7	138°37.6 41.5	196°25.0 16.1	284°05.3 36.7	Gienah 175°43.2
3	300°46.2	271°07.2 · · 31.4	153°38.8 · · 41.0	211°26.9 · · 16.1	299°07.6 · · 36.7	Acrux 172°59.5 Gacrux 171°51.1
4	315°48.6	286°07.3 32.2	168°39.9 40.5	226°28.7 16.1	314°10.0 36.6	Alioth 166°12.4
5	$330^{\circ}51.1$	301°07.3 33.0	183°41.1 40.0	241°30.6 16.1	329°12.3 36.6	Spica 158°21.8
6	345°53.6	316°07.4 N09°33.8	198°42.2 N14°39.5	256°32.4 N23°16.1	344°14.6 <b>S</b> 01°36.5	Alkaid 152°51.4
7	0°56.0	331°07.5 34.6	213°43.4 39.0	271°34.3 16.1	359°16.9 36.5	Hadar 148°35.1
8 9	15°58.5 31°01.0	346°07.5 35.3 1°07.6 · · 36.1	228°44.5 38.5 243°45.7 · · 38.0	286°36.1 16.1 301°38.0 · · 16.2	14°19.3 36.4 29°21.6 · · 36.4	Menkent 147°57.0
10	46°03.4	16°07.6 36.9	258°46.8 37.5	316°39.8 16.2	44°23.9 36.3	Arcturus 145°47.4
11	61°05.9	31°07.7 37.7	273°48.0 37.0	331°41.7 16.2	59°26.3 36.3	Rigil Kent. 139°39.3
12	76°08.4	46°07.7 N09°38.4	288°49.2 N14°36.5	346°43.5 N23°16.2	74°28.6 \$01°36.2	Kochab 137°18.8
13	91°10.8	61°07.8 39.2	303°50.3 36.1	1°45.4 16.2	89°30.9 36.2	Zuben'ubi 136°55.4 Alphecca 126°03.1
14	$106^{\circ}13.3$	76°07.9 40.0	318°51.5 35.6	16°47.2 16.2	104°33.3 36.2	Antares 112° 15.1
15	121°15.8	91°07.9 · · 40.8	333°52.6 · · 35.1	31°49.0 · · 16.2	119°35.6 · · 36.1	Atria 107°08.4
16	136°18.2	106°08.0 41.6	348°53.8 34.6	46°50.9 16.2	134°37.9 36.1	Sabik 102°02.1
17	151°20.7	121°08.0 42.3	3°54.9 34.1	61°52.7 16.2	149°40.2 36.0	Shaula 96°09.5
18 19	166°23.1 181°25.6	136°08.1 N09°43.1 151°08.1 43.9	18°56.1 N14°33.6 33°57.2 33.1	76°54.6 N23°16.2 91°56.4 16.2	164°42.6	Rasalhague 95°57.9
20	196°28.1	166°08.2 44.7	48°58.4 32.6	106°58.3 16.2	194°47.2 35.9	Eltanin 90°41.5
21	211°30.5	181°08.2 · · 45.4	63°59.5 · · 32.1	122°00.1 · · 16.2	209°49.6 · · 35.8	Kaus Aust. 83°31.7
22	226°33.0	196°08.3 46.2	79°00.7 31.6	137°02.0 16.2	224°51.9 35.8	Vega 80°32.6 Nunki 75°47.0
23	241°35.5	211°08.3 47.0	94°01.8 31.1	152°03.8 16.2	239°54.2 35.7	Altair 61°59.4
Mern	ass. 06:56	$\nu$ 0.1' d0.8' m-4.33	$\nu$ 1.2' d-0.5' m1.34	$\nu 1.8' \ d0.0' \ \text{m-}1.91$	ν2.3' d-0.0' m1.06	Peacock 53°04.8
- IVICI.P			ν1.2 d 0.5 m1.5+			Deneb 49°25.3
_						Enif 33°38.4
Sun	<b>GHA</b> 256°37.9	<b>GHA Dec</b> 226°08.4 N09°47.8	<b>GHA Dec</b> 109°03.0 <b>N</b> 14°30.6	<b>GHA Dec</b> 167°05.7 <b>N</b> 23°16.3	<b>GHA Dec</b> 254°56.5 <b>S</b> 01°35.7	Al Na'ir 27°32.4
0 1	250 37.9 271°40.4	241°08.4 48.6	124°04.1 30.1	182°07.5 16.3	269°58.9 35.6	Fomalhaut 15°14.1
2	286°42.9	256°08.5 49.3	139°05.3 29.7	197°09.4 16.3	285°01.2 35.6	Scheat 13°44.9
3	301°45.3	271°08.5 · · 50.1	154°06.4 · · 29.2	212°11.2 · · 16.3	300°03.5 · · 35.5	Markab 13°29.6
4	316°47.8	286°08.6 50.9	169°07.6 28.7	227°13.1 16.3	315°05.9 35.5	Jun 06 Fri SHA
5	$331^{\circ}50.3$	301°08.6 51.7	184°08.7 28.2	242°14.9 16.3	330°08.2 35.5	Venus 331°25.6
6	346°52.7	316°08.7 N09°52.5	199°09.9 N14°27.7	257°16.8 N23°16.3	345°10.5 S01°35.4	Mars 213°27.9
7	1°55.2	331°08.7 53.2	214°11.0 27.2	272°18.6 16.3	0°12.9 35.4	Jupiter 270°57.3
8 9	16°57.6 32°00.1	346°08.8 54.0 1°08.8 •• 54.8	229°12.2 26.7 244°13.3 · · 26.2	287°20.5 16.3 302°22.3 · · 16.3	15°15.2 35.3 30°17.5 · · 35.3	Saturn 358°25.2
10	47°02.6	16°08.8 55.6	259°14.5 25.7	317°24.2 16.3	45°19.9 35.2	Jun 07 Sat SHA
11	62°05.0	31°08.9 56.4	274°15.7 25.2	332°26.0 16.3	60°22.2 35.2	Venus 330°28.2
12	77°07.5	46°08.9 N09°57.1	289°16.8 N14°24.7	347°27.9 N23°16.3	75°24.5 <b>S</b> 01°35.1	Mars 212°56.5
13	92°10.0	61°09.0 57.9	304°18.0 24.2	2°29.7 16.3	90°26.9 35.1	Jupiter 270°42.5 Saturn 358°21.9
14	107°12.4	76°09.0 58.7	319°19.1 23.7	17°31.6 16.3	105°29.2 35.0	
15	122°14.9	91°09.1 09°59.5	334°20.3 · · 23.2	32°33.4 · · 16.3	120°31.5 · · 35.0	Jun 08 Sun SHA
16 17	137°17.4	106°09.1 10°00.3	349°21.4 22.7	47°35.3 16.3	135°33.9 34.9	Venus 329°30.5
17 18	152°19.8 167°22.3	121°09.1 01.0 136°09.2 N10°01.8	4°22.6 22.2 19°23.7 N14°21.7	62°37.1 16.3 77°39.0 N23°16.4	150°36.2 34.9 165°38.5 \$01°34.9	Mars 212°25.1
19	182°24.7	151°09.2 N10 01.8	34°24.9 21.2	92°40.8 16.4	180°40.9 34.8	Jupiter 270°27.8 Saturn 358°18.6
20	197°27.2	166°09.2 03.4	49°26.0 20.7	107°42.7 16.4	195°43.2 34.8	
21	212°29.7	181°09.3 · · 04.2	64°27.2 · · 20.3	122°44.5 · · 16.4	210°45.5 · · 34.7	Horizontal parallax
22	$227^{\circ}32.1$	196°09.3 04.9	79°28.3 19.8	137°46.3 16.4	225°47.9 34.7	Venus:
23	242°34.6	211°09.3 05.7	94°29.5 19.3	152°48.2 16.4	240°50.2 34.6	Mars:
Mer.p	ass. 06:52	ν0.0' d0.8' m-4.32	ν1.2' d-0.5' m1.34	ν1.8' d0.0' m-1.91	ν2.3' d-0.0' m1.06	

Dec 29°13.7

-42°09.9

56°40.3 -17°50.7

 $\text{-}57^{\circ}06.2$ 

23°34.8

 $89^{\circ}22.1$ 

-40°12.0

4°11.3

49°57.0 16°33.6

-8°10.3

 $46^{\circ}01.4$ 

 $6^{\circ}22.4$ 

28°37.7

 $-1^{\circ}11.1$ 

7°24.7

-52°42.6 -16°45.1

-29°00.5

 $5^{\circ}09.6$ 

27°58.0

-59°35.6

-43°32.3

-69°49.5 -8°46.2

11°50.6

 $61^{\circ}37.1$ 

14°25.8

-17°41.1

-63°14.7 -57°15.6

55°49.5

-11°17.7

49°11.3

-60°30.0 -36°29.9

 $19^{\circ}03.0$ 

-60°56.6

74°03.2

-16°08.9

26°37.7

-26°29.4

-69°04.4

-15°45.4 -37°07.3

12°32.4

51°29.0

-34°22.3

38°48.3 -26°15.9

8°56.0

-56°39.0

 $45^{\circ}22.0$ 

 $9^{\circ}59.4$ 

-46°50.0

-29°29.1

28°13.1

15°20.4

Mer.pass

08:56

16:46

12:56

07:07

08:55

16:44

12:53

07:03

08:55 16:43

12:50

06:59

0.2

0.1

Mer.pass

Mer.pass

h	Sun		Moon				
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°20.2	N22°39.4	59°44.4	16.8'	S08°31.1	13.6'	54.1'
1 2	195°20.1 210°20.0	39.6 39.9	74°20.2 88°56.0	16.8' 16.8'	08°44.6 08°58.1	13.5' 13.5'	54.1' 54.1'
3	210 20.0 225°19.9	. 40.1	103°31.7	16.7	00° 50.1	13.4	54.1'
4	240°19.8	40.4	$118^{\circ}07.5$	16.7'	09°25.1	13.4'	54.1'
5	255°19.7	40.6	132°43.1	16.7'	09°38.5	13.4'	54.1'
6 7	270°19.6 285°19.4	N22°40.9 41.1	147°18.8 161°54.5	16.6' 16.6'	\$09°51.8 10°05.2	13.3' 13.3'	54.1' 54.1'
8	300°19.3	41.4	176°30.1	16.6'	10° 18.5	13.3'	54.1'
9	315°19.2	• • 41.6	191°05.6	16.5'	$10^{\circ}31.7$	13.2'	54.1'
10 11	330°19.1 345°19.0	41.9 42.1	205°41.2 220°16.7	16.5' 16.5'	10°45.0 10°58.1	13.2' 13.1'	54.1' 54.1'
12	0°18.9	N22°42.4	234°52.1	16.4	S11°11.3	13.1	54.1'
13	15°18.8	42.6	249°27.5	16.4'	11°24.4	13.1'	54.1'
14	30°18.6	42.9	264°02.9	16.3'	11°37.4	13.0'	54.0'
15 16	45°18.5 60°18.4	· · 43.1 43.4	278°38.3 293°13.6	16.3' 16.3'	11°50.4 12°03.4	13.0' 12.9'	54.0' 54.0'
17	75°18.3	43.6	307°48.8	16.2'	12°16.3	12.9'	54.0'
18	90°18.2	N22°43.9	322°24.1	16.2'	S12°29.2	12.8'	54.0'
19 20	105°18.1 120°17.9	44.1 44.4	336°59.2 351°34.4	16.1' 16.1'	12°42.0 12°54.8	12.8' 12.7'	54.0' 54.0'
21	120 17.9 135°17.8	• • 44.6	6°09.5	16.1	12 54.6 13°07.5	12.7'	54.0'
22	150°17.7	44.8	20°44.5	16.0'	13°20.2	12.6'	54.0'
23	165°17.6	45.1	35°19.5	15.9'	13°32.8	12.6'	54.0'
	SD = 15.8'	d = 0.3'		SE	0 = 14.8'		
Sat	GHA	Dec	GHA	ν	Dec	d	НР
0	180°17.5	N22°45.3	49°54.4	15.9'	S13°45.4	12.5'	54.0'
1	195°17.4	45.6	64°29.3	15.8'	13°58.0	12.5'	54.0'
2	210°17.2 225°17.1	45.8 • • 46.0	79°04.2 93°39.0	15.8' 15.7'	14°10.4 14°22.9	12.4' 12.4'	54.0' 54.0'
4	240°17.0	46.3	93° 39.0 108° 13.7	15.7'	14°22.9	12.4	54.0'
5	255°16.9	46.5	122°48.4	15.6'	$14^{\circ}47.5$	12.3'	54.0'
6	270°16.8	N22°46.8	137°23.1	15.6'	\$14°59.8	12.2'	54.0'
7 8	285°16.7 300°16.5	47.0 47.2	151°57.6 166°32.2	15.5' 15.5'	15°12.0 15°24.2	12.1' 12.1'	54.0' 54.0'
9	315°16.4	• • 47.5	181°06.6	15.4'	15°36.3	12.0'	54.0'
10	330°16.3	47.7	195°41.1	15.4'	15°48.3	12.0'	54.0'
11 12	345°16.2 0°16.1	47.9 N22°48.2	210°15.4 224°49.7	15.3' 15.2'	16°00.3 \$16°12.2	11.9' 11.9'	54.0' 54.0'
13	15°16.0	48.4	239°23.9	15.2'	16°24.0	11.8'	54.0'
14	30°15.8	48.6	253°58.1	15.1'	16°35.8	11.7'	54.0'
15 16	45°15.7 60°15.6	· · 48.9 49.1	268°32.2 283°06.3	15.1' 15.0'	16°47.5 16°59.2	11.7' 11.6'	54.0' 54.0'
17	75°15.5	49.1	203 00.3 297°40.3	14.9'	10 39.2 17°10.8	11.5'	54.0'
18	90°15.4	N22°49.5	312°14.2	14.9'	S17°22.3	11.5'	54.0'
19 20	105°15.2 120°15.1	49.8 50.0	326°48.1 341°21.9	14.8' 14.7'	17°33.8 17°45.2	11.4'	54.0' 54.0'
21	135°15.0	50.2	355°55.6	14.7'	17 45.2 17°56.5	11.3'	54.0'
22	150°14.9	50.4	10°29.3	14.6'	18°07.8	11.2'	54.0'
23	165°14.8	50.7	25°02.9	14.5'	18°19.0	11.1'	54.0'
	SD = 15.8'	d = 0.2'		SE	0 = 14.7'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°14.7	N22°50.9	39°36.4	14.5'	\$18°30.1	11.0'	54.0'
1 2	195°14.5 210°14.4	51.1 51.3	54°09.9 68°43.3	14.4' 14.3'	18°41.1 18°52.1	11.0' 10.9'	54.0' 54.0'
3	225°14.3	51.6	83°16.6	14.3'	19°03.0	10.8'	54.0'
4	240°14.2	51.8	97°49.9	14.2'	19°13.9	10.8'	54.0'
5 6	255°14.1 270°13.9	52.0 N22°52.2	112°23.1 126°56.2	14.1' 14.0'	19°24.6 \$19°35.3	10.7' 10.6'	54.0' 54.0'
7	285°13.8	52.4	141°29.2	14.0'	19°45.9	10.5	54.0'
8	300°13.7	52.7	156°02.2	13.9'	19°56.4	10.4'	54.0'
9 10	315°13.6 330°13.5	· · 52.9 53.1	170°35.1 185°07.9	13.8' 13.8'	20°06.9 20°17.2	10.4' 10.3'	54.1' 54.1'
11	345°13.3	53.1	105 07.9 199°40.7	13.7'	20°17.2 20°27.5	10.3	54.1'
12	0°13.2	N22°53.5	214°13.4	13.6'	S20°37.7	10.1'	54.1'
13	15°13.1	53.7	228°46.0	13.5'	20°47.8	10.0'	54.1'
14 15	30°13.0 45°12.9	54.0 •• 54.2	243°18.5 257°51.0	13.5' 13.4'	20°57.9 21°07.8	9.9' 9.9'	54.1' 54.1'
16	60°12.7	54.4	272°23.3	13.3'	21°17.7	9.8'	54.1'
17	75°12.6	54.6	286°55.6	13.2'	21°27.4	9.7'	54.1'
18 19	90°12.5 105°12.4	N22°54.8 55.0	301°27.9 316°00.0	13.2' 13.1'	\$21°37.1 21°46.7	9.6' 9.5'	54.1' 54.1'
20	105 12.4 120°12.2	55.0	330°32.1	13.1	21°56.2	9.5 9.4'	54.1'
21	135°12.1	• • 55.4	345°04.1	12.9'	22°05.7	9.3'	54.1'
22 23	150°12.0 165°11.9	55.6 55.9	359°36.0 14°07.9	12.8' 12.8'	22°15.0 22°24.2	9.2' 9.1'	54.1' 54.1'
23		$\frac{35.9}{d=0.2'}$			0 = 14.7'	9.1	J4.1
	SD = 15.8'	a = 0.2		SL	ν = 14. <i>Γ</i>		

			2025	June 0	6 to Ju	ın. 08 l	
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil	Jamise	-	Civil	Naut.	
N $72^{\circ}$							
<b>N</b> 70°							
68°							
66°	////	////	00:44	23:19	////	////	
64°	////	////	01:44	22:15	////	////	
62°	////	////	02:17	21:42	////	////	
60°	////	01:09	02:42	21:17	22:51	////	
<b>N</b> 58°	////	01:50	03:01	20:58	22:10	////	
56°	////	02:17	03:17	20:42	21:42	////	
54°	01:03	02:37	03:30	20:28	21:21	22:57	
52°	01:41	02:54	03:42	20:16	21:04	22:19	
50°	02:06	03:09	03:52	20:06	20:50	21:53	
45°	02:48	03:37	04:14	19:44	20:21	21:10	
<b>N</b> 40°	03:18	03:59	04:31	19:27	19:59	20:40	
35°	03:40	04:16	04:46	19:12	19:42	20:18	
30°	03:58	04:31	04:58	19:00	19:27	20:00	
20°	04:26	04:55	05:20	18:38	19:03	19:32	
N $10^{\circ}$	04:48	05:15	05:38	18:20	18:43	19:10	
0°	05:07	05:33	05:55	18:03	18:25	18:51	
<b>S</b> 10°	05:23	05:49	06:12	17:46	18:08	18:35	
20°	05:39	06:06	06:30	17:28	17:52	18:19	
30°	05:55	06:25	06:51	17:07	17:33	18:03	
35°	06:03	06:35	07:03	16:55	17:23	17:55	
40°	06:12	06:46	07:16	16:41	17:12	17:46	
45°	06:22	06:59	07:33	16:25	16:59	17:36	
<b>S</b> 50°	06:33	07:15	07:53	16:05	16:43	17:24	
52°	06:38	07:22	08:02	15:56	16:36	17:19	
54°	06:44	07:30	08:13	15:45	16:28	17:14	
56°	06:50	07:38	08:25	15:33	16:19	17:08	
58°	06:56	07:48	08:39	15:19	16:10	17:02	
<b>S</b> 60°	07:03	07:59	08:55	15:02	15:58	16:54	
	Moonris		e		Moonset		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun	
N 72°	17.00			00:10			
N /2	17:20			23:25			
NI 700	16.57	10.10		00:22	00.56		
<b>N</b> 70°	16:57	19:19		23:50	22:56		
68°	16.20	10.20		00.33	00:10		
Öδ	16:39	18:39		00:33	23:37		
66°	16.24	10.10	20.21	00.41	00.26	00:05	
00	16:24	18:12	20:21	00:41	00:26	23:29	
64°	16:13	17:51	19:41	00:48	00:39	00:27	
62°	16:03	17:35	19:13	00:55	00:50	00:44	

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

		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	76-90%
	06	01:21	01:15	11:59	20:35	08:14	
	07	01:10	01:04	11:59	21:17	08:55	
	80	00:59	00:53	11:59	22:02	09:39	

h	Aries	Venus	Mars	Jupiter	Saturn	Stars
Mon	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	SHA Dec
0	257°37.1	226°09.4 N10°0		167°50.0 N23°16.4	255°52.5 <b>S</b> 01°34.6	
1	272°39.5		7.3 124°31.8 18.3	182°51.9 16.4	270°54.9 34.5	Alpheratz 357°34.5 29°13.7 Ankaa 353°06.9 -42°09.8
2	287°42.0		3.1 139°32.9 17.8	197°53.7 16.4	285°57.2 34.5	Ankaa 353°06.9 -42°09.8 Schedar 349°30.9 56°40.3
3	302°44.5	271°09.5 · · 0		212°55.6 · · 16.4	300°59.5 · · 34.5	Diphda 348°47.1 -17°50.7
4	317°46.9		0.6 169°35.2 16.8	227°57.4 16.4	316°01.9 34.4	Achernar 335°20.3 -57°06.2
5 6	332°49.4 347°51.9	301°09.5 1 316°09.6 N10°1	0.4 184°36.4 16.3 2 199°37.5 N14°15.8	242°59.3 16.4 258°01.1 N23°16.4	331°04.2 34.4 346°06.5 S01°34.3	Hamal 327°51.1 23°34.9
7	2°54.3		2.0 214°38.7 15.3	273°03.0 16.4	1°08.9 34.3	Polaris 314°17.0 89°22.1
8	17°56.8		2.7 229°39.8 14.8	288°04.8 16.4	16°11.2 34.2	Acamar 315°11.9 -40°12.0
9	32°59.2	1°09.7 · · 1		303°06.7 · · 16.4	31°13.5 · · 34.2	Menkar 314°06.1 4°11.3 Mirfak 308°28.2 49°56.9
10	48°01.7		1.3 259°42.1 13.8	318°08.5 16.4	46°15.9 34.1	Aldebaran 290°39.6 16°33.6
11	63°04.2		5.1 274°43.3 13.3	333°10.4 16.4	61°18.2 34.1	Rigel 281°03.9 -8°10.3
12	78°06.6	46°09.7 N10°1		348°12.2 N23°16.4	76°20.5 S01°34.0 91°22.9 34.0	Capella 280°21.9 46°01.4
13 14	93°09.1 108°11.6		5.7 304°45.6 12.3 7.4 319°46.7 11.8	3°14.1 16.4 18°15.9 16.4	91°22.9 34.0 106°25.2 34.0	Bellatrix 278°22.9 6°22.4
15	123°14.0	91°09.8 · · 1		33°17.8 · · 16.5	121°27.5 · · 33.9	Elnath 278°01.8 28°37.7
16	138°16.5		0.0 349°49.0 10.8	48°19.6 16.5	136°29.9 33.9	Alnilam 275°37.7 -1°11.1
17	153°19.0	121°09.9 1	9.8 4°50.2 10.3	63°21.5 16.5	151°32.2 33.8	Betelgeuse 270°52.1 7°24.7 Canopus 263°52.8 -52°42.6
18	168°21.4	136°09.9 N10°2		78°23.3 N23°16.5	166°34.6 <b>S</b> 01°33.8	Sirius 258°26.3 -16°45.1
19	183°23.9		3 34°52.5 09.3	93°25.1 16.5	181°36.9 33.7	Adhara 255°06.0 -29°00.4
20	198°26.4 213°28.8		2.1 49°53.6 08.8	108°27.0 16.5	196°39.2 33.7	Procyon 244°50.8 5°09.6
21 22	213°28.8 228°31.3	181°09.9 · · · 2 196°10.0 2	2.9 64°54.8 · · 08.3 3.7 79°55.9 07.8	123°28.8 · · 16.5 138°30.7 16.5	211°41.6 · · 33.7 226°43.9	Pollux 243°17.2 27°58.0
23	243°33.7		9.5 94°57.1 07.3	153°32.5 16.5	241°46.2 33.6	Avior 234°15.1 -59°35.6
					-	Suhail 222°46.3 -43°32.3
Mer.p	ass. 06:48	$\nu$ 0.0′ d0.8′ m-4.	$\nu 1.2' \ d$ -0.5' m1.35	ν1.8' d0.0' m-1.90	ν2.3' d-0.0' m1.05	Miaplacidus 221°38.8 -69°49.5 Alphard 217°47.6 -8°46.2
						Alphard 217°47.6 -8°46.2 Regulus 207°34.2 11°50.6
Tue	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°40.6 61°37.1
0	258°36.2	226°10.0 N10°2		168°34.4 N23°16.5	256°48.6 <b>S</b> 01°33.5	Denebola 182°24.6 14°25.8
1	273°38.7		5.0 124°59.3 06.3	183°36.2 16.5	271°50.9 33.5	Gienah 175°43.2 -17°41.1
2 3	288°41.1 303°43.6	256°10.0 2 271°10.1 · · · 2	5.8 140°00.5 05.8 7.6 155°01.6 · 05.3	198°38.1 16.5 213°39.9 · · 16.5	286°53.2 33.4 301°55.6 · · 33.4	Acrux 172°59.5 -63°14.7
3 4	318°46.1		3.4 170°02.8 04.8	213 39.9 · · 10.5 228°41.8 16.5	316°57.9 33.3	Gacrux 171°51.1 -57°15.6
5	333°48.5		0.2 185°03.9 04.3	243°43.6 16.5	332°00.3 33.3	Alioth 166°12.4 55°49.5
6	348°51.0	316°10.1 N10°2		258°45.5 N23°16.5	347°02.6 <b>S</b> 01°33.3	Spica 158°21.8 -11°17.7 Alkaid 152°51.4 49°11.3
7	$3^{\circ}53.5$		$0.7$ $215^{\circ}06.2$ $03.3$	273°47.3 16.5	2°04.9 33.2	Hadar 148°35.1 -60°30.0
8	18°55.9		5 230°07.4 02.8	288°49.2 16.5	17°07.3 33.2	Menkent 147°57.0 -36°29.9
9	33°58.4	1°10.1 · · 3		303°51.0 · · 16.5	32°09.6 · · 33.1	Arcturus 145°47.4 19°03.0
10 11	49°00.9 64°03.3		3.1 260°09.7 01.8 3.9 275°10.8 01.3	318°52.9 16.5 333°54.7 16.5	47°12.0 33.1 62°14.3 33.0	Rigil Kent. 139°39.3 -60°56.6
12	79°05.8	46°10.2 N10°3		348°56.5 N23°16.5	77°16.6 <b>S</b> 01°33.0	Kochab 137°18.8 74°03.2
13	94°08.2		5.4 305°13.1 14°00.3	3°58.4 16.5	92°19.0 33.0	Zuben'ubi 136°55.4 -16°08.9 Alphecca 126°03.1 26°37.8
14	$109^{\circ}10.7$		5.2 320°14.3 13°59.8	19°00.2 16.5	107°21.3 32.9	Alphecca 126°03.1 26°37.8 Antares 112°15.1 -26°29.4
15	124°13.2	91°10.2 · · 3		34°02.1 · · 16.5	122°23.6 · · 32.9	Atria 107°08.4 -69°04.4
16	139°15.6		7.8 350°16.6 58.8	49°03.9 16.6	137°26.0 32.8	Sabik 102°02.0 -15°45.4
17	154°18.1		3.5 5°17.7 58.3	64°05.8 16.6	152°28.3 32.8	Shaula 96°09.5 -37°07.3
18 19	169°20.6 184°23.0	136°10.2 N10°3 151°10.2 4	0.3 20°18.9 N13°57.7 0.1 35°20.0 57.2	79°07.6 N23°16.6 94°09.5 16.6	167°30.7 S01°32.7 182°33.0 32.7	Rasalhague 95°57.9 12°32.4
20	199°25.5		0.9 50°21.2 56.7	109°11.3 16.6	197°35.3 32.7	Eltanin 90°41.5 51°29.0
21	214°28.0	181°10.2 · · 4		124°13.2 · · 16.6	212°37.7 · · 32.6	Kaus Aust. 83°31.7 -34°22.3 Vega 80°32.6 38°48.3
22	229°30.4	196°10.2 4	2.5 80°23.5 55.7	139°15.0 16.6	227°40.0 32.6	Vega 80°32.6 38°48.3 Nunki 75°47.0 -26°15.9
23	244°32.9	211°10.2 4	3.2 95°24.6 55.2	154°16.9 16.6	242°42.4 32.5	Altair 61°59.4 8°56.1
Mer.p	ass. 06:44	$\nu$ 0.0' d0.8' m-4.	$\nu 1.1' \ d$ -0.5' m1.36	ν1.8' d0.0' m-1.90	ν2.3' d-0.0' m1.05	Peacock 53°04.8 -56°39.0
						Deneb 49°25.3 45°22.0
Wed	GHA	GHA Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°38.3 9°59.4
vvea 0	259°35.4	<b>GHA Dec</b> 226° 10.2 <b>N</b> 10° 4		169°18.7 N23°16.6	<b>GHA Dec</b> 257°44.7 <b>S</b> 01°32.5	Al Na'ir 27°32.3 -46°50.0
1	274°37.8		4.8 125°26.9 54.2	184°20.5 16.6	272°47.0 32.4	Fomalhaut 15°14.1 -29°29.1 Scheat 13°44.9 28°13.1
2	289°40.3		5.6 140°28.0 53.7	199°22.4 16.6	287°49.4 32.4	Markab 13°29.5 15°20.4
3	304°42.7	271°10.3 · · 4		214°24.2 · · 16.6	302°51.7 · · 32.4	
4	319°45.2		7.2 170°30.3 52.7	229°26.1 16.6	317°54.1 32.3	Jun 09 Mon SHA Mer.pass
5 6	334°47.7 349°50.1	301°10.3 4 316°10.3 N10°4	7.9 185°31.5 52.2 3.7 200°32.6 N13°51.7	244°27.9 16.6 259°29.8 N23°16.6	332°56.4 32.3 347°58.8 \$01°32.2	Venus 328°32.3 08:55 Mars 211°53.5 16:41
7	4°52.6		9.5 215°33.8 51.2	274°31.6 16.6	3°01.1 32.2	Jupiter 270°13.0 12:47
8	4 52.0 19°55.1		0.3 230°34.9 50.7	289°33.5 16.6	18°03.4 32.2	Saturn 358°15.5 06:55
9	34°57.5	1°10.2 · · · 5		304°35.3 · · 16.6	33°05.8 · · 32.1	
10	50°00.0		9 260°37.2 49.7	319°37.2 16.6	48°08.1 32.1	Jun 10 Tue         SHA         Mer.pass           Venus         327°33.8         08:55
11	65°02.5		2.6 275°38.4 49.2	334°39.0 16.6	63°10.5 32.0	Mars 211°22.0 16:39
12	80°04.9	46°10.2 N10°5		349°40.9 N23°16.6	78°12.8 <b>S</b> 01°32.0	Jupiter 269°58.2 12:44
13 14	95°07.4 110°09.8		48.2 305°40.7 48.2 5.0 320°41.8 47.6	4°42.7 16.6 19°44.6 16.6	93°15.1 31.9 108°17.5 31.9	Saturn 358°12.4 06:52
14 15	110 09.8 125°12.3	91°10.2 · · 5		34°46.4 · · 16.6	108 17.5 31.9 123°19.8 · · 31.9	Jun 11 Wed SHA Mer.pass
16	140°14.8		5.5 350°44.1 46.6	49°48.2 16.6	138°22.2 31.8	Venus 326°34.9 08:55
17	155°17.2		7.3 5°45.2 46.1	64°50.1 16.6	153°24.5 31.8	Mars 210°50.4 16:37
18	170°19.7	136°10.2 N10°5		79°51.9 N23°16.6	168°26.9 <b>S</b> 01°31.7	Jupiter 269°43.4 12:41
19	185°22.2		3.9 35°47.5 45.1	94°53.8 16.6	183°29.2 31.7	Saturn 358°09.4 06:48
20	200°24.6	166°10.2 10°5		109°55.6 16.6	198°31.5 31.7	Horizontal parallax
21 22	215°27.1 230°29.6	181°10.2 11°0 196°10.1 0	0.5 65°49.8 · · 44.1 2 80°51.0 43.6	124°57.5 · · 16.6 139°59.3     16.6	213°33.9 · · 31.6 228°36.2 31.6	Venus: 0.2
23	245°32.0		2.0 95°52.1 43.1	155°01.2 16.6	243°38.6 31.5	Mars: 0.1
ivier.p	ass. 06:41	ν0.0′ d0.8′ m-4.	$\nu 1.1' \ d$ -0.5' m1.37	ν1.8′ d0.0′ m-1.90	ν2.3' d-0.0' m1.04	

h	Sur	1		· •	Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°11.8	N22°56.1	28°39.6	12.7'	S22°33.4	9.0'	54.1'
1	195°11.6	56.3	43°11.3	12.6'	$22^{\circ}42.4$	9.0'	54.1'
2	210°11.5	56.5	57°42.9	12.5'	22°51.3	8.9'	54.2'
3	225°11.4	• • 56.7	72°14.4	12.5'	23°00.2	8.8'	54.2'
4	240°11.3 255°11.2	56.9	86°45.9 101°17.3	12.4'	23°09.0 23°17.6	8.7'	54.2'
5 6	255 11.2 270°11.0	57.1 N22°57.3	101 17.3 115°48.6	12.3' 12.2'	523°26.2	8.6' 8.5'	54.2' 54.2'
7	285°10.9	57.5	130°19.8	12.1'	23° 34.6	8.4	54.2'
8	300°10.8	57.7	144°50.9	12.1'	23°43.0	8.3'	54.2'
9	315°10.7	• • 57.9	159°22.0	12.0'	23°51.2	8.1'	54.2'
10	330°10.5	58.1	173°53.0	11.9'	23°59.4	8.0'	54.2'
11	345°10.4	58.3	188°23.9	11.8'	24°07.4	7.9'	54.2'
12	0°10.3	N22°58.5	202°54.7 217°25.4	11.7'	\$24°15.4	7.8'	54.2'
13 14	15°10.2 30°10.0	58.7 58.9	217°25.4 231°56.1	11.7' 11.6'	24°23.2 24°30.9	7.7' 7.6'	54.3' 54.3'
15	45°09.9	59.1	231 30.1 246°26.7	11.5	24°38.5	7.0 7.5'	54.3'
16	60°09.8	59.3	260°57.2	11.4'	24°46.1	7.4	54.3'
17	75°09.7	59.5	275°27.6	11.4'	24°53.4	7.3'	54.3'
18	90°09.6	N22°59.7	289°58.0	11.3'	S25°00.7	7.2'	54.3'
19	105°09.4	22°59.9	304°28.3	11.2'	25°07.9	7.1'	54.3'
20	120°09.3	23°00.1	318°58.5	11.1'	25° 15.0	6.9'	54.3'
21	135°09.2 150°09.1	00.3	333°28.6 347°58.6	11.1'	25°21.9 25°28.7	6.8'	54.3'
22 23	150°09.1 165°08.9	00.4 00.6	347°58.6 2°28.6	11.0' 10.9'	25°28.7 25°35.5	6.7' 6.6'	54.3' 54.4'
23						0.0	54.4
	SD = 15.8'	d = 0.2'		SD	= 14.8'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°08.8	N23°00.8	16°58.5	10.8'	S25°42.0	6.5'	54.4'
1	195°08.7	01.0	31°28.3	10.8'	25°48.5	6.4'	54.4'
2	210°08.6	01.2	45°58.1	10.7'	25°54.9	6.2'	54.4'
3	225°08.4 240°08.3	• • 01.4	60°27.8 74°57.4	10.6'	26°01.1 26°07.2	6.1'	54.4'
4 5	240 08.3 255°08.2	01.6 01.8	74 57.4 89°26.9	10.5' 10.5'	26°13.2	6.0' 5.9'	54.4' 54.4'
6	270°08.1	N23°02.0	103°56.4	10.4	526°19.1	5.7'	54.4
7	285°07.9	02.1	118°25.8	10.3'	26°24.8	5.6'	54.4'
8	300°07.8	02.3	132°55.1	10.3'	26°30.5	5.5'	54.5'
9	315°07.7	•• 02.5	147°24.3	10.2'	26°36.0	5.4'	54.5'
10	330°07.6	02.7	161°53.5	10.1'	26°41.3	5.2'	54.5'
11	345°07.4	02.9	176°22.6	10.0'	26°46.6	5.1'	54.5'
12 13	0°07.3 15°07.2	N23°03.1 03.2	190°51.7 205°20.7	10.0' 9.9'	\$26°51.7 26°56.7	5.0' 4.9'	54.5' 54.5'
14	30°07.1	03.4	205 20.7 219°49.6	9.9 9.9'	20° 50.7 27° 01.5	4.9 4.7'	54.5'
15	45°06.9	03.6	234°18.4	9.8'	27°06.3	4.6'	54.5'
16	60°06.8	03.8	248°47.2	9.7'	27° 10.9	4.5'	54.6'
17	75°06.7	04.0	263°15.9	9.7'	$27^{\circ}15.3$	4.3'	54.6'
18	90°06.6	N23°04.1	277°44.6	9.6'	<b>S</b> 27°19.6	4.2'	54.6'
19	105°06.4	04.3	292°13.2	9.5'	27°23.8	4.1'	54.6'
20 21	120°06.3 135°06.2	04.5 •• 04.7	306°41.7 321°10.2	9.5' 9.4'	27°27.9 27°31.8	3.9' 3.8'	54.6' 54.6'
22	150°06.1	04.7	321 10.2 335°38.6	9.4 9.4'	27°35.6	3.6'	54.6'
23	165°05.9	05.0	350°07.0	9.3'	27°39.3	3.5'	54.7'
	SD = 15.7'	d = 0.2'	-	SD	= 14.8'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°05.8 195°05.7	N23°05.2 05.4	4°35.3 19°03.6	9.3' 9.2'	\$27°42.8 27°46.1	3.4' 3.2'	54.7'
1 2	195°05.7 210°05.6	05.4 05.5	33°31.8	9.2' 9.2'	27°46.1 27°49.4	3.1'	54.7' 54.7'
3	225°05.4	05.7	48°00.0	9.2	27°52.5	3.0'	54.7'
4	240°05.3	05.9	62°28.1	9.1'	27°55.4	2.8'	54.7'
5	255°05.2	06.0	$76^{\circ}56.1$	9.0'	27°58.2	2.7'	54.7'
6	270°05.0	N23°06.2	91°24.1	9.0'	S28°00.9	2.5'	54.8'
7	285°04.9	06.4	105°52.1	8.9'	28°03.4	2.4'	54.8'
8	300°04.8 315°04.7	06.6	120°20.0	8.9'	28°05.8 28°08.1	2.2'	54.8' 54.8'
9 10	315°04.7 330°04.5	· · 06.7 06.9	134°47.9 149°15.7	8.8' 8.8'	28° 08.1 28° 10.2	2.1' 2.0'	54.8'
11	345°04.4	00.9	149 15.7 163°43.5	o.o 8.7'	28° 10.2	2.0 1.8'	54.8'
12	0°04.3	N23°07.2	178°11.2	8.7'	S28° 13.9	1.7'	54.9'
13	15°04.2	07.4	192°38.9	8.7'	$28^{\circ}15.6$	1.5'	54.9'
14	30°04.0	07.5	207°06.6	8.6'	28° 17.1	1.4'	54.9'
15	45°03.9	• • 07.7	221°34.3	8.6'	28° 18.5	1.2'	54.9'
16	60°03.8	07.9	236°01.9	8.6'	28° 19.7	1.1'	54.9'
17 18	75°03.6 90°03.5	08.0 N23°08.2	250°29.4 264°57.0	8.5' 8.5'	28°20.8 <b>S</b> 28°21.7	0.9'	54.9' 54.9'
18	90 03.5 105°03.4	N23 08.2 08.4	204 57.0 279°24.5	8.5'	28° 22.5	0.6	54.9 55.0'
20	120°03.3	08.5	293°52.0	8.5'	28°23.1	0.5	55.0'
21	135°03.1	• • 08.7	308°19.4	8.4'	28°23.6	0.3'	55.0'
22	150°03.0	8.80	322°46.9	8.4'	28°23.9	0.2'	55.0'
23	165°02.9	09.0	337°14.3	8.4'	28°24.1	0.0'	55.0'
	SD = 15.7'	d = 0.2'		SD	$=14.9^{\prime}$		

			2025	June 0	9 to Ji	un. 11
Lat.	Twilight Naut. Civil		Sunrise	Sunset	<b>Tw</b> Civil	ilight Naut.
N 72°						
N 70°						
68°						
66°	////	7///	00:27	23:39	////	////
64°	////	////	01:39	23:39	////	////
62°	/////	////	02:14	21:46	////	////
60°	1111	01:02	02:39	21:21	22:59	7777
N 58°	////	01:46	02:59	21:01	22:14	////
56°	11111	02:14	03:15	20:45	21:46	////
54°	00:57	02:35	03:29	20:31	21:25	23:04
52°	01:37	02:52	03:41	20:19	21:07	22:23
50°	02:03	03:07	03:51	20:08	20:52	21:57
45°	02:47	03:36	04:13	19:46	20:23	21:12
N 40°	03:17	03:58	04:31	19:28	20:01	20:42
35°	03:40	04:16	04:46	19:14	19:43	20:20
30°	03:58	04:31	04:58	19:01	19:28	20:01
20°	04:26	04:55	05:20	18:39	19:04	19:33
N 10°	04:49	05:16	05:39	18:20	18:43	19:10
0°	05:07	05:33	05:56	18:03	18:26	18:52
<b>S</b> $10^{\circ}$	05:24	05:50	06:13	17:46	18:09	18:35
$20^{\circ}$	05:40	06:07	06:31	17:28	17:52	18:19
30°	05:56	06:26	06:52	17:07	17:33	18:03
35°	06:04	06:36	07:04	16:55	17:23	17:54
40°	06:14	06:48	07:18	16:41	17:11	17:45
45°	06:24	07:01	07:35	16:24	16:58	17:35
<b>S</b> 50°	06:35	07:17	07:55	16:04	16:42	17:24
52°	06:40	07:24	08:04	15:54	16:35	17:19
54°	06:46	07:32	08:15	15:44	16:27	17:13
56° 58°	06:52 06:58	07:41 07:51	08:28 08:42	15:31 15:17	16:18 16:08	17:07 17:00
<b>S</b> 60°	07:06	08:02	08:59	15:17	15:57	16:53
		Moonris			Moonse	
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
N 72°						
N 70°						
68°						
66°						
64°	22:04			00:10 23:26		
62°	21:00	23:07		00:38	00:30	00:10
60°	20:26	21:59	23:12	01:00	01:05	01:19
<b>N</b> 58°	20:01	21:24	22:31	01:18	01:30	01:54
56°	19:42	20:59	22:03	01:33	01:51	02:19
54°	19:25	20:39	21:42	01:46	02:07	02:40
52°	19:11	20:22	21:24	01:58	02:22	02:57
50°	18:59	20:08	21:08	02:08	02:35	03:11
45°	18:34	19:38	20:38	02:29	03:01	03:41
<b>N</b> 40°	18:13	19:15	20:14	02:47	03:21	04:04
35°	17:57	18:57	19:54	03:01	03:39	04:23
30°	17:42	18:41	19:37	03:14	03:54	04:40
20°	17:18	18:13	19:09	03:36	04:19	05:07
N 10°	16:57	17:50	18:44	03:55	04:41	05:31
0°	16:38	17:28	18:21	04:13	05:02	05:54
<b>S</b> 10°	16:19	17:07	17:59	04:31	05:23	06:16
20°	15:58	16:44	17:34	04:50	05:45	06:40
30°	15:34	16:17	17:06	05:12	06:11	07:08
35° 40°	15:20	16:01	16:49	05:26	06:26	07:25
40° 45°	15:04 14:45	15:43 15:21	16:30 16:06	05:41 05:59	06:44 07:05	07:44 08:07
45 C EO°	14:45	14.52	10:00	05:59	07:05	00:07

	Sun			Moon			
Day	Eqn.o	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%	
09	00:47	00:41	11:59	22:50	10:25		
10	00:35	00:29	12:00	23:41	11:15		
11	00:23	00:17	12:00	-:-	12:08		

15:36

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15:04

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08:01

08:19

08:41

09:10

08:37

08:52

09:10

09:31

09:57

10:35

14:22

14:10

13:58

13:43

13:26

13:05

**S**  $50^{\circ}$ 

52°

54° 56° 58°

14:53

14:39

14:24

14:05

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

h	Aries	Vei	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Thu -	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	260°34.5	226°10.1	N11°02.8	110°53.3	N13°42.6	170°03.0	N23°16.6	258°40.9	S01°31.5			
1	275°37.0	241°10.1	03.6	125°54.4	42.1	185°04.9	16.6	273°43.3	31.5	Alpheratz	357°34.5	29°13.7
2	290°39.4	256° 10.1	04.4	140°55.5	41.6	200°06.7	16.6	288°45.6	31.4	Ankaa	353°06.9	-42°09.8
3	305°41.9	271°10.1	05.2	155°56.7	• • 41.0	215°08.5	16.6	303°47.9	31.4	Schedar	349°30.8	56°40.3
4	320°44.3	286° 10.1	05.9	170°57.8	40.5	230° 10.4	16.6	318°50.3	31.3	Diphda	348°47.1	-17°50.7
5	335°46.8	301°10.0	06.7	185°59.0	40.0	245° 12.2	16.6	333°52.6	31.3	Achernar	335°20.2	-57°06.2
6	350°49.3	316° 10.0	N11°07.5	201°00.1	N13°39.5	260° 14.1	N23° 16.7	348°55.0	S01°31.3	Hamal	327°51.0	23°34.9
7	5°51.7	331°10.0	08.3	216°01.3	39.0	275° 15.9	16.7	3°57.3	31.2	Polaris	314°15.8	89°22.1
8	20°54.2	346°10.0	09.1	231°02.4	38.5	290°17.8	16.7	18°59.7	31.2	Acamar	315°11.9	-40°12.0
9	35°56.7	1°10.0	• • 09.8	246°03.6	• • 38.0	305°19.6	• • 16.7	34°02.0	• • 31.1	Menkar	314°06.1	4°11.4
10	50°59.1	$16^{\circ}10.0$	10.6	261°04.7	37.5	320°21.5	16.7	49°04.4	31.1	Mirfak	308°28.2	49°56.9 16°33.6
11	66°01.6	31°09.9	11.4	276°05.8	37.0	335°23.3	16.7	64°06.7	31.1	Aldebaran Rigel	290°39.6 281°03.9	-8°10.3
12	81°04.1	46°09.9	N11°12.2	291°07.0	N13°36.5	350°25.2	N23° 16.7	79°09.1	S01°31.0	Capella	280°21.9	-6 10.3 46°01.4
13	96°06.5	$61^{\circ}09.9$	13.0	$306^{\circ}08.1$	36.0	5°27.0	16.7	94°11.4	31.0	Bellatrix	278°22.8	6°22.4
14	111°09.0	$76^{\circ}09.9$	13.8	321°09.3	35.4	20°28.8	16.7	109°13.7	30.9	Elnath	278°01.8	28°37.7
15	126°11.5	91°09.9	• • 14.5	336° 10.4	• • 34.9	35°30.7	• • 16.7	124°16.1	• • 30.9	Alnilam	275°37.7	-1°11.1
16	141°13.9	106°09.8	15.3	351°11.6	34.4	50°32.5	16.7	139°18.4	30.9	Betelgeuse	270°52.1	7°24.7
17	156°16.4	121°09.8	16.1	6°12.7	33.9	65°34.4	16.7	154°20.8	30.8	Canopus	263°52.8	-52°42.6
18	171°18.8	136°09.8	N11°16.9	21°13.9	N13°33.4	80°36.2	N23° 16.7	169°23.1	S01°30.8	Sirius	258°26.3	-16°45.1
19	186°21.3	151°09.8	17.7	36°15.0	32.9	95°38.1	16.7	184°25.5	30.7	Adhara	255°06.0	-29°00.4
20	201°23.8	166°09.7	18.5	51°16.1	32.4	110°39.9	16.7	199°27.8	30.7	Procyon	244°50.8	5°09.6
21	216°26.2	181°09.7	•• 19.2	66°17.3	• • 31.9	125°41.8 140°43.6	· · 16.7	214°30.2	• • 30.7	Pollux	243°17.2	27°57.9
22	231°28.7	196°09.7	20.0	81°18.4	31.4		16.7 16.7	229°32.5	30.6	Avior	234°15.1	-59°35.6
23	246°31.2	211°09.7	20.8	96°19.6	30.8	155° 45.5		244°34.9	30.6	Suhail	$222^{\circ}46.3$	-43°32.3
Mer.p	ass. 06:37	$\nu$ -0.0' d0.	.8′ m-4.29	$ u$ 1.1 $^{\prime}$ d-0	0.5'  m 1.37	$\nu$ 1.8′ d0.	.0′ m-1.90	$\nu$ 2.3′ d-0	.0′ m1.04	Miaplacidus	$221^{\circ}38.8$	-69°49.5
										Alphard	217°47.6	-8°46.2
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.2	11°50.6
0	261°33.6	226°09.6	N11°21.6	111°20.7	N13°30.3	170° 47.3	N23° 16.7	259°37.2	S01°30.5	Dubhe	193°40.7	61°37.1
1	201 33.0 276°36.1	241°09.6	22.4	111 20.7 126°21.9	29.8	170 47.3 185°49.1	16.7	274°39.6	30.5	Denebola	182°24.6	14°25.8
2	291°38.6	256° 09.6	23.1	141°23.0	29.3	200°51.0	16.7	289°41.9	30.5	Gienah	175°43.2	-17°41.1
3	306°41.0	271°09.5	23.9	156°24.1	. 28.8	215°52.8	16.7	304°44.3	30.4	Acrux	172°59.6	-63°14.7
4	321°43.5	286° 09.5	24.7	171°25.3	28.3	230° 54.7	16.7	319°46.6	30.4	1	171°51.1	-57°15.6
5	336°46.0	301°09.5	25.5	186°26.4	27.8	245°56.5	16.7	334°48.9	30.3	Alioth	166°12.4	55°49.5
6	351°48.4	316°09.4	N11°26.3	201°27.6	N13°27.3	260°58.4	N23°16.7	349°51.3	S01°30.3	Spica	158°21.8	-11°17.7
7	6°50.9	331°09.4	27.1	216°28.7	26.7	276°00.2	16.7	4°53.6	30.3	Alkaid	152°51.4 148°35.1	49°11.3 -60°30.0
8	21°53.3	346°09.4	27.8	231°29.9	26.2	291°02.1	16.7	19°56.0	30.2	Hadar Menkent	146 35.1 147°57.0	-36°29.9
9	36°55.8	1°09.3	• • 28.6	246°31.0	• • 25.7	306°03.9	• • 16.7	34°58.3	• • 30.2	Arcturus	147 57.0 145°47.4	19°03.0
10	51°58.3	$16^{\circ}09.3$	29.4	261°32.2	25.2	321°05.8	16.7	50°00.7	30.2	Rigil Kent.	139°39.3	-60°56.6
11	67°00.7	31°09.3	30.2	276°33.3	24.7	336°07.6	16.7	65°03.0	30.1	Kochab	137°18.8	74°03.2
12	82°03.2	46°09.2	N11°31.0	291°34.4	N13°24.2	351°09.4	N23° 16.7	80°05.4	S01°30.1	Zuben'ubi	136°55.4	-16°08.9
13	97°05.7	61°09.2	31.7	306°35.6	23.7	6°11.3	16.7	95°07.7	30.0	Alphecca	126°03.1	26°37.8
14	112°08.1	76°09.2	32.5	321°36.7	23.2	21° 13.1	16.7	110°10.1	30.0	Antares	112°15.0	-26°29.4
15	127°10.6	91°09.1	• • 33.3	336° 37.9	• • 22.6	36° 15.0	• • 16.7	125°12.4	• • 30.0	Atria	107°08.4	-69°04.4
16	142°13.1	106°09.1	34.1	351°39.0	22.1	51°16.8	16.7	140°14.8	29.9	Sabik	102°02.0	-15°45.4
17	157°15.5	121°09.0	34.9	6°40.1	21.6	66° 18.7	16.7	155°17.1	29.9	Shaula	96°09.5	-37°07.3
18	172°18.0	136°09.0	N11°35.7	21°41.3	N13°21.1	81°20.5	N23° 16.7	170°19.5	S01°29.9	Rasalhague	95°57.9	12°32.4
19	187°20.5	151°09.0	36.4	36°42.4	20.6	96°22.4	16.7	185°21.8	29.8	Eltanin	90°41.5	51°29.0
20 21	202°22.9 217°25.4	166°08.9 181°08.9	37.2 · · 38.0	51°43.6 66°44.7	20.1 · · 19.6	111°24.2 126°26.0	16.7 •• 16.7	200°24.2 215°26.5	29.8 •• 29.7	Kaus Aust.	83°31.7	-34°22.3
22	217 25.4 232°27.8	196°08.8	38.8	81°45.9	19.0	120 20.0 141°27.9	16.7	215 20.5 230°28.9	29.7	Vega	80°32.6	38°48.3
23	247°30.3	211°08.8	39.6	96°47.0	18.5	156° 29.7	16.7	245°31.2	29.7	Nunki	75°47.0	-26°15.9
										Altair	61°59.3	8°56.1
Mer.p	bass. 06:33	$\nu$ -0.0′ d0.	.8′ m-4.28	$\nu 1.1' \ d$ -0	1.5'  m 1.38	$\nu 1.8' d0$	.0′ m-1.90	$\nu 2.3' \ d-0$	.0′ m1.04	Peacock	53°04.7	-56°39.0
										Deneb	49°25.3	45°22.0
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif Al Na'ir	33°38.3 27°32.3	9°59.4 -46°50.0
0	262°32.8	226°08.8	N11°40.3	111°48.1		171°31.6	N23° 16.7	260°33.6	501°29.6	Fomalhaut	27 32.3 15°14.1	-46 50.0 -29°29.1
1	277°35.2	241°08.7	41.1	$126^{\circ}49.3$	17.5	$186^{\circ}33.4$	16.7	275°35.9	29.6	Scheat	13°44.8	28°13.1
2	292°37.7	256°08.7	41.9	$141^{\circ}50.4$	17.0	$201^{\circ}35.3$	16.7	290°38.3	29.6	Markab	13°29.5	15°20.4
3	307°40.2	271°08.6	• • 42.7	156°51.6	•• 16.5	216°37.1	•• 16.7	305°40.6	• • 29.5			
4	322°42.6	286°08.6	43.5	171°52.7	15.9	231°39.0	16.7	320°43.0	29.5	Jun 12 Thu	SHA	Mer.pass
5	337°45.1	301°08.5	44.2	186°53.9	15.4	246°40.8	16.7	335°45.3	29.4	Venus		08:55
6	352°47.6	316°08.5	N11°45.0	201°55.0	N13°14.9	261°42.7	N23° 16.7	350°47.7	S01°29.4	Mars		16:35
7	7°50.0	331°08.4	45.8	216°56.1	14.4	276° 44.5	16.7	5°50.0	29.4	Jupiter		12:38
8	22°52.5	346°08.4	46.6	231°57.3	13.9	291°46.3	16.7	20°52.4	29.3	Saturn	358°06.4	06:44
9	37°55.0	1°08.3	. 47.4	246°58.4	13.4	306°48.2	· · 16.7	35°54.7	• • 29.3	Jun 13 Fri	SHA	Mer.pass
10 11	52°57.4 67°59.9	16°08.3 31°08.2	48.1 48.9	261°59.6 277°00.7	12.8 12.3	321°50.0 336°51.9	16.7 16.7	50°57.1 65°59.5	29.3 29.2	Venus	324°36.0	08:55
11 12	83°02.3	46°08.2	48.9 N11°49.7	277 00.7 292°01.8	N13°11.8	351°53.7	N23° 16.7	81°01.8	501°29.2	Mars	209°47.1	16:33
13	98°04.8	61°08.1	50.5	307°03.0	11.3	6°55.6	16.7	96°04.2	29.1	Jupiter		12:35
14	113°07.3	76°08.1	51.3	322°04.1	10.8	21°57.4	16.7	111°06.5	29.1	Saturn	358°03.6	06:40
15	128°09.7	91°08.0	• • 52.0	337°05.3	10.3	36°59.3	. 16.7	126°08.9	29.1	Jun 14 Sat	SHA	Mer.pass
16	143°12.2	106° 08.0	52.8	352°06.4	09.7	52°01.1	16.7	141°11.2	29.0		323°36.0	08:55
17	158°14.7	121°07.9	53.6	7°07.5	09.2	67°02.9	16.7	156°13.6	29.0		209°15.4	16:32
18	173°17.1	136°07.9	N11°54.4	22°08.7	N13°08.7	82°04.8	N23° 16.7	171°15.9	S01°29.0	Jupiter		12:32
19	188°19.6	151°07.8	55.2	37°09.8	08.2	97°06.6	16.7	186°18.3	28.9	Saturn		06:37
20	203°22.1	$166^{\circ}07.8$	55.9	52°11.0	07.7	$112^{\circ}08.5$	16.7	201°20.6	28.9			
21	218°24.5	181°07.7	• • 56.7	67°12.1	•• 07.1	127° 10.3	• • 16.7	216°23.0	• • 28.9	Horizont	al parallax	
22	233°27.0	196° 07.6	57.5	82°13.3	06.6	142° 12.2	16.7	231°25.3	28.8		Venus:	0.2
23	248°29.4	211°07.6	58.3	97°14.4	06.1	157° 14.0	16.7	246°27.7	28.8		Mars:	0.1
Mer.n	pass. 06:29	$\nu$ -0.0' d0	.8′ m-4.27	$\nu 1.1' d-0$	0.5′ m1.39	$\nu 1.8' d0$	.0′ m-1.90	$\nu^{2.4'} d^{-0}$	.0′ m1.03			

h	Sur	า	Moon				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°02.7	N23°09.1	351°41.7	8.4'	S28°24.1	-0.1'	55.0'
1	195°02.6	09.3	6°09.0	8.4'	28°24.0	-0.3'	55.1'
2	210°02.5	09.5	20°36.4	8.3'	28°23.7	-0.4	55.1'
3	225°02.4 240°02.2	• • 09.6	35°03.7	8.3'	28°23.3	-0.6'	55.1' 55.1'
4 5	240 02.2 255°02.1	09.8 09.9	49°31.0 63°58.4	8.3' 8.3'	28° 22.7 28° 22.0	-0.7' -0.9'	55.1'
6	270°02.0	N23°10.1	78°25.6	8.3'	S28°21.1	-1.0'	55.1'
7	285°01.8	10.2	92°52.9	8.3'	28°20.1	-1.2'	55.2'
8	300°01.7	10.4	107°20.2	8.3'	28° 18.9	-1.3'	55.2'
9	315°01.6	• • 10.5	121°47.5	8.3'	28° 17.6	-1.5'	55.2'
10	330°01.5	10.7	136°14.7	8.3'	28° 16.1	-1.6'	55.2'
11	345°01.3	10.8	150°42.0	8.3'	28°14.5	-1.8'	55.2'
12 13	0°01.2 15°01.1	N23°11.0 11.1	165°09.2 179°36.5	8.3' 8.3'	\$28° 12.7 28° 10.8	-1.9' -2.1'	55.3' 55.3'
14	30°00.9	11.1	179 30.5 194°03.8	6.3 8.3'	28°08.7	-2.1 -2.2'	55.3'
15	45°00.8	. 11.4	208°31.0	8.3	28° 06.7	-2.2 -2.4'	55.3'
16	60°00.7	11.6	222°58.3	8.3'	28°04.1	-2.5	55.3'
17	75°00.6	11.7	237°25.5	8.3'	28°01.5	-2.7'	55.3'
18	90°00.4	N23°11.8	251°52.8	8.3'	S27°58.8	-2.8'	55.4'
19	105°00.3	12.0	266°20.1	8.3'	27°56.0	-3.0'	55.4'
20	120°00.2	12.1	280°47.4	8.3'	27°53.0	-3.1'	55.4'
21 22	135°00.0 149°59.9	· · 12.3 12.4	295°14.7 309°42.0	8.3' 8.3'	27° 49.8 27° 46.6	-3.3' -3.4'	55.4' 55.4'
22	149°59.9 164°59.8	12.4 12.6	309°42.0 324°09.3	8.3'	27°46.6 27°43.1	-3.4° -3.6'	55.4° 55.5'
23			J24 U9.3			-5.0	55.5
	SD = 15.7'	d = 0.2'		SI	D = 15.0'		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	179°59.6 194°59.5	N23°12.7	338°36.7 353°04.1	8.4'	\$27°39.5 27°35.8	-3.7'	55.5'
1 2	194°59.5 209°59.4	12.8 13.0	353°04.1 7°31.4	8.4' 8.4'	27°35.8 27°31.9	-3.9' -4.0'	55.5' 55.5'
3	209 59.4 224°59.3	13.1	21°58.8	8.4'	27° 27.8	-4.0 -4.2'	55.5'
4	239°59.1	13.2	36°26.3	8.4	27°23.6	-4.3'	55.5'
5	254°59.0	13.4	50°53.7	8.5'	27° 19.3	-4.5'	55.6'
6	269°58.9	N23°13.5	65°21.2	8.5'	S27°14.8	-4.6'	55.6'
7	284°58.7	13.7	79°48.7	8.5'	$27^{\circ}10.1$	-4.8'	55.6'
8	299°58.6	13.8	94°16.2	8.6'	27°05.3	-4.9'	55.6'
9	314°58.5	• • 13.9	108°43.8	8.6'	27°00.4	-5.1'	55.6'
10 11	329°58.3 344°58.2	14.1 14.2	123°11.4 137°39.0	8.6' 8.6'	26°55.3 26°50.1	-5.2' -5.4'	55.7' 55.7'
12	359°58.1	N23°14.3	152°06.6	8.7'	S26°44.7	-5.5'	55.7'
13	14°57.9	14.4	166°34.3	8.7'	26° 39.2	-5.7'	55.7'
14	29°57.8	14.6	181°02.0	8.8'	26°33.5	-5.8'	55.7'
15	44°57.7	• • 14.7	195°29.8	8.8'	$26^{\circ}27.7$	-6.0'	55.8'
16	59°57.6	14.8	209°57.6	8.8'	26°21.7	-6.1'	55.8'
17	74°57.4	15.0 N23°15.1	224°25.4	8.9'	26°15.6	-6.2'	55.8'
18 19	89°57.3 104°57.2	N23°15.1 15.2	238°53.3 253°21.2	8.9' 8.9'	\$26°09.4 26°03.0	-6.4' -6.5'	55.8' 55.8'
20	104 57.2 119°57.0	15.2	267°49.1	9.0'	25°56.5	-0.5 -6.7'	55.9'
21	134°56.9	• • 15.5	282°17.1	9.0'	25°49.8	-6.8'	55.9'
22	149°56.8	15.6	296°45.1	9.1'	25°43.0	-6.9'	55.9'
23	164°56.6	15.7	$311^{\circ}13.2$	9.1'	$25^{\circ}36.1$	-7.1'	55.9'
	SD = 15.7'	d = 0.1'		SI	D = 15.1'		
C-4	GHA	D	CUA		D	.,	
Sat 0	<b>GHA</b> 179°56.5	<b>Dec</b> N23°15.8	<b>GHA</b> 325°41.3	u 9.2'	<b>Dec</b> \$25° 29.0	d -7.2'	<b>HP</b> 55.9'
1	194°56.4	16.0	340°09.5	9.2	25°21.8	-7.4'	56.0'
2	209°56.2	16.1	354°37.7	9.3'	25°14.4	-7.5'	56.0'
3	224°56.1	• • 16.2	9°05.9	9.3'	25°06.9	-7.6'	56.0'
4	239°56.0	16.3	23°34.3	9.4'	24°59.3	-7.8'	56.0'
5	254°55.8	16.4	38°02.6	9.4'	24°51.5	-7.9'	56.0'
6	269°55.7 284°55.6	N23°16.6 16.7	52°31.0 66°59.5	9.5' 9.5'	\$24°43.6 24°35.6	-8.0' -8.2'	56.1'
7 8	284°55.6 299°55.4	16.7 16.8	66°59.5 81°28.0	9.5'	24°35.6 24°27.4	-8.2° -8.3'	56.1' 56.1'
9	314°55.3	. 16.9	95°56.5	9.6'	24° 19.1	-6.5 -8.4'	56.1
10	329°55.2	17.0	110°25.1	9.7'	24°10.7	-8.6'	56.1
11	344°55.1	17.1	124°53.8	9.7'	24°02.1	-8.7'	56.2'
12	359°54.9	N23°17.3	139°22.5	9.8'	S23°53.4	-8.8'	56.2'
13	14°54.8	17.4	153°51.3	9.8'	23°44.6	-9.0'	56.2'
14	29°54.7	17.5	168°20.1	9.9'	23°35.6	-9.1'	56.2'
15 16	44°54.5 59°54.4	· · 17.6 17.7	182°49.0 197°17.9	9.9' 10.0'	23°26.6 23°17.3	-9.2' -9.3'	56.3' 56.3'
16 17	59°54.4 74°54.3	17.7 17.8	197°17.9 211°46.9	10.0'	23°17.3 23°08.0	-9.3° -9.5'	56.3'
18	89°54.1	N23°17.9	211 40.9 226°15.9	10.0	\$22°58.6	-9.6'	56.3
19	104°54.0	18.0	240°45.0	10.1	22°49.0	-9.7'	56.3'
20	119°53.9	18.1	$255^{\circ}14.1$	10.2'	22°39.3	-9.8'	56.4'
21	134°53.7	• • 18.2	269°43.3	10.3	22°29.5	-9.9'	56.4
22	149°53.6	18.4	284°12.6	10.3'	22°19.5	-10.1'	56.4'
23	164°53.5	18.5	298°41.9	10.4'	22°09.5	-10.2'	56.4'
	SD = 15.7'	d = 0.1'		SI	D = 15.3'		

Lat.	<b>Twi</b> Naut.	<b>light</b> Civil	Sunrise	Sunset	<b>Twi</b> Civil	light Naut
N 72°						
<b>N</b> 70°						
68°						
66°						
64°	////	////	01:35	22:26	////	////
62°	////	////	02:11	21:50	////	////
60°	////	00:56	02:37	21:24	23:06	////
N 58°	////	01:43	02:57	21:04	22:18	////
56°	////	02:12	03:14	20:47	21:49	////
54° 52°	00:51 01:34	02:34 02:51	03:28 03:40	20:33 20:21	21:27 21:09	23:11 22:27
50°	02:01	03:06	03:50	20:21	20:54	21:59
45°	02:46	03:35	04:13	19:48	20:25	21:14
N 40°	03:16	03:58	04:31	19:30	20:03	20:44
35°	03:39	04:16	04:45	19:15	19:45	20:21
30°	03:58	04:31	04:58	19:02	19:29	20:03
20°	04:27	04:56	05:20	18:40	19:05	19:34
N 10°	04:49	05:16	05:39	18:21	18:44	19:11
0°	05:08	05:34	05:56	18:04	18:26	18:52
S 10°	05:25 05:41	05:51	06:14	17:46	18:09	18:36
20° 30°	05:41	06:08 06:27	06:32 06:53	17:28 17:07	17:52 17:33	18:20 18:03
35°	06:06	06:27	00:55	16:55	17:33	17:55
40°	06:15	06:49	07:19	16:41	17:11	17:45
45°	06:25	07:02	07:36	16:24	16:58	17:35
<b>S</b> 50°	06:37	07:18	07:57	16:03	16:42	17:23
52°	06:42	07:26	08:06	15:54	16:35	17:18
54°	06:48	07:34	08:17	15:43	16:26	17:13
56°	06:54	07:43	08:30	15:30	16:17	17:06
58° <b>S</b> 60°	07:00 07:08	07:53 08:04	08:44 09:02	15:16	16:07	17:00 16:52
3 00	I	Moonris		14:58	15:56 Moonset	
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
<b>N</b> 72°	l					
						_
<b>N</b> 70°						
68°						
68° 66°						
68° 66° 64°		00:52	01:28		02:11	03:27
68° 66° 64° 62°		00:52	01:28 00:34	01:57	02:11	03:27 04:20
68° 66° 64° 62° 60°	23:48		01:28 00:34 00:02	01:57	03:14	03:27 04:20 04:52
68° 66° 64° 62°			01:28 00:34	01:57 02:38 03:06		03:27 04:20 04:52 05:16
68° 66° 64° 62° 60° <b>N</b> 58° 56° 54°	23:48	23:37	01:28 00:34 00:02 23:49	02:38	03:14 03:48	03:27 04:20 04:52 05:16 05:35
68° 66° 64° 62° 60° <b>N</b> 58° 56° 54° 52°	23:48 23:14 22:49 22:29 22:12	23:37 23:18 23:01 22:47	01:28 00:34 00:02 23:49 23:35 23:23 23:12	02:38 03:06 03:27 03:45	03:14 03:48 04:13 04:33 04:49	03:27 04:20 04:52 05:16 05:38 05:51 06:08
68° 66° 64° 62° 60° <b>N</b> 58° 56° 54° 52° 50°	23:48 23:14 22:49 22:29 22:12 21:58	23:37 23:18 23:01 22:47 22:35	01:28 00:34 00:02 23:49 23:35 23:23 23:12 23:02	02:38 03:06 03:27 03:45 04:01	03:14 03:48 04:13 04:33 04:49 05:04	03:27 04:20 04:52 05:16 05:35 05:51 06:05 06:17
68° 66° 64° 62° 60° <b>N</b> 58° 56° 54° 52° 50° 45°	23:48 23:14 22:49 22:29 22:12 21:58 21:28	23:37 23:18 23:01 22:47 22:35 22:09	01:28 00:34 00:02 23:49 23:35 23:23 23:12 23:02 22:42	02:38 03:06 03:27 03:45 04:01 04:32	03:14 03:48 04:13 04:33 04:49 05:04 05:33	03:27 04:20 04:52 05:16 05:35 05:51 06:05 06:17
68° 66° 64° 62° 60° <b>N</b> 58° 56° 54° 52° 50° 45° <b>N</b> 40°	23:48 23:14 22:49 22:29 22:12 21:58 21:28 21:05	23:37 23:18 23:01 22:47 22:35 22:09 21:49	01:28 00:34 00:02 23:49 23:35 23:23 23:12 23:02 22:42 22:25	02:38 03:06 03:27 03:45 04:01 04:32 04:56	03:14 03:48 04:13 04:33 04:49 05:04 05:33 05:55	03:27 04:20 04:52 05:16 05:35 05:51 06:05 06:17 06:41
68° 66° 64° 62° 60° <b>N</b> 58° 56° 54° 52° 50° 45° <b>N</b> 40° 35°	23:48 23:14 22:49 22:29 22:12 21:58 21:28 21:05 20:46	23:37 23:18 23:01 22:47 22:35 22:09 21:49 21:32	01:28 00:34 00:02 23:49 23:35 23:23 23:12 23:02 22:42 22:25 22:11	02:38 03:06 03:27 03:45 04:01 04:32 04:56 05:15	03:14 03:48 04:13 04:33 04:49 05:04 05:33 05:55 06:14	03:27 04:20 04:52 05:16 05:39 05:55 06:09 06:17 06:41 07:01
68° 66° 64° 62° 60° <b>N</b> 58° 56° 54° 52° 50° 45° <b>N</b> 40° 35° 30°	23:48 23:14 22:49 22:29 22:158 21:28 21:05 20:46 20:30	23:37 23:18 23:01 22:47 22:35 22:09 21:49 21:32 21:17	01:28 00:34 00:02 23:49 23:35 23:23 23:12 23:02 22:42 22:25 22:11 21:59	02:38 03:06 03:27 03:45 04:01 04:32 04:56 05:15 05:32	03:14 03:48 04:13 04:33 04:49 05:04 05:33 05:55 06:14 06:30	03:27 04:20 04:52 05:16 05:38 05:55 06:08 06:17 06:44 07:01 07:17
68° 66° 64° 62° 60° <b>N</b> 58° 56° 54° 52° <b>N</b> 40° 35° 30° 20°	23:48 23:14 22:49 22:29 22:12 21:58 21:28 21:05 20:46 20:30 20:02	23:37 23:18 23:01 22:47 22:35 22:09 21:49 21:32 21:17 20:52	01:28 00:34 00:02 23:35 23:23 23:12 23:02 22:42 22:25 22:11 21:59 21:37	02:38 03:06 03:27 03:45 04:01 04:32 04:56 05:15 05:32 06:00	03:14 03:48 04:13 04:33 04:49 05:04 05:33 05:55 06:14 06:30 06:57	03:27 04:20 04:52 05:16 05:38 05:55 06:08 06:17 06:42 07:01 07:31 07:58
68° 66° 64° 62° 60° <b>N</b> 58° 56° 54° 52° 50° 45° <b>N</b> 40° 35° 30°	23:48 23:14 22:49 22:29 22:158 21:28 21:05 20:46 20:30	23:37 23:18 23:01 22:47 22:35 22:09 21:49 21:32 21:17	01:28 00:34 00:02 23:49 23:35 23:23 23:12 23:02 22:42 22:25 22:11 21:59	02:38 03:06 03:27 03:45 04:01 04:32 04:56 05:15 05:32	03:14 03:48 04:13 04:33 04:49 05:04 05:33 05:55 06:14 06:30	03:22 04:22 04:52 05:16 05:33 05:55 06:05 06:17 07:07 07:17 07:33 07:55 08:16
68° 66° 64° 62° 60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° 20° N 10°	23:48 23:14 22:49 22:29 22:12 21:58 21:28 21:05 20:46 20:30 20:02 19:38	23:37 23:18 23:01 22:47 22:35 22:09 21:49 21:32 21:17 20:52 20:30	01:28 00:34 00:02 23:49 23:35 23:23 23:12 23:02 22:42 22:25 22:11 21:59 21:37 21:19	02:38 03:06 03:27 03:45 04:01 04:32 04:56 05:15 05:32 06:00 06:25	03:14 03:48 04:13 04:33 04:49 05:04 05:33 05:55 06:14 06:30 06:57 07:20	03:27 04:20 04:52 05:16 05:39 05:50 06:17 06:41 07:01 07:11 07:33 07:55 08:16 08:38
68° 66° 64° 62° 60° N 58° 54° 52° 50° 45° N 40° 35° 30° 20° N 10° 5 10° 20°	23:48 23:14 22:49 22:29 22:12 21:58 21:28 21:05 20:46 20:30 20:02 19:38 19:16	23:37 23:18 23:01 22:47 22:35 22:09 21:49 21:32 21:17 20:52 20:30 20:10	01:28 00:34 00:02 23:49 23:35 23:23 23:12 23:02 22:42 22:25 22:11 21:59 21:37 21:19 21:02	02:38 03:06 03:27 03:45 04:01 04:32 04:56 05:15 05:32 06:00 06:25 06:48	03:14 03:48 04:13 04:33 04:49 05:04 05:33 05:55 06:14 06:30 06:57 07:20 07:42	03:21 04:26 04:52 05:16 05:35 05:55 06:05 06:17 07:01 07:13 07:55 08:16 08:35
68° 66° 64° 62° 60° N 58° 54° 52° 50° 45° N 40° 35° 30° 20° N 10° 0° \$\$ 10° 20° 30°	23:48 23:14 22:49 22:29 22:12 21:58 21:28 21:05 20:46 20:30 20:02 19:38 19:16 18:53 18:30 18:02	23:37 23:18 23:01 22:47 22:35 22:09 21:49 21:32 21:17 20:52 20:30 20:10 19:49 19:27 19:02	01:28 00:34 00:02 23:49 23:35 23:23 23:12 23:02 22:42 22:25 22:11 21:59 21:37 21:19 21:02 20:44 20:26 20:04	02:38 03:06 03:27 03:45 04:01 04:32 04:56 05:15 05:32 06:00 06:25 06:48 07:10 07:34 08:03	03:14 03:48 04:13 04:33 04:39 05:05 06:14 06:30 06:57 07:20 07:42 08:03 08:26 08:53	03:21 04:20 04:52 05:16 05:33 05:5: 06:01 06:41 07:03 07:17 07:33 07:55 08:16 08:35 09:14
68° 66° 64° 62° 50° 54° 52° 50° 45° 8 40° 35° 30° 20° N 10° 0° 5 10° 20° 35°	23:48 23:14 22:49 22:29 22:12 21:58 21:28 21:05 20:30 20:02 19:38 19:16 18:53 18:30 18:02 17:45	23:37 23:18 23:01 22:47 22:35 22:09 21:49 21:32 21:17 20:52 20:30 20:10 19:49 19:27 19:02 18:47	01:28 00:34 00:02 23:39 23:23 23:12 23:02 22:42 22:25 22:11 21:59 21:37 21:19 21:02 20:44 20:26 20:04 19:51	02:38 03:06 03:27 03:45 04:01 04:32 04:56 05:15 05:32 06:00 06:25 06:48 07:10 07:34 08:03 08:19	03:14 03:48 04:13 04:33 04:49 05:04 05:33 05:55 06:14 06:30 06:57 07:20 07:42 08:03 08:26 08:53 09:08	03:21 04:20 04:52 05:16 05:33 05:51 06:05 06:05 07:17 07:33 07:55 08:16 08:35 09:14
68° 66° 64° 62° N 58° 56° 54° 52° 50° 45° 30° 20° N 10° 0° S 10° 20° 30° 35° 40°	23:48 23:14 22:49 22:29 22:12 21:58 21:28 21:05 20:46 20:30 20:02 19:38 19:16 18:53 18:30 18:02 17:45 17:26	23:37 23:18 23:01 22:47 22:35 22:09 21:49 21:32 21:17 20:52 20:30 20:10 19:49 19:27 19:02 18:47 18:29	01:28 00:34 00:02 23:49 23:35 23:23 23:12 23:02 22:42 22:25 22:11 21:59 21:37 21:19 21:02 20:44 20:26 20:04 19:51 19:37	02:38 03:06 03:27 03:45 04:01 04:32 04:56 05:15 05:32 06:00 06:25 06:48 07:10 07:34 08:03 08:19 08:39	03:14 03:48 04:13 04:33 04:49 05:04 05:55 06:14 06:30 06:57 07:20 07:42 08:03 08:26 08:53 09:08 09:26	03:21 04:20 04:55 05:16 05:35 05:55 06:05 06:17 07:37 07:37 08:38 08:54 09:14 09:37 09:55 10:06
68° 66° 64° 62° 50° 54° 52° 50° 45° 8 40° 35° 30° 20° 8 10° 20° 5 10° 30° 35° 40° 45°	23:48 23:14 22:49 22:29 22:12 21:58 21:28 21:05 20:46 20:30 20:02 19:38 19:16 18:53 18:30 18:02 17:45 17:26 17:03	23:37 23:18 23:01 22:47 22:35 22:09 21:49 21:32 21:17 20:52 20:30 20:10 19:49 19:27 19:02 18:47 18:29 18:08	01:28 00:34 00:02 23:49 23:35 23:23 23:12 23:02 22:42 22:25 22:11 21:59 21:37 21:19 21:02 20:44 20:26 20:04 19:51 19:37 19:19	02:38 03:06 03:27 03:45 04:01 04:32 04:56 05:15 05:32 06:00 06:25 06:48 07:10 07:34 08:03 08:19 08:39 09:02	03:14 03:48 04:13 04:33 04:49 05:04 05:55 06:14 06:30 06:57 07:20 07:42 08:03 08:26 09:08 09:26 09:48	03:21 04:20 04:55 05:16 05:35 05:55 06:05 06:17 07:37 07:35 08:36 08:54 09:37 09:55 10:06
68° 66° 64° 62° 50° N 58° 56° 52° 50° 45° N 40° 30° 20° N 10° 0° S 10° 20° 35° 40° 45° S 50°	23:48 23:14 22:49 22:29 22:12 21:58 21:28 21:05 20:46 20:30 20:02 19:38 19:16 18:53 18:30 18:02 17:45 17:26 17:03 16:33	23:37 23:18 23:01 22:47 22:35 22:09 21:49 21:32 21:17 20:52 20:30 20:10 19:49 19:27 19:02 18:47 18:29 18:08 17:41	01:28 00:34 00:02 23:49 23:35 23:23 23:12 23:02 22:42 22:25 22:11 21:59 21:37 21:19 21:02 20:44 20:26 20:04 19:51 19:37 19:19 18:57	02:38 03:06 03:27 03:45 04:01 04:32 04:56 05:15 06:00 06:25 06:48 07:10 07:34 08:03 08:19 08:39 09:02 09:33	03:14 03:48 04:13 04:33 04:49 05:04 05:33 05:55 06:14 06:30 06:57 07:20 07:42 08:03 08:26 08:53 09:08 09:26 09:26 09:48 10:16	03:21 04:20 04:52 05:16 05:33 05:55 06:05 06:17 07:17 07:31 07:31 08:33 08:54 09:14 09:37 09:55 10:06
68° 66° 64° 62° 60° N 58° 54° 52° 45° N 40° 35° 30° 20° S 10° 20° 30° 35° 40° 55° 55° 55° 55° 55° 55° 55° 55° 55° 5	23:48 23:14 22:49 22:29 22:12 21:58 21:28 21:05 20:46 20:30 20:02 19:38 19:16 18:53 18:30 18:02 17:45 17:26 17:03 16:33 16:18	23:37 23:18 23:01 22:47 22:35 22:09 21:49 21:32 21:17 20:52 20:30 20:10 19:49 19:27 19:02 18:47 18:29 18:08 17:41 17:28	01:28 00:34 00:02 23:49 23:35 23:23 23:12 23:02 22:42 22:25 22:11 21:59 21:37 21:19 21:02 20:44 20:26 20:04 19:51 19:37 19:19 18:57 18:47	02:38 03:06 03:27 03:45 04:01 04:32 04:56 05:15 06:00 06:25 06:48 07:10 07:34 08:03 08:19 09:02 09:33 09:48	03:14 03:48 04:13 04:33 04:33 05:04 05:04 05:33 05:55 06:14 06:30 06:57 07:20 07:42 08:03 08:26 08:53 09:08 09:26 09:48 10:16 10:29	03:21 04:20 04:52 05:16 05:33 05:51 06:03 06:17 07:31 07:33 07:53 08:54 09:14 09:31 09:51 10:02 10:44 10:55
68° 66° 64° 62° 60° N 58° 54° 52° 50° 45° N 40° 35° 30° 20° N 10° 5 10° 20° 35° 40° 5 50° 5 50° 5 50° 5 50° 5 50°	23:48 23:14 22:29 22:12 21:58 21:28 21:05 20:46 20:30 20:02 19:38 19:16 18:53 18:30 18:02 17:45 17:26 17:03 16:33 16:18 16:00	23:37 23:18 23:01 22:47 22:35 22:09 21:49 21:32 21:17 20:52 20:30 20:10 19:49 19:27 19:02 18:47 18:29 18:08 17:41 17:28 17:13	01:28 00:34 00:02 23:49 23:35 23:32 23:12 23:02 22:42 22:25 22:11 21:59 21:37 21:19 21:02 20:44 20:26 20:04 19:51 19:37 19:19 18:57 18:47 18:35	02:38 03:06 03:27 03:45 04:01 04:32 04:56 05:15 05:32 06:00 06:25 06:48 07:10 07:34 08:03 08:19 08:39 09:02 09:33 09:48 10:05	03:14 03:48 04:13 04:33 04:33 05:55 06:14 06:30 06:57 07:42 08:03 08:26 08:53 09:08 09:26 09:48 10:16 10:29 10:44	03:21 04:20 04:52 05:16 05:33 05:51 06:00 06:17 07:01 07:13 07:55 08:16 08:38 09:51 10:00 10:22 10:44 10:55 11:11
68° 66° 64° 62° 60° N 58° 54° 52° 45° N 40° 35° 30° 20° S 10° 20° 30° 35° 40° 55° 55° 55° 55° 55° 55° 55° 55° 55° 5	23:48 23:14 22:49 22:29 22:12 21:58 21:28 21:05 20:46 20:30 20:02 19:38 19:16 18:53 18:30 18:02 17:45 17:26 17:03 16:33 16:18	23:37 23:18 23:01 22:47 22:35 22:09 21:49 21:32 21:17 20:52 20:30 20:10 19:49 19:27 19:02 18:47 18:29 18:08 17:41 17:28	01:28 00:34 00:02 23:49 23:35 23:23 23:12 23:02 22:42 22:25 22:11 21:59 21:37 21:19 21:02 20:44 20:26 20:04 19:51 19:37 19:19 18:57 18:47	02:38 03:06 03:27 03:45 04:01 04:32 04:56 05:15 06:00 06:25 06:48 07:10 07:34 08:03 08:19 09:02 09:33 09:48	03:14 03:48 04:13 04:33 04:33 05:04 05:04 05:33 05:55 06:14 06:30 06:57 07:20 07:42 08:03 08:26 08:53 09:08 09:26 09:48 10:16 10:29	03:21 04:20 04:52 05:16 05:33 05:51 06:03 06:17 07:31 07:33 07:53 08:54 09:14 09:31 09:51 10:02 10:44 10:55

June 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 0	263°31.9	226°07.5	N11°59.1	112° 15.5	N13°05.6	172° 15.9	N23°16.7	261°30.0	S01°28.7		ЗПА	Dec
1	203 31.9 278°34.4	241°07.5	11°59.1	112 15.5 127°16.7	05.1	172 15.9 187° 17.7	16.7	201 30.0 276°32.4	28.7	Alpheratz	357°34.5	29°13.7
2	293°36.8	256°07.4	11 59.6 12°00.6	142° 17.8	04.6	202° 19.5	16.7	270 32.4 291°34.8	28.7	Ankaa	353°06.9	-42°09.8
3	293 30.6 308°39.3							306° 37.1		Schedar	349°30.8	56°40.4
		271°07.3	01.4	157°19.0 172°20.1	• • 04.0	217°21.4	•• 16.7		• • 28.6	Diphda	348°47.0	-17°50.7
4	323°41.8	286°07.3	02.2		03.5	232°23.2	16.7	321°39.5	28.6	Achernar	335°20.2	-57°06.2
5	338°44.2	301°07.2	02.9	187°21.2	03.0	247°25.1	16.7	336°41.8	28.6	Hamal	327°51.0	23°34.9
6	353°46.7	316°07.2	N12°03.7	202°22.4	N13°02.5	262°26.9	N23°16.7	351°44.2	S01°28.5	Polaris	314°14.7	89°22.1
7	8°49.2	331°07.1	04.5	217°23.5	02.0	277°28.8	16.7	6°46.5	28.5	Acamar	$315^{\circ}11.8$	-40°12.0
8	23°51.6	346°07.0	05.3	232°24.7	01.4	292°30.6	16.7	21°48.9	28.5	Menkar	314°06.0	4°11.4
9	38°54.1	1°07.0	• • 06.1	247°25.8	• • 00.9	307°32.5	• • 16.7	36°51.2	• • 28.4	Mirfak	308°28.2	49°56.9
10	53°56.6	16°06.9	06.8	262°26.9	13°00.4	322°34.3	16.7	51°53.6	28.4	Aldebaran	290°39.6	16°33.6
11	68°59.0	31°06.8	07.6	277°28.1	12°59.9	337°36.1	16.7	66° 56.0	28.4	Rigel	281°03.9	-8°10.3
12	84°01.5	46°06.8	N12°08.4	292°29.2	N12°59.4	352°38.0	N23°16.7	81°58.3	S01°28.3	Capella	280°21.8	46°01.4
13	99°03.9	61°06.7	09.2	307°30.4	58.8	7°39.8	16.7	97°00.7	28.3	Bellatrix	278°22.8	6°22.4
14	114°06.4	76°06.6	10.0	322°31.5	58.3	22°41.7	16.7	112°03.0	28.2	Elnath	278°01.8	28°37.7
15	129°08.9	91°06.6	• • 10.7	337°32.6	• • 57.8	37°43.5	• • 16.7	127°05.4	• • 28.2	Alnilam	275°37.7	-1°11.1
16	144°11.3	106°06.5	11.5	352°33.8	57.3	52° 45.4	16.7	142°07.7	28.2	Betelgeuse	270°52.0	7°24.7
17	159°13.8	121°06.4	12.3	7°34.9	56.7	67° 47.2	16.7	157° 10.1	28.1	Canopus	263°52.8	-52°42.5
18	174°16.3	136°06.4	N12°13.1	22°36.0	N12°56.2	82°49.0	N23°16.7	172° 12.4	S01°28.1	Sirius	258°26.3	-16°45.1
19	189°18.7	151°06.3	13.8	37°37.2	55.7	97°50.9	16.7	187°14.8	28.1	Adhara	255°06.0	-29°00.4
20	204°21.2	$166^{\circ}06.2$	14.6	52°38.3	55.2	112°52.7	16.7	202°17.2	28.0	Procyon	244°50.8	5°09.6
21	219°23.7	$181^{\circ}06.1$	• • 15.4	67°39.5	• • 54.7	127°54.6	• • 16.7	$217^{\circ}19.5$	• • 28.0	Pollux	243°17.2	27°57.9
22	234°26.1	$196^{\circ}06.1$	16.2	82°40.6	54.1	142°56.4	16.7	232°21.9	28.0	Avior	234°15.1	-59°35.6
23	249°28.6	211°06.0	16.9	97°41.7	53.6	157°58.3	16.7	247°24.2	27.9	Suhail	234 15.1 222°46.4	-43°32.3
Mar	ass. 06:25	11 0 1/ d0	.8′ m-4.26	,1 1/ d C	0.5' m1.40	11 0/ d 0	.0′ m-1.90	1/2 1/ 1/ 0	.0′ m1.03	Miaplacidus	222 40.4 221°38.8	-43 32.3 -69°49.5
ivier.p	ass. 00:25	$\nu$ -0.1 au	.8 m-4.20	$\nu_{1.1}$ a-c	0.5 m1.40	$\nu$ 1.8 a-0	.0 m-1.90	$\nu$ 2.4 $a$ -0	.0 m1.03			-8°46.2
										Alphard	217°47.6 207°34.2	-6 40.2 11°50.6
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	193°40.7	61°37.1
0	264°31.1	226°05.9	N12°17.7	112°42.9	N12°53.1	173°00.1	N23°16.7	262°26.6	S01°27.9	Dubhe Denebola	193 40.7 182°24.6	14°25.8
1	279°33.5	241°05.8	18.5	127°44.0	52.6	188°02.0	16.7	277°28.9	27.9	1		
2	294°36.0	256°05.8	19.3	142°45.2	52.0	203°03.8	16.6	292°31.3	27.8	Gienah	175°43.2	-17°41.1
3	309°38.4	271°05.7	20.1	157°46.3	51.5	218°05.6	. 16.6	307°33.7	27.8		172°59.6	-63°14.7
4	324°40.9	286°05.6	20.8	172°47.4	51.0	233°07.5	16.6	322°36.0	27.8		171°51.1	-57°15.6
5	339°43.4	301°05.5	21.6	187°48.6	50.5	248°09.3	16.6	337°38.4	27.7	Alioth	166°12.5	55°49.5
6	354°45.8	316°05.5	N12°22.4	202°49.7	N12°50.0	263°11.2	N23°16.6	352°40.7	S01°27.7	Spica	158°21.8	-11°17.7
7	9°48.3	331°05.4	23.2	217°50.9	49.4	278° 13.0	16.6	7°43.1	27.7	Alkaid	152°51.4	49°11.3
8	24°50.8	346°05.3	23.9	232°52.0	48.9	293° 14.9	16.6	22°45.5	27.6	Hadar	148°35.1	-60°30.0
9	39°53.2	1°05.2	• • 24.7	247°53.1	• 48.4	308° 16.7	16.6	37° 47.8	• • 27.6	Menkent	147°57.0	-36°29.9
10	54°55.7	16°05.1	25.5	262°54.3	47.9	323° 18.6	16.6	52° 50.2	27.6	Arcturus	145°47.4	19°03.0
11	69°58.2	31°05.1	26.3	202 54.5 277°55.4	47.9 47.3	338° 20.4	16.6	67°52.5		Rigil Kent.	139°39.3	-60°56.7
12	85°00.6	46°05.0	N12°27.0	292°56.5	N12°46.8	353° 20.4	N23°16.6	82° 54.9	27.5 \$01°27.5	Kochab	137°18.9	74°03.2
13	100°03.1	61°04.9	27.8	307° 57.7		8°24.1	16.6	97° 57.2	27.5	Zuben'ubi	136°55.4	-16°08.9
					46.3	23°25.9		97 57.2 112°59.6		Alphecca	$126^{\circ}03.1$	26°37.8
14	115°05.6	76°04.8	28.6	322°58.8	45.8		16.6		27.4	Antares	$112^{\circ}15.0$	-26°29.4
15	130°08.0	91°04.7	• • 29.4	338°00.0	• • 45.2	38°27.8	• • 16.6	128°02.0	• • 27.4	Atria	107°08.4	-69°04.4
16	145°10.5	106°04.6	30.1	353°01.1	44.7	53°29.6	16.6	143°04.3	27.4	Sabik	102°02.0	-15°45.4
17	160°12.9	121°04.6	30.9	8°02.2	44.2	68°31.5	16.6	158°06.7	27.3	Shaula	96°09.5	-37°07.3
18	175°15.4	136°04.5	N12°31.7	23°03.4	N12°43.7	83°33.3	N23°16.6	173°09.0	501°27.3	Rasalhague	95°57.9	12°32.4
19	190°17.9	151°04.4	32.5	38°04.5	43.1	98°35.1	16.6	188°11.4	27.3	Eltanin	90°41.5	51°29.0
20	205°20.3	166°04.3	33.2	53°05.6	42.6	113°37.0	16.6	203°13.8	27.2	Kaus Aust.	83°31.6	-34°22.3
21	220°22.8	181°04.2	• • 34.0	68°06.8	• • 42.1	128° 38.8	• • 16.6	218° 16.1	• • 27.2	Vega	80°32.6	38°48.3
22	235°25.3	196°04.1	34.8	83°07.9	41.6	143°40.7	16.6	233° 18.5	27.2	Nunki	75°47.0	-26°15.9
23	250°27.7	211°04.0	35.6	98°09.1	41.0	158° 42.5	16.6	248°20.9	27.1	Altair	61°59.3	8°56.1
Mer.p	ass. 06:21	$\nu$ -0.1' d0	.8′ m-4.25	$\nu 1.1' \ d-0$	0.5' m1.40	$\nu 1.8' d-0$	.0′ m-1.90	$\nu 2.4' d-0$	.0′ m1.02	Peacock	53°04.7	-56°39.0
		- 0.2 40								Deneb	49°25.2	45°22.1
										Enif	33°38.3	9°59.4
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.3	-46°50.0
0	265°30.2	226°03.9	N12°36.3	113° 10.2	N12°40.5	173°44.4	N23°16.6	263°23.2	S01°27.1	Fomalhaut	15°14.0	-29°29.1
1	280°32.7	241°03.9	37.1	128°11.3	40.0	188° 46.2	16.6	278°25.6	27.1	Scheat	13°44.8	28°13.1
2	295°35.1	256°03.8	37.9	143° 12.5	39.5	203°48.0	16.6	293°27.9	27.0	Markab	13°29.5	15°20.4
3	310°37.6	271°03.7	• • 38.6	158° 13.6	• • 38.9	218°49.9	• • 16.6	308°30.3	· · 27.0			
4	325°40.0	286°03.6	39.4	173° 14.7	38.4	233°51.7	16.6	323°32.7	27.0	Jun 15 Sun	SHA	Mer.pass
5	340°42.5	301°03.5	40.2	188° 15.9	37.9	248°53.6	16.6	338°35.0	26.9		322°35.6	08:56
6	355°45.0	316°03.4	N12°41.0		N12°37.4	263°55.4	N23°16.6	353°37.4	S01°26.9		208°43.6	16:30
7	10°47.4	331°03.3	41.7	218° 18.1	36.8	278° 57.3	16.6	8°39.7	26.9	Jupiter		12:29
8	25°49.9	346°03.2	42.5	233° 19.3	36.3	293°59.1	16.6	23°42.1	26.8	Saturn	357°58.1	06:33
9	40°52.4	1°03.1	• • 43.3	248°20.4	• • 35.8	309°01.0	• • 16.6	38°44.5	• • 26.8	Jun 16 Mon	SHA	Mer.pass
10	55°54.8	16°03.0	44.1	263°21.6	35.2	324°02.8	16.6	53°46.8	26.8		321°34.9	08:56
11	70°57.3	31°02.9	44.8	278°22.7	34.7	339°04.6	16.6	68°49.2	26.7	1	321 34.9 208°11.8	
12	85°59.8	46°02.8	N12°45.6	293°23.8	N12°34.2	354°06.5	N23°16.6	83°51.6	S01°26.7		208°11.8 268°29.1	16:28
13	101°02.2	61°02.7	46.4	$308^{\circ}25.0$	33.7	9°08.3	16.6	98°53.9	26.7			12:26
14	116°04.7	76°02.6	47.1	323°26.1	33.1	24°10.2	16.6	113°56.3	26.6	Saturn	357°55.5	06:29
15	131°07.2	91°02.5	• • 47.9	338°27.2	• • 32.6	39°12.0	• • 16.5	128°58.6	26.6	Jun 17 Tue	SHA	Mer.pass
16	146°09.6	106°02.4	48.7	353°28.4	32.1	54°13.9	16.5	144°01.0	26.6		320°33.8	08:56
17	161°12.1	121°02.3	49.5	8°29.5	31.5	69° 15.7	16.5	159°03.4	26.5	1	207°40.0	16:26
18	176°14.5	136°02.2	N12°50.2	23°30.6	N12°31.0	84° 17.5	N23°16.5	174°05.7	S01°26.5		268°14.2	12:24
19	191°17.0	151°02.1	51.0	38°31.8	30.5	99°19.4	16.5	189°08.1	26.5		357°53.0	06:25
20	206°19.5	166°02.0	51.8	53°32.9	30.0	114°21.2	16.5	204° 10.5	26.5			
21	221°21.9	181°01.9	52.5	68°34.1	• • 29.4	129°23.1	. 16.5	219° 12.8	26.4	Horizont	al parallax	
22	236°24.4	196°01.8	53.3	83°35.2	28.9	144°24.9	16.5	234° 15.2	26.4		Venus:	0.2
23	251°26.9	211°01.7	54.1	98°36.3	28.4	159° 26.8	16.5	249°17.6	26.4		Mars:	0.1
										_		
Mer.p	ass. 06:17	$\nu$ -0.1′ d0	.8′ m-4.24	$\nu$ 1.1' d-0	0.5′ m1.41	$\nu$ 1.8′ $d$ -0	.0′ m-1.90	ν2.4′ d-0	.0′ m1.02			

h	Sur	า			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°53.3	N23°18.6	313°11.3	10.4'	S21°59.3	-10.3'	56.5'
1 2	194°53.2 209°53.1	18.7 18.8	327°40.7 342°10.2	10.5' 10.5'	21°49.0 21°38.6	-10.4' -10.5'	56.5' 56.5'
3	209 53.1 224°52.9	. 18.9	356°39.7	10.6'	21°28.0	-10.5'	56.5
4	239°52.8	19.0	11°09.3	10.7'	$21^{\circ}17.4$	-10.8'	56.5'
5	254°52.7	19.1	25°39.0	10.7'	21°06.6	-10.9'	56.6'
6 7	269°52.5 284°52.4	N23°19.2 19.3	40°08.7 54°38.5	10.8' 10.8'	\$20°55.8 20°44.8	-11.0' -11.1'	56.6' 56.6'
8	299°52.3	19.3	69°08.3	10.0	20° 33.7	-11.1	56.6'
9	314°52.1	• • 19.5	83°38.2	10.9'	$20^{\circ}22.5$	-11.3'	56.7'
10	329°52.0	19.6	98°08.1	11.0'	20°11.1	-11.4'	56.7'
11 12	344°51.9 359°51.7	19.7 N23°19.8	112°38.1 127°08.1	11.0' 11.1'	19°59.7 \$19°48.2	-11.5' -11.6'	56.7' 56.7'
13	14°51.6	19.9	141°38.2	11.2'	19°36.6	-11.7'	56.7'
14	29°51.5	20.0	156°08.4	11.2'	19°24.8	-11.8'	56.8'
15	44°51.3 59°51.2	· · 20.1 20.2	170°38.6 185°08.9	11.3' 11.3'	19°13.0 19°01.0	-11.9' -12.1'	56.8' 56.8'
16 17	74°51.1	20.2	105 00.9 199°39.2	11.4'	19 01.0 18°49.0	-12.1	56.8'
18	89°50.9	N23°20.3	214°09.6	11.4'	\$18° 36.8	-12.3'	56.9'
19	104°50.8	20.4	228°40.0	11.5'	18°24.6	-12.4'	56.9'
20 21	119°50.7 134°50.5	20.5 • • 20.6	243°10.5 257°41.0	11.5' 11.6'	18° 12.2 17° 59.8	-12.4' -12.5'	56.9' 56.9'
22	149°50.4	20.7	272°11.6	11.6'	17°47.2	-12.6'	57.0'
23	164°50.3	20.8	286°42.2	11.7'	17°34.6	-12.7'	57.0'
	SD = 15.7'	d = 0.1'		SI	O = 15.4'		
	CUA	D.	CIIA			,	
Mon 0	<b>GHA</b> 179°50.1	<b>Dec</b> N23°20.9	<b>GHA</b> 301°12.9	$ u \ 11.7'$	Dec \$17° 21.8	<i>d</i> -12.8′	<b>HP</b> 57.0'
1	194°50.0	21.0	315°43.6	11.8'	17°09.0	-12.9	57.0'
2	209°49.8	21.1	330°14.4	11.8'	16°56.1	-13.0'	57.0'
3 4	224°49.7 239°49.6	· · 21.1 21.2	344°45.2 359°16.1	11.9' 11.9'	16° 43.1 16° 30.0	-13.1' -13.2'	57.1' 57.1'
5	254°49.4	21.2	13°47.0	12.0'	16° 16.8	-13.2	57.1'
6	269°49.3	N23°21.4	28°18.0	12.0'	S16°03.5	-13.4'	57.1'
7	284°49.2	21.5	42°49.0	12.1'	15°50.1	-13.5'	57.2'
8 9	299°49.0 314°48.9	21.6 •• 21.7	57°20.1 71°51.2	12.1' 12.2'	15°36.7 15°23.2	-13.5' -13.6'	57.2' 57.2'
10	329°48.8	21.7	86°22.4	12.2'	15° 23.2	-13.0 -13.7'	57.2'
11	344°48.6	21.8	100°53.6	12.2'	14°55.8	-13.8'	57.3'
12	359°48.5	N23°21.9	115°24.8	12.3'	S14°42.0	-13.9'	57.3'
13 14	14°48.4 29°48.2	22.0 22.0	129°56.1 144°27.4	12.3' 12.4'	14°28.2 14°14.2	-13.9' -14.0'	57.3' 57.3'
15	44°48.1	22.1	158°58.8	12.4'	14°14.2	-14.1'	57.4'
16	59°48.0	22.2	173°30.2	12.4'	13° 46.1	-14.2'	57.4'
17	74°47.8 89°47.7	22.3 N23°22.4	188°01.6 202°33.1	12.5'	13°31.9 \$13°17.7	-14.3'	57.4' 57.4'
18 19	89 47.7 104°47.6	N23 22.4 22.4	202 33.1 217°04.6	12.5' 12.5'	13°03.4	-14.3' -14.4'	57.4 57.5'
20	119°47.4	22.5	231°36.1		12°49.0		57.5'
21	134°47.3	• • 22.6	246°07.7	12.6'	12°34.5	-14.5'	57.5'
22 23	149°47.2 164°47.0	22.7 22.7	260°39.3 275°11.0	12.6' 12.7'	12°20.0 12°05.3	-14.6' -14.7'	57.5' 57.6'
23	SD = 15.7'	d = 0.1'	273 11.0		D = 15.5'	-14.7	37.0
	<u>JD = 13.7</u>	<u>u = 0.1</u>		31	J = 15.5		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0 1	179°46.9 194°46.7	N23°22.8 22.9	289°42.7 304°14.4	12.7' 12.7'	\$11°50.7 11°35.9	-14.7' -14.8'	57.6' 57.6'
2	209°46.6	22.9	318°46.1	12.8'	11°21.1	-14.9'	57.6'
3	224°46.5	• • 23.0	333°17.9	12.8'	11°06.2	-14.9'	57.7'
4 5	239°46.3 254°46.2	23.1 23.1	347°49.7 2°21.5	12.8' 12.8'	10°51.3 10°36.3	-15.0' -15.1'	57.7' 57.7'
6	254 46.2 269°46.1	N23°23.2	2 21.5 16°53.4	12.8	510°21.2	-15.1	57.7'
7	284°45.9	23.3	$31^{\circ}25.2$	12.9'	$10^{\circ}06.1$	-15.2'	57.8'
8	299°45.8	23.3	45°57.1	12.9'	09°50.9	-15.2'	57.8'
9 10	314°45.7 329°45.5	· · 23.4 23.5	60°29.0 75°01.0	12.9' 13.0'	09°35.7 09°20.4	-15.3' -15.4'	57.8' 57.8'
11	344°45.4	23.5	89°32.9	13.0'	09° 05.0	-15.4'	57.9
12	359°45.3	N23°23.6	104°04.9	13.0'	S08°49.6	-15.5'	57.9'
13 14	14°45.1 29°45.0	23.7 23.7	118°36.9 133°08.9	13.0' 13.0'	08°34.1 08°18.6	-15.5' -15.6'	57.9' 57.9'
14 15	29°45.0 44°44.8	. 23.7	133°08.9 147°41.0	13.0'	08° 18.6 08° 03.1	-15.6'	57.9° 58.0'
16	59°44.7	23.8	162°13.0	13.1'	07°47.4	-15.7'	58.0'
17	74°44.6	23.9	176°45.1	13.1'	07°31.8	-15.7'	58.0'
18 19	89°44.4 104°44.3	N23°24.0 24.0	191°17.1 205°49.2	13.1' 13.1'	\$07°16.0 07°00.3	-15.8' -15.8'	58.0' 58.1'
20	104 44.3 119°44.2	24.0	205 49.2 220°21.3	13.1'	07 00.3 06°44.5	-15.6 -15.9'	58.1
21	134°44.0	24.1	234°53.4	13.1'	$06^{\circ}28.6$	-15.9'	58.1'
22	149°43.9 164°43.8	24.2	249°25.5 263°57.6	13.1' 13.1'	06° 12.7 05° 56.8	-15.9'	58.1'
23		24.2	203-57.6			-16.0'	58.2'
	SD = 15.7'	d = 0.1'		SI	O = 15.7'		

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Mer.Pass.		
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	19-21	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	87-69%	
15	00:27	00:33	12:01	03:14	15:39		
16	00:40	00:46	12:01	04:03	16:27		
17	00:52	00:59	12:01	04:50	17:13		

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	266° 29.3	226°01.6	N12°54.9	113° 37.5	N12°27.8	174°28.6	N23°16.5	264°19.9	S01°26.3			
1	281°31.8	241°01.5	55.6	128° 38.6	27.3	189°30.4	16.5	279°22.3	26.3	Alpheratz	357°34.4	29°13.7
2	296°34.3	256°01.4	56.4	143°39.7	26.8	204°32.3	16.5	294°24.7	26.3	Ankaa	353°06.8	-42°09.8
3	311°36.7	271°01.3	57.2	158° 40.9	26.3	219°34.1	. 16.5	309°27.0	26.2	Schedar	349°30.8	56°40.4
4	326°39.2	286°01.2	57.9	173°42.0	25.7	234°36.0	16.5	324°29.4	26.2	Diphda	348°47.0	-17°50.7
5	341°41.7	301°01.1	58.7	188°43.1	25.2	249°37.8	16.5	339°31.8	26.2	Achernar	335°20.2	-57°06.2 23°34.9
6	356° 44.1	316°01.0	N12°59.5	203°44.3	N12°24.7	264°39.7	N23°16.5	354°34.1	S01°26.1	Hamal Polaris	327°51.0 314°13.7	23 34.9 89°22.1
7	11°46.6	331°00.9	13°00.2	218°45.4	24.1	279°41.5	16.5	9°36.5	26.1	Acamar	315°11.8	-40°12.0
8	26°49.0	346°00.8	01.0	233°46.5	23.6	294°43.3	16.5	24°38.8	26.1	Menkar	314°06.0	4° 11.4
9	41°51.5	1°00.6	• • 01.8	248° 47.7	• • 23.1	309°45.2	• • 16.5	39°41.2	• • 26.1	Mirfak	308°28.2	49°56.9
10	56°54.0	16°00.5	02.5	263°48.8	22.5	324°47.0	16.5	54°43.6	26.0	Aldebaran	290°39.5	16°33.6
11	71°56.4	31°00.4	03.3	278°49.9	22.0	339°48.9	16.5	69°45.9	26.0	Rigel	281°03.9	-8°10.3
12	86°58.9	46°00.3	N13°04.1	293°51.1	N12°21.5	354°50.7	N23°16.5	84°48.3	S01°26.0	Capella	280°21.8	46°01.4
13 14	102°01.4 117°03.8	61°00.2 76°00.1	04.8 05.6	308°52.2 323°53.4	20.9 20.4	9°52.6 24°54.4	16.5 16.5	99°50.7 114°53.0	25.9 25.9	Bellatrix	278°22.8	6°22.4
15	132°06.3	91°00.1	•• 06.4	338° 54.5	. 19.9	39°56.3	. 16.5	114 55.0 129°55.4	25.9	Elnath	278°01.8	28°37.7
16	147°08.8	105°59.9	07.1	353°55.6	19.4	54°58.1	16.4	144°57.8	25.8	Alnilam	275°37.7	-1°11.1
17	162°11.2	120°59.7	07.9	8°56.8	18.8	69°59.9	16.4	160°00.1	25.8	Betelgeuse	270°52.0	7°24.7
18	177° 13.7	135°59.6	N13°08.7	23°57.9	N12° 18.3	85°01.8	N23° 16.4	175°02.5	S01°25.8	Canopus	263°52.8	-52°42.5
19	192° 16.1	150°59.5	09.5	38°59.0	17.8	100°03.6	16.4	190°04.9	25.8	Sirius	258°26.3	-16°45.1
20	$207^{\circ}18.6$	165°59.4	10.2	54°00.2	17.2	115°05.5	16.4	205°07.2	25.7	Adhara	255°06.0	-29°00.4
21	222°21.1	180°59.3	• • 11.0	69°01.3	• • 16.7	$130^{\circ}07.3$	• • 16.4	220°09.6	• • 25.7	Procyon Pollux	244°50.8 243°17.2	5°09.6 27°57.9
22	237° 23.5	$195^{\circ}59.2$	11.8	84°02.4	16.2	$145^{\circ}09.2$	16.4	235°12.0	25.7	Avior	243 17.2 234°15.1	-59°35.6
23	252°26.0	210°59.0	12.5	99°03.6	15.6	$160^{\circ}11.0$	16.4	250°14.4	25.6	Suhail	234 15.1 222°46.4	-59 35.0 -43°32.3
Mern	ass. 06:13	ν-0 1' d0	.8′ m-4.23	ν1 1' d-Ω	0.5' m1.42	ν1 8' d-0	.0′ m-1.90	ν2 4' d-0	.0′ m1.02	Miaplacidus	221°38.9	-43 32.3 -69°49.5
		- 0.1 00	.5 111 7.25	ν 1.1 U-C		- 1.0 U-0	1.30	u-0	.5 1111.02	Alphard	217°47.6	-8°46.2
			_		_		_		_	Regulus	207°34.2	11°50.6
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.7	61°37.1
0	267°28.5	225°58.9	N13°13.3	114°04.7	N12° 15.1	175°12.8	N23°16.4	265°16.7	S01°25.6	Denebola	$182^{\circ}24.6$	14°25.9
1	282°30.9	240°58.8	14.0	129°05.8 144°07.0	14.6	190°14.7	16.4	280°19.1	25.6	Gienah	175°43.2	-17°41.1
2	297°33.4 312°35.9	255°58.7 270°58.6	14.8 •• 15.6	144 07.0 159°08.1	14.0 •• 13.5	205°16.5 220°18.4	16.4 •• 16.4	295°21.5 310°23.8	25.5 •• 25.5		172°59.6	-63°14.7
3 4	312 35.9 327°38.3	270 56.0 285°58.4	16.3	174° 09.2	13.0	235°20.2	16.4	325°26.2	25.5	1	171°51.2	-57° 15.6
5	342° 40.8	300°58.3	17.1	189° 10.4	12.4	250°22.1	16.4	340°28.6	25.5	1	166°12.5	55°49.5
6	357° 43.3	315°58.2	N13°17.9	204° 11.5	N12°11.9	265°23.9	N23° 16.4	355°30.9	S01°25.4	Spica	158°21.8	-11° 17.7
7	12° 45.7	330°58.1	18.6	219° 12.6	11.4	280°25.7	16.4	10°33.3	25.4	Alkaid	152°51.5	49°11.4
8	27° 48.2	345°57.9	19.4	234° 13.8	10.8	295°27.6	16.4	25°35.7	25.4	Hadar	148°35.1	-60°30.0
9	42°50.6	0°57.8	20.2	249° 14.9	· · 10.3	310°29.4	· · 16.4	40°38.0	25.3	1	147°57.0	-36°29.9
10	57°53.1	15°57.7	20.9	264°16.0	09.8	325°31.3	16.4	55°40.4	25.3	Arcturus Rigil Kent.	145°47.4 139°39.4	19°03.0 -60°56.7
11	72°55.6	30°57.6	21.7	279°17.2	09.2	340°33.1	16.4	70°42.8	25.3	Kochab	139 39.4 137°18.9	74°03.2
12	87°58.0	45°57.4	N13°22.5	294°18.3	N12°08.7	355°35.0	N23°16.3	85°45.2	S01°25.3	Zuben'ubi	136°55.4	-16°08.9
13	103°00.5	60°57.3	23.2	309°19.4	08.1	10°36.8	16.3	100°47.5	25.2	Alphecca	126°03.1	26°37.8
14	118°03.0	75°57.2	24.0	324°20.6	07.6	25°38.6	16.3	115°49.9	25.2	Antares	112°15.0	-26°29.4
15	133°05.4	90°57.0	• • 24.7	339°21.7	•• 07.1	40°40.5	• • 16.3	130°52.3	• • 25.2	Atria	107°08.4	-69°04.5
16	148°07.9	105°56.9	25.5	354°22.8	06.5	55°42.3	16.3	145°54.6	25.1	Sabik	102°02.0	-15°45.4
17	163°10.4	120°56.8	26.3	9°24.0	06.0	70°44.2	16.3	160°57.0	25.1	Shaula	96°09.5	-37°07.3
18	178°12.8	135°56.7	N13°27.0	24°25.1	N12°05.5	85°46.0	N23°16.3	175°59.4	S01°25.1	Rasalhague	95°57.9	12°32.5
19	193° 15.3 208° 17.8	150°56.5 165°56.4	27.8	39°26.2 54°27.4	04.9	100°47.9 115°49.7	16.3	191°01.7 206°04.1	25.1	Eltanin	90°41.5	51°29.1
20 21	200 17.0 223°20.2	180°56.3	28.6 •• 29.3	69° 28.5	04.4 •• 03.9	115 49.7 130°51.5	16.3 •• 16.3	200 04.1 221°06.5	25.0 •• 25.0	Kaus Aust.	83°31.6	-34°22.3
22	238° 22.7	195°56.1	30.1	84° 29.6	03.3	145°53.4	16.3	236°08.9	25.0	Vega	80°32.6	38°48.3
23	253°25.1	210°56.0	30.8	99°30.8	02.8	160°55.2	16.3	251°11.2	24.9	Nunki	75°46.9	-26°15.9
										Altair	61°59.3	8°56.1
Mer.p	pass. 06:09	$\nu$ -0.1' d0	.8′ m-4.23	$\nu$ 1.1' d-0	0.5′ m1.42	$\nu 1.8' \ d-0$	.0′ m-1.90	$\nu 2.4' \ d-0$	.0′ m1.01	Peacock	53°04.7	
										Deneb Enif	49°25.2 33°38.3	45°22.1 9°59.4
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.2	
0	268°27.6	225°55.9	N13°31.6	114°31.9	$N12^{\circ}02.3$	$175^{\circ}57.1$	N23°16.3	266°13.6	S01°24.9	Fomalhaut	15°14.0	-40° 30.0° -29° 29.1
1	283°30.1	240°55.7	32.4	129°33.0	01.7	190°58.9	16.3	281°16.0	24.9	Scheat	13°44.8	28° 13.1
2	298° 32.5	255°55.6	33.1	144°34.2	01.2	206°00.8	16.3	296°18.3	24.9	Markab	13°29.5	15°20.4
3	313°35.0	270°55.4	• • 33.9	159°35.3	• • 00.6	221°02.6	• • 16.3	311°20.7	• • 24.8	10.10	2114	
4	328°37.5	285°55.3	34.6	174°36.4	12°00.1	236°04.4	16.3	326°23.1	24.8	Jun 18 Wed	SHA	Mer.pass
5	343°39.9	300°55.2	35.4 N12°26.2	189°37.6	11°59.6	251°06.3	16.3	341°25.5	24.8 \$01°24.7	1	319°32.3 207°08.1	08:56 16:24
6 7	358° 42.4	315°55.0	N13°36.2	204°38.7	N11°59.0	266°08.1 281°10.0	N23° 16.2	356°27.8 11°30.2	S01°24.7	Jupiter		10:24
7 8	13°44.9 28°47.3	330°54.9 345°54.8	36.9 37.7	219°39.8 234°40.9	58.5 58.0	281°10.0 296°11.8	16.2 16.2	26°32.6	24.7 24.7	Saturn	357°50.6	06:22
9	43° 49.8	0°54.6	• • 38.4	249° 42.1	• • 57.4	311°13.7	. 16.2	41°35.0	• • 24.7			
10	58° 52.2	15°54.5	39.2	264° 43.2	56.9	326°15.5	16.2	56°37.3	24.6	Jun 19 Thu	SHA	Mer.pass
11	73°54.7	30°54.3	40.0	279°44.3	56.3	341°17.3	16.2	71°39.7	24.6	1	318°30.4	08:56
12	88°57.2	45°54.2	N13°40.7	294°45.5	N11°55.8	356°19.2	N23°16.2	86°42.1	S01°24.6	1	206°36.2	16:22
13	103°59.6	60°54.0	41.5	309°46.6	55.3	$11^{\circ}21.0$	16.2	$101^{\circ}44.5$	24.6	Jupiter Saturn	267°44.4 357°48.3	12:18 06:18
14	119°02.1	75°53.9	42.2	324°47.7	54.7	26°22.9	16.2	116°46.8	24.5	Jatuin	JJ1 70.J	00.10
15	134°04.6	90°53.8	• • 43.0	339°48.9	• • 54.2	41°24.7	• • 16.2	131°49.2	• • 24.5	Jun 20 Fri	SHA	Mer.pass
16	149°07.0	105°53.6	43.8	354°50.0	53.7	56°26.6	16.2	146°51.6	24.5		317°28.2	08:56
17	164°09.5	120°53.5	44.5	9°51.1	53.1	71°28.4	16.2	161°53.9	24.4		206°04.3	16:21
18	179°12.0	135°53.3	N13°45.3	24°52.3	N11°52.6	86°30.2	N23°16.2	176°56.3	S01°24.4		267°29.5	12:15
19	194° 14.4 209° 16.9	150°53.2	46.0 46.8	39°53.4	52.0 51.5	101°32.1	16.2	191°58.7 207°01.1	24.4	Saturn	357°46.0	06:14
20 21	209° 16.9 224° 19.4	165°53.0 180°52.9	46.8 •• 47.5	54°54.5 69°55.7	51.5 •• 51.0	116°33.9 131°35.8	16.2 •• 16.1	207°01.1 222°03.4	24.4 •• 24.3	Horizont	al parallax	
22	239°21.8	100 52.9 195°52.7	48.3	84° 56.8	50.4	131 35.6 146°37.6	16.1	222 03.4 237°05.8	24.3		Venus:	0.2
23	254° 24.3	210°52.6	49.0	99°57.9	49.9	161°39.5	16.1	252°08.2	24.3		Mars:	0.1
										-		
Mer.p	bass. 06:05	$\nu$ -0.1′ d0	.8′ m-4.22	$\nu$ 1.1' $d$ -0	0.5′ m1.43	$\nu$ 1.8′ $d$ -0	.0′ m-1.90	ν2.4′ d-0	.0′ m1.01			

h	Sur			Moon			
			CIIA			-1	LID
Wed	<b>GHA</b> 179° 43.6	Dec	GHA	ν	Dec	d 16.0'	HP
0		N23°24.3	278°29.7	13.1'	\$05°40.8	-16.0'	58.2'
1	194° 43.5	24.3	293°01.8	13.1'	05°24.8	-16.1'	58.2'
2	209° 43.4 224° 43.2	24.4	307°33.9 322°06.0	13.1'	05°08.7	-16.1'	58.2'
3		• • 24.4		13.1'	04°52.6	-16.1'	58.3'
4	239°43.1	24.5	336°38.1	13.1'	04°36.5	-16.2'	58.3'
5	254° 42.9	24.6	351°10.3	13.1'	04°20.3	-16.2'	58.3'
6	269° 42.8 284° 42.7	N23°24.6 24.6	5°42.4 20°14.5	13.1'	\$04°04.1 03°47.9	-16.2' -16.3'	58.3'
7 8	284 42.7 299°42.5	24.0 24.7	20 14.5 34°46.6	13.1' 13.1'	03 47.9 03°31.6	-16.3'	58.4' 58.4'
9	314° 42.4	24.7	49°18.6	13.1	03°15.3	-16.3'	58.4'
10	314 42.4 329°42.3	24.7	49 18.6 63°50.7	13.1	03 15.3 02°59.0	-16.3 -16.4'	58.4'
11	344° 42.1	24.8	78° 22.8	13.1	02 59.0 02°42.7	-16.4'	58.5'
12	359° 42.0	N23°24.9	92°54.8	13.1	502°26.3	-16.4	58.5
13	14°41.9	24.9	107°26.9	13.0'	02°09.9	-16.4'	58.5'
14	29° 41.7	25.0	107 20.9 121°58.9	13.0'	02 09.9 01°53.4	-16.5'	58.5
15	44°41.6	. 25.0	136°30.9	13.0'	01°37.0	-16.5'	58.6'
16	59°41.4	25.1	151°02.9	13.0'	01°20.5	-16.5'	58.6'
17	74°41.3	25.1	165°34.9	13.0'	01°04.0	-16.5	58.6'
18	89°41.2	N23°25.1	180°06.9	12.9'	S00°47.5	-16.5	58.6'
19	104°41.0	25.2	194°38.8	12.9'	00°31.0	-16.5'	58.6
20	119° 40.9	25.2	209° 10.7	12.9'	S00°14.4	-16.6'	58.7'
21	134° 40.8	• • 25.3	223°42.6	12.9'	N00°02.1	16.6	58.7'
22	149° 40.6	25.3	238° 14.5	12.8'	00°18.7	16.6'	58.7'
23	164° 40.5	25.3	252°46.3	12.8'	00°35.3	16.6'	58.7'
							-0.1
	SD = 15.7'	d = 0.1'		SI	O = 15.9'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°40.3	N23°25.4	$267^{\circ}18.1$	12.8'	N00°51.9	16.6'	58.8'
1	194°40.2	25.4	281°49.9	12.7'	$01^{\circ}08.5$	16.6'	58.8'
2	209°40.1	25.4	296°21.6	12.7'	$01^{\circ}25.1$	16.6'	58.8'
3	224°39.9	• • 25.5	310°53.3	12.7'	$01^{\circ}41.7$	16.6'	58.8'
4	239°39.8	25.5	325°25.0	12.6'	01°58.3	16.6'	58.9'
5	254°39.7	25.5	339°56.6	12.6'	02°15.0	16.6'	58.9'
6	269°39.5	N23°25.6	354°28.2	12.6'	N02°31.6	16.6'	58.9'
7	284°39.4	25.6	8°59.8	12.5'	02°48.2	16.6'	58.9'
8	299°39.3	25.6	23°31.3	12.5'	03°04.9	16.6'	59.0'
9	314°39.1	• • 25.7	38°02.8	12.4'	03°21.5	16.6'	59.0'
10	329°39.0	25.7	52°34.3	12.4'	03°38.2	16.6'	59.0'
11	344°38.8	25.7	67°05.6	12.3'	03°54.8	16.6'	59.0'
12	359° 38.7	N23°25.8	81°37.0	12.3'	N04°11.4	16.6'	59.1'
13	14°38.6	25.8	96°08.3	12.3'	04°28.0	16.6'	59.1'
14	29°38.4	25.8	110°39.6	12.2'	04°44.6	16.6'	59.1'
15	44°38.3	• • 25.8	125° 10.8	12.2'	05°01.2	16.6'	59.1'
16	59°38.2	25.9	139°41.9	12.1'	05°17.8	16.6'	59.2'
17	74°38.0	25.9	154° 13.0	12.0'	05°34.4	16.6'	59.2'
18	89°37.9	N23°25.9	168°44.0	12.0'	N05°50.9	16.5'	59.2'
19	104° 37.8	25.9	183°15.0	11.9'	06°07.5	16.5	59.2'
20	119°37.6	26.0	197°46.0	11.9'	06°24.0	16.5	59.2'
21	134° 37.5	• • 26.0	212°16.8	11.8'	06°40.5	16.5	59.3'
22	149°37.3	26.0	226°47.6	11.7'	06°57.0	16.5	59.3'
23	164°37.2	26.0	241°18.4	11.7'	07°13.5	16.4'	59.3'
	SD = 15.7'	d = 0.0'		SI	O = 16.0'		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	179° 37.1	N23°26.0	255°49.1	11.6'	N07°29.9	16.4'	59.3
1	194°36.9	26.1	270° 19.7	11.6'	07°46.3	16.4	59.4'
2	209° 36.8	26.1	284°50.3	11.5'	08°02.7	16.4	59.4
3	224° 36.7	. 26.1	299°20.7	11.4'	08°19.1	16.3	59.4
4	239° 36.5	26.1	313°51.2	11.3'	08°35.4	16.3'	59.4'
5	254°36.4	26.1	328°21.5	11.3'	08°51.7	16.3'	59.4'
6	269°36.2	N23°26.1	342°51.8	11.2'	N09°07.9	16.2	59.5'
7	284°36.1	26.2	357°22.0	11.1'	09°24.2	16.2'	59.5'
8	299°36.0	26.2	11°52.1	11.1'	09°40.3	16.2'	59.5'
9	314°35.8	• • 26.2	26°22.2	11.0'	09°56.5	16.1'	59.5'
10	329°35.7	26.2	$40^{\circ}52.1$	10.9'	$10^{\circ}12.6$	16.1'	59.5'
11	344°35.6	26.2	55°22.0	10.8'	10°28.7	16.0'	59.6'
12	359°35.4	N23°26.2	69°51.8	10.7'	N10°44.7	16.0'	59.6'
13	14°35.3	26.2	84°21.6	10.7'	11°00.7	15.9'	59.6'
14	29°35.1	26.2	98°51.2	10.6'	11°16.6	15.9'	59.6'
15	44°35.0	• • 26.3	113°20.8	10.5'	11°32.5	15.8'	59.6'
16	59°34.9	26.3	127°50.3	10.4'	11°48.3	15.8'	59.7'
17	74°34.7	26.3	142° 19.7	10.3'	12°04.1	15.7'	59.7'
18	89°34.6	N23°26.3	156°49.0	10.2'	N12°19.8	15.7'	59.7'
19	104°34.5	26.3	171°18.2	10.1'	12°35.5	15.6'	59.7'
20	119°34.3	26.3	185°47.3	10.0'	12°51.1	15.5'	59.7'
21	134°34.2	• • 26.3	200°16.4	9.9'	13°06.7	15.5'	59.8'
22	149°34.1	26.3	214°45.3	9.9'	13°22.1	15.4'	59.8'
23	164°33.9	26.3	229°14.2	9.8'	0 = 16.2'	15.4'	59.8'
	SD = 15.7'	d = 0.0'					

Lat.	Twil	light	Sunrise	Sunset	Twi	light	
Lat.	Naut.	Civil	Juliuse	Juliset	Civil	Naut.	
N 72°							
<b>N</b> 70°							
68°							
66°							
64°	////	////	01:31	22:32	////	////	
62°	////	////	02:09	21:54	////	////	
60°	////	00:49	02:36	21:27	23:14	////	
<b>N</b> 58°	////	01:40	02:56	21:07	22:23	////	
56°	////	02:10	03:13	20:50	21:53	////	
54°	00:45	02:33	03:27	20:36	21:30	23:18	
52°	01:32	02:51	03:39	20:23	21:12	22:31	
50°	02:00	03:06	03:50	20:13	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	20:47	
35°	03:40	04:16	04:46	19:17	19:47	20:23	
30°	03:58	04:32	04:59	19:04	19:31	20:05	
20°	04:27	04:57	05:21	18:42	19:06	19:36	
<b>N</b> 10°	04:50	05:17	05:40	18:23	18:46	19:13	
0°	05:09	05:35	05:58	18:05	18:28	18:54	
<b>S</b> 10°	05:26	05:52	06:15	17:48	18:10	18:37	
20°	05:42	06:10	06:34	17:29	17:53	18:21	
30°	05:59	06:29	06:55	17:08	17:34	18:04	
35°	06:08	06:39	07:07	16:55	17:24	17:55	
40°	06:17	06:51	07:22	16:41	17:12	17:46	
45°	06:27	07:05	07:38	16:24	16:58	17:36	
<b>S</b> 50°	06:39	07:21	07:59	16:04	16:42	17:24	
52°	06:44	07:28	08:09	15:54	16:35	17:18	
54°	06:50	07:36	08:20	15:43	16:26	17:13	
56°	06:56	07:45	08:33	15:30	16:17	17:07	
58°	07:03	07:56	08:48	15:15	16:07	17:00	
<b>S</b> 60°	07:11	08:07	09:05	14:58	15:55	16:52	
				ı	N4		

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

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Age		
Day	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	22-24	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	59-37%	
18	01:06	01:12	12:01	05:36	18:00		
19	01:19	01:25	12:01	06:23	18:47		
20	01:32	01:38	12:02	07:11	19:36		

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

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	269°26.7	225°52.4	N13°49.8	114°59.0	N11°49.3	176°41.3	N23°16.1	267°10.6	S01°24.3			
1	284°29.2	240°52.3	50.6	130°00.2	48.8	191°43.1	16.1	282°12.9	24.2	Alpheratz	357°34.4	29°13.7
2	299°31.7	255°52.1	51.3	145°01.3	48.3	206°45.0	16.1	297°15.3	24.2	Ankaa	353°06.8	-42°09.8
3	314°34.1	270°52.0	52.1	145 01.3 160°02.4	40.3 · · 47.7	200 45.0 221°46.8	. 16.1	312° 17.7	. 24.2	Schedar	349°30.7	56°40.4
3 4								312 17.7 327°20.1		Diphda	348°47.0	-17°50.7
	329°36.6	285°51.8	52.8	175°03.6	47.2	236°48.7	16.1		24.2	Achernar	$335^{\circ}20.1$	-57°06.2
5	344°39.1	300°51.7	53.6	190°04.7	46.6	251°50.5	16.1	342°22.5	24.1	Hamal	327°51.0	23°34.9
6	359°41.5	315°51.5	N13°54.3	205°05.8	N11°46.1	266°52.3	N23°16.1	357°24.8	S01°24.1	Polaris	314°12.5	89°22.0
7	14°44.0	330°51.4	55.1	220°07.0	45.6	281°54.2	16.1	12°27.2	24.1	Acamar	315°11.8	-40°12.0
8	29°46.5	345°51.2	55.8	235°08.1	45.0	296° 56.0	16.1	27°29.6	24.1	Menkar	314°06.0	4°11.4
9	44°48.9	$0^{\circ}51.1$	• • 56.6	250°09.2	• • 44.5	311°57.9	• • 16.1	42°32.0	• • 24.0	Mirfak	308°28.1	49°56.9
10	59°51.4	15°50.9	57.3	265°10.4	43.9	326°59.7	16.1	57°34.3	24.0	Aldebaran	290°39.5	16°33.6
11	74°53.9	30°50.7	58.1	$280^{\circ}11.5$	43.4	$342^{\circ}01.6$	16.0	72°36.7	24.0	Rigel	281°03.9	-8°10.3
12	89°56.3	45°50.6	N13°58.9	$295^{\circ}12.6$	N11°42.8	357°03.4	N23°16.0	$87^{\circ}39.1$	S01°23.9	Capella	280°21.8	46°01.4
13	104°58.8	60°50.4	13°59.6	310°13.7	42.3	12°05.2	16.0	102°41.5	23.9	Bellatrix	278°22.8	6°22.4
14	120°01.2	75°50.3	14°00.4	325°14.9	41.8	$27^{\circ}07.1$	16.0	117°43.8	23.9	1		
15	135°03.7	$90^{\circ}50.1$	•• 01.1	340°16.0	· · 41.2	42°08.9	• • 16.0	132°46.2	• • 23.9	Elnath	278°01.8	28°37.7
16	150°06.2	105°49.9	01.9	$355^{\circ}17.1$	40.7	$57^{\circ}10.8$	16.0	147°48.6	23.8	Alnilam	275°37.7	-1°11.1
17	165°08.6	120°49.8	02.6	10°18.3	40.1	$72^{\circ}12.6$	16.0	162°51.0	23.8	Betelgeuse	270°52.0	7°24.7
18	180°11.1	135°49.6	N14°03.4	25° 19.4	N11°39.6	87° 14.5	N23°16.0	177°53.4	S01°23.8	Canopus	263°52.8	-52°42.5
19	195°13.6	150° 49.5	04.1	40°20.5	39.1	102° 16.3	16.0	192°55.7	23.8	Sirius	258°26.3	-16°45.0
20	210°16.0	165°49.3	04.1	55°21.6	38.5	102 10.3 117°18.1	16.0	207°58.1	23.7	Adhara	255°06.0	-29°00.4
21	210 10.0 225°18.5	105 49.3 180°49.1	•• 05.6	70°22.8	38.0	117 16.1 132°20.0	. 16.0	207 56.1 223°00.5	23.7	Procyon	244°50.8	$5^{\circ}09.6$
22	240°21.0			70 22.8 85°23.9		132 20.0 147°21.8				Pollux	243°17.2	27°57.9
		195°49.0	06.4		37.4		16.0	238°02.9	23.7	Avior	$234^{\circ}15.2$	-59°35.6
23	255°23.4	210°48.8	07.1	100°25.0	36.9	162°23.7	16.0	253°05.2	23.7	Suhail	222°46.4	-43°32.3
Mer.p	ass. 06:01	$\nu$ -0.2' d0	.8′ m-4.21	$\nu 1.1' \ d-0$	.5' m1.44	$\nu 1.8' \ d-0$	.0′ m-1.90	$\nu 2.4' \ d-0$	.0′ m1.00	Miaplacidus	221°38.9	-69°49.5
										Alphard	217°47.6	-8°46.2
										Regulus	207°34.2	11°50.6
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		193°40.7	61°37.1
0	270°25.9	225°48.6	N14°07.9	115°26.2	N11°36.3	177°25.5	N23°16.0	268°07.6	501°23.6	Denebola	182°24.6	14°25.9
1	285°28.3	240°48.5	08.6	130°27.3	35.8	192°27.4	15.9	283°10.0	23.6	Gienah	175°43.2	-17°41.1
2	300°30.8	255°48.3	09.4	145°28.4	35.2	$207^{\circ}29.2$	15.9	298°12.4	23.6	1	173°43.2	-17 41.1 -63°14.7
3	315°33.3	270°48.1	• • 10.1	160°29.6	• • 34.7	222°31.0	• • 15.9	$313^{\circ}14.8$	• • 23.6			
4	330°35.7	285°48.0	10.9	175°30.7	34.2	237°32.9	15.9	328°17.1	23.5	1	171°51.2	-57°15.6
5	345°38.2	300°47.8	11.6	190°31.8	33.6	252°34.7	15.9	343° 19.5	23.5	Alioth	166°12.5	55°49.5
6	0°40.7	315° 47.6	N14°12.4	205°32.9	N11°33.1	267°36.6	N23°15.9	358°21.9	S01°23.5	Spica	158°21.8	-11°17.7
7	15°43.1	330° 47.5	13.1	220°34.1	32.5	282°38.4	15.9	13°24.3	23.5	Alkaid	152°51.5	49°11.4
8	30°45.6	345°47.3	13.9	235°35.2	32.0	297°40.3	15.9	28°26.7	23.5	Hadar	148°35.2	-60°30.0
9	45°48.1	0°47.1	• • 14.6	250° 36.3	• • 31.4	312°42.1	• 15.9	43°29.0	• • 23.4	Menkent	147°57.0	-36°29.9
										Arcturus	145°47.4	19°03.1
10	60°50.5	15°47.0	15.4	265°37.5	30.9	327°43.9	15.9	58°31.4	23.4	Rigil Kent.	139°39.4	-60°56.7
11	75°53.0	30°46.8	16.1	280°38.6	30.3	342°45.8	15.9	73°33.8	23.4	Kochab	$137^{\circ}19.0$	74°03.2
12	90°55.5	45°46.6	N14°16.8	295°39.7	N11°29.8	357° 47.6	N23°15.9	88°36.2	S01°23.4	Zuben'ubi	136°55.4	-16°08.9
13	105°57.9	60°46.4	17.6	310°40.8	29.3	12°49.5	15.8	103°38.6	23.3	Alphecca	126°03.1	26°37.8
14	121°00.4	75°46.3	18.3	325°42.0	28.7	27°51.3	15.8	118°41.0	23.3	Antares	112°15.0	-26°29.4
15	136°02.8	90°46.1	• • 19.1	340°43.1	• • 28.2	42°53.2	• • 15.8	133°43.3	• • 23.3	Atria	107°08.4	-69°04.5
16	151°05.3	105°45.9	19.8	355°44.2	27.6	57°55.0	15.8	148°45.7	23.3	Sabik	102°02.0	-15°45.4
17	166°07.8	120°45.7	20.6	10°45.4	27.1	72°56.8	15.8	163°48.1	23.2	Shaula	96°09.4	-37°07.4
18	181°10.2	135°45.6	N14°21.3	25° 46.5	N11°26.5	87°58.7	N23°15.8	178°50.5	S01°23.2	Rasalhague	95°57.9	12°32.5
19	196°12.7	150°45.4	22.1	40°47.6	26.0	103°00.5	15.8	193°52.9	23.2	_		51°29.1
20	211°15.2	165°45.2	22.8	55°48.7	25.4	118°02.4	15.8	208°55.2	23.2	Eltanin Kaus Aust.	90°41.5 83°31.6	-34°22.3
21	226°17.6	180°45.0	• • 23.6	70°49.9	• • 24.9	133°04.2	• • 15.8	223°57.6	• • 23.1			
22	241°20.1	195°44.9	24.3	85°51.0	24.3	148°06.0	15.8	239°00.0	23.1	Vega	80°32.5	38°48.4
23	256°22.6	210°44.7	25.0	100°52.1	23.8	163°07.9	15.8	254°02.4	23.1	Nunki	75°46.9	-26°15.9
										Altair	61°59.3	8°56.1
Mer.p	ass. 05:57	$\nu$ -0.2' d0	.7′ m-4.20	$\nu 1.1' \ d$ -0	1.5'  m 1.44	$\nu 1.8' \ d-0$	.0′ m-1.89	$\nu$ 2.4′ d-0	.0' m $1.00$	Peacock	53°04.6	-56°39.0
										Deneb	49°25.2	45°22.1
Mar	CHA	CHA	Daa	CH A	Daa	CHA	Daa	CHA	Daa	Enif	33°38.2	9°59.5
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.2	-46°50.0
0	271°25.0	225°44.5	N14°25.8	115°53.2	N11°23.3	178°09.7	N23°15.7	269°04.8	S01°23.1	Fomalhaut	15°14.0	-29°29.1
1	286°27.5	240°44.3	26.5	130°54.4	22.7	193°11.6	15.7	284°07.2	23.1	Scheat	13°44.8	28°13.1
2	301°30.0	255°44.1	27.3	145°55.5	22.2	208°13.4	15.7	299°09.5	23.0	Markab	13°29.4	$15^{\circ}20.5$
3	316°32.4	270°44.0	• • 28.0	160°56.6	• • 21.6	223°15.3	• • 15.7	314°11.9	• • 23.0	I 01 C	CIIA	NA -
4	331°34.9	285°43.8	28.8	175°57.8	21.1	238° 17.1	15.7	329°14.3	23.0	Jun 21 Sat	SHA	Mer.pass
5	346°37.3	300°43.6	29.5	190°58.9	20.5	253° 18.9	15.7	344°16.7	23.0		316°25.7	08:57
6	1°39.8	315°43.4	N14°30.2	206°00.0	N11°20.0	268° 20.8	N23°15.7	359° 19.1	S01°22.9	Mars		16:19
7	16°42.3	330°43.2	31.0	221°01.1	19.4	283°22.6	15.7	14°21.5	22.9	Jupiter		12:12
8	31°44.7	345°43.0	31.7	236°02.3	18.9	298°24.5	15.7	29°23.8	22.9	Saturn	357°43.8	06:10
9	46°47.2	0°42.9	• • 32.5	251°03.4	•• 18.3	313°26.3	•• 15.7	44°26.2	• • 22.9	lun 22 C	CHA	Ma:: :
10	61°49.7	15°42.7	33.2	266°04.5	17.8	328°28.2	15.7	59°28.6	22.8	Jun 22 Sun	SHA 215°22.0	Mer.pass
11	76°52.1	30°42.5	33.9	281°05.6	17.2	343°30.0	15.6	74°31.0	22.8		315°22.8	08:57
12	91°54.6	45°42.3	N14°34.7	296°06.8	N11°16.7	358°31.8	N23°15.6	89°33.4	501°22.8	1	205°00.3	16:17
13	106°57.1	60°42.1	35.4	311°07.9	16.1	13°33.7	15.6	104°35.8	22.8	Jupiter		12:09
14	121°59.5	75°41.9	36.2	326°09.0	15.6	28°35.5	15.6	119°38.1	22.8	Saturn	357°41.7	06:07
15	137°02.0	90°41.7	36.9	341°10.2	• • 15.0	43°37.4	• • 15.6	134°40.5	22.7	Jun 23 Mon	SHA	Mer pass
16	157 02.0 152°04.5	105°41.5	37.6	356°11.3	14.5	58°39.2	15.6	149° 42.9	22.7			Mer.pass
		105 41.5 120°41.4						149 42.9 164° 45.3		1	314°19.5	08:57
17	167°06.9		38.4 N14°39.1	11°12.4	13.9 N110124	73°41.1	15.6 N23°15.6		22.7	1	204°28.2	16:15
18	182°09.4	135°41.2		26°13.5	N11°13.4	88°42.9		179°47.7	S01°22.7	Jupiter		12:06
19	197°11.8	150°41.0	39.8	41°14.7	12.8	103°44.7	15.6	194°50.1	22.6	Saturn	357°39.7	06:03
20	212°14.3	165°40.8	40.6	56° 15.8	12.3	118°46.6	15.6	209°52.5	22.6	<b>∐</b> a!-a4	al parallas	
21	227°16.8	180°40.6	• • 41.3	71°16.9	• • 11.7	133°48.4	• • 15.5	224°54.8	· · 22.6	norizont	al parallax	0.0
22	242°19.2	195°40.4	42.1	86° 18.0	11.2	148°50.3	15.5	239°57.2	22.6		Venus:	0.2
23	257°21.7	210°40.2	42.8	101°19.2	10.6	163°52.1	15.5	254°59.6	22.6		Mars:	0.1
Mare	ass. 05:53	1/_O 2/ 40	.7′ m-4.20	,,1 1/ d O	.5′ m1.45	1/1 Q/ d O	.0′ m-1.89	1/2 // 4 0	.0′ m0.99			
iviei.p	ass. 05.55	ν-0.2 d0	.7 111-4.20	$\nu_{1.1}$ u-0	.5 1111.45	$\nu_{1.0} u_{-0}$	.0 111-1.09	$\nu_{2.4}$ u=0	.0 1110.99			

h	Su			Moon			
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	179°33.8	N23° 26.3	243°42.9	9.7'	N13°52.9	15.3'	59.8'
1	194°33.6	26.3	$258^{\circ}11.6$	9.6'	14°08.2	15.2'	59.8'
2	209°33.5	26.3	272°40.1	9.5'	14°23.4	15.1'	59.8'
3	224°33.4	• • 26.3	287°08.6	9.4'	14°38.6	15.1'	59.9'
4	239°33.2 254°33.1	26.3	301°37.0 316°05.2	9.3'	14°53.7 15°08.7	15.0'	59.9'
5 6	269°33.0	26.3 N23° 26.3	310 05.2 330°33.4	9.2' 9.1'	N15°23.6	14.9' 14.8'	59.9' 59.9'
7	284°32.8	26.3	345°01.5	9.0'	15°38.4	14.8'	59.9'
8	299°32.7	26.3	359°29.4	8.9'	15°53.2	14.7'	59.9'
9	314°32.5	• • 26.3	13°57.3	8.7'	16°07.9	14.6'	60.0'
10	329°32.4	26.3	28°25.0	8.6'	$16^{\circ}22.5$	14.5'	60.0'
11	344°32.3	26.3	42°52.7	8.5'	16°37.0	14.4'	60.0'
12	359°32.1	N23°26.3	57°20.2	8.4'	N16°51.4	14.3'	60.0'
13 14	14°32.0 29°31.9	26.3 26.3	71°47.6 86°14.9	8.3' 8.2'	17°05.7 17°20.0	14.2' 14.1'	60.0' 60.0'
15	44°31.7	26.2	100°42.1	8.1	17°20.0	14.0'	60.0
16	59°31.6	26.2	115°09.2	8.0'	17°48.1	13.9'	60.1
17	74°31.5	26.2	129°36.2	7.9'	18°02.1	13.8'	60.1'
18	89°31.3	N23°26.2	144°03.1	7.8'	N18° 15.9	13.7'	60.1'
19	104°31.2	26.2	158°29.9	7.7'	18°29.7	13.6'	60.1'
20	119°31.0	26.2	172°56.5	7.5'	18°43.3	13.5'	60.1'
21	134°30.9 149°30.8	• • 26.2	187°23.1 201°49.5	7.4'	18°56.8	13.4'	60.1' 60.1'
22 23	149°30.8 164°30.6	26.2 26.2	201°49.5 216°15.8	7.3' 7.2'	19° 10.2 19° 23.5	13.3' 13.2'	60.1' 60.1'
23			210 13.0			15.2	00.1
	SD = 15.7'	d = 0.0'		SI	D = 16.3'		
Sun	<b>GHA</b> 179°30.5	<b>Dec</b> N23°26.1	<b>GHA</b> 230°42.0	u  7.1'	<b>Dec</b> N19°36.7	d 13.1'	HP 60.1'
0 1	179°30.5 194°30.4	N23 26.1 26.1	245°08.1	7.1° 7.0°	19° 49.8	13.1	60.1
2	209°30.2	26.1	259°34.1	6.9'	20°02.7	12.8'	60.2
3	224°30.1	• • 26.1	273°59.9	6.7'	20°15.6	12.7'	60.2'
4	239°29.9	26.1	288°25.7	6.6'	20°28.3	12.6'	60.2'
5	254°29.8	26.1	302°51.3	6.5'	20°40.9	12.5'	60.2'
6	269°29.7	N23°26.0	317°16.8	6.4'	N20°53.3 21°05.7	12.3'	60.2'
7 8	284°29.5 299°29.4	26.0 26.0	331°42.2 346°07.5	6.3' 6.2'	21°05.7 21°17.9	12.2' 12.1'	60.2' 60.2'
9	314°29.3	26.0	0°32.6	6.1	21°17.9	11.9'	60.2
10	329°29.1	25.9	14°57.7	5.9'	21°41.9	11.8'	60.2
11	344°29.0	25.9	29°22.6	5.8'	$21^{\circ}53.7$	11.7'	60.2'
12	359°28.9	N23°25.9	43°47.5	5.7'	N22°05.3	11.5'	60.2'
13 14	14°28.7 29°28.6	25.9 25.9	58°12.2 72°36.8	5.6' 5.5'	22°16.8 22°28.2	11.4' 11.2'	60.3' 60.3'
15	44°28.4	. 25.8	72 30.6 87°01.2	5.4'	22 20.2 22°39 4	11.1'	60.3
16	59°28.3	25.8	101°25.6	5.3'	22°50.5	10.9'	60.3
17	74°28.2	25.8	115°49.9	5.1'	23°01.4	10.8'	60.3'
18	89°28.0	N23°25.7	130°14.0	5.0'	N23°12.2	10.6'	60.3'
19	104°27.9	25.7	144°38.1	4.9'	23°22.8	10.5'	60.3'
20	119°27.8	25.7	159°02.0	4.8'	23°33.3	10.3'	60.3'
21 22	134°27.6 149°27.5	· · 25.7 25.6	173°25.8 187°49.5	4.7' 4.6'	23°43.6 23°53.8	10.2' 10.0'	60.3' 60.3'
23	164°27.4	25.6 25.6	202°13.1	4.5'	23 55.6 24°03.8	9.8'	60.3
20	SD = 15.7'	d = -0.0'			D = 16.4'	3.0	
N4	CUA		CHA		D		
Mon 0	<b>GHA</b> 179°27.2	<b>Dec</b> N23° 25.6	<b>GHA</b> 216°36.6	ν 4.4'	<b>Dec</b> N24°13.6	d 9.7'	<b>HP</b> 60.3'
1	194°27.1	25.5	231°00.0	4.3'	24°23.3	9.5'	60.3
2	209°26.9	25.5	245°23.3	4.2'	24°32.8	9.3'	60.3
3	224°26.8	•• 25.5	259°46.5	4.1'	24°42.1	9.2'	60.3'
4	239°26.7	25.4	274°09.6	4.0'	24°51.3	9.0'	60.3'
5	254°26.5	25.4 N23°25.4	288°32.6	3.9' 3.8'	25°00.3 N25°09.1	8.8'	60.3'
6 7	269°26.4 284°26.3	N23°25.4 25.3	302°55.5 317°18.2	3.8′	N25°09.1 25°17.7	8.6' 8.5'	60.3' 60.3'
8	299°26.1	25.3 25.3	331°40.9	3.6'	25° 17.7 25° 26.2	8.3'	60.3
9	314°26.0	25.2	346°03.6	3.5'	25°34.4	8.1	60.3'
10	329°25.9	25.2	0°26.1	3.4'	25°42.6	7.9'	60.3'
11	344°25.7	25.2	14°48.5	3.3'	25°50.5	7.7'	60.3'
12	359°25.6	N23°25.1	29°10.8	3.3'	N25°58.2	7.5'	60.3'
13 14	14°25.4 29°25.3	25.1 25.0	43°33.1 57°55.3	3.2' 3.1'	26°05.8 26°13.1	7.4' 7.2'	60.3' 60.3'
14 15	29 25.3 44°25.2	25.0	72°17.3	3.0'	26°20.3	7.2 7.0'	60.3
16	59°25.0	25.0	86°39.4	2.9'	26°27.3	6.8'	60.3
17	74°24.9	24.9	$101^{\circ}01.3$	2.9'	$26^{\circ}34.1$	6.6'	60.3'
18	89°24.8	N23°24.9	115°23.2	2.8'	N26°40.7	6.4'	60.3'
19	104°24.6	24.8	129°44.9	2.7'	26°47.1	6.2'	60.3'
20 21	119°24.5 134°24.4	24.8 •• 24.7	144°06.7 158°28.3	2.7' 2.6'	26°53.3 26°59.3	6.0' 5.8'	60.3' 60.2'
22	149°24.2	24.7	172°49.9	2.5'	20 59.5 27°05.1	5.6'	60.2
23	164°24.1	24.6	187°11.4	2.5'	27° 10.7	5.4'	60.2'
	SD = 15.7'	d = -0.0'		SI	D = 16.4'		

			2025 .	June 21	l to Ju	n. 23 l
Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junioc	Julisce	Civil	Naut.
N 72°						
<b>N</b> 70°						
68°						
66°		$\equiv$	$\equiv$		$\equiv$	$\equiv$
64°	7///	////	01:31	22:33	////	7///
62°	7777	////	02:10	21:54	////	////
60°	7777	00:50	02:36	21:28	23:14	////
N 58°	////	01:41	02:57	21:07	22:23	////
56°	1////	01:41	02.57	20:51	21:53	////
54°	00:45	02:11	03:13	20:31	21:31	23:18
52°	01:33	02:51	03:40	20:30	21:31	22:31
50°	02:01	02:31	03:51	20:24	20:58	22:03
45°	02:46	03:36	03.31	19:51	20:38	21:18
N 40°	03:17	03:59	04:32	19:33	20:05	20:47
35°	03:40	04:17	04:47	19:17	19:47	20:24
30°	03:59	04:32	05:00	19:04	19:32	20:05
20°	04:28	04:57	05:22	18:42	19:07	19:36
N 10°	04:51	05:18	05:41	18:23	18:46	19:14
0°	05:10	05:36	05:58	18:06	18:28	18:55
<b>S</b> 10°	05:27	05:53	06:16	17:48	18:11	18:37
$20^{\circ}$	05:43	06:10	06:34	17:30	17:54	18:21
$30^{\circ}$	05:59	06:29	06:56	17:08	17:35	18:05
$35^{\circ}$	06:08	06:40	07:08	16:56	17:24	17:56
40°	06:18	06:52	07:22	16:42	17:12	17:47
45°	06:28	07:05	07:39	16:25	16:59	17:36
<b>S</b> 50°	06:40	07:21	08:00	16:04	16:43	17:24
52°	06:45	07:29	08:10	15:54	16:35	17:19
54°	06:51	07:37	08:21	15:43	16:27	17:13
56°	06:57	07:46	08:34	15:31	16:18	17:07
58°	07:04	07:56	08:48	15:16	16:08	17:00
<b>S</b> 60°	07:11	80:80	09:06	14:58	15:56	16:53
1 -4		Moonris	e		Moonset	:
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
N 72°						
<b>N</b> 70°	21:49			18:46		
68°	22:37			18:00	$\equiv$	$\equiv$
66°	23:09	22:04		17:30	20:35	
64°	23:32	23:10		17:08	19:31	
62°	23:51	23:45	23:37	16:50	18:56	21:16
60°	00:05	00:07	00:11	16:35	18:31	20:28
	00.03	00.01	00.11	10.55	10.51	20.20

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

	Sun		Moon			
Eqn.of	Time	Mer.	Mer.	Pass.	Age	
00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	25-27	
mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	26-9%	
01:45	01:51	12:02	08:02	20:29		
01:58	02:05	12:02	08:58	21:27		
02:11	02:18	12:02	09:58	22:30		
	00 <sup>h</sup> mm:ss 01:45 01:58	Eqn.of Time 00 <sup>h</sup> 12 <sup>h</sup> mm:ss mm:ss 01:45 01:51 01:58 02:05	Eqn. of Time 00h         Mer.           00h         12h         Pass hh:mm           mm:ss         mm:ss         hh:mm           01:45         01:51         12:02           01:58         02:05         12:02	Eqn. of Time 00h         Mer. 12h         Mer. Pass hh:mm         Mer. Upper hh:mm           01:45         01:51         12:02         08:02           01:58         02:05         12:02         08:58	Eqn. of Time 00h         Mer. Pass.           upper mm:ss         12h           mm:ss         hh:mm           upper hh:mm         Lower hh:mm           upper hh:mm         12h           upper hh:mm         12w           upper hi:mm         12w           upper	

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

1. 267/260 3 298 0 4 4 1 147/14 0 10 10 10 10 10 10 10 10 10 10 10 10 1	h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
2072   22   229   40   148   43   118   23   111   101   178   33   122   15   2070   20   172   20   20   20   20   20   20   20	Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
1 227°30 0 20°30 8 443 313°21.4 50 109°558 155 285°04 225 6 Solution 3.00°46 225 6 Solution													
2 302°291 2 379'39 4 450 146°225 000 208°37.0 155 300°08 225   3 317'35 300°30 47 2 101°25 000 208°35 155 315°02 2 225   5 347'35 300°30 47 2 101°25 000 208°35 156 315°02 2 225   5 347'35 300°30 47 2 101°25 000 208°35 156 315°02 2 225   6 2°39 30 315'38 447 9 200°27 0 111°08 2 200°05 0 123°15 1 30°13 30°12 2 24   15 347'35 300°30 47 2 101°25 0 156 2 286°63 154 15°127 2 24   15 347'35 30°30 47 2 101°25 0 156 2 286°63 154 15°127 2 24   15 347'35 30°13 8 447 9 200°27 0 111°08 2 200°30 154 157 2 24   15 347'35 30°13 8 15°13 8 164 2 25°23 2 105 2 286°63 154 15°127 2 24   15 10 6°48 15°48 0 50 0 206°31 5 6 6 30°12 1 154 15°127 2 24   16 6°48 15°48 0 50 0 206°31 5 6 6 30°12 1 154 1 15°127 2 24   16 10 6°48 1 15°48 0 50 0 206°31 5 6 20°31 1 10°40 1 10°40 2 23   16 10 6°48 1 15°48 1 15°48 1 1 10°40 1 10°											Alpheratz	357°34.4	29° 13.7
3 17*31.6 20*394.4 457 101*257 88.4 223*95.1 15.5 315*02.2 2.5 5.6 4.5 175*0.4 45.7 101*257 88.6 77.0 20*10.1 15.5 315*0.2 2.2 5.5 1.5 1.5 10*258.6 10*25.2 10*258.6											Ankaa	353°06.8	-42°09.8
4 302°340 300°300 45.5 170°248 073 24°010.3 15.5 330°14.6 22.5 4											Schedar	349°30.7	56°40.4
5 97"905 300"90											Diphda	348°47.0	-17°50.7
Fig. 12   190   191											Achernar	$335^{\circ}20.1$	-57°06.1
7 17"414 330"38.6											Hamal	327°50.9	23°34.9
8 32*419 30*384 40.4 238*283 50.7 29*08.7 15.4 30*22.1 2.4 According to 10.7 40.8 10*384 50.3 12.5 10.1 21.5 40.8 10.3 10.3 10.3 10.3 10.3 10.3 10.3 10.3											Polaris	$314^{\circ}10.9$	89°22.0
10											Acamar	315°11.8	-40°11.9
Minfall   Minf											Menkar	314°06.0	4°11.4
10   10   10   10   10   10   10   10											Mirfak	308°28.1	49° 56.9
19											Aldebaran	290°39.5	16°33.6
14   1275-12   128   1											I	281°03.8	-8°10.3
13   127-827													46°01.4
13   13   13   13   13   13   13   13													6°22.4
13   13   13   13   13   13   13   13											1		28° 37.7
Betalgene											l .		-1°11.1
Campas   C											I		7°24.7
1989   1889													-52°42.5
1987   13.5   1987   36.6				N14°56.7				N23° 15.3					-16°45.0
21 2 23 23 13.4 13.5 3.6 1.8 2.5 2.5 4.7 4.7 5.8 1.1 19.3 0.8 1.1 5.3 2.5 1.5 2.2 2.1 1.5 2.2 2.1 1.5 2.2 2.1 1.5 2.2 2.1 1.5 2.5 2.2 2.1 1.5 2.1 1.5						10°59.6					1		-29°00.4
228 28 19 28 19 28 19 28 19 28 19 28 19 28 19 28 19 28 28 28 28 28 28 28 28 28 28 28 28 28	20			58.2		59.1		15.3		22.1			5°09.6
24 243 16.4 16.5 16.5 16.5 16.5 16.5 16.5 16.5 16.5													27°57.9
Mer.pass   Of. 196											1		-59°35.6
Mer. pass: 05:49	23	$258^{\circ}20.8$	210°35.4	15°00.4	101°46.2	57.4	164°36.4	15.3	255°56.9	22.1	I		-59 35.0 -43°32.3
Wed GHA GHA CHA   CHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   Decebola   39°340.7    273°323   22°352   23°2532   23°2532   23°352   23°3532   23°3532   23°3532   23°3532   23°3532   23°3532   23°3532   23°3532   23°3532   23°3532   23°3532   23°3532   23°3532   23°3532   23°3532   23°3532   23°3532   23°3532   23°35333   23°3533   23°3533   23°3533   23°3533   23°3533   23°3533   23°3533   23°3533   23°3533   23°3533   23°3533   23°3533   23°3533   23°3533   23°3533   23°3533   23°3533   23°3533   23°3533	Mar	255 UE-40	1/-D 2/ 4D	7' m / 10	,,1 1/ A C	16' m1 45	1/1 Q/ J O	0' m 1 90	1/2 A/ d O	0' m0 00	I		-43 32.3 -69°49.5
CHA	ivier.p	ass. 00.49	ν-0.2 d0	., 111-4.19	ν 1.1 α-0	.0 1111.45	ν1.0 U-U	.0 111-1.09	ν2.4 <b>u</b> -0	.0 1110.99			-8°46.2
O 273°23 3 225°52 N15°01.1 In 6°473 N10°58.3 IP 9°38.2 N22°15.3 270°59.3 S0°12.0 Denebbox 182°24.6   1 288°258 240°34.9 01.8 131°46.4   56.3 144°40.1 15.3 286°10.7   22.0 Genah 175°43.2   1.3   2 30°20.2 255°44.7   02.6 146′49.5   55.7 209°41.9   15.3 286°10.7   22.0 Acrus 172°59.7   3 318°30.2 255°44.7   02.6 146′49.5   55.7 209°41.9   15.3 286°10.7   22.0 Acrus 172°59.7   3 318°30.2 255°44.7   02.6 146′49.5   55.7 209°41.9   15.2 316°65.5   20.0   3 318°30.2 255°44.7   02.6 146′49.5   55.7 209°41.9   15.2 316°65.5   20.0   6 3°38.1   315°33.9 N15°05.5   206°54.0 N10°35.5   266°44.7   15.2 246°11.3   21.9   5 484°35.6   300°43.1   04.7   101°52.9   244°47.4   15.2 246°11.3   21.9   6 3°38.1   315°33.9 N15°05.5   206°54.0 N10°35.5   269°40.3 N12°15.2   16°16.1   21.9   Alciad 152°51.5   8 33°43.0 345°33.5   00.9   236°56.3   52.4   299°52.9   15.2   31°16.5   21.9   Alciad 152°51.5   9 48°45.5   0°33.2   0°0.9   236°56.3   52.4   299°52.9   15.2   31°16.5   21.9   Alciad 147°57.0   10 63°48.0   15°33.0   00.4   266°85.5   51.3   329°56.6   15.2   61°32.2   21.8   Accuracy 147°57.0   11 78°50.4   30°32.8   00.1   231°59.7   50.8   344°58.5   15.1   60°30.4   21.8   Accuracy 147°57.0   12 93°52.9   45°32.6   N15°00.8   207°00.8   N10°50.2   0°00.3   N22°15.1   51°30.0   001°21.8   Accuracy 147°57.0   14 123°57.8   75°32.2   11.3   327°03.0   49.1   30°40.6   15°01.1   151°30.0   00°20.4   21.8   Alciad 147°57.0   15 139°03.3   90°31.9   12.0   342°04.1   445.5   45°56.8   15.1   151°37.6   21.7   Alciad 147°57.0   16 154°07.7   100°31.7   12.7   357°05.3   48.0   60°07.7   15.1   151°37.6   21.7   Sabbi  100°30.4   21.8   Alciad 197°08.4   21.8   Alciad 197°08.4   21.8   Alciad 197°08.4   21.8   Alciad 197°08.4   21.8   Alciad 197°08.4   21.8   Alciad 197°08.4   21.8   Alciad 197°08.4   21.8   Alciad 197°08.4   21.8   Alciad 197°08.4   21.8   Alciad 197°08.4   21.8   Alciad 197°08.4   21.8   Alciad 197°08.4   21.8   Alciad 197°08.4   21.8   Alciad 197°08.4   21.8   Alciad 197°08.4   21.8   Alciad 197°08.4   21													-6 40.2 11°50.6
288   286	Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	1		61°37.1
2 2 36°28.2 26°54.7 0 0.8 131°48.4 50.3 194°40.0 15.3 280°0.1 22.0 General 179°5.20 1.3 318°30.7 270°34.5 0.03.3 161°50.7 0.55.2 224°43.7 15.2 316°06.5 0.22.0 General 179°5.20 1.3 318°30.7 270°34.5 0.03.3 161°50.7 0.55.2 224°43.7 15.2 316°06.5 0.22.0 General 179°5.1 1.5 1.5 318°30.7 270°34.5 0.03.3 161°50.7 0.55.2 224°43.7 15.2 316°06.5 0.22.0 General 179°5.1 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	0										l l		14°25.9
3 318°307 20°345 0.02.6 146°495 55.7 209°41,9 15.2 301°06.5 0.22.0 Acros. 17.2°51.2 4 333°33.2 286°34.3 04.0 176°51.8 54.6 239°45.6 15.2 331°06.5 0.22.0 Acros. 171°51.7 5.5 5.2 24°47.4 15.2 331°06.9 2.2.0 Acros. 171°51.7 5.5 5.3 48°35.6 30°34.1 04.7 191°52.9 54.1 254°47.4 15.2 331°08.9 2.2.0 Aloih 166°12.5 6 33°36.1 315°33.9 N16°05.5 206°54.0 N10°53.5 269°49.3 N22°15.2 1913.7 501°21.9 Aloih 166°12.5 6 33°34.1 04.7 191°52.9 54.1 254°47.4 15.2 31°18.5 21.9 Aloih 166°12.5 6 34°45.5 0°33.2 0°0.9 236°56.3 52.4 299°52.9 15.2 31°18.5 21.9 Aloih 166°12.5 6 34°45.5 0°33.2 0°0.9 236°56.3 52.4 299°52.9 15.2 31°18.5 21.9 Aloih 166°12.5 6 34°11.2 15.0 1.2 1.9 Aloih 166°12.5 6 34°45.5 0°33.2 0°0.9 236°56.3 52.4 299°52.9 15.2 31°18.5 21.9 Aloih 166°12.5 6 34°12.0 1.2 1.0 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2											I		
3 318°30.7 270°34.5 .03.3 161°90.7 .55.2 224°43.7 .15.2 316°60.5 .22.0   Garno 171°51.2   318°30.7 220   Alloth 166°12.5 = 5 348°35.6 300°34.1 04.7 191°52.9 54.1 254°47.4 15.2 34°61.3 21.9   Spica 1828.2   Spica 1828													-17°41.1
Saling   S													-63°14.7
5 348°36.6 300°34.1 04.7 191°82.9 54.1 254°47.4 15.2 34°41.3 21.9 1610.6 12.9 17.7 18°40.6 330°33.7 06.2 221°55.2 530. 264°45.1 15.2 1616.1 21.9 1616											1		-57° 15.6
Special   Spec											I		55°49.5
8 33°3.0 348°3.0 348°3.5 06.9 236°56.3 52.4 299°52.9 15.2 31°18.2 19 Hadir 148°52.2 -€ 18 8 34°3.0 348°3.5 06.9 236°56.3 52.4 299°52.9 15.2 31°18.2 21.9 Hadir 148°52.2 -€ 18 10 6°34.0 15°3.0 08.4 266°88.5 15.3 392°56.6 15.2 61°22.2 21.8 11 78°50.4 30°32.8 00.1 281°9.7 50.8 344°58.5 15.1 76°25.6 21.8 11 78°50.4 30°32.8 00.1 281°9.7 50.8 344°58.5 15.1 76°25.6 21.8 11 78°50.4 30°32.8 00.1 281°9.7 50.8 344°58.5 15.1 16°30.4 21.8 Kochab 137'9.0 7 31.0 108°55.3 60°32.4 10.5 312°01.9 49.6 15°02.1 15.1 106°30.4 21.8 Kochab 137'9.0 7 31.1 128°37.8 75°32.2 11.3 32°03.0 49.1 30°04.0 15.1 121°38.2 21.8 Kochab 137'9.0 7 31.0 15°1.1 15°1.3 106°30.4 21.8 Kochab 137'9.0 7 31.0 15°1.1 15°1.3 106°30.4 21.8 Kochab 137'9.0 7 31.0 15°1.1 15°1.3 106°30.4 21.8 Kochab 137'9.0 7 31.0 15°1.1 15°1.3 106°30.4 21.8 Kochab 137'9.0 7 31.0 15°1.1 15°1.3 106°30.4 21.8 Kochab 137'9.0 7 31.0 15°1.1 15°1.3 106°30.4 21.8 Kochab 137'9.0 7 31.0 15°1.1 15°1.3 106°30.4 21.8 Kochab 137'9.0 7 31.0 15°1.1 15°1.3 106°30.4 21.8 Kochab 137'9.0 7 31.0 15°1.1 15°1.3 106°30.4 21.8 Kochab 137'9.0 7 31.0 15°1.1 15°1.3 106°30.4 21.8 Kochab 137'9.0 7 31.0 15°1.1 15°1.3 106°30.4 21.8 Kochab 137'9.0 7 31.0 15°1.1 15°1.3 106°30.4 21.8 Kochab 137'9.0 7 31.0 15°1.1 15°1.3 106°30.4 21.8 Kochab 137'9.0 7 31.0 15°1.1 15°1.3 106°30.4 21.8 Kochab 137'9.0 7 31.0 15°1.1 15°1.3 106°30.4 21.8 Kochab 137'9.0 7 31.0 15°1.1 15°1.3 106°30.4 21.8 Kochab 137'9.0 7 31.0 15°1.1 15°1.0 15°1.1 15													-11°17.7
8 33*43.0 345*33.5 06.9 236*66.3 52.4 299*52.9 15.2 31*18.5 21.9 Merkent 14*77.0 =   9 48*45.5 0*33.2 0*7.6 251*57.4 51.9 31*45*48 **1.52 46*20.8 21.9 10 63*48.0 15*33.0 08.4 266*8.5 51.3 329*56.6 15.2 61*23.2 21.8 11 78*50.4 30*28 001. 281*89.7 50.8 34*58.5 15.1 76*25.6 21.8 12.0 33*52.9 45*32.6 N15*09.8 29*70.8 N10*50.2 0**00.3 N23*15.1 01*28.0 501*21.8 Kochab 137*39.4 -6   13 1.08*55.3 60*52.4 10.5 312*01.9 446.6 15*02.1 15.1 106*32.0 501*21.8 Kochab 137*39.9 4.6   14 1.23*57.8 75*32.2 11.3 32*703.0 40.1 30*04.0 15.1 10*28.0 501*21.8 Kochab 137*39.0 4   15 139*00.3 90*31.9 12.0 342*64.1 48.5 45*05.8 15.1 136*32.2 12.8 Apheca 126*03.1 4   16 154*02.7 105*31.7 12.7 35*765.3 48.0 60*07.7 15.1 151*37.6 21.7   17 16*96.5 2 120*31.5 13.4 12*96.4 47.4 75*09.5 15.1 16*40.0 21.7   18 184*07.7 135*31.3 N15*14.2 2**075* N10*46.9 00**11.4 N23*15.1 181*24 501*21.7   5abil 190*01.1 150*31.1 14.9 42*08.6 46.3 105*13.2 15.1 190*44.8 501*21.7   19 190*01.1 150*31.1 14.9 42*08.6 46.3 105*13.2 15.1 106*44.8 21.7   21 24*12.6 165*30.8 15.6 57*09.8 45.8 120*15.0 115.0 211*51.0 211*51.0 2													49°11.4
9 48*45.5 0°33.2 · 0.76 25!°87.4 · 51.9 314*54.8 · 15.2 66*20.8 · 21.9 10 63*48.0 15*33.0 084 266*88.5 13.3 309*56.6 15.2 61*2.2 21.8 11.1 78*80.4 30*32.8 09.1 28!*99.7 80.8 34*58.5 15.1 76*26.6 21.8 18.1 178*80.4 30*32.8 09.1 28!*99.7 80.8 34*58.5 15.1 76*26.6 21.8 18.1 18.1 18.2 18.2 18.1 19.2 18.1 19.2 18.1 19.2 18.1 19.2 18.1 19.2 18.1 19.2 18.1 19.2 18.1 19.2 18.1 19.2 18.1 19.2 18.1 19.2 18.1 19.2 18.1 19.2 18.1 19.2 18.1 19.2 18.1 19.2 18.1 19.2 19.2 18.1 19.2 19.2 18.1 19.2 19.2 18.1 19.2 19.2 19.2 19.2 19.2 19.2 19.2 19													-60°30.0
10 63°48(0 15°33) 084 26°58;5 513 329°566 152 61°332 218 Rigil Ment. 130°394. 112 93°82.9 45°326 N15°08 207°08 N10°502 0°03 N23°151 91°360 51°218 130°394. 218 130°855.3 66°32.4 10.5 312°01.9 49.6 15°02.1 15:1 106°30.5 51°22.8 218 14 123′578. 75°32.2 11.3 327°03.0 49.1 30°04.0 15:1 121°32.8 218 Alpheca 120°03.1 24 121°578. 75°32.2 11.3 327°03.0 49.1 30°04.0 15:1 121°32.8 218 Alpheca 120°03.1 24 121°357.8 75°32.2 11.3 327°03.0 49.1 30°04.0 15:1 121°32.8 218 Alpheca 120°03.1 24 121°357.8 75°32.2 11.3 327°03.0 49.1 30°04.0 15:1 121°32.8 218 Atria 107°08.4 61 15°02.1 15°03.1 71.2 73°575.3 48.0 60°07.7 15:1 151°37.6 21.7 160°05.2 120°31.5 13.4 12°06.4 47.4 75′095.5 15:1 160°40.0 21.7 150°40.7 131°14.2 27°07.5 N10°46.9 00°11.4 N23°15:1 180°40.8 21.7 19.1 199°10.1 150°31.1 14.9 42°08.6 46.3 105°13.2 15:1 190°44.8 21.7 12.2 229°15.1 180°30.6 16.6 57°08.8 45.8 120°15.0 15.0 211°47.2 21.7 12.2 229°15.1 180°30.6 16.6 57°08.8 45.8 120°15.0 15.0 211°47.2 21.7 12.2 229°15.1 180°30.6 16.3 72°10.9 45.2 135°16.9 15.0 226°49.6 21.6 Veg 80°32.5 22 244°17.5 195°30.4 17.0 87°12.0 44.6 150°18.7 15.0 241°6.1 9.2 16.6 Nunki 75°46.9 24.0 16°48.2 16.0 160°40.2 16.0 160°40.2 16.0 160°40.2 16.0 160°40.2 16.0 160°40.2 16.0 15.0 256°54.3 21.6 Nunki 75°46.9 24.0 16°40.2 16.0 160°40.2 16.0 16.0 16.0 16.0 16.0 16.0 16.0 16.0											1		-36°29.9
11 78°80.4 30°32.8 09.1 281°50.7 50.8 344°85.5 15.1 76°25.6 21.8 No. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.											l .		19°03.1
13   198° 52.9   45° 32.6   N15° 09.8   297° 00.8   N10° 50.2   0° 00.3   N23° 15.1   91° 28.0   50° 121.8   205° 121.8   13° 13° 121.5   13° 120° 121.8   13° 13° 121.5   13° 12° 121.8   14   123° 57.8   75° 32.2   11.3   32°° 03.0   49.1   30° 04.0   15.1   121° 32.8   21.8   Alpheca   126° 03.1   2.8   15° 139° 03.0   90° 31.9   1.12.0   342° 04.1   48.5   45° 05.8   15.1   136° 35.4   21.8   Atria   107° 08.4   4.5   15° 12.1   15° 12.1   15° 22.1   15° 12.1   15°											_		-60°56.7
13 108°553 60°32.4 10.5 312°0.19 49.6 15°0.21 15.1 106°30.4 21.8 14 12°357.8 75°32.2 11.3 32°0.30 491.1 30°40.4 15.1 121°32.8 21.8 1.5 130°0.3 90°31.9 · · · · 12.0 342°0.4 1 · · · · · · · · · · · · · · · · · ·											Kochab		74°03.2
14   123°678   75°322   11.3   327°03.0   49.1   30°04.0   15.1   121°328   21.8   18   18   18   15.1   15.1   136°35.2   21.8   18   18   18   18   18   18   18											Zuben'ubi	136°55.4	-16°08.9
15   139°00.3   90°31.9   0.12.0   342°04.1   0.48.5   45°05.8   0.15.1   136°35.2   0.21.8   Africa 107°08.4   0.69°07.7   0.15.1   1.16°05.2   0.17   0.16°05.2   1.20°31.5   1.3.4   12°06.4   47.4   75°09.5   1.5.1   1.16°40.0   0.17.7   1.17   1.16°05.2   1.20°31.5   1.3.4   12°06.4   47.4   75°09.5   1.5.1   1.16°40.0   0.17.7   1.17   1.16°05.2   1.20°31.3   N15°14.2   27°07.5   N10°46.9   90°11.4   N23°15.1   1.11°42.4   S01°21.7   Shaula   60°09.4   -2.16   0.20°21.7   0.20°21.7   0.20°21.7   0.21°10.3   0.15°31.1   1.19   42°08.6   46.3   105°13.2   1.5.1   1.50°48.6   2.1.7   0.21°47.2   0.21°47.5   1.50°30.6   1.6.3   72°10.9   0.45.2   135°16.9   0.15.0   211°47.2   21.6   0.20°49.6   0.21°49.2   0.20°49.6   0.21.6   0.20°49.6   0.21.6   0.20°49.6   0.21°49.2   0.20°49.6   0.21°49.2   0.20°49.6   0.21°49.2   0.21											Alphecca	126°03.1	26°37.8
16 154°02.7 105°31.7 12.7 357°05.3 48.0 60°07.7 15.1 151°37.6 21.7 Sabik 102°02.0 1-1 17 169°05.2 120°31.5 13.4 12°06.4 47.4 75°09.5 15.1 160°40.0 21.7 Sabik 102°02.0 1-1 18 184°07.7 135°31.3 N15°14.2 27°07.5 N10°46.9 90°11.4 N23°15.1 181°42.4 501°21.7 191°99°10.1 150°31.1 14.9 42°08.6 46.3 105°13.2 15.1 196°44.8 21.7 191°99°10.1 150°31.1 14.9 42°08.6 46.3 105°13.2 15.1 196°44.8 21.7 191°14.2 22°15.5 180°30.6 16.5 57°09.8 45.8 120°15.0 15.0 211°47.2 21.7 191°22.0 4.6 150°18.7 15.0 226°49.6 21.6 Vega 80°32.5 122 244°17.5 195°30.4 17.0 87°12.0 44.6 150°18.7 150. 226°49.6 21.6 Vega 80°32.5 122 244°17.5 195°30.4 17.0 87°12.0 44.6 150°18.7 150. 226°49.6 21.6 Vega 80°32.5 122 244°15.1 92°30.4 17.0 87°12.0 44.6 150°18.7 150. 226°49.6 21.6 Vega 80°32.5 12.6 Vega 80°32.5 12.5 Vega 80°											Antares	112°15.0	-26° 29.4
18 184°07.7 135°31.3 N15°14.2 27°07.5 N10°46.9 90°11.4 N23°15.1 166°40.0 21.7 Shaula 96°09.4 - 21.0 19 199°10.1 150°31.1 14.9 42°08.6 46.3 105°13.2 15.1 196°44.8 21.7 Etalain 96°09.4 - 22.0 214°12.6 165°30.8 15.6 57°09.8 45.8 120°15.0 15.0 211°47.2 21.7 Etalain 90°41.5 22.2 244°17.5 195°30.4 17.0 87°12.0 44.6 150°18.7 15.0 226°49.6 - 21.6 Vega 80°32.5 3.0 23 259°20.0 210°30.2 17.8 102°13.1 44.1 165°20.6 15.0 240°51.9 21.6 Nunki 75°40.9 - 22.0 244°17.5 195°30.4 17.0 87°12.0 44.6 150°18.7 15.0 241°51.9 21.6 Nunki 75°40.9 - 22.0 240°29.1 17.8 102°13.1 44.1 165°20.6 15.0 256°54.3 21.6 Nunki 75°40.9 - 22.4 0°2.2 d0.7 m-4.18											Atria	107°08.4	-69°04.5
18											Sabik	102°02.0	-15°45.4
19   199°10.1   150°31.1   14.9   42°08.6   46.3   105°13.2   15.1   196°44.8   21.7											Shaula	96°09.4	-37°07.4
20 214°12.6 165°30.8 1.5.6 57°09.8 45.8 120°15.0 15.0 211°47.2 21.7 (August 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5											Rasalhague	95°57.9	12°32.5
21 229°15.1 180°30.6 · · 16.3 72°10.9 · · 45.2 135°16.9 · · 15.0 226°49.6 · · · 21.6 222 244°17.5 195°30.4 17.0 87°12.0 44.6 150°18.7 15.0 241°51.9 21.6 Nunki 75°46.9 · 2 325°9°20.0 210°30.2 17.8 102°13.1 44.1 165°20.6 15.0 265°54.3 21.6 Nunki 75°46.9 · 2 4 Altair 61°92.0 Nunki 75°46.9 · 2 Altair 61°92.0 · 2 Altair 61°92.0 · 2 Altair 61°92.0 · 2 Altair 61°92.0											Eltanin	90°41.5	51°29.1
Number   Section   Secti											Kaus Aust.		-34°22.3
Mer.pass. 05:45   V-0.2' d0.7' m-4.18   V1.1' d-0.6' m1.46   V1.8' d-0.0' m-1.89   V2.4' d-0.0' m0.99   Peacock   53°0.46   Enf (6°59.3 3)											Vega	80°32.5	38°48.4
Mer.pass. 05:45   V-0.2' d0.7' m-4.18   V1.1' d-0.6' m1.46   V1.8' d-0.0' m-1.89   V2.4' d-0.0' m0.99													-26° 15.9
Mer.pass. 05:45   ν-0.2' d0.7' m-4.18   ν1.1' d-0.6' m1.46   ν1.8' d-0.0' m-1.89   ν2.4' d-0.0' m0.99   Peacock   53°04.6   52   53°04.6   52   53°04.6   54   53°04.6   54   53°04.6   55°04.6   55°0	23	259°20.0	210°30.2	17.8	102°13.1	44.1	165°20.6	15.0	256°54.3	21.6	l .		8°56.1
Thu GHA GHA Dec GHA DEC GHA DEC GHA DEC GHA DEC GHA DEC GHA DEC GHA DEC GHA DEC GHA DE	Mer n	ass 05:45	$\nu$ -0.2' d0	7′ m-4 18	$\nu 1.1' d-0$	1 6' m1 46	$\nu$ 1 8' d-0	0′ m-1.89	ν2 4' d-0	0′ m0 99	I		-56° 39.0
Thu GHA GHA Dec GHA De	- wici.p		- 0.2 00	7.10	ν 1.1 U-C		₽ 1.0 U-0	1.09	u-0	.5 1110.33			45°22.1
Thu GHA GHA Dec GHA De													9°59.5
0 274°22.5 225°30.0 N15°18.5 117°14.3 N10°43.5 180°22.4 N23°15.0 271°66.7 S01°21.6 1 289°24.9 240°29.7 19.2 132°15.4 43.0 195°24.3 15.0 286°59.1 21.6 2 304°27.4 255°29.5 19.9 147°16.5 42.4 210°26.1 15.0 302°01.5 21.6 317°03.9 . 21.5 434.7 2 315°32.8 285°29.1 21.4 177°18.7 41.3 240°29.8 15.0 332°06.3 21.5 439°34.8 300°28.8 22.1 192°19.9 40.7 255°31.6 14.9 347°08.7 21.5 434°34.7 2.15 44.9 225°37.9 1.0 14.9 347°08.7 21.5 44.9 225°31.6 14.9 347°08.7 21.5 44.9 225°31.6 14.9 347°08.7 21.5 44.9 225°31.6 14.9 347°08.7 21.5 44.9 225°31.6 14.9 347°08.7 21.5 44.9 225°31.6 14.9 347°08.7 21.5 44.9 225°31.6 14.9 347°08.7 21.5 44.9 225°31.6 14.9 347°08.7 21.5 44.9 225°31.6 14.9 347°08.7 21.5 44.9 225°31.6 14.9 347°08.7 21.5 44.9 225°31.6 14.9 347°08.7 21.5 44.9 225°31.6 14.9 347°08.7 21.5 44.9 225°31.6 14.9 347°08.7 21.5 44.9 225°31.6 14.9 347°08.7 21.5 44.9 225°31.6 14.9 347°08.7 21.5 44.9 225°31.6 14.9 347°08.7 21.5 44.9 32°15.9 21.4 49 32°1	Thu										1		-46°50.0
1 289°24.9 240°29.7 19.2 132°15.4 43.0 195°24.3 15.0 286°59.1 21.6 21.6 25°29.5 19.9 147°16.5 42.4 210°26.1 15.0 302°01.5 21.6 319°29.8 270°29.3 · 20.6 162°17.6 · 41.9 225°27.9 · 15.0 317°03.9 · 21.5 4334°32.3 285°29.1 21.4 177°18.7 41.3 240°29.8 15.0 332°06.3 21.5 349°34.8 300°28.8 22.1 192°19.9 40.7 255°31.6 14.9 347°08.7 21.5 7 19°39.7 330°28.4 23.5 222°22.1 39.6 225°35.3 14.9 17°13.5 21.5 7 19°39.7 330°28.4 23.5 222°22.1 39.6 225°35.3 14.9 17°13.5 21.5 21.5 21.5 21.5 21.5 21.5 21.5 21	0												-29°29.1
2 304°27.4 255°29.5 19.9 147°16.5 42.4 210°26.1 15.0 302°01.5 21.6 319°29.8 270°29.3 · 20.6 162°17.6 · 41.9 225°27.9 · 15.0 317°03.9 · 21.5 4 334°32.3 285°29.1 21.4 177°18.7 41.3 240°29.8 15.0 332°06.3 21.5 5 349°34.8 300°28.8 22.1 192°19.9 40.7 255°31.6 14.9 347°08.7 21.5 6 4°37.2 315°28.6 N15°22.8 207°21.0 N10°40.2 270°33.5 N23°14.9 2°11.1 501°21.5 Mars 203°56.1 Jupiter 266°29.8 34°42.2 345°28.1 24.2 237°23.2 39.1 300°37.2 14.9 32°15.9 21.4 10 64°47.1 15°27.7 25.7 267°25.5 38.0 330°40.8 14.9 47°18.3 · 21.4 11 79°49.6 30°27.5 26.4 282°26.6 37.4 345°42.7 14.9 47°18.3 · 21.4 11 79°49.6 30°27.5 26.4 282°26.6 37.4 345°42.7 14.9 77°23.1 21.4 12 94°52.0 45°27.2 N15°27.1 297°27.7 N10°36.8 0°44.5 N23°14.9 92°25.5 501°21.4 124°56.9 75°26.8 28.5 327°30.0 35.7 30.8 8.2 14.8 122°30.3 21.3 15°19.9 105°54.5 60°27.0 27.8 312°28.8 36.3 15°46.4 14.8 107°27.9 21.4 142°56.9 75°26.8 28.5 327°30.0 35.7 30.8 8.2 14.8 122°30.3 21.3 15°19.9 105°26.3 30.0 357°32.2 34.6 60°51.9 14.8 152°35.1 21.3 19°59.4 90°26.5 · 29.2 342°31.1 · 35.2 45°50.1 · 14.8 137°32.7 · 21.3 18 185°06.8 135°25.6 N15°31.4 27°34.5 N10°33.5 90°55.6 N23°14.8 182°39.9 501°21.3 19°20°09.3 150°25.6 32.1 42°35.6 32.9 105°57.4 14.8 197°42.3 21.3 19°20°09.3 150°25.6 32.1 42°35.6 32.9 105°57.4 14.8 197°42.3 21.3 19°20°09.3 150°25.6 32.1 42°35.6 32.9 105°57.4 14.8 197°42.3 21.3 140°22.4 180°25.1 · 33.5 72°37.8 · 31.8 136°01.1 · 14.7 227°47.0 · 21.2 22°47.0 · 21.2 22°45°16.7 195°24.9 34.2 87°38.9 31.2 151°03.0 14.7 242°49.4 21.2 140°22.2 245°16.7 195°24.9 34.2 87°38.9 31.2 151°03.0 14.7 242°49.4 21.2 140°24.9 34.9 102°40.1 30.7 166°04.8 14.7 257°51.8 21.2 140°22.2 140°													28° 13.1
3 319°29.8 270°29.3 · · · 20.6 162°17.6 · · · 41.9 225°27.9 · · 15.0 317°03.9 · · 21.5   4 334°32.3 285°29.1 21.4 177°18.7 41.3 240°29.8 15.0 332°06.3 21.5   5 349°34.8 300°28.8 22.1 192°19.9 40.7 255°31.6 14.9 347°08.7 21.5   6 4°37.2 315°28.6 N15°22.8 207°21.0 N10°40.2 270°33.5 N23°14.9 2°11.1 S01°21.5   7 19°39.7 330°28.4 23.5 222°22.1 39.6 285°35.3 14.9 17°13.5 21.5   8 34°42.2 345°28.1 24.2 237°23.2 39.1 300°37.2 14.9 32°15.9 21.4   9 49°44.6 0°27.9 · · 25.0 252°24.4 · · · 38.5 315°39.0 · · · 14.9 47°18.3 · · · 21.4   10 64°47.1 15°27.7 25.7 267°25.5 38.0 330°40.8 14.9 62°20.7 21.4   11 79°49.6 30°27.5 26.4 282°26.6 37.4 345°42.7 14.9 77°23.1 21.4   12 94°52.0 45°27.2 N15°27.1 297°27.7 N10°36.8 0°44.5 N23°14.9 92°25.5 S01°21.4   13 100°54.5 60°27.0 27.8 312°28.8 36.3 15°46.4 14.8 107°27.9 21.4   14 124°56.9 75°26.8 28.5 327°30.0 35.7 30°48.2 14.8 122°30.3 21.3   15 139°59.4 90°26.5 · · · 29.2 342°31.1 · · · 35.2 45°50.1 · · · 14.8 137°32.7 · · · 21.3   16 155°01.9 105°26.3 30.0 357°32.2 34.6 60°51.9 14.8 152°35.1 21.3   17 170°04.3 120°26.1 30.7 12°33.3 34.0 75°53.7 14.8 167°37.5 21.3   18 185°06.8 135°25.8 N15°31.4 27°34.5 N10°33.5 90°55.6 N23°14.8 182°39.9 S01°21.3   19 200°09.3 150°25.6 32.1 42°35.6 32.9 105°57.4 14.8 197°42.3 21.3   20 215°11.7 165°25.4 32.8 57°36.7 32.4 120°59.3 14.8 197°42.3 21.3   21 230°14.2 180°25.1 · · 33.5 72°37.8 · · · · · · · · · · · · · · · · · · ·	2												15°20.5
5 349°34.8 300°28.8 22.1 192°19.9 40.7 255°31.6 14.9 347°08.7 21.5 66 4°37.2 315°28.6 N15°22.8 207°21.0 N10°40.2 270°33.5 N23°14.9 2°11.1 501°21.5 Mars 203°56.1 7 19°39.7 330°28.4 23.5 222°22.1 39.6 285°35.3 14.9 17°13.5 21.5 8 34°42.2 345°28.1 24.2 237°23.2 39.1 300°37.2 14.9 32°15.9 21.4 19.1 15°27.7 25.7 267°25.5 38.0 330°40.8 14.9 47°18.3 · 21.4 11 79°49.6 30°27.5 26.4 282°26.6 37.4 345°42.7 14.9 77°23.1 21.4 12 94°52.0 45°27.2 N15°27.1 297°27.7 N10°36.8 0°44.5 N23°14.9 92°25.5 501°21.4 14 124°56.9 75°66.8 28.5 327°30.0 35.7 30°48.2 14.8 122°30.3 21.3 15°39.0 14.2 120°26.1 30.7 12°33.3 34.0 60°51.9 14.8 152°35.1 21.3 17°10°40.3 120°26.1 30.7 12°33.3 34.0 75°53.7 14.8 166°37.5 21.3 18 185°06.8 135°25.8 N15°31.4 27°34.5 N10°33.5 90°55.6 N23°14.8 182°39.9 501°21.3 18 185°06.8 135°25.4 32.8 57°36.7 32.4 120°59.3 14.8 197°42.3 21.3 199°42.3 21.3 20°251.8 22 245°16.7 195°24.9 34.2 87°38.9 31.2 151°03.0 14.7 242°49.4 21.2 23°24.6 34.9 102°40.1 30.7 166°04.8 14.7 257°51.8 21.2 Mars: 200°51.8 14.0 14.0 14.0 14.7 227°47.0 · · · · · · · · · · · · · · · · · · ·													
6 4°37.2 315°28.6 N15°22.8 207°21.0 N10°40.2 270°33.5 N23°14.9 2°11.1 S01°21.5   Mars 203°56.1   T19°39.7 330°28.4 23.5 222°22.1 39.6 285°35.3 14.9 17°13.5 21.5   Saturn 357°37.8   Saturn 357°	4		$285^{\circ}29.1$			41.3		15.0		21.5			Mer.pass
7 19°39.7 330°28.4 23.5 222°22.1 39.6 285°35.3 14.9 17°13.5 21.5 8 34°42.2 345°28.1 24.2 237°23.2 39.1 300°37.2 14.9 32°15.9 21.4 9 49°44.6 0°27.9 · · · 25.0 252°24.4 · · · 38.5 315°39.0 · · · 14.9 47°18.3 · · · 21.4 10 64°47.1 15°27.7 25.7 267°25.5 38.0 330°40.8 14.9 62°20.7 21.4 11 79°49.6 30°27.5 26.4 282°26.6 37.4 345°42.7 14.9 77°23.1 21.4 12 94°52.0 45°27.2 N15°27.1 297°27.7 N10°36.8 0°44.5 N23°14.9 92°25.5 S01°21.4 13 109°54.5 60°27.0 27.8 312°28.8 36.3 15°46.4 14.8 107°27.9 21.4 14 124°56.9 75°26.8 28.5 327°30.0 35.7 30°48.2 14.8 122°30.3 21.3 15 139°59.4 90°26.5 · · · 29.2 342°31.1 · · · 35.2 45°50.1 · · · 14.8 137°32.7 · · · 21.3 16 155°01.9 105°26.3 30.0 357°32.2 34.6 60°51.9 14.8 152°35.1 21.3 18 185°06.8 135°25.8 N15°31.4 27°34.5 N10°33.5 90°55.6 N23°14.8 182°39.9 S01°21.3 19 200°09.3 150°25.6 32.1 42°35.6 32.9 105°57.4 14.8 197°42.3 21.3 21.3 20°251.8 320°24.9 34.2 180°25.1 · · 33.5 72°37.8 · · 31.8 136°01.1 · · 14.7 227°47.0 · · · 21.2 21 230°14.2 180°25.1 · · 33.5 72°37.8 · · 31.8 136°01.1 · · 14.7 227°47.0 · · · · 21.2 21 230°14.2 180°25.1 · · 33.5 72°37.8 · · 31.8 136°01.1 · · 14.7 227°47.0 · · · · · · · · · · · · · · · · · · ·	5		300°28.8				255°31.6						08:57
8	6		315°28.6	N15°22.8		N10°40.2	270°33.5	N23°14.9		S01°21.5	1		16:13
9	7		330°28.4	23.5	222°22.1	39.6	285°35.3	14.9		21.5			12:03
10 64°47.1 15°27.7 25.7 267°25.5 38.0 330°40.8 14.9 62°20.7 21.4 179°49.6 30°27.5 26.4 282°26.6 37.4 345°42.7 14.9 77°23.1 21.4 12°45.0 45°27.2 N15°27.1 297°27.7 N10°36.8 0°44.5 N23°14.9 92°25.5 501°21.4 12°456.9 75°26.8 28.5 327°30.0 35.7 30°48.2 14.8 122°30.3 21.3 15 139°59.4 90°26.5 · 29.2 342°31.1 · 35.2 45°50.1 · 14.8 137°32.7 · 21.3 16 155°01.9 105°26.3 30.0 357°32.2 34.6 60°51.9 14.8 152°35.1 21.3 18 185°06.8 135°25.8 N15°31.4 27°34.5 N10°33.5 90°55.6 N23°14.8 182°39.9 S01°21.3 18 185°06.8 135°25.6 32.1 42°35.6 32.9 105°57.4 14.8 197°42.3 21.3 20°20°51.8 19 200°09.3 150°25.6 32.1 42°35.6 32.9 105°57.4 14.8 197°42.3 21.3 20°21.7 165°25.4 32.8 57°36.7 32.4 120°59.3 14.8 212°44.6 21.2 21 230°14.2 180°25.1 · 33.5 72°37.8 · 31.8 136°01.1 · 14.7 227°47.0 · 21.2 22 245°16.7 195°24.9 34.2 87°38.9 31.2 151°03.0 14.7 242°49.4 21.2 23 260°19.1 210°24.6 34.9 102°40.1 30.7 166°04.8 14.7 257°51.8 21.2     Jun 25 Wed SHA   Mens 203°24.0											Saturn	357°37.8	05:59
10 64 47.1 15 27.7 25.7 26.7 25.5 38.0 330 40.8 14.9 62 20.7 21.4 11 79° 49.6 30° 27.5 26.4 282° 26.6 37.4 345° 42.7 14.9 77° 23.1 21.4 12 94° 52.0 45° 27.2 N15° 27.1 297° 27.7 N10° 36.8 0° 44.5 N23° 14.9 92° 25.5 501° 21.4 13 109° 54.5 60° 27.0 27.8 312° 28.8 36.3 15° 46.4 14.8 107° 27.9 21.4 14 124° 56.9 75° 26.8 28.5 327° 30.0 35.7 30° 48.2 14.8 122° 30.3 21.3 15 139° 59.4 90° 26.5 ·· 29.2 342° 31.1 ·· 35.2 45° 50.1 ·· 14.8 137° 32.7 ·· 21.3 16 155° 01.9 105° 26.3 30.0 357° 32.2 34.6 60° 51.9 14.8 152° 35.1 21.3 18 185° 06.8 135° 25.8 N15° 31.4 27° 34.5 N10° 33.5 90° 55.6 N23° 14.8 182° 39.9 501° 21.3 19 200° 99.3 150° 25.6 32.1 42° 35.6 32.9 105° 57.4 14.8 197° 42.3 21.3 21.3 19 200° 99.3 150° 25.6 32.1 42° 35.6 32.9 105° 57.4 14.8 197° 42.3 21.3 21.3 21.3 21.3 21.3 21.3 21.3 2	9		0°27.9	• • 25.0	252°24.4	• • 38.5		• • 14.9		• • 21.4	lue 25 M/s 1	C L V	Mor noss
11	10	64°47.1		25.7	267°25.5	38.0	330°40.8	14.9		21.4			Mer.pass 08:58
12 94 5 2.0 45 27.2 N15 27.1 297 27.7 N10 36.8 0 44.5 N23 14.9 92 25.5 S01 21.4 109° 54.5 60° 27.0 27.8 312° 28.8 36.3 15° 46.4 14.8 107° 27.9 21.4 14.2 2° 30.3 21.3 15 139° 59.4 90° 26.5 · 29.2 342° 31.1 · 35.2 45° 50.1 · 14.8 137° 32.7 · 21.3 16 155° 01.9 105° 26.3 30.0 357° 32.2 34.6 60° 51.9 14.8 152° 35.1 21.3 17 170° 04.3 120° 26.1 30.7 12° 33.3 34.0 75° 53.7 14.8 167° 37.5 21.3 18 185° 06.8 135° 25.8 N15° 31.4 27° 34.5 N10° 33.5 90° 55.6 N23° 14.8 182° 39.9 S01° 21.3 19 200° 09.3 150° 25.6 32.1 42° 35.6 32.9 105° 57.4 14.8 197° 42.3 21.3 20 215° 11.7 165° 25.4 32.8 57° 36.7 32.4 120° 59.3 14.8 120° 44.6 21.2 21 230° 14.2 180° 25.1 · 33.5 72° 37.8 · 31.8 136° 01.1 · 14.7 227° 47.0 · 21.2 22 245° 16.7 195° 24.9 34.2 87° 38.9 31.2 151° 03.0 14.7 242° 49.4 21.2 23 260° 19.1 210° 24.6 34.9 102° 40.1 30.7 166° 04.8 14.7 257° 51.8 21.2	11	79°49.6	30°27.5	26.4	282°26.6	37.4	345°42.7	14.9	77°23.1	21.4			
13	12	94°52.0	45°27.2	N15°27.1	297°27.7	N10°36.8	0°44.5	N23°14.9	92°25.5	S01°21.4	l .		16:12
14		$109^{\circ}54.5$	60°27.0	27.8	312°28.8	36.3	15°46.4	14.8	107°27.9	21.4			12:00
15		$124^{\circ}56.9$	75°26.8	28.5	327°30.0	35.7	30°48.2	14.8	122°30.3	21.3	Saturn	30.0	05:55
16       155°01.9       105°26.3       30.0       357°32.2       34.6       60°51.9       14.8       152°35.1       21.3       Venus       311°07.5         17       170°04.3       120°26.1       30.7       12°33.3       34.0       75°53.7       14.8       167°37.5       21.3       Mars       202°51.8         18       185°06.8       135°25.8       N15°31.4       27°34.5       N10°33.5       90°55.6       N23°14.8       182°39.9       S01°21.3       Jupiter       266°00.0         19       200°09.3       150°25.6       32.1       42°35.6       32.9       105°57.4       14.8       197°42.3       21.3       Saturn       357°34.3         20       215°11.7       165°25.4       32.8       57°36.7       32.4       120°59.3       14.8       212°44.6       21.2         21       230°14.2       180°25.1       33.5       72°37.8       31.8       136°01.1       14.7       227°47.0       21.2       Horizontal parallax         22       245°16.7       195°24.9       34.2       87°38.9       31.2       151°03.0       14.7       242°49.4       21.2       Mars:         23       260°19.1       210°24.6       34.9       102°40.1       3		$139^{\circ}59.4$	90°26.5	• • 29.2	342°31.1	• • 35.2	45°50.1	• • 14.8	137°32.7		Jun 26 Thu	SHA	Mer.pass
17 170°04.3 120°26.1 30.7 12°33.3 34.0 75°53.7 14.8 167°37.5 21.3 18 185°06.8 135°25.8 N15°31.4 27°34.5 N10°33.5 90°55.6 N23°14.8 182°39.9 S01°21.3 19 200°09.3 150°25.6 32.1 42°35.6 32.9 105°57.4 14.8 197°42.3 21.3 20 215°11.7 165°25.4 32.8 57°36.7 32.4 120°59.3 14.8 212°44.6 21.2 21 230°14.2 180°25.1 · 33.5 72°37.8 · 31.8 136°01.1 · 14.7 227°47.0 · 21.2 22 245°16.7 195°24.9 34.2 87°38.9 31.2 151°03.0 14.7 242°49.4 21.2 23 260°19.1 210°24.6 34.9 102°40.1 30.7 166°04.8 14.7 257°51.8 21.2  Mars 202°51.8  Jupiter 266°00.0  Saturn 357°34.3  Horizontal parallax  Venus:  Mars:													08:58
18											1		16:10
19 200°09.3 150°25.6 32.1 42°35.6 32.9 105°57.4 14.8 197°42.3 21.3 20 215°11.7 165°25.4 32.8 57°36.7 32.4 120°59.3 14.8 212°44.6 21.2 21 230°14.2 180°25.1 · · 33.5 72°37.8 · · 31.8 136°01.1 · · 14.7 227°47.0 · · 21.2 22 245°16.7 195°24.9 34.2 87°38.9 31.2 151°03.0 14.7 242°49.4 21.2 23 260°19.1 210°24.6 34.9 102°40.1 30.7 166°04.8 14.7 257°51.8 21.2  Mars:													11:57
20 215°11.7 165°25.4 32.8 57°36.7 32.4 120°59.3 14.8 212°44.6 21.2 21 230°14.2 180°25.1 ·· 33.5 72°37.8 ·· 31.8 136°01.1 ·· 14.7 227°47.0 ·· 21.2 22 245°16.7 195°24.9 34.2 87°38.9 31.2 151°03.0 14.7 242°49.4 21.2 23 260°19.1 210°24.6 34.9 102°40.1 30.7 166°04.8 14.7 257°51.8 21.2  Mars:													05:51
21 230°14.2 180°25.1 ··· 33.5 72°37.8 ··· 31.8 136°01.1 ··· 14.7 227°47.0 ··· 21.2 Horizontal parallax 22 245°16.7 195°24.9 34.2 87°38.9 31.2 151°03.0 14.7 242°49.4 21.2 23 260°19.1 210°24.6 34.9 102°40.1 30.7 166°04.8 14.7 257°51.8 21.2 Mars:													00.01
22       245°16.7       195°24.9       34.2       87°38.9       31.2       151°03.0       14.7       242°49.4       21.2       Venus:         23       260°19.1       210°24.6       34.9       102°40.1       30.7       166°04.8       14.7       257°51.8       21.2       Mars:											Horizont	al parallax	
23 260°19.1 210°24.6 34.9 102°40.1 30.7 166°04.8 14.7 257°51.8 21.2 Mars:												Venus:	0.2
												Mars:	0.1
Wer.pass. Ub:42 $\nu$ -0.2' d0.7' m-4.17 $\nu$ 1.1' d-0.6' m1.47 $\nu$ 1.8' d-0.0' m-1.89 $\nu$ 2.4' d-0.0' m0.98													
	Mer.p	ass. 05:42	$\nu$ -0.2′ d0	. <i>t</i> ′ m-4.17	$\nu$ 1.1′ d-0	0.0′ m1.47	$\nu$ 1.8′ $d$ -0	.u′ m-1.89	$\nu$ 2.4′ d-0	.u′ m0.98			

h	Su	n	Moon					
Tue	GHA	Dec	GHA	ν	Dec	d	HP	
0	179°24.0	N23°24.6	201°32.9	2.4'	N27°16.2	5.2'	60.2'	
1	194°23.8	24.5	215°54.3	2.4'	27°21.4	5.0'	60.2'	
2	209°23.7	24.5	230°15.6	2.3'	$27^{\circ}26.4$	4.8'	60.2'	
3	224°23.6	• • 24.4	244°37.0	2.3'	27°31.2	4.6'	60.2'	
4	239°23.4	24.4	258°58.2	2.2'	27°35.8	4.4'	60.2'	
5	254°23.3	24.3	273°19.4	2.2'	27°40.2	4.2'	60.2'	
6	269°23.1 284°23.0	N23°24.3 24.2	287°40.6 302°01.7	2.1'	N27°44.4 27°48.4	4.0' 3.8'	60.2'	
7 8	284 23.0 299°22.9	24.2	302 01.7 316°22.8	2.1' 2.1'	27 48.4 27°52.2	3.6'	60.2' 60.1'	
9	314°22.7	• • 24.1	330°43.9	2.0'	27°55.8	3.4'	60.1	
10	329°22.6	24.0	345°04.9	2.0'	27°59.1	3.2'	60.1	
11	344°22.5	24.0	359°25.9	2.0'	28°02.3	3.0'	60.1'	
12	359°22.3	N23°23.9	13°46.9	2.0'	N28°05.2	2.7'	60.1'	
13	14°22.2	23.9	28°07.9	1.9'	$28^{\circ}08.0$	2.5'	60.1'	
14	29°22.1	23.8	42°28.8	1.9'	28°10.5	2.3'	60.1'	
15	44°21.9 59°21.8	· · 23.8 23.7	56°49.7 71°10.7	1.9' 1.9'	28°12.8 28°15.0	2.1' 1.9'	60.1'	
16 17	59 21.8 74°21.7	23.7	71 10.7 85°31.6	1.9'	28°16.9	1.7'	60.0' 60.0'	
18	89°21.5	N23°23.6	99°52.5	1.9'	N28°18.5	1.5'	60.0'	
19	104°21.4	23.5	114°13.4	1.9'	28°20.0	1.3'	60.0'	
20	119°21.3	23.4	128°34.3	1.9'	28°21.3	1.1'	60.0'	
21	134°21.1	• • 23.4	142°55.2	1.9'	28°22.3	0.8'	60.0'	
22	149°21.0	23.3	157°16.2	1.9'	28°23.2	0.6'	59.9'	
23	164°20.9	23.2	171°37.1	2.0'	28°23.8	0.4'	59.9'	
	SD = 15.7'	d = -0.1'		SI	D = 16.4'			
Wed	GHA	Dec	GHA	ν	Dec	d	HP	
vvea 0	<b>GПА</b> 179°20.7	N23°23.2	185°58.1	ν 2.0'	N28°24.3	<i>a</i> 0.2'	<b>пР</b> 59.9'	
1	194° 20.6	23.1	200°19.0	2.0'	28°24.5	0.2	59.9'	
2	209° 20.5	23.0	214°40.0	2.0'	28°24.5	-0.2'	59.9'	
3	224°20.3	• • 23.0	229°01.1	2.1'	28°24.3	-0.4'	59.9'	
4	239° 20.2	22.9	243°22.1	2.1'	28°23.9	-0.6'	59.8'	
5	254°20.0	22.8	257°43.2	2.1'	28°23.2	-0.8'	59.8'	
6	269° 19.9	N23°22.8	272°04.3	2.2'	N28°22.4	-1.0'	59.8'	
7	284° 19.8 299° 19.6	22.7 22.6	286°25.5 300°46.7	2.2' 2.3'	28°21.4 28°20.1	-1.2' -1.5'	59.8' 59.8'	
8 9	299 19.6 314°19.5	22.5	300 46.7 315°08.0	2.3'	28° 20.1 28° 18.7	-1.5 -1.7'	59.8 59.7'	
10	329° 19.4	22.5	329°29.3	2.4'	28°17.0	-1.9'	59.7'	
11	344° 19.2	22.4	343°50.6	2.4'	28°15.2	-2.1'	59.7'	
12	359° 19.1	N23°22.3	358°12.1	2.5'	N28°13.1	-2.3'	59.7'	
13	14° 19.0	22.2	12°33.5	2.5'	$28^{\circ}10.8$	-2.5'	59.7'	
14	29° 18.8	22.2	26°55.1	2.6'	28°08.4	-2.7'	59.6'	
15	44°18.7	• • 22.1	41°16.7	2.7'	28°05.7 28°02.8	-2.9' -3.1'	59.6'	
16 17	59° 18.6 74° 18.4	22.0 21.9	55°38.3 70°00.0	2.7' 2.8'	28°02.8 27°59.7	-3.1' -3.3'	59.6' 59.6'	
18	89° 18.3	N23°21.9	84°21.9	2.9'	N27°56.5	-3.5'	59.5	
19	104° 18.2	21.8	98°43.7	3.0'	27°53.0	-3.7'	59.5'	
20	119° 18.0	21.7	113°05.7	3.0'	27°49.4	-3.9'	59.5'	
21	134° 17.9	•• 21.6	127°27.7	3.1'	27°45.5	-4.0'	59.5'	
22	149° 17.8	21.5	141°49.9	3.2'	27°41.5	-4.2'	59.4'	
23	164°17.6	21.4	156°12.1	3.3'	27°37.2	-4.4'	59.4'	
	SD = 15.7'	d = -0.1'		SI	D = 16.3'			
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	179° 17.5	N23°21.4	170°34.4	3.4'	N27°32.8	-4.6'	59.4'	
1	194° 17.4	21.3	184°56.8	3.5'	27°28.2	-4.8'	59.4'	
2	209° 17.2 224° 17.1	21.2	199°19.2 213°41.8	3.6' 3.7'	27°23.4 27°18.4	-5.0' -5.2'	59.3'	
3 4	224°17.1 239°17.0	· · 21.1 21.0	213°41.8 228°04.5	3.7° 3.8'	27°18.4 27°13.2	-5.2′ -5.4′	59.3' 59.3'	
5	259 17.0 254°16.9	20.9	242°27.3	3.9'	27° 13.2	-5.4 -5.5'	59.3 59.2'	
6	269° 16.7	N23°20.8	256°50.2	4.0'	N27°02.4	-5.7'	59.2'	
7	284° 16.6	20.8	271°13.1	4.1'	26°56.7	-5.9'	59.2'	
8	299°16.5	20.7	285°36.2	4.2'	26°50.8	-6.1'	59.2'	
9	314° 16.3	• • 20.6	299°59.4	4.3'	26°44.7	-6.2'	59.1'	
10	329°16.2	20.5	314°22.7	4.4'	26°38.5	-6.4'	59.1'	
11 12	344° 16.1 359° 15.9	20.4 N23°20.3	328°46.1 343°09.7	4.5' 4.6'	26°32.1 N26°25.5	-6.6' -6.7'	59.1' 59.1'	
13	359 15.9 14° 15.8	N23 20.3 20.2	343°09.7 357°33.3	4.6'	N26° 25.5 26° 18.7	-6.7'	59.1' 59.0'	
13	29° 15.7	20.2	357 33.3 11°57.1	4.0 4.9'	26°11.8	-0.9 -7.1'	59.0'	
15	44° 15.5	20.0	26°21.0	5.0'	26°04.7	-7.2	59.0'	
16	59° 15.4	19.9	40°45.0	5.1'	25°57.5	-7.4'	58.9'	
17	74°15.3	19.8	$55^{\circ}09.1$	5.2'	$25^{\circ}50.1$	-7.6'	58.9'	
18	89° 15.1	N23°19.7	69°33.3	5.4'	N25°42.5	-7.7'	58.9'	
19	104° 15.0	19.6	83°57.7	5.5'	25°34.8	-7.9'	58.8'	
20	119°14.9 134°14.7	19.5	98°22.2	5.6'	25°26.9 25°18.9	-8.0'	58.8'	
21 22	134°14.7 149°14.6	· · 19.4 19.3	112°46.8 127°11.6	5.7' 5.9'	25°18.9 25°10.7	-8.2' -8.3'	58.8' 58.7'	
23	164° 14.5	19.3	141°36.4	5.9 6.0'	25° 10.7 25° 02.3	-o.s -8.5'	58.7'	
_0	SD = 15.7'	d = -0.1'			D = 16.2'			
			-					

			2025	June 24	4 to Ju	n. 26
Lat.	<b>Twi</b> Naut.	<b>light</b> Civil	Sunrise	Sunset	<b>Twi</b> Civil	<b>light</b> Naut.
N 72°	I I I	CIVII			CIVII	
N 70°						
68° 66°	—					
64°			01.22	22.21		////
62°	/////		01:33	22:31		////
60°	1111	//// 00:52	02:11 02:37	21:54 21:28	//// 23:12	
						////
N 58°	////	01:42	02:58	21:07	22:23	////
56° 54°	////	02:12	03:15	20:51	21:53	////
54 52°	00:48	02:34	03:29	20:36	21:31	23:16
52°	01:34	02:52	03:41	20:24	21:13	22:31
45°	02:02 02:47	03:07 03:37	03:52 04:14	20:13 19:51	20:58 20:28	22:03 21:18
N 40° 35°	03:18	04:00	04:32	19:33	20:06	20:47
30°	03:41	04:18	04:48	19:18	19:48	20:24
30° 20°	04:00 04:29	04:33	05:01	19:05	19:32	20:06
N 10°	04:29	04:58 05:18	05:23 05:41	18:43 18:24	19:07 18:47	19:37 19:14
0°	05:10	05:37	05:59	18:06	18:29	18:55
<b>S</b> 10°	05:27	05:54	06:16	17:49	18:12	18:38
20° 30°	05:43	06:11	06:35	17:30	17:55	18:22
30°	06:00 06:09	06:30	06:56	17:09	17:36	18:06
35°	06:09	06:40 06:52	07:09 07:23	16:57 16:43	17:25 17:13	17:57 17:47
45°	06:28	07:06	07:23	16:26	17:13	17:37
<b>S</b> 50°						
52°	06:40	07:22	08:00	16:05	16:44	17:25
54°	06:45 06:51	07:29 07:37	08:10 08:21	15:55 15:44	16:36 16:28	17:20 17:14
56°	06:57	07:46	08:34	15:32	16:19	17:08
58°	07:04	07:57	08:48	15:17	16:09	17:00
<b>S</b> 60°	07:12	08:08	09:06	15:00	15:57	16:54
		Moonris		I	Moonset	
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
N 72°						
<b>N</b> 70°						
68°						
66°						
64°						
62°			01:39		23:46	23:37
60°	00:24	01:05	02:33	22:05	22:52	23:08
<b>N</b> 58°	00:55	01:44	03:05	21:26	22:19	22:45
56°	01:19	02:11	03:29	20:59	21:55	22:27
54°	01:38	02:32	03:48	20:38	21:35	22:11
52°	01:54	02:50	04:05	20:20	21:19	21:58
50°	02:08	03:05	04:19	20:05	21:04	21:46
45°	02:36	03:36	04:47	19:34	20:35	21:21
<b>N</b> 40°	02:59	04:00	05:10	19:10	20:12	21:02
35°	03:18	04:19	05:28	18:50	19:53	20:45
30°	03:34	04:36	05:44	18:34	19:37	20:31
20°	04:01	05:05	06:11	18:05	19:09	20:06
<b>N</b> 10°	04:25	05:29	06:34	17:41	18:45	19:45
0°	04:47	05:52	06:56	17:18	18:23	19:24
<b>S</b> $10^{\circ}$	05:09	06:15	07:17	16:55	18:00	19:04
20°	05:33	06:40	07:40	16:31	17:36	18:43
30°	06:01	07:08	08:07	16:02	17:08	18:17
35°	06.18	07:25	08.22	15.45	16.51	18:02

13	01.00	00.03	03.02	15.02	10.00	11.21
<b>S</b> 50°	07:31	08:40	09:30	14:31	15:37	16:57
52°	07:46	08:55	09:43	14:16	15:22	16:44
54°	08:03	09:13	09:59	13:58	15:04	16:29
56°	08:24	09:35	10:17	13:37	14:43	16:11
58°	08:51	10:03	10:39	13:10	14:15	15:50
<b>S</b> 60°	09:29	10:42	11:07	12:31	13:36	15:22
		Sun		1	Moon	
	_	Sun			Moon	
Day	Eqn.o	<b>Sun</b> f Time	Mer.	Mer.	<b>Moon</b> Pass.	Age
Day	Eqn.or		Mer. Pass	Mer. Upper		Age 28-1
Day	1 1	f Time			Pass.	_
Day 24	00 <sup>h</sup>	f Time 12 <sup>h</sup>	Pass	Upper	Pass. Lower	28-1
	00 <sup>h</sup> mm:ss	f Time 12 <sup>h</sup> mm:ss	Pass hh:mm	Upper hh:mm	Pass. Lower hh:mm	28-1

08:22

08:40

09:02

15:45

15:26

15:02

16:51

16:32

16:08

18:02

17:45 17:24

35°

40°

45°

06:18 06:37

07:00

07:25

07:45

08:09

Fig.   Gilla   Colla	h _	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
1 2007-241 2007-242 30.4 137-243 20.6 130-20.5 14.7 397-50.6 12.7 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0	Fri	GHA	GHA	Dec	GHA		GHA	Dec	GHA			SHA	Dec
1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0	275°21.6	225°24.4	N15°35.7		N10°30.1	181°06.6	N23°14.7	272°54.2		Alphoratz	357°34 3	20°13.7
20,000	1	290°24.1		36.4		29.6		14.7	287°56.6	21.2			
3 597-51 207-527 - 378 2174-52 - 384 207-126 - 344 3187-106 - 321 1	2	305°26.5	255°23.9	37.1	147°43.4	29.0	$211^{\circ}10.3$	14.7	302°59.0				
1	3	320°29.0	270°23.7	• • 37.8	162°44.5	• • 28.4	$226^{\circ}12.2$	• • 14.7	318°01.4	• • 21.1			
9 99 98 4 4 94 95 96 195 96 22 92 95 15 1 95 96 22 18 195 96 22 18 195 96 22 18 195 10 91 11 91 10 12 11 Polaris 217 95 29 18 18 18 19 10 12 11 Polaris 217 95 29 18 18 18 195 10 12 11 Polaris 217 95 29 18 18 18 195 10 12 11 Polaris 217 95 29 18 18 18 195 10 12 11 Polaris 217 95 29 18 18 18 195 10 12 11 Polaris 217 95 29 18 18 18 195 10 12 11 Polaris 217 95 29 18 18 18 195 10 12 11 Polaris 217 95 29 18 18 18 195 10 12 11 Polaris 217 95 29 18 18 18 195 10 12 11 Polaris 217 95 29 18 18 18 195 10 12 18 18 18 18 18 18 18 18 18 18 18 18 18	4	335°31.4	285°23.4	38.5		27.9	241°14.0	14.7	333°03.8	21.1			
9 9 80 8 39 29 1 82 60 1 1 1 1 2 2 2 1 2 2 2 2 2 2 2 2 2 2 2	5		300°23.2	39.2	192°46.8	27.3	$256^{\circ}15.9$	14.6	348°06.2		I		
1		5°36.4	315°23.0	N15°39.9		N10°26.8		N23°14.6		501°21.1			
9 9 9 14 1 9 19 19 19 19 19 19 19 19 19 19 19 19	7	20°38.8	330°22.7	40.6	222°49.0	26.2	$286^{\circ}19.5$	14.6	18°11.0	21.1			
1				41.3		25.6		14.6		21.0			
101 097-097 197-217	9			• • 42.0		• • 25.1		• • 14.6		• • 21.0			
11	10			42.8		24.5		14.6		21.0			
19	11			43.5	282°53.5	24.0		14.6	78°20.6				
1.1 1.1 1.2 1.5 1.5 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6	12	95°51.2		N15°44.2	297°54.6	N10°23.4		N23°14.5		S01°21.0			
181 140*594 00*590 1.50 1.50 10*595 1.27 34.74 1.50 1.50 1.50 1.50 1.50 1.50 1.50 1.50	13			44.9		22.8		14.5		21.0			
18 155'010 0 105'205 470 337'801 12 2 00'381 145 153'326 20 0 1618'05 9 138'200 N15'404 22'014 N10'200 91'308 N22'415 188'374 50'200 91 1818'05 9 138'200 N15'404 22'014 N10'200 91'308 N22'415 188'374 50'200 91 1818'05 9 138'200 N15'404 22'014 N10'200 91'308 N22'415 188'374 50'200 91 1818'05 9 138'200 N15'404 22'014 N10'200 91'308 N22'415 188'374 50'200 91 1818'05 9 138'200 N15'404 22'014 N10'200 91'308 N22'415 188'374 50'200 91 1818'05 9 1818				45.6									
19 177-013 107-023 147, 32-90.2 0.6 77-39.0 143 107-025 0.00 0.00 143 107-025 0.00 143 107-	15			• • 46.3		• • 21.7		• • 14.5		• • 20.9			
18	16	156°01.0	105°20.5	47.0		21.2				20.9	I		
10	17	171°03.5	120°20.3		13°00.2	20.6	76°38.0		168°35.0				
Adhara   25°05.05   Adhara   25°05.05   25	18	186°05.9	135°20.0	N15°48.4	28°01.4	N10°20.0	91°39.8	N23°14.5	183°37.4	S01°20.9			
Procedure   Proc	19	201°08.4	$150^{\circ}19.8$	49.1	43°02.5	19.5	$106^{\circ}41.7$	14.5		20.9			
Pollux   243-113   180-19-3   180-19-3   180-19-3   180-19-3   144   283-19-4   20.8   243-19-3   20.3	20	$216^{\circ}10.9$	$165^{\circ}19.5$	49.8	58°03.6	18.9	121°43.5	14.4	213°42.2	20.9			
222   246*15.8   196*19.0   51.2   88*05.8   17.8   17.8   17.7   14.4   245*47.0   20.8   Solution   22.2   240*18.3   220*18.8   51.9   103*07.0   17.2   16.6 *49.0   17.8   24.7   24.0 0 *m.1.89   2.4 *d.0.0 *m.1.89   2.4 *d.0 *m.1.89   2.4 *d.0.0 *m.1.89	21	231°13.3	$180^{\circ}19.3$	• • 50.5	73°04.7	• • 18.3		• • 14.4	228°44.6	• • 20.8			
Mer pass	22	$246^{\circ}15.8$	$195^{\circ}19.0$	51.2	88°05.8	17.8	151°47.2	14.4	243°47.0				
Mer. pass. 05:38	23	261°18.3	210°18.8	51.9	103°07.0	17.2	166°49.0	14.4		20.8	I		
Sal GHA  CHA  CHA  Dec  GHA  Dec  GHA  Dec  GHA  Dec  CHA  Dec  CHA  Dec  CHA  Dec  CHA  Dec  CHA  Dec  CHA  Dec  CHA  Dec  Dubble  193°40.8 212 1150.6  198°40.7 22518.5 115°26.6 118°08.1 101°16.7 131′50.9 1023°14.4 2875.8 2028.8 228.	Max :-	DE:20	11 0 2/ 10		1 1/		,,1 0/ 4 0		4/ -/ 0		I		
Sat   CHA   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   Dubbe	ivier.p	Jass. U5:38	ν-υ.2 αυ	. rn-4.1/	$\nu$ 1.1 $a$ -0	.o m1.4/	ν1.8 a-0	.u-1.89	ν2.4 α-U	.u mu.98			
Sat GHA GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA GHA Dec GHA DEC GH													
0. 276°20.7 22°18.5 NLS°26 6 118°08.1 NLO°16.7 181°90.9 NL23°14.4 273°51.8 S01°20.8 NLS°26.2 240°18.3 53.3 130°0.2 16.1 196°82.7 14.4 280°56.6 20.8 NLS°26.2 240°18.3 53.3 130°0.2 16.1 196°82.7 14.4 280°56.6 20.8 NLS°26.2 240°18.3 130°17.5 54.1 148°10.3 15.5 211°84.6 14.4 303°56.6 20.8 NLS°26.2 240°18.3 143°10.4 240°58.3 143.3 180°9.0 -22.6 240°48.3 143.3 340°10.4 20.7 NLS°26.3 148°10.3 250°10.1 14.3 340°10.4 20.7 NLS°26.3 140°13.3 250°10.1 14.3 340°10.4 20.7 NLS°26.3 140°13.3 250°10.1 14.3 340°10.4 20.7 NLS°26.3 140°13.3 250°10.1 14.3 340°10.4 20.7 NLS°26.3 140°13.3 250°10.1 14.3 340°10.4 20.7 NLS°26.3 140°13.3 250°10.1 14.3 340°10.6 20°12.7 NLS°26.3 140°13.3 250°10.1 14.3 340°10.4 20.7 NLS°26.3 140°13.3 250°10.1 14.3 340°10.6 20°10.7 NLS°26.3 140°13.3 250°10.1 14.3 340°10.4 20.7 NLS°26.3 140°13.3 140°13.3 250°10.1 14.3 340°10.4 20.7 NLS°26.3 140°13.3 250°10.1 140°13.3 250°10.3 NLS°26.3 140°13.3 250°10.1 140°13.3 250°10.3 NLS°26.3 140°13.3 250°10.3 NLS°26.3 140°13.3 250°10.3 NLS°26.3 140°13.3 250°10.3 NLS°26.3 NLS	Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA				
12 991°32 2 290°18 3 53 3 133°09 2 16.1 196°52 7 14.4 288°54 2 20.8	0	276° 20.7	225°18.5	N15°52.6	118°08.1		181°50.9	N23° 14.4	273°51.8	501°20.8			
2 306°25.7 25°18.0 54.0 148°10.3 15.5 211°54.6 1.44 303°56.0 208	1	291°23.2	240°18.3	53.3	133°09.2	16.1	196°52.7	14.4	288°54.2				
321°281 70°777	2	306° 25.7	255°18.0	54.0	148°10.3	15.5	211°54.6	14.4	303°56.6				
36°306 2 88°17.5 5 54 18°12.6 14.4 24°58.3 14.3 334°01.4 20.7 55.1 39°13.7 18.2 55°0.0 14.3 334°0.1 20.7 56.6 6°35.5 31°13.1 300°17.2 56.1 19°13.7 7.2 18°13.0 14.3 34°0.3 20.7 56.6 6°35.5 31°13.1 300°17.5 56.2 223°15.9 11.7 28°70.3 14.3 4°0.6 2 501°20.7 56.6 18°13.1 50°10.7 57.5 12.3 40°0.6 2 501°20.7 56.6 18°10.7 57.5 12.3 18°10.0 10.6 6°45.4 18°16.5 58.2 238°17.0 12.1 30°26.5 14.3 34°11.0 20.7 56.2 11.3 10°6.6 2.5 18°10.1 10.6 31°0.5 14.3 34°11.0 20.7 56.2 11.3 11°21.5 10.6 6°45.4 18°15.5 15°50.6 268°19.3 11.0 32°00.3 14.2 64°15.9 20.7 11.0 11.0 10.6 6°45.4 18°15.5 15°50.6 268°19.3 11.0 32°00.3 14.2 64°15.9 20.7 12.2 99°50.3 45°15.4 10°0.0 28°21.5 101°0.9 2°13.0 N23°14.2 94°20.7 501°20.6 12.2 99°50.3 45°15.4 10.2 12.2 12.2 12.2 12.2 12.2 12.2 12.2	3	321°28.1	270°17.7	• • 54.7	163°11.4	• • 15.0	226°56.4	• • 14.3	318°59.0				
5 351°33. Signation of the content o	4	336°30.6	$285^{\circ}17.5$	55.4	178°12.6	14.4	241°58.3	14.3					
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7 21°380, 30°16.7 5.75, 223°15.9 12.7 287°03.8 14.3 19°06.6 20.7	6	6°35.5	315°17.0	N15°56.8	208°14.8	N10°13.3	272°01.9	N23°14.3	4°06.2				
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13 111-52.8 0°15.2 75°14.9 0.24 328°23.7 0.88 32°16.7 14.2 126°25.5 20.6 15°16.9 16°16.9 15°14.9 0.24 328°23.7 0.88 32°16.7 14.2 126°25.5 20.6 Artares 120°16.1 15°17.0 0°14.6 0.31 343°24.9 0.82 47°18.5 14.2 139°27.9 20.6 14.1 12°15.0 2.0 26°29.4 11.8 18°70.2 105°14.4 0.38 38°26.0 0.76 6°220.4 14.2 156°30.3 20.6 Sabik 100°20.0 15°45.4 18 18°70.1 12°15.0 2.0 20°14.1 0.5 13°27.1 0.71 77°22.2 14.1 160°32.7 20.6 Sabik 100°20.0 15°45.4 18 18°70.1 0.165°13.3 0.66 6.5 135°13.9 N16°05.2 28°28.2 N10°06.5 0°224.1 N23°14.1 184°35.1 501°20.5 Sabik 100°20.0 15°45.4 18°20.2 12°10.0 165°13.3 0.66 6.58°30.5 0.54 122°27.7 14.1 214°39.9 20.5 Etanin 22°22.2 24°44.9 195°12.8 0.80 88°32.7 0.42 15°31.4 11.0 44°47.7 20.5 N00.2 22°47.4 10°12.5 0.8.7 103°33.8 0.3.7 16°33.3 14.1 25°47.1 20.5 N00.2 20.5 N00.2 22°24.1 N00°3.3 14.1 12°31.4 14.1 244°4.7 20.5 N00.2 22°47.4 20°12.5 0.8.7 103°33.8 0.3.7 16°33.3 14.1 25°47.1 20.5 N00.2 20°20.5 N00.2 22°23.3 V00°10.7 m-4.16 V1.1' d-0.6' m1.48 V1.8' d-0.0' m-1.89 V2.4' d-0.0' m0.97 Peacock 55°04.6 56°30.0 N00.2 22°12.3 N16°09.3 118°3.4 N10°03.1 182°35.1 N23°14.0 180°5.0 S00.2 27°49.5 S01°20.5 S00.2 25°12.3 N16°09.3 118°3.4 N10°03.1 182°35.1 N23°14.0 30°45.3 20.4 N00.2 25°12.3 N16°09.3 118°3.4 N10°03.1 182°35.1 N23°14.0 30°45.3 20.4 N00.2 25°12.3 N16°09.3 118°3.4 N10°03.1 182°35.1 N23°14.0 30°45.3 20.4 N00.2 25°12.3 N16°09.3 118°3.4 N10°0.2 118°3.3 N10°0.2 N00.2 27°40.7 N10.3 33°45.1 20°43.4 N10°0.3 133°45.1 S00.2 S	12	96°50.3	45°15.4	N16°01.0	298°21.5	N10°09.9	2°13.0	N23°14.2	94°20.7	S01°20.6			
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15 141°57.7 90°14.6 · 0.31 343°24.9 · 0.82 47°18.5 · 1.42 139°27.9 · 0.206   16 157°0.2 105°14.4 · 0.38 358°26.0 07.6 6 2°20.4 142 154°30.3 · 20.6   17 172°02.6 120°14.1 04.5 130°27.1 07.1 77°22.2 14.1 169°32.7 20.6   18 187°0.5 135°13.9 N16°05.2 28°28.2 N10°06.5 9°2°4.1 N23°14.1 184°35.1 501°20.5   19 202°07.6 150°13.6 05.9 4°3°29.3 05.9 107°25.9 14.1 199°37.5 20.5   21 232°12.5 180°13.1 · 0.73 73°31.6 · 0.48 137°29.6 · 1.41 22°47.9 9 20.5   22 247°14.9 195°12.8 08.0 88°32.7 04.2 152°31.4 14.1 244°44.7 20.5   Mer.pass. 05.34	14	126°55.2	75°14.9	02.4	328°23.7	08.8	32°16.7	14.2	124°25.5	20.6			
16 157°00.2 105°14.4 03.8 38°26.0 07.6 62°20.4 14.2 154°30.3 20.6 Sabik 102°02.0 1.7 17'22.2 14.1 169°32.7 20.6 Sabik 102°02.0 1.8 18.7 19.20.6 13.6 05.9 43°39.3 05.9 107°25.9 14.1 184°35.1 S01°20.5 Sabik 96°09.4 33°07.4 19.20.6 19.20.6 19.20.6 Sabik 102°02.0 1.8 19.20.6 Sabik 102°02.0 1.20.6 Sabik 102°02.0 1.20.2 1.20.1 1.20.6 Sabik 102°02.0 1.20.2 1.20.1 1.20.2 1.20.1 1.20.2 1.20.1 1.20.2 1.20.1 1.20.2 1.20.1 1.20.2 1.20.1 1.20.2 1.20.1 1.20.2 1.20.1 1.20.2 1.20.1 1.20.2 1.20.1 1.20.2 1.2	15	141°57.7	90°14.6	• • 03.1	343°24.9	• • 08.2	$47^{\circ}18.5$	• • 14.2	139°27.9	• • 20.6			
17 172°02.6 120°14.1 04.5 135°27.1 07.1 77°22.2 14.1 169°32.7 20.6 Shaula 96°09.4 37°07.4 18 187°05.1 135°13.9 N16°05.2 28°28.2 N10°06.5 92°24.1 183°5.1 501°20.5 150°3.6 05.9 43°93.3 05.9 107°25.9 14.1 199°37.5 20.5 Eltanin 90°41.5 51°29.1 12.1 12.1 0.0 166°13.3 06.6 6 58°30.5 05.4 122°27.7 14.1 219°49.9 20.5 Eltanin 90°41.5 51°29.1 12.2 24°04.9 195°12.8 08.0 88°32.7 04.2 152°31.4 14.1 244°44.7 20.5 14.1 259°47.1 20.5 14.1 259°	16	157°00.2	105°14.4	03.8	358°26.0	07.6	62°20.4	14.2	154°30.3	20.6			
18 187°05.1 135°13.9 N16°05.2 28°28.2 N10°05.5 92°24.1 N23°14.1 184°35.1 501°20.5 P.	17	172°02.6	$120^{\circ}14.1$	04.5	13°27.1	07.1	77°22.2	14.1	169°32.7	20.6			
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21 232°12.5   180°13.1 · · · · · · · · · · · · · · · · · · ·	20	217°10.0	165°13.3	06.6	58°30.5	05.4	122°27.7	14.1	214°39.9	20.5			
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Mer.pass. 05:34   v-0.3' d0.7' m-4.16   v1.1' d-0.6' m1.48   v1.8' d-0.0' m-1.89   v2.4' d-0.0' m0.97	23	262°17.4	$210^{\circ}12.5$	08.7	103°33.8	03.7	167°33.3	14.1	259°47.1	20.5			
Sun   GHA   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   GHA   Dec   CHA   Dec   CHA   CP   CP   CP   CP   CP   CP   CP   C	N 4	05.24	0.2/ 10	7/ 4.16	1 1/ / 0	1.6/ 1.40	1.0/ 1.0	0/ 1.00	0.4/ 1.0	0/ 0.07	I		
Sun         GHA         GHA         Dec         All Naïre         27°32.1         -46°50.0           1         292°22.3         240°12.0         10.0         133°36.1         0.25         19°37.0         14.0         289°51.9         20.4         26°61.7         20°27.1         188°37.2         02.0         212°38.8         1.4.0         304°54.3         20.4         34°89.1         20.4         337°29.7         285°11.2         12.1         178°39.4         00.8         242°42.5         14.0         336°01.5         20.4         40°20.0         13°9.0         18°20°2.9         20°27°4.0         5°03.9         50°20.0         40°20.1         40°20.1         40°20.1         40°20.1         40°20.1         40°20.1         40°20.1         40°20.1         40°20.1         40°20.1         40°20.1         40°20.1         40°20.1         40°20.1         40°20.1	ivier.p	bass. U5:34	$\nu$ -0.3 au	.7 m-4.10	$\nu_{1.1}$ a-0	0.0° m1.48	$\nu_{1.8}$ a-0	.0' m-1.89	$\nu$ 2.4° $a$ -0	0.0° m0.97			
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1 292°22.3 240°12.0 10.0 133°36.1 02.5 197°37.0 14.0 289°51.9 20.4 307°24.8 255°11.7 10.7 148°37.2 02.0 212°38.8 14.0 304°54.3 20.4 322°27.3 270°11.5 · 11.4 163°38.3 · 0.1 4 227°40.7 · 14.0 319°56.7 · 20.4 4 337°29.7 285°11.2 12.1 178°39.4 00.8 242°42.5 14.0 334°59.1 20.4 4 337°29.7 285°11.2 12.1 178°39.4 00.8 242°42.5 14.0 334°59.1 20.4 4 200.4 20.4 20.4 20.4 20.4 20.4 2													
2 307° 24.8 255° 11.7 10.7 148° 37.2 02.0 212° 38.8 14.0 304° 54.3 20.4 313° 20.4 313° 20.4 313° 20.4 313° 20.7 11.5 11.4 163° 38.3 · · · · · · · · · · · · · · · · · · ·													
3 32° 27.3 270° 11.5 · · · 11.4 163° 38.3 · · · 01.4 227° 40.7 · · · 14.0 310° 56.7 · · · 20.4 4 337° 29.7 285° 11.2 12.1 178° 39.4 00.8 242° 42.5 14.0 334° 59.1 20.4 5 352° 32.2 300° 10.9 12.8 193° 40.5 10° 00.3 257° 44.3 14.0 350° 01.5 20.4 6 7° 34.7 315° 10.6 N16° 13.5 208° 41.6 N09° 59.7 272° 46.2 N23° 14.0 5° 03.9 S01° 20.4 8 37° 39.6 345° 10.1 14.9 238° 43.9 58.6 302° 49.9 13.9 35° 08.8 20.4 5 340° 10.0 0° 09.8 · 15.6 253° 45.0 · 58.0 317° 51.7 · · · 13.9 50° 11.2 · · 20.3 10 67° 44.5 15° 09.6 16.2 268° 46.1 57.4 332° 53.6 13.9 65° 13.6 20.3 11.2 ° 50.3 11.2		$307^{\circ}24.8$											
4 337°29.7 285°11.2 12.1 178°39.4 00.8 242°42.5 14.0 334°59.1 20.4 52°30.0 10.9 12.8 193°40.5 10°00.3 257°44.3 14.0 350°01.5 20.4 Venus 310°02.8 08:59 60.7 34.7 315°10.6 N16°13.5 208°41.6 N09°59.7 272°46.2 N23°14.0 5°03.9 S01°20.4 Mars 202°19.6 16:08 37°39.6 345°10.1 14.9 238°43.9 58.6 302°49.9 13.9 35°08.8 20.4 Jupiter 265°45.0 11:54 310°02.8 20.3 10°67.4 5°0.0 10°0.3 1									319°56.7		iviainab	10 40.4	10 20.0
5 352°32.2 300°10.9 12.8 193°40.5 10°00.3 257°44.3 14.0 350°01.5 20.4   Venus 310°02.8 08:59 6 7°34.7 315°10.6 N16°13.5 208°41.6 N09°59.7 272°46.2 N23°14.0 5°03.9 S01°20.4   Mars 202°19.6 16:08 37°39.6 345°10.1 14.9 238°43.9 58.6 302°49.9 13.9 35°08.8 20.4   Saturn 357°32.6 05:47 9 52°42.0 0°09.8 · 15.6 253°45.0 · 58.0 317°51.7 · 13.9 50°11.2 · 20.3 10 67°44.5 15°09.6 16.2 268°46.1 57.4 332°53.6 13.9 65°13.6 20.3 11 82°47.0 30°09.3 16.9 283°47.2 56.9 347°55.4 13.9 80°16.0 20.3 12 97°49.4 45°09.0 N16°17.6 298°48.4 N09°56.3 2°57.2 N23°13.9 95°18.4 501°20.3 11 12°51.9 60°08.7 18.3 313°49.5 55.7 17°59.1 13.8 110°20.8 20.3 11 12°51.9 60°08.7 18.3 313°49.5 55.7 17°59.1 13.8 110°20.8 20.3 15 142°56.8 90°08.2 · 19.7 343°51.7 · 54.6 48°02.8 · 13.8 140°25.6 · 20.3 17 173°01.8 120°07.6 21.0 13°53.9 53.5 78°06.5 13.8 170°30.4 20.2 18 188°04.2 135°07.4 N16°21.7 28°55.1 N09°52.9 93°08.3 N23°13.8 185°32.8 501°20.2 18°09.2 165°06.8 23.1 58°57.3 51.8 123°12.0 13.7 215°37.6 20.2 128°09.2 165°06.8 23.1 58°57.3 51.8 123°12.0 13.7 215°37.6 20.2 218°09.2 165°06.2 24.5 88°59.5 50.6 153°15.7 13.7 245°42.5 20.2 22 248°14.1 195°06.2 24.5 88°59.5 50.6 153°15.7 13.7 245°44.9 20.2 Horizontal parallax 10.1 160°0.1 16			_								Jun 27 Fri	SHA	Mer.pass
6 7°34.7 315°10.6 N16°13.5 208°41.6 N09°59.7 272°46.2 N23°14.0 5°03.9 S01°20.4 7 22°37.1 330°10.4 14.2 223°42.8 59.1 287°48.0 13.9 20°06.4 20.4 8 37°39.6 345°10.1 14.9 238°43.9 58.6 302°49.9 13.9 35°08.8 20.4 520 20.3 10 67°44.5 15°09.6 16.2 268°46.1 57.4 332°53.6 13.9 65°13.6 20.3 11 82°47.0 30°09.3 16.9 283°47.2 56.9 347°55.4 13.9 80°16.0 20.3 12 97°49.4 45°09.0 N16°17.6 298°48.4 N09°56.3 2°57.2 N23°13.9 95°18.4 S01°20.3 11 12°51.9 60°08.7 18.3 313°49.5 55.7 17°59.1 13.8 110°20.8 20.3 142°56.8 90°08.2 19.0 328°50.6 55.2 33°00.9 13.8 125°23.2 20.3 15 142°56.8 90°08.2 19.7 343°51.7 1.54.6 48°02.8 13.8 140°25.6 20.3 15°0.8 120°07.6 21.0 13°53.9 53.5 78°06.5 13.8 170°30.4 20.2 188°04.2 135°07.4 N16°21.7 28°55.1 N09°52.9 93°08.3 N23°13.8 185°32.8 S01°20.2 20 218°09.2 165°06.8 23.1 58°57.3 51.8 123°12.0 13.7 215°37.6 20.2 212°23°16.5 210°06.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 186°06.5 210°06.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 165°06.2 24.5 88°59.5 50.6 153°15.7 13.7 260°44.9 20.2 168°41.1 195°06.2 24.5 88°59.5 50.6 153°15.7 13.7 260°44.9 20.2 168°41.1 195°06.2 24.5 88°59.5 50.6 153°15.7 13.7 260°44.9 20.2 168°09.2 210°06.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 168°01.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 168°01.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 168°01.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 168°01.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 168°01.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 168°01.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 168°01.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 168°01.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 168°01.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 168°01.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 168°01.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 168°01.0 25.1 104°01.0 104°01.									350°01.5		Venus		
7			315°10.6		208°41.6						Mars	$202^{\circ}19.6$	16:08
8 37°39.6 345°10.1 14.9 238°43.9 58.6 302°49.9 13.9 35°08.8 20.4 9 52°42.0 0°09.8 · 15.6 253°45.0 · 58.0 317°51.7 · 13.9 50°11.2 · 20.3 10 67°44.5 15°09.6 16.2 268°46.1 57.4 332°53.6 13.9 65°13.6 20.3 11 82°47.0 30°09.3 16.9 283°47.2 56.9 347°55.4 13.9 80°16.0 20.3 12°51.9 60°08.7 18.3 313°49.5 55.7 17°59.1 13.8 110°20.8 20.3 11 12°51.9 60°08.7 18.3 313°49.5 55.7 17°59.1 13.8 110°20.8 20.3 14 127°54.4 75°08.5 19.0 328°50.6 55.2 33°00.9 13.8 125°23.2 20.3 15 142°56.8 90°08.2 · 19.7 343°51.7 · 54.6 48°02.8 · 13.8 140°25.6 · 20.3 16 157°59.3 105°07.9 20.4 358°52.8 54.0 63°04.6 13.8 155°28.0 20.3 17 173°01.8 120°07.6 21.0 13°53.9 53.5 78°06.5 13.8 170°30.4 20.2 188°04.2 135°07.4 N16°21.7 28°55.1 N09°52.9 93°08.3 N23°13.8 185°32.8 501°20.2 19 203°06.7 150°07.1 22.4 43°56.2 52.3 108°10.2 13.8 200°35.2 20.2 218°09.2 165°06.8 23.1 58°57.3 51.8 123°12.0 13.7 215°37.6 20.2 218°09.2 165°06.8 23.1 58°57.3 51.8 123°12.0 13.7 215°37.6 20.2 22 248°14.1 195°06.2 24.5 88°59.5 50.6 153°15.7 13.7 245°42.5 20.2 18 0.2 248°14.1 195°06.2 24.5 88°59.5 50.6 153°15.7 13.7 245°42.5 20.2 18 0.2 210°06.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0											Jupiter	265°45.0	11:54
9 52°42.0 0°09.8 · 15.6 253°45.0 · · 58.0 317°51.7 · · 13.9 50°11.2 · · 20.3 10 67°44.5 15°09.6 16.2 268°46.1 57.4 332°53.6 13.9 65°13.6 20.3 11 82°47.0 30°09.3 16.9 283°47.2 56.9 347°55.4 13.9 80°16.0 20.3 12 97°49.4 45°09.0 N16°17.6 298°48.4 N09°56.3 2°57.2 N23°13.9 95°18.4 S01°20.3 112°51.9 60°08.7 18.3 313°49.5 55.7 17°59.1 13.8 110°20.8 20.3 14 127°54.4 75°08.5 19.0 328°50.6 55.2 33°00.9 13.8 125°23.2 20.3 15 142°56.8 90°08.2 · · 19.7 343°51.7 · · · 54.6 48°02.8 · · 13.8 140°25.6 · · 20.3 15°17.9 10 13°53.9 53.5 78°06.5 13.8 170°30.4 20.2 135°07.4 N16°21.7 28°55.1 N09°52.9 93°08.3 N23°13.8 185°32.8 S01°20.2 128°09.2 165°06.8 23.1 58°57.3 51.8 123°12.0 13.7 215°37.6 20.2 218°09.2 165°06.8 23.1 58°57.3 51.8 123°12.0 13.7 215°37.6 20.2 218°09.2 165°06.2 24.5 88°59.5 50.6 153°15.7 13.7 245°42.5 20.2 22 248°14.1 195°06.2 24.5 88°59.5 50.6 153°15.7 13.7 245°42.5 20.2 20.3 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 156°4.9 20.2 156°06.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 156°04.9 20.2 156°06.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 156°04.9 20.2 156°06.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 156°04.9 20.2 156°06.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 156°04.9 20.2 156°06.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 156°15.2 1348rs 0.1											Saturn	$357^{\circ}32.6$	05:47
10 67° 44.5 15° 09.6 16.2 268° 46.1 57.4 332° 53.6 13.9 65° 13.6 20.3 11 82° 47.0 30° 09.3 16.9 283° 47.2 56.9 347° 55.4 13.9 80° 16.0 20.3 12 97° 49.4 45° 09.0 N16° 17.6 298° 48.4 N09° 56.3 2° 57.2 N23° 13.9 95° 18.4 S01° 20.3 112° 51.9 60° 08.7 18.3 313° 49.5 55.7 17° 59.1 13.8 110° 20.8 20.3 14 127° 54.4 75° 08.5 19.0 328° 50.6 55.2 33° 00.9 13.8 125° 23.2 20.3 15 142° 56.8 90° 08.2 · 19.7 343° 51.7 · 54.6 48° 02.8 · 13.8 140° 25.6 · 20.3 16° 157° 59.3 105° 07.9 20.4 358° 52.8 54.0 63° 04.6 13.8 155° 28.0 20.3 17 173° 01.8 120° 07.6 21.0 13° 53.9 53.5 78° 06.5 13.8 170° 30.4 20.2 188° 09.2 135° 07.4 N16° 21.7 28° 55.1 N09° 52.9 93° 08.3 N23° 13.8 185° 32.8 S01° 20.2 120° 218° 09.2 165° 06.8 23.1 58° 57.3 51.8 123° 12.0 13.7 215° 37.6 20.2 21 233° 11.6 180° 06.5 · 23.8 73° 58.4 · 51.2 138° 13.8 · 13.7 230° 40.1 · 20.2 22 248° 14.1 195° 06.2 24.5 88° 59.5 50.6 153° 15.7 13.7 245° 42.5 20.2 22 248° 14.1 195° 06.2 24.5 88° 59.5 50.6 153° 15.7 13.7 245° 42.5 20.2 20.3 104° 00.6 50.1 168° 17.5 13.7 260° 44.9 20.2 148° 12.0 13° 13.7 215° 37.6 20.2 148° 12.0 13° 13.7 215° 37.6 20.2 148° 14.1 195° 06.2 24.5 88° 59.5 50.6 153° 15.7 13.7 245° 42.5 20.2 148° 14.1 195° 06.2 24.5 88° 59.5 50.6 153° 15.7 13.7 245° 42.5 20.2 148° 14.9 20.2 148° 14.1 195° 06.2 24.5 88° 59.5 50.6 153° 15.7 13.7 245° 42.5 20.2 148° 14.9 20.2 148° 14.1 195° 06.2 24.5 88° 59.5 50.6 153° 15.7 13.7 245° 42.5 20.2 148° 14.9 20.2 148° 14.9 20.2 148° 14.9 20.2 148° 14.1 195° 06.2 24.5 88° 59.5 50.6 153° 15.7 13.7 245° 42.5 20.2 148° 14.9 20.2 14.9 20.2 14.9 20.2 14.9 20.2 14.9 20.2 14.9 20.2 14.9 20.2 14.9 20.2 14.9 20.2 14		52°42.0		• • 15.6	253°45.0	• • 58.0	317°51.7			• • 20.3	I 20 C :	CIIA	N4
11 82°47.0 30°09.3 16.9 283°47.2 56.9 347°55.4 13.9 80°16.0 20.3   12 97°49.4 45°09.0 N16°17.6 298°48.4 N09°56.3 2°57.2 N23°13.9 95°18.4 S01°20.3   13 112°51.9 60°08.7 18.3 313°49.5 55.7 17°59.1 13.8 110°20.8 20.3   14 127°54.4 75°08.5 19.0 328°50.6 55.2 33°00.9 13.8 125°23.2 20.3   15 142°56.8 90°08.2 · 19.7 343°51.7 · 54.6 48°02.8 · 13.8 140°25.6 · 20.3   16 157°59.3 105°07.9 20.4 358°52.8 54.0 63°04.6 13.8 155°28.0 20.3   17 173°01.8 120°07.6 21.0 13°53.9 53.5 78°06.5 13.8 170°30.4 20.2   18 188°04.2 135°07.4 N16°21.7 28°55.1 N09°52.9 93°08.3 N23°13.8 185°32.8 S01°20.2   19 203°06.7 150°07.1 22.4 43°56.2 52.3 108°10.2 13.8 200°35.2 20.2   20 218°09.2 165°06.8 23.1 58°57.3 51.8 123°12.0 13.7 215°37.6 20.2   21 233°11.6 180°06.5 · 23.8 73°58.4 · 51.2 138°13.8 · 13.7 230°40.1 · 20.2   22 248°14.1 195°06.2 24.5 88°59.5 50.6 153°15.7 13.7 245°42.5 20.2   23 263°16.5 210°06.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2   Mars: 0.1											I		
12 97°49.4 45°09.0 N16°17.6 298°48.4 N09°56.3 2°57.2 N23°13.9 95°18.4 S01°20.3 Jupiter 265°30.1 11:51 13 112°51.9 60°08.7 18.3 313°49.5 55.7 17°59.1 13.8 110°20.8 20.3 14 127°54.4 75°08.5 19.0 328°50.6 55.2 33°00.9 13.8 125°23.2 20.3 15 142°56.8 90°08.2 · 19.7 343°51.7 · 54.6 48°02.8 · 13.8 140°25.6 · 20.3 16 157°59.3 105°07.9 20.4 358°52.8 54.0 63°04.6 13.8 155°28.0 20.3 17 173°01.8 120°07.6 21.0 13°53.9 53.5 78°06.5 13.8 170°30.4 20.2 18 188°04.2 135°07.4 N16°21.7 28°55.1 N09°52.9 93°08.3 N23°13.8 185°32.8 S01°20.2 19 203°06.7 150°07.1 22.4 43°56.2 52.3 108°10.2 13.8 200°35.2 20.2 20 218°09.2 165°06.8 23.1 58°57.3 51.8 123°12.0 13.7 215°37.6 20.2 21 233°11.6 180°06.5 · 23.8 73°58.4 · 51.2 138°13.8 · 13.7 230°40.1 · 20.2 22 248°14.1 195°06.2 24.5 88°59.5 50.6 153°15.7 13.7 245°42.5 20.2 23 263°16.5 210°06.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 Mars: 0.1											I		
13													
14 127°54.4 75°08.5 19.0 328°50.6 55.2 33°00.9 13.8 125°23.2 20.3 15 142°56.8 90°08.2 · 19.7 343°51.7 · · 54.6 48°02.8 · · 13.8 140°25.6 · · 20.3 16 157°59.3 105°07.9 20.4 358°52.8 54.0 63°04.6 13.8 155°28.0 20.3 17 173°01.8 120°07.6 21.0 13°53.9 53.5 78°06.5 13.8 170°30.4 20.2 18 188°04.2 135°07.4 N16°21.7 28°55.1 N09°52.9 93°08.3 N23°13.8 185°32.8 S01°20.2 19 203°06.7 150°07.1 22.4 43°56.2 52.3 108°10.2 13.8 200°35.2 20.2 20 218°09.2 165°06.8 23.1 58°57.3 51.8 123°12.0 13.7 215°37.6 20.2 21 233°11.6 180°06.5 · · 23.8 73°58.4 · · 51.2 138°13.8 · · 13.7 230°40.1 · · 20.2 22 248°14.1 195°06.2 24.5 88°59.5 50.6 153°15.7 13.7 245°42.5 20.2 23 263°16.5 210°06.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2													
15       142°56.8       90°08.2       · · 19.7       343°51.7       · · 54.6       48°02.8       · · 13.8       140°25.6       · · 20.3       Jun 29 Sun       SHA       Mer.pass         16       157°59.3       105°07.9       20.4       358°52.8       54.0       63°04.6       13.8       155°28.0       20.3       Venus       307°52.4       08:59         17       173°01.8       120°07.6       21.0       13°53.9       53.5       78°06.5       13.8       170°30.4       20.2       Mars       201°15.1       16:04         18       188°04.2       135°07.4       N16°21.7       28°55.1       N09°52.9       93°08.3       N23°13.8       185°32.8       S01°20.2       Jupiter       265°15.2       11:48         19       203°06.7       150°07.1       22.4       43°56.2       52.3       108°10.2       13.8       200°35.2       20.2       22       Saturn       357°29.6       05:40         21       233°11.6       180°06.5       23.8       73°58.4       · · 51.2       138°13.8       · 13.7       215°37.6       20.2       Horizontal parallax         22       248°14.1       195°06.2       24.5       88°59.5       50.6       153°15.7       13.7											Saturn	351-31.1	U5:44
16       157°59.3       105°07.9       20.4       358°52.8       54.0       63°04.6       13.8       155°28.0       20.3       Venus 307°52.4       08:59         17       173°01.8       120°07.6       21.0       13°53.9       53.5       78°06.5       13.8       170°30.4       20.2       Mars 201°15.1       16:04         18       188°04.2       135°07.4       N16°21.7       28°55.1       N09°52.9       93°08.3       N23°13.8       185°32.8       S01°20.2       Jupiter 265°15.2       11:48         19       203°06.7       150°07.1       22.4       43°56.2       52.3       108°10.2       13.8       200°35.2       20.2       20.2       Saturn 357°29.6       05:40         20       218°09.2       165°06.8       23.1       58°57.3       51.8       123°12.0       13.7       215°37.6       20.2       22       248°14.1       195°06.2       24.5       88°59.5       50.6       153°15.7       13.7       245°42.5       20.2       40°20.2       10°20.2       10°20.2       10°20.2       10°20.2       10°20.2       10°20.2       10°20.2       10°20.2       10°20.2       10°20.2       10°20.2       10°20.2       10°20.2       10°20.2       10°20.2       10°20.2       10°20.											Jun 29 Sun	SHA	Mer.pass
17       173°01.8       120°07.6       21.0       13°53.9       53.5       78°06.5       13.8       170°30.4       20.2       Mars       201°15.1       16:04         18       188°04.2       135°07.4       N16°21.7       28°55.1       N09°52.9       93°08.3       N23°13.8       185°32.8       S01°20.2       180°20.2       10.2       10.2       13.8       200°35.2       20.2													-
18       188°04.2       135°07.4       N16°21.7       28°55.1       N09°52.9       93°08.3       N23°13.8       185°32.8       S01°20.2       Jupiter 265°15.2       11:48         19       203°06.7       150°07.1       22.4       43°56.2       52.3       108°10.2       13.8       200°35.2       20.2													
19													
20 218 ° 09.2 165 ° 06.8 23.1 58 ° 57.3 51.8 123 ° 12.0 13.7 215 ° 37.6 20.2 21 233 ° 11.6 180 ° 06.5 · · 23.8 73 ° 58.4 · · 51.2 138 ° 13.8 · · 13.7 230 ° 40.1 · · 20.2 22 248 ° 14.1 195 ° 06.2 24.5 88 ° 59.5 50.6 153 ° 15.7 13.7 245 ° 42.5 20.2 23 263 ° 16.5 210 ° 06.0 25.1 104 ° 00.6 50.1 168 ° 17.5 13.7 260 ° 44.9 20.2													
21       233°11.6       180°06.5       · · · 23.8       73°58.4       · · · 51.2       138°13.8       · · · 13.7       230°40.1       · · · 20.2       Horizontal parallax         22       248°14.1       195°06.2       24.5       88°59.5       50.6       153°15.7       13.7       245°42.5       20.2       Venus: 0.2         23       263°16.5       210°06.0       25.1       104°00.6       50.1       168°17.5       13.7       260°44.9       20.2       Mars: 0.1													33.10
22       248°14.1       195°06.2       24.5       88°59.5       50.6       153°15.7       13.7       245°42.5       20.2       Venus: 0.2         23       263°16.5       210°06.0       25.1       104°00.6       50.1       168°17.5       13.7       260°44.9       20.2       Mars: 0.1											Horizont	al parallax	
23 263°16.5 210°06.0 25.1 104°00.6 50.1 168°17.5 13.7 260°44.9 20.2 Mars: 0.1													
												Mars:	0.1

h	Su	n	Moon				
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	179°14.3	N23° 19.1	$156^{\circ}01.4$	6.1'	N24°53.9	-8.6'	58.7'
1	194°14.2	19.0	170°26.6	6.3'	24°45.2	-8.8'	58.6'
2	209°14.1	18.9	184°51.8	6.4'	24°36.5	-8.9'	58.6'
3 4	224°14.0 239°13.8	· · 18.8 18.7	199°17.2 213°42.7	6.5' 6.7'	24°27.5 24°18.5	-9.1' -9.2'	58.6' 58.6'
5	254°13.7	18.6	213° 42.7 228° 08.4	6.8'	24°09.3	-9.2' -9.3'	58.5
6	269°13.6	N23° 18.5	242°34.2	6.9'	N24°00.0	-9.5'	58.5'
7	284°13.4	18.4	257°00.1	7.0'	23°50.5	-9.6'	58.5'
8	299°13.3	18.3	271°26.1	7.2'	23°40.9	-9.7'	58.4'
9 10	314°13.2 329°13.0	· · 18.2 18.1	285°52.3 300°18.6	7.3' 7.4'	23°31.2 23°21.3	-9.9' -10.0'	58.4' 58.4'
11	344°12.9	18.0	314°45.1	7.6'	23°11.3	-10.0	58.3'
12	359°12.8	N23°17.9	329°11.6	7.7'	N23°01.2	-10.2'	58.3'
13	14°12.6	17.8	343°38.4	7.8'	22°51.0	-10.3'	58.3'
14	29°12.5 44°12.4	17.7	358°05.2	8.0'	22°40.7	-10.5'	58.2'
15 16	44 · 12.4 59 · 12.3	· · 17.5 17.4	12°32.2 26°59.3	8.1' 8.3'	22°30.2 22°19.6	-10.6' -10.7'	58.2' 58.1'
17	74°12.1	17.3	41°26.6	8.4	22°08.9	-10.7	58.1
18	89°12.0	N23°17.2	55°53.9	8.5'	N21°58.1	-10.9'	58.1'
19	104°11.9	17.1	$70^{\circ}21.5$	8.6'	21°47.2	-11.0'	58.0'
20	119°11.7	17.0	84°49.1	8.8'	21°36.2	-11.1'	58.0'
21 22	134°11.6 149°11.5	· · 16.9 16.7	99°16.9 113°44.8	8.9' 9.0'	21°25.0 21°13.8	-11.2' -11.3'	58.0' 57.9'
23	164°11.4	16.7	113 44.6 128°12.8	9.0 9.2'	21 13.6 21°02.4	-11.5 -11.4'	57.9'
	SD = 15.7'	d = -0.1'			D = 16.0'		-15
	3υ = 15. <i>l</i> ′	<i>u</i> = -0.1		31	_ 10.0°		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	179°11.2 194°11.1	N23° 16.5 16.4	142°41.0 157°09.3	9.3' 9.4'	N20°51.0 20°39.5	-11.5' -11.6'	57.9' 57.8'
2	209°11.0	16.3	157 09.3 171°37.8	9.4 9.6'	20° 27.8	-11.0	57.8'
3	224°10.8	. 16.2	186°06.3	9.7'	20°16.1	-11.8'	57.8'
4	239°10.7	16.0	200°35.0	9.8'	20°04.3	-11.9'	57.7'
5	254°10.6	15.9	215°03.9	10.0'	19°52.3	-12.0'	57.7'
6	269°10.4 284°10.3	N23° 15.8 15.7	229°32.8 244°01.9	10.1' 10.2'	N19°40.3 19°28.2	-12.1' -12.2'	57.7' 57.6'
7 8	284 10.3 299°10.2	15.7 15.5	244 01.9 258°31.1	10.2	19 28.2 19°16.1	-12.2 -12.3'	57.6'
9	314°10.1	. 15.4	273°00.4	10.5'	19°03.8	-12.4	57.6'
10	329°09.9	15.3	287°29.9	10.6'	18°51.4	-12.4'	57.5'
11	344°09.8	15.2	301°59.5	10.7'	18°39.0	-12.5'	57.5'
12 13	359°09.7 14°09.6	N23°15.0 14.9	316°29.2 330°59.0	10.8' 10.9'	N18°26.5 18°13.9	-12.6' -12.7'	57.5' 57.4'
14	29°09.4	14.8	345°29.0	11.1'	18°01.2	-12.7'	57.4'
15	44°09.3	• • 14.7	359°59.0	11.2'	17°48.5	-12.8'	57.3'
16	59°09.2	14.5	14°29.2	11.3'	17°35.7	-12.9'	57.3'
17	74°09.0	14.4 N23°14.3	28°59.5	11.4'	17°22.8 N17°09.9	-12.9'	57.3' 57.2'
18 19	89°08.9 104°08.8	N23 14.3 14.1	43°29.9 58°00.5	11.5' 11.7'	16°56.8	-13.0' -13.1'	57.2'
20	119°08.7	14.0	72°31.1	11.8'	16°43.8	-13.1	57.2'
21	134°08.5	• • 13.9	87°01.9	11.9'	16°30.6	-13.2'	57.1'
22	149°08.4	13.7	101°32.8	12.0'	16°17.4	-13.3'	57.1'
23	164°08.3	13.6	116°03.8	12.1'	16°04.1	-13.3'	57.1'
	SD = 15.7'	d = -0.1'		SI	O = 15.8'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°08.1	N23°13.5	130°34.9	12.2'	N15°50.8	-13.4'	57.0'
1	194°08.0	13.3	145°06.1	12.3'	15°37.4	-13.4'	57.0'
2	209°07.9 224°07.8	13.2 •• 13.1	159°37.4 174°08.8	12.4' 12.5'	15°24.0 15°10.5	-13.5' -13.6'	57.0' 56.9'
3 4	239°07.6	12.9	174 08.8 188°40.4	12.5	15 10.5 14°56.9	-13.6'	56.9'
5	254°07.5	12.8	203°12.0	12.7'	14°43.3	-13.7	56.9'
6	269°07.4	N23°12.6	217°43.8	12.8'	N14°29.7	-13.7'	56.8'
7	284°07.3	12.5	232°15.6	12.9'	14°16.0	-13.8'	56.8'
8 9	299°07.1 314°07.0	12.4 •• 12.2	246°47.6 261°19.6	13.1' 13.1'	14°02.2 13°48.4	-13.8' -13.8'	56.8' 56.7'
10	329°06.9	12.2	201 19.0 275°51.8	13.1	13°34.6	-13.9	56.7'
11	344°06.8	11.9	290°24.0	13.3'	13°20.7	-13.9'	56.7'
12	359°06.6	N23°11.8	304°56.4	13.4'	N13°06.8	-14.0'	56.6'
13	14°06.5 29°06.4	11.6 11.5	319°28.8 334°01.3	13.5' 13.6'	12°52.8 12°38.8	-14.0' -14.0'	56.6' 56.6'
14 15	29°06.4 44°06.3	11.5	334°01.3 348°34.0	13.6	12°38.8 12°24.8	-14.0 -14.1'	56.5
16	59°06.1	11.2	3°06.7	13.8'	12°10.7	-14.1'	56.5'
17	74°06.0	11.1	17°39.5	13.9'	11°56.6	-14.2'	56.5'
18	89°05.9	N23°10.9	32°12.4	14.0'	N11°42.4	-14.2'	56.4
19 20	104°05.8 119°05.6	10.8 10.6	46°45.4 61°18.4	14.1' 14.2'	11°28.2 11°14.0	-14.2' -14.2'	56.4' 56.4'
20	119°05.6 134°05.5	10.6	75°51.6	14.2'	11°14.0 10°59.8	-14.2 -14.3'	56.3
22	149°05.4	10.3	90°24.8	14.3'	10°45.5	-14.3'	56.3'
23	164°05.3	10.2	104°58.1	14.4'	10°31.2	-14.3'	56.3'
	SD = 15.7'	d = -0.1'		SI	O = 15.6'		

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

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

	Sun Moon					
Day		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	3-15%
27	03:03	03:09	12:03	14:08	01:40	
28	03:15	03:21	12:03	15:00	02:35	
29	03:27	03:33	12:04	15:47	03:24	

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Man -	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
Mon	278°19.0		N16°25.8		N09° 49.5		N23°13.7		S01°20.2		эпа	
0	278 19.0 293°21.5	225°05.7		119°01.8 134°02.9		183° 19.4 198° 21.2		275°47.3 290°49.7		Alpheratz	357°34.3	29°13.7
1		240°05.4	26.5		48.9		13.7		20.2	Ankaa	353°06.7	-42°09.8
2	308°23.9 323°26.4	255°05.1	27.2	149°04.0	48.3	213°23.1	13.6	305°52.1	20.1	Schedar	349°30.6	56°40.4
3		270°04.8	• • 27.9	164°05.1	• • 47.8	228°24.9	• • 13.6	320°54.5	20.1	Diphda	348°46.9	-17°50.7
4	338°28.9	285°04.5	28.5	179°06.2	47.2	243°26.8	13.6	335°56.9	20.1	Achernar	335°20.0	-57°06.1
5	353°31.3	300°04.3	29.2	194°07.3	46.6	258°28.6	13.6	350°59.3	20.1	Hamal	327°50.9	23°34.9
6	8°33.8	315°04.0	N16°29.9	209°08.5	N09°46.1	273°30.4	N23°13.6	6°01.7	S01°20.1	Polaris	314°08.3	89°22.0
7	23°36.3	330°03.7	30.6	224°09.6	45.5	288°32.3	13.6	21°04.2	20.1	Acamar	315°11.7	-40°11.9
8	38°38.7	345°03.4	31.3	239° 10.7	44.9	303°34.1	13.5	36°06.6	20.1	Menkar	314°05.9	4°11.4
9	53°41.2	0°03.1	• • 31.9	254°11.8	• • 44.4	318° 36.0	• • 13.5	51°09.0	• • 20.1	Mirfak	308°28.0	49°56.9
10	68°43.7	$15^{\circ}02.8$	32.6	269°12.9	43.8	333°37.8	13.5	66°11.4	20.1	Aldebaran	290°39.5	16°33.6
11	83°46.1	30°02.5	33.3	284° 14.0	43.2	348° 39.7	13.5	81° 13.8	20.0	Rigel	281°03.8	-8°10.3
12	98°48.6	45°02.2	N16°34.0	299°15.2	N09°42.7	3°41.5	N23°13.5	96° 16.2	S01°20.0	Capella	280°21.8	46°01.3
13	113°51.0	60°02.0	34.6	314° 16.3	42.1	18°43.3	13.5	$111^{\circ}18.6$	20.0	Bellatrix	278°22.8	6°22.4
14	128°53.5	75°01.7	35.3	329°17.4	41.5	33°45.2	13.4	$126^{\circ}21.0$	20.0	Elnath	278°01.7	28°37.7
15	$143^{\circ}56.0$	90°01.4	· · 36.0	344°18.5	• • 40.9	48°47.0	• • 13.4	141°23.4	· · 20.0	Alnilam	275°37.7	-1°11.1
16	158°58.4	$105^{\circ}01.1$	36.7	$359^{\circ}19.6$	40.4	63°48.9	13.4	156° 25.9	20.0	Betelgeuse	270°52.0	7°24.7
17	174°00.9	120°00.8	37.3	14°20.7	39.8	78°50.7	13.4	171°28.3	20.0	Canopus	263°52.8	-52°42.5
18	189°03.4	135°00.5	N16°38.0	29°21.9	N09°39.2	93°52.6	N23°13.4	186°30.7	S01°20.0	Sirius	258°26.2	-32 42.3 -16°45.0
19	204°05.8	150°00.2	38.7	44°23.0	38.7	108°54.4	13.4	201°33.1	20.0	1		-10 45.0 -29°00.4
20	219°08.3	164°59.9	39.4	59°24.1	38.1	123°56.3	13.4	216°35.5	20.0	Adhara	255°05.9	
21	234°10.8	179°59.6	• • 40.0	74°25.2	• • 37.5	138°58.1	• • 13.3	231°37.9	• • 19.9	Procyon	244°50.7 243°17.2	5°09.6
22	249°13.2	194°59.3	40.7	89°26.3	36.9	154°00.0	13.3	246°40.3	19.9	Pollux		27°57.9
23	264°15.7	209°59.0	41.4	104°27.4	36.4	169°01.8	13.3	261°42.7	19.9	Avior	234°15.2	-59°35.5
								-		Suhail	222°46.4	-43°32.2
Mer.p	ass. 05:26	$\nu$ -0.3′ d0	.7′ m-4.15	$\nu_{1.1'} d_{-0}$	.6′ m1.49	$\nu$ 1.8′ $d$ -0	.0′ m-1.89	$\nu$ 2.4′ $d$ -0	.0′ m0.96	Miaplacidus	221°39.0	-69°49.5
										Alphard	217°47.6	-8°46.2
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.2	11°50.6
0	279°18.1	224°58.7	N16°42.1	119°28.5	N09°35.8	184°03.6	N23°13.3	276°45.1	S01°19.9	Dubhe	193°40.8	61°37.1
1	294°20.6	239°58.4	42.7	134°29.7	35.2	199°05.5	13.3	291°47.6	19.9	Denebola	182°24.6	14°25.9
2	309°23.1	254°58.1	43.4	149°30.8	34.7	214°07.3	13.3	306°50.0	19.9	Gienah	175°43.2	-17°41.1
3	324°25.5	269°57.8	• • 44.1	164°31.9	•• 34.1	229°09.2	13.2	321°52.4	. 19.9		172°59.7	-63°14.7
4	339°28.0	284°57.5	44.7	179°33.0	33.5	244°11.0	13.2	336°54.8	19.9	Gacrux	171°51.2	-57°15.6
5	354°30.5	299°57.2	45.4	179°33.0	32.9	259°12.9	13.2	351° 57.2	19.9	Alioth	166°12.5	55°49.5
6	9°32.9	314°56.9	N16°46.1	209°35.2	N09° 32.4	274° 14.7	N23°13.2	6°59.6	S01°19.9	Spica	158°21.8	-11°17.7
7	9 32.9 24°35.4	329°56.6	46.7	209 35.2 224°36.4	31.8	289° 16.6	13.2	22°02.0	19.8	Alkaid	152°51.5	49°11.4
	24 35.4 39°37.9			239° 37.5		304° 18.4		37°04.5		Hadar	148°35.2	-60°30.0
8		344°56.3	47.4		31.2		13.1		19.8 •• 19.8	Menkent	147°57.0	-36°29.9
9	54°40.3	359°56.0	• • 48.1	254°38.6	• • 30.6	319°20.2	13.1	52°06.9		Arcturus	145°47.4	19°03.1
10	69°42.8	14°55.7	48.7	269°39.7	30.1	334°22.1	13.1	67°09.3	19.8	Rigil Kent.	139°39.4	-60°56.7
11	84°45.3	29°55.4	49.4	284°40.8	29.5	349°23.9	13.1	82°11.7	19.8	Kochab	$137^{\circ}19.1$	74°03.2
12	99°47.7	44°55.1	N16°50.1	299°41.9	N09°28.9	4°25.8	N23°13.1	97°14.1	S01°19.8	Zuben'ubi	136°55.4	-16°08.9
13	114°50.2	59° 54.8	50.7	314°43.0	28.4	19°27.6	13.1	112° 16.5	19.8	Alphecca	126°03.1	26°37.8
14	129°52.6	74° 54.5	51.4	329°44.2	27.8	34° 29.5	13.0	127° 18.9	19.8	Antares	112°15.0	-26°29.4
15	144°55.1	89° 54.2	• • 52.1	344° 45.3	• • 27.2	49°31.3	• • 13.0	142°21.4	• • 19.8	Atria	107°08.4	-69°04.5
16	159°57.6	104°53.9	52.7	359°46.4	26.6	64°33.2	13.0	157°23.8	19.8	Sabik	102°02.0	-15°45.4
17	175°00.0	119°53.6	53.4	14°47.5	26.1	79°35.0	13.0	172°26.2	19.8	Shaula	96°09.4	-37°07.4
18	190°02.5	134°53.3	N16°54.0	29°48.6	N09°25.5	94°36.8	N23°13.0	187°28.6	S01°19.7	Rasalhague	95°57.8	12°32.5
19	205°05.0	149°53.0	54.7	44° 49.7	24.9	109°38.7	13.0	202°31.0	19.7	Eltanin	90°41.5	51°29.1
20	220°07.4	164°52.7	55.4	59°50.8	24.3	124°40.5	12.9	217°33.4	19.7	Kaus Aust.	83°31.6	-34°22.3
21	235°09.9	179°52.4	• • 56.0	74°52.0	• • 23.8	139°42.4	• • 12.9	232°35.9	•• 19.7	Vega	80°32.5	38°48.4
22	250°12.4	194°52.1	56.7	89°53.1	23.2	154° 44.2	12.9	247°38.3	19.7	Nunki	75°46.9	-26°15.9
23	265°14.8	209°51.8	57.4	104°54.2	22.6	$169^{\circ}46.1$	12.9	262°40.7	19.7	Altair	61°59.2	8°56.1
N/1011 10	0F.22	0 3/ 40	7/ 111	1 1/ 4 0	6/ 1 40	1 0/ ./ 0	0/ 1 90		.0′ m0.96	Peacock	53°04.5	-56°39.0
ivier.p	ass. 05:22	ν-υ.5 αυ	.7′ m-4.14	$\nu$ 1.1 $a$ -0	0.6′ m1.49	ν1.ο a-U	.0′ m-1.89	ν2.4 <b>α</b> -0	.0 1110.90	Deneb	49°25.1	-50 39.0 45°22.1
										Enif	49 25.1 33°38.2	45 22.1 9°59.5
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.1	-46°50.0
0	280°17.3	224°51.5	N16°58.0	119°55.3	N09°22.0	184°47.9	N23°12.9	277°43.1	S01°19.7	Fomalhaut	15°13.9	-40 50.0 -29°29.0
1	295°19.8	239°51.1	58.7	134°56.4	21.5	199°49.8	12.9	292°45.5	19.7	Scheat	13°44.7	-29 29.0 28°13.1
2	$310^{\circ}22.2$	254°50.8	16°59.3	149°57.5	20.9	214°51.6	12.8	307°47.9	19.7	Markab	13°29.4	15°20.5
3	325°24.7	269° 50.5	17°00.0	164°58.6	20.3	229°53.5	12.8	322° 50.4	• • 19.7	iviarkab	13 29.4	13 20.3
4	340°27.1	284°50.2	00.6	179°59.8	19.7	244°55.3	12.8	337° 52.8	19.7	Jun 30 Mon	SHA	Mer.pass
5	355°29.6	299°49.9	01.3	195°00.9	19.2	259°57.1	12.8	352°55.2	19.7	Venus	306°46.7	09:00
6	10°32.1	314°49.6	N17°02.0	210°02.0	N09°18.6	274°59.0	N23°12.8	7° 57.6	S01°19.7	Mars		16:03
7	25°34.5	329°49.3	02.6	225°03.1	18.0	290°00.8	12.7	23°00.0	19.6	Jupiter	265°00.4	11:45
8	40°37.0	344° 48.9	03.3	240°04.2	17.4	305°02.7	12.7	38°02.4	19.6	Saturn	357°28.3	05:36
9	55°39.5	359° 48.6	03.9	255°05.3	. 16.9	320°04.5	12.7	53°04.9	. 19.6			
10	70°41.9	14°48.3	04.6	270°06.4	16.3	335°06.4	12.7	68°07.3	19.6	Jul 01 Tue	SHA	Mer.pass
11	85°44.4	29°48.0	05.2	285°07.6	15.7	350°08.2	12.7	83°09.7	19.6	Venus	305°40.6	09:00
12	100°46.9	44° 47.7	N17°05.9	300°08.7	N09°15.1	5° 10.1	N23°12.7	98° 12.1	S01°19.6	Mars		16:01
13	115°49.3	59° 47.4	06.5	315°09.8	14.6	20° 11.9	12.6	113° 14.5	19.6	Jupiter	264°45.5	11:42
14	130°51.8	74° 47.0	07.2	330° 10.9	14.0	35° 13.8	12.6	128° 17.0	19.6	Saturn	357°27.0	05:32
15	145°54.2	89°46.7	• • 07.8	345°12.0	• • 13.4	50° 15.6	12.6	143°19.4	. 19.6	Jul 02 Wed	SHA	Mer.pass
16	160°56.7	104°46.4	08.5	0°13.1	12.8	65°17.4	12.6	158°21.8	19.6		304°34.2	09:01
17	175° 59.2	119°46.1	00.5	15° 14.2	12.0	80° 19.3	12.6	173° 24.2	19.6	1	304 34.2 199°38.0	
18	175 59.2 191°01.6	134°45.8	N17°09.8	30° 15.3	N09°11.7	95°21.1	N23°12.5	173 24.2 188° 26.6	S01° 19.6	Jupiter		15:59 11:39
19	206°04.1	149°45.4	10.4	45° 16.5	11.1	110°23.0	12.5	203°29.1	19.6	Saturn		
20	200 04.1 221°06.6	164° 45.4	11.1	60° 17.6	10.5	110 23.0 125°24.8	12.5	203 29.1 218°31.5	19.5	Saturn	357°25.8	05:28
21	236°09.0	179° 44.8	•• 11.7	75° 18.7	•• 09.9	140°26.7	12.5	233°33.9	• • 19.5	Horizont	al parallax	
22	251°11.5	194°44.5	12.4	90° 19.8	09.4	155°28.5	12.5	248°36.3	19.5		Venus:	0.2
23	266°14.0	209°44.2	13.0	105° 20.9	08.8	170°30.4	12.5	263°38.7	19.5		Mars:	0.1
										1		
Mer.p	ass. 05:18	$\nu$ -0.3′ d0	.7′ m-4.13	$\nu$ 1.1′ d-0	.6′ m1.50	$\nu$ 1.8′ <i>d</i> -0	.0′ m-1.89	$\nu$ 2.4′ d-0	.0′ m0.95			

h	Su	n	Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°05.1	N23°10.0	119°31.5	14.5'	N10°16.9	-14.4'	56.2'
1 2	194°05.0 209°04.9	09.9 09.7	134°05.0 148°38.5	14.6'	10°02.5 09°48.1	-14.4'	56.2' 56.2'
3	209 04.9 224°04.8	•• 09.6	148 38.5 163°12.2	14.6' 14.7'	09 48.1 09°33.7	-14.4' -14.4'	56.2 56.1'
4	239°04.6	09.4	177°45.9	14.8'	09°19.3	-14.4'	56.1'
5	254°04.5	09.2	192°19.7	14.9'	09°04.8	-14.5'	56.1'
6	269°04.4 284°04.3	N23°09.1	206°53.5 221°27.4	14.9'	N08°50.4 08°35.9	-14.5'	56.0'
7 8	284 04.3 299°04.1	08.9 08.8	221°27.4 236°01.4	15.0' 15.1'	08°35.9 08°21.4	-14.5' -14.5'	56.0' 56.0'
9	314°04.0	• • 08.6	250°35.5	15.1'	08°06.8	-14.5'	55.9'
10	329°03.9	08.5	265°09.6	15.2'	$07^{\circ}52.3$	-14.6'	55.9'
11	344°03.8	08.3 N23°08.1	279°43.8 294°18.1	15.3'	07°37.7 N07°23.2	-14.6' -14.6'	55.9'
12 13	359°03.7 14°03.5	N23 08.1 08.0	294°18.1 308°52.4	15.3' 15.4'	07° 08.6	-14.6'	55.8' 55.8'
14	29°03.4	07.8	323°26.8	15.4'	06°54.0	-14.6'	55.8'
15	44°03.3	• • 07.7	338°01.2	15.5'	06°39.4	-14.6'	55.8'
16	59°03.2	07.5	352°35.7	15.6'	06°24.8	-14.6'	55.7'
17 18	74°03.0 89°02.9	07.3 N23°07.2	7°10.3 21°44.9	15.6' 15.7'	06°10.2 N05°55.5	-14.6' -14.6'	55.7' 55.7'
19	104°02.8	07.0	36°19.6	15.7'	05°40.9	-14.6'	55.6'
20	119°02.7	06.8	50°54.3	15.8'	05°26.2	-14.7'	55.6'
21	134°02.5	• • 06.7	65°29.1	15.8'	05°11.6	-14.7'	55.6'
22 23	149°02.4 164°02.3	06.5 06.3	80°03.9 94°38.8	15.9' 15.9'	04°56.9 04°42.3	-14.7' -14.7'	55.6' 55.5'
23	SD = 15.7'	d = -0.2'				-1-1.1	33.3
	טט = 15.7'	$a = -0.2^{\circ}$		51	O = 15.3'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°02.2 194°02.1	N23°06.2	109°13.7	16.0'	N04°27.6 04°12.9	-14.7'	55.5'
1 2	194°02.1 209°01.9	06.0 05.8	123°48.7 138°23.7	16.0' 16.1'	04°12.9 03°58.3	-14.7' -14.7'	55.5' 55.4'
3	224°01.8	• • 05.7	150° 25.7° 152° 58.8	16.1	03°43.6	-14.7'	55.4'
4	239°01.7	05.5	167°33.9	16.1'	03°29.0	-14.7'	55.4'
5	254°01.6	05.3	182°09.0	16.2'	03°14.3	-14.7'	55.4'
6 7	269°01.5 284°01.3	N23°05.1 05.0	196°44.2 211°19.5	16.2' 16.3'	N02°59.6 02°45.0	-14.7' -14.7'	55.3' 55.3'
8	299°01.2	04.8	211 19.5 225°54.7	16.3'	02°45.0	-14.7	55.3'
9	314°01.1	•• 04.6	240°30.0	16.3'	02°15.7	-14.6'	55.3'
10	329°01.0	04.4	255°05.4	16.4'	02°01.0	-14.6'	55.2'
11 12	344°00.9 359°00.7	04.3 N23°04.1	269°40.7 284°16.2	16.4' 16.4'	01°46.4 N01°31.7	-14.6' -14.6'	55.2' 55.2'
13	14°00.6	03.9	298°51.6	16.5	01°17.1	-14.6'	55.2'
14	29°00.5	03.7	$313^{\circ}27.1$	16.5'	$01^{\circ}02.5$	-14.6'	55.1'
15	44°00.4	• • 03.5	328°02.5	16.5'	00°47.9	-14.6'	55.1'
16 17	59°00.3 74°00.1	03.4 03.2	342°38.1 357°13.6	16.5' 16.6'	00°33.3 00°18.7	-14.6' -14.6'	55.1' 55.1'
18	89°00.0	N23°03.0	11°49.2	16.6'	N00°04.2	-14.6'	55.0'
19	103°59.9	02.8	$26^{\circ}24.8$	16.6'	\$00°10.4	14.5'	55.0'
20	118°59.8	02.6	41°00.4		00°25.0	14.5	55.0'
21 22	133°59.7 148°59.5	· · 02.5 02.3	55°36.1 70°11.7	16.7' 16.7'	00°39.5 00°54.0	14.5' 14.5'	55.0' 55.0'
23	163°59.4	02.3	84°47.4	16.7	01°08.5	14.5'	54.9'
	SD = 15.7'	d = -0.2'		SI	0 = 15.1'		
Wed	<b>GHA</b> 178°59.3	<b>Dec</b> N23°01.9	<b>GHA</b> 99°23.1	u 16.7'	Dec 501°23.0	d 14.5'	<b>HP</b> 54.9'
0 1	178 59.3 193°59.2	N23 01.9 01.7	99 23.1 113°58.8	16.7'	01°37.5	14.5'	54.9'
2	208°59.1	01.5	128°34.5	16.7'	01°51.9	14.4'	54.9'
3	223°58.9	•• 01.3	143°10.3	16.8'	02°06.4	14.4'	54.9'
4 5	238°58.8 253°58.7	01.2 01.0	157°46.0 172°21.8	16.8' 16.8'	02°20.8 02°35.2	14.4' 14.4'	54.8' 54.8'
6	268°58.6	N23°00.8	186°57.6	16.8'	S02°49.6	14.4'	54.8'
7	283°58.5	00.6	201°33.3	16.8'	03°03.9	14.3'	54.8'
8	298°58.4	00.4	216°09.1	16.8'	03°18.2	14.3'	54.8'
9 10	313°58.2 328°58.1	· · 00.2 23°00.0	230°44.9 245°20.7	16.8' 16.8'	03°32.6 03°46.9	14.3' 14.3'	54.7' 54.7'
11	343°58.0	23° 59.8	259°56.5	16.8'	03°40.9 04°01.1	14.2'	54.7'
12	358°57.9	N22°59.6	274°32.4	16.8'	S04°15.4	14.2'	54.7'
13	13°57.8	59.4	289°08.2	16.8'	04°29.6 04°43.8	14.2'	54.7'
14 15	28°57.7 43°57.5	59.2 •• 59.0	303°44.0 318°19.8	16.8' 16.8'	04°43.8 04°57.9	14.2' 14.1'	54.6' 54.6'
16	58°57.4	58.8	332°55.6	16.8'	05°12.1	14.1	54.6'
17	73°57.3	58.6	347°31.4	16.8'	05°26.2	14.1'	54.6'
18	88°57.2	N22°58.4	2°07.2	16.8'	\$05°40.3	14.1'	54.6'
19 20	103°57.1 118°57.0	58.2 58.0	16°43.0 31°18.8	16.8' 16.8'	05°54.3 06°08.4	14.0' 14.0'	54.6' 54.5'
21	133°56.8	• • 57.8	45°54.6	16.8'	06°22.4	14.0'	54.5
22	148°56.7	57.6	60°30.3	16.8'	06°36.3	13.9'	54.5'
23	163°56.6	57.4	75°06.1	16.7'	06°50.3	13.9'	54.5'
	SD = 15.7'	d = -0.2'		SI	O = 15.0'		

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

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

		Sun			Moon			
Day	Eqn.of Time		Eqn.of Time		Mer.	Mer.	Mer.Pass.	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	5-7		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	24-42%		
30	03:39	03:45	12:04	16:30	04:09			
01	03:51	03:57	12:04	17:11	04:51			
02	04:03	04:08	12:04	17:51	05:31			

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	281°16.4	224°43.8	N17° 13.7	120°22.0	N09°08.2	185°32.2	N23° 12.4	278°41.2	S01°19.5			
1	296° 18.9	239°43.5	14.3	135°23.1	07.6	200°34.1	12.4	293°43.6	19.5	Alpheratz	$357^{\circ}34.3$	29°13.8
2	311°21.4	254°43.2	15.0	150°24.2	07.0	215°35.9	12.4	308°46.0	19.5	Ankaa	353°06.7	-42°09.8
3	326° 23.8	269°42.8	15.6	165°25.4	06.5	230°37.7	. 12.4	323°48.4	. 19.5	Schedar	$349^{\circ}30.6$	56°40.4
	341°26.3	209 42.6 284°42.5				245°39.6				Diphda	348°46.9	-17°50.6
4			16.3	180°26.5	05.9		12.4	338°50.8	19.5	Achernar	335°20.0	-57°06.1
5	356°28.7	299°42.2	16.9	195°27.6	05.3	260°41.4	12.3	353°53.3	19.5	Hamal	327°50.9	23°34.9
6	11°31.2	314°41.9	N17° 17.6	210°28.7	N09°04.7	275°43.3	N23°12.3	8°55.7	S01°19.5	Polaris	314°07.0	89°22.0
7	26°33.7	329°41.5	18.2	225°29.8	04.2	290°45.1	12.3	23°58.1	19.5	Acamar	315°11.7	-40°11.9
8	41°36.1	344°41.2	18.8	240°30.9	03.6	305°47.0	12.3	39°00.5	19.5	Menkar	314°05.9	4°11.4
9	56°38.6	359°40.9	• • 19.5	255°32.0	• • 03.0	320°48.8	•• 12.3	54°02.9	• • 19.5	Mirfak	308° 28.0	49°56.9
10	$71^{\circ}41.1$	14°40.5	20.1	270°33.1	02.4	335°50.7	12.2	69°05.4	19.5			
11	86° 43.5	29°40.2	20.8	285°34.3	01.8	350°52.5	12.2	84°07.8	19.5	Aldebaran	290°39.5	16°33.6
12	101°46.0	44°39.9	N17°21.4	300°35.4	N09°01.3	5°54.4	N23°12.2	99°10.2	S01°19.5	Rigel	281°03.8	-8°10.3
13	116°48.5	59°39.6	22.1	315°36.5	00.7	20°56.2	12.2	114°12.6	19.4	Capella	280°21.7	46°01.3
14	131°50.9	74°39.2	22.7	330°37.6	09°00.1	35°58.0	12.2	129°15.1	19.4	Bellatrix	278°22.8	6°22.4
15	146°53.4	89°38.9	23.3	345°38.7	08°59.5	50°59.9	12.1	144°17.5	• • 19.4	Elnath	278°01.7	28°37.7
16	161°55.9	104°38.6	24.0	0°39.8	58.9	66°01.7	12.1	159°19.9	19.4	Alnilam	275°37.6	$-1^{\circ}11.1$
										Betelgeuse	270°52.0	$7^{\circ}24.7$
17	176°58.3	119°38.2	24.6	15°40.9	58.4	81°03.6	12.1	174°22.3	19.4	Canopus	263°52.8	-52°42.4
18	192°00.8	134°37.9	N17°25.3	30°42.0	N08°57.8	96°05.4	N23° 12.1	189°24.7	S01°19.4	Sirius	258° 26.2	-16°45.0
19	207°03.2	149°37.5	25.9	45°43.2	57.2	111°07.3	12.1	204°27.2	19.4	Adhara	255°05.9	-29°00.3
20	222°05.7	164°37.2	26.5	60°44.3	56.6	$126^{\circ}09.1$	12.1	219°29.6	19.4	Procyon	244°50.7	5°09.6
21	237°08.2	179°36.9	• • 27.2	75°45.4	• • 56.0	141°11.0	• • 12.0	234°32.0	•• 19.4	Pollux	244 50.7 243° 17.2	27°57.9
22	252°10.6	194°36.5	27.8	90°46.5	55.5	156°12.8	12.0	249°34.4	19.4			
23	267° 13.1	209°36.2	28.4	105°47.6	54.9	171°14.7	12.0	264°36.9	19.4	Avior	234°15.2	-59°35.5
			_			-		-		Suhail	222°46.4	-43°32.2
Mer.p	ass. 05:14	$\nu$ -0.3′ d0	.6′ m-4.13	$\nu 1.1' d-0$	0.6′ m1.50	$\nu 1.8'  d$ -0	.0′ m-1.89	$\nu$ 2.4′ d-0	.0′ m0.95	Miaplacidus	221°39.0	-69°49.4
										Alphard	217° 47.6	-8°46.2
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.2	11°50.6
										Dubhe	193°40.8	$61^{\circ}37.1$
0	282°15.6	224°35.9	N17°29.1	120°48.7	N08°54.3	186°16.5	N23°12.0	279°39.3	S01°19.4	Denebola	182°24.6	14°25.9
1	297°18.0	239°35.5	29.7	135°49.8	53.7	201°18.4	12.0	294°41.7	19.4	Gienah	175°43.2	$-17^{\circ}41.1$
2	312°20.5	254°35.2	30.3	150°50.9	53.1	216°20.2	11.9	309°44.1	19.4	Acrux	172°59.7	-63°14.7
3	327°23.0	269°34.8	• • 31.0	165°52.0	• • 52.6	231°22.1	• • 11.9	324°46.6	• • 19.4		171°51.3	-57°15.6
4	342°25.4	284°34.5	31.6	180°53.2	52.0	246°23.9	11.9	339°49.0	19.4	Alioth	166° 12.6	55°49.5
5	357°27.9	299°34.2	32.2	195°54.3	51.4	261°25.7	11.9	354°51.4	19.4	Spica	158°21.8	-11°17.7
6	12°30.3	314°33.8	N17°32.9	210°55.4	N08°50.8	276°27.6	N23°11.9	9°53.8	501°19.4	Alkaid	150° 51.5	49°11.4
7	27°32.8	329°33.5	33.5	225°56.5	50.2	291°29.4	11.8	24°56.3	19.4		148° 35.2	-60°30.0
8	42°35.3	344°33.1	34.1	240°57.6	49.7	306°31.3	11.8	39°58.7	19.4	Hadar		
9	57° 37.7	359°32.8	• • 34.8	255°58.7	• • 49.1	321°33.1	· · 11.8	55°01.1	• • 19.3		147°57.0	-36°29.9
10	72°40.2	14°32.4	35.4	270°59.8	48.5	336°35.0	11.8	70°03.5	19.3		145° 47.4	19°03.1
11	87° 42.7	29°32.1	36.0	286°00.9	47.9	351°36.8	11.8	85°06.0	19.3	"	139°39.4	-60°56.7
		44°31.7					N23°11.7		501°19.3	Kochab	$137^{\circ}19.1$	74°03.2
12	102°45.1		N17°36.6	301°02.0	N08°47.3	6°38.7		100°08.4		Zuben'ubi	136°55.4	$-16^{\circ}08.9$
13	117°47.6	59°31.4	37.3	316°03.2	46.7	21°40.5	11.7	115°10.8	19.3	Alphecca	$126^{\circ}03.1$	26°37.8
14	132°50.1	74°31.1	37.9	331°04.3	46.2	36°42.4	11.7	130°13.2	19.3	Antares	112° 15.0	-26°29.4
15	147°52.5	89°30.7	• • 38.5	346°05.4	• • 45.6	51°44.2	• • 11.7	145°15.7	• • 19.3	Atria	107°08.4	-69°04.5
16	162°55.0	104°30.4	39.2	$1^{\circ}06.5$	45.0	66°46.1	11.7	$160^{\circ}18.1$	19.3	Sabik	102°02.0	-15°45.4
17	177°57.5	119°30.0	39.8	16°07.6	44.4	81°47.9	11.6	175°20.5	19.3	Shaula	96°09.4	-37°07.4
18	192°59.9	134°29.7	N17°40.4	31°08.7	N08°43.8	96°49.8	N23°11.6	190°23.0	S01°19.3		95° 57.8	12°32.5
19	208°02.4	149°29.3	41.0	46°09.8	43.3	111°51.6	11.6	205°25.4	19.3	Rasalhague		
20	223°04.8	164°29.0	41.7	61°10.9	42.7	126°53.4	11.6	220°27.8	19.3	Eltanin	90°41.5	51°29.1
21	238°07.3	179°28.6	• • 42.3	76°12.0	• • 42.1	141°55.3	· · 11.5	235°30.2	• • 19.3	Kaus Aust.	83°31.6	-34°22.3
22	253°09.8	194°28.3	42.9	91°13.1	41.5	156°57.1	11.5	250°32.7	19.3	Vega	80°32.5	38°48.4
23	268° 12.2	209°27.9	43.5	106°14.3	40.9	171°59.0	11.5	265°35.1	19.3	Nunki	75°46.9	-26°15.9
23	200 12.2	209 21.9	45.5	100 14.5	40.9	171 39.0	11.5	203 33.1	19.5	Altair	61°59.2	8°56.1
Mer.p	ass. 05:10	$\nu$ -0.3 $'$ d0	.6′ m-4.12	u 1.1' d-0	$0.6'~{ m m}1.51$	$\nu$ 1.8′ d-0	.0′ m-1.89	$\nu$ 2.4′ d-0	.0′ m0.94	Peacock	53°04.5	-56°39.0
<u> </u>										Deneb	49°25.1	45°22.2
_	_	_	_		_	_	_		_	Enif	33°38.2	9°59.5
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.1	-46°50.0
0	283°14.7	224°27.6	N17°44.1	121°15.4	N08°40.3	187°00.8	$N23^{\circ}11.5$	280°37.5	S01°19.3	Fomalhaut	15°13.9	-29°29.0
1	298° 17.2	239°27.2	44.8	$136^{\circ}16.5$	39.8	202°02.7	11.5	295°39.9	19.3	Scheat	13°44.7	28°13.2
2	$313^{\circ}19.6$	254°26.8	45.4	151°17.6	39.2	217°04.5	11.4	310°42.4	19.3	Markab	13°29.4	15°20.5
3	328°22.1	269°26.5	• • 46.0	166°18.7	• • 38.6	232°06.4	• • 11.4	325°44.8	• • 19.3	Iviainab	±3 ±3.₹	10.0
4	343°24.6	284°26.1	46.6	181°19.8	38.0	247°08.2	11.4	340°47.2	19.3	Jul 03 Thu	SHA	Mer.pass
5	358°27.0	299°25.8	47.2	196°20.9	37.4	262°10.1	11.4	355°49.7	19.3	Venus		09:01
6	13°29.5	314°25.4	N17°47.9	211°22.0	N08°36.8	277°11.9	N23°11.4	10°52.1	S01°19.3		199°05.6	15:57
7	28° 32.0	329°25.1	48.5	226°23.1	36.2	292°13.8	11.3	25°54.5	19.3	Jupiter	264° 15.8	11:36
										Saturn	357° 24.7	05:24
8	43°34.4	344°24.7	49.1	241°24.2	35.7	307°15.6	11.3	40°57.0	19.3	Saturn	JJ1 24.1	05:24
9	58°36.9	359°24.3	• • 49.7	256°25.4	35.1	322°17.5	· · 11.3	55°59.4	• • 19.3	Jul 04 Fri	SHA	Mer.pass
10	73°39.3	14°24.0	50.3	271°26.5	34.5	337°19.3	11.3	71°01.8	19.3	Venus	302°20.3	09:02
11	88°41.8	29°23.6	51.0	286°27.6	33.9	352°21.2	11.3	86°04.2	19.3		198° 33.1	15:56
12	103°44.3	44°23.3	N17°51.6	301°28.7	N08°33.3	7°23.0	N23°11.2	101°06.7	S01°19.3	Jupiter	198 33.1 264°00.9	
13	118°46.7	59°22.9	52.2	$316^{\circ}29.8$	32.7	22°24.8	11.2	$116^{\circ}09.1$	19.3			11:33
14	133°49.2	74°22.5	52.8	331°30.9	32.2	37°26.7	11.2	131°11.5	19.3	Saturn	357°23.7	05:21
15	148°51.7	89°22.2	• • 53.4	346°32.0	31.6	52°28.5	· · 11.2	146°14.0	• • 19.3	Jul 05 Sat	SHA	Mer.pass
16	163°54.1	104°21.8	54.0	1°33.1	31.0	67°30.4	11.2	161°16.4	19.3		301°12.9	09:02
17	178°56.6	119°21.5	54.6	16°34.2	30.4	82°32.2	11.1	176°18.8	19.3		198°00.7	15:54
18	193°59.1	134°21.1	N17°55.2	31°35.3	N08°29.8	97°34.1	N23°11.1	191°21.3	S01°19.2	Jupiter		11:31
19	209°01.5	149°20.7	55.9	46°36.4	29.2	112°35.9	11.1	206°23.7	19.2	Saturn	357°22.8	05:17
20	224°04.0	164°20.4	56.5	61°37.6	28.6	127°37.8	11.1	221°26.1	19.2	11!-	al nav-11-:	
21	239°06.4	179°20.0	• • 57.1	76°38.7	• • 28.1	142°39.6	· · 11.0	236°28.5	• • 19.2	norizont	al parallax	0.0
22	254°08.9	194°19.6	57.7	91°39.8	27.5	157°41.5	11.0	251°31.0	19.2		Venus:	0.2
23	269°11.4	209°19.3	58.3	106°40.9	26.9	172°43.3	11.0	266°33.4	19.2		Mars:	0.1
N / -	05:00	0 4/ /0	6/ - 110	1 1/ 10	6/ -1 -1	1 0/ / 0	0/ == 1.00		0/ = 0.04			
ivier.p	ass. 05:06	$\nu$ -0.4 d0	.6′ m-4.12	$\nu_{\rm I.I.}$ d-C	).6′ m1.51	$\nu$ 1.8 a-0	.0′ m-1.89	$\nu \angle .4^{\circ} a = 0$	.0′ m0.94			

This   CHA   Dec   GHA   Dec   0   178°56.5   N22°57.2   88°41.8   16.7"   S07°04.2   13.9"   54.5"   1   193°56.4   57.0   104°17.6   16.7"   07°31.9   13.8   54.5"   2   208°56.3   56.8   118°53.3   16.7"   07°31.9   13.8   54.5"   3   223°56.2   56.6   133°29.0   16.7"   07°31.9   13.8   54.5"   4   238°56.0   56.4   148°04.7   16.7"   07°59.4   13.7   54.4"   5   268°55.8   N22°56.0   167°80.4   16.7"   07°59.4   13.7   54.4"   6   268°55.8   N22°56.0   177°16.0   16.6"   08°54.9   13.7   54.4"   7   283°55.7   55.6   206°27.3   16.6   08°54.1   13.6"   54.4"   10   328°55.4   55.2   235°38.4   16.5"   09°21.3   13.5"   54.4"   11   343°55.2   55.0   250°14.0   16.5"   09°21.3   13.5"   54.4"   11   343°55.2   55.0   250°14.0   16.5"   09°21.3   13.5"   54.4"   12   388°55.1   N22°54.8   246°49.5   16.5"   09°21.3   13.5"   54.4"   13   13°55.0   55.5   250°10.6   50°10.77   13.5"   54.4"   15   428°54.9   54.3   294°00.5   16.4"   10°15.0   13.3"   54.3"   15   43°54.8   N22°53.5   330°22.1   16.3"   51.9"   54.3"   18   88°64.4   N22°63.5   330°22.1   16.3"   51.9"   54.3"   19   103°64.3   53.3   65°4.6   63°1.3   54.1"   19   103°64.3   53.3   65°4.6   63°1.3   54.1"   22   148°54.0   52.6   50°43.1   16.2"   11°34.4   13.1"   54.3"   23   163°53.9   52.4   66°18.3   16.2"   11°34.4   13.1"   54.3"   24   228°53.3   85°4.6   65°8.3   16.2"   11°34.5   13.1"   54.3"   25   253°53.2   51.7   109°0.26   16.0"   12°5.9   12.2"   54.2"   26   266°53.1   N22°50.8   167°23.4   15.8"   13°30.6   16.2"   13°30.5   12.2"   27   283°53.0   50.6   181°53.3   15.9"   13°30.4   12.6"   54.2"   28   266°54.7   50.0   225°42.5   16.1"   12°3.5   12.9"   54.2"   29   313°52.8   51.7   109°0.26   16.0"   13°0.50   12.7"   54.2"   21   133°51.5   43°0.5	h	Su	n	Moon						
198*66.4   50.22*67.2   88°41.8   16.7   507°04.2   13.9   54.5	Thu	GHA	Dec	GHA	ν	Dec	d	HP		
2										
3	1	193°56.4	57.0		16.7'		13.8'	54.5'		
5										
The color of the										
The color of the										
8										
10   328°55.4   55.2   235°38.4   16.5°   09°21.3   13.5°   54.4°     11   343°55.2   55.0   250°14.0   16.5°   509°48.2   13.4°   54.3°     12   358°55.1   N22°54.8   264°49.5   16.5°   509°48.2   13.4°   54.3°     13   13°55.0   54.5   279°25.0   16.5°   10°01.7   13.4°   54.3°     14   228°54.9   54.3   224°00.5   16.4°   10°28.4   13.3°   54.3°     15   43°54.8   · 54.1   308°35.9   16.4°   10°28.4   13.3°   54.3°     16   58°54.7   53.9   323°11.3   16.4°   10°28.4   13.3°   54.3°     17   73°54.6   53.7   337°45.7   16.3°   11°08.1   13.2°   54.3°     18   88°54.4   N22°55.5   352°22.1   16.3°   11°08.1   13.2°   54.3°     19   103°54.3   55.3   6°57.4   16.3°   11°21.3   13.1°   54.3°     20   118°54.2   55.0   21°32.7   16.2°   11°34.4   13.1°   54.3°     21   133°54.1   · 52.8   36°07.9   16.2°   11°47.5   13.0°   54.2°     22   148°54.0   52.6   50°43.1   16.2°   12°03.5   12.9°   54.2°     22   148°54.0   52.6   50°43.1   16.2°   12°03.5   12.9°   54.2°     22   148°54.3   55.2   94°28.5   16.1°   12°39.3   12.8°   54.2°     22   208°53.5   55.7   109°3.6   16.0°   12°9.2   12.8°   54.2°     23   223°53.4   · 51.5   123°38.6   16.0°   13°05.0   12.7°   54.2°     24   238°53.3   51.3   138°1.6   15.9°   13°1.77   12.7°   54.2°     25   253°53.2   51.1   152°48.5   15.9°   13°04.1   12.5°   54.2°     26   268°53.1   N22°50.8   16°72.4   15.8°   13°34.0   12.6°   54.2°     27   283°53.0   50.6   181°58.3   15.8°   13°43.0   12.6°   54.2°     28   313°52.8   50.2   210°7.8   15.7°   14°20.6   12.4°   54.2°     10   328°52.7   50.0   225°42.5   15.7°   14°33.0   12.4°   54.2°     11   343°52.5   49.7   240°1.7   81.5°   14°30.1   12.5°   54.2°     29   313°50.8   40.6   181°58.3   15.8°   13°45.1   12.5°   54.2°     12   358°52.4   40.2   40.2   40.2   40.3   11.5°   40.2°   12.1°   54.1°     14   28°52.2   49.0   226°4.5   15.5°   15°09.9   12.2°   54.1°     15   43°52.1   44.8   32°40.9   15.5°   15°09.9   12.2°   54.1°     16   58°52.0   44.6   34.8   32°   34.8   12.6°   54.2°     17   73°51.9   44.										
11   343°55.2   55.0   250°14.0   16.5'   00°34.8   13.5' 54.3'     12   358°55.1   N22°54.8   264°49.5   16.5'   509°34.2   13.4' 54.3'     13   13°55.0   54.5   279°25.0   16.5'   10°10.7   13.4' 54.3'     14   28°54.9   54.3   294°00.5   16.4'   10°15.0   13.3' 54.3'     15   43°54.8   54.1   306°35.9   16.4'   10°28.4   13.3' 54.3'     16   58°54.7   53.9   322°11.3   16.4'   10°41.7   13.3' 54.3'     18   88°64.4   N22°53.5   352°22.1   16.3'   310°54.9   13.2' 54.3'     19   103°64.3   53.3   6°57.4   16.3'   11°21.3   13.1' 54.3'     20   118°54.2   55.0   21°32.7   16.2'   11°34.4   13.1' 54.3'     21   133°54.1   · · · · · · · · · · · · · · · · · ·	9	313°55.5	• • 55.4	221°02.9	16.6'	09°07.7	13.5'	54.4'		
13	10	328°55.4	55.2	235°38.4	16.5'		13.5'	54.4'		
13										
14										
16										
16										
17										
10		73°54.6	53.7	337°46.7		10°54.9		54.3'		
20	18	88°54.4	N22°53.5	$352^{\circ}22.1$			13.2'	54.3'		
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Fri   GHA   Dec   0   178°53.8   N22°52.2   79°53.4   16.1'   512°26.5   12.9'   54.2'   1	23			05 10.5			14.9	J+. Z		
178°53.8   N22°52.2   79°53.4   16.1'   S12°26.5   12.9'   54.2'     193°53.7   52.0   94°28.5   16.1'   12°33.3   12.8'   54.2'     2 208°53.5   51.7   109°03.6   16.0'   12°52.2   12.8'   54.2'     3 223°53.3   4 · 51.5   123°38.6   16.0'   13°05.0   12.7'   54.2'     4 238°53.3   51.3   138°13.6   15.9'   13°17.7   12.7'   54.2'     5 253°53.2   51.1   152°48.5   15.9'   13°30.4   12.6'   54.2'     6 268°53.1   N22°50.8   167°23.4   15.8'   S13°43.0   12.6'   54.2'     7 283°53.0   50.6   181°58.3   15.8'   13°55.6   12.5'   54.2'     8 298°52.9   50.4   196°33.1   15.8'   14°08.1   12.5'   54.2'     9 313°52.8   · 50.2   211°07.8   15.7'   14°20.6   12.4'   54.2'     10 328°52.7   50.0   225°42.5   15.7'   14°20.6   12.4'   54.2'     11 343°52.5   49.7   240°17.2   15.6'   14°45.3   12.3'   54.2'     12 358°52.4   N22°49.5   254°51.8   15.6'   14°57.6   12.2'   54.1'     13 13°52.3   49.3   269°26.3   15.5'   15°09.9   12.2'   54.1'     14 28°52.2   49.0   284°00.9   15.5'   15°09.9   12.2'   54.1'     15 43°52.1   · 48.8   298°35.3   15.4'   15°34.2   12.1'   54.1'     16 58°52.0   48.6   313°09.7   15.3'   15°46.2   12.0'   54.1'     17 73°51.9   48.4   327°44.1   15.3'   15°58.2   11.9'   54.1'     18 88°51.8   N22°48.1   342°18.3   15.2'   516°10.2   11.9'   54.1'     19 103°51.0   46.5   84°16.8   14.8'   17°31.9   11.4'   54.1'     22 148°51.3   47.2   40°34.9   15.1'   16°45.6   11.7'   54.1'     22 148°51.3   47.2   40°34.9   15.1'   16°45.6   11.7'   54.1'     23 163°51.2   47.0   55°08.9   14.9'   17°08.9   11.6'   54.1'     4 238°50.5   A5.5   127°58.1   14.6'   18°06.0   11.2'   54.1'     5 268°50.5   N22°45.3   157°65.1   14.6'   18°06.0   11.2'   54.1'     6 268°50.5   N22°45.3   157°65.1   14.6'   18°06.0   11.2'   54.1'     7 283°50.6   45.5   142°31.7   14.6'   18°07.0   10.2'   54.1'     1 343°49.9   44.1   229°52.1   14.2'   19°12.1   10.8'   54.1'     1 343°49.9   44.1   229°52.1   14.2'   19°12.1   10.8'   54.1'     1 343°49.9   44.1   229°52.1   14.2'   19°12.1   10.8'   54.1'     1		SD = 15.7'	d = -0.2'		SE	0 = 14.9'				
1 193°53.7 52.0 94°28.5 16.1′ 12°39.3 12.8′ 54.2′ 2 208°53.5 51.7 109°03.6 16.0′ 12°52.2 12.8′ 54.2′ 3 223°53.4 · 51.5 123°38.6 16.0′ 13°05.0 12.7′ 54.2′ 4 238°53.3 51.3 138°13.6 15.9′ 13°04.7 12.7′ 54.2′ 56.2′ 66°68°53.1 N22°50.8 167°23.4 15.8′ 513°43.0 12.6′ 54.2′ 7 283°53.0 50.6 181°58.3 15.8′ 13°45.6 12.5′ 54.2′ 68°29.5 15.0 150° 33.1 15.8′ 13°55.6 12.5′ 54.2′ 68° 298°52.9 50.4 196°33.1 15.8′ 13°55.6 12.5′ 54.2′ 10 328°52.7 50.0 225°42.5 15.7′ 14°20.6 12.4′ 54.2′ 11 343°52.5 49.7 240°17.2 15.6′ 14°45.3 12.3′ 54.2′ 11 343°52.5 49.7 240°17.2 15.6′ 14°45.3 12.3′ 54.2′ 12 358°52.2 49.0 284°00.9 15.5′ 15°09.9 12.2′ 54.1′ 13 13°52.3 49.3 269°26.3 15.5′ 15°09.9 12.2′ 54.1′ 15 43°52.0 48.6 313°09.7 15.3′ 15°46.2 12.0′ 54.1′ 15 43°52.0 48.6 313°09.7 15.3′ 15°46.2 12.0′ 54.1′ 16 58°52.0 48.6 313°09.7 15.3′ 15°46.2 12.0′ 54.1′ 18 88°51.8 N22°48.1 342°18.3 15.2′ 516°10.2 11.9′ 54.1′ 19 103°51.7 47.9 356°52.6 15.2′ 16°22.0 11.8′ 54.1′ 21 133°351.5 47.4 26°00.9 15.1′ 16°45.6 11.7′ 54.1′ 21 133°51.5 47.4 26°00.9 15.1′ 16°45.6 11.7′ 54.1′ 21 133°351.5 47.4 26°00.9 15.1′ 16°45.6 11.7′ 54.1′ 21 133°351.5 47.4 26°00.9 15.1′ 16°45.6 11.7′ 54.1′ 21 133°351.5 47.4 26°00.9 15.1′ 16°45.6 11.7′ 54.1′ 21 133°351.5 47.4 26°00.9 15.1′ 16°45.6 11.7′ 54.1′ 21 133°351.5 47.4 26°00.9 15.1′ 16°45.6 11.7′ 54.1′ 21 133°351.5 47.4 26°00.9 15.1′ 16°45.6 11.7′ 54.1′ 21 133°351.5 47.4 26°00.9 15.1′ 16°45.6 11.7′ 54.1′ 21 133°351.5 47.4 26°00.9 15.1′ 16°45.6 11.7′ 54.1′ 21 133°351.5 47.4 26°00.9 15.1′ 16°45.6 11.7′ 54.1′ 21 133°351.5 47.4 26°00.9 15.1′ 16°45.6 11.7′ 54.1′ 21 133°351.5 47.4 26°00.9 15.1′ 16°45.6 11.7′ 54.1′ 21 133°351.5 47.4 26°00.9 15.1′ 16°45.6 11.7′ 54.1′ 21 133°351.5 47.4 26°00.9 15.1′ 16°45.6 11.7′ 54.1′ 21 133°351.5 47.4 26°00.9 15.1′ 16°45.6 11.7′ 54.1′ 54.1′ 17° 38.8 11.7′ 54.1′ 11° 18.8 41.8′ 17° 11° 11° 11° 11° 11° 11° 11° 11° 11°										
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8         298°52.9         50.4         196°33.1         15.8'         14°08.1         12.5'         54.2'           9         313°52.8         · 50.2         211°07.8         15.7'         14°20.6         12.4'         54.2'           10         328°52.7         50.0         225°42.5         15.7'         14°33.0         12.4'         54.2'           11         343°52.5         49.7         240°17.2         15.6'         14°45.3         12.3'         54.2'           12         358°52.4         N22°49.5         254°51.8         15.6'         514°57.6         12.2'         54.1'           13         13°52.3         49.0         284°0.9         15.5'         15°22.0         12.1'         54.1'           15         43°52.1         -48.8         298°35.3         15.4'         15°34.2         12.1'         54.1'           16         58°52.0         48.6         313°09.7         15.3'         15°46.2         12.0'         54.1'           17         73°51.9         48.4         327°44.1         15.3'         15°46.2         12.0'         54.1'           18         88°51.8         N22°48.1         342°18.3         15.2'         16°22.0         11.8'	6		N22°50.8							
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5         253°50.6         45.5         142°31.7         14.6'         18°17.2         11.1'         54.1'           6         268°50.5         N22°45.3         157°05.3         14.5'         S18°28.3         11.1'         54.1'           7         283°50.4         45.1         171°38.8         14.4'         18°39.4         11.0'         54.1'           8         298°50.3         44.8         186°12.2         14.4'         18°50.4         10.9'         54.1'           9         313°50.2         · 44.6         200°45.6         14.3'         19°01.3         10.8'         54.1'           10         328°50.1         44.3         215°18.9         14.2'         19°12.1         10.8'         54.1'           11         343°49.9         44.1         229°52.1         14.2'         19°22.9         10.7'         54.1'           12         358°49.8         N22°43.8         244°25.3         14.1'         519°33.6         10.6'         54.1'           13         13°49.7         43.6         258°58.3         14.0'         19°44.2         10.5'         54.1'           14         28°49.6         43.4         273°31.4         14.0'         19°54.8         10.5'										
6         268°50.5         N22°45.3         157°05.3         14.5'         S18°28.3         11.1'         54.1'           7         283°50.4         45.1         171°38.8         14.4'         18°39.4         11.0'         54.1'           8         298°50.3         44.8         186°12.2         14.4'         18°50.4         10.9'         54.1'           9         313°50.2         · · 44.6         200°45.6         14.3'         19°01.3         10.8'         54.1'           10         328°50.1         44.3         215°18.9         14.2'         19°12.1         10.8'         54.1'           11         343°49.9         44.1         229°52.1         14.2'         19°22.9         10.7'         54.1'           12         358°49.8         N22°43.8         244°25.3         14.1'         519°33.6         10.6'         54.1'           13         13°49.7         43.6         258°58.3         14.0'         19°44.2         10.5'         54.1'           14         28°49.6         43.4         273°31.4         14.0'         19°54.8         10.5'         54.1'           15         43°49.5         · 43.1         288°04.3         13.9'         20°05.2         10.4' <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>										
7       283°50.4       45.1       171°38.8       14.4'       18°39.4       11.0'       54.1'         8       298°50.3       44.8       186°12.2       14.4'       18°50.4       10.9'       54.1'         9       313°50.2       · · · 44.6       200°45.6       14.3'       19°01.3       10.8'       54.1'         10       328°50.1       44.3       215°18.9       14.2'       19°12.1       10.8'       54.1'         11       343°49.9       44.1       229°52.1       14.2'       19°22.9       10.7'       54.1'         12       358°49.8       N22°43.8       244°25.3       14.1'       519°33.6       10.6'       54.1'         13       13°49.7       43.6       258°58.3       14.0'       19°54.8       10.5'       54.1'         14       28°49.6       43.4       273°31.4       14.0'       19°54.8       10.5'       54.1'         15       43°49.5       · 43.1       288°04.3       13.9'       20°05.2       10.4'       54.1'         16       58°49.4       42.9       302°37.2       13.8'       20°15.6       10.3'       54.1'         17       73°49.3       42.6       317°10.0       13.7'										
8       298°50.3       44.8       186°12.2       14.4'       18°50.4       10.9'       54.1'         9       313°50.2       · 44.6       200°45.6       14.3'       19°01.3       10.8'       54.1'         10       328°50.1       44.3       215°18.9       14.2'       19°12.1       10.8'       54.1'         11       343°49.9       44.1       229°52.1       14.2'       19°22.9       10.7'       54.1'         12       358°49.8       N22°43.8       244°25.3       14.1'       519°33.6       10.6'       54.1'         13       13°49.7       43.6       258°58.3       14.0'       19°42.2       10.5'       54.1'         14       28°49.6       43.4       273°31.4       14.0'       19°54.8       10.5'       54.1'         15       43°49.5       · 43.1       288°04.3       13.9'       20°05.2       10.4'       54.1'         16       58°49.4       42.9       302°37.2       13.8'       20°15.6       10.3'       54.1'         17       73°49.3       42.6       317°10.0       13.7'       20°25.9       10.2'       54.1'         18       88°49.2       N22°42.4       331°42.8       13.5'										
10         328°50.1         44.3         215°18.9         14.2'         19°12.1         10.8'         54.1'           11         343°49.9         44.1         229°52.1         14.2'         19°22.9         10.7'         54.1'           12         358°49.8         N22°43.8         244°25.3         14.1'         S19°33.6         10.6'         54.1'           13         13°49.7         43.6         258°58.3         14.0'         19°44.2         10.5'         54.1'           14         28°49.6         43.4         273°31.4         14.0'         19°54.8         10.5'         54.1'           15         43°49.5         · 43.1         288°04.3         13.9'         20°05.2         10.4'         54.1'           16         58°49.4         42.9         302°37.2         13.8'         20°15.6         10.3'         54.1'           17         73°49.3         42.6         317°10.0         13.7'         20°25.9         10.2'         54.1'           18         88°49.2         N22°42.4         331°42.8         13.7'         520°36.1         10.1'         54.2'           19         103°49.1         42.1         346°15.4         13.6'         20°46.2         10.0'										
11         343°49.9         44.1         229°52.1         14.2'         19°22.9         10.7'         54.1'           12         358°49.8         N22°43.8         244°25.3         14.1'         S19°33.6         10.6'         54.1'           13         13°49.7         43.6         258°58.3         14.0'         19°44.2         10.5'         54.1'           14         28°49.6         43.4         273°31.4         14.0'         19°54.8         10.5'         54.1'           15         43°49.5         · 43.1         288°04.3         13.9'         20°05.2         10.4'         54.1'           16         58°49.4         42.9         302°37.2         13.8'         20°15.6         10.3'         54.1'           17         73°49.3         42.6         317°10.0         13.7'         20°25.9         10.2'         54.1'           18         88°49.2         N22°42.4         331°42.8         13.7'         520°36.1         10.1'         54.2'           19         103°49.1         42.1         346°15.4         13.6'         20°46.2         10.0'         54.2'           20         118°49.0         41.9         0°48.0         13.5'         20°56.3         10.0'										
12         358°49.8         N22°43.8         244°25.3         14.1'         S19°33.6         10.6'         54.1'           13         13°49.7         43.6         258°58.3         14.0'         19°44.2         10.5'         54.1'           14         28°49.6         43.4         273°31.4         14.0'         19°54.8         10.5'         54.1'           15         43°49.5         · · 43.1         288°04.3         13.9'         20°05.2         10.4'         54.1'           16         58°49.4         42.9         302°37.2         13.8'         20°15.6         10.3'         54.1'           17         73°49.3         42.6         317°10.0         13.7'         20°25.9         10.2'         54.1'           18         88°49.2         N22°42.4         331°42.8         13.7'         520°36.1         10.1'         54.2'           19         103°49.1         42.1         346°15.4         13.6'         20°46.2         10.0'         54.2'           20         118°49.0         41.9         0°48.0         13.5'         20°56.3         10.0'         54.2'           21         133°48.9         · 41.6         15°20.5         13.4'         21°66.2         9.9'										
13         13°49.7         43.6         258°58.3         14.0'         19°44.2         10.5'         54.1'           14         28°49.6         43.4         273°31.4         14.0'         19°54.8         10.5'         54.1'           15         43°49.5         · 43.1         288°04.3         13.9'         20°05.2         10.4'         54.1'           16         58°49.4         42.9         302°37.2         13.8'         20°15.6         10.3'         54.1'           17         73°49.3         42.6         317°10.0         13.7'         20°25.9         10.2'         54.1'           18         88°49.2         N22°42.4         331°42.8         13.7'         520°36.1         10.1'         54.2'           19         103°49.1         42.1         346°15.4         13.6'         20°46.2         10.0'         54.2'           20         118°49.0         41.9         0°48.0         13.5'         20°56.3         10.0'         54.2'           21         133°48.9         · 41.6         15°20.5         13.4'         21°06.2         9.9'         54.2'           22         148°48.8         41.4         29°53.0         13.4'         21°16.1         9.8' <t< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>										
14         28°49.6         43.4         273°31.4         14.0'         19°54.8         10.5'         54.1'           15         43°49.5         · 43.1         288°04.3         13.9'         20°05.2         10.4'         54.1'           16         58°49.4         42.9         302°37.2         13.8'         20°15.6         10.3'         54.1'           17         73°49.3         42.6         317°10.0         13.7'         20°25.9         10.2'         54.1'           18         88°49.2         N22°42.4         331°42.8         13.7'         S20°36.1         10.1'         54.2'           19         103°49.1         42.1         346°15.4         13.6'         20°46.2         10.0'         54.2'           20         118°49.0         41.9         0°48.0         13.5'         20°56.3         10.0'         54.2'           21         133°48.9         · 41.6         15°20.5         13.4'         21°06.2         9.9'         54.2'           22         148°48.8         41.4         29°53.0         13.4'         21°16.1         9.8'         54.2'           23         163°48.7         41.1         44°25.3         13.3'         21°25.9         9.7' <td< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></td<>										
$\begin{array}{cccccccccccccccccccccccccccccccccccc$										
16         58°49.4         42.9         302°37.2         13.8'         20°15.6         10.3'         54.1'           17         73°49.3         42.6         317°10.0         13.7'         20°25.9         10.2'         54.1'           18         88°49.2         N22°42.4         331°42.8         13.7'         S20°36.1         10.1'         54.2'           19         103°49.1         42.1         346°15.4         13.6'         20°46.2         10.0'         54.2'           20         118°49.0         41.9         0°48.0         13.5'         20°56.3         10.0'         54.2'           21         133°48.9         · 41.6         15°20.5         13.4'         21°06.2         9.9'         54.2'           22         148°48.8         41.4         29°53.0         13.4'         21°16.1         9.8'         54.2'           23         163°48.7         41.1         44°25.3         13.3'         21°25.9         9.7'         54.2'										
18     88°49.2     N22°42.4     331°42.8     13.7'     \$20°36.1     10.1'     54.2'       19     103°49.1     42.1     346°15.4     13.6'     20°46.2     10.0'     54.2'       20     118°49.0     41.9     0°48.0     13.5'     20°56.3     10.0'     54.2'       21     133°48.9     · 41.6     15°20.5     13.4'     21°06.2     9.9'     54.2'       22     148°48.8     41.4     29°53.0     13.4'     21°16.1     9.8'     54.2'       23     163°48.7     41.1     44°25.3     13.3'     21°25.9     9.7'     54.2'										
19     103°49.1     42.1     346°15.4     13.6'     20°46.2     10.0'     54.2'       20     118°49.0     41.9     0°48.0     13.5'     20°56.3     10.0'     54.2'       21     133°48.9     · 41.6     15°20.5     13.4'     21°06.2     9.9'     54.2'       22     148°48.8     41.4     29°53.0     13.4'     21°16.1     9.8'     54.2'       23     163°48.7     41.1     44°25.3     13.3'     21°25.9     9.7'     54.2'	17		42.6	$317^{\circ}10.0$	13.7'		10.2'			
20     118°49.0     41.9     0°48.0     13.5'     20°56.3     10.0'     54.2'       21     133°48.9     · 41.6     15°20.5     13.4'     21°06.2     9.9'     54.2'       22     148°48.8     41.4     29°53.0     13.4'     21°16.1     9.8'     54.2'       23     163°48.7     41.1     44°25.3     13.3'     21°25.9     9.7'     54.2'										
21     133°48.9     · · 41.6     15°20.5     13.4'     21°06.2     9.9'     54.2'       22     148°48.8     41.4     29°53.0     13.4'     21°16.1     9.8'     54.2'       23     163°48.7     41.1     44°25.3     13.3'     21°25.9     9.7'     54.2'										
22       148°48.8       41.4       29°53.0       13.4'       21°16.1       9.8'       54.2'         23       163°48.7       41.1       44°25.3       13.3'       21°25.9       9.7'       54.2'										
23 163°48.7 41.1 44°25.3 13.3' 21°25.9 9.7' 54.2'										
SD = 15.7'  d = -0.2' $SD = 14.8'$										
		SD = 15.7'	d = -0.2'		SE	D = 14.8'				

	Twi	light	1		Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut
N 72°						
<b>N</b> 70°						
68°						
66°	7///	7///	00:43	23:21	7///	////
64°	////	////	01:48	22:20	////	////
62°	////	////	02:21	21:46	////	////
60°	////	01:12	02:46	21:22	22:55	////
N 58°	////	01:54	03:05	21:03	22:14	////
56°	11111	02:21	03:21	20:47	21:47	7777
54°	01:06	02:42	03:35	20:34	21:26	23:01
52°	01:45	02:59	03:47	20:22	21:09	22:23
50°	02:10	03:13	03:57	20:11	20:55	21:58
45°	02:53	03:42	04:19	19:50	20:27	21:15
N 40°	03:23	04:04	04:37	19:32	20:05	20:46
35°	03:45	04:04	04:51	19:32	19:47	20:40
30°	04:03	04:22	05:04	19:05	19:32	20:05
20°	04:32	05:01	05:25	18:44	19:08	19:37
N 10°	04:54	05:21	05:44	18:25	18:48	19:15
0°	05:12	05:38	06:01	18:08	18:31	18:57
<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	18:25
30°	06:01	06:30	06:56	17:13	17:39	18:09
35°	06:09	06:40	07:08	17:01	17:29	18:00
40°	06:18	06:52	07:22	16:47	17:17	17:51
45°	06:28	07:05	07:39	16:31	17:04	17:41
<b>S</b> 50°	06:39	07:20	07:59	16:11	16:49	17:30
52°	06:44	07:28	08:08	16:01	16:42	17:25
54°	06:50	07:36	08:19	15:50	16:34	17:20
56°	06:56	07:44	08:31	15:38	16:25	17:14
58°	07:02	07:54	08:45	15:24	16:15	17:07
<b>S</b> 60°	07:09	08:05	09:02	15:08	16:04	17:00
Lat.		Moonris	e		Moonset	t .
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
<b>N</b> 72°	14:44	17:21		21:52	20:43	
<b>N</b> 70°	14:26	16:36		22:12	21:29	
68°	14:12	16:07	18:34	22:28	22:00	21:04
66°	14:01	15:45	17:44	22:41	22:23	21:55
64°	13:51	15:28	17:13	22:52	22:41	22:27
62°	13:43	15:14	16:50	23:02	22:57	22:51
60°	13:36	15:02	16:31	23:10	23:09	23:10
NI FOO	13:30	14:52	16:16	23:17	23:20	23:26
	13:25	14:43	16:03	23:23	23:30	23:39
56°	15.25		15.50	23:29	23:38	23:51
56° 54°	13:20	14:35	15:52	l		
56° 54° 52°	13:20 13:16	14:28	15:42	23:34	23:46	
56° 54° 52° 50°	13:20 13:16 13:12	14:28 14:22	15:42 15:33	23:34 23:39	23:53	
56° 54° 52°	13:20 13:16	14:28	15:42	23:34		
56° 54° 52° 50° 45° <b>N</b> 40°	13:20 13:16 13:12	14:28 14:22	15:42 15:33	23:34 23:39	23:53	00:08
56° 54° 52° 50° 45° <b>N</b> 40° 35°	13:20 13:16 13:12 13:04	14:28 14:22 14:09	15:42 15:33 15:15 15:00 14:47	23:34 23:39 23:49	23:53	00:08 00:20
56° 54° 52° 50° 45° <b>N</b> 40° 35° 30°	13:20 13:16 13:12 13:04 12:57	14:28 14:22 14:09 13:58	15:42 15:33 15:15 15:00	23:34 23:39 23:49 23:57	23:53  00:05 00:11	00:08 00:20 00:31 00:40
56° 54° 52° 50° 45° <b>N</b> 40° 35° 30° 20°	13:20 13:16 13:12 13:04 12:57 12:51 12:46 12:37	14:28 14:22 14:09 13:58 13:48 13:40 13:26	15:42 15:33 15:15 15:00 14:47 14:36 14:17	23:34 23:39 23:49 23:57 	23:53  00:05 00:11 00:22	00:08 00:20 00:31 00:40 00:56
56° 54° 52° 50° 45° <b>N</b> 40° 35° 30° 20° <b>N</b> 10°	13:20 13:16 13:12 13:04 12:57 12:51 12:46 12:37 12:29	14:28 14:22 14:09 13:58 13:48 13:40	15:42 15:33 15:15 15:00 14:47 14:36	23:34 23:39 23:49 23:57 	23:53  00:05 00:11 00:22 00:32	00:08 00:20 00:31 00:40 00:56 01:10
54° 52° 50° 45° <b>N</b> 40° 35° 30°	13:20 13:16 13:12 13:04 12:57 12:51 12:46 12:37	14:28 14:22 14:09 13:58 13:48 13:40 13:26	15:42 15:33 15:15 15:00 14:47 14:36 14:17	23:34 23:39 23:49 23:57 	23:53  00:05 00:11 00:22	00:08 00:20 00:31 00:40 00:56

11:17	11:20	11:24	00:49	02:09	03:32
11:12	11:11	11:11	00:53	02:17	03:44
	Sun			Moon	
		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	52-70%
04:14	04:20	12:04	18:31	06:11	
04:25	04:30	12:05	19:13	06:52	
04:35	04:41	12:05	19:57	07:34	
	Eqn.of 00 <sup>h</sup> mm:ss 04:14 04:25	11:12 11:11  Sun  Eqn.of Time 00 <sup>h</sup> 12 <sup>h</sup> mm:ss mm:ss 04:14 04:20 04:25 04:30	Sun           Eqn.of Time 00h 12h Pass mm:ss mm:ss hh:mm           04:14 04:20 04:25 04:30 12:05	11:12         11:11         11:11         00:53           Sun           Eqn. of Time 00h 12h Pass 00h 12h Pass 00h 12h Pass 0h:mm hh:mm         Mer. Mer. Mer. Upper 0h:mm:ss 0h:mm hh:mm           04:14 04:20 12:04 18:31 04:25 04:30 12:05 19:13         12:04 18:31 19:13	11:12         11:11         11:11         00:53         02:17           Sun         Moon           Eqn.of Time 00h 12h Pass         Mer. Pass.         Upper Lower hh:mm hh:mm hh:mm           04:14 04:20 12:04 04:25 04:30 12:05 19:13 06:52         18:31 06:11 06:52

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**S** 10° 20° 30°

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h	Aries	` Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
Sun O	284°13.8	224°18.9	Dec N17°58.9	121°42.0	N08°26.3	<b>GПА</b> 187° 45.2	N23°11.0	281°35.8	501°19.2			
1	299°16.3	239°18.5	17°59.5	136°43.1	25.7	202°47.0	11.0	296°38.3	19.2	Alpheratz	357°34.3	29°13.8
										Ankaa	353°06.7	-42°09.8
2	314°18.8	254°18.2	18°00.1	151°44.2	25.1	217°48.9	10.9	311°40.7	19.2	Schedar	349°30.5	56°40.4
3	329°21.2	269°17.8	• • 00.7	166°45.3	• • 24.5	232°50.7	• • 10.9	326°43.1	19.2	Diphda	348°46.9	-17°50.6
4	344°23.7	284°17.4	01.3	181°46.4	24.0	247° 52.6	10.9	341°45.6	19.2	Achernar	335°20.0	-57°06.1
5	359°26.2	299°17.1	01.9	196°47.5	23.4	262°54.4	10.9	356°48.0	19.2	Hamal	327°50.8	23°34.9
6	14°28.6	314°16.7	N18°02.5	211°48.6	N08°22.8	277°56.3	N23°10.9	11°50.4	501°19.2	Polaris	314°05.5	89°22.0
7	29°31.1	329°16.3	03.2	226°49.7	22.2	292°58.1	10.8	26°52.9	19.2		314 05.5 315°11.7	-40°11.9
8	44°33.6	344°15.9	03.8	241°50.9	21.6	308°00.0	10.8	41°55.3	19.2	Acamar		
9	59°36.0	359°15.6	• • 04.4	256°52.0	• • 21.0	323°01.8	• • 10.8	56°57.7	• • 19.2	Menkar	314°05.9	4°11.4
10	74°38.5	14°15.2	05.0	271°53.1	20.4	338°03.6	10.8	72°00.2	19.2	Mirfak	308°28.0	49°56.9
11	89°40.9	29°14.8	05.6	286°54.2	19.9	353°05.5	10.7	87°02.6	19.2	Aldebaran	290°39.4	16°33.6
12	104°43.4	44°14.5	N18°06.2	301°55.3	N08°19.3	8°07.3	N23°10.7	102°05.0	S01°19.2	Rigel	281°03.8	-8°10.2
13	119°45.9	59°14.1	06.8	316°56.4	18.7	23°09.2	10.7	102 03.0 117°07.5		Capella	280°21.7	46°01.3
	119 45.9 134°48.3							117 07.5 132°09.9	19.2	Bellatrix	278°22.8	6°22.4
14		74°13.7	07.4	331°57.5	18.1	38°11.0	10.7		19.2	Elnath	278°01.7	28°37.7
15	149°50.8	89°13.3	• • 08.0	346°58.6	• • 17.5	53°12.9	• • 10.7	147°12.3	• • 19.2	Alnilam	275°37.6	$-1^{\circ}11.1$
16	164°53.3	104°13.0	08.6	1°59.7	16.9	68° 14.7	10.6	162°14.8	19.2	Betelgeuse	270°52.0	7°24.7
17	179°55.7	119°12.6	09.2	17°00.8	16.3	83°16.6	10.6	177°17.2	19.2	Canopus	263°52.8	-52°42.4
18	194°58.2	134°12.2	$N18^{\circ}09.8$	$32^{\circ}01.9$	N08°15.7	98° 18.4	N23°10.6	192°19.6	S01°19.2	Sirius	258°26.2	-16°45.0
19	210°00.7	149°11.8	10.4	47°03.0	15.1	113°20.3	10.6	207°22.1	19.2	Adhara		-10 45.0 -29°00.3
20	225°03.1	164°11.4	11.0	62°04.1	14.6	$128^{\circ}22.1$	10.5	222°24.5	19.2		255°05.9	
21	240°05.6	$179^{\circ}11.1$	• • 11.6	77°05.3	• • 14.0	143°24.0	• • 10.5	237°26.9	• • 19.2	Procyon	244°50.7	5°09.6
22	255°08.1	194°10.7	12.1	92°06.4	13.4	158°25.8	10.5	252°29.4	19.2	Pollux	243°17.2	27°57.9
23	270°10.5	209°10.3	12.7	107°07.5	12.8	173° 27.7	10.5	267°31.8	19.2	Avior	234°15.2	-59°35.5
			_					-		Suhail	222°46.4	-43°32.2
Mer.p	ass. 05:02	$\nu$ -0.4 $'$ d0	.6′ m-4.11	$\nu$ 1.1' d-0	$0.6' \; \mathrm{m}1.52$	$\nu$ 1.8′ d-0	.0′ m-1.89	$\nu$ 2.4′ d-0	.0′ m0.93	Miaplacidus	221°39.0	-69°49.4
										Alphard	217°47.6	-8°46.1
	a		_		_		_		_	Regulus	207°34.2	11°50.6
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.8	61°37.1
0	285°13.0	224°09.9	N18°13.3	122°08.6	N08°12.2	$188^{\circ}29.5$	N23°10.5	282°34.3	501°19.2	Denebola	182°24.6	14°25.9
1	300°15.4	239°09.5	13.9	137°09.7	11.6	203°31.4	10.4	297°36.7	19.2	Gienah	175°43.2	-17°41.1
2	315°17.9	254°09.2	14.5	152°10.8	11.0	218°33.2	10.4	312°39.1	19.2		173°43.2	-17 41.1 -63°14.7
3	330°20.4	269°08.8	•• 15.1	$167^{\circ}11.9$	• • 10.4	233°35.1	• • 10.4	327°41.6	• • 19.2			
4	345°22.8	284°08.4	15.7	182°13.0	09.9	248°36.9	10.4	342°44.0	19.2	l l	171°51.3	-57°15.6
5	0°25.3	299°08.0	16.3	197°14.1	09.3	263°38.8	10.3	357°46.4	19.2	Alioth	166°12.6	55°49.5
6	15°27.8	314°07.6	N18°16.9	212°15.2	N08°08.7	278°40.6	N23°10.3	12°48.9	S01°19.2	Spica	158°21.8	-11°17.7
7	30°30.2	329°07.2	17.5	227°16.3	08.1	293°42.5	10.3	27°51.3	19.2	Alkaid	152°51.6	49°11.4
		344°06.9		242°17.4				42°53.7		Hadar	148°35.2	-60°30.0
8	45°32.7		18.1		07.5	308°44.3	10.3		19.2	Menkent	147°57.0	-36°29.9
9	60°35.2	359°06.5	• • 18.7	257°18.5	• • 06.9	323°46.2	· · 10.2	57°56.2	• • 19.2	Arcturus	145°47.4	19°03.1
10	75°37.6	14°06.1	19.3	272°19.6	06.3	338° 48.0	10.2	72°58.6	19.2	Rigil Kent.	139°39.5	-60°56.7
11	90°40.1	29°05.7	19.8	287°20.8	05.7	353°49.9	10.2	88°01.1	19.2	Kochab	137°19.2	74°03.3
12	105°42.6	44°05.3	N18°20.4	302°21.9	$N08^{\circ}05.1$	8°51.7	N23°10.2	103°03.5	S01°19.2	Zuben'ubi	136°55.4	-16°08.9
13	120°45.0	59°04.9	21.0	317°23.0	04.5	23°53.6	10.2	118°05.9	19.2	Alphecca	126°03.1	26°37.8
14	135°47.5	74°04.5	21.6	332°24.1	04.0	38°55.4	10.1	133°08.4	19.2	·		
15	150°49.9	89°04.1	• • 22.2	347°25.2	• • 03.4	53°57.3	• • 10.1	148°10.8	• • 19.2	Antares	112°15.0	-26°29.4
16	165°52.4	104°03.7	22.8	2°26.3	02.8	68°59.1	10.1	163°13.3	19.2	Atria	107°08.4	-69°04.5
17	180°54.9	119°03.4	23.4	17°27.4	02.2	84°01.0	10.1	178°15.7	19.2	Sabik	102°02.0	-15°45.4
18	195°57.3	134°03.0	N18°23.9	32°28.5	N08°01.6	99°02.8	N23°10.0	193°18.1	S01°19.2	Shaula	96°09.4	-37°07.4
19	210°59.8	149°02.6	24.5	47°29.6	01.0	114°04.7	10.0	208°20.6		Rasalhague	95°57.8	12°32.5
									19.2	Eltanin	90°41.5	51°29.2
20	226°02.3	164°02.2	25.1	62°30.7	08°00.4	129°06.5	10.0	223°23.0	19.2	Kaus Aust.	83°31.6	-34°22.3
21	241°04.7	179°01.8	• • 25.7	77°31.8	07°59.8	144°08.4	• • 10.0	238°25.4	• • 19.2	Vega	80°32.5	38°48.4
22	256°07.2	194°01.4	26.3	92°32.9	59.2	159° 10.2	09.9	253°27.9	19.2	Nunki	75°46.9	-26°15.9
23	271°09.7	209°01.0	26.8	107°34.0	58.6	$174^{\circ}12.1$	09.9	268°30.3	19.2	Altair	61°59.2	8°56.2
Marn	04.E9	0 1/ d0	.6′ m-4.11	u1 1/ d 0	0.6' m1.52	11 0/ d 0	.0′ m-1.89	12 A' 40	.0′ m0.93	Peacock	53°04.5	-56°39.0
ivier.p	ass. 04:58	ν-0.4 αυ	.0 m-4.11	$\nu_{1.1}$ $a$ -0	0.0 m1.52	ν1.ο <i>a</i> -0	.0 111-1.09	ν2.4 d0	.0 1110.93	Deneb	49°25.1	45°22.2
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.1	9°59.5
0	286°12.1	224°00.6	N18°27.4	122°35.1	N07°58.0	189° 13.9	N23°09.9	283°32.8	S01°19.2	Al Na'ir	27°32.1	-46°50.0
1	301°14.6	239°00.2	28.0	137°36.2	57.5	204° 15.8	09.9	298°35.2	19.2	Fomalhaut	15°13.9	-29°29.0
2	316°17.0	259 00.2 253°59.8	28.6	157 30.2 152°37.3	56.9	204 15.6 219°17.6	09.9	313°37.6	19.2	Scheat	13°44.6	28°13.2
3										Markab	13°29.3	15°20.5
	331°19.5	268°59.4	• • 29.2	167°38.5	56.3	234° 19.5	• • 09.8	328°40.1	19.3	I''I DE C''	Ç LI A	Ma:: ====
4	346°22.0	283°59.0	29.7	182°39.6	55.7	249°21.3	09.8	343°42.5	19.3	Jul 06 Sun	SHA	Mer.pass
5	1°24.4	298°58.6	30.3	197°40.7	55.1	264°23.1	09.8	358°45.0	19.3	Venus		09:03
6	16°26.9	313°58.2	N18°30.9	212°41.8	N07°54.5	279°25.0	N23°09.8	13°47.4	S01°19.3	l l	197°28.1	15:52
7	31°29.4	328°57.8	31.5	227°42.9	53.9	294°26.8	09.7	28°49.8	19.3	Jupiter		11:28
8	46°31.8	343°57.4	32.0	242°44.0	53.3	309°28.7	09.7	43°52.3	19.3	Saturn	357°22.0	05:13
9	61°34.3	358°57.0	• • 32.6	257°45.1	• • 52.7	324°30.5	• • 09.7	58°54.7	• • 19.3	1. 1.07.11	C114	N4-
10	76°36.8	13°56.6	33.2	272°46.2	52.1	339°32.4	09.7	73°57.2	19.3	Jul 07 Mon	SHA	Mer.pass
11	91°39.2	28°56.2	33.8	287°47.3	51.5	354° 34.2	09.6	88°59.6	19.3	Venus	298°56.9	09:04
12	106°41.7	43°55.8	N18°34.3	302°48.4	N07°50.9	9°36.1	N23°09.6	104°02.1	S01°19.3		196°55.6	15:50
13	121°44.2	58°55.4	34.9	317°49.5	50.4	24°37.9	09.6	119°04.5	19.3	Jupiter	263°16.5	11:25
14	136°46.6	73°55.0	35.5	317 49.5 332°50.6	49.8	39°39.8	09.6	134°06.9	19.3	Saturn	357°21.3	05:09
										1		
15	151°49.1	88°54.6	• • 36.1	347°51.7	• • 49.2	54°41.6	• • 09.5	149°09.4	• • 19.3	Jul 08 Tue	SHA	Mer.pass
16	166°51.5	103°54.2	36.6	2°52.8	48.6	69° 43.5	09.5	164°11.8	19.3	Venus		09:04
17	181°54.0	118°53.8	37.2	17°53.9	48.0	84°45.3	09.5	179°14.3	19.3	Mars	196°23.0	15:48
18	196°56.5	133°53.4	N18°37.8	32°55.0	N07°47.4	99°47.2	N23°09.5	194°16.7	501°19.3	Jupiter	263°01.8	11:22
19	211°58.9	148°53.0	38.3	47°56.1	46.8	114°49.0	09.4	209°19.1	19.3	Saturn	357°20.6	05:05
20	227°01.4	163°52.6	38.9	62°57.2	46.2	129°50.9	09.4	224°21.6	19.3	Jutuill		33.03
21	242°03.9	178°52.2	39.5	77°58.3	• • 45.6	144°52.7	09.4	239°24.0	. 19.3	Horizont	al parallax	
22	257°06.3	193°51.8	40.0	92°59.4	45.0	159°54.6	09.4	254°26.5	19.3		Venus:	0.1
23	272°08.8	208°51.4	40.6	108°00.6	44.4	174° 56.4	09.4	269°28.9	19.3		Mars:	0.1
23	212 00.0	200 31.4	40.0			174 30.4	09.4	209 20.9	19.3			
Mer.n	ass. 04:54	$\nu$ -0.4 $'$ d0	.6′ m-4.10	$ u 1.1' \ d$ -0	).6′ m1.53	$\nu 1.8' \ d$ -0	.0′ m-1.89	$\nu$ 2.4′ d0	.0′ m0.92			
								0				

h	Su	n		ı	Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°48.6	N22°40.9	58°57.6	13.2'	S21°35.6	9.6'	54.2'
1	193°48.5	40.6	73°29.8	13.1'	21°45.2	9.5'	54.2'
2	208°48.4	40.4	88°02.0	13.1'	21°54.7	9.4'	54.2'
3	223°48.3	• • 40.1	102°34.0	13.0'	22°04.2	9.3'	54.2'
4	238°48.2	39.8	117°06.0	12.9'	22°13.5	9.3'	54.2'
5	253°48.1 268°48.0	39.6 N22°39.3	131°37.9 146°09.8	12.8' 12.8'	22°22.8 S22°31.9	9.2' 9.1'	54.2' 54.2'
6 7	283°47.9	39.1	140 09.8 160°41.5	12.8	22°41.0	9.1 9.0'	54.2'
8	298°47.7	38.8	175°13.2	12.6'	22°50.0	8.9'	54.2'
9	313°47.6	38.6	189°44.8	12.5'	22°58.9	8.8'	54.2'
10	328°47.5	38.3	204°16.3	12.4'	23°07.6	8.7'	54.3'
11	343°47.4	38.0	218°47.7	12.4'	23°16.3	8.6'	54.3'
12	358°47.3	N22°37.8	233°19.1	12.3'	S23°24.9	8.5'	54.3'
13	13°47.2	37.5	247°50.4	12.2'	23°33.4	8.4'	54.3'
14 15	28°47.1 43°47.0	37.3 · · · 37.0	262°21.6 276°52.7	12.1' 12.0'	23°41.8 23°50.0	8.3' 8.2'	54.3' 54.3'
16	58°46.9	36.7	270 52.7 291°23.7	12.0'	23°58.2	8.1'	54.3'
17	73°46.8	36.5	305°54.7	11.9'	24°06.3	8.0'	54.3
18	88°46.7	N22°36.2	320°25.6	11.8'	\$24°14.2	7.9'	54.3'
19	103°46.6	35.9	334°56.4	11.7'	24°22.1	7.8'	54.3'
20	118°46.5	35.7	349°27.1	11.6'	24°29.9	7.6'	54.3'
21	133°46.4	• • 35.4	3°57.7	11.6'	24°37.5	7.5'	54.4'
22	148°46.3	35.2	18°28.3	11.5'	24°45.1	7.4'	54.4'
23	163°46.2	34.9	32°58.8	11.4'	24°52.5	7.3'	54.4'
	SD = 15.7'	d = -0.3'		SD	= 14.8'		
Mon	GHA	Dec	GHA	ν	Dec	d	НР
0	178°46.1	N22°34.6	47°29.2	11.3'	\$24°59.8	7.2'	54.4'
1	193°46.0	34.3	61°59.5	11.2'	25°07.0	7.1'	54.4'
2	208°45.9	34.1	76°29.7	11.2'	$25^{\circ}14.1$	7.0'	54.4'
3	223°45.8	• • 33.8	90°59.9	11.1'	25°21.1	6.9'	54.4'
4	238°45.7	33.5	105°30.0	11.0'	25°28.0	6.8'	54.4'
5	253°45.6 268°45.5	33.3 N22°33.0	120°00.0 134°29.9	10.9' 10.9'	25°34.7 \$25°41.3	6.6' 6.5'	54.4' 54.5'
6 7	283°45.4	32.7	134 29.9 148°59.8	10.9	25°47.9	6.4	54.5'
8	298°45.3	32.4	148 59.8 163°29.6	10.7	25°54.3	6.3	54.5'
9	313°45.2	32.2	177°59.3	10.6'	26°00.5	6.2'	54.5'
10	328°45.1	31.9	192°28.9	10.5'	26°06.7	6.0'	54.5'
11	343°45.0	31.6	206°58.4	10.5'	$26^{\circ}12.7$	5.9'	54.5'
12	358°44.9	N22°31.3	221°27.9	10.4'	S26°18.7	5.8'	54.5'
13	13°44.8	31.1	235°57.3	10.3'	26°24.5	5.7'	54.5
14	28°44.7 43°44.6	30.8 · · 30.5	250°26.6 264°55.9	10.3' 10.2'	26°30.1 26°35.7	5.5' 5.4'	54.6' 54.6'
15 16	58°44.5	30.2	204 55.9 279°25.1	10.2	26°41.1	5.4	54.6'
17	73°44.4	30.0	293°54.2	10.0'	26°46.4	5.2	54.6'
18	88°44.3	N22°29.7	308°23.2	10.0'	S26°51.6	5.0'	54.6'
19	103°44.2	29.4	322°52.2	9.9'	26°56.6	4.9'	54.6'
20	118°44.1	29.1	337°21.0	9.8'	27°01.5	4.8'	54.6'
21	133°44.1	• • 28.8	351°49.9	9.8'	27°06.3	4.6'	54.7'
22 23	148°44.0 163°43.9	28.5 28.3	6°18.6 20°47.3	9.7' 9.6'	27°10.9 27°15.4	4.5' 4.4'	54.7' 54.7'
23		d = -0.3'	20 47.3		27 15.4 = 14.8'	4.4	34.7
	SD = 15.7'	a = -0.3		30	14.8		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°43.8	N22°28.0	35°15.9	9.6'	\$27°19.8	4.2'	54.7'
1	193°43.7	27.7	49°44.5	9.5'	27°24.1	4.1'	54.7'
2	208°43.6 223°43.5	27.4 •• 27.1	64°13.0 78°41.4	9.4' 9.4'	27°28.2 27°32.2	4.0' 3.8'	54.7' 54.8'
3 4	223 43.5 238°43.4	26.8	93°09.8	9.4	27°36.0	3.0 3.7'	54.8'
5	253°43.3	26.5	107°38.1	9.2'	27°39.7	3.6'	54.8'
6	268°43.2	N22°26.3	122°06.3	9.2'	\$27°43.3	3.4'	54.8'
7	283°43.1	26.0	$136^{\circ}34.5$	9.1'	$27^{\circ}46.7$	3.3'	54.8'
8	298°43.0	25.7	151°02.6	9.1'	27°50.0	3.1'	54.8'
9	313°42.9	• • 25.4	165°30.7	9.0'	27°53.1 27°56.1	3.0'	54.9'
10 11	328°42.8 343°42.7	25.1 24.8	179°58.7 194°26.6	9.0' 8.9'	27°56.1 27°59.0	2.9' 2.7'	54.9' 54.9'
11	343°42.7 358°42.6	24.8 N22°24.5	194°26.6 208°54.5	8.9	\$28°01.7	2.6'	54.9'
13	13°42.5	24.2	223°22.4	8.8'	28°04.3	2.4'	54.9'
14	28°42.4	23.9	237°50.2	8.7'	28°06.8	2.3'	54.9'
15	43°42.3	• • 23.6	252°17.9	8.7'	28°09.0	2.1'	55.0'
16	58°42.2	23.3	266°45.6	8.6'	28°11.2	2.0'	55.0'
17	73°42.2	23.0	281°13.3	8.6'	28°13.2	1.9'	55.0'
18	88°42.1	N22°22.7	295°40.9	8.6'	\$28°15.1	1.7'	55.0'
19 20	103°42.0 118°41.9	22.4 22.2	310°08.4 324°35.9	8.5' 8.5'	28°16.8 28°18.3	1.6' 1.4'	55.0' 55.1'
20	118°41.9 133°41.8	21.9	324°35.9 339°03.4	8.4	28° 18.3 28° 19.7	1.4	55.1'
22	133 41.6 148°41.7	21.6	353°30.8	8.4'	28°21.0	1.1'	55.1'
23	163°41.6	21.3	7°58.2	8.4'	28°22.1	1.0'	55.1'
	SD = 15.7'	d = -0.3'		SD	= 14.9'		

Lat.		light	Sunrise	Sunset		light
	Naut.	Civil			Civil	Naut
N 72°						
N 70°						
68°						
66°	////	////	00:59	23:07	////	////
64°	////	////	01:54	22:14	////	////
62°	////	////	02:27	21:42	////	////
60°	////	01:20	02:50	21:19	22:47	////
<b>N</b> 58°	////	01:59	03:09	21:00	22:09	////
56°	////	02:25	03:25	20:45	21:44	////
54°	01:14	02:46	03:38	20:31	21:24	22:54
52°	01:50	03:02	03:49	20:20	21:07	22:19
50°	02:14	03:16	04:00	20:10	20:53	21:55
45°	02:56	03:44	04:21	19:48	20:25	21:13
<b>N</b> 40°	03:25	04:06	04:38	19:31	20:04	20:45
$35^{\circ}$	03:47	04:23	04:53	19:17	19:46	20:23
$30^{\circ}$	04:05	04:38	05:05	19:05	19:32	20:05
$20^{\circ}$	04:33	05:02	05:26	18:44	19:08	19:37
<b>N</b> 10°	04:55	05:22	05:45	18:25	18:48	19:15
0°	05:13	05:39	06:01	18:09	18:31	18:57
S $10^{\circ}$	05:29	05:55	06:18	17:52	18:15	18:41
20°	05:45	06:12	06:36	17:34	17:58	18:25
30°	06:00	06:30	06:56	17:14	17:40	18:10
35°	06:09	06:40	07:08	17:02	17:30	18:02
40°	06:17	06:51	07:22	16:49	17:19	17:53
45°	06:27	07:04	07:38	16:33	17:06	17:43
<b>S</b> 50°	06:38	07:19	07:57	16:13	16:51	17:32
52°	06:43	07:26	08:06	16:04	16:44	17:27
54°	06:48	07:34	08:17	15:53	16:36	17:22
56°	06:54	07:43	08:29	15:41	16:28	17:16
58°	07:00	07:52	08:43	15:28	16:18	17:10
<b>S</b> $60^{\circ}$	07:07	08:03	08:59	15:12	16:07	17:03
Lat.		Moonris	e		Moonset	
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°						
N 70°						
68° 66°					=	
64°				21:59	=	
04	10.17			21.39		
62°	19:17			22.44		
62° 60°	18:34	20:31	21:03	22:44 23:13	22:31 23:22	
60°	18:34 18:05	20:31 19:39	21:03	23:13	23:22	23:50
60° <b>N</b> 58°	18:34 18:05 17:43	20:31 19:39 19:08	21:03 20:22	23:13 23:36	23:22 23:54	23:50
60° <b>N</b> 58° 56°	18:34 18:05 17:43 17:25	20:31 19:39 19:08 18:45	21:03 20:22 19:55	23:13 23:36 23:54	23:22 23:54 	23:50  00:18
60° <b>N</b> 58° 56° 54°	18:34 18:05 17:43 17:25 17:10	20:31 19:39 19:08 18:45 18:25	21:03 20:22 19:55 19:33	23:13 23:36 23:54	23:22 23:54  00:10	23:50  00:18 00:37
60° N 58° 56° 54° 52°	18:34 18:05 17:43 17:25 17:10 16:57	20:31 19:39 19:08 18:45 18:25 18:09	21:03 20:22 19:55 19:33 19:15	23:13 23:36 23:54  00:02	23:22 23:54  00:10 00:23	23:50  00:18 00:37 00:54
60° N 58° 56° 54° 52° 50°	18:34 18:05 17:43 17:25 17:10 16:57 16:45	20:31 19:39 19:08 18:45 18:25 18:09 17:56	21:03 20:22 19:55 19:33 19:15 19:00	23:13 23:36 23:54  00:02 00:11	23:22 23:54  00:10 00:23 00:35	23:50  00:18 00:37 00:54 01:08
60° N 58° 56° 54° 52° 50° 45°	18:34 18:05 17:43 17:25 17:10 16:57 16:45 16:22	20:31 19:39 19:08 18:45 18:25 18:09 17:56 17:27	21:03 20:22 19:55 19:33 19:15 19:00 18:29	23:13 23:36 23:54  00:02 00:11 00:31	23:22 23:54  00:10 00:23 00:35 01:00	23:50  00:18 00:37 00:54 01:08 01:36
60° N 58° 56° 54° 52° 50° 45° N 40°	18:34 18:05 17:43 17:25 17:10 16:57 16:45 16:22 16:03	20:31 19:39 19:08 18:45 18:25 18:09 17:56 17:27 17:05	21:03 20:22 19:55 19:33 19:15 19:00 18:29 18:05	23:13 23:36 23:54  00:02 00:11 00:31 00:47	23:22 23:54  00:10 00:23 00:35 01:00 01:19	23:50  00:18 00:37 00:54 01:08 01:36
60° N 58° 56° 54° 52° 50° 45° N 40° 35°	18:34 18:05 17:43 17:25 17:10 16:57 16:45 16:22 16:03 15:47	20:31 19:39 19:08 18:45 18:25 18:09 17:56 17:27 17:05 16:47	21:03 20:22 19:55 19:33 19:15 19:00 18:29 18:05 17:46	23:13 23:36 23:54  00:02 00:11 00:31 00:47 01:01	23:22 23:54  00:10 00:23 00:35 01:00 01:19 01:36	23:50  00:18 00:37 00:54 01:08 01:36 01:59 02:18
60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30°	18:34 18:05 17:43 17:25 17:10 16:57 16:45 16:22 16:03 15:47 15:33	20:31 19:39 19:08 18:45 18:25 18:09 17:56 17:27 17:05 16:47 16:32	21:03 20:22 19:55 19:33 19:15 19:00 18:29 18:05 17:46 17:29	23:13 23:36 23:54  00:02 00:11 00:31 00:47 01:01 01:13	23:22 23:54  00:10 00:23 00:35 01:00 01:19 01:36 01:50	23:50  00:18 00:37 00:54 01:08 01:36 01:59 02:18
60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° 20°	18:34 18:05 17:43 17:25 17:10 16:57 16:45 16:22 16:03 15:47 15:33 15:10	20:31 19:39 19:08 18:45 18:25 18:09 17:56 17:27 17:05 16:47 16:32 16:05	21:03 20:22 19:55 19:33 19:15 19:00 18:29 18:05 17:46 17:29 17:01	23:13 23:36 23:54  00:02 00:11 00:31 00:47 01:01 01:13 01:33	23:22 23:54  00:10 00:23 00:35 01:00 01:19 01:36 01:50 02:14	23:50  00:18 00:37 00:54 01:08 01:36 01:59 02:18 02:34 03:01
60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° 20° N 10°	18:34 18:05 17:43 17:25 17:10 16:57 16:45 16:22 16:03 15:47 15:33 15:10 14:50	20:31 19:39 19:08 18:45 18:25 18:09 17:56 17:27 17:05 16:47 16:32 16:05 15:42	21:03 20:22 19:55 19:33 19:15 19:00 18:29 18:05 17:46 17:29 17:01 16:36	23:13 23:36 23:54  00:02 00:11 00:31 00:47 01:01 01:13 01:33 01:51	23:22 23:54 00:10 00:23 00:35 01:00 01:19 01:36 01:50 02:14 02:36	23:50  00:18 00:37 00:54 01:08 01:36 01:59 02:18 02:34 03:01 03:25
60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° 20° N 10° 0°	18:34 18:05 17:43 17:25 17:10 16:57 16:22 16:03 15:47 15:33 15:10 14:50 14:32	20:31 19:39 19:08 18:45 18:25 18:09 17:56 17:27 17:05 16:47 16:32 16:05 15:42 15:21	21:03 20:22 19:55 19:33 19:15 19:00 18:29 18:05 17:46 17:29 17:01 16:36 16:14	23:13 23:36 23:54  00:02 00:11 00:31 00:47 01:01 01:13 01:33 01:51 02:08	23:22 23:54 00:10 00:23 00:35 01:00 01:19 01:36 01:50 02:14 02:36 02:55	23:50 00:18 00:37 00:54 01:08 01:36 01:59 02:18 02:34 03:01 03:25 03:46
60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° 20° N 10° 0° S 10°	18:34 18:05 17:43 17:25 17:10 16:57 16:45 16:22 16:03 15:47 15:33 15:10 14:50 14:32 14:14	20:31 19:39 19:08 18:45 18:25 18:09 17:56 17:27 17:05 16:47 16:32 16:05 15:42 15:21 15:00	21:03 20:22 19:55 19:33 19:15 19:00 18:29 18:05 17:46 17:29 17:01 16:36 16:14	23:13 23:36 23:54  00:02 00:11 00:31 00:47 01:01 01:13 01:33 01:51 02:08 02:25	23:22 23:54  00:10 00:23 00:35 01:00 01:19 01:36 01:50 02:14 02:36 02:55	23:50 
60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° 20° N 10° 0° S 10° 20°	18:34 18:05 17:43 17:25 17:10 16:57 16:45 16:22 16:03 15:47 15:33 15:10 14:50 14:32 14:14 13:54	20:31 19:39 19:08 18:45 18:25 18:09 17:56 17:27 17:05 16:47 16:32 16:05 15:42 15:21 15:00 14:38	21:03 20:22 19:55 19:33 19:15 19:00 18:29 18:05 17:46 17:29 17:01 16:36 16:14 15:51 15:27	23:13 23:36 23:54  00:02 00:11 00:31 00:47 01:01 01:13 01:51 02:08 02:25 02:43	23:22 23:54  00:10 00:23 00:35 01:00 01:19 01:36 01:50 02:36 02:36 02:55 03:37	23:50 
60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° N 10° 0° S 10° 20° 30°	18:34 18:05 17:43 17:25 17:10 16:57 16:45 16:22 16:03 15:47 15:33 15:10 14:50 14:32 14:14 13:54 13:34	20:31 19:39 19:08 18:45 18:25 18:09 17:56 17:27 17:05 16:47 16:32 16:05 15:42 15:21 15:00 14:38 14:12	21:03 20:22 19:55 19:33 19:15 19:00 18:29 18:05 17:46 17:29 17:01 16:36 16:14 15:51 15:27 14:59	23:13 23:36 23:54  00:02 00:11 00:31 00:47 01:01 01:13 01:33 01:51 02:08 02:25 02:43 03:04	23:22 23:54 00:10 00:23 00:35 01:00 01:19 01:36 01:50 02:14 02:36 02:55 03:15 03:37 04:01	23:50 
60° N 58° 56° 54° 52° 60° 45° N 40° 35° 30° 20° N 10° 0° S 10° 20° 30° 35°	18:34 18:05 17:43 17:25 17:10 16:57 16:45 16:22 16:03 15:47 15:33 15:10 14:50 14:32 14:14 13:54 13:32 13:18	20:31 19:39 19:08 18:45 18:25 18:09 17:56 17:27 17:05 16:47 16:32 16:05 15:42 15:21 15:00 14:38 14:12 13:57	21:03 20:22 19:55 19:33 19:15 19:00 18:29 18:05 17:46 17:29 17:01 16:36 16:14 15:51 15:27 14:59 14:43	23:13 23:36 23:54  00:02 00:11 00:31 00:47 01:01 01:13 01:33 01:51 02:08 02:25 02:43 03:04 03:16	23:22 23:54 00:10 00:23 00:35 01:00 01:19 01:36 01:50 02:14 02:36 02:55 03:15 03:37 04:01 04:16	23:50 
60° N 58° 56° 54° 52° 45° N 40° 35° 20° N 10° 0° S 10° 20° 30° 30° 35° 40°	18:34 18:05 17:43 17:25 17:10 16:57 16:45 16:22 16:03 15:47 15:33 15:10 14:50 14:32 14:14 13:54 13:54 13:03	20:31 19:39 19:08 18:45 18:25 18:09 17:56 17:27 17:05 16:47 16:32 16:05 15:42 15:21 15:00 14:38 14:12 13:57 13:39	21:03 20:22 19:55 19:33 19:15 19:00 18:29 18:05 17:46 17:29 17:01 16:36 16:14 15:51 15:57 14:59 14:43 14:24	23:13 23:36 23:54 00:02 00:11 00:31 00:47 01:01 01:13 01:33 01:51 02:08 02:25 02:43 03:04 03:16 03:30	23:22 23:54 00:10 00:23 00:35 01:00 01:19 01:36 01:50 02:14 02:36 02:55 03:37 04:01 04:16 04:33	23:50 
60° N 58° 56° 54° 52° 45° N 40° 35° 30° 20° N 10° 0° S 10° 20° 30° 35° 40° 45°	18:34 18:05 17:43 17:25 17:10 16:57 16:45 16:22 16:03 15:47 15:33 15:10 14:50 14:32 14:14 13:54 13:32 13:18 13:03 12:46	20:31 19:39 19:08 18:45 18:25 18:09 17:56 17:27 17:05 16:47 16:32 16:05 15:42 15:21 15:00 14:38 14:12 13:57 13:39 13:18	21:03 20:22 19:55 19:33 19:15 19:00 18:29 17:46 17:29 17:01 16:36 16:14 15:51 15:51 14:59 14:43 14:24 14:00	23:13 23:36 23:54 00:02 00:11 00:31 00:47 01:01 01:13 01:33 01:51 02:08 02:25 02:43 03:04 03:16 03:30 03:47	23:22 23:54 00:10 00:23 00:35 01:00 01:19 01:36 01:50 02:14 02:36 02:55 03:15 03:37 04:01 04:16 04:33 04:53	23:50 
60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° 0° S 10° 20° 30° 35° 40° 45° S 50°	18:34 18:05 17:43 17:25 17:10 16:57 16:45 16:22 16:03 15:47 15:33 15:10 14:50 14:32 14:14 13:54 13:54 13:03 12:46 12:24	20:31 19:39 19:08 18:45 18:25 17:56 17:27 17:05 16:47 16:32 16:05 15:42 15:21 15:00 14:38 14:12 13:57 13:39 13:18	21:03 20:22 19:55 19:33 19:15 19:00 18:29 18:05 17:46 17:29 17:01 16:36 16:14 15:51 15:27 14:43 14:24 14:00 13:30	23:13 23:36 23:54 00:02 00:11 00:31 00:47 01:01 01:13 01:33 01:51 02:08 02:25 02:43 03:04 03:16 03:30 03:47 04:08	23:22 23:54 00:10 00:23 00:35 01:00 01:19 01:36 01:50 02:14 02:36 02:55 03:15 03:37 04:01 04:16 04:33 04:53 05:19	23:50 
60° N 58° 54° 52° 50° 45° N 40° 35° 30° 20° N 10° 0° S 10° 20° 30° 35° 40° 45° S 50° 52°	18:34 18:05 17:43 17:25 17:10 16:57 16:45 16:22 16:03 15:47 15:33 15:10 14:50 14:50 14:32 14:14 13:54 13:32 13:18 13:03 12:46 12:24 12:13	20:31 19:39 19:08 18:45 18:25 18:09 17:56 17:27 17:05 16:47 16:32 16:05 15:42 15:21 15:00 14:38 14:12 13:57 13:39 13:18	21:03 20:22 19:55 19:33 19:15 19:00 18:29 18:05 17:46 17:29 17:01 16:36 16:14 15:51 15:27 14:59 14:43 14:24 14:00 13:30 13:16	23:13 23:36 23:54  00:02 00:11 00:31 00:47 01:01 01:13 01:51 02:08 02:25 02:43 03:04 03:16 03:30 03:47 04:08 04:18	23:22 23:54 00:10 00:23 00:35 01:00 01:19 01:36 01:50 02:36 02:55 03:15 03:37 04:01 04:16 04:33 05:59 05:39	23:50 00:18 00:37 00:54 01:08 01:36 01:59 02:18 02:34 03:01 03:25 03:46 04:08 04:32 04:59 05:16 05:35 06:27 06:42
60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° N 10° 0° S 10° 20° 30° 40° 45° S 50°	18:34 18:05 17:43 17:25 17:10 16:57 16:45 16:22 16:03 15:47 15:33 15:10 14:50 14:32 14:14 13:54 13:54 13:03 12:46 12:24	20:31 19:39 19:08 18:45 18:25 17:56 17:27 17:05 16:47 16:32 16:05 15:42 15:21 15:00 14:38 14:12 13:57 13:39 13:18	21:03 20:22 19:55 19:33 19:15 19:00 18:29 18:05 17:46 17:29 17:01 16:36 16:14 15:51 15:27 14:43 14:24 14:00 13:30	23:13 23:36 23:54 00:02 00:11 00:31 00:47 01:01 01:13 01:33 01:51 02:08 02:25 02:43 03:04 03:16 03:30 03:47 04:08	23:22 23:54 00:10 00:23 00:35 01:00 01:19 01:36 01:50 02:14 02:36 02:55 03:15 03:37 04:01 04:16 04:33 04:53 05:19	23:50 

		Sun		Moon			
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age	
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	11-13	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	79-92%	
06	04:46	04:51	12:05	20:44	08:20		
07	04:56	05:00	12:05	21:34	09:08		
08	05:05	05:10	12:05	22:27	10:00		

12:13

04:42

04:57

06:03

06:23

07:19 07:44

56°

58°

11:48

11:32

12:07

h	Aries	`	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
											SHA	Dec
0	287°11.3	223°50.9	N18°41.2	123°01.7	N07°43.8	189°58.3	N23°09.3	284°31.4	S01°19.3	Alpheratz	357°34.2	29°13.8
1	302°13.7	238°50.5	41.7	138°02.8	43.2	205°00.1	09.3	299°33.8	19.3	Ankaa	353°06.6	-42°09.8
2	317°16.2	253°50.1	42.3	153°03.9	42.6	220°02.0	09.3	314°36.2	19.3	Schedar	349°30.5	56°40.4
3	332°18.7	268°49.7	• • 42.9	168°05.0	• • 42.0	235°03.8	• • 09.3	329°38.7	• • 19.3	Diphda	348°46.8	-17°50.6
4	$347^{\circ}21.1$	283°49.3	43.4	183°06.1	41.4	250°05.7	09.2	344°41.1	19.3	Achernar	335°19.9	-57°06.1
5	2°23.6	298°48.9	44.0	198°07.2	40.9	265°07.5	09.2	359°43.6	19.3		327°50.8	23°34.9
6	17°26.0	313°48.5	N18°44.5	213°08.3	N07°40.3	280°09.4	N23°09.2	14°46.0	S01°19.3	Hamal		
7	32°28.5	328°48.1	45.1	228°09.4	39.7	295°11.3	09.2	29°48.5	19.3	Polaris	314°03.8	89°22.0
8	47°31.0	343°47.7	45.7	243°10.5	39.1	310°13.1	09.1	44°50.9	19.3	Acamar	315°11.7	-40°11.9
9	62°33.4	358°47.2	46.2	258°11.6	• • 38.5	325°15.0	09.1	59°53.4	. 19.3	Menkar	314°05.9	$4^{\circ}11.4$
10	77°35.9	13°46.8	46.8	273°12.7	37.9	340°16.8	09.1	74°55.8	19.3	Mirfak	308°27.9	49°56.9
										Aldebaran	290°39.4	16°33.6
11	92°38.4	28°46.4	47.3	288°13.8	37.3	355°18.7	09.1	89°58.3	19.4	Rigel	281°03.8	-8°10.2
12	107°40.8	43°46.0	N18°47.9	303°14.9	N07°36.7	10°20.5	N23°09.0	105°00.7	S01°19.4	Capella	280°21.7	46°01.3
13	122°43.3	58°45.6	48.5	318°16.0	36.1	25°22.4	09.0	120°03.1	19.4	Bellatrix	278°22.7	6°22.4
14	137°45.8	73°45.2	49.0	333°17.1	35.5	40°24.2	09.0	135°05.6	19.4	Elnath	278°01.7	28°37.7
15	152°48.2	88°44.7	• • 49.6	348°18.2	• • 34.9	55°26.1	• • 09.0	150°08.0	· · 19.4	Alnilam	275°37.6	-1°11.1
16	167°50.7	103°44.3	50.1	3°19.3	34.3	70°27.9	08.9	165°10.5	19.4			
17	182°53.2	118°43.9	50.7	18°20.4	33.7	85°29.8	08.9	180°12.9	19.4	Betelgeuse	270°52.0	7°24.8
18	197°55.6	133°43.5	N18°51.2	33°21.5	N07°33.1	100°31.6	N23°08.9	195°15.4	S01°19.4	Canopus	263°52.8	-52°42.4
19	212°58.1	148°43.1	51.8	48°22.6	32.5	115°33.5	08.9	210°17.8	19.4	Sirius	258°26.2	-16°45.0
20	212 30.1 228°00.5	163°42.7	52.3	63°23.7	31.9	130°35.3	08.8	225°20.3	19.4	Adhara	255°05.9	-29°00.3
	243°03.0	103 42.7 178°42.2	52.9	78° 24.8		130 35.3 145°37.2	• • 08.8	240°22.7		Procyon	244°50.7	5°09.6
21					•• 31.3					Pollux	243°17.2	27°57.9
22	258°05.5	193°41.8	53.4	93°25.9	30.7	160°39.0	08.8	255°25.2	19.4	Avior	234°15.2	-59°35.5
23	273°07.9	208°41.4	54.0	108°27.0	30.1	175°40.9	8.80	270°27.6	19.4	Suhail	222°46.4	-43°32.2
Mern	ass. 04:50	$\nu$ -0.4' d0	.6′ m-4.09	$\nu 1.1' d_{-0}$	0.6' m1.53	ν1 9' d-0	.0′ m-1.89	$\nu^2 4' d0$	0′ m0.92	Miaplacidus	221°39.1	-69°49.4
сг.р		- 3.1 00								Alphard	217°47.6	-8°46.1
										Regulus	207°34.2	11°50.6
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.8	61°37.1
0	$288^{\circ}10.4$	223°41.0	N18°54.5	123°28.1	N07°29.5	190°42.7	N23°08.7	$285^{\circ}30.1$	S01°19.4	Denebola	182°24.6	14°25.9
1	$303^{\circ}12.9$	238°40.5	55.1	138°29.2	28.9	205°44.6	08.7	300°32.5	19.4	Gienah	175°43.2	-17°41.1
2	318°15.3	253°40.1	55.6	153°30.3	28.3	220°46.4	08.7	315°34.9	19.4		173° 43.2	-63°14.7
3	333°17.8	268°39.7	• • 56.2	168°31.5	• • 27.8	235°48.3	• • 08.7	330°37.4	• • 19.4	<b>I</b>		
4	348°20.3	283°39.3	56.7	183°32.6	27.2	250°50.1	08.6	345°39.8	19.4		171°51.3	-57°15.6
5	3°22.7	298°38.8	57.3	198°33.7	26.6	265°52.0	08.6	0°42.3	19.4	Alioth	166°12.6	55°49.5
6	18°25.2	313°38.4	N18°57.8	213°34.8	N07°26.0	280°53.8	N23°08.6	15°44.7	S01°19.4	Spica	158°21.8	-11° 17.7
7	33°27.7	328°38.0	58.4	228°35.9	25.4	295°55.7	08.6	30°47.2	19.5	Alkaid	152°51.6	49°11.4
8	48°30.1	343°37.6	58.9	243°37.0	24.8	310°57.5	08.5	45°49.6	19.5	Hadar	148°35.2	-60°30.0
9	63°32.6	358°37.1	18° 59.5	258°38.1	• • 24.2	325°59.4	• • 08.5	60°52.1	• • 19.5	Menkent	147°57.0	-36°29.9
										Arcturus	145°47.4	19°03.1
10	78°35.0	13°36.7	19°00.0	273°39.2	23.6	341°01.2	08.5	75°54.5	19.5	Rigil Kent.	139°39.5	-60°56.7
11	93°37.5	28°36.3	00.5	288°40.3	23.0	356°03.1	08.5	90°57.0	19.5	Kochab	$137^{\circ}19.2$	74°03.3
12	108°40.0	43°35.9	N19°01.1	303°41.4	N07°22.4	11°04.9	N23°08.4	105°59.4	S01°19.5	Zuben'ubi	136°55.4	-16°08.9
13	123°42.4	58°35.4	01.6	318°42.5	21.8	26°06.8	08.4	121°01.9	19.5	Alphecca	126°03.2	26°37.8
14	138°44.9	73°35.0	02.2	333°43.6	21.2	41°08.6	08.4	136°04.3	19.5	Antares	112°15.0	-26° 29.4
15	153°47.4	88°34.6	• • 02.7	348°44.7	• • 20.6	$56^{\circ}10.5$	• • 08.3	151°06.8	• • 19.5	Atria	107°08.4	-69°04.5
16	168°49.8	103°34.1	03.2	3°45.8	20.0	$71^{\circ}12.3$	08.3	166°09.2	19.5	Sabik	102°02.0	-15°45.4
17	183°52.3	118°33.7	03.8	18°46.9	19.4	86°14.2	08.3	181°11.7	19.5	Shaula	96°09.4	-37°07.4
18	198°54.8	133°33.3	N19°04.3	33°48.0	$N07^{\circ}18.8$	$101^{\circ}16.0$	N23°08.3	$196^{\circ}14.1$	S01°19.5	Rasalhague	95°57.8	12°32.5
19	213°57.2	148°32.8	04.9	48°49.1	18.2	$116^{\circ}17.9$	08.2	211°16.6	19.5	Eltanin	90°41.5	51°29.2
20	228°59.7	163°32.4	05.4	63°50.2	17.6	$131^{\circ}19.7$	08.2	226°19.0	19.5			-34°22.3
21	244°02.2	178°32.0	• • 05.9	78°51.3	• • 17.0	146°21.6	• • 08.2	241°21.5	• • 19.5	Kaus Aust.	83°31.6	
22	259°04.6	193°31.5	06.5	93°52.4	16.4	161°23.5	08.2	256°23.9	19.5	Vega	80°32.5	38°48.5
23	274°07.1	208°31.1	07.0	108°53.5	15.8	176°25.3	08.1	271°26.4	19.6	Nunki	75°46.9	-26°15.9
_										Altair	61°59.2	8°56.2
Mer.p	ass. 04:47	$\nu$ -0.4' d0	.5′ m-4.09	$\nu 1.1' d-0$	0.6'  m 1.53	$\nu$ 1.9′ d-0	.0′ m-1.90	$\nu$ 2.4′ d0	.0'  m0.91	Peacock	53°04.5	-56°39.0
										Deneb	49°25.1	45°22.2
			_		_		_		_	Enif	$33^{\circ}38.1$	9°59.5
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.0	-46°50.0
0	289°09.5	223°30.7	N19°07.5	123°54.6	N07°15.2	191°27.2	N23°08.1	286°28.8	S01°19.6	Fomalhaut	15°13.8	-29°29.0
1	304°12.0	238°30.2	08.1	138°55.7	14.6	206°29.0	08.1	301°31.3	19.6	Scheat	13°44.6	28°13.2
2	319°14.5	253°29.8	08.6	153°56.8	14.0	221°30.9	08.1	316°33.7	19.6	Markab	13°29.3	15°20.5
3	334°16.9	268°29.3	• • 09.1	168°57.9	• • 13.4	236°32.7	• • 08.0	331°36.2	• • 19.6			
4	$349^{\circ}19.4$	283°28.9	09.7	183°59.0	12.8	251°34.6	0.80	346°38.6	19.6	Jul 09 Wed	SHA	Mer.pass
5	4°21.9	298°28.5	10.2	199°00.1	12.2	266°36.4	0.80	1°41.1	19.6	Venus		09:05
6	19°24.3	313°28.0	N19°10.7	214°01.2	N07°11.6	281°38.3	N23°08.0	16°43.5	S01°19.6	Mars	195°50.4	15:47
7	34°26.8	328°27.6	11.3	229°02.3	11.0	296°40.1	07.9	31°46.0	19.6	Jupiter	262°47.0	11:19
8	49°29.3	343°27.1	11.8	244°03.4	10.4	311°42.0	07.9	46°48.5	19.6	Saturn	$357^{\circ}20.1$	05:01
9	64°31.7	358°26.7	12.3	259°04.5	• • 09.8	326°43.8	07.9	61°50.9	. 19.6			
10	79°34.2	13°26.3	12.8	274°05.6	09.2	341°45.7	07.9	76°53.4	19.6	Jul 10 Thu	SHA	Mer.pass
11	94°36.7	28°25.8	13.4	289°06.7	08.6	356°47.5	07.8	91°55.8	19.6	Venus		09:06
12	109°39.1	43°25.4	N19°13.9	304°07.8	N07°08.0	11°49.4	N23°07.8	106°58.3	S01°19.6		195°17.7	15:45
13	124°41.6	58°24.9	14.4	319°08.9	07.4	26°51.2	07.8	122°00.7	19.7	Jupiter		11:16
14	139°44.0	73°24.5	14.9	334°10.0	06.8	41°53.1	07.7	137°03.2	19.7	Saturn	357°19.7	04:57
15	154°46.5	88°24.0	• • 15.5	349°11.1	06.2	56°54.9	•• 07.7	152°05.6	• • 19.7	1 11 F	CH A	Me:: ====
16	169°49.0	103°23.6	16.0	4°12.2	05.6	71°56.8	07.7	167°08.1	19.7	Jul 11 Fri	SHA	Mer.pass
	109 49.0 184°51.4	103 23.0 118°23.2		4 12.2 19°13.3	05.0	86°58.6	07.7 07.7	182°10.5	19.7	Venus		09:06
17			16.5 N19°17.0								194°45.1	15:43
18	199°53.9	133°22.7		34°14.4	N07°04.4	102°00.5	N23°07.6	197°13.0	S01°19.7		262°17.6	11:13
19	214°56.4	148°22.3	17.6	49°15.5	03.8	117°02.4	07.6	212°15.4	19.7	Saturn	357°19.3	04:53
20	229°58.8	163°21.8	18.1	64°16.6	03.2	132°04.2	07.6	227°17.9	19.7	Horizont	al navallas	
21	245°01.3	178°21.4	• • 18.6	79°17.7	• • 02.6	147°06.1	• • 07.6	242°20.3	• • 19.7	HORIZON	al parallax	0.1
22	260°03.8	193°20.9	19.1	94°18.8	02.0	162°07.9	07.5	257°22.8	19.7		Venus: Mars:	0.1 0.1
23	275°06.2	208°20.5	19.6	109°19.9	01.4	177°09.8	07.5	272°25.3	19.7		iviars:	0.1
Mern	ass. 04:43	$\nu - 0.4' d0$	.5′ m-4.08	$\nu 1.1' d-0$	0.6' m1.54	$\nu 1.9' d_{-0}$	.0′ m-1.90	$\nu^{2.5'}$ d0	.0′ m0.91			
р				0		0		0				

h	Su	Moon						
Wed	GHA	Dec	GHA	ν	Dec	d	HP	
0	178°41.5	N22°21.0	$22^{\circ}25.6$	8.3'	S28°23.1	0.8'	55.1'	
1	193°41.4	20.7	36°52.9	8.3'	28°23.9	0.7'	55.1'	
2	208°41.3 223°41.2	20.4	51°20.2 65°47.4	8.3' 8.2'	28°24.6 28°25.1	0.5' 0.4'	55.2' 55.2'	
4	238°41.1	19.7	80°14.7	8.2'	28°25.5	0.4	55.2'	
5	253°41.0	19.4	94°41.8	8.2'	28°25.7	0.1'	55.2'	
6	268°41.0 283°40.9	N22°19.1	109°09.0	8.1'	\$28°25.8	-0.1'	55.2'	
7 8	283°40.9 298°40.8	18.8 18.5	123°36.1 138°03.3	8.1' 8.1'	28°25.7 28°25.4	-0.2' -0.4'	55.3' 55.3'	
9	313° 40.7	• • 18.2	152°30.3	8.1'	28°25.0	-0.5	55.3'	
10	328°40.6	17.9	166°57.4	8.0'	28°24.5	-0.7'	55.3'	
11	343°40.5 358°40.4	17.6 N22°17.3	181°24.5 195°51.5	8.0'	28°23.8 <b>S</b> 28°22.9	-0.9' -1.0'	55.3'	
12 13	13° 40.3	N22 17.3 17.0	195 51.5 210°18.5	8.0' 8.0'	28°21.9	-1.0 -1.2'	55.4' 55.4'	
14	28° 40.2	16.7	224°45.5	8.0'	28°20.8	-1.3'	55.4'	
15	43°40.1	• • 16.4	239°12.5	8.0'	28°19.4	-1.5'	55.4'	
16 17	58° 40.1 73° 40.0	16.1 15.7	253°39.5 268°06.4	8.0' 8.0'	28°18.0 28°16.4	-1.6' -1.8'	55.4' 55.5'	
18	88° 39.9	N22°15.4	282°33.4	7.9	\$28°14.6	-1.9'	55.5'	
19	103°39.8	15.1	297°00.3	7.9'	28°12.6	-2.1'	55.5'	
20	118°39.7	14.8	311°27.3	7.9'	28°10.5	-2.2'	55.5'	
21 22	133°39.6 148°39.5	· · 14.5 14.2	325°54.2 340°21.1	7.9' 7.9'	28°08.3 28°05.9	-2.4' -2.6'	55.5' 55.6'	
23	148 39.5 163°39.4	13.9	340 21.1 354°48.1	7.9' 7.9'	28°03.3	-2.0 -2.7'	55.6'	
	SD = 15.7'	d = -0.3'			D = 15.0'			
Thu 0	<b>GHA</b> 178°39.4	<b>Dec</b> N22°13.5	<b>GHA</b> 9°15.0	ν 7.9'	<b>Dec</b> \$28°00.6	d -2.9'	<b>HP</b> 55.6'	
1	176 39.4 193°39.3	13.2	9 15.0 23°41.9	7.9' 7.9'	27°57.8	-2.9 -3.0'	55.6'	
2	208° 39.2	12.9	38°08.9	7.9'	27°54.8	-3.2'	55.6'	
3	223°39.1	• • 12.6	52°35.8	8.0'	27°51.6	-3.3'	55.7'	
4	238°39.0 253°38.9	12.3 12.0	67°02.8 81°29.8	8.0' 8.0'	27°48.3 27°44.8	-3.5' -3.6'	55.7' 55.7'	
5 6	253 38.9 268° 38.8	N22°11.6	95°56.7	8.0'	\$27°41.1	-3.8'	55.7'	
7	283°38.7	11.3	110°23.7	8.0'	27°37.3	-3.9'	55.8'	
8	298°38.7	11.0	124°50.7	8.0'	27°33.4	-4.1'	55.8'	
9 10	313°38.6 328°38.5	· · 10.7 10.3	139°17.7 153°44.8	8.0' 8.1'	27°29.3 27°25.1	-4.3' -4.4'	55.8' 55.8'	
11	343°38.4	10.0	168°11.8	8.1'	27°20.7	-4.6'	55.8'	
12	358°38.3	N22°09.7	182°38.9	8.1'	\$27°16.1	-4.7'	55.9'	
13	13°38.2	09.4	197°06.0	8.1'	27°11.4	-4.9'	55.9'	
14 15	28°38.1 43°38.1	09.0 •• 08.7	211°33.1 226°00.3	8.1' 8.2'	27°06.5 27°01.5	-5.0' -5.2'	55.9' 55.9'	
16	58° 38.0	08.4	240°27.4	8.2'	26°56.4	-5.3	55.9'	
17	73°37.9	08.1	254°54.6	8.2'	26°51.0	-5.5'	56.0'	
18 19	88°37.8 103°37.7	N22°07.7 07.4	269°21.9 283°49.1	8.3' 8.3'	\$26°45.6 26°40.0	-5.6' -5.8'	56.0' 56.0'	
20	118° 37.6	07.4	298°16.4		26°34.2		56.0'	
21	133°37.6	• • 06.8	$312^{\circ}43.7$	8.4'	26°28.3	-6.1'	56.1'	
22	148° 37.5	06.4	327°11.1	8.4'	26°22.2	-6.2	56.1'	
23	163°37.4	06.1	341°38.5	8.4'	26°16.0	-6.4'	56.1'	
	SD = 15.7'	d = -0.3'		SI	O = 15.2'			
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0 1	178°37.3 193°37.2	N22°05.8 05.4	356°05.9 10°33.4	8.5' 8.5'	\$26°09.7 26°03.2	-6.5'	56.1' 56.1'	
2	193°37.2 208°37.1	05.4 05.1	25°00.9	8.5'	26°03.2 25°56.5	-6.6' -6.8'	56.1'	
3	223°37.1	• • 04.8	39°28.4	8.6'	25°49.7	-6.9'	56.2'	
4	238° 37.0	04.4	53°56.0	8.6'	25°42.8	-7.1'	56.2'	
5 6	253°36.9 268°36.8	04.1 N22°03.7	68°23.6 82°51.3	8.7' 8.7'	25°35.7 \$25°28.5	-7.2' -7.4'	56.2' 56.3'	
7	283°36.7	03.4	97°19.0	8.8'	25°21.1	-7.5'	56.3	
8	298° 36.7	03.1	111°46.7	8.8'	25°13.6	-7.6'	56.3'	
9	313°36.6	•• 02.7	126°14.5 140°42.4	8.8'	25°06.0 24°58.2	-7.8'	56.3' 56.3'	
10 11	328°36.5 343°36.4	02.4 02.1	140°42.4 155°10.3	8.9' 8.9'	24°58.2 24°50.2	-7.9' -8.1'	56.3° 56.4'	
12	358° 36.3	N22°01.7	169°38.2	9.0'	\$24°42.2	-8.2'	56.4	
13	13°36.2	01.4	184°06.2	9.0'	24°34.0	-8.3'	56.4	
14 15	28°36.2 43°36.1	01.0 · · 00.7	198°34.3 213°02.4	9.1' 9.1'	24°25.6 24°17.1	-8.5' -8.6'	56.4' 56.5'	
15 16	43°36.1 58°36.0	00.7	213°02.4 227°30.5	9.1	24°17.1 24°08.5	-8.6' -8.7'	56.5'	
17	73°35.9	22°00.0	241°58.7	9.2'	23°59.8	-8.9'	56.5'	
18	88°35.8	N21°59.7	256°26.9	9.3'	\$23°50.9	-9.0'	56.5	
19 20	103°35.8 118°35.7	59.3 59.0	270°55.3 285°23.6	9.4' 9.4'	23°41.9 23°32.7	-9.1' -9.3'	56.5' 56.6'	
20	118° 35.7 133° 35.6	59.0 •• 58.6	285°23.6 299°52.0	9.4 9.5'	23° 32.7 23° 23.5	-9.3' -9.4'	56.6'	
22	148°35.5	58.3	$314^{\circ}20.5$	9.5'	23°14.0	-9.5'	56.6'	
23	163°35.5	57.9	328°49.0	9.6'	23°04.5	-9.7'	56.6'	
	SD = 15.7'	d = -0.3'		SI	D = 15.3'			
			_		_			

			202	5 July (	9 to Ji	ul. 11 U
Lat.	<b>Twi</b> Naut.	light Civil	Sunrise	Sunset	<b>Tw</b>	ilight Naut.
N 72°						
<b>N</b> 70°						
68°						
66°	////	////	01:14	22:53	////	////
64°	////	////	02:02	22:07	////	////
62° 60°		//// 01:30	02:32 02:55	21:37 21:15	//// 22:39	//// ////
N 58°	1///	01:30	02.55	20:57		1111
56°	////	02:05	03:13	20:57	22:04 21:40	////
54°	01:22	02:50	03:41	20:29	21:10	22:46
52°	01:55	03:06	03:53	20:18	21:04	22:14
50°	02:19	03:20	04:03	20:08	20:51	21:51
45°	02:59	03:47	04:23	19:47	20:23	21:11
N 40°	03:28	04:08	04:40	19:30	20:02	20:43
35°	03:49	04:25	04:54	19:16	19:45	20:21
30° 20°	04:07 04:34	04:40 05:03	05:07 05:27	19:04 18:43	19:31 19:08	20:04 19:36
N 10°	04:56	05:22	05:45	18:26	18:48	19:15
0°	05:14	05:39	06:02	18:09	18:31	18:57
<b>S</b> 10°	05:30	05:56	06:18	17:53	18:15	18:41
20°	05:45	06:12	06:36	17:35	17:59	18:26
30°	06:00	06:30	06:56	17:15	17:41	18:11
35°	06:08	06:39	07:07	17:04	17:32	18:03
40°	06:17	06:50	07:20	16:51	17:21	17:54
45°	06:26	07:03	07:36	16:35	17:08	17:45
<b>S</b> 50° 52°	06:37 06:42	07:18 07:25	07:55 08:04	16:16	16:53 16:47	17:34 17:30
5∠ 54°	06:42	07:25 07:32	08:04	16:07 15:57	16:47	17:30 17:24
56°	06:52	07:40	08:26	15:45	16:31	17:19
58°	06:58	07:50	08:40	15:32	16:22	17:13
<b>S</b> 60°	07:05	08:00	08:55	15:16	16:11	17:06
Lat.	Wed	Moonris Thu	<b>e</b> Fri	Wed	Moonse Thu	<b>t</b> Fri
N 70°	vved	T nu	<u> </u>	vved	I nu	<u> </u>
N 72°						
<b>N</b> 70° 68°						
66°			23:58			
64°			23:10			
62°	_	22:49	22:40			01:52
60°	21:52	22:10	22:16		00:55	02:30
N 58°	21:14	21:43	21:58	00:30	01:32	02:57
56°	20:47	21:21	21:42	00:58	01:59	03:18
54° 52°	20:26 20:09	21:03 20:48	21:28 21:16	01:20 01:38	02:20 02:37	03:36 03:51
52°	19:54	20:46	21:10	01:56	02:57	04:03
45°	19:23	20:08	20:44	02:24	03:22	04:30
<b>N</b> 40°	19:00	19:46	20:26	02:48	03:45	04:50
35°	18:40	19:29	20:10	03:07	04:05	05:08
30°	18:23	19:13	19:57	03:24	04:21	05:23
20°	17:55	18:47	19:35	03:53	04:49	05:48
N 10°	17:31	18:24	19:15	04:17	05:13	06:09
0°	17:08	18:03	18:57	04:40	05:35	06:29
<b>S</b> 10° 20°	16:46 16:21	17:42 17:19	18:38 18:18	05:03 05:27	05:57 06:20	06:49 07:10
30°	15:53	17:19 16:53	18:18 17:55	05:27	06:20 06:48	07:10 07:35
35°	15:37	16:37	17:42	06:12	07:04	07:49
40°	15:17	16:19	17:26	06:32	07:23	08:05
45°	14:53	15:57	17:08	06:56	07:45	08:25

			Sun			Moon	
	)ay	Eqn.of	Time	Mer.	Mer.	Pass.	Age
-	, u.y	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	14-16
		mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	96-100%
	09	05:14	05:18	12:05	23:22	10:54	
	10	05:23	05:27	12:05	-:-	11:49	
	11	05:31	05:35	12:06	00:16	12:43	

16:33

16:20

16:05

15:47 15:26

07:26

07:41 07:59

08:21

08:48

08:14

08:28 08:44

09:03

09:27

**S** 50° 52° 54°

56°

14:23

14:08

13:50

13:29

13:01

15:29

15:15

14:40

14:16

08:50 09:01 09:15

09:30

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

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Cat -	CHA	CHA	Doo	CHA	Das	CHA	Das	CHA	Doo		СПУ	Doo
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	290°08.7	223°20.0	N19°20.1	124°21.0	N07°00.8	192°11.6	N23°07.5	287°27.7	S01°19.7	Alpheratz	357°34.2	29°13.8
1	305°11.1	238°19.6	20.7	139°22.1	07°00.2	207°13.5	07.4	302°30.2	19.7	Ankaa	353°06.6	-42°09.7
2	320°13.6	253°19.1	21.2	154°23.2	06°59.6	222°15.3	07.4	317°32.6	19.8	Schedar	349°30.5	56° 40.4
3	335°16.1	268°18.7	• • 21.7	169°24.3	• • 59.0	237°17.2	• • 07.4	332°35.1	• • 19.8	Diphda	348°46.8	-17°50.6
4	350°18.5	283°18.2	22.2	184°25.4	58.4	252°19.0	07.4	347°37.5	19.8	Achernar	335°19.9	-57°06.1
5	5°21.0	298°17.8	22.7	199°26.5	57.8	267°20.9	07.3	2°40.0	19.8 S01°19.8	Hamal	327°50.8	23°34.9
6 7	20°23.5 35°25.9	313°17.3 328°16.9	N19°23.2	214°27.6 229°28.7	N06°57.2	282°22.7 297°24.6	N23°07.3	17°42.4 32°44.9		Polaris	314°02.4	89°22.0
8	50°28.4	343°16.4	23.8	244°29.8	56.6 56.0	312°26.4	07.3 07.3	32 44.9 47°47.4	19.8	Acamar	$315^{\circ}11.6$	-40°11.9
9	65°30.9	358°15.9	24.3 •• 24.8	259°30.9	• • 55.4	312 20.4 327°28.3	07.3	62°49.8	19.8 •• 19.8	Menkar	$314^{\circ}05.8$	4°11.4
10	80°33.3	13°15.5	25.3	274°32.0	54.8	342°30.2	07.2	77°52.3	19.8	Mirfak	308°27.9	49°56.9
11	95°35.8	28°15.0	25.8	289°33.1	54.0	357°32.0	07.2	92°54.7	19.8	Aldebaran	290°39.4	16°33.6
12	110°38.3	43°14.6	N19° 26.3	304°34.2	N06°53.6	12°33.9	N23°07.1	107°57.2		Rigel	281°03.7	-8°10.2
13	125°40.7	58°14.1	26.8	319°35.3	53.0	27°35.7	07.1	122°59.6	19.9	Capella	280°21.7	46°01.3
14	140°43.2	73°13.7	27.3	334°36.4	52.4	42°37.6	07.1	138°02.1	19.9	Bellatrix	278°22.7	6°22.4
15	155°45.6	88°13.2	27.8	349°37.5	• • 51.8	57°39.4	07.1	153°04.6	• • 19.9	Elnath	278°01.7	28° 37.7
16	170°48.1	103°12.8	28.3	4°38.6	51.2	72°41.3	07.0	168°07.0	19.9	Alnilam	275°37.6	-1°11.1
17	185°50.6	118°12.3	28.8	19°39.7	50.6	87°43.1	07.0	183°09.5	19.9	Betelgeuse	270°51.9	7°24.8
18	200°53.0	133°11.8	N19°29.3	34°40.8	N06°50.0	102°45.0	N23°07.0	198°11.9	S01°19.9	Canopus	263°52.7	-52°42.4
19	215°55.5	148°11.4	29.9	49°41.9	49.4	117°46.8	07.0	213°14.4	19.9	Sirius	258°26.2	-16°45.0
20	230°58.0	163°10.9	30.4	64°43.0	48.8	132°48.7	06.9	228°16.8	19.9	Adhara	255°05.9	-29°00.3
21	246°00.4	178°10.5	• • 30.9	79°44.1	• • 48.2	147°50.5	• • 06.9	243°19.3	• • 19.9	Procyon	244°50.7	5°09.6
22	261°02.9	193°10.0	31.4	94°45.2	47.5	162°52.4	06.9	258°21.8	19.9	Pollux	243°17.2	27°57.9
23	276°05.4	208°09.5	31.9	109°46.3	46.9	177°54.3	06.8	273°24.2	20.0	Avior	234°15.2	-59°35.5
N 4 = ··	200 04:20		E/ m 4.00		16' m1 F4	-	0/ m 1 00			Suhail	222°46.4	-43°32.2
ivier.p	ass. 04:39	$\nu$ -0.5′ $d0$	.5′ m-4.08	$\nu$ 1.1 d-0	0.6′ m1.54	$\nu_{1.9}$ d-0	.0′ m-1.90	$\nu$ 2.5′ $d0$	.0′ m0.90	Miaplacidus Alphard	221°39.1 217°47.6	-69° 49.4 -8° 46.1
										Regulus	217 47.0 207°34.2	-8 46.1 11°50.6
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.8	61°37.0
0	291°07.8	223°09.1	N19°32.4	124°47.4	$N06^{\circ}46.3$	192°56.1	N23°06.8	288°26.7	S01°20.0	Dubne	193 40.8 182°24.6	14°25.9
1	$306^{\circ}10.3$	238°08.6	32.9	139°48.5	45.7	207°58.0	06.8	$303^{\circ}29.1$	20.0	Gienah	175°43.2	-17°41.1
2	$321^{\circ}12.8$	253°08.1	33.4	154°49.6	45.1	222°59.8	06.8	318°31.6	20.0		173°43.2 172°59.8	-63°14.7
3	$336^{\circ}15.2$	268°07.7	• • 33.9	169°50.7	• • 44.5	238°01.7	• • 06.7	333°34.1	• • 20.0		172 59.0 171°51.3	-57° 15.6
4	351°17.7	283°07.2	34.4	184°51.8	43.9	253°03.5	06.7	348°36.5	20.0	Alioth	166°12.6	55°49.5
5	6°20.1	298°06.7	34.9	199°52.9	43.3	268°05.4	06.7	3°39.0	20.0	Spica	158°21.8	-11° 17.7
6	21°22.6	313°06.3	N19°35.4	214°54.0	N06°42.7	283°07.2	N23°06.6	18°41.4	501°20.0	Alkaid	150° 21.6	49°11.4
7	$36^{\circ}25.1$	328°05.8	35.8	229°55.1	42.1	$298^{\circ}09.1$	06.6	33°43.9	20.0	Hadar	148°35.3	-60°30.0
8	51°27.5	343°05.3	36.3	244°56.2	41.5	313°10.9	06.6	48°46.4	20.0		147°57.0	-36° 29.9
9	66°30.0	358°04.9	• • 36.8	259°57.3	• • 40.9	$328^{\circ}12.8$	• • 06.6	63°48.8	• • 20.1	Arcturus	145°47.4	19°03.1
10	81°32.5	13°04.4	37.3	274°58.4	40.3	343°14.7	06.5	78°51.3	20.1	Rigil Kent.	139°39.5	-60°56.7
11	96°34.9	28°03.9	37.8	289°59.5	39.7	358°16.5	06.5	93°53.7	20.1	Kochab	137°19.3	74°03.3
12	111°37.4	43°03.5	N19°38.3	305°00.6	N06°39.1	13°18.4	N23°06.5	108°56.2	S01°20.1	Zuben'ubi	136°55.4	-16°08.9
13	126°39.9	58°03.0	38.8	320°01.7	38.5	28°20.2	06.5	123°58.7	20.1	Alphecca	126°03.2	26°37.8
14	141°42.3	73°02.5	39.3	335°02.8	37.9	43°22.1	06.4	139°01.1	20.1	Antares	112°15.0	-26°29.4
15	156°44.8	88°02.1	• • 39.8	350°03.9	• • 37.3	58°23.9	• • 06.4	154°03.6	• • 20.1	Atria	107°08.4	-69°04.6
16	171°47.3	103°01.6	40.3	5°05.0	36.7	73°25.8	06.4	169°06.0	20.1	Sabik	102°02.0	-15°45.4
17	186°49.7	118°01.1	40.8	20°06.1	36.1	88°27.6	06.3	184°08.5	20.1	Shaula	96°09.4	-37°07.4
18	201°52.2	133°00.6	N19°41.3	35°07.2	N06°35.5	103°29.5	N23°06.3	199°11.0	S01°20.2	Rasalhague	95°57.8	12°32.5
19	216°54.6	148°00.2	41.7	50°08.3	34.9	118°31.4	06.3	214°13.4	20.2	Eltanin	90°41.5	51°29.2
20	231°57.1	162°59.7	42.2	65°09.4	34.2	133°33.2	06.3	229°15.9	20.2	Kaus Aust.	83°31.5	-34°22.3
21	246°59.6	177°59.2	• • 42.7	80°10.4	• • 33.6	148°35.1	• • 06.2	244°18.4	• • 20.2	Vega	80°32.5	38° 48.5
22	262°02.0	192°58.7	43.2	95°11.5	33.0	163°36.9	06.2	259°20.8	20.2	Nunki	75°46.8	-26°15.9
23	277°04.5	207°58.3	43.7	110°12.6	32.4	178°38.8	06.2	274°23.3	20.2	Altair	$61^{\circ}59.2$	8°56.2
Mer.p	ass. 04:35	$\nu$ -0.5 $'$ d0	.5′ m-4.07	$\nu 1.1' \ d$ -0	0.6′ m1.55	$\nu$ 1.9′ d-0	.0′ m-1.90	$\nu 2.5' \ d0$	.0′ m0.90	Peacock	53°04.5	-56°39.0
										Deneb	49°25.1	45°22.2
	6114	6114	_		_	6114	_	6114	-	Enif	33°38.1	9°59.5
Mon	<b>GHA</b> 292°07.0	GHA	Dec	<b>GHA</b> 125°13.7	Dec	<b>GHA</b> 193°40.6	<b>Dec</b> N23°06.1	GHA	<b>Dec</b> <b>S</b> 01°20.2	Al Na'ir	27°32.0	-46°50.0
0 1	292°07.0 307°09.4	222°57.8 237°57.3	N19°44.2 44.6	125° 13.7 140° 14.8	N06°31.8 31.2	193°40.6 208°42.5	N23 06.1 06.1	289°25.7 304°28.2	20.2	Fomalhaut	15°13.8	-29°29.0
2	307 09.4 322°11.9	257 57.3 252°56.8	44.0 45.1	140 14.8 155°15.9	30.6	208 42.5 223°44.3	06.1	304 28.2 319°30.7	20.2	Scheat	13°44.6	28° 13.2
3	322 11.9 337°14.4	252 56.8 267°56.4	45.1 • • 45.6	155 15.9 170°17.0	30.0	223 44.3 238°46.2	06.0	319 30.7 334°33.1	. 20.3	Markab	13°29.3	15°20.5
3 4	357 14.4 352°16.8	282°55.9	46.1	170 17.0 185°18.1	29.4	253°48.1	06.0	334 33.1 349°35.6	20.3	Jul 12 Sat	SHA	Mer.pass
5	7°19.3	202 55.9 297°55.4	46.1	200°19.2	28.8	268°49.9	06.0	4°38.1	20.3		293°11.3	09:07
6	7 19.3 22°21.7	312°54.9	N19° 47.0	215°20.3	N06°28.2	283°51.8	N23°06.0	19°40.5	S01°20.3		194°12.3	15:41
7	37°24.2	327°54.4	47.5	230°21.4	27.6	298°53.6	05.9	34°43.0	20.3		262°02.9	11:10
8	52°26.7	342°54.0	48.0	245°22.5	27.0	313°55.5	05.9	49°45.5	20.3	Saturn	357°19.0	04:49
9	67°29.1	357°53.5	• 48.5	260°23.6	26.4	328°57.3	•• 05.9	64°47.9	. 20.3			
10	82°31.6	12°53.0	49.0	275°24.7	25.8	343°59.2	05.8	79°50.4	20.3	Jul 13 Sun	SHA	Mer.pass
11	97°34.1	27°52.5	49.4	290°25.8	25.2	359°01.0	05.8	94°52.8	20.4		292°01.2	09:08
12	112°36.5	42°52.0	N19°49.9	305°26.9	N06°24.5	14°02.9	N23°05.8	109°55.3	S01°20.4		193°39.6	15:40
13	127°39.0	57°51.6	50.4	320°28.0	23.9	29°04.8	05.8	124°57.8	20.4		261°48.3	11:07
14	142°41.5	72°51.1	50.9	335°29.1	23.3	44°06.6	05.7	140°00.2	20.4	Saturn	357°18.9	04:45
15	157°43.9	87°50.6	• • 51.3	350°30.2	• • 22.7	59°08.5	• • 05.7	155°02.7	. 20.4	Jul 14 Mon	SHA	Mer.pass
16	172°46.4	102°50.1	51.8	5°31.3	22.1	74°10.3	05.7	170°05.2	20.4		290°50.8	09:08
17	187°48.9	117°49.6	52.3	20°32.4	21.5	89°12.2	05.6	185°07.6	20.4		193°06.8	15:38
18	202°51.3	132°49.1	N19°52.7	35°33.5	N06°20.9	104°14.0	N23°05.6	$200^{\circ}10.1$	S01°20.5		261°33.7	11:04
19	$217^{\circ}53.8$	147°48.7	53.2	50°34.6	20.3	119°15.9	05.6	$215^{\circ}12.6$	20.5		357°18.8	04:42
20	232°56.2	162°48.2	53.7	65°35.7	19.7	134°17.7	05.6	$230^{\circ}15.0$	20.5			
21	247°58.7	177°47.7	•• 54.1	$80^{\circ}36.8$	•• 19.1	149°19.6	• • 05.5	245°17.5	• • 20.5	Horizont	al parallax	
22	263°01.2	192°47.2	54.6	95°37.9	18.5	164°21.5	05.5	260°20.0	20.5		Venus:	0.1
23	278°03.6	207°46.7	55.1	110°38.9	17.9	179°23.3	05.5	275°22.4	20.5		Mars:	0.1
Mern	ass. 04:31	ν-0 5/ d0	.5′ m-4.07	ν1 1 <sup>/</sup> d.0	0.6′ m1.55	v1 0' d₋∩	.0′ m-1.90	1/2 5/ d0	.0′ m0.89			
.т.ст.р		- 0.5 00	.5 1.01	- 1.1 U-C				- 2.5 40				

h	Su			Moon			
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°35.4	N21°57.6	343° 17.6	9.6'	S22°54.8	-9.8'	56.6'
1 2	193°35.3 208°35.2	57.2 56.9	357°46.2 12°14.9	9.7' 9.7'	22°45.0 22°35.1	-9.9' -10.0'	56.7' 56.7'
3	206 35.2 223°35.1	56.5	26° 43.7	9.7 9.8'	22°25.1	-10.0	56.7'
4	238°35.1	56.2	41°12.5	9.9'	22°14.9	-10.3'	56.7'
5	253°35.0	55.8	55°41.3	9.9'	22°04.6	-10.4'	56.8'
6 7	268°34.9 283°34.8	N21°55.5 55.1	70°10.3 84°39.2	10.0' 10.0'	\$21°54.2 21°43.7	-10.5' -10.7'	56.8' 56.8'
8	298°34.8	54.8	99°08.3	10.0	21°33.0	-10.7	56.8
9	313°34.7	• • 54.4	113°37.4	10.2'	21°22.3	-10.9'	56.8'
10	328°34.6	54.1	128°06.5	10.2'	21°11.4	-11.0'	56.9'
11 12	343°34.5 358°34.5	53.7 N21°53.4	142°35.7 157°05.0	10.3' 10.3'	21°00.4 520°49.2	-11.1' -11.2'	56.9' 56.9'
13	13°34.4	53.0	171°34.3	10.4'	20°38.0	-11.3'	56.9
14	28°34.3	52.6	186°03.7	10.5'	20°26.7	-11.5'	56.9'
15 16	43°34.2 58°34.2	· · 52.3 51.9	200°33.2 215°02.7	10.5' 10.6'	20°15.2 20°03.6	-11.6' -11.7'	57.0' 57.0'
17	73°34.1	51.6	219°32.3	10.6'	19°51.9	-11.7 -11.8'	57.0'
18	88°34.0	N21°51.2	244°01.9	10.7'	S19°40.1	-11.9'	57.0'
19	103°33.9	50.9	258°31.6	10.7'	19°28.2	-12.0'	57.1'
20 21	118°33.9 133°33.8	50.5 •• 50.1	273°01.3 287°31.1	10.8' 10.9'	19°16.2 19°04.1	-12.1' -12.2'	57.1' 57.1'
22	148°33.7	49.8	302°01.0	10.9'	18°51.9	-12.3'	57.1
23	163°33.6	49.4	316°30.9	11.0'	18°39.6	-12.4'	57.1'
	SD = 15.7'	d = -0.3'		SE	O = 15.4'		
Ç	CUV	Doc		••	Doc	٦	НР
Sun 0	<b>GHA</b> 178°33.6	<b>Dec</b> N21°49.0	<b>GHA</b> 331°00.9	u 11.0'	<b>Dec</b> 518°27.2	d -12.5'	<b>нР</b> 57.2'
1	193°33.5	48.7	$345^{\circ}30.9$	11.1'	$18^{\circ}14.6$	-12.6'	57.2'
2	208°33.4	48.3	0°01.0	11.1'	18°02.0	-12.7'	57.2'
3 4	223°33.3 238°33.3	· · 47.9 47.6	14°31.1 29°01.3	11.2' 11.3'	17°49.3 17°36.5	-12.8' -12.9'	57.2' 57.2'
5	253°33.2	47.2	43°31.6	11.3'	17°23.6	-13.0'	57.3'
6	268°33.1	N21°46.8	58°01.9	11.4'	<b>S</b> 17°10.6	-13.1'	57.3'
7	283°33.0	46.5	72°32.3 87°02.7	11.4'	16°57.5 16°44.3	-13.2'	57.3'
8 9	298°33.0 313°32.9	46.1 •• 45.7	87°02.7 101°33.2	11.5' 11.5'	16°44.3 16°31.0	-13.3' -13.4'	57.3' 57.3'
10	328°32.8	45.4	116°03.7	11.6'	16°17.6	-13.5'	57.4
11	343°32.8	45.0	130°34.3	11.6'	16°04.2	-13.5'	57.4'
12 13	358°32.7 13°32.6	N21°44.6 44.3	145°04.9 159°35.6	11.7' 11.7'	\$15°50.6 15°37.0	-13.6' -13.7'	57.4' 57.4'
14	28°32.6	43.9	174°06.3	11.8'	15°23.3	-13.7 -13.8'	57.4'
15	43°32.5	• • 43.5	$188^{\circ}37.1$	11.8'	$15^{\circ}09.5$	-13.9'	57.5'
16	58°32.4	43.1	203°07.9	11.9'	14°55.6	-14.0'	57.5
17 18	73°32.3 88°32.3	42.8 N21°42.4	217°38.8 232°09.8	11.9' 12.0'	14°41.6 \$14°27.5	-14.0' -14.1'	57.5' 57.5'
19	103°32.2	42.0	246° 40.7	12.0'	14°13.4	-14.2'	57.5'
20	118°32.1	41.6	261°11.8	12.1'	13°59.2		57.6'
21 22	133°32.1 148°32.0	· · 41.3 40.9	275° 42.8 290° 13.9	12.1' 12.2'	13°44.9 13°30.6	-14.4' -14.4'	57.6' 57.6'
23	163°31.9	40.9	304°45.1	12.2'	13°16.2	-14.4	57.6'
	SD = 15.7'	d = -0.4'		SE	0 = 15.6'		
Mon 0	<b>GHA</b> 178°31.9	<b>Dec</b> N21°40.1	<b>GHA</b> 319° 16.3	u 12.2'	Dec \$13°01.6	d -14.6'	<b>HP</b> 57.6'
1	176 31.9 193°31.8	39.7	333° 47.5	12.3'	12°47.1	-14.6'	57.0 57.7'
2	208°31.7	39.4	348° 18.8	12.3'	$12^{\circ}32.4$	-14.7'	57.7'
3 4	223°31.7 238°31.6	· · 39.0 38.6	2°50.2 17°21.5	12.4' 12.4'	12°17.7 12°02.9	-14.8' -14.8'	57.7' 57.7'
4 5	253°31.5	38.0 38.2	31°52.9	12.4' 12.4'	12°02.9 11°48.1	-14.8 -14.9'	57.7'
6	268°31.5	N21°37.8	46°24.4	12.5'	S11°33.2	-15.0'	57.8'
7	283°31.4	37.5	60°55.9	12.5'	11°18.2	-15.0'	57.8'
8 9	298°31.3 313°31.3	37.1 · · 36.7	75°27.4 89°58.9	12.6' 12.6'	11°03.2 10°48.1	-15.1' -15.2'	57.8' 57.8'
10	328°31.2	36.3	104° 30.5	12.6'	10°32.9	-15.2'	57.8'
11	343°31.1	35.9	119°02.1	12.7'	10°17.7	-15.3'	57.8'
12 13	358°31.1 13°31.0	N21°35.5 35.1	133°33.8 148°05.5	12.7' 12.7'	\$10°02.4 09°47.1	-15.3' -15.4'	57.9' 57.9'
13 14	28°30.9	35.1 34.8	148°05.5 162°37.2	12.7' 12.7'	09°47.1 09°31.7	-15.4' -15.4'	57.9' 57.9'
15	43°30.9	• • 34.4	$177^{\circ}08.9$	12.8'	$09^{\circ}16.3$	-15.5'	57.9'
16	58°30.8	34.0	191°40.7	12.8'	09°00.8	-15.5'	57.9'
17 18	73°30.7 88°30.7	33.6 N21°33.2	206° 12.5 220° 44.3	12.8' 12.8'	08°45.2 \$08°29.6	-15.6' -15.6'	58.0' 58.0'
19	103°30.6	32.8	235° 16.2	12.0	08°14.0	-15.0 -15.7'	58.0'
20	118°30.5	32.4	249°48.0	12.9'	07°58.3	-15.7'	58.0'
21 22	133°30.5 148°30.4	· · 32.0 31.6	264° 19.9 278° 51.8	12.9' 12.9'	07°42.6 07°26.8	-15.8' -15.8'	58.0' 58.1'
23	148°30.4 163°30.3	31.0	278°51.8 293°23.8	12.9 13.0'	07°26.8 07°10.9	-15.8 -15.9'	58.1' 58.1'
	SD = 15.7'	d = -0.4'			0 = 15.7'		
	JD — 10.1	<u> </u>		J.	10.1		

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	17-19	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	98-89%	
12	05:38	05:42	12:06	01:09	13:35		
13	05:46	05:49	12:06	02:00	14:24		
14	05:53	05:56	12:06	02:48	15:12		

July 15, 16, 17 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	293°06.1	222°46.2	N19°55.5	125°40.0	N06°17.3	194°25.2	N23°05.4	290°24.9	S01°20.5			
1	308°08.6	237°45.7	56.0	140°41.1	16.6	209°27.0	05.4	305°27.4	20.5	Alpheratz	357°34.2	29°13.8
2	323°11.0	252°45.2	56.5	155°42.2	16.0	209 27.0 224°28.9	05.4	320°29.8	20.5	Ankaa	353°06.6	-42°09.7
				170°43.3						Schedar	349°30.4	56°40.4
3	338°13.5	267°44.7	• • 56.9		• • 15.4	239°30.7	• • 05.3	335°32.3	• • 20.6	Diphda	348°46.8	-17°50.6
4	353°16.0	282°44.3	57.4	185°44.4	14.8	254°32.6	05.3	350°34.8	20.6	Achernar	335°19.9	-57°06.1
5	8°18.4	297°43.8	57.9	200°45.5	14.2	269°34.5	05.3	5°37.2	20.6	Hamal	327°50.8	23°34.9
6	23°20.9	312°43.3	N19°58.3	215°46.6	N06°13.6	284°36.3	N23°05.3	20°39.7	S01°20.6	Polaris	$314^{\circ}01.1$	89°22.0
7	38°23.4	327°42.8	58.8	230°47.7	13.0	299°38.2	05.2	35°42.2	20.6	Acamar	$315^{\circ}11.6$	-40°11.8
8	53°25.8	342°42.3	59.2	245°48.8	12.4	314°40.0	05.2	50°44.6	20.6	Menkar	314°05.8	4°11.5
9	68°28.3	357°41.8	19°59.7	260°49.9	• • 11.8	329°41.9	• • 05.2	65°47.1	• • 20.7	Mirfak	308°27.9	49°56.9
10	83°30.7	12°41.3	20°00.2	275°51.0	11.2	344°43.7	05.1	80°49.6	20.7	Aldebaran	290°39.4	16°33.6
11	98°33.2	27°40.8	00.6	290°52.1	10.6	359°45.6	05.1	95°52.0	20.7	Rigel	281°03.7	-8°10.2
12	113°35.7	42°40.3	N20°01.1	305°53.2	N06°10.0	14°47.5	N23°05.1	110°54.5	S01°20.7	Capella	280°21.6	46°01.3
13	128°38.1	57°39.8	01.5	320°54.3	09.3	29°49.3	05.0	125°57.0	20.7	Bellatrix	278°22.7	6°22.4
14	143°40.6	72°39.3	02.0	335°55.4	08.7	44°51.2	05.0	140°59.4	20.7	Elnath	278°01.6	28°37.7
15	158°43.1	87°38.8	• • 02.4	350°56.5	• • 08.1	59°53.0	• • 05.0	156°01.9	• • 20.7	Alnilam	275°37.6	-1°11.1
16	173°45.5	102°38.3	02.9	5°57.6	07.5	74°54.9	05.0	171°04.4	20.8	Betelgeuse	270°51.9	7°24.8
17	188°48.0	117°37.8	03.3	20°58.7	06.9	89°56.7	04.9	186°06.9	20.8	Canopus	263°52.7	-52°42.4
18	203°50.5	132°37.3	N20°03.8	35°59.7	N06°06.3	104°58.6	N23°04.9	201°09.3	S01°20.8	Sirius	258°26.2	-16°45.0
19	218°52.9	147°36.8	04.3	51°00.8	05.7	120°00.5	04.9	216°11.8	20.8	Adhara	255°05.9	-29°00.3
20	233°55.4	162°36.3	04.7	66°01.9	05.1	135°02.3	04.8	231°14.3	20.8	Procyon	244°50.7	5°09.6
21	248°57.8	177°35.8	• • 05.2	81°03.0	• • 04.5	150°04.2	• • 04.8	246°16.7	• • 20.8	Pollux	243°17.2	27°57.9
22	264°00.3	192°35.3	05.6	96°04.1	03.9	165°06.0	04.8	261°19.2	20.8	Avior	234°15.2	-59°35.5
23	279°02.8	207°34.8	06.0	111°05.2	03.2	180°07.9	04.7	276°21.7	20.9	Suhail	222°46.4	-43°32.2
Mer n	ass. 04:27	$\nu$ -0.5' d0	.5′ m-4.07	$\nu 1.1' d-0$	.6′ m1.55	ν1.9' d-0	.0′ m-1.90	$\nu^{2.5'} d0$	.0′ m0.89	Miaplacidus	221°39.1	-69°49.4
										Alphard	217°47.6	-8°46.1
										Regulus	207°34.2	11°50.6
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.9	61°37.0
0	294°05.2	222°34.3	N20°06.5	126°06.3	$N06^{\circ}02.6$	195°09.7	N23°04.7	291°24.1	S01°20.9	Denebola	182°24.6	14°25.9
1	309°07.7	237°33.8	06.9	141°07.4	02.0	$210^{\circ}11.6$	04.7	306°26.6	20.9	Gienah	175°43.3	-17°41.1
2	324°10.2	252°33.3	07.4	156°08.5	01.4	225°13.5	04.6	321°29.1	20.9	l l	172°59.8	-63°14.7
3	339°12.6	267°32.8	• • 07.8	171°09.6	• • 00.8	240°15.3	• • 04.6	336°31.6	• • 20.9		171°51.3	-57° 15.6
4	354°15.1	282°32.3	08.3	186°10.7	06°00.2	$255^{\circ}17.2$	04.6	351°34.0	20.9	Alioth	166°12.6	55°49.5
5	9°17.6	297°31.8	08.7	201°11.8	05°59.6	$270^{\circ}19.0$	04.6	6°36.5	20.9	Spica	158°21.8	-11° 17.7
6	24°20.0	312°31.3	N20°09.2	$216^{\circ}12.9$	N05°59.0	285°20.9	N23°04.5	21°39.0	S01°21.0	Alkaid	152°51.6	49°11.4
7	39°22.5	$327^{\circ}30.8$	09.6	231°14.0	58.4	300°22.8	04.5	36°41.4	21.0	Hadar	148°35.3	-60°30.0
8	54°25.0	342°30.3	10.0	246°15.1	57.7	$315^{\circ}24.6$	04.5	51°43.9	21.0	<b>I</b>	147°57.0	-36°29.9
9	69°27.4	357°29.8	• • 10.5	261°16.2	•• 57.1	330°26.5	• • 04.4	66°46.4	• • 21.0	Arcturus	145°47.4	19°03.1
10	84°29.9	12°29.3	10.9	276°17.2	56.5	345°28.3	04.4	81°48.9	21.0	Rigil Kent.	139°39.5	-60°56.7
11	99°32.3	27°28.8	11.4	291°18.3	55.9	0°30.2	04.4	96°51.3	21.0	Kochab	137°19.3	74°03.3
12	114°34.8	42°28.3	N20°11.8	306°19.4	N05°55.3	15°32.0	N23°04.3	111°53.8	S01°21.1	Zuben'ubi	136°55.4	-16°08.9
13	129°37.3	57°27.8	12.2	321°20.5	54.7	30°33.9	04.3	126°56.3	21.1	Alphecca	126°03.2	26°37.9
14	144°39.7	72°27.3	12.7	$336^{\circ}21.6$	54.1	45°35.8	04.3	141°58.7	21.1	Antares	112° 15.0	-26°29.4
15	159°42.2	87°26.7	• • 13.1	351°22.7	• • 53.5	60°37.6	• • 04.2	157°01.2	• • 21.1	Antares	107°08.4	-20°29.4° -69°04.6
16	174°44.7	$102^{\circ}26.2$	13.5	6°23.8	52.9	75°39.5	04.2	172°03.7	21.1	Sabik	107 00.4 102°02.0	-15°45.4
17	189°47.1	$117^{\circ}25.7$	14.0	21°24.9	52.2	90°41.3	04.2	187°06.2	21.1	Shaula	96°09.4	-13 43.4 -37°07.4
18	204°49.6	132°25.2	N20°14.4	36°26.0	N05°51.6	105°43.2	N23°04.2	202°08.6	S01°21.2	Rasalhague	95°57.8	12°32.5
19	219°52.1	147°24.7	14.8	51°27.1	51.0	120°45.1	04.1	217°11.1	21.2	Eltanin	90°41.5	51°29.2
20	234°54.5	162°24.2	15.3	66°28.2	50.4	135°46.9	04.1	232°13.6	21.2	Kaus Aust.	83°31.5	-34°22.3
21	249°57.0	177°23.7	• • 15.7	81°29.3	• • 49.8	150°48.8	• • 04.1	$247^{\circ}16.1$	• • 21.2	Vega	80°32.5	38°48.5
22	264°59.4	192°23.2	16.1	96°30.4	49.2	165°50.6	04.0	262°18.5	21.2	Nunki	75°46.8	-26°15.9
23	280°01.9	207°22.6	16.6	111°31.4	48.6	180°52.5	04.0	277°21.0	21.2	Altair	61°59.2	8°56.2
N 4	04:22		.4′ m-4.06	-11/-10	6/ 1 F6	-10/-10	0/ 1 00	- 2 5/ -10	0/ 0 00	Peacock	53°04.4	-56°39.1
ivier.p	ass. 04:23	$\nu$ -0.5 au	.4 m-4.00	$\nu_{1.1}$ a-0	.6′ m1.56	$\nu$ 1.9 a-0.	.0′ m-1.90	ν2.5 au	.0′ m0.88	Deneb	49°25.1	45°22.2
										Enif	33°38.1	9°59.5
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.0	-46°50.0
0	295°04.4	222°22.1	N20°17.0	126°32.5	N05°48.0	195°54.3	N23°04.0	292°23.5	S01°21.3	Fomalhaut	15°13.8	-40 50.0 -29°29.0
1	$310^{\circ}06.8$	$237^{\circ}21.6$	17.4	141°33.6	47.3	210°56.2	03.9	$307^{\circ}26.0$	21.3	Scheat	13°44.6	28°13.2
2	325°09.3	252°21.1	17.9	156°34.7	46.7	225°58.1	03.9	322°28.4	21.3	Markab	13°29.3	15°20.6
3	$340^{\circ}11.8$	267°20.6	• • 18.3	171°35.8	• • 46.1	240°59.9	• • 03.9	337°30.9	• • 21.3	IviaiNaD	10 49.0	13 20.0
4	$355^{\circ}14.2$	$282^{\circ}20.1$	18.7	186°36.9	45.5	$256^{\circ}01.8$	03.8	352°33.4	21.3	Jul 15 Tue	SHA	Mer.pass
5	$10^{\circ}16.7$	$297^{\circ}19.6$	19.1	201°38.0	44.9	271°03.6	03.8	7°35.9	21.3		$289^{\circ}40.1$	09:09
6	25°19.2	312°19.0	N20°19.6	216°39.1	N05°44.3	286°05.5	N23°03.8	22°38.3	S01°21.4	l l	192°33.9	15:36
7	40°21.6	$327^{\circ}18.5$	20.0	231°40.2	43.7	301°07.4	03.7	37°40.8	21.4		$261^{\circ}19.1$	11:01
8	55°24.1	$342^{\circ}18.0$	20.4	246°41.3	43.0	$316^{\circ}09.2$	03.7	52°43.3	21.4	Saturn	357°18.8	04:38
9	70°26.6	357°17.5	• • 20.8	261°42.4	• • 42.4	331°11.1	• • 03.7	67°45.8	• • 21.4	16 \A/= 1	CHA	Me:: ====
10	85°29.0	12°17.0	21.2	276°43.5	41.8	$346^{\circ}12.9$	03.6	82°48.2	21.4	Jul 16 Wed	<b>SHA</b> 288°29.1	Mer.pass 09:10
11	100°31.5	$27^{\circ}16.5$	21.7	291°44.5	41.2	1°14.8	03.6	97°50.7	21.4			
12	115°33.9	42°15.9	N20°22.1	306°45.6	N05°40.6	16°16.7	N23°03.6	112°53.2	S01°21.5	!	192°01.1	15:34
13	130°36.4	57°15.4	22.5	321°46.7	40.0	$31^{\circ}18.5$	03.6	127°55.7	21.5	Saturn	261°04.5	10:58 04:34
14	145°38.9	$72^{\circ}14.9$	22.9	336°47.8	39.4	46°20.4	03.5	142°58.1	21.5	Saturn	357°18.9	U4:34
15	$160^{\circ}41.3$	87°14.4	• • 23.3	351°48.9	• • 38.8	61°22.2	• • 03.5	158°00.6	• • 21.5	Jul 17 Thu	SHA	Mer.pass
16	175°43.8	102°13.8	23.8	6°50.0	38.1	$76^{\circ}24.1$	03.5	173°03.1	21.5		287°17.8	09:11
17	190°46.3	$117^{\circ}13.3$	24.2	$21^{\circ}51.1$	37.5	91°26.0	03.4	$188^{\circ}05.6$	21.5	l l	191°28.2	15:33
18	205°48.7	132°12.8	N20°24.6	36°52.2	N05°36.9	106°27.8	N23°03.4	203°08.0	S01°21.6		260°50.0	10:55
19	220°51.2	$147^{\circ}12.3$	25.0	51°53.3	36.3	121°29.7	03.4	$218^{\circ}10.5$	21.6		357°19.1	04:30
20	235°53.7	$162^{\circ}11.8$	25.4	66°54.4	35.7	136°31.5	03.3	233°13.0	21.6			
21	$250^{\circ}56.1$	$177^{\circ}11.2$	• • 25.8	81°55.5	• • 35.1	151°33.4	• • 03.3	248°15.5	• • 21.6	Horizont	al parallax	
22	265°58.6	192°10.7	26.2	96°56.5	34.5	166°35.3	03.3	263°18.0	21.6		Venus:	0.1
23	281°01.1	$207^{\circ}10.2$	26.6	111°57.6	33.8	181°37.1	03.2	278°20.4	21.7		Mars:	0.1
Mara	255 04:10	1/_O 5/ dO	.4′ m-4.06	,,1 1/ 4 0	.6′ m1.56	1/1 O/ d O	.0′ m-1.90	1/2 E/ 40	.0′ m0.88			
ivier.p	ass. 04:19	ν-0.5 α0	.+ 111-4.00	ν1.1 <i>α</i> -0	.0 1111.50	ν1.9 a-0.	.0 111-1.90	ν2.5 aU				

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°30.3	N21°30.8	307°55.7	13.0'	\$06°55.1	-15.9'	58.1'
1	193°30.2	30.4	322°27.7	13.0'	$06^{\circ}39.2$	-15.9'	58.1'
2	208°30.2	30.0	336° 59.7	13.0'	06°23.2	-16.0'	58.1'
3	223°30.1	• • 29.7	351°31.7	13.0'	06°07.2	-16.0'	58.1'
4 5	238°30.0 253°30.0	29.3 28.9	6°03.7 20°35.8	13.0' 13.0'	05°51.2 05°35.1	-16.1' -16.1'	58.2' 58.2'
6	268°29.9	N21°28.5	20 35.6 35°07.8	13.1'	505°19.0	-16.1	58.2
7	283°29.8	28.1	49°39.9	13.1'	05°02.9	-16.2	58.2
8	298°29.8	27.7	64°11.9	13.1'	04°46.8	-16.2	58.2'
9	313°29.7	• • 27.3	78°44.0	13.1'	04°30.6	-16.2'	58.2'
10	328°29.7	26.9	93°16.1	13.1'	04°14.3	-16.2'	58.3'
11	343°29.6	26.5 N21°26.1	107°48.2	13.1' 13.1'	03°58.1 \$03°41.8	-16.3'	58.3' 58.3'
12 13	358°29.5 13°29.5	N21 - 26.1 25.7	122°20.3 136°52.3	13.1'	03°25.5	-16.3' -16.3'	58.3'
14	28°29.4	25.7	150° 52.5	13.1	03°25.5	-10.3 -16.3	58.3
15	43°29.4	24.8	165° 56.5	13.1'	02°52.8	-16.4	58.3'
16	58°29.3	24.4	180°28.6	13.1'	02°36.5	-16.4'	58.4'
17	73°29.2	24.0	195°00.7	13.1'	$02^{\circ}20.1$	-16.4'	58.4'
18	88°29.2	N21°23.6	209°32.8	13.1'	S02°03.7	-16.4'	58.4'
19	103°29.1 118°29.1	23.2	224°04.9 238°37.0	13.1'	01°47.2 01°30.8	-16.4'	58.4'
20 21	118°29.1 133°29.0	22.8 • • 22.4	238°37.0 253°09.1	13.1' 13.1'	01°30.8 01°14.3	-16.5' -16.5'	58.4' 58.4'
22	148°28.9	22.0	267°41.1	13.1'	01° 14.3	-16.5'	58.5
23	163°28.9	21.6	282°13.2	13.0'	00°41.4	-16.5'	58.5'
	SD = 15.7'	d = -0.4'		CI	D = 15.8'		
	3D = 13.1	<u>u = -0.4</u>		31	7 — 15.6		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178°28.8 193°28.8	N21°21.2 20.8	296°45.2 311°17.3	13.0' 13.0'	\$00°24.9 \$00°08.4	-16.5' -16.5'	58.5' 58.5'
2	193°28.8 208°28.7	20.8	311°17.3 325°49.3	13.0'	N00°08.2	-16.5'	58.5'
3	223°28.6	20.0	340°21.3	13.0'	00°24.7	16.5'	58.5'
4	238°28.6	19.5	354°53.3	13.0'	00°41.2	16.5'	58.6'
5	253°28.5	19.1	9°25.2	12.9'	00°57.8	16.5'	58.6'
6	268°28.5	N21°18.7	23°57.2	12.9'	N01°14.3	16.5	58.6'
7 8	283°28.4 298°28.4	18.3 17.9	38°29.1 53°01.0	12.9' 12.9'	01°30.8 01°47.4	16.5' 16.5'	58.6' 58.6'
9	313°28.3	•• 17.5	67°32.9	12.9'	01°47.4	16.5	58.6'
10	328°28.2	17.1	82°04.8	12.8'	02°20.5	16.5'	58.6'
11	343°28.2	16.6	96°36.6	12.8'	02°37.0	16.5'	58.7'
12	358°28.1	N21°16.2	111°08.4	12.8'	N02°53.5	16.5'	58.7'
13	13°28.1 28°28.0	15.8 15.4	125°40.2 140°11.9	12.7' 12.7'	03°10.1 03°26.6	16.5' 16.5'	58.7' 58.7'
14 15	43°28.0	15.4	140 11.9 154°43.6	12.7'	03°43.1	16.5	58.7'
16	58°27.9	14.5	169° 15.3	12.6'	03°59.6	16.5	58.7'
17	73°27.9	14.1	$183^{\circ}47.0$	12.6'	$04^{\circ}16.1$	16.5'	58.7'
18	88°27.8	N21°13.7	198° 18.6	12.6'	N04°32.5	16.5'	58.8'
19	103°27.8	13.3	212°50.2	12.5'	04°49.0	16.4'	58.8'
20 21	118°27.7 133°27.6	12.9 •• 12.4	227°21.7 241°53.2	12.5' 12.5'	05°05.4 05°21.9	16.4' 16.4'	58.8' 58.8'
22	148°27.6	12.0	256° 24.6	12.4	05°38.3	16.4	58.8'
23	163°27.5	11.6	270°56.0	12.4'	05°54.7	16.4	58.8'
	SD = 15.7'	d = -0.4'		SI	O = 16.0'		
<b>-</b> .							
Thu 0	<b>GHA</b> 178°27.5	<b>Dec</b> N21°11.2	<b>GHA</b> 285° 27.4	u 12.3'	Dec N06°11.0	d 16.3'	<b>HP</b> 58.8'
1	178 27.5 193°27.4	10.7	205° 27.4 299° 58.7	12.3'	06°27.4	16.3	58.9'
2	208°27.4	10.3	314°30.0	12.2'	06°43.7	16.3'	58.9'
3	223°27.3	•• 09.9	329°01.2	12.2'	07°00.0	16.3'	58.9'
4	238°27.3	09.5	343°32.4	12.1'	07°16.2	16.2'	58.9'
5	253°27.2 268°27.2	09.0 N21°08.6	358°03.5 12°34.6	12.1' 12.0'	07°32.5 N07°48.7	16.2'	58.9'
6 7	268°27.2 283°27.1	N21 08.6 08.2	12°34.6 27°05.6	12.0'	08°04.9	16.2' 16.1'	58.9' 58.9'
8	298°27.1	07.7	41°36.6	11.9'	08°21.0	16.1	58.9'
9	313°27.0	• • 07.3	56°07.5	11.9'	08°37.1	16.1	59.0'
10	328°27.0	06.9	$70^{\circ}38.4$	11.8'	08°53.2	16.0'	59.0'
11	343°26.9	06.5	85°09.2	11.7'	09°09.2	16.0'	59.0'
12	358°26.9 13°26.8	N21°06.0 05.6	99°39.9 114°10.6	11.7'	N09°25.2 09°41.2	16.0'	59.0'
13 14	13°26.8 28°26.8	05.6 05.2	114° 10.6 128° 41.2	11.6' 11.5'	09°41.2 09°57.1	15.9' 15.9'	59.0' 59.0'
15	43°26.7	04.7	120 41.2 143°11.7	11.5'	10° 12.9	15.8'	59.0'
16	58°26.7	04.3	157° 42.2	11.4'	10°28.7	15.8'	59.0'
17	73°26.6	03.9	172° 12.6	11.3'	10°44.5	15.7'	59.1'
18	88°26.6	N21°03.4	186° 43.0	11.3'	N11°00.2	15.7'	59.1'
19 20	103°26.5 118°26.5	03.0 02.5	201°13.2 215°43.4	11.2' 11.1'	11°15.9 11°31.5	15.6' 15.6'	59.1' 59.1'
20	118 20.5 133°26.4	02.5	215 43.4 230°13.6	11.1	11 31.5 11°47.1	15.5	59.1'
22	148°26.4	01.7	244°43.6	11.0'	12°02.6	15.5'	59.1
23	163°26.3	01.2	259°13.6	10.9'	12°18.1	15.4'	59.1'
	SD = 15.7'	d = -0.4'		SI	O = 16.0'		
			-		-		

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

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

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Mer.Pass.		
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	20-22	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	82-62%	
15	05:59	06:02	12:06	03:35	15:58		
16	06:05	06:07	12:06	04:21	16:44		
17	06:10	06:13	12:06	05:08	17:32		

July 18, 19, 20 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
	296°03.5				N05°33.2		N23°03.2		S01°21.7			Dec
0		222°09.7	N20°27.1	126°58.7		196°39.0		293°22.9		Alpheratz	357°34.2	29°13.8
1	311°06.0	$237^{\circ}09.1$	27.5	141°59.8	32.6	211°40.8	03.2	308°25.4	21.7	Ankaa	353°06.6	-42°09.7
2	326°08.4	252°08.6	27.9	$157^{\circ}00.9$	32.0	226° 42.7	03.1	323°27.9	21.7	Schedar	349°30.4	56°40.4
3	341°10.9	267°08.1	• • 28.3	172°02.0	• • 31.4	241°44.6	• • 03.1	338°30.4	• • 21.7			
4	356°13.4	282°07.5	28.7	187°03.1	30.8	256° 46.4	03.1	353°32.8	21.8	Diphda	348°46.8	-17°50.6
5	11°15.8	297°07.0	29.1	202°04.2	30.1	271°48.3	03.0	8°35.3	21.8	Achernar	$335^{\circ}19.8$	-57°06.1
										Hamal	327°50.7	23°34.9
6	26°18.3	312°06.5	N20°29.5	217°05.3	N05°29.5	286°50.1	N23°03.0	23°37.8	S01°21.8	Polaris	313°59.5	89°22.0
7	41°20.8	327°06.0	29.9	232°06.4	28.9	301°52.0	03.0	38°40.3	21.8	Acamar	315°11.6	-40°11.8
8	56°23.2	342°05.4	30.3	247°07.4	28.3	316°53.9	02.9	53°42.7	21.8		314°05.8	4°11.5
9	71°25.7	357°04.9	• • 30.7	262°08.5	• • 27.7	331°55.7	• • 02.9	68°45.2	• • 21.8	Menkar		
10	86°28.2	12°04.4	31.1	277°09.6	27.1	346° 57.6	02.9	83°47.7	21.9	Mirfak	308°27.9	49°56.9
	101°30.6							98° 50.2		Aldebaran	290°39.4	16°33.6
11		27°03.8	31.5	292°10.7	26.5	1°59.4	02.8		21.9	Rigel	281°03.7	-8°10.2
12	116°33.1	42°03.3	N20°31.9	307°11.8	N05°25.8	17°01.3	N23°02.8	113°52.7	S01°21.9	Capella	280°21.6	46°01.3
13	131°35.5	57°02.8	32.3	322°12.9	25.2	32°03.2	02.8	128°55.1	21.9	Bellatrix	278°22.7	6°22.4
14	146°38.0	72°02.2	32.7	337°14.0	24.6	47°05.0	02.7	143°57.6	21.9			
15	161°40.5	87°01.7	• • 33.1	$352^{\circ}15.1$	• • 24.0	62°06.9	• • 02.7	159°00.1	• • 22.0	Elnath	278°01.6	28°37.7
16	176°42.9	102°01.2	33.5	7°16.2	23.4	77°08.8	02.7	174°02.6	22.0	Alnilam	275°37.6	$-1^{\circ}11.0$
										Betelgeuse	270°51.9	7°24.8
17	191°45.4	117°00.6	33.9	22°17.2	22.8	92°10.6	02.6	189°05.1	22.0	Canopus	263°52.7	-52°42.4
18	206°47.9	132°00.1	N20°34.3	37° 18.3	N05°22.1	$107^{\circ}12.5$	N23°02.6	204° 07.6	S01°22.0	Sirius	258°26.2	-16°45.0
19	221°50.3	146°59.6	34.7	52° 19.4	21.5	122° 14.3	02.6	$219^{\circ}10.0$	22.0	1		
20	236°52.8	161°59.0	35.1	67°20.5	20.9	$137^{\circ}16.2$	02.5	234°12.5	22.1	Adhara	255°05.9	-29°00.3
21	251°55.3	176° 58.5	35.5	82°21.6	20.3	152° 18.1	02.5	249° 15.0	22.1	Procyon	244°50.7	5°09.6
22	266°57.7	170 58.5 191°58.0	35.9	97°22.7	19.7	167° 19.9	02.5	264° 17.5	22.1	Pollux	243°17.1	27°57.9
										Avior	234°15.2	-59°35.5
23	282°00.2	206° 57.4	36.3	112°23.8	19.1	182°21.8	02.4	279°20.0	22.1	Suhail	222°46.4	-43°32.2
N/a=	νοςς Ω4.1E	1, 0 E/ d0	.4′ m-4.05	1 1/	0.6' m1.56	1 0/ -/ 0	0' m 1 00	1.2 E/ -/0	0′ m0 97	1	221°39.1	
ivier.p	oass. 04:15	ν-υ.5 d0	. <del>4</del> m-4.05	$\nu$ 1.1 $a$ -0	0.0 m1.50	$\nu_{1.9} a-0$	.0′ m-1.90	ν2.5 a0	.0′ m0.87	Miaplacidus		-69°49.4
										Alphard	217°47.6	-8°46.1
Cat.	CHA	CHA	Don	CHA	Doo	CHA	Dee	CHA	Doo	Regulus	207°34.2	11°50.6
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.9	61°37.0
0	297°02.7	221°56.9	N20°36.6	127°24.9	N05° 18.4	197°23.6	N23°02.4	294°22.4	S01°22.1	Denebola	182°24.7	14°25.9
1	312°05.1	236°56.3	37.0	142°26.0	17.8	212°25.5	02.4	309°24.9	22.2	Gienah	175°43.3	-17°41.1
2	327°07.6	251°55.8	37.4	157°27.0	17.2	227°27.4	02.3	324°27.4	22.2		172°59.9	-63°14.7
3	342°10.0	266° 55.3	• • 37.8	172°28.1	• • 16.6	242° 29.2	• • 02.3	339°29.9	• • 22.2			
4	357°12.5	281°54.7	38.2	187°29.2	16.0	257° 31.1	02.3	354°32.4	22.2	1	171°51.4	-57°15.6
										Alioth	$166^{\circ}12.7$	55°49.5
5	12°15.0	296°54.2	38.6	202°30.3	15.4	272°33.0	02.2	9°34.9	22.2	Spica	158°21.9	$-11^{\circ}17.7$
6	27°17.4	311°53.7	N20°39.0	217°31.4	N05° 14.7	287°34.8	N23°02.2	24°37.3	S01°22.3	Alkaid	152°51.6	49°11.4
7	$42^{\circ}19.9$	$326^{\circ}53.1$	39.4	232°32.5	14.1	302°36.7	02.2	39°39.8	22.3	Hadar	148°35.3	-60°30.0
8	57°22.4	341°52.6	39.7	247°33.6	13.5	317°38.5	02.1	54°42.3	22.3			
9	72°24.8	356° 52.0	• • 40.1	262°34.7	. 12.9	332°40.4	02.1	69°44.8	22.3	1	147°57.1	-36°29.9
						347°42.3				Arcturus	145°47.4	19°03.1
10	87°27.3	11°51.5	40.5	277°35.7	12.3		02.1	84°47.3	22.3	Rigil Kent.	139°39.5	-60°56.7
11	102°29.8	26°50.9	40.9	292°36.8	11.6	2°44.1	02.0	99°49.8	22.4	Kochab	$137^{\circ}19.4$	74°03.3
12	117°32.2	41°50.4	N20°41.3	307°37.9	$N05^{\circ}11.0$	17°46.0	N23°02.0	114°52.2	S01°22.4	Zuben'ubi		-16°08.9
13	132°34.7	56°49.9	41.6	322°39.0	10.4	32°47.9	02.0	129°54.7	22.4			
14	147°37.2	71°49.3	42.0	337°40.1	09.8	47°49.7	01.9	144° 57.2	22.4	Alphecca	126°03.2	26°37.9
								159°59.7		Antares	$112^{\circ}15.0$	-26°29.4
15	162°39.6	86°48.8	• • 42.4	352°41.2	• • 09.2	62°51.6	• • 01.9			Atria	107°08.4	-69°04.6
16	177°42.1	101°48.2	42.8	7°42.3	08.6	77°53.4	01.9	175°02.2	22.5	Sabik	102°02.0	-15°45.4
17	192°44.5	116°47.7	43.2	22°43.4	07.9	92°55.3	01.8	190°04.7	22.5	Shaula	96°09.4	-37°07.4
18	207°47.0	131°47.1	N20°43.5	37°44.4	N05°07.3	107°57.2	N23°01.8	205°07.1	S01°22.5			
19	222°49.5	146°46.6	43.9	52°45.5	06.7	122°59.0	01.8	220°09.6	22.5	Rasalhague	95°57.8	12°32.5
	237°51.9	161°46.0		67°46.6		138°00.9		235°12.1		Eltanin	90°41.5	51°29.2
20			44.3		06.1		01.7		22.6	Kaus Aust.	83°31.5	-34°22.4
21	252°54.4	176° 45.5	• • 44.6	82°47.7	•• 05.5	153°02.8	• • 01.7	250° 14.6	• • 22.6	Vega	80°32.5	38°48.5
22	267°56.9	191°44.9	45.0	97°48.8	04.8	168°04.6	01.7	$265^{\circ}17.1$	22.6	Nunki	75°46.8	-26°15.9
23	282°59.3	206°44.4	45.4	112°49.9	04.2	183°06.5	01.6	$280^{\circ}19.6$	22.6		61°59.2	8°56.2
										Altair		
Mer.p	ass. 04:11	$ u$ -0.5 $^{\prime}$ $d$ 0	.4′ m-4.05	$ u 1.1' \ d$ -0	).6′ m1.57	u 1.9' d-0	.0′ m-1.90	$\nu$ 2.5′ d0	.0′ m0.87	Peacock	53°04.4	$-56^{\circ}39.1$
										Deneb	$49^{\circ}25.1$	45°22.2
										Enif	33°38.1	9°59.6
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.0	-46°50.0
0	298°01.8	221°43.8	N20°45.8	$127^{\circ}51.0$	$N05^{\circ}03.6$	198°08.3	N23°01.6	295°22.1	S01°22.6	Fomalhaut	15°13.8	-29°29.0
1	313°04.3	236°43.3	46.1	142°52.1	03.0	213° 10.2	01.6	310°24.5	22.7		13°44.5	
2	328°06.7	251° 42.7	46.5	157°53.1	02.4	228° 12.1	01.5	325°27.0	22.7	Scheat		28°13.2
3	343°09.2	266° 42.2	• • 46.9	172° 54.2	01.7	243°13.9	•• 01.5	340°29.5	• • 22.7	Markab	13°29.2	15°20.6
										1 1 10 5	CLIA	
4	358°11.7	281°41.6	47.2	187°55.3	01.1	258° 15.8	01.5	355°32.0	22.7	Jul 18 Fri	SHA	Mer.pass
5	13°14.1	296°41.1	47.6	202°56.4	05°00.5	273° 17.7	01.4	10°34.5	22.7	Venus		09:12
6	28°16.6	311°40.5	N20°48.0	217°57.5	N04°59.9	$288^{\circ}19.5$	N23°01.4	25°37.0	S01°22.8	Mars	$190^{\circ}55.2$	15:31
7	43°19.0	326° 40.0	48.3	232°58.6	59.3	303°21.4	01.4	40°39.5	22.8	Jupiter	260°35.5	10:52
8	58°21.5	341°39.4	48.7	247°59.7	58.6	318°23.3	01.4	55° 42.0	22.8	Saturn	357°19.4	04:26
										Jatuill	551 19.4	07.20
9	73°24.0	356° 38.9	• • 49.1	263°00.7	• • 58.0	333°25.1	• • 01.3	70°44.4	• • 22.8	Jul 19 Sat	SHA	Mer.pass
10	88°26.4	11°38.3	49.4	278°01.8	57.4	348°27.0	01.3	85°46.9	22.9		284°54.2	09:13
11	103°28.9	26°37.8	49.8	293°02.9	56.8	3°28.8	01.2	100°49.4	22.9			
12	118°31.4	41°37.2	N20°50.1	308°04.0	N04°56.2	18° 30.7	N23°01.2	115°51.9		1	190°22.2	15:29
13	133°33.8	56°36.7	50.5	323°05.1	55.5	33°32.6	01.2	130°54.4	22.9	Jupiter	260°21.0	10:49
										Saturn	$357^{\circ}19.8$	04:22
14	148°36.3	71°36.1	50.9	338°06.2	54.9	48° 34.4	01.1	145°56.9	22.9			
15	163°38.8	86°35.6	• • 51.2	353°07.3	• • 54.3	63°36.3	•• 01.1	160°59.4	• • 23.0	Jul 20 Sun	SHA	Mer.pass
16	178°41.2	101°35.0	51.6	8°08.3	53.7	78°38.2	01.1	$176^{\circ}01.9$	23.0	Venus		09:13
17	193°43.7	116°34.4	51.9	23°09.4	53.1	93°40.0	01.0	191°04.3	23.0	1	189°49.2	15:27
18	208°46.1	131°33.9	N20°52.3	38° 10.5	N04°52.4	108°41.9	N23°01.0	206° 06.8	S01°23.0			
										Jupiter		10:46
19	223°48.6	146°33.3	52.6	53°11.6	51.8	123°43.8	01.0	221°09.3	23.1	Saturn	357°20.3	04:18
20	238°51.1	161°32.8	53.0	68°12.7	51.2	138°45.6	00.9	236°11.8	23.1			
21	253°53.5	176°32.2	• • 53.3	83°13.8	• • 50.6	153°47.5	• • 00.9	251°14.3	• • 23.1	Horizont	al parallax	
22	268°56.0	191°31.6	53.7	98°14.9	50.0	168°49.4	8.00	266° 16.8	23.1		Venus:	0.1
23	283°58.5	206°31.1	54.0	113° 15.9	49.3	183°51.2	00.8	281° 19.3	23.2		Mars:	0.1
25	203 30.3	200 31.1	54.0	113 13.9	79.3	100 01.2	00.0	201 19.3	29.2			
Mern	ass. 04:07	$\nu$ -0.5 $^{\prime}$ d0	.4′ m-4.04	$\nu$ 1 1' d.C	0.6′ m1.57	v1 9' d-0	.0′ m-1.90	v25' d0	.0′ m0.86			
ρ	0	. 0.5 40				0		40				

h	Su	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178°26.3	N21°00.8	273°43.5	10.8'	N12°33.5	15.3'	59.1'
1 2	193°26.2 208°26.2	21°00.3 20°59.9	288°13.4 302°43.1	10.8' 10.7'	12°48.8 13°04.1	15.3' 15.2'	59.1' 59.2'
3	200 20.2 223°26.1	59.5	302 43.1 317°12.8	10.7	13°19.3	15.2 15.1'	59.2'
4	238°26.1	59.0	331°42.4	10.5'	13°34.4	15.1'	59.2'
5	253°26.0	58.6	346°11.9	10.4'	13°49.5	15.0'	59.2'
6 7	268°26.0 283°25.9	N20°58.1 57.7	0°41.3 15°10.7	10.3' 10.3'	N14°04.5 14°19.5	14.9' 14.9'	59.2' 59.2'
8	203 25.9 298°25.9	57.7 57.3	29°39.9	10.3	14 19.5 14°34.3	14.8'	59.2'
9	313°25.9	• • 56.8	44°09.1	10.1'	14°49.1	14.7'	59.2'
10	328°25.8	56.4	58°38.2	10.0'	15°03.9	14.6'	59.2'
11 12	343°25.8 358°25.7	55.9 N20°55.5	73°07.2 87°36.1	9.9' 9.8'	15°18.5 N15°33.1	14.6' 14.5'	59.2' 59.3'
13	13°25.7	55.0	102°04.9	9.7'	15°47.6	14.4'	59.3'
14	28°25.6	54.6	116°33.6	9.6'	16°02.0	14.3'	59.3'
15 16	43°25.6 58°25.5	· · 54.1 53.7	131°02.3 145°30.8	9.5' 9.5'	16°16.3 16°30.5	14.2' 14.2'	59.3' 59.3'
17	73°25.5	53.2	159°59.3	9.5 9.4'	16° 30.5	14.1	59.3'
18	88°25.5	N20°52.8	174°27.6	9.3'	N16°58.7	14.0'	59.3'
19	103°25.4	52.3	188°55.9	9.2'	17°12.7	13.9'	59.3'
20 21	118°25.4 133°25.3	51.9 •• 51.4	203°24.0 217°52.1	9.1' 9.0'	17°26.6 17°40.4	13.8' 13.7'	59.3' 59.3'
22	148°25.3	51.0	232°20.1	9.0 8.9'	17°54.1	13.6'	59.3'
23	163°25.2	50.5	246°48.0	8.8'	$18^{\circ}07.7$	13.5'	59.4'
	SD = 15.7'	d = -0.4'		SE	0 = 16.1'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°25.2 193°25.2	N20°50.1	261°15.7	8.7'	N18°21.1 18°34.5	13.4' 13.3'	59.4'
1 2	193 25.2 208°25.1	49.6 49.1	275°43.4 290°11.0	8.6' 8.5'	18 34.5 18°47.8	13.3	59.4' 59.4'
3	223°25.1	• • 48.7	304°38.4	8.4'	19°01.0	13.1'	59.4'
4	238°25.0	48.2	319°05.8	8.3'	19°14.1	13.0'	59.4'
5 6	253°25.0 268°25.0	47.8 N20°47.3	333°33.1 348°00.2	8.2' 8.1'	19°27.1 N19°39.9	12.9' 12.7'	59.4' 59.4'
7	283°24.9	46.9	2°27.3	8.0'	19°52.7	12.6'	59.4'
8	298°24.9	46.4	16°54.2	7.9'	20°05.3	12.5'	59.4'
9	313°24.8	• • 45.9	31°21.1	7.7'	20°17.8	12.4'	59.4'
10 11	328°24.8 343°24.8	45.5 45.0	45°47.8 60°14.5	7.6' 7.5'	20°30.2 20°42.5	12.3' 12.2'	59.4' 59.4'
12	358°24.7	N20° 44.6	74°41.0	7.4	N20°54.6	12.0'	59.4
13	13°24.7	44.1	89°07.5	7.3'	21°06.7	11.9'	59.4'
14	28°24.6 43°24.6	43.6 •• 43.2	103°33.8 118°00.0	7.2' 7.1'	21°18.6 21°30.4	11.8' 11.7'	59.4' 59.5'
15 16	43 24.0 58°24.6	· · 43.2 42.7	118 00.0 132°26.1	7.1 7.0'	21 30.4 21°42.0	11.7	59.5' 59.5'
17	73°24.5	42.2	146°52.1	6.9'	21°53.5	11.4'	59.5'
18	88°24.5	N20°41.8	161°18.0	6.8'	N22°04.9	11.3'	59.5'
19 20	103°24.4 118°24.4	41.3 40.8	175°43.8 190°09.5	6.7' 6.6'	22°16.2 22°27.3	11.1' 11.0'	59.5' 59.5'
21	133°24.4	• • 40.4	204°35.1	6.5	22°38.3	10.8'	59.5'
22	148°24.3	39.9	219°00.6	6.4'	22°49.2	10.7'	59.5'
23	163°24.3	39.4	233°26.0	6.3'	22°59.9	10.6'	59.5'
	SD = 15.7'	d = -0.5'		SL	0 = 16.2'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178°24.3 193°24.2	N20°39.0 38.5	247°51.3 262°16.5	6.2' 6.1'	N23°10.4 23°20.8	10.4' 10.3'	59.5' 59.5'
2	208°24.2	38.0	276°41.5	6.0'	23°31.1	10.1	59.5'
3	223°24.1	• • 37.6	291°06.5	5.9'	23°41.2	10.0'	59.5'
4 5	238°24.1 253°24.1	37.1 36.6	305°31.4 319°56.2	5.8' 5.7'	23°51.2 24°01.0	9.8' 9.7'	59.5' 59.5'
6	268°24.0	N20°36.1	334°20.8	5.6'	N24°10.7	9.5'	59.5'
7	283°24.0	35.7	348°45.4	5.5'	24°20.2	9.4'	59.5'
8 9	298°24.0 313°23.9	35.2 •• 34.7	3°09.9 17°34.3	5.4' 5.3'	24°29.6 24°38.8	9.2' 9.0'	59.5' 59.5'
10	328°23.9	34.2	31°58.5	5.2'	24° 47.8	8.9'	59.5'
11	343°23.9	33.8	46°22.7	5.1'	24°56.7	8.7'	59.5'
12	358°23.8 13°23.8	N20° 33.3	60°46.8	5.0'	N25°05.4	8.6'	59.5'
13 14	13°23.8 28°23.8	32.8 32.3	75°10.8 89°34.7	4.9' 4.8'	25°14.0 25°22.4	8.4' 8.2'	59.5' 59.5'
15	43°23.7	• • 31.9	103°58.5	4.7'	25°30.6	8.1'	59.5'
16	58°23.7	31.4	118°22.2	4.6'	25°38.7	7.9'	59.5'
17 18	73°23.7 88°23.6	30.9 N20°30.4	132°45.9 147°09.4	4.5' 4.5'	25°46.5 N25°54.3	7.7' 7.5'	59.5' 59.5'
18	103°23.6	29.9	147 09.4 161°32.9	4.5 4.4'	26°01.8	7.5 7.4'	59.5'
20	118°23.6	29.5	175°56.3	4.3'	26°09.2	7.2'	59.5'
21	133°23.5	• • 29.0	190°19.5 204°42.8	4.2'	26°16.3	7.0'	59.5'
22 23	148°23.5 163°23.5	28.5 28.0	204°42.8 219°05.9	4.1' 4.1'	26°23.3 26°30.2	6.8' 6.6'	59.5' 59.5'
23	SD = 15.7'	d = -0.5'			0 = 16.2'	0.0	55.5
		-					

	Twi	light			Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°						
<b>N</b> 70°						
68°	////	////	00:49	23:14	////	////
66°	////	////	01:54	22:15	////	////
64°	////	////	02:28	21:42	////	////
62°	////	01:17	02:53	21:18	22:51	////
$60^{\circ}$	////	01:59	03:12	20:59	22:11	////
N 58°	////	02:26	03:28	20:44	21:44	////
56°	01:10	02:47	03:41	20:30	21:24	22:58
54°	01:49	03:04	03:53	20:19	21:07	22:21
52°	02:14	03:19	04:03	20:09	20:53	21:56
50°	02:34	03:31	04:12	20:00	20:41	21:37
45°	03:10	03:56	04:32	19:41	20:16	21:01
N 40°	03:36	04:16	04:47	19:25	19:57	20:36
35°	03:56	04:31	05:00	19:12	19:41	20:16
30°	04:13	04:45	05:11	19:01	19:28	20:00
20°	04:38	05:07	05:31	18:42	19:06	19:34
N $10^{\circ}$	04:58	05:25	05:47	18:25	18:48	19:14
0°	05:15	05:41	06:03	18:10	18:32	18:58
<b>S</b> 10°	05:30	05:56	06:18	17:55	18:17	18:43
20°	05:44	06:11	06:34	17:39	18:02	18:29
30°	05:58	06:27	06:53	17:20	17:46	18:15
35°	06:05	06:36	07:03	17:09	17:37	18:08
40°	06:13	06:46	07:16	16:57	17:27	18:00
45°	06:21	06:58	07:30	16:43	17:16	17:52
<b>S</b> 50°	06:31	07:11	07:48	16:25	17:02	17:42
52°	06:35	07:17	07:56	16:17	16:56	17:38
54°	06:39	07:24	08:05	16:08	16:49	17:34
56°	06:44	07:31	08:16	15:58	16:42	17:29
58°	06:50	07:40	08:27	15:46	16:34	17:24
<b>S</b> 60°	06:55	07:49	08:41	15:32	16:24	17:18
1-4		Moonris	e		Moonset	<u> </u>
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
N 72°	19:36			16:43		
NI 700	20.20			15.50		

Lat.			Moonris	e		Moonset	:
Lat.		Fri	Sat	Sun	Fri	Sat	Sun
N 72	2°	19:36			16:43		
N 70	)°	20:30			15:52		
68		21:03			15:20		
66		21:27	20:49		14:57	17:30	
64		21:47	21:29		14:39	16:51	
62		22:03	21:57	21:49	14:25	16:24	18:35
60		22:16	22:19	22:27	14:13	16:03	17:58
N 58		22:28	22:37	22:54	14:02	15:46	17:31
56		22:38	22:52	23:15	13:53	15:32	17:11
54		22:47	23:05	23:33	13:45	15:19	16:54
52		22:55	23:16	23:48	13:38	15:08	16:39
50		23:02	23:26	•• ••	13:31	14:59	16:26
45		23:18	23:48		13:17	14:39	16:00
N 40		23:31		00:05	13:06	14:22	15:40
35		23:42		00:20	12:56	14:09	15:22
30		23:51		00:33	12:48	13:57	15:08
20			80:00	00:55	12:34	13:37	14:43
N 10			00:23	01:15	12:21	13:19	14:21
1	)°		00:37	01:33	12:09	13:03	14:01
S 10			00:51	01:51	11:58	12:47	13:41
20		00:05	01:06	02:11	11:45	12:30	13:20
30		00:16	01:24	02:34	11:31	12:10	12:55
35		00:23	01:34	02:47	11:23	11:58	12:41
40		00:30	01:46	03:03	11:14	11:45	12:24
45		00:40	02:00	03:22	11:03	11:30	12:04
<b>S</b> 50		00:50	02:17	03:46	10:50	11:11	11:39
52		00:56	02:25	03:57	10:44	11:02	11:28
54		01:01	02:34	04:10	10:38	10:52	11:14
56		01:08	02:45	04:25	10:30	10:41	10:58
58		01:15	02:57	04:43	10:22	10:28	10:40
<b>S</b> 60	ງັ	01:23	03:10	05:05	10:13	10:14	10:17

	Sun M			Moon	oon		
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	50-28%	
18	06:15	06:17	12:06	05:57	18:23		
19	06:19	06:21	12:06	06:50	19:18		
20	06:23	06:25	12:06	07:47	20:17		

July 21, 22, 23 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	299°00.9	221°30.5	N20° 54.4	128°17.0	N04°48.7	198°53.1	N23°00.8	296°21.8	S01°23.2			
1	314°03.4	236°30.0	54.7	143°18.1	48.1	213°54.9	00.7	311°24.3	23.2	Alpheratz	357°34.1	29°13.8
2	329°05.9	251°29.4	55.1	158°19.2	47.5	228°56.8	00.7	326°26.7	23.2	Ankaa	353°06.5	-42°09.7
3	344°08.3	266°28.8	55.4	173°20.3	46.9	243°58.7	00.7	341°29.2	23.2	Schedar	349°30.4	56°40.4
4	359°10.8	281°28.3	55.8	188°21.4	46.2	259°00.5	00.6	356°31.7	23.3	Diphda	348°46.7	-17°50.6
5	14°13.3	296°27.7	56.1	203°22.4	45.6	274°02.4	00.6	11°34.2	23.3	Achernar	335°19.8	-57°06.1 23°34.9
6	29°15.7	311°27.2	N20° 56.5	218°23.5	N04°45.0	289°04.3	N23°00.6	26°36.7	S01°23.3	Hamal Polaris	327°50.7 313°57.7	23 34.9 89°22.0
7	44°18.2	326°26.6	56.8	233°24.6	44.4	304°06.1	00.5	41°39.2	23.3	Acamar	315°11.5	-40°11.8
8	59°20.6	341°26.0	57.2	248°25.7	43.7	319°08.0	00.5	56°41.7	23.4	Menkar	314°05.8	4° 11.5
9	74°23.1	356°25.5	• • 57.5	263°26.8	• • 43.1	334°09.9	• • 00.5	71°44.2	• • 23.4	Mirfak	308°27.8	49° 56.9
10	89°25.6	11°24.9	57.8	278°27.9	42.5	349°11.7	00.4	86°46.7	23.4	Aldebaran	290°39.3	16°33.6
11	104°28.0	26°24.3	58.2	293°29.0	41.9	4°13.6	00.4	101°49.2	23.4	Rigel	281°03.7	-8°10.2
12	119°30.5	41°23.8	N20° 58.5	308°30.0	N04°41.3	19°15.5	N23°00.4	116°51.7		Capella	$280^{\circ}21.6$	46°01.3
13 14	134°33.0 149°35.4	56°23.2 71°22.6	58.9 59.2	323°31.1 338°32.2	40.6 40.0	34°17.3 49°19.2	00.3 00.3	131°54.2 146°56.6	23.5 23.5	Bellatrix	278°22.7	6°22.4
15	164°37.9	86°22.1	59.5	353°33.3	• • 39.4	64°21.1	00.2	140 50.0 161°59.1	. 23.5	Elnath	278°01.6	28° 37.7
16	179°40.4	101°21.5	20°59.9	8°34.4	38.8	79°22.9	00.2	177°01.6	23.6	Alnilam	275°37.5	-1°11.0
17	194°42.8	116°20.9	21°00.2	23°35.5	38.1	94°24.8	00.2	192°04.1	23.6	Betelgeuse	270°51.9	7°24.8
18	209°45.3	131°20.4	N21°00.5	38°36.5	N04°37.5	109°26.7	N23°00.1	207°06.6	S01°23.6	Canopus	263°52.7	-52°42.4
19	224°47.8	$146^{\circ}19.8$	00.9	53°37.6	36.9	124°28.5	00.1	222°09.1	23.6	Sirius	258°26.2	-16°45.0 -29°00.3
20	$239^{\circ}50.2$	161°19.2	01.2	68°38.7	36.3	139°30.4	00.1	$237^{\circ}11.6$	23.7	Adhara Procyon	255°05.9 244°50.7	-29°00.3 5°09.6
21	254°52.7	176°18.7	•• 01.5	83°39.8	• • 35.7	154°32.3	• • 00.0	252°14.1	• • 23.7	Procyon	244 50.7 243°17.1	5 09.6 27°57.9
22	269°55.1	191°18.1	01.9	98°40.9	35.0	169°34.1	0.00	267°16.6	23.7	Avior	234° 15.2	-59°35.4
23	284°57.6	206°17.5	02.2	113°42.0	34.4	184°36.0	00.0	282°19.1	23.7	Suhail	222°46.4	-43°32.2
Mer.n	ass. 04:03	$\nu$ -0.6' d0	.3′ m-4.04	$\nu 1.1' \ d-0$	.6′ m1.57	$\nu 1.9' \ d-0$	.0′ m-1.90	$\nu 2.5' d0$	.0′ m0.86	Miaplacidus	221°39.1	-69°49.4
										Alphard	217°47.6	-8°46.1
т	CIIA	CHA	D	CHA	D	CIIA	D	CHA	D	Regulus	207°34.2	11°50.6
Tue 0	<b>GHA</b> 300°00.1	<b>GHA</b> 221°16.9	<b>Dec</b> N21°02.5	<b>GHA</b> 128°43.0	<b>Dec</b> N04°33.8	<b>GHA</b> 199°37.9	<b>Dec</b> N22°59.9	<b>GHA</b> 297°21.6	<b>Dec</b> <b>S</b> 01°23.8	Dubhe	193°40.9	61°37.0
1	300 00.1 315°02.5	221 16.9 236°16.4	02.9	128 43.0 143°44.1	33.2	199 37.9 214°39.7	N22 59.9 59.9	312°24.1	23.8	Denebola	182°24.7	14°25.9
2	330°05.0	251°15.8	03.2	158°45.2	32.5	229°41.6	59.9	327°26.6	23.8	Gienah	175°43.3	-17°41.1
3	345°07.5	266°15.2	03.5	173°46.3	31.9	244°43.5	• • 59.8	342°29.1	23.8		172°59.9	-63°14.7
4	0°09.9	281°14.7	03.8	188°47.4	31.3	259°45.3	59.8	357°31.5	23.9		171°51.4	-57°15.6
5	15°12.4	296°14.1	04.2	203°48.4	30.7	274°47.2	59.8	12°34.0	23.9	Alioth	166°12.7	55°49.5
6	30°14.9	311°13.5	N21°04.5	218°49.5	N04°30.0	289°49.1	N22°59.7	27°36.5	S01°23.9	Spica Alkaid	158°21.9 152°51.6	-11° 17.7 49° 11.4
7	45°17.3	$326^{\circ}12.9$	04.8	233°50.6	29.4	304°50.9	59.7	42°39.0	23.9	Hadar	132 31.0 148°35.3	-60°30.0
8	60°19.8	341°12.4	05.1	248°51.7	28.8	319°52.8	59.6	57°41.5	24.0		140°57.1	-36° 29.9
9	75°22.3	$356^{\circ}11.8$	• • 05.5	263°52.8	• • 28.2	334°54.7	• • 59.6	72°44.0	• • 24.0	Arcturus	145°47.5	19°03.1
10	90°24.7	11°11.2	05.8	278°53.9	27.6	349°56.5	59.6	87°46.5	24.0	Rigil Kent.	139°39.6	-60° 56.7
11	105°27.2	26°10.6	06.1	293°54.9	26.9	4°58.4	59.5	102°49.0	24.0	Kochab	$137^{\circ}19.5$	74°03.3
12	120°29.6	41°10.1	N21°06.4	308°56.0	N04°26.3	20°00.3	N22°59.5	117°51.5	S01°24.1	Zuben'ubi	$136^{\circ}55.4$	-16°08.9
13 14	135°32.1 150°34.6	56°09.5 71°08.9	06.7 07.1	323°57.1 338°58.2	25.7 25.1	35°02.1 50°04.0	59.5 59.4	132°54.0 147°56.5	24.1 24.1	Alphecca	126°03.2	26°37.9
15	165°37.0	86°08.3	07.1	353°59.3	24.4	65°05.9	• • 59.4	162°59.0	. 24.1	Antares	112°15.0	-26°29.4
16	180°39.5	101°07.8	07.4	9°00.3	23.8	80°07.7	59.4	102 59.0 178°01.5	24.1	Atria	107°08.4	-69°04.6
17	195°42.0	116°07.2	08.0	24°01.4	23.2	95°09.6	59.3	193°04.0	24.2	Sabik	102°02.0	-15°45.4
18	210°44.4	131°06.6	N21°08.3	39°02.5	N04°22.6	110°11.5	N22°59.3	208°06.5	S01°24.2	Shaula	96°09.4	-37°07.4
19	225°46.9	146°06.0	08.6	54°03.6	21.9	125°13.3	59.2	223°09.0	24.2	Rasalhague	95°57.8	12°32.6
20	240°49.4	161°05.4	08.9	69°04.7	21.3	140°15.2	59.2	238°11.5	24.3	Eltanin Kaus Aust.	90°41.5 83°31.5	51°29.2 -34°22.4
21	255°51.8	176°04.9	• • 09.3	84°05.8	• • 20.7	$155^{\circ}17.1$	• • 59.2	253°14.0	• • 24.3	Vega	80°32.5	38°48.5
22	270°54.3	191°04.3	09.6	99°06.8	20.1	170°18.9	59.1	$268^{\circ}16.5$	24.3	Nunki	75°46.8	-26°15.9
23	285°56.8	206°03.7	09.9	114°07.9	19.4	$185^{\circ}20.8$	59.1	283°19.0	24.3	Altair	61°59.2	8°56.2
Mer n	ass. 03:59	$\nu$ -0.6' d0	.3′ m-4.04	$\nu 1.1' d-0$	.6′ m1.58	v1 9' d-0	.0′ m-1.90	$v^{2} 5' d0$	.0′ m0.85	Peacock	53°04.4	-56°39.1
		- 0.0 40								Deneb	49°25.0	45°22.3
	G11.4	6114	_	6114	-	6114	_	6114	_	Enif	$33^{\circ}38.1$	9°59.6
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.9	-46°50.0
0 1	300°59.2 316°01.7	221°03.1 236°02.5	N21° 10.2 10.5	129°09.0 144°10.1	N04°18.8 18.2	200°22.7 215°24.5	N22°59.1 59.0	298°21.5 313°24.0	S01°24.4 24.4	Fomalhaut	15°13.7	-29°29.0
2	310 01.7 331°04.1	250 02.5 251°02.0	10.5	144 10.1 159°11.2	17.6	215 24.5 230°26.4	59.0 59.0	313 24.0 328°26.5	24.4	Scheat	13°44.5	28° 13.2
3	346°06.6	266°01.4	11.1	174°12.2	. 16.9	245°28.3	• • 59.0	343°29.0	• • 24.4	Markab	13°29.2	15°20.6
4	1°09.1	281°00.8	11.4	189°13.3	16.3	260°30.1	58.9	358°31.5	24.5	Jul 21 Mon	SHA	Mer.pass
5	16°11.5	296°00.2	11.7	204°14.4	15.7	275°32.0	58.9	13°34.0	24.5		282°29.6	09:14
6	31°14.0	310°59.6	N21°12.0		N04°15.1	290°33.9	N22°58.8	28°36.5	S01°24.5	Mars	$189^{\circ}16.1$	15:26
7	$46^{\circ}16.5$	$325^{\circ}59.0$	12.3	$234^{\circ}16.6$	14.4	305°35.7	58.8	43°39.0	24.6	Jupiter		10:43
8	61°18.9	340°58.5	12.6	249°17.6	13.8	320°37.6	58.8	58°41.5	24.6	Saturn	357°20.8	04:14
9	76°21.4	355°57.9	• • 12.9	264°18.7	• • 13.2	335°39.5	• • 58.7	73°44.0	• • 24.6	Jul 22 Tue	SHA	Mer.pass
10	91°23.9	10°57.3	13.2	279°19.8	12.6	350°41.3	58.7	88°46.5	24.6		281°16.9	09:15
11	106°26.3	25°56.7	13.5	294°20.9	11.9	5°43.2	58.7	103°48.9	24.7		188°43.0	15:24
12	121°28.8	40°56.1	N21°13.8	309°22.0	N04°11.3 10.7	20°45.1	N22°58.6	118°51.4	S01°24.7		259°37.8	10:40
13 14	136°31.3 151°33.7	55°55.5 70°54.9	14.1 14.4	324°23.0 339°24.1	10.7	35°47.0 50°48.8	58.6 58.6	133°53.9 148°56.4	24.7 24.7		$357^{\circ}21.5$	04:10
15	166°36.2	70 54.9 85°54.4	. 14.4	354°25.2	09.4	65°50.7	58.5	146 50.4 163°58.9	• • 24.8	Jul 23 Wed	SHA	Mer pass
16	181°38.6	100°53.8	15.0	9°26.3	08.8	80°52.6	58.5	103 56.9 179°01.4	24.8		280°03.9	Mer.pass 09:16
17	196°41.1	115°53.2	15.3	24°27.4	08.2	95°54.4	58.4	194°03.9	24.8		280 03.9 188°09.8	15:22
18	211°43.6	130°52.6	N21° 15.6	39°28.4	N04°07.5	110°56.3	N22°58.4	209°06.4			259°23.4	10:37
19	226°46.0	$145^{\circ}52.0$	15.9	54°29.5	06.9	125°58.2	58.4	224°08.9	24.9		357°22.2	04:06
20	241°48.5	$160^{\circ}51.4$	16.2	69°30.6	06.3	141°00.0	58.3	239°11.4	24.9			
21	256°51.0	175°50.8	• • 16.4	84°31.7	• • 05.7	156°01.9	• • 58.3	254°14.0	• • 24.9	Horizont	al parallax	2.1
22	271°53.4	190°50.2	16.7	99°32.8	05.0	171°03.8	58.3	269°16.5	25.0		Venus:	0.1
23	286°55.9	205°49.6	17.0	114°33.8	04.4	186°05.6	58.2	284°19.0	25.0		Mars:	0.1
Mer.p	ass. 03:55	$\nu$ -0.6 $^{\prime}$ d0	.3′ m-4.03	$\nu$ 1.1′ d-0	.6′ m1.58	$\nu 1.9' \ d-0$	.0′ m-1.91	$\nu$ 2.5′ d0.	.0′ m0.85			

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°23.4	N20°27.5	233°29.0	4.0'	N26°36.8	6.5	59.5'
1	193°23.4	27.0	247°51.9	3.9'	26°43.3	6.3'	59.5'
2	208°23.4	26.6	262°14.9	3.8'	26°49.6	6.1'	59.5'
3	223°23.4	• • 26.1	276°37.7	3.8'	26°55.7	5.9'	59.5'
4	238°23.3	25.6	291°00.5	3.7'	27°01.6	5.7'	59.5'
5 6	253°23.3 268°23.3	25.1 N20°24.6	305°23.2 319°45.8	3.6' 3.6'	27°07.3 N27°12.9	5.5' 5.4'	59.5' 59.5'
7	283°23.2	24.1	319 45.6 334°08.4	3.5'	27° 18.2	5.4 5.2'	59.5'
8	298°23.2	23.6	348°30.9	3.5'	27° 23.4	5.0'	59.5'
9	313°23.2	23.2	2°53.4	3.4'	27°28.3	4.8'	59.5'
10	328°23.1	22.7	17°15.8	3.3'	27°33.1	4.6'	59.5'
11	343°23.1	22.2	31°38.1	3.3'	27°37.7	4.4'	59.5'
12	358°23.1	N20°21.7	46°00.4	3.3'	N27°42.1	4.2'	59.4'
13	13°23.1	21.2	60°22.7	3.2'	27°46.3	4.0'	59.4
14 15	28°23.0 43°23.0	20.7	74°44.9 89°07.0	3.2' 3.1'	27°50.3 27°54.1	3.8' 3.6'	59.4' 59.4'
16	58°23.0	19.7	103°29.2	3.1'	27°57.7	3.4	59.4'
17	73°23.0	19.2	117°51.2	3.0'	28°01.2	3.2'	59.4
18	88°22.9	N20° 18.7	132°13.3	3.0'	N28°04.4	3.0'	59.4'
19	103°22.9	18.2	146°35.3	3.0'	28°07.4	2.8'	59.4'
20	118°22.9	17.7	160°57.3	3.0'	28°10.2	2.6'	59.4'
21	133°22.8	• • 17.2	175°19.2	2.9'	28° 12.8	2.4'	59.4'
22	148°22.8	16.7	189°41.2	2.9'	28°15.3	2.2'	59.4
23	163°22.8	16.2	204°03.1	2.9'	28° 17.5	2.0'	59.4'
	SD = 15.7'	d = -0.5'		SI	D = 16.2'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°22.8	N20° 15.8	218°25.0	2.9'	N28° 19.5	1.8'	59.4
1	193°22.7	15.3	232°46.9	2.9'	28°21.3	1.6'	59.4'
2	208°22.7	14.8	247°08.7	2.9'	28°23.0	1.4'	59.3'
3	223°22.7	• • 14.3	261°30.6	2.9'	28°24.4	1.2'	59.3'
4	238°22.7	13.8	275°52.4	2.8'	28°25.6	1.0'	59.3'
5	253°22.6 268°22.6	13.3 N20°12.8	290°14.3 304°36.1	2.8'	28°26.6 N28°27.4	0.8'	59.3' 59.3'
6 7	283°22.6	12.3	318°58.0	2.0	28°28.0	0.6	59.3'
8	298°22.6	11.7	333°19.8	2.9'	28°28.5	0.4	59.3'
9	313°22.6	• • 11.2	347°41.7	2.9'	28°28.7	0.0'	59.3'
10	328°22.5	10.7	2°03.6	2.9'	28°28.7	-0.2'	59.3'
11	343°22.5	10.2	16°25.5	2.9'	28°28.5	-0.4'	59.3'
12	358°22.5	N20°09.7	30°47.4	2.9'	N28°28.1	-0.6'	59.2'
13	13°22.5 28°22.4	09.2	45°09.3 59°31.2	2.9'	28°27.5 28°26.7	-0.8'	59.2'
14 15	28 22.4 43°22.4	08.7 •• 08.2	73°53.2	3.0' 3.0'	28°25.7	-1.0' -1.2'	59.2' 59.2'
16	58°22.4	07.7	88°15.2	3.0'	28° 24.5	-1.4'	59.2'
17	73°22.4	07.2	102°37.3	3.1'	28°23.1	-1.6'	59.2'
18	88°22.4	N20°06.7	116°59.3	3.1'	N28°21.5	-1.8'	59.2'
19	103°22.3	06.2	131°21.4	3.1'	28° 19.8	-2.0'	59.2'
20	118°22.3	05.7	145°43.6	3.2'	28° 17.8	-2.2'	59.1'
21 22	133°22.3 148°22.3	· · 05.2 04.7	160°05.8 174°28.0	3.2' 3.3'	28°15.6 28°13.2	-2.4' -2.6'	59.1' 59.1'
23	146 22.3 163°22.3	04.7	174 20.0 188°50.3	3.3'	28°10.6	-2.8'	59.1'
	SD = 15.7'	d = -0.5'			D = 16.2'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d 2.0'	HP
0 1	178°22.2 193°22.2	N20°03.6 03.1	203°12.6 217°35.0	3.4' 3.4'	N28°07.9 28°04.9	-3.0' -3.2'	59.1' 59.1'
2	208°22.2	02.6	217 55.0 231°57.5	3.5'	28°01.8	-3.2' -3.3'	59.1
3	223°22.2	02.1	246°20.0	3.6'	27°58.4	-3.5'	59.0'
4	238°22.2	01.6	260°42.5	3.6'	27°54.9	-3.7'	59.0'
5	253°22.1	01.1	275°05.2	3.7'	27°51.2	-3.9'	59.0'
6	268°22.1	N20°00.5	289°27.9	3.8'	N27°47.2	-4.1'	59.0'
7	283°22.1	20°00.0	303°50.6	3.8'	27°43.1	-4.3'	59.0'
8 9	298°22.1 313°22.1	19°59.5 •• 59.0	318°13.5 332°36.4	3.9' 4.0'	27°38.9 27°34.4	-4.5' -4.7'	58.9' 58.9'
10	313 22.1 328°22.1	58.5	332 30.4 346°59.4	4.0 4.1'	27°34.4 27°29.7	-4. <i>1</i> '	58.9'
11	343°22.0	58.0	1°22.5	4.2'	27°24.9	-5.0'	58.9'
12	358°22.0	N19°57.4	15°45.6	4.2'	N27°19.9	-5.2'	58.9'
13	13°22.0	56.9	30°08.8	4.3'	27° 14.7	-5.4'	58.9'
14	28°22.0	56.4	44°32.2	4.4'	27°09.3	-5.6'	58.8'
15	43°22.0	• • 55.9	58°55.6	4.5'	27°03.7	-5.7'	58.8'
16 17	58°22.0 73°21.9	55.4 54.8	73°19.1 87°42.6	4.6' 4.7'	26°58.0 26°52.1	-5.9' -6.1'	58.8' 58.8'
18	73 21.9 88°21.9	54.8 N19°54.3	102°06.3	4.7	26 52.1 N26°46.0	-6.3	58.8'
19	103°21.9	53.8	102 00.3 116°30.1	4.9	26°39.7	-6.4'	58.7
20	118°21.9	53.3	130°54.0	5.0'	26°33.3	-6.6'	58.7'
21	133°21.9	• • 52.7	145°17.9	5.1'	26°26.7	-6.8'	58.7'
22	148°21.9	52.2	159°42.0	5.2'	26°20.0	-6.9'	58.7'
23	163°21.9	51.7	174°06.2	5.3'	26°13.0	-7.1'	58.7'
	SD = 15.7'	d = -0.5'		SI	D = 16.1'		

			2025	5 July 2	21 to Ju	ul. 23
Lat.	<b>Twi</b> Naut.	light Civil	Sunrise	Sunset	<b>Twi</b> Civil	light Naut.
N 72°						
<b>N</b> 70°						
68°	7///	7///	01:16	22:51	7///	7///
66°	<i>                                   </i>	7///	02:06	22:03	7777	////
64°	////	////	02:37	21:33	////	////
62°	////	01:32	03:00	21:11	22:37	////
60°	////	02:09	03:18	20:53	22:02	////
<b>N</b> 58°	////	02:34	03:34	20:38	21:37	////
56°	01:24	02:54	03:46	20:25	21:18	22:45
54°	01:58	03:10	03:58	20:14	21:02	22:13
52°	02:21	03:24	04:07	20:05	20:48	21:50
50°	02:40	03:35	04:16	19:56	20:37	21:32
45°	03:15	04:00	04:35	19:38	20:13	20:57
<b>N</b> 40°	03:39	04:18	04:50	19:23	19:54	20:33
35°	03:59	04:34	05:02	19:10	19:39	20:14
30°	04:15	04:47	05:13	18:59	19:26	19:58
20°	04:40	05:08	05:32	18:41	19:05	19:33
N 10°	04:59	05:25	05:48	18:25	18:47	19:14
0°	05:15	05:41	06:03	18:10	18:32	18:58
<b>S</b> 10°	05:30	05:55	06:18	17:55	18:18	18:43
20°	05:43	06:10	06:33	17:40	18:03	18:30
30°	05:57	06:26	06:51	17:22	17:47	18:17
35°	06:04	06:34	07:02	17:12	17:39	18:10
40°	06:11	06:44	07:14	17:00	17:29	18:02 17:54
45°	06:19	06:55	07:27	16:46	17:18	
<b>S</b> 50°	06:28	07:08	07:44	16:29	17:05	17:45
52° 54°	06:32	07:14	07:52	16:21	17:00	17:41
56°	06:36 06:41	07:20 07:28	08:01 08:11	16:12	16:53	17:37 17:33
58°	06:41	07:26	08:23	16:02 15:51	16:46 16:38	17:33
<b>S</b> 60°	06:51	07:44	08:36	15:38	16:30	17:22
Lat.	١	Moonris			Moonset	
	Mon	Tue	Wed	Mon	Tue	Wed
N 72°						
N 70°						
68°						
66°						
64°						21.52
62°	22.52	23-50		10.44	20.50	21:52
60°	22:52	23:59		19:44	20:50	21:14
N 58°	23:29		00:36	19:07	20:13	20:48
56°	23:56		01:03	18:40	19:46	20:26
54° 52°		00:17	01:24 01:41	18:19	19:25 19:08	20:09 19:54
52°	00:01	00:35 00:50	01:41	18:02 17:47	18:53	19:54
45°	00:01	01:20	02:26	17:17	18:22	19:41
N 40°	00:28	01:44				
35°	00:49	01:44	02:49 03:09	16:53 16:34	17:59 17:39	18:52 18:35
30°	01:07	02:04	03:09	16:34	17:39 17:22	18:35
20°	01:23	02:20	03:25	15:49	16:54	17:53
N 10°	02:12	03:13	03.33	15:25	16:29	17:30
0°	02:33	03:36	04:39	15:03	16:07	17:09
<b>S</b> 10°	02:55	03:59	05:02	14:41	15:44	16:47
20°	02.55	03.39	05:02	14:41	15:44	16:24
200	03.10	04.53	05.20	12:40	14.50	15.57

		Sun		Moon			
Day	Eqn.of	Eqn.of 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	18-4%	
21	06:26	06:28	12:06	08:48	21:20		
22	06:29	06:30	12:07	09:51	22:23		
23	06:31	06:32	12:07	10:54	23:25		

06:10

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06:52

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08:13

08:38

09:12

04:52

05:10

05:29

05:54

06:25

06:41

06:59

07:21

07:50

30°

35°

40°

45°

 $52^{\circ}$ 

54°

56°

 $58^{\circ}$ 

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

03:45

04:01

04:19

04:42

05:11

05:25

05:42

06:02

06:26

13:49

13:32

13:13

12:50

12:20

12:06

11:49

11:29

11:04

14:50

14:33

14:13

13:49

13:18

13:02

12:44

12:22

11:53

15:57

15:42

15:23

15:00

14:31

14:17

14:01

13:41

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

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Thu -	CHA	CHA	Das	CHA	Doo	CHA	Das	CHA	Doo		CHA	Dos
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	301°58.4	220°49.1	N21°17.3	129°34.9	N04°03.8	201°07.5	N22°58.2	299°21.5	S01°25.0	Alpheratz	357°34.1	29°13.8
1	317°00.8	235°48.5	17.6	144°36.0	03.2	216°09.4	58.1	314°24.0	25.0	Ankaa	353°06.5	-42°09.7
2	332°03.3	250°47.9	17.9	159°37.1	02.5	231°11.3	58.1	329°26.5	25.1	Schedar	349°30.3	56°40.5
3	347°05.8	265°47.3	• • 18.2	174°38.1	• • 01.9	$246^{\circ}13.1$	•• 58.1	344°29.0	• • 25.1	Diphda	348°46.7	-17°50.6
4	2°08.2	280°46.7	18.5	189°39.2	01.3	$261^{\circ}15.0$	58.0	359°31.5	25.1			-57°06.1
5	17°10.7	295°46.1	18.7	204°40.3	00.6	$276^{\circ}16.9$	58.0	14°34.0	25.2	Achernar	335°19.8	
6	32°13.1	310°45.5	N21°19.0	219°41.4	N04°00.0	291°18.7	N22°58.0	29°36.5	S01°25.2	Hamal	327°50.7	23°35.0
7	47°15.6	325°44.9	19.3	234°42.5	03°59.4	306° 20.6	57.9	44°39.0	25.2	Polaris	313°56.0	89°22.0
8	62°18.1	340°44.3	19.6	249°43.5	58.8	321°22.5	57.9	59°41.5	25.2	Acamar	$315^{\circ}11.5$	-40°11.8
9	77°20.5	355°43.7	19.9	264° 44.6	• • 58.1	336°24.3	• • 57.8	74°44.0	25.3	Menkar	314°05.7	4°11.5
	92°23.0	10°43.1		279° 45.7				89°46.5		Mirfak	308°27.8	49°56.9
10			20.1		57.5	351°26.2	57.8		25.3	Aldebaran	290°39.3	16°33.7
11	107°25.5	25° 42.5	20.4	294°46.8	56.9	6°28.1	57.8	104°49.0	25.3	Rigel	281°03.7	-8°10.2
12	122°27.9	40°41.9	N21°20.7	309°47.9	N03°56.3	21°30.0	N22°57.7	119°51.5	S01°25.4	Capella	280°21.6	46°01.3
13	137°30.4	55°41.3	21.0	324°48.9	55.6	36°31.8	57.7	134°54.0	25.4	Bellatrix	278°22.6	6°22.4
14	152°32.9	70°40.7	21.2	339°50.0	55.0	51°33.7	57.7	149°56.5	25.4	Elnath	278°01.6	28°37.7
15	167°35.3	85°40.1	· · 21.5	354°51.1	• • 54.4	66° 35.6	• • 57.6	164°59.0	• • 25.4	1		
16	182°37.8	100°39.5	21.8	9°52.2	53.7	81°37.4	57.6	180°01.5	25.5	Alnilam	275°37.5	-1°11.0
17	197°40.3	115°38.9	22.1	24°53.2	53.1	96° 39.3	57.5	195°04.0	25.5	Betelgeuse	270°51.9	7°24.8
18	212°42.7	130°38.3	N21°22.3	39°54.3	N03°52.5	111°41.2	N22°57.5	210°06.5	S01°25.5	Canopus	263°52.7	-52°42.3
	227°45.2	145°37.7		54°55.4	51.9	126°43.1		225°09.0		Sirius	258°26.2	-16°44.9
19	242°47.6		22.6			120 43.1 141°44.9	57.5	240°11.5	25.6	Adhara	255°05.9	-29°00.3
20		160°37.1	22.9	69°56.5	51.2		57.4		25.6	Procyon	244°50.7	5°09.6
21	257°50.1	175°36.6	· · 23.1	84°57.5	• • 50.6	156° 46.8	• • 57.4	255°14.0	• • 25.6	Pollux	243°17.1	27°57.9
22	272°52.6	190°36.0	23.4	99°58.6	50.0	171°48.7	57.4	270° 16.5	25.7	Avior	234°15.2	-59°35.4
23	287°55.0	205°35.4	23.7	114°59.7	49.3	186°50.5	57.3	285° 19.0	25.7	Suhail	222°46.4	-43°32.1
N 4 = ··	255 N2.F1	., 0.6/ -10	2/ m 4.02	,,1 1/ -/ 0	6/ -1 -0	,,10/ -10	0/ m 1 01	10 E/ -10	0/ 200	1		
ivier.p	ass. 03:51	ν-υ.υ΄ d0	.3′ m-4.03	$\nu$ 1.1 d-0	0.6′ m1.58	$\nu_{1.9}$ d-0	.0′ m-1.91	ν2.5' d0	.0′ m0.84	Miaplacidus	221°39.1	-69°49.4
										Alphard	217°47.6	-8°46.1
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.2	11°50.6
0	302°57.5	220°34.8	N21°23.9	130°00.8	N03°48.7	201°52.4	N22°57.3	300°21.5	S01°25.7	Dubhe	193°40.9	61°37.0
										Denebola	182°24.7	14°25.9
1	318°00.0	235°34.1	24.2	145°01.9	48.1	216°54.3	57.2	315°24.0	25.7	Gienah	175°43.3	-17°41.1
2	333°02.4	250° 33.5	24.5	160°02.9	47.5	231°56.1	57.2	330°26.5	25.8	Acrux	172°59.9	-63°14.7
3	348°04.9	265°32.9	• • 24.7	175°04.0	• • 46.8	$246^{\circ}58.0$	• • 57.2	345°29.0	• • 25.8		171°51.4	-57°15.6
4	3°07.4	280°32.3	25.0	$190^{\circ}05.1$	46.2	261°59.9	57.1	0°31.6	25.8	Alioth	166°12.7	55°49.5
5	$18^{\circ}09.8$	295°31.7	25.2	205°06.2	45.6	277°01.8	57.1	15°34.1	25.9			-11°17.7
6	33°12.3	310°31.1	N21°25.5	220°07.2	N03°44.9	292°03.6	N22°57.0	30°36.6	S01°25.9	Spica	158°21.9	
7	48°14.7	325° 30.5	25.8	235°08.3	44.3	307°05.5	57.0	45°39.1	25.9	Alkaid	152°51.6	49°11.4
8	63°17.2	340°29.9		250°09.4	43.7	322°07.4		60°41.6		Hadar	148°35.4	-60°30.0
			26.0				57.0		26.0	Menkent	$147^{\circ}57.1$	-36°29.9
9	78°19.7	355°29.3	26.3	265° 10.5	• • 43.0	337°09.3	• • 56.9	75°44.1	• • 26.0	Arcturus	145°47.5	19°03.1
10	93°22.1	10°28.7	26.5	280°11.5	42.4	352°11.1	56.9	90°46.6	26.0	Rigil Kent.	139°39.6	-60°56.7
11	108°24.6	$25^{\circ}28.1$	26.8	295°12.6	41.8	7°13.0	56.9	105°49.1	26.0	Kochab	137°19.5	74°03.3
12	123°27.1	40°27.5	N21°27.0	$310^{\circ}13.7$	N03°41.2	22°14.9	N22°56.8	120°51.6	S01°26.1	Zuben'ubi	136°55.4	-16°08.9
13	138°29.5	55°26.9	27.3	325°14.8	40.5	$37^{\circ}16.7$	56.8	135°54.1	26.1	I		
14	153°32.0	70°26.3	27.5	340°15.8	39.9	52° 18.6	56.7	150° 56.6	26.1	Alphecca	126°03.2	26°37.9
15	168°34.5	85° 25.7	27.8	355° 16.9	39.3	67° 20.5	56.7	165°59.1	26.2	Antares	112°15.0	-26°29.4
16	183°36.9	100°25.1	28.0	10° 18.0	38.6	82°22.4	56.7	181°01.6	26.2	Atria	107°08.4	-69°04.6
		115°24.5								Sabik	$102^{\circ}02.0$	-15°45.4
17	198°39.4		28.3	25°19.1	38.0	97°24.2	56.6	196°04.1	26.2	Shaula	96°09.4	-37°07.4
18	213°41.9	130°23.9	N21°28.5	40°20.2	N03°37.4	112°26.1	N22°56.6		S01°26.3	Rasalhague	95°57.8	12°32.6
19	228°44.3	145°23.3	28.8	55°21.2	36.7	127°28.0	56.6	226°09.2	26.3	Eltanin	90°41.5	51°29.2
20	243°46.8	160°22.7	29.0	70°22.3	36.1	142°29.8	56.5	241°11.7	26.3	Kaus Aust.	83°31.5	-34°22.4
21	258°49.2	$175^{\circ}22.1$	• • 29.3	85°23.4	• • 35.5	157°31.7	• • 56.5	256° 14.2	• • 26.3	Vega	80°32.5	38°48.5
22	273°51.7	$190^{\circ}21.4$	29.5	100°24.5	34.9	172°33.6	56.4	271°16.7	26.4	_		
23	288°54.2	205°20.8	29.8	115°25.5	34.2	187° 35.5	56.4	286° 19.2	26.4	Nunki	75°46.8	-26°15.9
										Altair	61°59.2	8°56.2
Mer.p	ass. 03:48	$\nu$ -0.6' d0	.3′ m-4.03	$\nu 1.1' d-0$	0.6'  m 1.59	$\nu 1.9' \ d-0$	.0' m-1.91	$\nu 2.5' \ d0$	.0′ m0.84	Peacock	53°04.4	-56°39.1
										Deneb	49°25.0	45°22.3
<b>.</b> .	CIIA	C114	Б	6114	Б	C114	Г.	CILA	Б	Enif	33°38.0	9°59.6
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	$27^{\circ}31.9$	-46°50.0
0	303°56.6	220° 20.2	N21°30.0	130°26.6	N03°33.6	202°37.3	N22°56.4	301°21.7		Fomalhaut	15°13.7	-29°29.0
1	318°59.1	235° 19.6	30.3	145°27.7	33.0	217°39.2	56.3	316°24.2	26.5	Scheat	13°44.5	28°13.3
2	$334^{\circ}01.6$	$250^{\circ}19.0$	30.5	160°28.8	32.3	$232^{\circ}41.1$	56.3	331°26.7	26.5	Markab	13°29.2	15°20.6
3	349°04.0	$265^{\circ}18.4$	• • 30.7	175°29.8	• • 31.7	247°43.0	• • 56.2	346°29.2	• • 26.5			
4	4°06.5	280°17.8	31.0	190°30.9	31.1	262°44.8	56.2	1°31.7	26.6	Jul 24 Thu	SHA	Mer.pass
5	19°09.0	295°17.2	31.2	205°32.0	30.4	277°46.7	56.2	16°34.2	26.6	Venus	278°50.7	09:17
6	34°11.4	310° 16.6	N21°31.5	220°33.0	N03°29.8	292°48.6	N22°56.1	31°36.8	S01°26.6		187°36.6	15:21
7	49°13.9	325°16.0	31.7	235°34.1	29.2	307°50.5	56.1	46°39.3	26.7		259°09.2	10:34
8	64° 16.4	340°15.3	31.7	250° 35.2	28.6	322°52.3	56.0	61°41.8	26.7	Saturn		04:02
										Jatuill	JJ1 2J.1	07.02
9	79°18.8	355° 14.7	• • 32.2	265°36.3	• • 27.9	337°54.2	56.0	76°44.3	• • 26.7	Jul 25 Fri	SHA	Mer.pass
10	94°21.3	10° 14.1	32.4	280°37.3	27.3	352°56.1	56.0	91°46.8	26.8		277°37.3	09:18
11	109°23.7	25° 13.5	32.6	295°38.4	26.7	7°58.0	55.9	106°49.3	26.8		187°03.3	15:19
12	124°26.2	40°12.9	N21°32.9	310°39.5	N03°26.0	22°59.8	N22°55.9	121°51.8	501°26.8		258°54.9	10:31
13	139°28.7	55°12.3	33.1	325°40.6	25.4	38°01.7	55.9	136° 54.3	26.9			
14	154°31.1	$70^{\circ}11.7$	33.3	340°41.6	24.8	53°03.6	55.8	151°56.8	26.9	Saturn	357°24.0	03:58
15	169°33.6	85°11.0	33.6	355°42.7	24.1	68°05.4	• • 55.8	166° 59.4	26.9	Jul 26 Sat	SHA	Mer.pass
16	184°36.1	100° 10.4	33.8	10°43.8	23.5	83°07.3	55.7	182°01.9	27.0		276°23.6	09:19
17	199°38.5	115°09.8	34.0	25° 44.9	22.9	98°09.2	55.7	197°04.4	27.0			
											186°30.0	15:17
18	214°41.0	130°09.2	N21°34.2	40°45.9	N03°22.2	113°11.1	N22°55.7	212°06.9	S01°27.0		258°40.7	10:28
19	229°43.5	145°08.6	34.5	55° 47.0	21.6	128° 12.9	55.6	227°09.4	27.0	Saturn	357°25.1	03:54
20	244°45.9	160°08.0	34.7	70°48.1	21.0	143°14.8	55.6	242°11.9	27.1			
21	259°48.4	175°07.3	• • 34.9	85°49.2	• • 20.3	$158^{\circ}16.7$	•• 55.5	257° 14.4	•• 27.1	Horizon	al parallax	
22	274°50.8	190°06.7	35.1	100°50.2	19.7	173° 18.6	55.5	$272^{\circ}16.9$	27.1		Venus:	0.1
23	289°53.3	205°06.1	35.4	115°51.3	19.1	188° 20.4	55.5	$287^{\circ}19.4$	27.2		Mars:	0.1
Mer.p	ass. 03:44	$\nu$ -0.6' d0	.2′ m-4.02	$\nu 1.1' \ d$ -0	0.6′ m1.59	$\nu$ 1.9′ d-0	.0′ m-1.91	$\nu 2.5' \ d0$	.0′ m0.83			

h	Su	Moon					
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°21.9	N19°51.2	188° 30.5	5.4'	N26°05.9	-7.3'	58.6'
1	193°21.8 208°21.8	50.6 50.1	202°54.8 217°19.3	5.5' 5.6'	25°58.7 25°51.3	-7.4'	58.6'
2	208 21.8 223°21.8	49.6	217 19.3 231°43.9	5.0 5.7'	25 51.3 25°43.7	-7.6' -7.7'	58.6' 58.6'
4	238°21.8	49.1	246°08.6	5.8'	25°36.0	-7.9'	58.6'
5	253°21.8	48.5	260°33.4	5.9'	25°28.1	-8.0'	58.5'
6	268°21.8 283°21.8	N19°48.0	274°58.3 289°23.4	6.0'	N25°20.0 25°11.8	-8.2'	58.5'
7 8	283°21.8 298°21.8	47.5 46.9	289°23.4 303°48.5	6.1' 6.3'	25°11.8 25°03.5	-8.3' -8.5'	58.5' 58.5'
9	313°21.7	• • 46.4	318° 13.8	6.4	24°55.0	-8.6'	58.4'
10	328°21.7	45.9	$332^{\circ}39.1$	6.5'	24°46.4	-8.8'	58.4'
11	343°21.7 358°21.7	45.4	347°04.6	6.6'	24°37.6	-8.9'	58.4'
12 13	358°21.7 13°21.7	N19°44.8 44.3	1°30.2 15°56.0	6.7' 6.8'	N24°28.7 24°19.6	-9.1' -9.2'	58.4' 58.3'
14	28°21.7	43.8	30°21.8	7.0'	24°10.4	-9.2' -9.3'	58.3'
15	43°21.7	• • 43.2	44°47.8	7.1'	24°01.0	-9.5'	58.3'
16	58°21.7	42.7	59° 13.8	7.2'	23°51.5	-9.6'	58.3'
17 18	73°21.7 88°21.7	42.2 N19°41.6	73°40.0 88°06.3	7.3' 7.4'	23°41.9 N23°32.2	-9.8' -9.9'	58.3' 58.2'
19	103°21.6	41.1	102°32.8	7.4 7.6'	23°22.3	-9.9 -10.0'	58.2'
20	118°21.6	40.5	116°59.3	7.7'	23°12.3	-10.1	58.2'
21	133°21.6	• • 40.0	$131^{\circ}26.0$	7.8'	23°02.1	-10.3'	58.2'
22	148°21.6	39.5	145°52.8	7.9'	22°51.9	-10.4'	58.1'
23	163°21.6	38.9	160°19.7	8.0'	22°41.5	-10.5'	58.1'
	SD = 15.7'	d = -0.5'		SI	O = 16.0'		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178°21.6	N19°38.4	174°46.8	8.2'	N22°31.0	-10.6'	58.1'
1	193°21.6	37.8	189°14.0	8.3'	22°20.3	-10.7'	58.1'
2	208°21.6 223°21.6	37.3 · · 36.8	203°41.2 218°08.6	8.4' 8.5'	22°09.6 21°58.7	-10.9' -11.0'	58.0' 58.0'
3 4	223 21.6 238°21.6	36.2	218 08.6 232°36.2	8.7'	21 58.7 21°47.8	-11.0 -11.1'	58.0'
5	253°21.6	35.7	247°03.8	8.8'	21°36.7	-11.2'	57.9'
6	268°21.6	N19°35.1	261°31.6	8.9'	N21°25.5	-11.3'	57.9'
7	283°21.6	34.6	275°59.5	9.0'	21°14.2	-11.4'	57.9'
8 9	298°21.6 313°21.6	34.1 •• 33.5	290°27.5 304°55.7	9.1' 9.3'	21°02.8 20°51.2	-11.5' -11.6'	57.9' 57.8'
10	328°21.6	33.0	319°23.9	9.3 9.4'	20°31.2	-11.0	57.8'
11	343°21.5	32.4	333°52.3	9.5'	20°27.9	-11.8'	57.8'
12	358°21.5	N19°31.9	348°20.8	9.6'	N20°16.1	-11.9'	57.8'
13 14	13°21.5 28°21.5	31.3 30.8	2°49.4 17°18.2	9.7' 9.9'	20°04.2 19°52.2	-12.0' -12.1'	57.7' 57.7'
15	43°21.5	30.2	31°47.0	10.0'	19° 40.0	-12.1	57.7'
16	58°21.5	29.7	46°16.0	10.1	19°27.8	-12.3'	57.6'
17	73°21.5	29.1	$60^{\circ}45.1$	10.2'	19°15.6	-12.4'	57.6'
18	88°21.5 103°21.5	N19°28.6	75°14.3 89°43.6	10.3'	N19°03.2 18°50.7	-12.5'	57.6'
19 20	103 21.5 118°21.5	28.0 27.5	89 43.0 104°13.1	10.4' 10.6'	18°38.2	-12.5'	57.6' 57.5'
21	133°21.5	26.9	118° 42.6	10.7'	18°25.5	-12.7'	57.5'
22	148°21.5	26.4	133°12.3	10.8'	18°12.8	-12.8'	57.5'
23	163°21.5	25.8	147° 42.1	10.9'	18°00.0	-12.9'	57.4'
	SD = 15.7'	d = -0.5'		SI	O = 15.8'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°21.5	N19°25.3	162° 12.0	11.0'	N17°47.1	-12.9'	57.4'
1	193°21.5	24.7	176° 42.0	11.1'	17°34.2	-13.0'	57.4'
2	208°21.5 223°21.5	24.2 •• 23.6	191°12.1 205°42.3	11.2' 11.3'	17°21.2 17°08.1	-13.1' -13.2'	57.4' 57.3'
3 4	238°21.5	23.1	205 42.3 220° 12.7	11.4'	16°54.9	-13.2'	57.3'
5	253°21.5	22.5	234°43.1	11.6'	16°41.7	-13.3'	57.3'
6	268°21.5	N19°21.9	249° 13.7	11.7'	N16°28.4	-13.4'	57.2'
7 8	283°21.5 298°21.5	21.4 20.8	263°44.3 278°15.1	11.8' 11.9'	16°15.0 16°01.6	-13.4' -13.5'	57.2' 57.2'
9	298 21.5 313°21.5	20.8	278 15.1 292°46.0	12.0'	15°48.1	-13.5 -13.6'	57.2'
10	328°21.5	19.7	$307^{\circ}17.0$	12.1'	15°34.5	-13.6'	57.1'
11	343°21.5	19.2	321°48.0	12.2'	15°20.9	-13.7'	57.1'
12	358°21.5 13°21.5	N19°18.6	336° 19.2 350° 50.5	12.3'	N15°07.2 14°53.5	-13.7'	57.1'
13 14	13°21.5 28°21.5	18.0 17.5	350°50.5 5°21.9	12.4' 12.5'	14°53.5 14°39.7	-13.8' -13.8'	57.0' 57.0'
15	43°21.5	16.9	19°53.4	12.6'	14°25.8	-13.9'	57.0'
16	58°21.5	16.4	34°25.0	12.7'	14°11.9	-13.9'	57.0'
17	73°21.5	15.8	48° 56.6	12.8'	13°58.0	-14.0'	56.9'
18 19	88°21.5 103°21.6	N19° 15.2 14.7	63°28.4 78°00.3	12.9' 13.0'	N13°44.0 13°29.9	-14.0' -14.1'	56.9' 56.9'
20	118°21.6	14.7	92°32.3	13.1'	13° 15.8	-14.1'	56.8
21	133°21.6	• • 13.5	$107^{\circ}04.3$	13.1'	13°01.7	-14.2'	56.8'
22	148°21.6	13.0	121°36.5	13.2'	12°47.5	-14.2'	56.8'
23	163°21.6	12.4	136°08.7	13.3'	12°33.3	-14.3'	56.7'
	SD = 15.7'	d = -0.6'		SI	O = 15.7'		

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

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

		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	1-2%		
24	06:33	06:33	12:07	11:54	-:-			
25	06:34	06:34	12:07	12:48	00:22			
26	06:34	06:34	12:07	13:38	01:14			

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

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
C	CHA	CHA	Das	CHA	Doo	CHA	Dag	CHA	Das		СПУ	Doo
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	304°55.8	220°05.5	N21°35.6	130°52.4	N03°18.4	203°22.3	N22°55.4	302°22.0	S01°27.2	Alpheratz	357°34.1	29° 13.9
1	319°58.2	235°04.9	35.8	145°53.4	17.8	218°24.2	55.4	317°24.5	27.2	Ankaa	353°06.5	-42°09.7
2	335°00.7	250°04.3	36.0	160°54.5	17.2	233°26.1	55.3	332°27.0	27.3	Schedar	349°30.3	56° 40.5
3	350°03.2	265°03.6	• • 36.2	175°55.6	• • 16.5	248°27.9	• • 55.3	347°29.5	• • 27.3	Diphda	348°46.7	-17°50.6
4	5°05.6	280°03.0	36.5	190°56.7	15.9	263°29.8	55.3	2°32.0	27.3	Achernar	$335^{\circ}19.7$	-57°06.1
5	20°08.1	295°02.4	36.7	205°57.7	15.3	278°31.7	55.2	17°34.5	27.4	Hamal	327°50.7	23°35.0
6	35°10.6	310°01.8	N21°36.9	220°58.8	N03°14.6	293°33.6	N22°55.2	32°37.0	S01°27.4	Polaris	313°54.6	89°22.0
7	50°13.0	325°01.2	37.1	235°59.9	14.0	308°35.5	55.1	47°39.6	27.4	Acamar	$315^{\circ}11.5$	-40°11.8
8	65°15.5	340°00.5	37.3	251°01.0	13.4	323°37.3	55.1	62°42.1	27.5	Menkar	314°05.7	4°11.5
9	80°18.0	354°59.9	• • 37.5	266°02.0	• • 12.8	338°39.2	• • 55.1	77°44.6	• • 27.5	Mirfak	308°27.7	49°56.9
10	95°20.4	9°59.3	37.7	281°03.1 296°04.2	12.1 11.5	353°41.1 8°43.0	55.0	92°47.1 107°49.6	27.5	Aldebaran	290°39.3	16°33.7
11 12	110°22.9 125°25.3	24°58.7 39°58.0	37.9 N21°38.2	311°05.2	N03°10.9	23°44.8	55.0 N22°54.9	107 49.0 122°52.1	27.6 \$01°27.6	Rigel	281°03.7	-8°10.2
13	140°27.8	54°57.4	38.4	326°06.3	10.2	38°46.7	54.9	137°54.6	27.6	Capella	280°21.5	46°01.3
14	155°30.3	69°56.8	38.6	341°07.4	09.6	50°48.6	54.9 54.9	157° 54.0 152° 57.2	27.0	Bellatrix	278°22.6	6°22.4
15	170°32.7	84°56.2	• • 38.8	356°08.5	• • 09.0	68°50.5	• • 54.8	167°59.7	• • 27.7	Elnath	278°01.6	28° 37.7
16	185°35.2	99°55.6	39.0	11°09.5	08.3	83°52.3	54.8	183°02.2	27.7	Alnilam	275°37.5	$-1^{\circ}11.0$
17	200°37.7	114°54.9	39.0	26°10.6	07.7	98°54.2	54.7	198°04.7	27.7	Betelgeuse	270°51.9	7°24.8
18	215°40.1	129°54.3	N21°39.4	41°11.7	N03°07.1	113°56.1	N22°54.7	213°07.2	S01°27.8	Canopus	263°52.7	-52°42.3
19	230°42.6	144°53.7	39.6	56°12.7	06.4	113 50.1 128°58.0	54.7	213 07.2 228°09.7	27.8	Sirius	258°26.1	-16°44.9
20	245°45.1	159°53.1	39.8	71°13.8	05.8	143°59.8	54.6	243°12.2	27.0	Adhara	255°05.9	-29°00.2
21	260°47.5	174°52.4	40.0	86°14.9	05.2	159°01.7	• • 54.6	258°14.8	27.9	Procyon	244°50.7	5°09.6
22	275°50.0	174 52.4 189°51.8	40.0	101°16.0	04.5	174°03.6	54.5	273°17.3	27.9	Pollux	243°17.1	27° 57.9
23	275 50.0 290°52.5	204°51.2	40.2	101 10.0 116°17.0	03.9	174 03.0 189°05.5	54.5 54.5	273 17.3 288°19.8	28.0	Avior	$234^{\circ}15.2$	-59°35.4
										Suhail	222°46.4	-43°32.1
Mer.p	ass. 03:40	$\nu$ -0.6 $'$ d0	.2′ m-4.02	$\nu 1.1' \ d$ -0	.6′ m1.59	$\nu$ 1.9′ d-0	.0′ m-1.91	$\nu$ 2.5′ d0	.0′ m0.83	Miaplacidus	221°39.2	-69°49.3
										Alphard	217°47.6	-8°46.1
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.2	11°50.6
Mon 0	305°54.9	219°50.6	N21° 40.6	ина 131°18.1	N03°03.3	204°07.3	N22°54.5	303°22.3	S01°28.0	Dubhe	193°40.9	61°37.0
1	305 54.9 320°57.4	219 50.6 234°49.9	N21 40.6 40.8	131 18.1 146°19.2	02.6	204 07.3 219°09.2	N22 54.5 54.4	303 22.3 318°24.8	28.1	Denebola	182°24.7	14° 25.9
2	335°59.8	249°49.3	41.0	161°20.2	02.0	219 09.2 234°11.1	54.4	333°27.3	28.1	Gienah	175°43.3	-17°41.1
3	351°02.3	249 49.3 264°48.7	• • 41.2	176°21.3	01.3	249°13.0	• • 54.3	348°29.9	. 28.1		172°59.9	-63°14.7
4	6°04.8	279°48.0	41.4	170°21.3 191°22.4	00.7	249 13.0 264°14.9	54.3	3°32.4	28.2		171°51.4	-57° 15.6
5	21°07.2	294°47.4	41.6	206°23.4	00.7 03°00.1	279°16.7	54.3	18°34.9	28.2	Alioth	166°12.7	55°49.5
6	36°09.7	309°46.8	N21°41.8	200°23.4°221°24.5	N02°59.4	294°18.6	N22°54.2	33°37.4	S01°28.2	Spica	158°21.9	-11° 17.7
7	51°12.2	324°46.2	42.0	236°25.6	58.8	309°20.5	54.2	48°39.9	28.3	Alkaid	152°51.7	49°11.4
8	66°14.6	339°45.5	42.0	250°25.0° 251°26.7	58.2	324°22.4	54.1	63°42.4	28.3	Hadar	148°35.4	-60°30.0
9	81°17.1	354°44.9	• • 42.3	266°27.7	• • 57.5	339°24.2	• • 54.1	78°45.0	. 28.3		147°57.1	-36° 29.9
10	96°19.6	9°44.3	42.5	281°28.8	56.9	354°26.1	54.1	93°47.5	28.4	Arcturus	145°47.5	19°03.1
11	111°22.0	24°43.6	42.7	296°29.9	56.3	9°28.0	54.0	108°50.0	28.4	Rigil Kent.	139°39.6	-60°56.7
12	126°24.5	39°43.0	N21°42.9	311°30.9	N02°55.6	24°29.9	N22°54.0	123°52.5	S01°28.4	Kochab	137°19.6	74°03.3
13	141°26.9	54°42.4	43.1	326°32.0	55.0	39°31.8	53.9	138°55.0	28.5	Zuben'ubi	136°55.4	-16°08.9
14	156°29.4	69°41.8	43.3	341°33.1	54.4	54°33.6	53.9	153°57.6	28.5	Alphecca	126°03.2	26° 37.9
15	171°31.9	84°41.1	43.5	356°34.1	• • 53.7	69°35.5	• • 53.9	169°00.1	• • 28.5	Antares	112°15.0	-26°29.4
16	186°34.3	99°40.5	43.6	11°35.2	53.1	84°37.4	53.8	184°02.6	28.6	Atria	107°08.5	-69°04.6
17	201°36.8	114°39.9	43.8	26°36.3	52.5	99°39.3	53.8	199°05.1	28.6	Sabik	102°02.0	-15°45.4
18	216°39.3	129°39.2	N21°44.0	41°37.4	N02°51.8	114°41.2	N22°53.7	214°07.6	S01°28.6	Shaula	96°09.4	-37°07.4
19	231°41.7	144°38.6	44.2	56°38.4	51.2	129°43.0	53.7	229°10.2	28.7	Rasalhague	95°57.8	12°32.6
20	246°44.2	159°38.0	44.4	71°39.5	50.6	144°44.9	53.7	244°12.7	28.7	Eltanin	90°41.5	51°29.3
21	261°46.7	174°37.3	• • 44.5	86°40.6	• • 49.9	159°46.8	• • 53.6	259°15.2	• • 28.8	Kaus Aust.	83°31.5	-34°22.4
22	276°49.1	189°36.7	44.7	101°41.6	49.3	174°48.7	53.6	274°17.7	28.8	Vega	80°32.5	38°48.5
23	291°51.6	204°36.1	44.9	116°42.7	48.7	189°50.5	53.5	289°20.2	28.8	Nunki	75°46.8	-26°15.9
										Altair	61°59.2	8°56.2
Mer.p	ass. 03:36	$\nu$ -0.6′ d0	.2′ m-4.02	$\nu 1.1' \ d-0$	1.6'  m 1.59	$\nu$ 1.9′ d-0	.0′ m-1.91	$\nu$ 2.5′ d0	.0'  m0.82	Peacock	53°04.4	-56°39.1
										Deneb	49°25.0	45°22.3
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.0	9°59.6
0	306°54.1	219°35.4	N21°45.1	131°43.8	N02°48.0	204°52.4	N22°53.5	304°22.7		Al Na'ir Fomalhaut	27°31.9	-46° 50.0 -29° 29.0
1	321°56.5	234°34.8	45.2	146°44.8	47.4	219°54.3	53.4	319°25.3	28.9	Scheat	15°13.7 13°44.5	
2	336°59.0	249°34.2	45.4	161°45.9	46.7	234°56.2	53.4	334°27.8	28.9	Markab	13°44.5 13°29.2	28°13.3
3	352°01.4	264°33.5	• • 45.6	176°47.0	• • 46.1	249°58.1	• • 53.4	349°30.3	29.0	iviarkab	13 29.2	15°20.6
4	7°03.9	279°32.9	45.8	191°48.0	45.5	264°59.9	53.3	4°32.8	29.0	Jul 27 Sun	SHA	Mer.pass
5	22°06.4	294°32.2	45.9	206°49.1	44.8	280°01.8	53.3	19°35.4	29.0		275°09.7	09:20
6	37°08.8	309°31.6	N21°46.1		N02°44.2	295°03.7	N22°53.2	34°37.9	S01°29.1		185°56.6	15:15
7	52°11.3	324°31.0	46.3	236°51.2	43.6	310°05.6	53.2	49°40.4	29.1		258°26.5	10:25
8	67°13.8	339°30.3	46.4	251°52.3	42.9	325°07.5	53.2	64°42.9	29.2	Saturn	$357^{\circ}26.2$	03:50
9	82°16.2	354°29.7	• • 46.6	266°53.4	• • 42.3	340°09.3	• • 53.1	79°45.4	29.2	1		
10	97°18.7	9°29.1	46.8	281°54.5	41.7	355°11.2	53.1	94°48.0	29.2	Jul 28 Mon	SHA	Mer.pass
11	$112^{\circ}21.2$	24°28.4	46.9	296°55.5	41.0	10°13.1	53.0	109°50.5	29.3		273°55.6	09:21
12	127°23.6	39°27.8	N21°47.1	311°56.6	N02°40.4	25°15.0	N22°53.0	124°53.0	S01°29.3		185°23.2	15:14
13	$142^{\circ}26.1$	54°27.2	47.3	326°57.7	39.8	40°16.9	53.0	139°55.5	29.3		258°12.4	10:22
14	$157^{\circ}28.5$	69°26.5	47.4	$341^{\circ}58.7$	39.1	55°18.7	52.9	154°58.0	29.4	Saturn	357°27.4	03:46
15	172°31.0	84°25.9	• • 47.6	356°59.8	• • 38.5	70°20.6	• • 52.9	170°00.6	• • 29.4	Jul 29 Tue	SHA	Mer.pass
16	$187^{\circ}33.5$	99°25.2	47.7	$12^{\circ}00.9$	37.8	85°22.5	52.8	$185^{\circ}03.1$	29.4		272°41.4	09:22
17	202°35.9	114°24.6	47.9	$27^{\circ}01.9$	37.2	100°24.4	52.8	$200^{\circ}05.6$	29.5		184°49.7	15:12
18	217°38.4	129°24.0	N21°48.1	42°03.0	N02°36.6	115°26.3	N22°52.7	215°08.1	S01°29.5		257°58.4	10:19
19	232°40.9	144°23.3	48.2	57°04.1	35.9	130°28.1	52.7	$230^{\circ}10.7$	29.6		357°28.7	03:42
20	247°43.3	159°22.7	48.4	$72^{\circ}05.1$	35.3	145°30.0	52.7	$245^{\circ}13.2$	29.6			
21	262°45.8	174°22.0	• • 48.5	87°06.2	• • 34.7	160°31.9	• • 52.6	$260^{\circ}15.7$	• • 29.6	Horizont	al parallax	
22	277°48.3	189°21.4	48.7	102°07.3	34.0	175°33.8	52.6	275°18.2	29.7		Venus:	0.1
23	292°50.7	204°20.8	48.8	117°08.3	33.4	190°35.7	52.5	290°20.8	29.7		Mars:	0.1
Mern	ass. 03:32	ν-0 6′ d0	.2′ m-4.01	ν1 1 <sup>/</sup> d.0	.6′ m1.60	ν1 0/ d-0	.0′ m-1.91	1/2 5/ dn	.0′ m0.82			
е		- 0.0 00										

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°21.6	N19° 11.8	150°41.0	13.4'	N12°19.0	-14.3'	56.7'
1 2	193°21.6 208°21.6	11.3 10.7	165°13.4 179°45.9	13.5' 13.6'	12°04.7 11°50.4	-14.3' -14.4'	56.7' 56.7'
3	223°21.6	10.1	194°18.5	13.7'	11°36.0	-14.4'	56.6'
4	238°21.6	09.6	208°51.2	13.8'	11°21.6	-14.4'	56.6'
5 6	253°21.6 268°21.6	09.0 N19°08.4	223°23.9 237°56.8	13.8' 13.9'	11°07.1 N10°52.7	-14.5' -14.5'	56.6' 56.5'
7	283°21.6	07.9	257 50.8 252°29.7	13.9 14.0'	10°38.1	-14.5'	56.5'
8	298°21.6	07.3	267°02.7	14.1'	10°23.6	-14.6'	56.5'
9	313°21.6	• • 06.7	281°35.8	14.1'	10°09.0	-14.6'	56.5'
10 11	328°21.6 343°21.7	06.1 05.6	296°08.9 310°42.1	14.2' 14.3'	09°54.4 09°39.8	-14.6' -14.7'	56.4' 56.4'
12	358°21.7	N19°05.0	325°15.4	14.4'	N09°25.1	-14.7'	56.4
13	13°21.7	04.4	339°48.8	14.4'	09°10.5	-14.7'	56.3'
14 15	28°21.7 43°21.7	03.9 · · 03.3	354°22.3 8°55.8	14.5' 14.6'	08°55.8 08°41.0	-14.7' -14.7'	56.3' 56.3'
16	58°21.7	02.7	23°29.4	14.7	08°26.3	-14.7 -14.8'	56.3'
17	73°21.7	02.1	38°03.0	14.7'	$08^{\circ}11.5$	-14.8'	56.2'
18	88°21.7	N19°01.6	52°36.7	14.8'	N07°56.8	-14.8'	56.2'
19 20	103°21.7 118°21.7	01.0 19°00.4	67°10.5 81°44.4	14.9' 14.9'	07°42.0 07°27.2	-14.8' -14.8'	56.2' 56.1'
21	133°21.8	18° 59.8	96°18.3	15.0'	07°12.3	-14.8'	56.1
22	148°21.8	59.2	110°52.3	15.0'	06°57.5	-14.9'	56.1'
23	163°21.8	58.7	125°26.3	15.1'	06°42.6	-14.9'	56.1'
	SD = 15.7'	d = -0.6'		SI	O = 15.5'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	НР
0	178°21.8	N18°58.1	$140^{\circ}00.4$	15.2'	N06°27.8	-14.9'	56.0'
1	193°21.8	57.5	154°34.5	15.2'	06°12.9	-14.9'	56.0'
2	208°21.8 223°21.8	56.9 •• 56.3	169°08.8 183°43.0	15.3' 15.3'	05°58.0 05°43.1	-14.9' -14.9'	56.0' 55.9'
4	238°21.8	55.8	198°17.4	15.4'	05°28.2	-14.9'	55.9'
5	253°21.9	55.2	$212^{\circ}51.7$	15.4'	$05^{\circ}13.3$	-14.9'	55.9'
6	268°21.9 283°21.9	N18°54.6 54.0	227°26.2 242°00.6	15.5' 15.5'	N04°58.4 04°43.5	-14.9' -14.9'	55.9' 55.8'
7 8	283 21.9 298°21.9	54.0 53.4	242 00.6 256°35.2	15.5'	04 43.5 04°28.6	-14.9' -14.9'	55.8'
9	313°21.9	• • 52.8	271°09.7	15.6'	04°13.7	-14.9'	55.8'
10	328°21.9	52.3	285°44.4	15.7'	03°58.7	-14.9'	55.8'
11 12	343°21.9 358°22.0	51.7 N18°51.1	300°19.0 314°53.7	15.7' 15.8'	03°43.8 N03°28.9	-14.9' -14.9'	55.7' 55.7'
13	13°22.0	50.5	329°28.5	15.8'	03°14.0	-14.9'	55.7'
14	28°22.0	49.9	344°03.3	15.8'	02°59.1	-14.9'	55.6'
15 16	43°22.0 58°22.0	· · 49.3 48.7	358°38.1 13°13.0	15.9' 15.9'	02°44.1 02°29.2	-14.9' -14.9'	55.6' 55.6'
17	73°22.0	48.2	27°47.9	16.0'	02°29.2	-14.9'	55.6'
18	88°22.0	N18° 47.6	42°22.9	16.0'	N01°59.4	-14.9'	55.5'
19	103°22.1 118°22.1	47.0	56°57.9 71°32.9	16.0'	01°44.5 01°29.7	-14.9'	55.5' 55.5'
20 21	118 22.1 133°22.1	46.4 •• 45.8	71 32.9 86°07.9	16.1	01 29.7 01°14.8	-14.9' -14.9'	55.5'
22	148°22.1	45.2	100°43.0	16.1'	00°59.9	-14.9'	55.4'
23	163°22.1	44.6	115°18.2	16.1'	00°45.1	-14.8'	55.4'
	SD = 15.7'	d = -0.6'		SI	D = 15.3'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°22.2	N18° 44.0	129°53.3	16.2'	N00°30.2	-14.8'	55.4'
1 2	193°22.2 208°22.2	43.4 42.8	144°28.5 159°03.7	16.2' 16.2'	00°15.4 N00°00.6	-14.8' -14.8'	55.4' 55.3'
3	223°22.2	• • 42.2	173°38.9	16.3'	S00°14.2	14.8	55.3'
4	238°22.2	41.6	188°14.2	16.3'	00°29.0	14.8'	55.3'
5 6	253°22.2 268°22.3	41.1 N18° 40.5	202°49.5 217°24.8	16.3' 16.3'	00°43.8 \$00°58.6	14.8' 14.7'	55.3' 55.3'
7	283°22.3	39.9	232°00.1	16.3'	01°13.3	14.7	55.2'
8	298°22.3	39.3	246°35.4	16.4'	01°28.0	14.7'	55.2'
9	313°22.3	• • 38.7	261°10.8	16.4'	01°42.7	14.7'	55.2'
10 11	328°22.4 343°22.4	38.1 37.5	275°46.2 290°21.6	16.4' 16.4'	01°57.4 02°12.1	14.7' 14.6'	55.2' 55.1'
12	358°22.4	N18° 36.9	304°57.0	16.4'	S02°26.7	14.6'	55.1'
13	13°22.4	36.3	319°32.4	16.4'	02°41.3	14.6'	55.1'
14 15	28°22.4 43°22.5	35.7 · · 35.1	334°07.8 348°43.3	16.4' 16.5'	02°55.9 03°10.5	14.6' 14.6'	55.1' 55.1'
16	58°22.5	34.5	3°18.7	16.5'	03°25.1	14.5	55.0'
17	73°22.5	33.9	17°54.2	16.5'	03°39.6	14.5'	55.0'
18 19	88°22.5 103°22.6	N18° 33.3 32.7	32°29.7 47°05.2	16.5' 16.5'	\$03°54.1 04°08.6	14.5' 14.4'	55.0' 55.0'
20	103 22.6 118°22.6	32.1 32.1	47 05.2 61°40.6	16.5'	04 08.6 04°23.0	14.4 14.4'	55.0 54.9'
21	133°22.6	• • 31.5	$76^{\circ}16.1$	16.5'	04°37.4	14.4'	54.9'
22 23	148°22.6 163°22.6	30.9	90°51.6 105°27.1	16.5'	04°51.8 05°06.2	14.4' 14.3'	54.9' 54.9'
23		30.3	105 27.1	16.5'		14.3	54.9
	SD = 15.7'	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°	////	////	00:41	23:17	////	////
68°	////	////	01:55	22:14	////	////
66°	////	////	02:31	21:39	////	////
64°	////	01:15	02:56	21:15	22:52	////
62°	////	01:59	03:16	20:55	22:10	////
60°	////	02:28	03:32	20:40	21:42	////
N 58°	01:08	02:50	03:45	20:26	21:22	22:59
56°	01:49	03:07	03:57	20:15	21:05	22:21
54°	02:15	03:21	04:07	20:05	20:50	21:55
52°	02:35	03:34	04:16	19:56	20:38	21:36
50°	02:52	03:45	04:24	19:48	20:27	21:20
45°	03:23	04:07	04:41	19:31	20:05	20:49
N 40°	03:46	04:24	04:55	19:18	19:48	20:26
35°	04:04	04:38	05:07	19:06	19:34	20:08
30°	04:19	04:51	05:17	18:56	19:22	19:53
20°	04:42	05:10	05:34	18:39	19:02	19:30
N 10°	05:01	05:27	05:49	18:24	18:46	19:12
0°	05:16	05:41	06:03	18:10	18:32	18:57
<b>S</b> 10°	05:29	05:55	06:17	17:56	18:18	18:44
20°	05:41	06:08	06:31	17:42	18:05	18:32
30°	05:54	06:23	06:48	17:25	17:51	18:20
35°	06:00	06:31	06:58	17:16	17:43	18:13
40°	06:07	06:39	07:09	17:05	17:34	18:07
45°	06:14	06:49	07:21	16:52	17:24	18:00
<b>S</b> 50°	06:22	07:01	07:37	16:37	17:12	17:52
52°	06:25	07:07	07:44	16:29	17:07	17:48
54°	06:29	07:12	07:52	16:21	17:01	17:45
56°	06:33	07:19	08:01	16:12	16:55	17:41
58°	06:37	07:26	08:12	16:02	16:48	17:37
<b>S</b> 60°	06:42	07:34	08:23	15:50	16:40	17:32

Lat.		Moonris	e		Moonset			
Lat.	Sun	Mon	Tue	Sun	Mon	Tue		
N 72°	05:44	07:59	10:03	22:03	21:29	20:56		
<b>N</b> 70°	06:03	08:06	10:00	21:54	21:27	21:02		
68°	06:17	08:11	09:57	21:46	21:26	21:08		
66°	06:29	08:15	09:55	21:39	21:25	21:12		
64°	06:39	08:19	09:54	21:34	21:25	21:16		
62°	06:48	08:22	09:52	21:29	21:24	21:19		
60°	06:55	08:25	09:51	21:24	21:23	21:22		
N 58°	07:01	08:27	09:50	21:21	21:23	21:24		
56°	07:07	08:29	09:49	21:17	21:22	21:27		
54°	07:12	08:31	09:48	21:14	21:22	21:29		
52°	07:16	08:33	09:47	21:11	21:21	21:31		
50° 45°	07:20	08:35	09:46	21:09	21:21	21:32		
	07:29	08:38	09:45	21:03	21:20	21:36		
N 40°	07:36	08:41	09:43	20:59	21:19	21:39		
35°	07:42	08:43	09:42	20:54	21:19	21:42		
30°	07:48	08:46	09:41	20:51	21:18	21:45		
20° N 10°	07:57 08:05	08:49 08:53	09:40 09:38	20:44 20:39	21:17	21:49 21:53		
0°	08:13	08:56	09:36	20:39	21:16 21:15	21:55		
-								
<b>S</b> 10°	08:20	08:59	09:35	20:28	21:15	22:00		
20° 30°	08:28 08:37	09:02 09:06	09:34 09:32	20:22 20:16	21:14 21:13	22:03 22:08		
35°	08:43	09:00	09:32	20:10	21:13	22:06		
40°	08:49	09:08	09.31	20:12	21:12	22:10		
45°	08:55	09:10	09:30	20:00	21:11	22:16		
<b>S</b> 50°	09:04	09:16	09:28	19:56	21:09	22:20		
52°	09:04	09:16	09:28	19:50	21:09	22:20		
54°	09:07	09:16	09:27	19:55	21:09	22:22		
56°	09:12	09:20	09:26	19:47	21:08	22:24		
58°	09:21	09:23	09:25	19:43	21:07	22:29		
<b>S</b> 60°	09:27	09:26	09:24	19:38	21:06	22:31		

١			Sun		Moon			
	Day	Eqn.of	Time	Mer.	Mer.	Mer.Pass.		
		00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	3-5	
		mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	6-19%	
	27	06:34	06:33	12:07	14:23	02:01		
	28	06:33	06:32	12:07	15:06	02:45		
	29	06:31	06:30	12:07	15:46	03:26		

h	Aries	`	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	307°53.2	219°20.1	N21°49.0	132°09.4	N02°32.8	205°37.5	N22°52.5	305°23.3	S01°29.7			
1	322°55.7	234°19.5	49.1	147°10.5	32.1	200°39.4	52.5	320°25.8	29.8	Alpheratz	$357^{\circ}34.1$	29°13.9
2	337°58.1	249°18.8	49.3	162°11.5	31.5	235°41.3	52.4	335°28.3	29.8	Ankaa	353°06.4	-42°09.7
3	353°00.6	264°18.2	49.4	177°12.6	• • 30.8	250°43.2	52.4	350°30.8	29.9	Schedar	349°30.3	56°40.5
4	8°03.0	279°17.5	49.6	192°13.7	30.2	265°45.1	52.3	5°33.4	29.9	Diphda	348°46.7	-17°50.6
5	23°05.5	294°16.9	49.7	207°14.7	29.6	280°47.0	52.3	20°35.9	29.9	Achernar	335°19.7	-57°06.1
6	38°08.0	309°16.3	N21°49.9	222°15.8	N02°28.9	295°48.8	N22°52.2	35°38.4	S01°30.0	Hamal	327°50.6	23°35.0
7	53°10.4	324°15.6	50.0	237°16.9	28.3	310°50.7	52.2	50°40.9	30.0	Polaris	313°53.1	89°22.0
8	68°12.9	339°15.0	50.2	252°17.9	27.7	325°52.6	52.2	65°43.5	30.0	Acamar	315°11.5	-40°11.8
9	83°15.4	354°14.3	50.3	267°19.0	27.0	340°54.5	52.1	80°46.0	30.1	Menkar	314°05.7	4°11.5
10	98°17.8	9°13.7	50.5	282°20.1	26.4	355°56.4	52.1	95°48.5	30.1	Mirfak	308°27.7	49°56.9
11	113°20.3	24°13.0	50.6	297°21.1	25.7	10°58.2	52.0	110°51.0	30.2	Aldebaran	290°39.3	16°33.7
12	128°22.8	39°12.4	N21°50.7	312°22.2	N02°25.1	26°00.1	N22°52.0	125°53.6	S01°30.2	Rigel	281°03.6	-8°10.2
13	143°25.2	54°11.7	50.9	327°23.3	24.5	41°02.0	52.0	140°56.1	30.2	Capella	280°21.5	46°01.3
14	158°27.7	$69^{\circ}11.1$	51.0	342°24.3	23.8	56°03.9	51.9	155°58.6	30.3	Bellatrix	278°22.6	6°22.5
15	173°30.2	84°10.5	• • 51.2	357°25.4	• • 23.2	$71^{\circ}05.8$	• • 51.9	$171^{\circ}01.2$	• • 30.3	Elnath	278°01.5	28°37.7
16	188°32.6	99°09.8	51.3	12°26.4	22.6	86°07.7	51.8	186°03.7	30.3	Alnilam	275°37.5	-1°11.0
17	203°35.1	114°09.2	51.4	27°27.5	21.9	$101^{\circ}09.5$	51.8	201°06.2	30.4	Betelgeuse	270°51.8	7°24.8
18	218°37.5	129°08.5	N21°51.6	42°28.6	N02°21.3	$116^{\circ}11.4$	N22°51.7	216°08.7	S01°30.4	Canopus	263°52.7 258°26.1	-52°42.3 -16°44.9
19	233°40.0	144°07.9	51.7	57°29.6	20.6	131°13.3	51.7	231°11.3	30.5	Sirius		-16 44.9 -29°00.2
20	248°42.5	159°07.2	51.8	72°30.7	20.0	$146^{\circ}15.2$	51.7	246°13.8	30.5	Adhara	255°05.8	
21	263°44.9	174°06.6	• • 52.0	87°31.8	• • 19.4	$161^{\circ}17.1$	• • 51.6	261°16.3	• • 30.5	Procyon Pollux	244°50.7 243°17.1	5°09.7 27°57.9
22	278°47.4	189°05.9	52.1	102°32.8	18.7	$176^{\circ}19.0$	51.6	$276^{\circ}18.8$	30.6	Avior	243°17.1 234°15.2	-59°35.4
23	293°49.9	204°05.3	52.2	117°33.9	18.1	191°20.8	51.5	291°21.4	30.6	Avior Suhail	234°15.2 222°46.4	-59°35.4 -43°32.1
Max	255 02,20	,, n 6/ Jn	.2′ m-4.01	,,1 1/ ,10	0.6' m1.60	11 0/ J 0	.0′ m-1.91	1/2 E/ 40	.0′ m0.81	Miaplacidus	222°46.4 221°39.2	-43° 32.1 -69° 49.3
ivier.p	ass. 03:28	ν-υ.σ΄ d0	.∠ m-4.U1	$\nu$ 1.1 $a$ -0	0.0 INT.00	$\nu$ 1.9 $a$ -0	.u-1.91	ν2.5 a0	ΤΩ.υπ. υ	Miaplacidus	221°39.2 217°47.6	-69°49.3 -8°46.1
											217 47.0 207°34.2	-6 40.1 11°50.6
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus Dubhe	207 34.2 193°40.9	61°37.0
0	308°52.3	219°04.6	N21°52.3	132°35.0	N02°17.4	206°22.7	N22°51.5	306°23.9	S01°30.7	Dubne	193°40.9 182°24.7	14°25.9
1	323°54.8	234°04.0	52.5	147°36.0	16.8	221°24.6	51.4	321°26.4	30.7	Gienah	182 24.7 175°43.3	-17°41.1
2	338°57.3	249°03.3	52.6	162°37.1	16.2	236°26.5	51.4	336°28.9	30.7		175 43.3 173°00.0	-17 41.1 -63°14.7
3	353°59.7	264°02.7	• • 52.7	177°38.2	• • 15.5	251°28.4	• • 51.4	351°31.5	• • 30.8	<b>I</b>	173 00.0 171°51.4	-03 14.7 -57°15.6
4	9°02.2	279°02.0	52.8	192°39.2	14.9	266°30.3	51.3	6°34.0	30.8	Alioth	166°12.7	55°49.5
5	24°04.6	294°01.4	53.0	207°40.3	14.3	$281^{\circ}32.1$	51.3	21°36.5	30.9	Spica	158°21.9	-11°17.7
6	39°07.1	309°00.7	N21°53.1	222°41.4	N02°13.6	296°34.0	N22°51.2	$36^{\circ}39.1$	S01°30.9	Alkaid	150° 21.9° 152° 51.7	49°11.4
7	54°09.6	324°00.1	53.2	237°42.4	13.0	311°35.9	51.2	51°41.6	30.9	Hadar	148°35.4	-60°30.0
8	69°12.0	338°59.4	53.3	252°43.5	12.3	326°37.8	51.1	66°44.1	31.0		140°557.1	-36° 29.9
9	84°14.5	353°58.8	• • 53.5	267°44.5	• • 11.7	341°39.7	•• 51.1	81°46.6	• • 31.0	Arcturus	145°47.5	19°03.1
10	99°17.0	8°58.1	53.6	282°45.6	11.1	$356^{\circ}41.6$	51.1	96°49.2	31.0	Rigil Kent.	139°39.6	-60°56.7
11	114°19.4	23°57.5	53.7	297°46.7	10.4	11°43.4	51.0	111°51.7	31.1	Kochab	137°19.6	74°03.3
12	129°21.9	38°56.8	N21°53.8	312°47.7	N02°09.8	26°45.3	N22°51.0	126°54.2	S01°31.1	Zuben'ubi	136°55.5	-16°08.9
13	144°24.4	53°56.2	53.9	327°48.8	09.1	41°47.2	50.9	141°56.8	31.2	Alphecca	126°03.2	26°37.9
14	159°26.8	68°55.5	54.0	342°49.9	08.5	$56^{\circ}49.1$	50.9	156°59.3	31.2	Antares	112°15.1	-26°29.4
15	174°29.3	83°54.9	• • 54.2	357°50.9	• • 07.9	$71^{\circ}51.0$	• • 50.8	172°01.8	• • 31.2	Atria	107°08.5	-69°04.6
16	189°31.8	98°54.2	54.3	12°52.0	07.2	86°52.9	50.8	187°04.4	31.3	Sabik	102°02.0	-15°45.4
17	204°34.2	113°53.6	54.4	27°53.0	06.6	101°54.8	50.8	202°06.9	31.3	Shaula	96°09.4	-37°07.4
18	219°36.7	128°52.9	N21°54.5	42°54.1	N02°06.0	116°56.6	N22°50.7		S01°31.4	Rasalhague	95°57.9	12°32.6
19	234°39.1	143°52.3	54.6	57°55.2	05.3	131°58.5	50.7	232°11.9	31.4	Eltanin	90°41.5	51°29.3
20	249°41.6	158°51.6	54.7	72°56.2	04.7	147°00.4	50.6	247°14.5	31.4	Kaus Aust.	83°31.5	-34°22.4
21	264°44.1	173°51.0	• • 54.8	87°57.3	• • 04.0	162°02.3	• • 50.6	262°17.0	• 31.5	Vega	80°32.5	38°48.5
22	279°46.5	188°50.3	54.9	102°58.4	03.4	177°04.2	50.5	277°19.5	31.5	Nunki	75°46.8	-26°15.9
23	294°49.0	203°49.6	55.0	117°59.4	02.8	192°06.1	50.5	292°22.1	31.6	Altair	61°59.2	8°56.2
Mer.p	ass. 03:24	$\nu$ -0.6' d0	.1′ m-4.01	$\nu 1.1' \ d-0$	0.6' m1.60	$\nu 1.9' d-0$	.0′ m-1.92	$\nu^{2.5'} d0$	.0′ m0.81	Peacock	53°04.4	-56°39.1
										Deneb	49°25.0	45°22.3
			_		_		_		_	Enif	33°38.0	9°59.6
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.9	-46°50.0
0	309°51.5	218°49.0	N21°55.1	133°00.5	N02°02.1	207°08.0	N22°50.5	307°24.6	S01°31.6	Fomalhaut	15°13.7	-29°29.0
1	324°53.9	233°48.3	55.2	148°01.5	01.5	222°09.8	50.4	322°27.1	31.6	Scheat	13°44.5	28°13.3
2	339°56.4	248°47.7	55.3	163°02.6	00.8 02°00 2	237°11.7	50.4	337°29.7	31.7	Markab	13°29.2	15°20.6
3	354°58.9	263°47.0	• • 55.4	178°03.7	02°00.2	252°13.6	• • 50.3	352°32.2	• • 31.7	Jul 30 Wed	SHA	Mer.pass
4	10°01.3	278°46.4	55.5	193°04.7	01°59.6	267°15.5	50.3	7°34.7	31.8		271°26.9	09:23
5	25°03.8	293°45.7	55.7 N21°55.7	208°05.8	58.9 No1°58.3	282°17.4	50.2	22°37.3	31.8 \$01°31.0	<b>I</b>	271 26.9 184°16.2	15:10
6	40°06.3	308°45.1	N21°55.7	223°06.9	N01°58.3	297°19.3	N22°50.2	37°39.8	S01°31.9		257°44.4	10:16
7	55°08.7 70°11.2	323°44.4	55.8 55.0	238°07.9	57.6 57.0	312°21.2 327°23.0	50.2 50.1	52°42.3 67°44.8	31.9	Saturn	257 44.4 357°30.1	03:38
8 9	70°11.2 85°13.6	338°43.7 353°43.1	55.9 • • 56.0	253°09.0 268°10.0	57.0 • • 56.4	327°23.0 342°24.9	50.1 •• 50.1	67°44.8 82°47.4	31.9 · · 32.0	Jaturn	JJ1 JU.1	05.30
9 10	85 13.6 100°16.1	353 43.1 8°42.4	56.1	283°11.1	55.7	342 24.9 357°26.8	50.0	82 47.4 97°49.9	32.0	Jul 31 Thu	SHA	Mer.pass
11	100 10.1 115°18.6	23°41.8	56.2	203 11.1 298°12.2	55. <i>1</i> 55.1	12°28.7	50.0	97 49.9 112°52.4	32.1		270°12.3	09:24
12	130°21.0	25 41.6 38°41.1	N21°56.3	313°13.2	N01°54.4	27°30.6	N22°49.9	112 52.4 127°55.0	501°32.1		183°42.6	15:09
13	145°23.5	50 41.1 53°40.5	N21 50.5 56.4	313 13.2 328°14.3	53.8	42°32.5	49.9	142°57.5	32.1	Jupiter		10:13
14	160°26.0	68°39.8	56.5	343°15.3	53.2	57°34.4	49.9	158°00.0	32.1	Saturn	357°31.6	03:34
14 15	175°28.4	83°39.1	56.6	358° 16.4	52.5	72°36.2	• • 49.8	173°02.6	32.2	A 01 F '	СПУ	Me:: ====
16	175° 20.4° 190° 30.9	98°38.5	56.7	13°17.5	51.9	87°38.1	49.8	173 02.0 188°05.1	32.3	Aug 01 Fri	<b>SHA</b> 268°57.5	Mer.pass 09:25
17	205°33.4	96° 36.3 113° 37.8	56.8	28°18.5	51.9	102°40.0	49.8	203°07.6	32.3		268°57.5 183°09.0	
18	200° 35.4 220° 35.8	113°37.8 128°37.2	N21°56.9	43°19.6	N01°50.6	102 40.0 117°41.9	N22°49.7		S01°32.3		257°16.5	15:07 10:10
19	235°38.3	143°36.5	56.9	58°20.7	49.9	132°43.8	49.6	233°12.7	32.4	Saturn		03:30
20	250°40.7	158°35.8	57.0	73°21.7	49.3	147°45.7	49.6	248°15.2	32.4	Saturn	JJ1 JJ.1	05:50
21	265°43.2	173°35.2	57.1	88°22.8	• • 48.7	162°47.6	• • 49.6	263°17.8	32.5	Horizont	tal parallax	
22	280°45.7	188°34.5	57.2	103°23.8	48.0	177°49.5	49.5	278°20.3	32.5		Venus:	0.1
23	295°48.1	203°33.9	57.3	118°24.9	47.4	192°51.3	49.5	293°22.8	32.6	L	Mars:	0.1
Mer.p	ass. 03:20	$\nu$ -0. $l'$ $d0$	.1′ m-4.00	$\nu$ 1.1′ $d$ -0	0.6′ m1.60	$\nu$ 1.9′ $d$ -0	.0′ m-1.92	$\nu$ 2.5′ $d$ 0	.0′ m0.80			

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	178° 22.7	N18°29.7	120°02.6	16.5'	\$05°20.5	14.3'	54.9'
1	193°22.7	29.0	134°38.1	16.5'	05°34.8	14.3'	54.8'
2	208°22.7	28.4	149°13.6	16.5'	05°49.1	14.2'	54.8'
3	223°22.8	27.8	163°49.1	16.5'	06°03.4	14.2'	54.8'
4	238°22.8	27.2	178°24.6	16.5'	06°17.6	14.2'	54.8'
5	253°22.8	26.6	193°00.1	16.5'	06°31.7	14.1'	54.8'
6	268°22.8	$N18^{\circ}26.0$	207°35.6	16.5'	S06°45.9	14.1'	54.8'
7	283°22.9	25.4	222°11.1	16.5'	07°00.0	14.1'	54.7'
8	298°22.9	24.8	236°46.5	16.5'	07°14.0	14.0'	54.7'
9	313°22.9	• • 24.2	251°22.0	16.4'	07°28.1	14.0'	54.7'
10	328°22.9	23.6	265°57.4	16.4'	07°42.1	14.0'	54.7'
11	343°23.0	23.0	280°32.9	16.4'	07°56.0	13.9'	54.7'
12	358°23.0	N18°22.4	295°08.3	16.4	508°10.0	13.9'	54.7'
13	13°23.0	21.7	309°43.7	16.4	08°23.8	13.8'	54.6'
14	28°23.1 43°23.1	21.1	324°19.1 338°54.5	16.4	08°37.7 08°51.5	13.8' 13.8'	54.6' 54.6'
15 16	43 23.1 58°23.1	19.9	358 54.5 353°29.8	16.4' 16.3'	08 51.5 09°05.2	13.8	54.6'
17	73°23.1	19.9	8°05.2	16.3	09°03.2	13.7	54.6'
18	88° 23.2	N18°18.7	22°40.5	16.3	509°32.6	13.6'	54.6'
19	103°23.2	18.1	37°15.8	16.3	09°46.3	13.6'	54.5
20	118° 23.2	17.4	51°51.1	16.3	09°40.3	13.5	54.5
21	133°23.3	16.8	66°26.3	16.2	10°13.4	13.5'	54.5
22	148° 23.3	16.2	81°01.6	16.2'	10°26.9	13.5'	54.5'
23	163°23.3	15.6	95°36.8	16.2'	10°40.4	13.4'	54.5'
	SD = 15.7'	d = -0.6'			0 = 15.0'		
	3D = 13.7	<u>u = -0.0</u>		JL	7 — 15.0		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°23.4	N18° 15.0	110°12.0	16.2'	\$10°53.8	13.4'	54.5'
1	193°23.4 208°23.4	14.4	124°47.1 139°22.3	16.1'	11°07.1 11°20.5	13.3' 13.3'	54.5'
2	208°23.4 223°23.4	13.7 •• 13.1	139°22.3 153°57.4	16.1' 16.1'	11°20.5 11°33.7	13.3'	54.5' 54.4'
3 4	223 23.4 238°23.5	12.5	153 57.4 168°32.5	16.1	11 33.7 11°46.9	13.2'	54.4'
5	253° 23.5	11.9	183°07.5	16.0'	11 40.9 12°00.1	13.1	54.4
6	268° 23.5	N18°11.3	197°42.5	16.0'	\$12°13.2	13.1	54.4'
7	283°23.6	10.6	212°17.5	15.9'	12°26.3	13.1	54.4
8	298°23.6	10.0	226°52.4	15.9'	12°39.3	13.0'	54.4'
9	313°23.6	• • 09.4	241°27.4	15.9'	12°52.3	12.9'	54.4'
10	328°23.7	08.8	256°02.2	15.8'	13°05.2	12.9'	54.4'
11	343°23.7	08.2	$270^{\circ}37.1$	15.8'	13°18.0	12.8'	54.4'
12	358°23.8	N18°07.5	285°11.9	15.8'	S13°30.8	12.7'	54.3'
13	13°23.8	06.9	299°46.6	15.7'	13°43.5	12.7'	54.3'
14	28°23.8	06.3	314°21.4	15.7'	13°56.2	12.6'	54.3'
15	43°23.9	• • 05.7	328°56.1	15.6'	14°08.9	12.6'	54.3'
16	58°23.9	05.0	343°30.7	15.6'	14°21.4	12.5'	54.3'
17	73°23.9 88°24.0	04.4 N18°03.8	358°05.3 12°39.9	15.6' 15.5'	14°33.9 \$14°46.4	12.5'	54.3'
18 19	103°24.0	03.2	12 39.9 27°14.4	15.5'	14°58.8	12.4' 12.3'	54.3' 54.3'
20	103 24.0 118° 24.0	03.2	41°48.8	15.4	14 56.6 15°11.1	12.3'	54.3'
21	133° 24.1	01.9	56°23.3	15.4	15°23.4	12.3	54.3'
22	148° 24.1	01.3	70°57.6	15.3'	15° 35.6	12.1'	54.3'
23	163°24.1	00.6	85°31.9	15.3'	15°47.7	12.1'	54.3'
_,	SD = 15.7'	d = -0.6'			0 = 14.9'		
<b>-</b> ·					Б.		
Fri	<b>GHA</b> 178°24.2	<b>Dec</b> N18°00.0	<b>GHA</b> 100°06.2	ν 15.2'	Dec \$15°59.8	d 12.0'	HP
0 1	178°24.2 193°24.2	N18°00.0 17°59.4	100°06.2 114°40.5	15.2' 15.2'	515°59.8 16°11.8	12.0' 12.0'	54.2' 54.2'
2	208° 24.3	17 59.4 58.7	114 40.5 129°14.6	15.2 15.1'	16 11.8 16°23.8	12.0	54.2'
3	206 24.3 223°24.3	58.1	143°48.8	15.1	16°25.6	11.9	54.2'
4	238° 24.3	57.5	158°22.8	15.1	16°47.5	11.8'	54.2'
5	253° 24.4	56.9	172°56.8	15.0'	16°59.3	11.7'	54.2'
6	268° 24.4	N17°56.2	187°30.8	14.9'	S17°10.9	11.6'	54.2'
7	283° 24.5	55.6	202°04.7	14.9'	17°22.6	11.5'	54.2'
8	298°24.5	55.0	216°38.6	14.8'	17°34.1	11.5'	54.2'
9	313°24.5	• • 54.3	231°12.4	14.7'	17°45.6	11.4'	54.2'
10	328° 24.6	53.7	245°46.1	14.7'	17°57.0	11.3'	54.2'
11	343°24.6	53.0	260°19.8	14.6'	18°08.3	11.3'	54.2'
12	358° 24.7	N17°52.4	274°53.4	14.6'	\$18°19.6	11.2'	54.2'
13	13°24.7	51.8	289°27.0	14.5'	18°30.8	11.1'	54.2'
14	28°24.7	51.1	304°00.5 318°33.9	14.4'	18°41.9 18°52.9	11.0'	54.2'
15 16	43°24.8 58°24.8	· · 50.5 49.9	318°33.9 333°07.3	14.4' 14.3'	18°52.9 19°03.9	11.0' 10.9'	54.2' 54.2'
16 17	58°24.8 73°24.9	49.9 49.2	333°07.3 347°40.6	14.3'	19°03.9 19°14.8	10.9'	54.2' 54.2'
18	73 24.9 88°24.9	49.2 N17°48.6	2°13.9	14.3	19 14.8 \$19°25.6	10.8	54.2'
19	103°25.0	47.9	2 13.9 16°47.1	14.2	19°36.3	10.7	54.2'
20	118° 25.0	47.3	31°20.2	14.1'	19° 47.0	10.7	54.2'
21	133° 25.0	46.7	45°53.3	14.0'	19°57.5	10.5	54.2'
22	148° 25.1	46.0	60°26.2	13.9'	20°08.0	10.4	54.2'
23	163°25.1	45.4	74°59.2	13.9'	20°18.4	10.3'	54.2'
	SD = 15.8'	d = -0.6'		SE	0 = 14.8'		

Lat.	Twilight		Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junise	Juliset	Civil	Naut.
N $72^{\circ}$						
<b>N</b> 70°	////	////	01:19	22:45	////	////
68°	////	////	02:11	21:57	////	////
66°	////	////	02:43	21:27	////	////
64°	////	01:35	03:06	21:05	22:33	////
62°	////	02:12	03:24	20:47	21:57	////
60°	////	02:38	03:39	20:32	21:33	////
<b>N</b> 58°	01:26	02:57	03:52	20:20	21:13	22:42
56°	02:00	03:14	04:02	20:09	20:57	22:10
54°	02:24	03:27	04:12	20:00	20:44	21:47
52°	02:43	03:39	04:21	19:51	20:33	21:28
50°	02:58	03:49	04:28	19:44	20:22	21:13
45°	03:28	04:11	04:44	19:28	20:01	20:44
<b>N</b> 40°	03:50	04:27	04:58	19:15	19:45	20:22
35°	04:07	04:41	05:09	19:04	19:31	20:05
30°	04:21	04:53	05:19	18:54	19:20	19:51
20°	04:44	05:12	05:35	18:37	19:01	19:29
<b>N</b> 10°	05:01	05:27	05:50	18:23	18:45	19:11
0°	05:16	05:41	06:03	18:10	18:32	18:57
<b>S</b> 10°	05:29	05:54	06:16	17:57	18:19	18:44
$20^{\circ}$	05:40	06:07	06:30	17:43	18:06	18:33
30°	05:52	06:21	06:46	17:27	17:52	18:21
35°	05:58	06:28	06:55	17:18	17:45	18:15
40°	06:04	06:37	07:06	17:08	17:36	18:09
45°	06:11	06:46	07:18	16:55	17:27	18:03
<b>S</b> 50°	06:18	06:57	07:33	16:41	17:16	17:55
52°	06:21	07:02	07:40	16:34	17:11	17:52
54°	06:25	07:08	07:47	16:26	17:06	17:49
56°	06:28	07:14	07:56	16:18	17:00	17:45
58°	06:32	07:21	08:05	16:08	16:53	17:41
<b>S</b> 60°	06:37	07:28	08:17	15:57	16:46	17:37
		Moonris	ie		Moonset	
Lat.	١ ,,, ,	<b>T</b> 1				

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

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.			
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	6-8	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	27-45%	
30	06:29	06:28	12:06	16:27	04:07		
31	06:27	06:25	12:06	17:08	04:47		
01	06:23	06:21	12:06	17:51	05:29		

## August 02, 03, 04 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	310°50.6	218°33.2	N21°57.4	133°26.0	N01° 46.7	207°53.2	N22°49.4	308° 25.4	S01°32.6			
1	325°53.1	233°32.5	57.4	148° 27.0	46.1	222°55.1	49.4	323°27.9	32.6	Alpheratz	357°34.1	29°13.9
2	340°55.5	248°31.9	57.5	163°28.1	45.5	237°57.0	49.3	338° 30.5	32.7	Ankaa	353°06.4	-42°09.7
3	355°58.0	263°31.2	• • 57.6	$178^{\circ}29.1$	• • 44.8	252°58.9	• • 49.3	353°33.0	• • 32.7	Schedar	349°30.2	56°40.5
4	11°00.5	278°30.6	57.7	193°30.2	44.2	268°00.8	49.2	8°35.5	32.8	Diphda Achernar	348°46.6 335°19.7	-17°50.6 -57°06.1
5	$26^{\circ}02.9$	293°29.9	57.8	208°31.3	43.5	283°02.7	49.2	23°38.1	32.8	Hamal	327°50.6	23°35.0
6	41°05.4	308° 29.2	N21°57.8	223°32.3	N01°42.9	298°04.6	N22°49.2	38°40.6	S01°32.8	Polaris	313°51.4	89°22.0
7	56°07.9	323°28.6	57.9	238°33.4	42.3	313°06.4	49.1	53°43.1	32.9	Acamar	315°11.4	-40°11.8
8	71°10.3	338°27.9	58.0	253°34.4	41.6	328°08.3	49.1	68° 45.7	32.9	Menkar	314°05.7	4°11.5
9	86° 12.8	353°27.2	58.1	268°35.5 283°36.6	• • 41.0	343°10.2 358°12.1	• • 49.0	83°48.2	• • 33.0	Mirfak	308°27.7	49°56.9
10 11	101°15.2 116°17.7	8°26.6 23°25.9	58.1 58.2	283 30.0 298°37.6	40.3 39.7	13°14.0	49.0 48.9	98°50.7 113°53.3	33.0 33.1	Aldebaran	290°39.2	16°33.7
12	131°20.2	38° 25.2	N21°58.3	313°38.7	N01°39.0	28°15.9	N22°48.9	113 55.5 128° 55.8	S01°33.1	Rigel	281°03.6	-8°10.2
13	146°22.6	53°24.6	58.3	328°39.7	38.4	43°17.8	48.8	143°58.3	33.1	Capella	280°21.5	46°01.3
14	161°25.1	68°23.9	58.4	343°40.8	37.8	58°19.7	48.8	159°00.9	33.2	Bellatrix	278°22.6	6°22.5
15	176°27.6	83°23.3	• • 58.5	358°41.8	• • 37.1	73°21.6	• • 48.8	174°03.4	• • 33.2	Elnath	278°01.5 275°37.5	28°37.7 -1°11.0
16	191°30.0	98°22.6	58.5	13°42.9	36.5	88°23.4	48.7	$189^{\circ}06.0$	33.3	Alnilam Betelgeuse	270°51.8	7°24.8
17	206°32.5	113°21.9	58.6	28°44.0	35.8	103°25.3	48.7	204°08.5	33.3	Canopus	263°52.6	-52°42.3
18	221°35.0	128°21.3	N21°58.7	43°45.0	N01°35.2	118°27.2	N22°48.6	219° 11.0	S01°33.4	Sirius	258°26.1	-16°44.9
19	236°37.4	143°20.6	58.7	58°46.1	34.6	133°29.1	48.6	234° 13.6	33.4	Adhara	255°05.8	-29°00.2
20	251°39.9	158° 19.9	58.8	73°47.1	33.9	148°31.0	48.5	249°16.1	33.4	Procyon	244°50.7	5°09.7
21 22	266° 42.4 281° 44.8	173° 19.3 188° 18.6	• • 58.8 58.9	88°48.2 103°49.3	· · 33.3 32.6	163°32.9 178°34.8	•• 48.5 48.5	264°18.6 279°21.2	· · 33.5	Pollux	243°17.1	27°57.9
23	201 44.0 296°47.3	203° 17.9	56.9 59.0	103 49.3 118°50.3	32.0	176 34.6 193°36.7	46.5 48.4	279 21.2 294°23.7	33.6	Avior	$234^{\circ}15.2$	-59°35.4
										Suhail	222°46.4	-43°32.1
Mer.p	ass. 03:16	$\nu$ -0.7′ d0.	.1′ m-4.00	$\nu 1.1' d-0$	.6′ m1.60	$\nu 1.9' \ d-0$	.0′ m-1.92	$\nu 2.5' d0$	.0′ m0.79	Miaplacidus	221°39.2	-69°49.3
										Alphard Regulus	217°47.6 207°34.2	-8°46.1 11°50.6
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.9	61°37.0
0	$311^{\circ}49.7$	$218^{\circ}17.3$	N21°59.0	133°51.4	N01°31.3	208°38.6	N22°48.4	309°26.3	S01°33.6	Denebola	182°24.7	14°25.9
1	326°52.2	233°16.6	59.1	148°52.4	30.7	223°40.5	48.3	324°28.8	33.7	Gienah	175°43.3	-17°41.1
2	341°54.7	248°15.9	59.1	163°53.5	30.1	238°42.3	48.3	339°31.3	33.7	Acrux	173°00.0	-63°14.7
3 4	356°57.1 11°59.6	263°15.3	59.2	178°54.5	• • 29.4	253°44.2 268°46.1	48.2	354°33.9 9°36.4	•• 33.7	Gacrux	$171^{\circ}51.5$	-57°15.6
5	27°02.1	278°14.6 293°13.9	59.2 59.3	193°55.6 208°56.7	28.8 28.1	283°48.0	48.2 48.1	9 30.4 24°39.0	33.8 33.8	Alioth	166°12.8	55°49.5
6	42°04.5	308° 13.3	N21°59.3	223°57.7	N01°27.5	298°49.9	N22°48.1	39°41.5	S01°33.9	Spica	158°21.9	-11°17.7
7	57°07.0	323°12.6	59.4	238°58.8	26.8	313°51.8	48.1	54°44.0	33.9	Alkaid	152°51.7	49°11.4
8	72°09.5	338°11.9	59.4	253°59.8	26.2	328°53.7	48.0	69°46.6	34.0	Hadar Menkent	148°35.4 147°57.1	-60°30.0 -36°29.9
9	$87^{\circ}11.9$	353°11.3	• • 59.5	269°00.9	• • 25.6	343°55.6	• • 48.0	84°49.1	• • 34.0	Arcturus	147 57.1 145°47.5	19°03.1
10	102° 14.4	8°10.6	59.5	284°01.9	24.9	358°57.5	47.9	99°51.6	34.0	Rigil Kent.	139°39.7	-60°56.7
11	117° 16.8	23°09.9	59.6	299°03.0	24.3	13°59.4	47.9	114°54.2	34.1	Kochab	$137^{\circ}19.7$	74°03.3
12	132° 19.3 147° 21.8	38°09.3	N21°59.6	314°04.1	N01°23.6	29°01.3	N22°47.8	129°56.7	S01°34.1	Zuben'ubi	$136^{\circ}55.5$	-16°08.9
13 14	147°21.8 162°24.2	53°08.6 68°07.9	59.7 59.7	329°05.1 344°06.2	23.0 22.4	44°03.1 59°05.0	47.8 47.7	144°59.3 160°01.8	34.2 34.2	Alphecca	126°03.2	26°37.9
15	102 24.2 177°26.7	83°07.2	59.8	359°07.2	. 21.7	74°06.9	• • 47.7	175°04.3	• • 34.3	Antares	112°15.1	-26°29.4
16	192°29.2	98°06.6	59.8	14°08.3	21.1	89°08.8	47.6	190°06.9	34.3	Atria	107°08.5	-69°04.6
17	$207^{\circ}31.6$	113°05.9	59.8	29°09.3	20.4	104°10.7	47.6	205°09.4	34.4	Sabik Shaula	102°02.0 96°09.4	-15°45.4 -37°07.4
18	$222^{\circ}34.1$	128°05.2	N21°59.9	44°10.4	N01°19.8	119°12.6	N22°47.6	220°12.0	S01°34.4	Rasalhague	95°57.9	12°32.6
19	237°36.6	143°04.6	21°59.9	59° 11.5	19.1	134°14.5	47.5	235° 14.5	34.4	Eltanin	90°41.6	51°29.3
20	252°39.0	158°03.9	22°00.0	74°12.5	18.5	149°16.4	47.5	250°17.1	34.5	Kaus Aust.	83°31.5	-34°22.4
21	267°41.5	173°03.2	• • 00.0	89°13.6	• • 17.8	164°18.3	• • 47.4	265°19.6	• • 34.5	Vega	80°32.5	38°48.6
22 23	282°44.0 297°46.4	188°02.5 203°01.9	00.0 00.1	104°14.6 119°15.7	17.2 16.6	179°20.2 194°22.1	47.4 47.3	280°22.1 295°24.7	34.6	Nunki	75°46.8	-26°15.9
									34.6	Altair	61°59.2	8°56.2
Mer.p	ass. 03:12	$\nu$ -0.7′ d0.	.1′ m-4.00	$\nu 1.1' \ d$ -0	.6′ m1.61	$\nu 1.9' \ d-0$	.0′ m-1.92	$\nu 2.5' \ d0$	.0′ m0.79	Peacock	53°04.4	-56°39.1
										Deneb Enif	49°25.0 33°38.0	45°22.3 9°59.6
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.9	-46°50.0
0	$312^{\circ}48.9$	218°01.2	$N22^{\circ}00.1$	$134^{\circ}16.7$	$N01^{\circ}15.9$	$209^{\circ}24.0$	N22°47.3	$310^{\circ}27.2$	S01°34.7	Fomalhaut	15°13.7	-40° 30.0 -29° 29.0
1	327°51.3	233°00.5	00.1	149° 17.8	15.3	224°25.8	47.2	325°29.8	34.7	Scheat	13°44.5	28°13.3
2	342°53.8	247°59.9	00.2	164° 18.8	14.6	239°27.7	47.2	340°32.3	34.8	Markab	13°29.2	15°20.6
3	357°56.3	262°59.2	00.2	179°19.9	• • 14.0	254°29.6	• • 47.2	355°34.8	• • 34.8	A 02 C :	CIIA	
4	12°58.7	277°58.5	00.2	194°21.0	13.3	269°31.5	47.1	10°37.4	34.8	Aug 02 Sat	SHA 267°42.6	Mer.pass
5 6	28°01.2 43°03.7	292°57.8 307°57.2	00.2 N22°00.3	209°22.0 224°23.1	12.7 N01°12.1	284°33.4 299°35.3	47.1 N22°47.0	25°39.9	34.9 \$01°34.9		267°42.6 182°35.4	09:26 15:05
7	58°06.1	322° 56.5	00.3	239°24.1	11.4	314°37.2	47.0	55° 45.0	35.0	Jupiter		10:07
8	73°08.6	337°55.8	00.3	254°25.2	10.8	329°39.1	46.9	70°47.6	35.0	Saturn	357°34.8	03:26
9	88°11.1	352°55.2	• • 00.3	269°26.2	• • 10.1	344°41.0	• • 46.9	85°50.1	• • 35.1		6114	
10	$103^{\circ}13.5$	7°54.5	00.4	284°27.3	09.5	359°42.9	46.8	$100^{\circ}52.6$	35.1	Aug 03 Sun	<b>SHA</b> 266° 27.5	Mer.pass 09:27
11	118° 16.0	22°53.8	00.4	299°28.3	8.80	14°44.8	46.8	115°55.2	35.2	1	182°01.6	15:04
12	133° 18.5	37°53.1	N22°00.4	314°29.4	N01°08.2	29°46.7	N22°46.7	130°57.7	S01°35.2	1	256°48.8	10:04
13	148°20.9	52°52.5	00.4	329°30.4	07.6	44°48.6	46.7	146°00.3	35.3	Saturn		03:22
14 15	163°23.4 178°25.8	67°51.8 82°51.1	00.4 •• 00.5	344°31.5 359°32.6	06.9 •• 06.3	59°50.5 74°52.4	46.7 •• 46.6	161°02.8 176°05.4	35.3 · · 35.3	Λιισ Ω4 Ν4-		
16	176 25.6 193°28.3	97°50.4	00.5	14°33.6	05.6	89°54.2	46.6	170 05.4 191°07.9	35.4	Aug 04 Mon Venus	<b>SHA</b> 265°12.3	Mer.pass 09:28
17	208° 30.8	112°49.8	00.5	29°34.7	05.0	104°56.1	46.5	206° 10.4	35.4	1	181°27.9	15:02
18	223°33.2	127°49.1	N22°00.5	44°35.7	N01°04.3	119°58.0	N22°46.5		S01°35.5	Jupiter	256°35.1	10:01
19	238° 35.7	142°48.4	00.5	59°36.8	03.7	134°59.9	46.4	$236^{\circ}15.5$	35.5	Saturn	357°38.3	03:18
20	253°38.2	157° 47.7	00.5	74°37.8	03.0	150°01.8	46.4	251°18.1	35.6			
21	268° 40.6	172°47.1	00.6	89°38.9	. 02.4	165°03.7	• • 46.3	266°20.6	• • 35.6	Horizont	al parallax Venus:	0.1
22 23	283°43.1 298°45.6	187° 46.4 202° 45.7	00.6 00.6	104°39.9 119°41.0	01.8 01.1	180°05.6 195°07.5	46.3 46.2	281°23.2 296°25.7	35.7 35.7		Mars:	0.1
										L		
ivier.p	ass. 03:08	$\nu$ -0.1' d0	.0′ m-3.99	$\nu_{1.1}$ d-0	.6′ m1.61	$\nu_{1.9}$ d-0	.0′ m-1.92	$\nu$ 2.5′ $d0$	.0′ m0.78			

Sat	h	Su	Moon					
1	Sat	GHA	Dec	GHA	ν	Dec	d	HP
2	0		N17° 44.7					
3								
5 238°25.4 42.2 147°42.8 13.5' 21°09.2 9.9' 54.2' 6 268°25.4 N17°40.9 176°47.8 13.4' 21°19.1 9.8' 54.2' 7 283°25.5 40.2 191°20.1 13.3' 21°38.7 9.6' 54.2' 8 298°25.5 39.6 205°52.4 13.2' 21°48.3 9.5' 54.2' 9 313°25.6 · 38.9 220°24.7 13.2' 21°48.9 9.5' 54.2' 10 328°25.6 38.3 24°56.8 13.1' 22°07.3 94.5' 54.2' 11 343°25.7 37.7 249°28.9 13.0' 22°16.7 9.3' 54.2' 11 343°25.7 N17°37.0 264°00.9 12.9' \$22°6.7 9.3' 54.2' 12 358°25.8 35.7 293°04.7 12.8' 22°44.2 9.0' 54.2' 13 13°25.8 36.4 278°32.9 12.9' 22°35.1 91.5 54.2' 14 28°25.8 35.7 293°04.7 12.8' 22°44.2 9.0' 54.2' 15 43°25.9 34.4 322°08.2 12.6' 23°02.1 8.8' 54.2' 16 58°25.9 34.4 322°08.2 12.6' 23°02.1 8.8' 54.2' 17 73°26.0 33.8 336°39.9 12.6' 23°02.1 8.8' 54.2' 23 188°26.1 N17°3.1 351°11.4 12.5' \$22°19.6 8.6' 54.2' 21 183°26.2 · 31.2 34°45.7 12.3' 23°45.1 8.3' 54.3' 22 148°26.2 30.5 49°16.9 12.2' 23°53.4 8.2' 54.3' 23 163°26.3 29.8 63°48.1 12.1' 24°01.6 8.1' 54.3' 25 1 193°26.4 28.5 92°50.3 12.0' 24°17.6 7.9' 54.3' 2 2 208°26.4 27.9 107°21.2 11.9' 24°25.5 7.8' 54.3' 2 2 208°26.4 27.9 107°21.2 11.9' 24°25.5 7.8' 54.3' 3 223°26.5 26.6 136°22.9 11.7' 24°41.0 7.6' 54.3' 2 2 208°26.6 07.7' 25.3 165°24.3 11.4' 25°10.5 7.1' 54.4' 2 238°26.5 26.6 136°22.9 11.7' 24°41.0 7.6' 54.3' 3 232°26.5 26.6 136°22.9 11.7' 24°41.0 7.6' 54.3' 4 238°26.5 26.6 136°22.9 11.7' 24°41.0 7.6' 54.3' 5 253°26.6 25.9 150°53.6 11.6' 24°48.5 7.4' 54.3' 10 328°26.7 24.6 179°58.8 11.3' 25°37.7' 7.0' 54.4' 11 343°26.9 22.0 237°56.4 11.2' 25°31.6 6.8' 54.4' 11 343°26.9 22.0 237°56.1 11.0' 25°45.0 6.5' 54.4' 11 343°27.0 11.7' 21.3' 25°26.5 11.1' 25°33. 7.2' 54.4' 18 88°27.0 N17°21.3 25°26.5 11.1' 25°33. 5.7' 54.5' 19 313°26.8 23.3 208°55.8 11.3' 25°27.7 7.0' 54.4' 19 133°27.7 12.7 80°52.2 10.2' 26°55.6 5.1' 54.6' 19 313°28.6 00.7' 21.2' 21.2' 25°53.6 6.5' 54.4' 11 343°27.5 11.7' 12.7' 339°56.7 11.0' 25°45.0 6.5' 54.4' 11 343°27.1 10.0 28°57.7 10.0' 25°45.0 6.5' 54.5' 22 148°27.7 11.0 28°57.7 10.0' 25°51.5 6.5' 54.5' 23 163°27.9 10.7' 124°19.4 9.9' 27°10.4 4.7' 54.6' 15 22 28°27.9 10.7' 124°19.4 9.9' 27°10								
5								
R   288°25.5   40.2   191°20.1   13.3   21°38.7   9.6   54.2′     S   298°25.5   33.6   205°52.4   13.2′   21°48.3   9.5   54.2′     9   313°25.6   33.9   220°24.7   13.2′   21°57.9   9.5   54.2′     10   328°25.6   33.3   234′56.8   13.1′   22°17.3   9.4′   54.2′     11   343°25.7   37.7   249′28.9   13.0′   22°16.0   9.2′   54.2′     12   388°25.7   N17°37.0   264′90.9   12.9′   522°26.0   9.2′   54.2′     13   13°25.8   36.4   278°32.9   12.9′   22°25.1   9.1′   54.2′     14   28°25.8   35.7   293′04.7   12.8′   22°44.2   90.5   54.2′     15   43°25.9   35.1   307°36.5   12.7′   22°53.2   8.9′   54.2′     16   58°25.9   34.4   322′90.2   12.6′   23°01.9   8.7′   54.2′     17   73°26.0   33.8   336°39.9   12.6′   23°01.9   8.7′   54.2′     18   88°26.0   N17°33.1   351°11.4   12.5′   523°19.6   8.6′   54.2′     19   103°26.1   31.8   20°14.3   12.3′   23°36.7   8.4′   54.3′     21   133°26.2   30.5   49°16.9   12.2′   23°38.4   8.2′   54.3′     22   148°26.2   30.5   49°16.9   12.2′   23°38.4   8.2′   54.3′     22   148°26.2   30.5   49°16.9   12.2′   23°36.4   8.2′   54.3′     23   163°26.3   29.8   63°48.1   12.1′   24°01.6   8.1′   54.3′     24   238°26.5   27.2   121°52.1   11.8′   24°33.3   7.7′   54.3′     25   253°26.6   25.9   150°53.6   11.6′   24°48.5   7.4′   54.3′     25   253°26.6   25.9   150°53.6   11.6′   24°48.5   7.4′   54.3′     26   266°26.6   N17°25.3   165°24.3   11.6′   524°36.0   7.3′   54.3′     27   233°26.7   24.6   179°54.8   11.5′   25°01.3   7.1′   54.4′     28   298°26.7   23.9   194°25.3   11.4′   25°10.5   7.1′   54.4′     28   298°26.7   23.9   194°25.3   11.6′   25°45.0   6.5′   54.4′     11   343°26.9   22.0   237°6.4   11.2′   25°10.5   7.1′   54.4′     12   358°27.0   N17°13.3   259°26.5   11.1′   25°51.5   6.5′   54.4′     13   31°27.0   20.7   266°56.7   10.9   25°45.0   6.5′   54.4′     15   43°27.1   10.0   236°56.7   10.9   25°47.0   6.5′   54.4′     16   58°28.6   0.17′08.3   33°39.2   0.1   27°55.6   4.8′   54.5′     10   328°28.1   0.0   0.87′06.4   10.0′   27°		253°25.4	41.5		13.4'	$21^{\circ}19.1$	9.8'	54.2'
Section   Sec								
10   313°25.6   -38.9   220°24.7   13.2   21°57.9   9.5   54.2     10   328°25.6   38.3   234°58.8   13.1   22°27.3   9.4   54.2     11   343°25.7   37.7   249°28.9   13.0   22°16.7   9.5   54.2     12   358°25.7   N17°37.0   264°00.9   12.9   S22°26.0   9.2   54.2     13   13°25.8   36.4   278°32.9   12.9   22°35.1   91.   54.2     14   28°25.8   35.7   293°04.7   12.8   22°44.2   9.0   54.2     15   43°25.9   -35.1   307°36.5   12.7   22°42.2   9.0   54.2     16   58°25.9   34.4   322°08.2   12.6   23°02.1   88.5   54.2     17   73°26.0   33.8   336°39.9   12.6   23°02.1   88.5   54.2     18   88°26.0   N17°33.1   351°11.4   12.5   S23°19.6   86.5   54.2     19   103°26.1   31.8   20°14.3   12.3   23°36.7   8.4   54.3     20   118°26.2   30.5   49°16.9   12.2   23°53.4   8.2   54.3     21   133°26.2   -31.2   34°45.7   12.3   23°45.1   8.3   54.3     22   148°26.2   30.5   49°16.9   12.2   23°53.4   8.2   54.3     23   163°26.3   29.8   63°48.1   12.1   24°01.6   81.   54.3     3   223°26.5   -27.2   121°52.1   11.8   24°33.3   7.7   54.3     2   208°26.4   27.9   107°21.2   11.9   24°25.5   78.5   54.3     3   223°26.5   -27.2   121°52.1   11.8   24°33.3   7.7   54.3     4   238°26.7   22.9   194°25.3   11.6   S24°56.0   7.3   54.3     5   233°26.8   22.6   233°26.5   11.1   25°10.5   7.1   54.4     9   313°26.8   22.6   223°26.5   11.1   25°10.5   7.1   54.4     9   313°26.8   22.0   237°56.4   11.5   25°10.3   7.2   54.4     11   343°26.9   22.0   237°56.4   10.2   25°31.6   6.8   54.4     11   343°26.9   22.0   237°56.4   10.2   25°31.6   6.8   54.4     12   388°27.0   N17°13.4   66°23.0   10.2   25°45.0   6.5   54.4     13   34°27.0   20.7   266°56.7   10.9   25°45.0   6.5   54.4     14   28°27.1   20.0   237°56.4   10.2   25°31.6   6.5   54.4     15   43°27.1   10.0   328°56.7   10.9   25°45.0   6.5   54.4     16   58°28.6   0.7   124°19.4   9.9   27°15.1   4.6   54.5     17   73°27.2   14.0   133°45.6   10.0   27°05.6   4.8     4   238°27.9   N17°13.4   66°23.0   10.2   256°50.6   5.5   54.5     5								
10   328°25.6   38.3   234°56.8   13.1   22°07.3   9.4   54.2'     11   343°25.7   37.7   249°28.9   13.0'   22°16.7   9.3   54.2'     12   358°25.7   37.7   249°28.9   13.0'   22°16.7   9.3   54.2'     13   13°25.8   36.4   278°32.9   12.9   522°26.0   9.1   54.2'     14   28°25.8   35.7   293°04.7   12.8   22°44.2   9.0   54.2'     15   43°25.9   34.4   322°08.2   12.6'   23°02.1   8.8   54.2'     16   58°25.9   34.4   322°08.2   12.6'   23°02.1   8.8   54.2'     17   73°26.0   33.8   336°39.9   12.6'   23°10.9   8.7   54.2'     18   88°26.0   N17°33.1   351°11.4   12.5   523°19.6   8.6'   54.2'     19   103°26.1   31.8   20°14.3   12.3   23°36.7   8.4'   54.3'     20   118°26.1   31.8   20°14.3   12.3   23°36.7   8.4'   54.3'     21   133°26.2   31.2   34°45.7   12.3   23°45.1   8.3   54.3'     22   148°26.2   30.5   49°16.9   12.2   23°53.4   8.2   54.3'     23   163°26.3   29.8   63°48.1   12.1'   24°01.6   8.1'   54.3'     SD = 15.8'   d = -0.6'   SD = 14.8'    Sun   GHA   Dec   GHA   \(\nu \) Dec   d   HP     0   178°26.4   26.5   92°50.3   12.0'   24°17.6   7.9   54.3'     2   208°26.4   27.9   107°21.2   11.9   24°25.5   7.8   54.3'     3   232°26.5   26.6   136°22.9   11.7   24°41.0   7.6'   54.3'     4   238°26.5   26.6   136°22.9   11.7   24°41.0   7.6'   54.3'     5   253°26.6   25.9   150°53.6   11.6'   24°48.5   7.4'   54.3'     7   283°26.7   24.6   179°54.8   11.5   25°03.3   7.2   54.4'     8   280°26.7   24.6   179°54.8   11.5   25°03.3   7.2   54.4'     10   328°26.8   22.0   237°56.4   11.2   25°31.6   6.8   54.4'     11   343°26.9   22.0   237°56.4   11.2   25°31.6   6.8   54.4'     12   358°27.0   N17°21.3   259°66.7   10.9   25°51.5   6.5   54.4'     13   13°27.0   20.7   266°56.7   11.0   25°51.5   6.5   54.4'     14   28°27.1   20.0   281°26.7   10.9   25°51.5   6.5   54.4'     15   43°27.7   1.7   30°52.5   10.8   26°04.3   5.7'   54.5'     22   148°27.5   N17°13.4   66°23.0   10.2   25°51.5   6.5   54.5'     18   88°27.8   N17°13.4   66°23.0   10.2   25°51.5   6.5   54.5'     21								
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Sun         GHA         Dec         GHA         ν         Dec         d         HP           0         178°26.3         N17°29.2         78°19.2         12.0'         S24°09.7         8.0'         54.3'           1         193°26.4         28.5         92°50.3         12.0'         24°17.6         7.9'         54.3'           2         208°26.5         2.6.6         136°22.9         11.1'         24°41.0         7.6'         54.3'           3         223°26.6         25.9         150°53.6         11.6'         24°44.0         7.6'         54.3'           5         253°26.6         25.9         150°53.6         11.6'         524°56.0         7.3'         54.3'           6         268°26.6         N17°25.3         165°24.3         11.6'         524°56.0         7.3'         54.3'           7         283°26.7         23.9         194°25.3         11.4'         25°10.5         7.1'         54.4'           8         298°26.7         23.3         208°55.8         11.3'         25°17.7         7.0'         54.4'           10         328°26.8         22.6         223°36.1         11.3'         25°21.7         7.1'         54.4'	23			05 48.1			0.1	54.5
0         178°26.3         N17°29.2         78°19.2         12.0'         S24°09.7         8.0'         54.3'           1         193°26.4         28.5         92°50.3         12.0'         24°17.6         7.9'         54.3'           2         208°26.5         · · · 27.2         121°52.1         11.8'         24°33.3         7.7'         54.3'           3         223°26.5         · · · 27.2         121°52.1         11.8'         24°33.3         7.7'         54.3'           4         238°26.6         25.9         150°53.6         11.6'         24°41.0         7.6'         54.3'           6         268°26.6         N17°25.3         165°24.3         11.6'         524°45.0         7.4'         54.3'           7         283°26.7         24.6         179°54.8         11.5'         25°03.3         7.2'         54.4'           9         313°26.8         · 23.3         208°55.8         11.3'         25°10.5         7.1'         54.4'           10         328°26.8         22.6         223°26.1         11.3'         25°10.5         7.1'         54.4'           11         343°26.9         22.0         23°56.4         11.2'         25°31.6         6.8'		5D = 15.8'	d = -0.6'		SE	$\nu = 14.8'$		
0         178°26.3         N17°29.2         78°19.2         12.0'         S24°09.7         8.0'         54.3'           1         193°26.4         28.5         92°50.3         12.0'         24°17.6         7.9'         54.3'           2         208°26.5         · · · 27.2         121°52.1         11.8'         24°33.3         7.7'         54.3'           3         223°26.5         · · · 27.2         121°52.1         11.8'         24°33.3         7.7'         54.3'           4         238°26.6         25.9         150°53.6         11.6'         24°41.0         7.6'         54.3'           6         268°26.6         N17°25.3         165°24.3         11.6'         524°45.0         7.4'         54.3'           7         283°26.7         24.6         179°54.8         11.5'         25°03.3         7.2'         54.4'           9         313°26.8         · 23.3         208°55.8         11.3'         25°10.5         7.1'         54.4'           10         328°26.8         22.6         223°26.1         11.3'         25°10.5         7.1'         54.4'           11         343°26.9         22.0         23°56.4         11.2'         25°31.6         6.8'	Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	0	178°26.3	$N17^{\circ}29.2$	$78^{\circ}19.2$	12.0'	S24°09.7	8.0'	54.3'
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1       193°27.7       12.7       80°52.2       10.2'       26°55.6       5.1'       54.6'         2       208°27.7       12.0       95°21.3       10.1'       27°00.7       5.0'       54.6'         3       223°27.8       ·· 11.4       109°50.4       10.0'       27°05.6       4.8'       54.6'         4       238°27.9       10.7       124°19.4       9.9'       27°10.4       4.7'       54.6'         5       253°27.9       10.0       138°48.4       9.9'       27°15.1       4.6'       54.6'         6       268°28.0       N17°09.4       153°17.3       9.8'       S27°19.7       4.4'       54.7'         7       283°28.0       08.7       167°46.1       9.7'       27°24.1       4.3'       54.7'         8       298°28.1       08.0       182°14.8       9.7'       27°24.1       4.3'       54.7'         9       313°28.2       · 07.4       196°43.5       9.6'       27°32.6       4.0'       54.7'         10       328°28.2       06.7       211°12.1       9.5'       27°36.6       3.9'       54.7'         11       343°28.3       06.0       225°40.7       9.5'       27°40.5								
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17 73°28.6 02.0 312°30.6 9.1' 28°01.0 2.9' 54.8'								
		88°28.7	N17° 01.3	326°58.8				
19 103°28.8 00.6 341°26.8 9.0' 28°06.8 2.7' 54.9'								
20 118°28.8 17°00.0 355°54.8 9.0' 28°09.4 2.5' 54.9' 21 133°28.9 16°59.3 10°22.8 8.9' 28°11.9 2.4' 54.9'								
21 133°28.9 16°59.3 10°22.8 8.9' 28°11.9 2.4' 54.9' 22 148°29.0 58.6 24°50.7 8.8' 28°14.3 2.2' 54.9'								
23 163°29.0 57.9 39°18.6 8.8' 28°16.5 2.1' 55.0'								
SD = 15.8'  d = -0.7' $SD = 14.9'$		SD = 15.8'	d = -0.7'		SE	0 = 14.9'		

1 -4	Twil	ight	C	C	Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°						
<b>N</b> 70°	////	////	01:45	22:21	////	////
68°	////	////	02:26	21:42	////	////
66°	7777	00:56	02:54	21:15	23:06	////
64°	////	01:52	03:15	20:55	22:16	////
62°	////	02:24	03:32	20:38	21:45	////
60°	00:51	02:47	03:46	20:25	21:23	23:12
<b>N</b> 58°	01:42	03:05	03:58	20:13	21:05	22:27
56°	02:11	03:20	04:08	20:03	20:50	21:59
54°	02:32	03:33	04:17	19:54	20:38	21:38
52°	02:50	03:44	04:25	19:46	20:27	21:21
50°	03:04	03:54	04:32	19:39	20:17	21:07
45°	03:32	04:14	04:48	19:24	19:57	20:39
<b>N</b> 40°	03:53	04:30	05:00	19:11	19:41	20:18
35°	04:10	04:43	05:11	19:01	19:28	20:02
30°	04:24	04:55	05:20	18:52	19:17	19:48
20°	04:45	05:13	05:36	18:36	18:59	19:27
<b>N</b> 10°	05:02	05:28	05:50	18:22	18:44	19:10
0°	05:16	05:41	06:03	18:10	18:31	18:56
<b>S</b> $10^{\circ}$	05:28	05:53	06:15	17:57	18:19	18:44
20°	05:39	06:06	06:29	17:44	18:07	18:33
30°	05:50	06:19	06:44	17:29	17:54	18:23
35°	05:56	06:26	06:53	17:20	17:47	18:17
40°	06:01	06:34	07:03	17:10	17:39	18:11
45°	06:08	06:43	07:14	16:59	17:30	18:05
<b>S</b> 50°	06:14	06:53	07:28	16:45	17:20	17:59
52°	06:17	06:58	07:35	16:38	17:15	17:56
54°	06:20	07:03	07:42	16:31	17:10	17:53
56°	06:24	07:09	07:50	16:23	17:04	17:50
58°	06:27	07:15	07:59	16:14	16:58	17:46
<b>S</b> 60°	06:31	07:22	08:09	16:04	16:51	17:42
Lat.	1	Moonris	е		Moonset	:
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
N 72°						
N 70°						
68°	17.00			10.00		
66° 64°	17:39 16:39			19:22 20:22		
62°	16:06	17:57		20:56	20:45	
60°	15:41	17:16	18:47	21:21	21:27	21:44
N 58°	15:22			21:41	21:55	
56°	15:22	16:48 16:27	18:08 17:41	21:41	22:17	22:22 22:50
54°	14:52	16:09	17:41	22:12	22:35	23:11
52°	14:40	15:54	17:03	22:24	22:51	23:29
50°	14:30	15:41	16:48	22:35	23:04	23:44
45°	14:08	15:14	16:18	22:58	23:31	•• ••
N 40°	13:50	14:53	15:54	23:17	23:53	
35°	13:35	14:36	15:35	23:32	•• ••	00:11
30°	13:23	14:21	15:18	23:46		00:27
20°	13:01	13:55	14:50		00:09	00:53
$N 10^{\circ}$	12:42	13:33	14:26		00:29	01:16
0°	12:25	13:13	14:04	00:02	00:48	01:37
<b>S</b> 10°	12:08	12:53	13:42	00:17	01:07	01:59
20°	11:50	12:31	13:18	00:34	01:27	02:22
$30^{\circ}$	11:28	12:07	12:51	00:53	01:51	02:48
$35^{\circ}$	11:16	11:52	12:35	01:05	02:04	03:04
40°	11:02	11:35	12:16	01:18	02:20	03:23
45°	10:46	11:15	11:53	01:33	02:40	03:45
<b>S</b> $50^{\circ}$	10:25	10:50	11:24	01:52	03:04	04:13
52°	10:16	10:38	11:10	02:01	03:16	04:27
54°	10:05	10:24	10:53	02:12	03:29	04:44
56°	09:53	10:08	10:34	02:23	03:44	05:03
58°	09:39	09:49	10:10	02:37	04:03	05:27
<b>S</b> 60° 09:22 09:26			09:37	02:52	04:26	05:59
Sun Egn.of Time					Moon	
Day			Mer.	Mer.		Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	9-11
	mmice					
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	55-73%

06:19 06:15 06:09

02 03 04 06:17 06:12

06:07

12:06 12:06

12:06

18:36 19:25

20:17

06:13 07:00 07:51

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

h	Aries		nus	M	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	313°48.0	217°45.0	N22°00.6	134°42.0	N01°00.5	210°09.4	N22°46.2	311°28.3	S01°35.8			
1	328°50.5	232°44.4	00.6	149°43.1	00°59.8	225°11.3	46.2	326°30.8	35.8	Alpheratz	357°34.0	29° 13.9
2	343°53.0	247° 43.7	00.6	164°44.1	59.2	240°13.2	46.1	341°33.4	35.8	Ankaa	353°06.4	-42°09.7
3	358° 55.4	262°43.0	•• 00.6	179°45.2	58.5	255°15.1	• • 46.1	356°35.9	• • 35.9	Schedar	349°30.2	56° 40.5
								11°38.4		Diphda	348°46.6	-17°50.6
4	13°57.9	277°42.3	00.6	194°46.3	57.9	270°17.0	46.0		35.9	Achernar	$335^{\circ}19.6$	$-57^{\circ}06.1$
5	29°00.3	292°41.6	00.6	209°47.3	57.2	285°18.9	46.0	26°41.0	36.0	Hamal	327°50.6	23°35.0
6	44°02.8	307°41.0	N22°00.6	224°48.4	N00°56.6	300°20.8	N22°45.9	41°43.5	S01°36.0	Polaris	313°49.6	89°22.0
7	59°05.3	322°40.3	00.6	239°49.4	56.0	315°22.7	45.9	56°46.1	36.1	Acamar	315°11.4	-40° 11.8
8	74°07.7	337°39.6	00.6	254°50.5	55.3	330°24.6	45.8	71°48.6	36.1	Menkar	314°05.7	4° 11.5
9	89°10.2	352°38.9	• • 00.6	269°51.5	• • 54.7	345°26.5	• • 45.8	86°51.2	• • 36.2	Mirfak	308°27.6	49°57.0
10	104°12.7	7°38.3	00.6	284°52.6	54.0	0°28.4	45.7	101°53.7	36.2	Aldebaran	290°39.2	16°33.7
11	$119^{\circ}15.1$	22°37.6	00.6	299°53.6	53.4	15°30.3	45.7	116°56.3	36.3	1	290 39.2 281°03.6	-8° 10.2
12	134°17.6	37°36.9	N22°00.6	314°54.7	N00°52.7	30°32.2	N22°45.7	131°58.8	S01°36.3	Rigel		
13	149°20.1	52°36.2	00.6	329°55.7	52.1	45°34.0	45.6	147°01.4	36.4	Capella	280°21.5	46°01.3
14	164°22.5	67°35.5	00.6	344°56.8	51.4	60°35.9	45.6	162°03.9	36.4	Bellatrix	278°22.6	6°22.5
15	179°25.0	82°34.9	• • 00.6	359°57.8	• • 50.8	75°37.8	• • 45.5	177°06.5	• • 36.5	Elnath	278°01.5	28°37.7
16	194°27.5	97°34.2	00.6	14°58.9	50.1	90°39.7	45.5	192°09.0	36.5	Alnilam	275°37.5	-1°11.0
17	209°29.9	112°33.5	00.6	29°59.9	49.5	105°41.6	45.4	207°11.5	36.5	Betelgeuse	270°51.8	7°24.8
18	224°32.4	127°32.8	N22°00.6	45°01.0	N00°48.9	120°43.5	N22°45.4	222°14.1	S01°36.6	Canopus	263°52.6	-52°42.3
		142° 32.0		60°02.0		135°45.4		237°16.6		Sirius	$258^{\circ}26.1$	-16°44.9
19	239°34.8		00.6		48.2		45.3		36.6	Adhara	255°05.8	-29°00.2
20	254°37.3	157°31.5	00.5	75°03.1	47.6	150°47.3	45.3	252°19.2	36.7	Procyon	244°50.6	5°09.7
21	269°39.8	172°30.8	• • 00.5	90°04.1	• • 46.9	165°49.2	• • 45.2	267°21.7	• • 36.7	Pollux	243°17.1	27°57.9
22	284°42.2	187°30.1	00.5	105°05.2	46.3	180°51.1	45.2	282°24.3	36.8	Avior	234°15.2	-59°35.4
23	299°44.7	202°29.4	00.5	120°06.2	45.6	195°53.0	45.1	297°26.8	36.8	Suhail	222°46.4	-43°32.1
Mars	ass. 03:04	<i>1/</i> −0 7′ d0	.0′ m-3.99	1/1 1/ d C	0.6' m1.61	1/1 Q' d O	.0′ m-1.92	$\nu 2.5' d0$	0′ m0 79	Miaplacidus	221°39.2	-43 32.1 -69°49.3
ivier.p	vass. US.U4	ν-0.1 α0	.0 111-3.99	ν1.1 α-0	.0 1111.01	ν1.9 U-U	.0 111-1.92	ν2.5 a0.	0 1110.70	Alphard	221 39.2 217°47.6	-69 49.3 -8°46.1
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.2	11°50.6
0	314°47.2	217°28.7	N22°00.5	135°07.3	N00°45.0	210°54.9	N22°45.1	312°29.4	S01°36.9	Dubhe	193°40.9	61°37.0
1	329°49.6	232°28.1	00.5	150°08.3	44.3	225°56.8	45.1	327°31.9	36.9	Denebola	182°24.7	14°25.9
2	344°52.1	247°27.4	00.5	165°09.4	43.7	240°58.7	45.0	342°34.5	37.0	Gienah	175°43.3	-17°41.1
3	359°54.6	262°26.7	•• 00.4	180°10.4	• • 43.0	256°00.6	• • 45.0	357°37.0	• • 37.0	Acrux	173°00.0	-63°14.7
										Gacrux	171°51.5	$-57^{\circ}15.6$
4	14°57.0	277°26.0	00.4	195°11.5	42.4	271°02.5	44.9	12°39.6	37.1	Alioth	$166^{\circ}12.8$	55°49.5
5	29°59.5	292°25.3	00.4	210°12.5	41.8	286°04.4	44.9	27°42.1	37.1	Spica	158°21.9	-11° 17.7
6	45°01.9	307°24.7	N22°00.4	225°13.6	N00°41.1	301°06.3	N22°44.8	42°44.7	S01°37.2	Alkaid	152°51.7	49°11.4
7	60°04.4	322°24.0	00.3	240°14.6	40.5	$316^{\circ}08.2$	44.8	$57^{\circ}47.2$	37.2	Hadar	148°35.5	-60°30.0
8	75°06.9	337°23.3	00.3	255°15.7	39.8	331°10.1	44.7	72°49.8	37.3	Menkent	147°57.1	-36°29.9
9	90°09.3	352°22.6	• • 00.3	270°16.7	• • 39.2	346°12.0	• • 44.7	87°52.3	• • 37.3	Arcturus	145°47.5	19°03.1
10	105°11.8	7°21.9	00.3	285°17.8	38.5	1°13.9	44.6	102°54.9	37.4	Rigil Kent.	139°39.7	-60°56.7
11	120°14.3	22°21.3	00.2	300°18.8	37.9	16°15.8	44.6	117°57.4	37.4		139 39.7 137°19.7	74°03.3
12	135°16.7	37°20.6	N22°00.2	315°19.9	N00°37.2	31°17.7	N22°44.5	133°00.0	S01°37.4	Kochab		
13	150°19.2	52°19.9	00.2	330°20.9	36.6	46°19.6	44.5	148°02.5	37.5	Zuben'ubi	136°55.5	-16°08.9
14	165°21.7	67° 19.2	00.2	345°22.0	35.9	61°21.5	44.5	163°05.1	37.5	Alphecca	126°03.2	26°37.9
15	180°24.1	82°18.5	00.1	0°23.0	• • 35.3	76°23.4	• • 44.4	178°07.6	• • 37.6	Antares	112°15.1	-26°29.4
16	195°26.6	97°17.8	00.1	15°24.1	34.6	91°25.3	44.4	193°10.2	37.6	Atria	107°08.5	-69°04.6
17	210°29.1	112° 17.2		30°25.1		106°27.2		208°12.7	37.7	Sabik	102°02.0	-15°45.4
			00.1		34.0	100 27.2 121°29.1	44.3			Shaula	96°09.4	-37°07.4
18	225°31.5	127°16.5	N22°00.0	45°26.2	N00°33.4		N22°44.3	223°15.3		Rasalhague	95°57.9	12°32.6
19	240°34.0	142°15.8	0.00	60°27.2	32.7	136°31.0	44.2	238°17.8	37.8	Eltanin	90°41.6	51°29.3
20	255° 36.4	157° 15.1	22°00.0	75°28.3	32.1	151°32.9	44.2	253°20.4	37.8	Kaus Aust.	83°31.5	-34°22.4
21	270°38.9	172°14.4	21°59.9	90°29.3	• • 31.4	166°34.8	• • 44.1	268°22.9	• • 37.9	Vega	80°32.5	38°48.6
22	285°41.4	187°13.7	59.9	105°30.4	30.8	181°36.7	44.1	283°25.5	37.9	Nunki	75°46.8	-26° 15.9
23	300°43.8	202°13.1	59.8	120°31.4	30.1	196°38.6	44.0	298°28.0	38.0	Altair	61°59.2	8°56.2
Marn	2000 02:00	·· 0 7′ d 0	10' m 2 00	1 1/ d C	0.6' m1.61	11 0/ d 0	.0′ m-1.93	$\nu 2.5' d0$	0′ m0 77	Peacock	53°04.3	-56°39.1
ivier.p	ass. 03:00	ν-0.1 a-0	0.0′ m-3.99	$\nu$ 1.1 $a$ -0	.0 1111.01	ν1.9 a-0	.0 111-1.93	ν2.5 aU.	0 1110.77	Deneb	49°25.0	-50 39.1 45°22.3
										Enif	33°38.0	9° 59.6
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec			
0	315°46.3	217° 12.4	N21°59.8	135°32.5	N00°29.5	211°40.5	N22°44.0	313°30.6		Al Na'ir	27°31.8	-46°50.1
1	330°48.8	232°11.7	59.8	150°33.5	28.8	226°42.4	43.9	328°33.1	38.1	Fomalhaut	15°13.7	-29°29.0
2	345°51.2	247°11.0	59.7	165°34.6	28.2	241°44.3	43.9	343°35.7	38.1	Scheat	13°44.4	28°13.3
3	0°53.7	262° 10.3	• • 59.7	180°35.6	27.5	256°46.2	• • 43.8	358°38.3	38.2	Markab	13°29.1	15°20.6
	15°56.2	202 10.3 277°09.6		195°36.7				13°40.8		Aug 05 Tue	SHA	Mer.pass
4			59.6		26.9	271°48.1	43.8		38.2	_	263°57.0	09:29
5	30°58.6	292°08.9	59.6	210°37.7	26.2	286°50.0	43.8	28°43.4	38.3		203 57.0 180°54.0	15:00
6	46°01.1	307°08.3	N21°59.5	225°38.8	N00°25.6	301°51.9	N22°43.7	43°45.9	S01°38.3			
7	61°03.6	322°07.6	59.5	240°39.8	25.0	316°53.8	43.7	58°48.5	38.4	Jupiter		09:58
8	76°06.0	337°06.9	59.4	255°40.9	24.3	331°55.7	43.6	73°51.0	38.4	Saturn	357°40.2	03:14
9	91°08.5	352°06.2	• • 59.4	270°41.9	• • 23.7	346°57.6	• • 43.6	88°53.6	• • 38.5	Aug 06 Wed	SHA	Mer.pass
10	$106^{\circ}10.9$	7°05.5	59.3	285°43.0	23.0	1°59.5	43.5	103°56.1	38.5	_	262°41.6	09:31
11	121°13.4	22°04.8	59.3	300°44.0	22.4	17°01.4	43.5	118°58.7	38.6			
12	136°15.9	37°04.1	N21°59.2	315°45.1	N00°21.7	32°03.3	N22°43.4	134°01.2	S01°38.6	1	180°20.1	14:58
13	151°18.3	52°03.5	59.2	330°46.1	21.1	47°05.2	43.4	149°03.8	38.7	Jupiter		09:55
14	166°20.8	67°02.8	59.1	345°47.2	20.4	62°07.1	43.3	164°06.3	38.7	Saturn	357°42.2	03:10
15	181°23.3	82°02.1	• • 59.1	0°48.2	. 19.8	77°09.0	• • 43.3	179°08.9	• • 38.8	Aug 07 Thu	SHA	Mer.pass
16	196°25.7	97°01.4	59.0	15°49.3	19.1	92°10.9	43.2	194°11.4	38.8		261°26.1	09:32
	211°28.2	112°00.7	59.0	30°50.3	18.5	107°12.8	43.2	209°14.0	38.9			
17				45°51.3			43.2 N22°43.1				179°46.2	14:57
18	226°30.7	127°00.0	N21°58.9		N00°17.8	122°14.7		224°16.6	S01°38.9	Jupiter		09:52
19	241°33.1	141°59.3	58.8	60°52.4	17.2	137°16.6	43.1	239°19.1	39.0	Saturn	357°44.3	03:05
20	256°35.6	156°58.7	58.8	75°53.4	16.5	152°18.5	43.0	254°21.7	39.0	Horizont	al navallav	
21	271°38.1	171°58.0	• • 58.7	90°54.5	• • 15.9	167°20.4	• • 43.0	269°24.2	• • 39.1	HORIZON	al parallax	Λ1
22	286°40.5	186°57.3	58.7	105°55.5	15.2	182°22.3	43.0	284°26.8	39.1		Venus:	0.1
23	301°43.0	201°56.6	58.6	120°56.6	14.6	197°24.2	42.9	299°29.3	39.2		Mars:	0.1
Mar -	ass. 02:56	11 D 7/ d 0	0.0' m-3.99	11 0/ d C	0.6' m1.61	1/1 0/ d 0	.0′ m-1.93	$\nu$ 2.6′ d0.	0/ m0 77			
iviei.p	.u.s. U2.JU	ν U.1 U-U	111-3.33	ν 1.0 U-C		ν1.5 U-U	111-1.90	ν Δ.Ο UU.	0 1110.11			

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	$178^{\circ}29.1$	N16°57.3	53°46.4	8.7'	S28°18.6	1.9'	55.0'
1	193°29.1	56.6	68°14.1	8.7'	28°20.5	1.8'	55.0'
2 3	208° 29.2 223° 29.3	55.9 •• 55.2	82°41.8 97°09.5	8.7' 8.6'	28°22.3 28°24.0	1.6' 1.5'	55.0' 55.0'
4	238° 29.3	54.5	97 09.5 111°37.1	8.6'	28°25.5	1.4'	55.1'
5	253° 29.4	53.9	126°04.6	8.5'	28°26.8	1.2'	55.1'
6	268° 29.5	$N16^{\circ}53.2$	140°32.1	8.5'	S28°28.0	1.1'	55.1'
7	283°29.5	52.5	154°59.6	8.4'	28°29.1	0.9'	55.1'
8 9	298° 29.6 313° 29.7	51.8 •• 51.1	169°27.1 183°54.4	8.4' 8.4'	28°30.0 28°30.7	0.8' 0.6'	55.1' 55.2'
10	313 29.7 328°29.7	50.5	103 54.4 198°21.8	8.3'	28°31.3	0.6	55.2'
11	343°29.8	49.8	212°49.1	8.3'	28°31.8	0.3'	55.2'
12	358° 29.9	N16°49.1	227°16.4	8.3'	S28°32.1	0.2'	55.2'
13	13°29.9	48.4	241°43.7	8.2'	28°32.3	0.0'	55.3'
14 15	28°30.0 43°30.1	47.7 • • 47.0	256°10.9 270°38.1	8.2' 8.2'	28°32.3 28°32.1	-0.1' -0.3'	55.3' 55.3'
16	58° 30.1	46.4	285°05.2	8.1	28°31.8	-0.5'	55.3
17	73°30.2	45.7	299°32.4	8.1'	28°31.4	-0.6'	55.4'
18	88°30.3	N16°45.0	313°59.5	8.1'	S28°30.8	-0.8'	55.4'
19	103°30.3	44.3	328°26.6	8.1'	28°30.0	-0.9'	55.4'
20 21	118°30.4 133°30.5	43.6 • • 42.9	342°53.6 357°20.6	8.0' 8.0'	28°29.1 28°28.0	-1.1' -1.2'	55.4' 55.4'
22	148° 30.6	42.2	11°47.7	8.0'	28°26.8	-1.4'	55.5'
23	163°30.6	41.6	26°14.7	8.0'	28°25.4	-1.5'	55.5'
	SD = 15.8'	d = -0.7'		SI	O = 15.0'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178°30.7 193°30.8	N16°40.9 40.2	40°41.6 55°08.6	8.0' 7.9'	\$28°23.9 28°22.2	-1.7' -1.8'	55.5' 55.5'
2	208° 30.8	39.5	69°35.5	7.9'	28°20.3	-2.0'	55.6'
3	223°30.9	• • 38.8	84°02.5	7.9'	28°18.3	-2.2'	55.6'
4	238° 31.0	38.1	98°29.4	7.9'	28°16.2	-2.3'	55.6'
5	253°31.0	37.4	112°56.3	7.9'	28°13.9	-2.5'	55.6'
6 7	268°31.1 283°31.2	N16°36.7 36.0	127°23.2 141°50.1	7.9' 7.9'	\$28°11.4 28°08.8	-2.6' -2.8'	55.7' 55.7'
8	298° 31.3	35.4	156°17.0	7.9'	28°06.0	-2.9'	55.7'
9	313°31.3	• • 34.7	170°43.9	7.9'	28°03.1	-3.1'	55.7'
10	328°31.4	34.0	185°10.8	7.9'	28°00.0	-3.2'	55.8'
11 12	343°31.5 358°31.6	33.3 N16°32.6	199°37.7 214°04.6	7.9' 7.9'	27°56.7 \$27°53.3	-3.4' -3.6'	55.8' 55.8'
13	13° 31.6	31.9	214 04.6 228°31.5	7.9 7.9'	27°49.8	-3.0 -3.7'	55.8'
14	28° 31.7	31.2	242°58.4	7.9'	27°46.1	-3.9'	55.9'
15	43°31.8	• • 30.5	257°25.3	7.9'	27°42.2	-4.0'	55.9'
16	58°31.9	29.8	271°52.2	7.9'	27°38.2	-4.2'	55.9'
17 18	73°31.9 88°32.0	29.1 N16°28.4	286°19.1 300°46.1	7.9' 7.9'	27°34.0 \$27°29.7	-4.3' -4.5'	55.9' 56.0'
19	103°32.1	27.7	315°13.0	8.0'	27°25.2	-4.6'	56.0'
20	118°32.2	27.0	329°40.0	8.0'	27°20.5	-4.8'	56.0'
21	133°32.2	• • 26.3	344°06.9	8.0'	27°15.7	-5.0'	56.1'
22 23	148°32.3 163°32.4	25.6 24.9	358°33.9 13°00.9	8.0' 8.0'	27°10.8 27°05.7	-5.1' -5.3'	56.1' 56.1'
23	SD = 15.8'	d = -0.7'	15 00.5		D = 15.1'	-5.5	30.1
	<u>JD = 13.0</u>	u = -0.1			J = 13.1		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	178°32.5 193°32.5	N16°24.2 23.5	27°27.9 41°55.0	8.0' 8.1'	\$27°00.4 26°55.0	-5.4' -5.6'	56.1' 56.2'
2	208° 32.6	22.8	56°22.0	8.1	26°49.4	-5.7'	56.2
3	223°32.7	• • 22.1	70°49.1	8.1'	26°43.7	-5.9'	56.2'
4	238° 32.8	21.4	85°16.2	8.1'	26°37.8	-6.0'	56.2'
5	253°32.8 268°32.9	20.7 N16°20.0	99°43.4 114°10.5	8.2' 8.2'	26°31.8 S26°25.6	-6.2' -6.3'	56.3' 56.3'
6 7	283° 33.0	19.3	114 10.5 128°37.7	8.2'	26°19.3	-0.5 -6.5	56.3
8	298°33.1	18.6	143°05.0	8.3'	26°12.8	-6.6'	56.3'
9	313°33.2	• • 17.9	157°32.2	8.3'	26°06.2	-6.8'	56.4'
10	328° 33.2	17.2	171°59.5	8.3'	25°59.4	-6.9'	56.4
11 12	343°33.3 358°33.4	16.5 N16°15.8	186°26.8 200°54.2	8.3' 8.4'	25°52.5 \$25°45.4	-7.1' -7.2'	56.4' 56.5'
13	13° 33.5	15.1	215°21.5	8.4	25°38.2	-7.4'	56.5
14	28°33.6	14.4	229°49.0	8.5'	25°30.9	-7.5'	56.5'
15	43°33.6	· · 13.7	244°16.4	8.5'	25°23.3	-7.7'	56.5'
16 17	58° 33.7 73° 33.8	13.0 12.3	258°43.9 273°11.4	8.5' 8.6'	25°15.7 25°07.9	-7.8' -8.0'	56.6' 56.6'
18	73°33.8 88°33.9	12.3 N16°11.6	273°11.4 287°39.0	8.6'	25°07.9 \$24°59.9	-8.0	56.6
19	103°34.0	10.9	302°06.6	8.7'	24°51.8	-8.2	56.6
20	118°34.0	10.1	316°34.3	8.7'	24°43.6	-8.4'	56.7'
21	133°34.1 148°34.2	•• 09.4	331°02.0 345°29.7	8.7'	24°35.2 24°26.7	-8.5'	56.7'
22 23	148° 34.2 163° 34.3	08.7 08.0	345°29.7 359°57.5	8.8' 8.8'	24°26.7 24°18.0	-8.7' -8.8'	56.7' 56.8'
	SD = 15.8'	d = -0.7'			D = 15.3'	0	22.0
					20.0		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
	Naut.	Civil			Civil	Naut.
N $72^{\circ}$	////	////	01:02	22:57	////	////
<b>N</b> 70°	////	////	02:06	22:01	////	////
68°	////	////	02:41	21:27	////	////
$66^{\circ}$	////	01:25	03:05	21:04	22:39	////
64°	////	02:08	03:25	20:45	22:00	////
62°	////	02:35	03:40	20:30	21:33	////
60°	01:17	02:56	03:53	20:17	21:13	22:49
N 58°	01:55	03:13	04:04	20:06	20:57	22:13
56°	02:21	03:13	04:04	19:57	20:43	21:48
54°	02:21	03:39	04:14	19:48	20:43	21:40
52°	!			!		
52°	02:57	03:50	04:30	19:41	20:21	21:13
	03:10	03:59	04:37	19:34	20:12	21:00
45°	03:37	04:18	04:51	19:20	19:53	20:34
<b>N</b> 40°	03:57	04:33	05:03	19:08	19:38	20:14
35°	04:13	04:46	05:13	18:58	19:25	19:58
$30^{\circ}$	04:26	04:57	05:22	18:49	19:15	19:45
$20^{\circ}$	04:47	05:14	05:37	18:34	18:58	19:25
N $10^{\circ}$	05:03	05:28	05:50	18:21	18:43	19:09
0°	05:16	05:41	06:02	18:09	18:31	18:56
<b>S</b> 10°	05:27	05:53	06:14	17:57	18:19	18:45
20°	05:38	06:04	06:27	17:45	18:08	18:34
30°	05:48	06:17	06:42	17:31	17:56	18:24
35°	05:53	06:23	06:50	17:22	17:49	18:19
40°	05:58	06:31	06:59	17:13	17:42	18:14
45°	06:04	06:39	07:10	17:02	17:33	18:08
<b>S</b> 50°	06:10	06:49	07:23	16:49	17:24	18:02
52°	06:13	06:53	07:23	16:43	17:24	18:00
54°	06:15	06:58	07:36	16:36	17:15	17:57
56°	06:18	07:03	07:44	16:29	17:19	17:54
58°	06:22	07:03	07:52	16:29	17:04	17:54
<b>S</b> 60°	06:25	07:09	08:02	16:10	16:57	17:48
	00.20			10:10		
Lat.	Tue	Moonris Wed	i <b>e</b> Thu	Tue	Moonset Wed	: Thu
N 72°	Tuc	Wed		Tuc	vvcu	1110
N 70°						
68°						=
66°						
64°			21:37			
62°		21:11	20:56		23:08	
60°	19:51	20:18	20:30	22:32	23.00	00:00
N 58°	19:10	19:46	20:05	23:14		00:32
56°	18:41	19:22	19:47	23:42		00:55
54°	18:19	19:03	19:32		00:04	01:15
		10.46				

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

			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	81-94%
	05	06:04	06:01	12:06	21:11	08:44	
ĺ	06	05:57	05:54	12:06	22:06	09:38	
	07	05:50	05:46	12:06	23:00	10:33	

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

0 316*64.5 216*51.6 N21*68.5 136*76.6 N02*140. 222*26.1 N22*22.0 316*30.2 30*190.2 34*0.4 30.5 30*190.2 34*0.5 30.5 30*190.2 34*0.5 30.5 30*190.2 34*0.5 30.5 30*190.2 34*0.5 30.5 30*190.2 34*0.5 30.5 30*190.2 34*0.5 30.5 30*190.2 34*0.5 30.5 30*190.2 34*0.5 30.5 30*190.2 34*0.5 30.5 30*190.2 34*0.5 30.5 30*190.2 34*0	h _	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
0 310*6-5-6 20*6-5-8 20*6-5-8 12*5-85 315*7-6 NO*1-10 212*20.1 102*2-9.3 31*3-19 S0*1*3-9.2 April 20*2-5-8 12*5-2.5 \$1.50*5-8.7 1.37 12*2-8 20*1*3.8 5.5 150*5-8.7 12*3.7	Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
1 317479 221°552 59.5 165°677 1313 227°280 428 329°34.4 39.3	0	316°45.4	216°55.9		135°57.6	N00°14.0	212°26.1	N22°42.9	314°31.9	S01°39.2		0	0
2 48 6 9.0 46 9.6 4.5 56.4 105 90.7 12.7 22 92 90.0 4.2 34 1370 93.3 1											Alpheratz		
3   1922   281953   593   390913   114   27273   394   427   397936   394   428   427   397936   427											Ankaa	353°06.4	-42°09.7
4 1695.3 27693.2 583 19870.8 11.4 27233.7 477 14.421 39.4 American Series of											Schedar	349°30.2	56°40.5
1											Diphda	348°46.6	-17°50.6
19 1 170 10 10 170 10 10 170 10 10 170 10 10 170 10 10 170 10 10 170 10 10 170 10 10 170 10 10 170 10 10 170 10 10 170 10 10 170 10 10 170 10	4			58.3		11.4		42.7		39.4			
9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5	31°57.8	291°52.5	58.2	211°02.9	10.7	287°35.6	42.6	29°44.7	39.5			
1	6	47°00.2	306°51.8	N21°58.1	226°03.9	N00°10.1	302°37.5	N22°42.6	44°47.2	S01°39.5			
8 77-05-2 336*504 580 280*00 0.88 332*413 4.25 74*52 3.96 0. According to the control of the con	7	62°02.7	321°51.1	58.0	241°04.9	09.4	317°39.4	42.5	59°49.8	39.6			
9 9 9°7.5   351'497   5.75   227'070   0.81   347'43.2   4.24   39°5.4   3.97   Middle   322'7.5   4.11   10   107'101   10   107'101   10   107'101   10   10   10   10   10   10   10											Acamar		
101 1071-10.1											Menkar	314°05.6	4°11.5
101 102-102-103   1979-104   1979											Mirfak	308°27.6	49°57.0
Fig.   1.5												290°39 2	16°33.7
19 13 13 13 13 13 13 13 13 13 13 13 13 13	11	122°12.6	21°48.3	57.7	301°09.1	06.8			120°00.0				
1.5   1.5	12	137°15.0	36° 47.6	N21°57.7	$316^{\circ}10.2$	N00°06.2	32°48.9	N22°42.3	135°02.6	501°39.8			
14   167   190   66   46.3   57.5   36°112.3   0.40   62°52.7   42.2   16°70.7   39.9   98   180   180   190   1	13	152°17.5	51°47.0	57.6	331°11.2	05.5	47°50.8	42.2	150°05.1	39.9			
15 18 18 224 8 18 48 6													
19. 1972-49. 9974.9 57.3 1154.4 20.0 1975-55 42.1 1997-12.8 40.0 1974-19. 1174-12. 1972.7 3.1 1154.4 0.0 1975-55 42.1 12071-53 40.1 198-12. 12071-53 40.1											Elnath		28°37.7
17 212 227 3 11174 2 57 3 31215 4 0 9 1078 5 42 1 210715 3 40.1 18 227728 127478 12742 57 57 6 107175 0 16 1387023 420 2257179 0 10.1 19 247373 147428 57 1 67175 0 16 1387023 420 2257179 0 10.1 19 247373 147428 57 1 67175 0 107175 1 1071											Alnilam	275°37.4	-1°11.0
227 297 39 119 435 5 N22 97 3 47 160 160 170 5 N22 97 3 19 100 170 5 N27 31 19 100 170 5 N27 31 19 100 170 5 N27 31 19 100 170 5 N27 31 19 100 170 170 170 170 170 170 170 170 170											Betelgeuse	270°51.8	7°24.8
10											_	263°52 6	
19	18	227°29.8		N21°57.2	46°16.4	N00°02.3	123°00.4	N22°42.0	225°17.9	S01°40.1			
22 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	19	242°32.3	141°42.8	57.1	61°17.5	01.6	138°02.3	42.0	240°20.5	40.2			
22 22"372 171"4.1	20	257°34.7	156° 42.1	57.0	76°18.5	01.0	153°04.2	41.9	255°23.0	40.2			
22 287*39.7 186*49.8 568 106*20.6 50*00.0 183*08.0 41.8 288*28.1 40.5 40.4 41.8 288*28.1 40.5 40.4 41.8 288*28.1 40.5 40.4 41.8 288*28.1 40.5 40.4 41.8 288*28.1 40.5 40.4 41.8 288*28.1 40.5 40.4 41.8 288*28.1 40.5 40.4 41.8 288*28.1 40.5 40.4 41.8 288*28.1 41.5 40.8 41.8 41.8 41.8 41.8 41.8 41.8 41.8 41													5°09.7
23   302"42   201"401   56.7   121"21.7   00.9   198"09.9   41.8   300"30.7   40.4   Marchaes   0.550   10.0   1											Pollux	243°17.0	27°57.9
23 302 42.1 201 201 201 50.7 121 217 00.9 198 198 9.9 4.18 300 30.7 40.4 Merpans. (25 00.1 m) (25 00.1											Avior	234°15.2	-59°35.4
Mer. pass. 02:52   \(\nu \)	23	302~42.1	201~40.1	56.7	121~21.7	00.9	198~09.9	41.8	300~30.7	40.4	1		-43°32.1
Sat GHA  GHA  GHA  Dec  GHA  Dec  GHA  Dec  GHA  Dec  GHA  Dec  GHA  Dec  GHA  Dec  GHA  Dec  GHA  Dec  GHA  Dec  GHA  Dec  GHA  Dec  GHA  Dec  GHA  Dec  GHA  Dec  Dubhe  193°409  193°408  193°407  193°417  193	Mar n	1255 UJ-EJ	7/_O 7/ d O	11' m-3 00	v1 0/ d 0	6' m1 61	1/1 0/ d 0	0' m-1 03	1/2 6/ 40	1' m0 76			-69°49.3
Second   Girk   Cirk	.ν.σι.β	,uss. U2.32	ν-0.1 u-0	111-3.90	ν1.0 u-0	.5 1111.01	ν 1.σ U-U	.0 111-1.93	ν 2.0 u0.				
Sat GHA GHA GHA Dec GHA DEC G													
19 317°446 216°394 N21°567 136°227 200°166 213°118 N22°417 315°333 501°404 213°397 301°397 301°397 301°397 301°397 301°397 317°397 301°397 30	Sat	GHA	GHA	Dec	GH∆	Dec	GΗΔ	Dec	GHΔ	Dec			
13 332°470 231°387 56.6 151°237 022 228°137 417 330°38.8 40.5   32 26°20 246°330 56.5 16°248 02.9 243°15.6 41.6 0°40.9 40.6   42 273°19.4 41.5 15°45.8 41.6 0°40.9 40.6   43 275°20 25°333 56.4 181°25.8 0.35.5 288°17.5 41.6 0°40.9 40.6   44 11°54.4 276°36.6 56.3 196°26.9 04.2 273°19.4 41.5 15°45.5 40.4   40 275°49.4 306°35.2 N21°56.1 226°90 500°6.5 303°32.2 N22°41.4 45°45.6 51°47.7   40 48 78°60.8 321°34.5 56.0 241°30.0 06.1 318°25.1 41.4 60°51.2 40.8   48 78°60.3 336°33.8 55.9 25°63.10 66.8 333°27.4 41.3 75°53.7 40.8   40 10 106°02.2 6°32.5 55.7 286°31.0 66.8 333°27.4 41.3 75°53.7 40.8   40 11 123°11.7 21°31.8 56.5 30°34.2 08.7 1 388°28.9 41.3 30°56.3 40.9   40 11 123°11.7 21°31.8 56.5 30°34.2 08.7 1 41.8 42.2 121°01.4 41.0   41 135°16.6 51°30.4 55.4 331°36.3 10.0 48°3.6 41.1 151°0.5 541.1   41 166°19.1 66°20.7 55.3 40°47.3 10.0 48°3.6 41.1 151°0.5 41.1   41 166°19.1 66°20.7 55.3 40°47.3 10.0 48°3.6 41.1 151°0.5 41.1   41 166°19.1 66°20.7 55.3 40°47.3 10.0 48°3.6 41.1 151°0.5 41.1   41 166°10.1 66°20.7 55.3 40°47.3 10.0 48°3.6 41.1 151°0.5 41.1   41 166°10.1 66°20.7 55.3 40°40.1 12.9 10°40.4 541.0 181°11.7 41.2   41 166°10.1 66°20.7 55.3 40°40.3 12.2 10.9 40°4.2 40.9 211°1.6 341.3   41 166°10.1 66°20.7 55.3 40°40.3 12.2 10.9 40°4.2 40.9 211°1.6 341.3   41 166°10.1 60°20.7 55.3 40°40.3 12.2 10.9 40°4.2 40.9 211°1.6 341.3   41 166°10.1 60°20.7 55.3 40°40.3 12.2 10.9 40°4.2 40.9 211°1.6 341.3   41 166°10.1 60°20.7 55.3 40°40.3 12.2 10.9 40°4.2 40.9 211°1.6 341.3   41 166°10.1 10°20.2 55.3 31°1.0 10.0 48°3.5 64.0 12.2 10.0 40°4.1 41.0 181°1.7 41.2   41 161°1.1 160°20.1 10°20.2 55.3 31°1.0 10.0 48°3.5 64.0 10.0 11°1.1 11°1.0 5.4 1.1   41 161°1.1 10°20.5 51.3 10°20.5 10°3.3 128°4.0 40.9 10°1.4 24.1 1.1   41 161°1.1 10°20.5 51.3 10°20.5 10°3.3 128°4.0 40.9 10°1.4 24.1 1.1   41 161°1.1 10°20.5 10°3.3 10°3.4 10.0 48°3.5 64.0 10.0 10°1.4 1.1   41 161°1.1 10°20.5 10°3.4 1											Dubhe		61°36.9
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2 3 47*49.5											Gienah	175°43.3	-17°41.1
3 2 **25.0	2	347°49.5	246°38.0	56.5	166°24.8	02.9	243°15.6	41.6	345°38.4	40.5			
17   194   17   194   196	3	2°52.0	261°37.3	• • 56.4	181°25.8	• • 03.5	258° 17.5	• • 41.6	0°40.9	• • 40.6			
\$\frac{3}{2}\frac{9}{6}0\$   \qua	4	17°54.4	276°36.6	56.3	196°26.9	04.2	273°19.4	41.5	15°43.5	40.6			
Series of the se													
76 63°01.8 221°34.5 56.0 241°30.0 06.1 318°25.1 41.4 60°51.2 40.8 76°31.3 336°33.3 55.9 26°31.0 06.8 333°27.0 41.3 76°53.7 40.8 Merkent 148°35.5 50°31.0 1010°10°09.2 6°32.5 55.7 26°33.1 07.4 348°28.9 141.3 76°53.5 40.9 11.1 123°11.7 21°31.8 14.2 36°31.1 N21°55.5 50.3 10°34.2 08.7 18°32.8 41.2 1015°58.0 40.9 11.1 123°11.7 21°31.8 14.2 36°31.1 N21°55.5 310°34.2 08.7 18°32.8 41.2 121°01.4 41.0 121°31.3 16°32.3 10.0 48°36.6 41.1 151°06.5 41.1 151°06.5 41.1 151°06.5 141.1											Spica		-11°17.7
8 78°043 336°338 55.9 256°31.0 0.68 333°27.0 41.3 75°53.7 40.8   Final 1, 16°35.3 36°38.   9 93°068 351°33.2 - 55.8 226°33.1 0.81 3°30.8 41.2 10°58.8 40.9   Final 1, 16°37.1 36°28.   10 108°09.2 6°32.5 55.7 286°33.1 0.81 3°30.8 41.2 121°01.4 10.   11 123°11.7 21°31.8 55.6 301°34.2 0.87 18°32.8 41.2 121°01.4 10.   12 138°14.2 36°31.1 N21°55.5 316°35.2 50°09.4 33°34.7 N22°41.1 136°04.0 501°41.1   13 153°16.6 51°30.4 55.4 313°36.3 10.0 48°36.6 41.1 151°06.0 14.1   14 168°19.1 66°29.7 55.3 346°37.3 10.7 63°38.5 41.0 166°09.1 41.2   15 183°12.5 81°29.0 - 55.2 1°33.3 11.3 78°40.4 - 41.0 166°09.1 41.2   16 198°24.0 96°28.3 55.1 16°30.4 12.0 93°42.3 40.9 196°14.2 41.3   16 198°24.0 96°28.3 55.1 16°30.4 12.6 108°42.4 40.9 196°14.2 41.3   17 21°36.5 111°27.6 55.0 31°40.4 12.6 108°42.4 40.9 196°14.2 41.3   18 228°28.9 1126°26.9 N21°54.9 46°41.5 50°13.3 123°46.1 N22°40.9 221°15.4   18 228°28.9 126°26.9 N21°54.9 46°41.5 50°13.3 123°46.1 N22°40.9 221°15.4   19 248°31.3 171°24.9 - 54.5 10°42.5 11.9 18°35.6 40.6 301°32.1 41.6   18 400°28.8 31.0 11°25.5 54.5 11°27.6 55.0 11°47.5 10°45.5 11°47.5 10°45.6 11.4 13°49.9 40.8 26°29.6 41.6   18 400°28.8 31.0 11°25.5 54.5 11°27.6 11°42.5 11.5 18°35.6 40.6 301°32.1 41.6   18 400°28.8 31.0 11°25.5 11°27.4 10°45.6 15.9 183°53.7 40.7 286°29.6 41.6   18 400°28.8 31.0 11°25.5 11°27.6 1.6 10°45.6 15.9 183°53.7 40.7 286°29.6 41.6   18 400°28.7 11°28.2 11°24.0 1.6 11°25.0 11											Alkaid	152°51.7	49°11.4
99 93°06.8 551°33.2 . 55.8 271°32.1 . 07.4 348°28.9 . 41.3 90°56.3 . 40.9   110 108°09.2 6°32.5 55.7 268°33.1 0.81 3°30.8 41.2 105°58.8 40.9   111 123°11.7 213°18.4 2 36°31.1 N21°55.5 301°34.2 0.87 18°32.8 41.2 121°01.4 41.0   112 138°14.2 36°31.1 N21°55.5 310°35.2 500°94.3 33°34.7 N22°41.1 136°04.0 50°14.1   113 153°15.6 51°30.4 55.4 331°36.3 10.0 48°36.6 41.1 151°05.5 41.1   113 153°15.6 51°30.4 55.4 331°36.3 10.0 48°36.6 41.1 151°05.5 41.1   115 183°21.5 81°29.0 · 55.2 1°36.3 · 110.7 63°35.5 41.0 166°09.1 41.2   116 181°24.0 6°26.3 55.1 16°39.4 12.0 93°42.3 40.9 196°14.2 41.3   117 121°36.5 111°27.6 55.1 16°39.4 12.0 10.6 93°4.2 40.9 196°14.2 41.3   118 228°28.9 1226°26.9 N21°54.9 46°41.5 500°13.3 123°46.1 N22°40.9 226°19.3 501°41.4   118 228°28.9 126°25.5 54.6 6°6°45.6 14.6 153°49.9 40.8 241°21.9 14.6   119 243°31.4 141°26.2 54.7 61°42.5 11.5 216°51.8 40.7 271°27.0 41.5   120 258°33.9 156°25.5 54.6 6°6°45.6 15.9 183°55.7 40.7 286°29.6 41.6   121 273°36.3 171°24.9 · 54.5 121°46.7 16.5 196°55.6 40.6 30°32.1 41.6   122 28°38.8 186°24.2 54.4 106°45.6 15.9 183°55.7 40.7 286°29.6 41.6   122 28°38.8 186°24.2 54.4 106°45.6 15.9 183°55.7 40.7 286°29.6 41.6   123 33°46.2 231°22.1 54.1 181°48.8 11.5 244°01.4 40.5 346°39.8 41.8   13 33°46.2 231°22.1 54.1 181°48.8 11.8 5 244°01.4 40.5 346°39.8 41.8   13 33°46.2 231°22.1 54.1 181°48.8 11.5 244°01.4 40.5 346°39.8 41.8   14 38°34.6 26°21.0 53.3 181°59.8 19.9 1.2 260°3.3 40.4 1°42.4 41.8   14 38°34.6 276°20.0 53.7 196°51.9 19.8 274°05.2 40.4 1°46.5 100°45.6 42.1   13 33°46.2 231°21.7 54.1 181°48.8 11.5 244°01.4 40.5 346°39.8 41.8   14 38°34.6 271°19.5 53.2 266°55.0 20°20.3 300°31.3 36°14.7 40.1 9°57.8 4.22   14 48°55.0 20°10.3 53.6 181°50.8 19.9 1.2 20°20.3 34.4 12.8   14 41°10.4 10.4 10.4 10.4 10.4 10.4 10.4 10.4											Hadar	148°35.5	-60°30.0
9 93°06.8 31′33.2 · 55.8 271°32.1 · 07.4 348°28.9 · 0.13 90°56.3 · 0.9 to 10 10°00.2 6°32.5 · 55.7 26°33.1 o.81 3°30.8 · 41.2 10°58.8 · 40.9 to 11 123°11.7 · 121°11.4 · 41.0 to 123°11.7 · 21°31.8 · 55.6 301°34.2 o.87 18°32.8 · 41.2 10°58.8 · 40.9 to 121°13.4 · 41.0 to 150°58.3 · 40.9 to 153°16.6 · 51°30.4 · 55.4 331°36.3 · 10.0 · 48°36.6 · 41.1 · 151°06.5 · 41.1 Zubentubi 133°19.8 r 74°02.1 · 151°16.6 · 51°30.4 · 55.4 331°36.3 · 10.0 · 48°36.6 · 41.1 · 151°06.5 · 41.1 Zubentubi 136°55.5 · 16°30.4 · 10.6 ° 60°1.1 · 11.2 ·	8			55.9		06.8		41.3		40.8		147°57 1	-36°29.9
100 100°09.2 6°32.5 55.7 286°33.1 08.1 3°30.8 41.2 12°10.4 41.0 11 12°31.1 23°11.7 21°31.8 55.6 301°34.2 08.7 18°32.8 41.2 12°10.4 41.0 13°10.1 12°11.3 15°10.6 51°30.4 55.4 31°30.3 10.0 48°36.6 41.1 151°06.0 50°41.1 21°30.4 55.4 31°30.3 10.0 48°36.6 41.1 151°06.0 50°41.1 21°30.4 55.4 31°30.3 10.0 48°36.6 41.1 151°06.0 50°41.1 21°30.4 55.1 18°30.4 55.4 10.1 166°19.1 41.2 41.2 41.2 41.2 41.2 41.2 41.2 41	9	93°06.8	351°33.2	• • 55.8	271°32.1	• • 07.4	348°28.9	• • 41.3	90°56.3	• • 40.9			
11 123°117, 21°318, 55.6 301°34.2 08.7 18°328, 41.2 12°01.4 41.0 Kochab 13°04.0 501°4.1 13°04.0 13°04.	10	108°09.2	6°32.5	55.7	286°33.1	08.1	3°30.8	41.2	105°58.8	40.9			
12 138"14.2 36"31.1 N21"95.5 316"35.2 S00"09.4 33"34.7 N22"41.1 131"06.0 S10"41.1 N21"36.5 14.1 141"16.6 151"30.0 5.2 41.1 N21"36.5 14.1 151"06.6 151"30.0 5.2 41.1 N21"36.5 14.1 N21"36.5 14.1 N21"36.5 14.1 N21"36.5 N21"36.1 N21"											_		
13 153°16.6 51°30.4 55.4 331°36.3 10.0 48°36.6 41.1 151°06.5 41.1 41.68°19.1 66°29.7 55.3 346°37.3 10.7 6°38.5 41.0 156°09.1 41.2 Alphecea 126°03.3 26°37.1 10.6 198°24.0 9°28.0 55.2 1°38.3 11.3 78°40.4 41.0 181°11.7 41.2 41.3 10°08.6 69°04.2 41.5 10°08.4 10°08.2 41.0 10°08.6 10°04.2 41.3 10°08.6 69°04.2 41.0 10°08.6 10°04.2 41.5 10°08.4 10°08.2 41.5 10°08.4 10°08.													
14 168°19.1 66°29.7 55.3 346°37.3 10.7 63°38.5 41.0 166°09.1 41.2 15.18°32.15 81°9.0 55.2 1°38.3 113 78°40.4 41.0 181°1.7 41.2 16.18°32.15 81°9.0 55.2 1°38.3 113 78°40.4 41.0 181°1.17 41.2 16.18°32.15 81°9.0 55.2 1°38.3 113 78°40.4 41.0 181°1.17 41.2 16.18°42.0 96°28.3 55.1 16°39.4 12.0 93°42.3 40.9 196°14.2 41.3 16.2 18°2.5 111°27.5 55.0 31°0.4 12.6 108°42.4 40.9 211°16.8 41.3 102°0.2 -15°48 11°2.6 2 28°38.9 126°26.9 N21°54.9 46°41.5 500°13.3 123°46.1 N22°40.9 226°19.3 501°41.4 18.2 11°2.5 54.7 61°42.5 13.9 138°48.0 40.8 241°21.9 41.4 18.2 18.2 11°2.5 55 54.6 76°43.6 14.6 153°49.9 40.8 256°24.5 41.5 18.2 168°51.8 40.7 271°27.0 41.5 18.2 28°38.8 186°24.2 54.4 106°45.6 15.9 188°53.7 40.7 286°29.6 41.6 18.2 23°303°41.3 201°23.5 54.3 121°46.7 16.5 198°55.6 40.6 301°32.1 41.6 18.2 18.2 18.2 18.2 18.2 18.2 18.2 18.2											Zuben'ubi	136°55.5	-16°08.9
141 168°19.1 66°29.7 55.3 346°37.3 10.7 63°38.5 41.0 166°09.1 41.2 15183°21.5 81°29.0 55.2 1°38.3 11.3 78°40.4 41.0 181°1.7 41.2 1618°21.5 81°29.0 55.2 1°38.3 11.3 78°40.4 41.0 181°1.7 41.2 1618°21.5 81°29.0 55.2 1°38.3 11.3 78°40.4 41.0 181°1.7 41.2 1618°4.2 41.3 10°8.6 6.6 91.3 16°39.4 12.0 93°42.3 40.9 196°14.2 41.3 10°8.6 6.6 91.5 111°27.6 55.0 31°40.4 12.6 108°44.2 40.9 21°16.8 41.3 5bit. 10°8.0 6.6 91.5 183°31.4 141°56.2 54.7 61°42.5 13.9 138°48.0 40.8 241°1.9 41.4 182.0 256°33.3 17°40.9 54.5 91°44.6 15.2 13.9 138°48.0 40.8 241°1.9 41.5 18.0 18.0 18.0 18.0 18.0 18.0 18.0 18.0											Alphecca	126°03.3	26°37.9
15 183°21.5 81°29.0 · · · · · · · · · · · · · · · · · · ·	14	$168^{\circ}19.1$		55.3	346°37.3	10.7	63°38.5	41.0	166°09.1				-26°29.4
16 198°24.0 96°28.3 55.1 116°39.4 12.0 93°42.3 40.9 196°14.2 41.3 Sabik 102°02.0 1.15°48.1   72 13°26.5 111°27.6 55.0 31°40.4 12.6 108°44.2 40.9 121°16.8 41.3   8 28°28.9 126°26.9 126°26.9 121°26.5 5.0 40°41.5 500°13.3 123°46.1 N22°40.9 226°19.3 501°41.4   8 28°28.9 126°26.9 126°26.9 50.2 54.7 61°42.5 13.9 138°48.0 40.8 241°21.9 41.4   8 29°28.3 116°25.5 54.6 67°43.6 14.6 153°49.9 40.8 256°24.5 41.5   8 22°28°38.8 186°24.2 54.4 106°45.6 15.9 138°55.6 40.6 301°32.1 41.6   8 23°303°41.3 201°23.5 54.4 106°45.6 15.9 188°55.6 40.6 301°32.1 41.6   8 23°303°41.3 201°23.5 54.3 121°46.7 16.5 198°55.6 40.6 301°32.1 41.6   8 23°303°41.3 201°23.5 54.3 121°46.7 16.5 198°55.6 40.6 301°32.1 41.6   8 24°40.9 40.8 40.8 40.8 40.8 40.8 40.8 40.8 40.8	15	183°21.5	81°29.0	• • 55.2	1°38.3	• • 11.3	78°40.4	• • 41.0	$181^{\circ}11.7$	• • 41.2			
17 213°26.5 111°27.6 55.0 31°40.4 12.6 108°44.2 40.9 211°16.8 41.3	16	198°24.0	96°28.3	55.1	16°39.4	12.0	93°42.3	40.9	196°14.2	41.3			
18 228°28 9 126°26 9 N21°54 9 46°41.5 S00°13.3 122°46.1 N22°40.9 226°19.3 S01°41.4   Shaling 90°0.4 1.5 S10°19 24°31.1   41°65°2 5 54.6   64°4.5   13.9   138°48.0   40.8   241°21.9   41.4   42.6   41.5   41.5   42.5   41.5   42.5   41.5   42.5   41.5   42.5   41.5   42.5   41.5   42.5   41.5   42.5   41.5   42.5   41.5   42.5   41.5   42.5   41.5   42.5   41.5   42.5   41.5   42.5   42.5   41.5   42.5   42.5   41.5   42.5   4			111°27.6	55.0	31°40.4	12.6		40.9	211°16.8	41.3			
19 243°31.4 141°26.2 54.7 61°42.5 13.9 138°48.0 40.8 241°21.9 41.4 Eltaning 20 25°33.3 17°26.4 51.5 54.6 76°43.6 14.6 153°49.9 40.8 256°24.5 41.5 Kaus Aust. 83°31.5 3-4°22.2 288°38.8 186°24.2 54.4 106°45.6 15.9 183°53.7 40.7 271°27.0 41.5 Vega 80°32.5 38°44 Vega 303°41.3 201°23.5 54.4 106°45.6 15.9 183°53.7 40.7 286°29.6 41.6 Mer.pass. 02:49 \$\nu_{\cup 0.07} \nu_{\cup													
20				- 4 -							Rasalhague	95°57.9	12°32.6
21 273°36.3 171°24.9 · 54.5 91°44.6 · 15.2 168°51.8 · 40.7 271°27.0 · 41.5 Vega 80°32.5 38°48 22 288°38.8 186°24.2 54.4 106°45.6 15.9 183°53.7 40.7 286°29.6 41.6 Nunki 75°46.8 · 26°18.2 30°341.3 201°23.5 54.3 121°46.7 16.5 198°55.6 40.6 301°32.1 41.6 Nunki 75°46.8 · 26°18 23 303°41.3 201°23.5 54.3 121°46.7 16.5 198°55.6 40.6 301°32.1 41.6 Nunki 75°46.8 · 26°18 201°23.5 54.3 121°46.7 16.5 198°55.6 40.6 301°32.1 41.6 Nunki 75°46.8 · 26°18 201°23.5 54.3 121°46.7 16.5 198°55.6 40.6 301°32.1 41.6 Nunki 75°46.8 · 26°18 201°23.5 0.3 18°43.7 216°22.8 N2°19.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0											Eltanin	90°41.6	51°29.3
21 273°36.3 171°24.9 · · · · · · · · · · · · · · · · · · ·											Kaus Aust.	83°31.5	-34°22.4
22 288°38.8 186°24.2 54.4 106°45.6 15.9 183°53.7 40.7 286°29.6 41.6 30°32.1 41.6 Mer.pass. 02:49	21			• • 54.5	91°44.6	• • 15.2		• • 40.7		• • 41.5			38°48.6
Altair   61°59.2   8°56   8°	22	288°38.8	186°24.2	54.4	106°45.6	15.9	183°53.7	40.7	286°29.6	41.6			
Mer. pass. 02:49	23	303°41.3	201°23.5	54.3	121°46.7	16.5	198°55.6	40.6	301°32.1	41.6			
Change   C													
Sun         GHA         GHA         Dec         All Naïrs         22°02         Classing         Classing         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         All Naïrs         22°02         Classing         Cla	Mer.p	pass. 02:49	$\nu$ -0.7′ $d$ -0	0.1′ m-3.98	$\nu$ 1.0′ d0	.6′ m1.61	$\nu$ 1.9′ d-0	.0′ m-1.93	$\nu$ 2.6′ d0.	.1′ m0.76	!		
GHA         GHA         Dec         Horizontal parallax           1         333°46.2         231°22.1         54.1         151°48.8         17.8         228°55.5         40.5         346°39.8         41.8         1.8         41.9         41.8         41.9         41.8         41.9         41.8         41.9         41.9         41.9         41.9         41.9         41.9         41.9         41.9         41.9         41.9 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Deneb</td> <td>49°25.0</td> <td>45°22.4</td>											Deneb	49°25.0	45°22.4
GHA         GHA         Dec         Horizontal parallax           1         333°46.2         231°22.1         54.1         151°48.8         17.8         228°55.5         40.5         346°39.8         41.8         1.8         41.9         41.8         41.9         41.8         41.9         41.8         41.9         41.9         41.9         41.9         41.9         41.9         41.9         41.9         41.9         41.9 <td>_</td> <td>_</td> <td>_</td> <td>_</td> <td>_</td> <td>_</td> <td></td> <td>_</td> <td></td> <td>_</td> <td>Enif</td> <td>33°38.0</td> <td>9°59.6</td>	_	_	_	_	_	_		_		_	Enif	33°38.0	9°59.6
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9 94°05.9 351°16.5 · · 53.1 271°57.1 · · · 23.0 349°14.7 · · · 40.1 91°57.8 · · · 42.2 10 109°08.4 6°15.8 53.0 286°58.1 23.7 4°16.6 40.1 107°00.3 42.2 11 124°10.8 21°15.1 52.9 301°59.2 24.3 19°18.5 40.0 122°02.9 42.3 13°13.3 36°14.5 N21°52.7 317°00.2 S00°25.0 34°20.4 N22°40.0 137°05.5 S01°42.3 13 154°15.8 51°13.8 52.6 332°01.2 25.6 49°22.4 39.9 152°08.0 42.4 14 169°18.2 66°13.1 52.5 347°02.3 26.3 64°24.3 39.9 167°10.6 42.4 15 184°20.7 81°12.4 · · 52.3 2°03.3 · · 26.9 79°26.2 · · 39.8 182°13.1 · · · 42.5 16 199°23.1 96°11.7 52.2 17°04.4 27.6 94°28.1 39.8 197°15.7 42.5 17 214°25.6 111°11.0 52.1 32°05.4 28.2 109°30.0 39.7 212°18.3 42.6 19 244°30.5 141°09.6 51.8 62°07.5 29.5 139°33.8 39.6 242°23.4 42.7 20 259°33.0 156°08.9 51.7 77°08.5 30.2 154°35.7 39.6 257°26.0 42.7 21 274°35.5 171°08.2 · · 51.5 92°09.6 · · 30.8 169°37.6 · · 39.5 272°28.5 · · 42.8 22 899°37.9 186°07.5 51.4 107°10.6 31.5 184°39.5 39.5 287°31.1 42.9 23	8	79°03.4	336° 17.2	53.2	256°56.0	22.4	334°12.8	40.2	76°55.2	42.1	Saturn	357°46.4	03:01
10 109°08.4 6°15.8 53.0 286°58.1 23.7 4°16.6 40.1 107°00.3 42.2 11 124°10.8 21°15.1 52.9 301°59.2 24.3 19°18.5 40.0 122°02.9 42.3 139°13.3 36°14.5 N21°52.7 317°00.2 S00°25.0 34°20.4 N22°40.0 137°05.5 S01°42.3 13 154°15.8 51°13.8 52.6 332°01.2 25.6 49°22.4 39.9 152°08.0 42.4 14 169°18.2 66°13.1 52.5 347°02.3 26.3 64°24.3 39.9 167°10.6 42.4 15 184°20.7 81°12.4 · 52.3 2°03.3 · 26.9 79°26.2 · 39.8 182°13.1 · 42.5 16 199°23.1 96°11.7 52.2 17°04.4 27.6 94°28.1 39.8 197°15.7 42.5 17 214°25.6 111°11.0 52.1 32°05.4 28.2 109°30.0 39.7 212°18.3 42.6 111°11.0 110°10.0 110°10.0 110°10.0 110°10.0 110°10.0 110°10.0 110°10.0													
11 124°10.8 21°15.1 52.9 301°59.2 24.3 19°18.5 40.0 122°02.9 42.3 13°03.3 36°14.5 N21°52.7 317°00.2 \$00°25.0 34°20.4 N22°40.0 137°05.5 \$01°42.3 13°15.8 \$1°13.8 \$2.6 332°01.2 25.6 49°22.4 39.9 152°08.0 42.4 169°18.2 66°13.1 52.5 347°02.3 26.3 64°24.3 39.9 167°10.6 42.4 15 184°20.7 81°12.4 · · · 52.3 2°03.3 · · · 26.9 79°26.2 · · · 39.8 182°13.1 · · · 42.5 16 199°23.1 96°11.7 52.2 17°04.4 27.6 94°28.1 39.8 197°15.7 42.5 17 214°25.6 111°11.0 52.1 32°05.4 28.2 109°30.0 39.7 212°18.3 42.6 18 229°28.1 126°10.3 N21°51.9 47°06.4 \$00°28.9 124°31.9 N22°39.7 227°20.8 \$01°42.6 19 244°30.5 141°09.6 51.8 62°07.5 29.5 139°33.8 39.6 242°23.4 42.7 20 259°33.0 156°08.9 51.7 77°08.5 30.2 154°35.7 39.6 257°26.0 42.7 21 274°35.5 171°08.2 · · · 51.5 92°09.6 · · · 30.8 169°37.6 · · · 39.5 272°28.5 · · · 42.8 22 89°37.9 186°07.5 51.4 107°10.6 31.5 184°39.5 39.5 287°31.1 42.9 230.9 Mars 178°08.1 09:													Mer.pass
11 124°10.8 21°15.1 52.9 301°59.2 24.3 19°18.5 40.0 122°02.9 42.3 12°13.3 36°14.5 N21°52.7 317°00.2 S00°25.0 34°20.4 N22°40.0 137°05.5 S01°42.3 13°154°15.8 51°13.8 52.6 332°01.2 25.6 49°22.4 39.9 152°08.0 42.4 14 169°18.2 66°13.1 52.5 347°02.3 26.3 64°24.3 39.9 167°10.6 42.4 15 184°20.7 81°12.4 · · 52.3 2°03.3 · · 26.9 79°26.2 · · · 39.8 182°13.1 · · · 42.5 16 199°23.1 96°11.7 52.2 17°04.4 27.6 94°28.1 39.8 197°15.7 42.5 17 214°25.6 111°11.0 52.1 32°05.4 28.2 109°30.0 39.7 212°18.3 42.6 18 229°28.1 126°10.3 N21°51.9 47°06.4 S00°28.9 124°31.9 N22°39.7 227°20.8 S01°42.6 19 244°30.5 141°09.6 51.8 62°07.5 29.5 139°33.8 39.6 242°33.4 42.7 20 259°33.0 156°08.9 51.7 77°08.5 30.2 154°35.7 39.6 257°26.0 42.7 21 274°35.5 171°08.2 · · 51.5 92°09.6 · · · 30.8 169°37.6 · · · 39.5 272°28.5 · · · 42.8 22 289°37.9 186°07.5 51.4 107°10.6 31.5 184°39.5 39.5 287°31.1 42.9 23 Mars 0.1											Venus	258°54.8	09:34
12 139°13.3 36°14.5 N21°52.7 317°00.2 S00°25.0 34°20.4 N22°40.0 137°05.5 S01°42.3 13°15.8 51°13.8 52.6 332°01.2 25.6 49°22.4 39.9 152°08.0 42.4 169°18.2 66°13.1 52.5 347°02.3 26.3 64°24.3 39.9 167°10.6 42.4 15 184°20.7 81°12.4 · · · 52.3 2°03.3 · · · 26.9 79°26.2 · · · 39.8 182°13.1 · · · 42.5 16 199°23.1 96°11.7 52.2 17°04.4 27.6 94°28.1 39.8 197°15.7 42.5 17°04.4 27.6 94°28.1 39.8 197°15.7 42.5 18 229°28.1 126°10.3 N21°51.9 47°06.4 S00°28.9 124°31.9 N22°39.7 227°20.8 S01°42.6 19 244°30.5 141°09.6 51.8 62°07.5 29.5 139°33.8 39.6 242°23.4 42.7 20 259°33.0 156°08.9 51.7 77°08.5 30.2 154°35.7 39.6 257°26.0 42.7 21 274°35.5 171°08.2 · · 51.5 92°09.6 · · · 30.8 169°37.6 · · · 39.5 272°28.5 · · · 42.8 289°37.9 186°07.5 51.4 107°10.6 31.5 184°39.5 39.5 287°31.1 42.9 23 Mars: 0.1													14:53
13 154*15.8 51*13.8 52.6 332*01.2 25.6 49*22.4 39.9 152*08.0 42.4 169*18.2 66*013.1 52.5 347*02.3 26.3 64*24.3 39.9 167*01.6 42.4 169*18.2 66*13.1 52.5 347*02.3 26.9 79*26.2 39.8 182*13.1 42.5 16 199*23.1 96*11.7 52.2 17*04.4 27.6 94*28.1 39.8 197*15.7 42.5 17*04.5 110*11.0 52.1 32*05.4 28.2 109*30.0 39.7 212*18.3 42.6 18 229*28.1 126*10.3 N21*51.9 47*06.4 \$00*28.9 124*31.9 N22*39.7 227*20.8 \$01*42.6 19 244*30.5 141*09.6 51.8 62*07.5 29.5 139*33.8 39.6 242*23.4 42.7 20 259*33.0 156*08.9 51.7 77*08.5 30.2 154*35.7 39.6 257*26.0 42.7 21 274*35.5 171*08.2 **51.5 92*09.6 ***30.8 169*37.6 ***39.5 272*28.5 ***42.8 22 289*37.9 186*07.5 51.4 107*10.6 31.5 184*39.5 39.5 287*31.1 42.9 23 304*40.4 201*06.8 51.3 122*11.6 32.1 199*41.5 39.4 302*33.7 42.9											!		09:46
14 169°18.2 66°13.1 52.5 347°02.3 26.3 64°24.3 39.9 167°10.6 42.4 15 184°20.7 81°12.4 · · 52.3 2°03.3 · · 26.9 79°26.2 · · 39.8 182°13.1 · · · 42.5 16 199°23.1 96°11.7 52.2 17°04.4 27.6 94°28.1 39.8 197°15.7 42.5 17 214°25.6 111°11.0 52.1 32°05.4 28.2 109°30.0 39.7 212°18.3 42.6 18 229°28.1 126°10.3 N21°51.9 47°06.4 \$00°28.9 124°31.9 N22°39.7 227°20.8 \$01°42.6 19 244°30.5 141°09.6 51.8 62°07.5 29.5 139°33.8 39.6 242°23.4 42.7 20 259°33.0 156°08.9 51.7 77°08.5 30.2 154°35.7 39.6 257°26.0 42.7 21 274°35.5 171°08.2 · · 51.5 92°09.6 · · 30.8 169°37.6 · · 39.5 272°28.5 · · 42.8 22 289°37.9 186°07.5 51.4 107°10.6 31.5 184°39.5 39.5 287°31.1 42.9 23 304°40.4 201°06.8 51.3 122°11.6 32.1 199°41.5 39.4 302°33.7 42.9    Mars 178°04.0 14:   Jupiter 255°13.8 09:   Saturn 357°51.0 02:   Horizontal parallax   Venus: 0.1   Venus	13	154°15.8	51°13.8	52.6	332°01.2	25.6	49°22.4	39.9	152°08.0	42.4			
15	14	169°18.2	66°13.1	52.5	347°02.3	26.3	64°24.3	39.9	$167^{\circ}10.6$	42.4	Saturn	JUI 48.1	UZ:57
16       199°23.1       96°11.7       52.2       17°04.4       27.6       94°28.1       39.8       197°15.7       42.5       Venus       257°39.0       09:         17       214°25.6       111°11.0       52.1       32°05.4       28.2       109°30.0       39.7       212°18.3       42.6       Mars       178°04.0       14:         18       229°28.1       126°10.3       N21°51.9       47°06.4       500°28.9       124°31.9       N22°39.7       227°20.8       501°42.6       Jupiter       255°13.8       09:         19       244°30.5       141°09.6       51.8       62°07.5       29.5       139°33.8       39.6       242°23.4       42.7       5aturn       357°51.0       02:         20       259°33.0       156°08.9       51.7       77°08.5       30.2       154°35.7       39.6       257°26.0       42.7       42.7       42.8       42.7       42.8       42.7       42.8       42.7       42.8       42.7       42.8       42.7       42.8       42.7       42.8       42.7       42.8       42.7       42.8       42.7       42.8       42.7       42.8       42.7       42.8       42.7       42.8       42.7       42.8       42.7       42											Διισ 10 Sιισ	SHA	Mer pace
17													
18											1		09:35
19											1		14:52
19				N21°51.9						S01°42.6	Jupiter	255°13.8	09:43
20 259°33.0 156°08.9 51.7 77°08.5 30.2 154°35.7 39.6 257°26.0 42.7 21 274°35.5 171°08.2 · 51.5 92°09.6 · 30.8 169°37.6 · 39.5 272°28.5 · 42.8 22 289°37.9 186°07.5 51.4 107°10.6 31.5 184°39.5 39.5 287°31.1 42.9 23 304°40.4 201°06.8 51.3 122°11.6 32.1 199°41.5 39.4 302°33.7 42.9  Horizontal parallax Venus: 0.1 Mars: 0.1	19	244°30.5	141°09.6	51.8	62°07.5	29.5	139°33.8	39.6	242°23.4	42.7			02:53
21       274°35.5       171°08.2       ··· 51.5       92°09.6       ·· 30.8       169°37.6       ·· 39.5       272°28.5       ·· 42.8       Horizontal parallax         22       289°37.9       186°07.5       51.4       107°10.6       31.5       184°39.5       39.5       287°31.1       42.9       Venus: 0.1         23       304°40.4       201°06.8       51.3       122°11.6       32.1       199°41.5       39.4       302°33.7       42.9       Mars: 0.1											Sutuill		52.50
22 289°37.9 186°07.5 51.4 107°10.6 31.5 184°39.5 39.5 287°31.1 42.9 Venus: 0.1 23 304°40.4 201°06.8 51.3 122°11.6 32.1 199°41.5 39.4 302°33.7 42.9 Mars: 0.1											Horizont	al parallax	
23 304°40.4 201°06.8 51.3 122°11.6 32.1 199°41.5 39.4 302°33.7 42.9 Mars: 0.1												-	0.1
25 501 10.11 201 00.00 51.5 11.2 11.0 52.11 155 12.5 55.11 502 55.11 12.5													
Mer pass 02:45  v=0.7' d=0.1' m=3.98  v1.0' d0.6' m1.62  v1.0' d=0.0' m=1.93  v2.6' d0.1' m0.75	23	304~40.4	201°06.8	51.3	122°11.6	32.1	199~41.5	39.4	302~33.7	42.9		iviars:	U.I
WERTINGS TO THE PROPERTY OF THE SUK TO THE PROPERTY OF THE PRO		00.45	0 7/ / 0	11/ == 2.00	1 0/ /0	6/ -1 60	1 0/ / 0	0/ == 1.02	0 61 10	1/ 0 75			

h	Su	Moon						
Fri	GHA	Dec	GHA	ν	Dec	d	HP	
0	178°34.4	N16°07.3	14°25.3	8.9'	S24°09.2	-8.9'	56.8'	
1	193°34.5	06.6	28°53.2	8.9'	24°00.3	-9.1'	56.8'	
2	208°34.5	05.9	43°21.1	9.0'	23°51.2	-9.2'	56.8'	
3	223°34.6	• • 05.2	57°49.1	9.0'	23°42.0	-9.4'	56.9'	
4	238°34.7	04.5	72°17.1	9.1'	23°32.6	-9.5'	56.9'	
5	253°34.8 268°34.9	03.8 N16°03.0	86°45.2 101°13.3	9.1' 9.2'	23°23.2 <b>S</b> 23°13.5	-9.6'	56.9'	
6 7	283°35.0	02.3	101 13.3 115°41.5	9.2' 9.2'	23°03.8	-9.8' -9.9'	56.9' 57.0'	
8	298°35.0	01.6	130°09.7	9.3'	22°53.9	-10.0'	57.0'	
9	313°35.1	00.9	144°37.9	9.3'	22°43.9	-10.2	57.0'	
10	328°35.2	16°00.2	159°06.3	9.4'	22°33.7	-10.3	57.1'	
11	343°35.3	15°59.5	173°34.6	9.4'	22°23.4	-10.4'	57.1'	
12	358°35.4	N15°58.8	188°03.0	9.5'	S22°13.0	-10.5'	57.1'	
13	13°35.5	58.0	202°31.5	9.5'	22°02.5	-10.7'	57.1'	
14	28°35.6	57.3	217°00.0	9.6'	21°51.8 21°41.0	-10.8'	57.2'	
15 16	43°35.6 58°35.7	· · 56.6 55.9	231°28.6 245°57.2	9.6' 9.7'	21°41.0 21°30.1	-10.9' -11.0'	57.2' 57.2'	
17	73°35.8	55.9	245° 37.2 260° 25.9	9.7'	21°19.0	-11.0	57.2'	
18	88°35.9	N15°54.5	274°54.6	9.8'	\$21°07.9	-11.3'	57.3'	
19	103°36.0	53.7	289°23.4	9.8'	20°56.6	-11.4'	57.3'	
20	118°36.1	53.0	303°52.3	9.9'	20°45.2	-11.5'	57.3'	
21	133°36.2	• • 52.3	$318^{\circ}21.2$	9.9'	$20^{\circ}33.6$	-11.6'	57.3'	
22	148°36.2	51.6	332°50.1	10.0'	20°22.0	-11.8'	57.4'	
23	163°36.3	50.9	347°19.1	10.1'	20°10.2	-11.9'	57.4'	
	SD = 15.8'	d = -0.7'		SI	O = 15.5'			
Sat	GHA	Dec	GHA	ν	Dec	d	НР	
0	178°36.4	N15°50.1	1°48.2	10.1'	S19°58.3	-12.0'	57.4'	
1	193°36.5	49.4	16°17.3	10.2'	19°46.3	-12.1'	57.4'	
2	208°36.6	48.7	30°46.4	10.2'	19°34.2	-12.2'	57.5'	
3	223°36.7	• • 48.0	45°15.7	10.3'	19°22.0	-12.3'	57.5'	
4	238°36.8	47.3	59°44.9	10.3'	19°09.7	-12.4'	57.5'	
5	253°36.9 268°37.0	46.5 N15°45.8	74°14.3 88°43.6	10.4' 10.4'	18°57.2 \$18°44.7	-12.6' -12.7'	57.5' 57.6'	
6 7	283°37.1	45.1	00 43.0 103°13.1	10.4	18°32.0	-12.7 -12.8'	57.6'	
8	298°37.1	44.4	103 13.1 117°42.6	10.5	18° 19.2	-12.9'	57.6'	
9	313°37.2	• • 43.6	132°12.1	10.6'	18°06.4	-13.0'	57.6'	
10	328°37.3	42.9	146°41.7	10.6'	17°53.4	-13.1'	57.7'	
11	343°37.4	42.2	161°11.3	10.7'	17°40.3	-13.2'	57.7'	
12	358°37.5	N15°41.5	175°41.0	10.7'	S17°27.1	-13.3'	57.7'	
13	13°37.6	40.7	190°10.8	10.8'	17°13.8	-13.4'	57.7'	
14	28°37.7 43°37.8	40.0	204°40.6 219°10.4	10.8'	17°00.4 16°47.0	-13.5' -13.6'	57.8'	
15 16	43°37.8 58°37.9	· · 39.3 38.6	219°10.4 233°40.3	10.9' 11.0'	16°47.0	-13.0° -13.7'	57.8' 57.8'	
17	73°38.0	37.8	248°10.3	11.0'	16°19.7	-13.7 -13.8'	57.8'	
18	88°38.1	N15°37.1	262°40.3	11.0'	S16°05.9	-13.9'	57.9'	
19	103°38.2	36.4	277°10.3	11.1'	15°52.1	-14.0'	57.9'	
20	118°38.3	35.6	291°40.4	11.1'	15°38.1	-14.0'	57.9'	
21	133°38.3	• • 34.9	306°10.6	11.2'	15°24.1	-14.1'	57.9'	
22	148°38.4	34.2	320°40.8	11.2'	15°09.9	-14.2'	58.0'	
23	163°38.5	33.5	335°11.0	11.3'	14°55.7	-14.3'	58.0'	
	SD = 15.8'	d = -0.7'		SI	O = 15.7'			
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP	
0	178°38.6	N15°32.7	349°41.3	11.3'	\$14°41.4	-14.4'	58.0'	
1 2	193°38.7 208°38.8	32.0 31.3	4°11.6 18°42.0	11.4' 11.4'	14°27.0 14°12.5	-14.5' -14.6'	58.0' 58.1'	
3	208 38.8 223°38.9	30.5	33°12.4	11.4	14 12.5 13°58.0	-14.6'	58.1'	
4	238°39.0	29.8	47°42.9	11.5'	13°43.3	-14.7'	58.1'	
5	253°39.1	29.1	62°13.4	11.6'	13°28.6	-14.8'	58.1'	
6	268°39.2	N15°28.3	76°44.0	11.6'	<b>S</b> 13°13.8	-14.9'	58.1'	
7	283°39.3	27.6	91°14.5	11.6'	12°59.0	-14.9'	58.2'	
8	298°39.4	26.9	105°45.2	11.7'	12°44.0	-15.0'	58.2'	
9	313°39.5	• • 26.1	120°15.9	11.7'	12°29.0	-15.1'	58.2'	
10 11	328°39.6 343°39.7	25.4 24.7	134°46.6 149°17.3	11.8' 11.8'	12°13.9 11°58.7	-15.2' -15.2'	58.2' 58.2'	
12	358°39.8	24.7 N15°23.9	149 17.3 163°48.1	11.8	\$11°43.5	-15.2 -15.3'	58.3	
13	13°39.9	23.2	178° 19.0	11.9'	11°28.2	-15.4'	58.3'	
14	28°40.0	22.4	192°49.8	11.9'	11°12.8	-15.4'	58.3'	
15	43°40.1	• • 21.7	$207^{\circ}20.7$	11.9'	$10^{\circ}57.4$	-15.5'	58.3'	
16	58°40.2	21.0	221°51.7	12.0'	10°41.9	-15.6'	58.4'	
17	73°40.3	20.2	236°22.6	12.0'	10°26.3	-15.6'	58.4'	
18 19	88°40.4 103°40.5	N15° 19.5 18.8	250°53.6 265°24.7	12.0' 12.1'	\$10°10.7 09°55.0	-15.7' -15.7'	58.4' 58.4'	
20	103°40.5 118°40.6	18.8 18.0	265°24.7 279°55.7	12.1'	09°55.0	-15.7' -15.8'	58.4' 58.4'	
21	133°40.7	17.3	279 35.7 294°26.8	12.1'	09°23.5	-15.9'	58.4	
22	148°40.8	16.5	308°58.0	12.2'	09°07.6	-15.9'	58.5'	
23	163°40.9	15.8	323°29.1	12.2'	08°51.7	-16.0'	58.5'	
	SD = 15.8'	d = -0.7'		SI	D = 15.8'			

	Twi	light			Twi	light
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
N 72°	////	////	01:37	22:25	////	////
<b>N</b> 70°	////	////	02:24	21:42	////	////
68°	////	00:35	02:54	21:13	23:18	////
$66^{\circ}$	////	01:47	03:17	20:52	22:18	////
64°	////	02:22	03:34	20:35	21:45	////
62°	00:32	02:46	03:48	20:21	21:22	23:23
$60^{\circ}$	01:36	03:06	04:00	20:09	21:03	22:30
N $58^{\circ}$	02:08	03:21	04:11	19:59	20:48	22:00
56°	02:31	03:34	04:20	19:50	20:35	21:38
54°	02:49	03:45	04:28	19:42	20:24	21:20
52°	03:04	03:55	04:35	19:35	20:14	21:06
50°	03:16	04:04	04:41	19:29	20:06	20:53
45°	03:41	04:22	04:55	19:15	19:48	20:28
N 40°	04:00	04:36	05:06	19:04	19:34	20:10
35°	04:16	04:48	05:16	18:55	19:22	19:55
30°	04:28	04:58	05:24	18:47	19:12	19:42
20°	04:48	05:15	05:38	18:33	18:56	19:23
N $10^{\circ}$	05:03	05:29	05:51	18:20	18:42	19:08
0°	05:16	05:41	06:02	18:09	18:30	18:55
S $10^{\circ}$	05:26	05:52	06:13	17:58	18:19	18:45
20°	05:36	06:03	06:25	17:46	18:09	18:35
30°	05:46	06:14	06:39	17:32	17:57	18:26
35°	05:50	06:20	06:47	17:25	17:51	18:21
40°	05:55	06:27	06:56	17:16	17:44	18:16
45°	06:00	06:35	07:06	17:06	17:36	18:11
<b>S</b> 50°	06:06	06:44	07:18	16:53	17:28	18:06
52°	06:08	06:48	07:24	16:47	17:24	18:04
54°	06:10	06:53	07:31	16:41	17:19	18:01
56°	06:13	06:57	07:38	16:34	17:14	17:59
58°	06:16	07:03	07:46	16:26	17:09	17:56
<b>S</b> 60°	06:19	07:09	07:55	16:17	17:03	17:53
Lat		Moonris	e		Moonset	:
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
N 72°		22:25	21:26			03:28
NI 700	l	01.50	01.10	l		00.50

Lat.		Moonris	е	Moonset			
Lat.	Fri	Sat	Sun	Fri	Sat	Sun	
N 72°	_	22:25	21:26	_		03:28	
<b>N</b> 70°		21:53	21:12			03:58	
68°	22:18	21:29	21:01		01:46	04:20	
66°	21:38	21:10	20:51		02:25	04:37	
64°	21:10	20:54	20:43	00:35	02:52	04:51	
62°	20:48	20:42	20:36	01:16	03:13	05:03	
60°	20:30	20:31	20:30	01:44	03:30	05:13	
<b>N</b> 58°	20:15	20:21	20:25	02:05	03:44	05:21	
56°	20:02	20:13	20:20	02:23	03:56	05:29	
54°	19:51	20:05	20:16	02:38	04:06	05:35	
52°	19:41	19:58	20:12	02:50	04:15	05:41	
50° 45°	19:32	19:52	20:08	03:02	04:23	05:46 05:58	
	19:14	19:39	20:00	03:25	04:41		
N 40°	18:58	19:28	19:54	03:44	04:55	06:07	
35° 30°	18:45 18:33	19:18 19:10	19:48 19:43	03:59 04:12	05:07 05:17	06:15 06:22	
20°	18:33	19:10	19:43	04:12	05:17	06:22	
N 10°	17:56	18:43	19:34	04.55	05:50	06:45	
0°	17:40	18:31	19:20	05:13	06:05	06:54	
<b>S</b> 10°	17:24	18:19	19:12	05:31	06:19	07:04	
20°	17:06	18:06	19:05	05:50	06:34	07:14	
30°	16:46	17:51	18:56	06:12	06:51	07:26	
35°	16:34	17:43	18:51	06:25	07:01	07:32	
40°	16:21	17:33	18:45	06:40	07:12	07:40	
45°	16:04	17:21	18:38	06:57	07:25	07:48	
<b>S</b> 50°	15:44	17:07	18:30	07:19	07:41	07:59	
52°	15:35	17:00	18:26	07:29	07:48	08:03	
54°	15:24	16:53	18:21	07:40	07:57	08:09	
56°	15:12	16:45	18:17	07:53	08:06	08:14	
58°	14:57	16:35	18:11	08:08	08:16	08:21	
<b>S</b> 60°	14:40	16:24	18:06	08:26	08:28	08:28	

		Sun		Moon			
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age	
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	15-17	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	98-99%	
08	05:43	05:38	12:06	23:53	11:27		
09	05:34	05:30	12:05	-:-	12:18		
10	05:25	05:21	12:05	00:43	13:07		

August 11, 12, 13 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	319°42.9	216°06.1	N21°51.1	137°12.7	500°32.8	214°43.4	N22°39.4	317°36.2	S01°43.0			
1	334°45.3	231°05.4	51.0	152°13.7	33.4	229°45.3	39.3	332°38.8	43.0	Alpheratz	357°34.0	29°13.9
2	349°47.8	246° 04.7	50.8	167°14.8	34.1	244°47.2	39.3	347°41.4	43.1	Ankaa	353°06.3	-42°09.7
3	4°50.3	261°04.0	• • 50.7	182°15.8	34.7	259°49.1	39.2	2°43.9	43.1	Schedar	349°30.1	56°40.5
4	19°52.7	276°03.3	50.5	197°16.8	35.4	274°51.0	39.2	17°46.5	43.2	Diphda	348°46.6	-17°50.6
5	34°55.2	291°02.7	50.4	212°17.9	36.0	289°52.9	39.2	$32^{\circ}49.1$	43.2	Achernar	335°19.5	-57°06.0
6	49°57.6	306°02.0	N21°50.3	227°18.9	S00°36.7	304°54.8	N22°39.1	47°51.6	S01°43.3	Hamal Polaris	327°50.5 313°46.5	23°35.0 89°22.0
7	65°00.1	321°01.3	50.1	242°19.9	37.3	$319^{\circ}56.7$	39.1	62°54.2	43.3	Acamar	315°11.4	-40°11.8
8	80°02.6	336°00.6	50.0	257°21.0	38.0	334°58.7	39.0	77°56.8	43.4	Menkar	314°05.6	4°11.5
9	95°05.0	350°59.9	• • 49.8	272°22.0	• • 38.6	350°00.6	• • 39.0	92°59.3	• • 43.5	Mirfak	308° 27.6	49°57.0
10	110°07.5	5°59.2	49.7	287°23.1	39.3	5°02.5	38.9	108°01.9	43.5	Aldebaran	290°39.2	16°33.7
11	125°10.0	20°58.5	49.5	302°24.1	39.9	20°04.4	38.9	123°04.5	43.6	Rigel	281°03.6	-8°10.1
12	140°12.4	35° 57.8	N21°49.4	317°25.1	S00°40.6	35°06.3	N22°38.8	138°07.0	S01°43.6	Capella	280°21.4	46°01.3
13	155°14.9	50°57.1	49.2	332°26.2	41.2	50°08.2	38.8	153°09.6	43.7	Bellatrix	278°22.5	6°22.5
14 15	170°17.4 185°19.8	65° 56.4 80° 55.7	49.1 •• 48.9	347°27.2 2°28.2	41.9 •• 42.5	65°10.1 80°12.0	38.7 •• 38.7	168°12.2 183°14.7	43.7 •• 43.8	Elnath	$278^{\circ}01.4$	28°37.7
16	200°22.3	95° 55.0	48.7	17°29.3	43.2	95°13.9	38.6	198°17.3	43.8	Alnilam	275°37.4	-1°11.0
17	215°24.8	110°54.3	48.6	32°30.3	43.8	110°15.9	38.6	213°19.9	43.9	Betelgeuse	270°51.8	7°24.8
18	230°27.2	125°53.6	N21°48.4	47°31.3	S00°44.5	125°17.8	N22°38.5	228°22.4	S01°43.9	Canopus	263°52.6	-52°42.3
19	245°29.7	140°52.9	48.3	62°32.4	45.1	140°19.7	38.5	243°25.0	44.0	Sirius	258°26.1	-16°44.9
20	260°32.1	155° 52.2	48.1	77°33.4	45.8	155°21.6	38.4	258°27.6	44.1	Adhara	255°05.8	-29°00.2
21	275°34.6	170°51.5	• • 47.9	92°34.5	• • 46.4	170°23.5	• • 38.4	273°30.1	• • 44.1	Procyon	244°50.6	5°09.7
22	290°37.1	185°50.8	47.8	107°35.5	47.1	185°25.4	38.3	288°32.7	44.2	Pollux	243°17.0	27°57.9
23	305°39.5	200°50.1	47.6	122°36.5	47.7	200°27.3	38.3	303°35.3	44.2	Avior	234° 15.2	-59°35.3 -43°32.1
1/10= -	ass. 02:41	1/_O 7/ d O	0.1' m-3.98	1/1 n/ dn	.6′ m1.62	1/1 0/ d 0	.0′ m-1.94	1/2 6/ 40	1′ m0.75	Suhail Miaplacidus	222°46.4 221°39.2	-43°32.1 -69°49.3
ivier.p	ass. U2:41	ν-υ.ι α-υ	v.1 III-3.98	ν1.0 a0	.0 1111.02	ν1.9 <b>α</b> -0	.0 111-1.94	ν2.0 a0	1110.75	Alphard	221° 39.2 217° 47.6	-8°46.1
										Regulus	207°34.2	11°50.6
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.0	61°36.9
0	320°42.0	215°49.4	N21°47.5	137°37.6	S00°48.4	215°29.2	N22°38.2	318°37.8	S01°44.3	Denebola	182°24.7	14°25.9
1	335°44.5	230°48.7	47.3	152°38.6	49.0	230°31.2	38.2	333°40.4	44.3	Gienah	175°43.3	-17°41.1
2	350°46.9	245°48.0	47.1	167°39.6	49.7	245°33.1	38.1	348°43.0	44.4	Acrux	173°00.1	-63°14.7
3	5°49.4	260° 47.4	• • 46.9	182°40.7	• • 50.3	260°35.0	· · 38.1	3°45.5	• • 44.4	Gacrux	$171^{\circ}51.5$	-57°15.6
4	20°51.9	275°46.7	46.8	197°41.7	51.0	275°36.9	38.0	18°48.1	44.5	Alioth	$166^{\circ}12.8$	55°49.5
5 6	35°54.3 50°56.8	290°46.0 305°45.3	46.6 N21°46.4	212°42.7 227°43.8	51.6 \$00°52.3	290°38.8 305°40.7	38.0 N22°37.9	33°50.7 48°53.2	44.6 S01°44.6	Spica	158°21.9	-11°17.7
7	65°59.2	320° 44.6	46.3	242°44.8	52.9	320°42.6	37.9	63°55.8	44.7	Alkaid	152°51.8	49°11.4
8	81°01.7	335°43.9	46.1	257°45.8	53.6	335°44.6	37.9	78°58.4	44.7	Hadar	148° 35.5	-60°30.0
9	96°04.2	350°43.2	• • 45.9	272°46.9	• • 54.2	350°46.5	• • 37.8	94°01.0	• • 44.8	Menkent	147°57.1	-36°29.9
10	111°06.6	5° 42.5	45.7	287°47.9	54.9	5°48.4	37.7	109°03.5	44.8	Arcturus	145°47.5	19°03.1
11	126°09.1	20°41.8	45.6	302°49.0	55.5	20°50.3	37.7	124°06.1	44.9	Rigil Kent.	139°39.7	-60°56.7
12	141°11.6	35°41.1	N21°45.4	317°50.0	S00°56.2	35°52.2	N22°37.6	139°08.7	S01°44.9	Kochab	137°19.8	74°03.3
13	156°14.0	50°40.4	45.2	332°51.0	56.8	50°54.1	37.6	154°11.2	45.0	Zuben'ubi	136°55.5 126°03.3	-16°08.9 26°37.9
14	171°16.5	65°39.7	45.0	347°52.1	57.5	65°56.0	37.5	169°13.8	45.1	Alphecca Antares	120 05.5 112° 15.1	-26°29.4
15	186°19.0	80°39.0	• • 44.9	2°53.1	• • 58.1	80°58.0	• • 37.5	$184^{\circ}16.4$	• • 45.1	Antares	112 15.1 107°08.6	-20 29.4 -69°04.6
16	201°21.4	95°38.3	44.7	$17^{\circ}54.1$	58.8	95°59.9	37.4	199°18.9	45.2	Sabik	102°02.0	-15°45.4
17	216°23.9	110°37.6	44.5	32°55.2	00°59.4	111°01.8	37.4	214°21.5	45.2	Shaula	96°09.4	-37°07.4
18	231°26.4	125°36.9	N21°44.3	47°56.2	S01°00.1	126°03.7	N22°37.3		S01°45.3	Rasalhague	95°57.9	12°32.6
19	246°28.8	140°36.2	44.1	62°57.2	00.7	141°05.6	37.3	244°26.7	45.3	Eltanin	$90^{\circ}41.6$	51°29.3
20	261°31.3	155°35.5	43.9	77°58.3	01.4	156°07.5	37.2	259°29.2	45.4	Kaus Aust.	83°31.5	-34°22.4
21	276°33.7 291°36.2	170°34.8	• • 43.7	92°59.3	• • 02.0	171°09.5 186°11.4	•• 37.2	274°31.8	• • 45.4	Vega	$80^{\circ}32.6$	38°48.6
22 23	291 36.2 306°38.7	185°34.1 200°33.4	43.6 43.4	108°00.3 123°01.4	02.7 03.3	201°13.3	37.1 37.1	289°34.4 304°36.9	45.5	Nunki	75°46.8	-26°15.9
23	300 30.7								45.6	Altair	61°59.2	8°56.3
Mer.p	ass. 02:37	$\nu$ -0.7' d-0	).2′ m-3.98	$\nu 1.0' \ d0$	.7′ m1.62	$\nu 1.9' \ d-0$	.0′ m-1.94	$\nu 2.6' \ d0$	1' m $0.74$	Peacock	53°04.3	-56°39.1
				-		-		-	_	Deneb	49°25.0	45°22.4
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.0	9°59.6
0	321°41.1	215°32.7	N21°43.2	138°02.4		216°15.2	N22°37.0	319°39.5		Al Na'ir Fomalhaut	27°31.8	-46°50.1 -29°29.0
1	336°43.6	230°32.0	43.0	153°03.4	04.6	231°17.1	37.0	334°42.1	45.7	Scheat	15° 13.6 13° 44.4	-29°29.0 28°13.3
2	351°46.1	245°31.3	42.8	168°04.5	05.3	246°19.0	36.9	349°44.7	45.7	Markab	13° 44.4 13° 29.1	26 13.3 15°20.7
3	6°48.5	260°30.6	• • 42.6	183°05.5	• • 05.9	261°20.9	• • 36.9	4°47.2	• • 45.8			13 20.1
4	$21^{\circ}51.0$	$275^{\circ}29.9$	42.4	$198^{\circ}06.5$	06.6	276°22.9	36.8	19°49.8	45.8	Aug 11 Mon	SHA	Mer.pass
5	36°53.5	290° 29.2	42.2	213°07.6	07.2	291°24.8	36.8	34°52.4	45.9		256°23.3	09:36
6	51°55.9	305°28.5	N21°42.0	228°08.6		306°26.7	N22°36.7		S01°46.0		177°29.8	14:50
7	66°58.4	320°27.8	41.8	243°09.6	08.5	321°28.6	36.7	64°57.5	46.0	Jupiter		09:40
8	82°00.8	335°27.1	41.6	258°10.6	09.2	336°30.5	36.6	80°00.1	46.1	Saturn	357°53.4	02:49
9	97°03.3	350°26.5	• • 41.4	273°11.7	• • 09.8	351°32.4	• • 36.6	95°02.7	• • 46.1	Aug 12 Tue	SHA	Mer.pass
10 11	112°05.8 127°08.2	5°25.8 20°25.1	41.2 41.0	288°12.7 303°13.7	10.5 11.1	6°34.4 21°36.3	36.5 36.5	110°05.2 125°07.8	46.2 46.2	_	255°07.4	09:37
11 12	127 08.2 142°10.7	20 25.1 35°24.4	N21°40.8	318°14.8	501°11.8	21 36.3 36°38.2	30.5 N22°36.4	125 07.8 140°10.4			$176^{\circ}55.6$	14:48
13	142 10.7 157°13.2	50°23.7	40.6	333°15.8	12.4	50° 56.2 51° 40.1	36.4	155°13.0	46.4		254°47.2	09:37
14	172°15.6	65° 23.0	40.4	348°16.8	13.1	66°42.0	36.3	170°15.5	46.4	Saturn	357°55.8	02:45
15	187°18.1	80°22.3	• • 40.2	3°17.9	• • 13.7	81°44.0	36.3	185°18.1	46.5	Aug 13 Wed	SHA	Mer.pass
16	202°20.6	95°21.6	40.0	18°18.9	14.4	96°45.9	36.2	200°20.7	46.5	_	253°51.6	09:38
17	217°23.0	110°20.9	39.8	33°19.9	15.0	111°47.8	36.2	215°23.3	46.6		176°21.3	14:47
18	232°25.5	125°20.2	N21°39.6	48°21.0	S01°15.7	126°49.7	N22°36.1	230°25.8	S01°46.6		254°34.1	09:34
19	247°28.0	140° 19.5	39.4	63°22.0	16.4	141°51.6	36.1	245°28.4	46.7		$357^{\circ}58.4$	02:41
20	262°30.4	155° 18.8	39.2	78°23.0	17.0	156° 53.5	36.0	260°31.0	46.8			
21	277°32.9	170°18.1	• • 39.0	93°24.1	• • 17.7	171°55.5	• • 36.0	275°33.6	• • 46.8	Horizont	al parallax	0.1
22	292°35.3	185°17.4	38.7	108°25.1	18.3	186°57.4	35.9	290°36.1	46.9		Venus: Mars:	0.1 0.1
23	307°37.8	200°16.7	38.5	123°26.1	19.0	201°59.3	35.9	305°38.7	46.9		iviars:	0.1
Mer.p	ass. 02:33	$\nu$ -0.7′ d-0	).2′ m-3.97	$\nu$ 1.0′ d0	.7′ m1.62	$\nu$ 1.9′ d-0	.0′ m-1.94	$\nu$ 2.6′ d0.	1′ m0.74			

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0 1	178°41.0 193°41.1	N15° 15.1 14.3	338°00.3 352°31.5	12.2' 12.2'	\$08°35.7 08°19.7	-16.0' -16.1'	58.5' 58.5'
2	208°41.2	13.6	7°02.7	12.3'	08°03.6	-16.1	58.5
3	223°41.3	• • 12.8	21°34.0	12.3'	07°47.5	-16.2'	58.6'
4 5	238°41.4 253°41.5	12.1 11.3	36°05.3 50°36.5	12.3' 12.3'	07°31.4 07°15.1	-16.2' -16.3'	58.6' 58.6'
6	268°41.6	N15° 10.6	65°07.9	12.3'	S06°58.9	-16.3	58.6'
7	283°41.7	09.9	79°39.2	12.4'	06°42.6	-16.3'	58.6'
8 9	298°41.8 313°41.9	09.1 •• 08.4	94°10.6 108°41.9	12.4' 12.4'	06°26.3 06°09.9	-16.4' -16.4'	58.6' 58.7'
10	328°42.0	07.6	123°13.3	12.4'	05°53.5	-16.5	58.7'
11	343°42.1 358°42.2	06.9 N15°06.1	137°44.7	12.4	05°37.0	-16.5'	58.7'
12 13	358° 42.2 13° 42.3	N15 06.1 05.4	152°16.2 166°47.6	12.4' 12.4'	\$05°20.5 05°04.0	-16.5' -16.6'	58.7' 58.7'
14	28°42.4	04.6	181°19.0	12.5'	04°47.5	-16.6'	58.7'
15	43°42.5 58°42.6	• • 03.9	195°50.5	12.5'	04°30.9 04°14.3	-16.6'	58.8'
16 17	58 42.0 73°42.7	03.1 02.4	210°22.0 224°53.4	12.5' 12.5'	04 14.3 03°57.6	-16.6' -16.7'	58.8' 58.8'
18	88°42.8	N15°01.6	239°24.9	12.5'	S03°40.9	-16.7'	58.8'
19	103°42.9	00.9 15°00.1	253°56.4 268°27.9	12.5'	03°24.2 03°07.5	-16.7'	58.8'
20 21	118°43.0 133°43.1	15°00.1 14°59.4	268° 27.9 282° 59.4	12.5' 12.5'	03°07.5 02°50.8	-16.7' -16.8'	58.8' 58.8'
22	148°43.3	58.6	297°30.9	12.5'	02°34.0	-16.8'	58.9'
23	163°43.4	57.9	312°02.4	12.5'	02°17.2	-16.8'	58.9'
	SD = 15.8'	d = -0.7'		SI	O = 16.0'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°43.5	N14°57.1	326°33.9	12.5'	502°00.4	-16.8'	58.9'
1 2	193°43.6 208°43.7	56.4 55.6	341°05.4 355°36.9	12.5' 12.5'	01°43.6 01°26.8	-16.8' -16.8'	58.9' 58.9'
3	223°43.8	• • 54.9	10°08.4	12.5'	01°09.9	-16.9	58.9'
4	238°43.9	54.1	24°39.9	12.5'	00°53.1	-16.9'	58.9'
5 6	253°44.0 268°44.1	53.4 N14° 52.6	39°11.4 53°42.8	12.5' 12.5'	00°36.2 500°19.3	-16.9' -16.9'	58.9' 59.0'
7	283°44.2	51.9	68°14.3	12.5'	500°02.5	-16.9	59.0'
8	298°44.3	51.1	82°45.8	12.4'	N00°14.4	16.9'	59.0'
9 10	313°44.4 328°44.5	• • 50.4 49.6	97°17.2 111°48.6	12.4' 12.4'	00°31.3 00°48.2	16.9' 16.9'	59.0' 59.0'
11	343°44.7	48.8	126°20.0	12.4'	01°05.1	16.9'	59.0'
12	358°44.8	N14°48.1	140°51.5 155°22.8	12.4'	N01°22.0 01°38.9	16.9'	59.0'
13 14	13°44.9 28°45.0	47.3 46.6	155° 22.8 169° 54.2	12.4' 12.4'	01°38.9 01°55.8	16.9' 16.9'	59.0' 59.1'
15	43°45.1	• • 45.8	184°25.6	12.3'	02°12.7	16.9'	59.1'
16 17	58°45.2 73°45.3	45.1 44.3	198°56.9 213°28.2	12.3' 12.3'	02°29.6 02°46.4	16.9' 16.9'	59.1' 59.1'
18	88°45.4	N14° 43.5	213 28.2 227°59.5	12.3'	N03°03.3	16.9	59.1
19	103°45.5	42.8	242°30.8	12.2'	03°20.2	16.8'	59.1'
20 21	118°45.6 133°45.8	42.0 •• 41.3	257°02.0 271°33.2	12.2' 12.2'	03°37.0 03°53.8	16.8' 16.8'	59.1' 59.1'
22	148°45.9	40.5	286°04.4	12.2'	03°33.8 04°10.6	16.8	59.1
23	163°46.0	39.7	300°35.5	12.1'	04°27.4	16.8'	59.1'
	SD = 15.8'	d = -0.8'		SI	O = 16.1'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°46.1	N14°39.0	315°06.7	12.1'	N04°44.2	16.8'	59.1'
1 2	193°46.2 208°46.3	38.2 37.5	329°37.8 344°08.8	12.1' 12.0'	05°01.0 05°17.7	16.7' 16.7'	59.2' 59.2'
3	223°46.4	• • 36.7	358°39.8	12.0'	05°34.4	16.7'	59.2'
4	238°46.5 253°46.7	35.9	13°10.8 27°41.8	12.0'	05°51.1 06°07.8	16.7'	59.2'
5 6	253°46.7 268°46.8	35.2 N14° 34.4	27°41.8 42°12.7	11.9' 11.9'	06°07.8 N06°24.4	16.6' 16.6'	59.2' 59.2'
7	283°46.9	33.6	56°43.6	11.8'	06°41.0	16.6'	59.2'
8	298°47.0 313°47.1	32.9 · · 32.1	71°14.4 85°45.2	11.8' 11.8'	06°57.6 07°14.1	16.5' 16.5'	59.2' 59.2'
10	313 47.1 328°47.2	31.4	85 45.2 100°16.0	11.8	07 14.1 07°30.6	16.5	59.2'
11	343°47.3	30.6	114°46.7	11.7'	$07^{\circ}47.1$	16.4'	59.2'
12 13	358°47.5 13°47.6	N14°29.8 29.1	129°17.3 143°47.9	11.6' 11.6'	N08°03.5 08°19.9	16.4' 16.4'	59.2' 59.2'
13 14	13°47.6 28°47.7	29.1	143°47.9 158°18.5	11.5	08°19.9 08°36.3	16.4	59.2' 59.2'
15	43°47.8	• • 27.5	172°49.0	11.5'	08°52.6	16.3'	59.2'
16 17	58°47.9 73°48.0	26.8 26.0	187°19.5 201°49.9	11.4' 11.4'	09°08.9 09°25.1	16.2' 16.2'	59.2' 59.3'
18	88°48.1	N14°25.2	216°20.3	11.3'	N09°41.3	16.1	59.3'
19	103°48.3	24.4	230°50.6	11.3'	09°57.4	16.1'	59.3'
20 21	118°48.4 133°48.5	23.7	245°20.8 259°51.0	11.2' 11.1'	10°13.5 10°29.5	16.0' 16.0'	59.3' 59.3'
22	148°48.6	22.1	274°21.2	11.1'	10°45.5	15.9'	59.3
23	163°48.7	21.4	288°51.2	11.0'	11°01.4	15.9'	59.3'
	SD = 15.8'	d = -0.8'		SI	O = 16.1'		

N 72°         ////         ////         02:04         22:00         ///           N 70°         ////         ////         02:42         21:24         //           68°         ////         01:19         03:08         20:59         22           66°         ////         02:06         03:27         20:40         21           64°         ////         02:35         03:43         20:24         21           62°         01:10         02:57         03:56         20:12         21           60°         01:53         03:14         04:07         20:01         20	Naut.
N 70°         ////         ////         02:42         21:24         //           68°         ////         01:19         03:08         20:59         22           66°         ////         02:06         03:27         20:40         21           64°         ////         02:35         03:43         20:24         21           62°         01:10         02:57         03:56         20:12         21           60°         01:53         03:14         04:07         20:01         20	/// //// 2:43 //// 1:59 //// 1:31 //// 1:10 22:52 0:53 22:13 0:39 21:47 0:27 21:27 0:17 21:11
68°     ////     01:19     03:08     20:59     22       66°     ////     02:06     03:27     20:40     21       64°     ////     02:35     03:43     20:24     21       62°     01:10     02:57     03:56     20:12     21       60°     01:53     03:14     04:07     20:01     20	2:43 //// 1:59 //// 1:31 //// 1:10 22:52 0:53 22:13 0:39 21:47 0:27 21:27 0:17 21:11
66°     ////     02:06     03:27     20:40     21       64°     ////     02:35     03:43     20:24     21       62°     01:10     02:57     03:56     20:12     21       60°     01:53     03:14     04:07     20:01     20	1:59     ////       1:31     ////       1:10     22:52       0:53     22:13       0:39     21:47       0:27     21:27       0:17     21:11
64°     ////     02:35     03:43     20:24     21       62°     01:10     02:57     03:56     20:12     21       60°     01:53     03:14     04:07     20:01     20	1:31 //// 1:10 22:52 0:53 22:13 0:39 21:47 0:27 21:27 0:17 21:11
62° 01:10 02:57 03:56 20:12 21 60° 01:53 03:14 04:07 20:01 20	1:10 22:52 0:53 22:13 0:39 21:47 0:27 21:27 0:17 21:11
60° 01:53 03:14 04:07 20:01 20	0:53 22:13 0:39 21:47 0:27 21:27 0:17 21:11
	0:39 21:47 0:27 21:27 0:17 21:11
$N 58^{\circ}$ 02.20 03.29 04.17 19.51 20	0:27 21:27 0:17 21:11
	0:17 21:11
56° 02:40 03:41 04:25 19:43 20	
54° 02:57 03:52 04:33 19:36 20	0.08 20.58
52° 03:10 04:01 04:39 19:29 20	2.00
	0:00 20:46
45° 03:46 04:26 04:58 19:11 19	9:43 20:23
	9:30 20:05
35° 04:18 04:51 05:18 18:52 19	9:19 19:51
	9:09 19:39
	3:54 19:21
	3:41 19:06
0° 05:15 05:40 06:02 18:08 18	3:30 18:55
	3:20 18:45
	3:09 18:36
	7:59 18:27
	7:53 18:23
	7:47 18:19
45° 05:56 06:31 07:02 17:09 17	7:40 18:14
	7:32 18:10
	7:28 18:08
	7:24 18:06
	7:20 18:04
	7:15 18:02
<b>S</b> $60^{\circ}$   $06:12$   $07:01$   $07:47$   $16:24$   $17$	7:10 17:59

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

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

The   CHA   CHA   Dec   CH	h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
22 22 - 23 22 - 24 3 22 - 24 3 24 3 24 3	Thu -	CHV	CHV.	Doc	CHV.	Doc	CHA	Doc	CHV.	Doc		SHA	Doc
1 557*67 7 287*53 83 1 937*22 20.0 20*631 857 857 857 640 47.0 25*20 35*04.0 47.0 47.0 47.0 47.0 47.0 47.0 47.0												ЗПА	Dec
2 3.744.7 20/1136 37.9 1879.0 399 47/551 55.7 2007-6-6 47.1 2.406.0 47.2 5 1.506.											Alpheratz	357°34.0	29°13.9
3 7°477 260°119 9.777 180°129 9.770 180°302 9.710 9.8007 3.76 190°101 4.72 190°101 9.770 190°101 9.											Ankaa	353°06.3	-42°09.7
2 29°81 1 77°13 2 37 4 99°81 3 22 0 20°10 10 3.6											Schedar	349°30.1	56°40.6
5 37°526 200°125 37°2 211333 2023 200°100 35.6 55°541 473 47470 200°54											Diphda	348°46.6	
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2												335°19.5	I .
8 6 From 3 38° 143 6 28° 334 500′ 20 30° 144 742° 385 6 60° 591 30° 147 74 742° 385 6 60° 591 30° 147 74 742° 385 6 60° 591 30° 147 74 742° 385 6 60° 591 30° 147 74 742° 385 6 60° 591 30° 140° 140° 140° 140° 140° 140° 140° 14											1		
8 9 9002 337103 338703 360 930738 24 244 225 3327166 384 84 817010 425 46105 475 10 1117049 50703 361 2828734 425 33210150 5354 37 10 117049 50703 361 2828734 425 332101 10 10 10 10 10 10 10 10 10 10 10 10											Polaris	313°44.9	89°22.0
8 8 60 0 3 30 70													
13													I
11 11 12 1979 8 2070 8 18 1973 15 18 18 1973 15 18 1973											1		I .
13   187   18   187   18   187   18   18											1		
14   13   14   13   14   15   15   15   15   15   15   15											1		I .
18 18 18 18 3 900 3 33 33 900 6 23 5 70.5 3.4 19113 4.7 18 18 18 18 18 18 18 18 18 18 18 18 18													
18   18   18   18   18   18   18   18	13		50°06.9	35.4		28.1		35.2		47.7			
Bas-147											1		I .
19	15										1		
Carpopa   287-26   139-26	16	203°19.7	95°04.8	34.7		30.0		35.0		47.9	1		I .
Simple   Section   Secti	17	218°22.2	110°04.1	34.5	33°44.6	30.7	112°33.9	35.0	216°25.1	48.0			
287 296 5 187 200 338 296 6 297 326 187 396 348 293 348 297 292 298 298 298 298 298 298 298 298 298	18	233°24.6	125°03.4	N21°34.3	48°45.7	S01°31.3	127°35.8	N22°34.9		S01°48.0			
23. 368 369 90 000 0 33.3 100 000 0	19		140°02.7	34.0		32.0		34.9		48.1	1		
27 28 29 34 5 185 007 333 1086 48 8 34 6 187 455 34 7 89 18 270 35 4 48 2 89 36 89 36 90 000 00 00 00 00 00 00 00 00 00 00 00	20	263°29.6	155°02.0	33.8	78°47.7	32.6	157°39.6	34.8	261°32.8	48.2	1		I .
23 30 30 50 50 200 00 331 125 50 8 346 02 454 347 30 40 50 453	21	278°32.0	170°01.3	• • 33.6	93°48.7	• • 33.3	172°41.5	• • 34.8	276°35.4	• • 48.2	,		
Substitute   Sub	22	293°34.5	185°00.7	33.3	108°49.8	34.0	187°43.5	34.7	291°38.0	48.3	1		
Maple   Mapl	23	308°36.9	200°00.0	33.1	123°50.8	34.6	202°45.4	34.7	306°40.5	48.3	1		
Fit   GHA	N 4 e ··	200 02:20	1,07/10	) 2/ m 2 07	1,1 0/ -/0	7/ 1 60	,,1 0/ -/ 0	1/ m 1 04	1,0 6/ -10	1/ m0 73			
Fri GIA	ivier.p	ass. U2:29	$\nu$ -0.1' $d$ -0	J.∠ m-3.97	$\nu$ 1.0° d0	. <i>i</i> m1.62	$\nu_{1.9}$ d-0	.ı m-1.94	ν2.0′ d0	.ı mu./3			
Fri GHA  GHA  CHA  CHA  CHA  CHA  CHA  CHA													
0 323°394 9 229°586 326 182°522 183°518 501°353 21°473 N22°346 321°431 501°484 51 338°419 229°586 336 326°457 445 235°549 530°484 324°579 324 168°539 366 234°510 345 56°58 485 51 36°513 34°4576 331 62757 335°549 530°484 326°514 485 51 36°514 272°4565 319 188°558 379 372°202°531 345 56°50 487 486 51 36°514 272°4565 319 188°558 51 379 32°491 34 36°50 487 486 51 36°514 272°4565 319 188°558 501°392 307°588 N22°343 51°526 501°487 486 51 36°514 272°4565 319 300°588 N22°343 51°526 500°491 487 486 51 36°514 486 51 36°514 487 486 51 36°514 487 486 51 36°514 487 486 51 36°514 486 51 36°514 487 487 487 487 487 487 487 487 487 48	Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	1		I .
2 333°41,9 22°86											1		
2 \$353"44.3 \$24"57.9 \$22.4 \$168"53.9 \$36.6 \$24"51.2 \$31"48.3 \$48.5 \$40"59.7 \$22"51.5 \$18"64.3 \$48.5 \$40"59.7 \$21"51.5 \$40"51.5 \$4											1		I .
8 646.8 299°57.2 . 32.1 l83°54.9 . 37.2 202°53.1 . 34.5 . 6°50.8 . 48.6   4 23°49.3 247°56.5 . 31.9 196°55.9 . 37.0 277°55.0 . 34.5 . 21°53.4 . 48.6   5 33°51.7 298°55.8 . 31.6 . 213°57.0 . 38.5 . 292°56.9 . 34.4 . 36°56.0 . 48.7   6 35°54.2 . 304°55.1 . 31.1 . 243°59.0 . 39.8 . 332°0.8 . 87.2 . 34.3 . 6°60.1 . 48.8   8 38°59.1 334°55.7 . 30.9 . 250°60.0 . 40.5 . 333°0.7 . 34.2 . 82°0.3 . 48.9   9 99°0.16 . 309°53.0 . 30.6 . 274°0.11 . 41.1 . 333°0.4 . 333°0.6 . 34.1 . 97°0.6 . 48.9   10 114°0.4 1 . 4°53.0 . 30.6 . 274°0.11 . 41.1 . 333°0.4 . 321°0.8 . 34.0 . 127°1.5 . 49.0   11 . 140°40.0 . 34°50.9 . 312°9.9 . 310°0.1 . 304°0.31 . 42.4 . 23°0.8 . 34.0 . 127°1.5 . 64.9 .   12 . 144°0.0 . 34°50.9 . 312°9.9 . 310°0.1 . 304°0.31 . 42.4 . 23°0.8 . 34.0 . 127°1.1 . 64.9 .   13 . 159°1.1 . 4 . 49°50.2 . 29.6 . 334°0.2 . 43.7 . 53°1.2 . 33.9 . 157°1.6 . 49.2   14 . 147°1.3 . 64°4.5 . 29.4 . 349°0.6 . 24.4 . 66°1.4 . 33.9 . 157°1.6 . 49.2   15 . 189°1.6 . 49°50.2 . 29.6 . 34°0.0 . 24.7 . 53°1.2 . 33.8 . 187°2.1 . 49.3   16 . 204°1.8 . 94°4.8 . 28.9 . 1 . 4°07.2 . 45.0 . 83°1.6 . 133°2.0 . 302°2.4 . 49.3   17 . 219°2.1 . 310°4.7 . 20°6.3 . 44°0.0 . 24°1.0 . 33.0 . 37°2.2 . 49.5   18 . 244°2.8 . 124°4.6 . 27°3.0 . 34°1.0 . 13°2.0 . 33.7 . 217°2.5 . 49.4   18 . 244°2.8 . 124°4.6 . 27°3.0 . 109°1.4 . 49.6 . 188°2.6 . 33.5 . 222°2.9 . 50°1.4 . 53°3.8 . 30°2.2 . 49°5.7 . 50°1.4 . 49.6 . 188°2.6 . 33.5 . 222°2.9 . 50°1.4 . 49.6 . 188°2.6 . 33.5 . 222°2.9 . 50°1.0 . 49°5.0 . 30°3.8 . 30°3													
4 23°49.3 274°85.5 31.9 198°55.9 37.9 277°55.0 34.4 21°33.4 48.6 58.6 31°40.7 28°55.8 31.6 21°57.0 38.5 292°56.9 34.4 21°33.4 48.6 48.7 48.7 48.7 48.7 48.7 48.7 48.7 48.7													
5 38°51.7 280°55.8 31.6 213°57.0 38.5 292°56.9 34.4 36°55.0 48.7 7 66°56.7 310°54.4 31.1 243°59.0 39.8 323°00.8 43.3 51°58.6 501°48.7 Alkiaid 152°51.8 46°51.4 7 66°56.7 310°54.4 31.1 243°59.0 49.5 338°02.7 34.2 82°03.7 48.9 99°01.6 340°53.0 30.6 274°01.1 41.1 353°04.6 31.1 12°06.9 49.0 114°04.1 4°52.3 30.4 280°02.1 41.8 8°05.5 341.1 12′08.9 49.0 114°04.1 4°52.3 30.4 280°02.1 41.8 8°05.5 341.0 127°11.5 49.0 Actions 11 120°6.9 19°51.6 30.1 304°03.1 42.4 23°08.5 340.0 127°11.5 49.0 Actions 11 150°11.4 49°50.2 29.6 334°05.2 43.7 53°12.3 33.9 157°16.6 49.2 Actions 13 150°11.4 49°50.2 29.6 334°05.2 43.7 53°12.3 33.9 157°16.6 49.2 Alpheca 126°03.3 26°37.9 11 150°11.4 49°50.2 29.6 346°05.2 43.7 53°12.3 33.9 157°16.6 49.2 Alpheca 126°03.3 26°37.9 16 204°13.8 94°48.1 28.9 19°08.2 43.7 63°16.1 33.8 102°24.4 49.3 162°1.2 100°47.4 28.6 34°03.3 46.3 113°20.1 33.7 217°20.9 49.2 Alpheca 126°03.3 26°37.9 11 210°21.3 100°47.4 28.6 34°03.7 40°10.3 51°47.0 128°21.9 N22°33.7 217°20.9 49.4 Action 126°09.5 11 220°22.4 Alpheca 126°09.4 Action 126°09.2 Alpheca 126°09.3 30°03.1 13°04.3 1											1		I .
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8 83°99.1 334°53.7 30.9 25°00.0 40.5 338°02.7 34.2 82°03.7 48.9 140.0 30.0 30.0 30.0 99°0.6 349°53.0 30.6 274°01.1 41.1 35°204.6 34.1 97°60.5 48.9 110.0 30.0 110.0 114°04.1 4°52.3 30.4 289°02.1 41.8 8°06.5 34.1 112°09.9 49.0 111 12°06.0 5 19°51.6 30.1 304°03.1 42.4 22°308.5 34.0 127°11.5 49.0 111 12°09.0 54.0 10.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 110.0 11.0 11.0 110.0 11.0											1		
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12 144°00.0 34°50.0 N21°29.9 310°04.1 S01°43.1 38°10.4 N22°94.0 142°14.0 S01°40.1 S01°40.1 S16°55.5 -16°08.9 13 15°15.4 79°08.8 24°0.2 44.4 68°14.2 33.9 172°19.2 49.2 Afraces 112°15.1 26°03.3 26°37.9 Afraces 112°15.1 26°03.4 112°19.2 49.2 Afraces 112°15.1 26°03.2 26°37.9 Afraces 112°15.1 26°03.4 26°37.9 Afraces 112°15.1 26°03.4 26°37.9 Afraces 112°15.1 26°03.4 26°37.9 Afraces 112°15.1 26°03.4 26°37.9 Afraces 112°15.1 26°37.1 Afraces 112°15.1 26°37.1 Afraces 112°15.1 26°37.1 Afraces 112°15.1											Rigil Kent.		
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14 174°13 0 64°49.5 29.4 349°06.2 44.4 68°14.2 33.9 172°19.2 49.2 April 15 189°16.4 70°48.8 29.1 4°07.2 45.0 83°16.1 33.8 187°21.8 49.3 Artra 12°15.1 26°29.4 Artra 12°15.1 21°15.1 21°19.1 31°19.2 49°2.8 12°15.1 21°19.1 31°20.0 33.7 217°26.9 49.4 49.3 38.7 21°19.9 49.2 49.2 49.2 48.8 124°46.7 N22°8.3 49°10.3 S01°47.0 128°21.9 N22°33.7 22°29.5 S01°49.5 Shalls 102°0.2 15°45.4 54.2 49.2 12°19.2 13°1											Zuben'ubi	136°55.5	-16°08.9
16 204*18.8 94*8.1 2.89 19°0.8.2 45.7 98°18.1 3.8 187°21.8 4.93 49.1 107°0.8.6 69°0.4.6 11.3 107°0.8.6 69°0.4.6 11.3 107°0.8.6 69°0.4.6 11.3 107°0.8.6 69°0.4.6 11.3 107°0.8 11.3 107°0.8 11.3 107°0.8 11.3 107°0.8 11.3 107°0.8 11.3 107°0.8 11.3 107											Alphecca	126°03.3	26°37.9
16   204°18.6   94°48.1   28.9   19°08.2   45.7   98°18.1   33.8   202°24.4   49.3   49.1   17°26.9   49.4   18°29.19   21°32.6   34°09.3   46.3   13°20.0   33.7   217°26.9   49.5   51°49.2   249°26.2   139°46.0   28.1   64°11.3   47.7   143°23.8   33.6   247°32.1   49.5   249°26.2   139°46.0   28.1   64°11.3   47.7   143°23.8   33.6   247°32.1   49.5   249°31.2   169°44.6   127°4.3   27.8   79°12.3   48.3   188°25.8   33.6   247°32.1   49.5   229°33.6   244°33.6   184°43.9   27.3   109°14.4   49.6   188°29.9   33.5   227°38.8   49.7   22°32.8   39°36.1   199°43.2   27.0   124°15.4   50.3   203°31.5   33.4   307°42.4   49.8   248°38.1   199°43.2   27.0   124°15.4   50.3   203°31.5   33.4   307°42.4   49.8   248°43.5   248°43.5   248°43.1   229°41.8   26.5   154°17.5   51.6   233°35.4   33.3   332°45.0   50°49.8   25°40.4   26.0   184°19.5   52.2   248°37.3   33.3   332°45.0   50°49.8   25°40.4   26.0   184°19.5   52.2   248°37.3   33.3   332°45.0   49.9   25°40.4   26.0   184°19.5   52.2   248°37.3   33.1   37°7.9   50.1   25°9.3   25°9.0   248°38.3   24°48.4   274°39.7   25.7   199°20.5   53.5   278°41.2   33.2   22°55.3   50.1   23°80.2   24°48.4   274°39.7   25.7   29°22.6   50°54.8   336°45.0   32°33.1   53°00.5   50°50.2   24°47.8   24°48.4   274°39.7   25°7.2   229°22.6   50°54.8   336°45.0   32°33.1   53°00.5   50°50.2   24°47.8   25°9.2   24°33.8   23°9.9   25°0.2   24°33.8   23°9.9   25°0.9   28°33.5   23°34.8   33.1   37°5.9   50.1   24°45.5   24°42.1   54°4.2   23°43.1   33.1   37°5.9   50.1   24°45.5   24°42.1   24°45.8   24°44.1   26°2.6   184°19.5   52.2   248°37.3   33.1   33°0.5   50°50.2   24°45.1   23°4.4   24°43.4   2											Antares	$112^{\circ}15.1$	-26°29.4
18   249°318   124°445   121°483   49°10.3   501°40   128°21.9   122°33.7   232°29.5   501°49.5   139°46.0   28.1   64°11.3   47.7   143°23.8   33.6   247°32.1   49.5   14.5   122°33.7   232°29.5   501°49.5   154°45.3   27.8   154°45.3   27.8   154°45.3   27.8   154°45.3   27.8   154°45.3   27.8   154°45.3   27.8   154°45.3   27.8   154°45.3   27.8   154°45.3   27.8   154°45.3   27.8   27.3   109°14.4   49.6   188°29.6   33.5   292°39.8   49.7   49.6   49.8											Atria		-69°04.6
18   234°23.8   124°46.7   N21°28.3   49°10.3   S01°47.0   128°21.9   N22°33.7   232°29.5   S01°49.5   S01°49.5     19   249°26.2   139°46.0   22.1   64°11.3   47.7   143°23.8   33.6   24°32.1   49.5     20   264°28.7   154°45.3   27.8   79°12.3   48.3   158°25.8   33.6   262°34.7   49.5     21   279°31.2   169°44.6   · · · · · · · · · · · · · · · · · ·											Sabik	102°02.0	-15°45.4
19   249°262   139°460   28.1   64°11.3   47.7   143°23.8   33.6   247°22.1   49.5   240°26.2   240°26.2   154°45.3   27.8   79°12.3   48.3   158°25.8   33.6   262°34.7   49.6   240°26.2   240°33.6   184°43.9   27.3   109°14.4   49.6   188°29.6   33.5   292°39.8   49.7   49.8   4											Shaula	$96^{\circ}09.5$	-37°07.4
20 264°28.7 154°45.3 27.8 79°12.3 48.3 158°25.8 33.6 262°34.7 49.6 21 27°31.2 169°44.6 · · · · · · · · · · · · · · · · · · ·											Rasalhague	95°57.9	12°32.6
21   279°31.2   166°44.6   27.6   94°13.4   49.0   173°37.7   33.5   277°37.3   49.6   22   294°33.6   184°43.9   27.3   109°14.4   49.6   188°29.6   33.5   292°39.8   49.7   Nunki   75°46.8   26°15.9   23°30°36.1   199°43.2   27.0   124°15.4   50.3   203°31.5   33.4   307°42.4   49.8   Nunki   75°46.8   26°15.9   28°56.3   Nunki   75°46.8   26°15.9   28°56.3   Nunki   75°46.8   26°15.9   28°56.3   Nunki   75°46.8   26°15.9   28°56.3   Nunki   75°46.8   26°15.9   28°56.3   Nunki   75°46.8   26°15.9   28°56.3   Nunki   75°46.8   26°50.1   Nunki   75°46.8   Nunki   75°46.8   26°50.1   Nunki   75°46.8   Nunki   Nunki   75°46.8   Nunki   Nunki   75°46.8   Nunki   Nunki   75°46.8											Eltanin	90°41.6	51°29.3
22   294°33.6   184°43.9   27.3   109°14.4   49.6   188°29.6   33.5   292°39.8   49.7											Kaus Aust.	83°31.6	-34°22.4
Mer.pass   O2:25   V-0.7'   d-0.2'   m-3.97   V1.0'   d0.7'   m1.62   V1.9'   d-0.1'   m-1.94   V2.6'   d0.1'   m0.73											Vega	80°32.6	38°48.6
Mer.pass. 02:25											Nunki	75°46.8	-26°15.9
Sat         GHA         GHA         Dec         All Na'ir         27° 31.8         46° 50.1         Fomalhaut         15° 13.6         229° 29° 41.8         6° 50.1         Fomalhaut         15° 13.6         229° 29° 29° 20° 20° 20° 20° 20° 20° 20° 20° 20° 20	23	309°36.1	199°43.2	27.0	124°15.4	50.3	203°31.5	33.4	307°42.4	49.8	Altair	61°59.2	8°56.3
Sat         GHA         CHA         Dec         GHA         Dec         All Na'ir         27°31.8         -46°50.1         Fomalhaut         15°13.6         -29°9.0         Ceber 33°35.9         33°38.0         9°9.0         Scheat         11°34.4         28°2.1         49°9.4         49°48.4         274°43.7         25.7         199°20.5         53.5         27°8°41.2         33°2.2°55.3         50.0         Scheat         13°44.4         28°13.4         40°8.3         30°3.0         28°3.7         25.7         9°5.8         31°3.0         30°3.0         80°3.1         50°0.0         50°0.0         50°0.0         Markab         13°29.1         15°20.7         40°3.3         30°3.0         80°3.1         30°0.5         50°0.0         50°0.0         Markab         13°29.1         13°20.	Mer.p	ass. 02:25	$\nu$ -0.7' d-0	).2′ m-3.97	$\nu 1.0' d0$	.7′ m1.62	$\nu 1.9' d-0$	.1′ m-1.94	$\nu^{2.6'} d0$	.1′ m0.73	Peacock	53°04.3	-56°39.1
Sat GHA         GHA         Dec         Al Na'ir         27° 31.8         -46°50.1         Formal mate         Formal mate         Formal mate         Handing         Ade°50.1         Formal mate         Markab         13° 38.0         9° 50.0         Scheat         13° 44.4         22° 9° 20.0         Scheat         13° 44.4         28° 13.4         28° 20.7         22° 38° 33.1         33.2         2° 55.3         50.0         50.											1		
0 324°38.6 214°42.5 N21°26.8 139°16.4 S01°50.9 218°33.5 N22°33.4 322°45.0 S01°49.8 13°39°41.0 229°41.8 26.5 154°17.5 51.6 233°35.4 33.3 337°47.6 49.9 348°43.5 229°41.8 26.5 169°18.5 52.2 248°37.3 33.3 337°47.6 49.9 352°45.0 49.9 36°45.9 259°40.4 26.0 184°19.5 52.9 263°39.2 33.2 7°52.8 50.0 49.9 39°50.9 259°40.4 26.0 184°19.5 52.9 263°39.2 33.2 7°52.8 50.0 49.9 39°50.9 289°39.0 25.4 214°21.6 54.2 293°43.1 33.1 37°57.9 50.1 39°50.9 289°39.0 25.4 214°21.6 54.2 293°43.1 33.1 37°57.9 50.1 40°40.2 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0											Enif	33°38.0	9°59.6
1 324°38.6 214°42.5 N21°26.8 139°16.4 501°50.9 218°33.5 N22°33.4 322°45.0 501°49.8 1 339°41.0 229°41.8 26.5 154°17.5 51.6 233°35.4 33.3 337°47.6 49.9 235°43.5 244°41.1 26.2 169°18.5 52.2 248°37.3 33.3 352°50.2 49.9 250°40.4 26.0 184°19.5 52.9 263°39.2 33.2 7°52.8 50.0 24°48.4 274°39.7 25.7 199°20.5 53.5 278°41.2 33.2 22°55.3 50.1 24°30.0 25.4 214°21.6 54.2 293°43.1 33.1 37°57.9 50.1 252°55.8 39°50.9 289°39.0 25.4 214°21.6 54.2 293°43.1 33.1 37°57.9 50.1 252°55.8 39°50.9 289°39.0 25.4 214°21.6 54.2 293°43.1 33.1 37°57.9 50.1 252°55.8 39°50.9 289°30.0 25.4 214°21.6 54.2 293°43.1 33.1 37°57.9 50.1 252°55.8 39°50.9 246°25.0 24°23.6 55.5 323°46.9 33.0 68°03.1 50.2 252°35.7 09.39 24°23.6 55.5 323°46.9 33.0 68°03.1 50.2 252°35.7 09.39 24°23.6 55.5 323°46.9 33.0 68°03.1 50.2 252°25.0 34.0 115°03.2 4°35.6 24.1 289°26.7 57.4 8°52.7 32.9 113°10.8 50.4 11 130°05.7 19°34.9 23.8 304°27.7 58.1 23°54.7 32.8 128°13.4 50.5 12 145°08.1 34°34.2 N21°23.5 319°28.7 58.1 23°54.7 32.8 128°13.4 50.5 12 145°08.1 34°34.2 N21°23.5 319°28.7 58.1 23°54.7 32.8 128°13.4 50.5 12 145°08.1 34°33.8 22.9 349°30.8 20°00.1 69°00.4 32.7 173°21.2 50.7 50.2 34°33.8 0.20 114°06.2 32.5 218°28.9 50.8 143°16.0 501°50.5 150°10.2 14°40.0 50.9 90.43 32.6 203°26.3 50.8 14°40.7 32.4 248°34.1 51.0 205°25.4 139°29.3 21.5 64°35.9 03.3 144°10.1 32.4 248°34.1 51.0 205°25.4 139°29.3 21.5 64°35.9 03.3 144°10.1 32.4 248°34.1 51.0 205°25.4 139°29.3 21.5 64°35.9 03.3 144°10.1 32.4 248°34.1 51.0 220°20.4 109°30.7 22.1 34°33.8 0.20 114°06.2 32.5 218°28.9 50.8 182°2.9 124°30.0 N21°21.8 49°34.9 502°02.7 129°08.1 N22°32.5 233°31.5 501°50.9 40.4 14°40.1 32.4 248°34.1 51.0 326°2.9 124°30.0 N21°21.8 49°34.9 502°02.7 129°08.1 N22°32.5 233°31.5 501°50.9 40.4 14°40.1 32.4 248°34.1 51.0 32.4 248°34.1 51.0 320°41.8 51.1 34°44.4 51.2 146°42.1 50.1 140°42.1 128°33.1 140°10.1 32.4 248°34.1 51.0 140°42.1											1		I .
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13	12	$145^{\circ}08.1$	34°34.2	N21°23.5	319°28.7	S01°58.8	38°56.6	N22°32.8	143°16.0	S01°50.5	1		
14 175°13.0 64°32.8 22.9 349°30.8 02°00.1 69°00.4 32.7 173°21.2 50.7 15 190°15.5 79°32.1 ··· 22.7 4°31.8 ··· 00.7 84°02.4 ··· 32.6 188°23.7 ··· 50.7 16 205°18.0 94°31.4 22.4 19°32.8 01.4 99°04.3 32.6 203°26.3 50.8 17 220°20.4 109°30.7 22.1 34°33.8 02.0 114°06.2 32.5 218°28.9 50.8 18 235°22.9 124°30.0 N21°21.8 49°34.9 502°02.7 129°08.1 N22°32.5 233°31.5 501°50.9 19 250°25.4 139°29.3 21.5 64°35.9 03.3 144°10.1 32.4 248°34.1 51.0 20 265°27.8 154°28.6 21.2 79°36.9 04.0 159°12.0 32.4 263°36.7 51.0 21 280°30.3 169°27.9 ··· 21.0 94°37.9 ··· 04.6 174°13.9 ··· 32.3 278°39.2 ··· 51.1 22 295°32.8 184°27.2 20.7 109°38.9 05.3 189°15.8 32.2 293°41.8 51.1 23 310°35.2 199°26.5 20.4 124°40.0 05.9 204°17.8 32.2 308°44.4 51.2			49°33.5	23.2	$334^{\circ}29.7$	$01^{\circ}59.4$	53°58.5	32.7	$158^{\circ}18.6$	50.6			
15		$175^{\circ}13.0$	64°32.8	22.9	349°30.8	$02^{\circ}00.1$	69°00.4	32.7	173°21.2	50.7	Saturn	336 U3./	02:33
16											Aug 16 Sat	SHA	Mer.pass
17													
18													
19													
20 265°27.8 154°28.6 21.2 79°36.9 04.0 159°12.0 32.4 263°36.7 51.0 21 280°30.3 169°27.9 · · 21.0 94°37.9 · · 04.6 174°13.9 · · 32.3 278°39.2 · · 51.1 22 295°32.8 184°27.2 20.7 109°38.9 05.3 189°15.8 32.2 293°41.8 51.1 23 310°35.2 199°26.5 20.4 124°40.0 05.9 204°17.8 32.2 308°44.4 51.2  Horizontal parallax Venus: 0.1 Mars: 0.1													
21       280°30.3       169°27.9       ·· 21.0       94°37.9       ·· 04.6       174°13.9       ·· 32.3       278°39.2       ·· 51.1       Horizontal parallax         22       295°32.8       184°27.2       20.7       109°38.9       05.3       189°15.8       32.2       293°41.8       51.1       Venus:       0.1         23       310°35.2       199°26.5       20.4       124°40.0       05.9       204°17.8       32.2       308°44.4       51.2       Mars:       0.1													02.29
22 295°32.8 184°27.2 20.7 109°38.9 05.3 189°15.8 32.2 293°41.8 51.1 Venus: 0.1 23 310°35.2 199°26.5 20.4 124°40.0 05.9 204°17.8 32.2 308°44.4 51.2 Mars: 0.1											Horizont	al parallax	
23 310°35.2 199°26.5 20.4 124°40.0 05.9 204°17.8 32.2 308°44.4 51.2 Mars: 0.1												Venus:	0.1
												Mars:	0.1
Mer.pass. 02:21 $\nu$ -0.7' $d$ -0.3' m-3.97 $\nu$ 1.0' $d$ 0.7' m1.62 $\nu$ 1.9' $d$ -0.1' m-1.95 $\nu$ 2.6' $d$ 0.1' m0.72													
	Mer.p	ass. 02:21	$\nu$ -0.7′ d-0	J.3′ m-3.97	$\nu 1.0' d0$	. <i>(</i> ′ m1.62	$\nu^{1.9'} d-0$	.1′ m-1.95	$\nu^{2.6'} d0$	.1′ m0.72			

h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°48.9	N14°20.6	303°21.3	11.0'	N11°17.3	15.8'	59.3'
1	193°49.0	19.8	$317^{\circ}51.2$	10.9'	11°33.1	15.7'	59.3'
2	208°49.1	19.1	332°21.1	10.8'	11°48.8	15.7'	59.3'
3	223°49.2	• • 18.3	346°50.9	10.8'	12°04.5	15.6'	59.3'
4	238°49.3	17.5	1°20.7	10.7'	12°20.1	15.6'	59.3'
5 6	253°49.4 268°49.6	16.7 N14°16.0	15°50.4 30°20.0	10.6' 10.6'	12°35.7 N12°51.2	15.5' 15.4'	59.3' 59.3'
7	283°49.7	15.2	44°49.6	10.5	13°06.6	15.4	59.3'
8	298°49.8	14.4	59° 19.1	10.4	13°21.9	15.3'	59.3'
9	313°49.9	• • 13.6	73°48.5	10.4'	13°37.2	15.2'	59.3'
10	328°50.0	12.9	88° 17.9	10.3'	13°52.4	15.1'	59.3'
11	343°50.2	12.1	102°47.2	10.2'	14°07.6	15.1'	59.3'
12	358°50.3	N14°11.3	117° 16.4	10.1'	N14°22.6	15.0'	59.3'
13 14	13°50.4 28°50.5	10.5 09.8	131°45.5 146°14.6	10.1' 10.0'	14°37.6 14°52.5	14.9' 14.8'	59.3' 59.3'
15	43°50.6	• • 09.0	160°43.6	9.9'	15°07.3	14.7	59.3'
16	58°50.8	08.2	175° 12.5	9.8'	15°22.1	14.7'	59.3'
17	73°50.9	07.4	189°41.3	9.8'	15°36.7	14.6'	59.3'
18	88°51.0	N14°06.7	204° 10.1	9.7'	$N15^{\circ}51.3$	14.5'	59.3'
19	103°51.1	05.9	218° 38.7	9.6'	16°05.8	14.4'	59.3'
20	118°51.2	05.1	233°07.3	9.5'	16°20.2	14.3'	59.3'
21	133°51.4 148°51.5	· · 04.3 03.5	247°35.8 262°04.3	9.4' 9.3'	16°34.5 16°48.7	14.2'	59.3' 59.3'
22 23	148°51.5 163°51.6	03.5 02.8	262°04.3 276°32.6	9.3'	16°48.7 17°02.8	14.1' 14.0'	59.3' 59.3'
23			210 32.0			14.0	39.3
	SD = 15.8'	d = -0.8'		SE	D = 16.2'		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178°51.7	N14°02.0	291°00.9	9.2'	N17°16.8	13.9'	59.3'
1 2	193°51.9 208°52.0	01.2 14°00.4	305°29.1 319°57.2	9.1' 9.0'	17°30.7 17°44.5	13.8' 13.7'	59.3' 59.3'
3	208 52.0 223°52.1	13°59.6	334°25.2	9.0 8.9'	17°58.3	13.6'	59.3'
4	238°52.2	58.9	348°53.1	8.8'	18°11.9	13.5'	59.3'
5	253°52.4	58.1	3°20.9	8.8'	18°25.4	13.4'	59.3'
6	268°52.5	N13°57.3	17°48.7	8.7'	N18°38.8	13.3'	59.3'
7	283°52.6	56.5	32°16.3	8.6'	18°52.1	13.2'	59.3'
8	298°52.7	55.7	46°43.9	8.5'	19°05.3	13.1'	59.3'
9 10	313°52.9 328°53.0	· · 54.9 54.2	61°11.4 75°38.8	8.4' 8.3'	19°18.4 19°31.3	13.0' 12.9'	59.3' 59.3'
11	328 53.0 343°53.1	54.2 53.4	75 38.8 90°06.1	8.2'	19 31.3 19°44.2	12.7	59.3'
12	358°53.2	N13°52.6	104°33.3	8.1'	N19°56.9	12.6'	59.3'
13	13°53.4	51.8	119°00.5	8.0'	20°09.5	12.5'	59.3'
14	28°53.5	51.0	133°27.5	7.9'	20°22.0	12.4'	59.3'
15	43°53.6	• • 50.2	147° 54.4	7.9'	20°34.4	12.3'	59.3'
16	58°53.7	49.4	162°21.3	7.8'	20°46.6	12.1'	59.3'
17 18	73°53.9 88°54.0	48.7 N13°47.9	176°48.1 191°14.7	7.7' 7.6'	20°58.8 N21°10.8	12.0' 11.9'	59.3' 59.3'
19	103°54.1	47.1	205°41.3	7.6 7.5'	21°22.7	11.7	59.3'
20	118°54.2	46.3	220° 07.8	7.4'	21°34.4	11.6'	59.3'
21	133°54.4	• • 45.5	234°34.2	7.3'	21°46.0	11.5'	59.2'
22	148°54.5	44.7	249°00.5	7.2'	21°57.5	11.3'	59.2'
23	163°54.6	43.9	263°26.7	7.1'	22°08.9	11.2'	59.2'
	SD = 15.8'	d = -0.8'		SE	0 = 16.2'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	178°54.8	N13°43.1	$277^{\circ}52.9$	7.0'	N22°20.1	11.1'	59.2'
1	193°54.9	42.3	292°18.9	6.9'	22°31.1	10.9'	59.2'
2	208°55.0	41.6	306°44.8	6.9'	22°42.1	10.8'	59.2'
3	223°55.1 238°55.3	· · 40.8 40.0	321°10.7 335°36.5	6.8' 6.7'	22°52.9 23°03.5	10.7' 10.5'	59.2' 59.2'
4 5	253°55.4	40.0 39.2	350°02.1	6.6'	23°14.0	10.5	59.2' 59.2'
6	268°55.5	N13° 38.4	4°27.7	6.5	N23°24.4	10.4	59.2'
7	283°55.7	37.6	18°53.2	6.4	23°34.6	10.1	59.2'
8	298°55.8	36.8	33°18.6	6.3'	23°44.7	9.9'	59.2'
9	313°55.9	• • 36.0	47°43.9	6.2'	23°54.6	9.8'	59.2'
10	328°56.1	35.2	62°09.2	6.1'	24°04.4	9.6'	59.2'
11	343°56.2 358°56.3	34.4 N13°33.6	76°34.3 90°59.4	6.1' 6.0'	24°14.0 N24°23.5	9.5' 9.3'	59.2' 59.2'
12 13	358°56.3 13°56.4	N13°33.6 32.8	90°59.4 105°24.3	6.0° 5.9'	N24°23.5 24°32.8	9.3'	59.2' 59.2'
14	28°56.6	32.0	105 24.3 119°49.2	5.8'	24° 42.0	9.2 9.0'	59.2'
15	43°56.7	31.2	134°14.0	5.7'	24°51.0	8.8'	59.2'
16	58°56.8	30.5	148°38.8	5.6'	24°59.8	8.7'	59.1'
17	73°57.0	29.7	163°03.4	5.6'	25°08.5	8.5'	59.1'
18	88°57.1	N13°28.9	177°28.0	5.5'	N25°17.0	8.3'	59.1'
19	103°57.2 118°57.4	28.1	191°52.4	5.4'	25°25.3	8.2'	59.1'
20 21	118°57.4 133°57.5	27.3 •• 26.5	206°16.9 220°41.2	5.3' 5.3'	25°33.5 25°41.5	8.0' 7.9'	59.1' 59.1'
22	148°57.6	25.7	235°05.4	5.2'	25°49.4	7.7'	59.1
23	163°57.8	24.9	249°29.6	5.1'	25°57.1	7.5'	59.1'
	SD = 15.8'	d = -0.8'		SE	0 = 16.2'		

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

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

		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	75-53%	
14	04:45	04:39	12:05	03:54	16:20		
15	04:33	04:27	12:04	04:46	17:13		
16	04:21	04:15	12:04	05:41	18:11		

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
C	CHA	GHA	Dec	CHA	Dec	CHA	Das	GHA	Doo		SHA	Dee
Sun	GHA			GHA	S02°06.6	GHA	Dec		Dec		эна	Dec
0	325°37.7	214° 25.8	N21°20.1	139°41.0		219°19.7	N22°32.1	323°47.0	S01°51.3	Alpheratz	357°34.0	29°13.9
1	340°40.2	229°25.1	19.8	154°42.0	07.2	234°21.6	32.1	338°49.6	51.3	Ankaa	353°06.3	-42°09.7
2	355°42.6	244°24.4	19.5	169°43.0	07.9	249°23.6	32.0	353°52.2	51.4	Schedar	349°30.1	56°40.6
3	10°45.1	259°23.7	• • 19.2	184°44.1	• • 08.5	264°25.5	• • 32.0	8°54.7	• • 51.5	Diphda	348° 46.5	-17°50.5
4	25°47.5	274°23.0	18.9	199°45.1	09.2	279°27.4	31.9	23°57.3	51.5	Achernar	335°19.5	-57°06.1
5	40°50.0	289°22.3	18.6	214°46.1	09.9	294°29.3	31.9	38°59.9	51.6	Hamal	327°50.5	23°35.0
6	55°52.5	304°21.6	N21°18.3	229°47.1	S02°10.5	309°31.3	N22°31.8	54°02.5	S01°51.6	Polaris	313°43.1	89°22.0
7	70°54.9	319°21.0	18.0	244°48.1	11.2	324°33.2	31.8	69°05.1	51.7	Acamar	315°11.3	-40°11.8
8	85°57.4	334°20.3	17.7	259°49.2	11.8	339°35.1	31.7	84°07.7	51.8	Menkar	314°05.6	4°11.5
9	100°59.9	349° 19.6	• • 17.4	274°50.2	• • 12.5	354°37.1	• • 31.7	99°10.2	• • 51.8	Mirfak	308° 27.5	49°57.0
10	116°02.3	4°18.9	17.1	289°51.2	13.1	9°39.0	31.6	114°12.8	51.9	Aldebaran	290°39.1	16°33.7
11	131°04.8	19°18.2	16.8	304°52.2	13.8	24°40.9	31.6	129°15.4	51.9	Rigel	281°03.5	-8°10.1
12	146°07.3	34° 17.5	N21°16.5	319°53.2	S02°14.4	39°42.8	N22°31.5	144°18.0	S01°52.0	Capella		
13	161°09.7	49°16.8	16.2	334°54.3	15.1	54°44.8	31.5	159°20.6	52.1		280°21.3	46°01.3
14	176°12.2	64°16.1	15.9	349°55.3	15.7	69°46.7	31.4	174°23.2	52.1	Bellatrix	278°22.5	6°22.5
15	191°14.7	79° 15.4	• • 15.6	4°56.3	• • 16.4	84°48.6	• • 31.4	189°25.8	• • 52.2	Elnath	278°01.4	28°37.7
16	206°17.1	94° 14.7	15.3	19°57.3	17.0	99°50.6	31.3	204°28.3	52.3	Alnilam	275°37.4	-1°11.0
17	221°19.6	109° 14.0	15.0	34°58.3	17.7	114°52.5	31.3	219°30.9	52.3	Betelgeuse	270°51.7	7°24.8
18	236°22.0	124°13.3	N21°14.7	49°59.3	S02°18.4	129°54.4	N22°31.2	234°33.5	S01°52.4	Canopus	263°52.5	-52°42.2
19	251°24.5	139° 12.6	14.4	65°00.4	19.0	144°56.4	31.2	249°36.1	52.4	Sirius	258° 26.0	-16°44.9
20	266°27.0	154°11.9	14.1	80°01.4	19.7	159°58.3	31.1	264°38.7	52.5	Adhara	255°05.8	-29°00.2
21	281°29.4	169°11.2	• • 13.8	95°02.4	20.3	175°00.2	31.1	279°41.3	52.6	Procyon	244°50.6	5°09.7
22	296°31.9	184° 10.5	13.4	110°03.4	21.0	190°02.2	31.0	294°43.9	52.6	Pollux	243°17.0	27°57.9
23	311°34.4	199°09.8		125°04.4	21.6	205°04.1	31.0	309°46.4		Avior	234°15.2	-59°35.3
23	311 34.4	199 09.8	13.1	125 04.4	21.0	205 04.1	31.0	309 46.4	52.7	Suhail	222°46.4	-43°32.0
Mer.p	ass. 02:17	$\nu$ -0.7′ d-0	).3′ m-3.97	$\nu$ 1.0′ d0.	.7′ m1.62	$\nu$ 1.9′ d-0.	.1′ m-1.95	$\nu$ 2.6′ d0.	.1′ m0.72	Miaplacidus	221°39.2	-69°49.2
										Alphard	217°47.6	-8°46.1
										Regulus	207°34.2	11°50.6
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.0	61°36.9
0	326°36.8	214°09.1	N21°12.8	140°05.5	S02°22.3	220°06.0	N22°30.9	324°49.0	S01°52.7	Denebola	182°24.7	14°25.9
1	341°39.3	229°08.4	12.5	155°06.5	22.9	235°07.9	30.8	339°51.6	52.8	Gienah	175°43.3	-17°41.0
2	356°41.8	244°07.8	12.2	170°07.5	23.6	250°09.9	30.8	354°54.2	52.9		173°00.1	-63°14.6
3	11°44.2	259°07.1	• • 11.9	185°08.5	• • 24.2	$265^{\circ}11.8$	• • 30.7	9°56.8	• • 52.9	Gacrux		-57°15.6
4	26°46.7	274°06.4	11.5	200°09.5	24.9	280°13.7	30.7	24°59.4	53.0	1	166° 12.9	55°49.5
5	41°49.2	289°05.7	11.2	215°10.5	25.5	295°15.7	30.6	40°02.0	53.1	Alioth		
6	56°51.6	304°05.0	N21°10.9	230°11.6	502°26.2	310°17.6	N22°30.6	55°04.6	S01°53.1	Spica	158°21.9	-11°17.7
7	$71^{\circ}54.1$	319°04.3	10.6	245°12.6	26.8	325°19.5	30.5	$70^{\circ}07.1$	53.2	Alkaid	152°51.8	49°11.4
8	86°56.5	334°03.6	10.3	260°13.6	27.5	340°21.5	30.5	85°09.7	53.2	Hadar	148°35.5	-60°30.0
9	101°59.0	349°02.9	09.9	275°14.6	28.2	355°23.4	30.4	100°12.3	53.3	Menkent	147°57.2	-36°29.9
10	117°01.5	4°02.2	09.6	290°15.6	28.8	10°25.3	30.4	115°14.9	53.4	Arcturus	145°47.5	19°03.1
11	132°03.9	19°01.5	09.3	305°16.6	29.5	25°27.3	30.4	130°17.5	53.4	Rigil Kent.	139°39.8	-60°56.7
12	147°06.4	34°00.8	N21°09.0	320°17.7	502°30.1	40°29.2	N22°30.3	145°20.1	S01°53.5	Kochab	$137^{\circ}20.0$	74°03.3
										Zuben'ubi	136°55.5	-16°08.9
13	162°08.9	49°00.1	08.6	335°18.7	30.8	55°31.1	30.2	160°22.7	53.6	Alphecca	126°03.3	26°37.9
14	177°11.3	63°59.4	08.3	350°19.7	31.4	70°33.1	30.2	175°25.3	53.6	Antares	$112^{\circ}15.1$	-26°29.4
15	192°13.8	78°58.7	0.80	5°20.7	• • 32.1	85°35.0	• • 30.1	190°27.9	• • 53.7	Atria	107°08.7	-69°04.6
16	207°16.3	93°58.0	07.6	20°21.7	32.7	100°36.9	30.1	205°30.4	53.8	Sabik	$102^{\circ}02.1$	-15°45.4
17	222°18.7	108°57.4	07.3	35°22.7	33.4	115°38.9	30.0	220°33.0	53.8	Shaula	96°09.5	-37°07.4
18	237°21.2	123°56.7	N21°07.0	50°23.8	502°34.0	130°40.8	N22°30.0	235°35.6	S01°53.9	Rasalhague	95°57.9	12°32.6
19	252°23.7	138°56.0	06.6	65°24.8	34.7	145°42.7	29.9	250°38.2	53.9	Eltanin	$90^{\circ}41.6$	51°29.3
20	267°26.1	153°55.3	06.3	80°25.8	35.3	160°44.7	29.9	265°40.8	54.0	Kaus Aust.	83°31.6	-34°22.4
21	282°28.6	168°54.6	• • 06.0	95°26.8	• • 36.0	175°46.6	• • 29.8	280°43.4	• • 54.1	Vega	80°32.6	38°48.6
22	297°31.0	183°53.9	05.6	110°27.8	36.7	190°48.5	29.8	295°46.0	54.1	Nunki	75°46.8	-26°15.9
23	312°33.5	198°53.2	05.3	125°28.8	37.3	205°50.5	29.7	310°48.6	54.2	Altair	61°59.2	8°56.3
Morn	ass. 02:13	0 7' d 0	0.3' m-3.96	11 0 <sup>1</sup> d0	.7′ m1.62	u1 0/ d 0	.1′ m-1.95	12 6' d0	.1′ m0.71	Peacock	53°04.3	-56°39.2
ivier.p	ass. 02.13	$\nu$ -0.1 $u$ -0	1.3 111-3.90	$\nu_{1.0}$ $u_{0.}$	1111.02	$\nu_{1.9} u_{-0}$	.1 111-1.95	ν2.0 do	1 1110.71	Deneb	49° 25.0	45°22.4
										Enif	33°38.0	9°59.7
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.8	-46°50.1
0	327°36.0	213°52.5	N21°04.9	140°29.8	502°38.0	220°52.4	N22°29.6		S01°54.3	Fomalhaut	27 31.8 15°13.6	-46 50.1 -29°29.0
1	342°38.4	228°51.8	04.6	155°30.9	38.6	235°54.3	29.6	340°53.7	54.3	Scheat	15 13.0 13°44.4	-29 29.0 28°13.4
2	357°40.9	243°51.1	04.3	170°31.9	39.3	250°56.3	29.5	355°56.3	54.4	1		
3	12°43.4	258° 50.4	• • 03.9	185°32.9	• • 39.9	265°58.2	29.5	10°58.9	• • 54.4	Markab	13°29.1	15°20.7
4	27°45.8	273°49.7	03.6	200°33.9	40.6	281°00.1	29.4	26°01.5	54.5	Aug 17 Sun	SHA	Mer.pass
5	42°48.3	288°49.0	03.2	215°34.9	41.2	296°02.1	29.4	41°04.1	54.6		248°48.1	09:43
6	57°50.8	303°48.4	N21°02.9	230°35.9		311°04.0	N22°29.3		S01°54.6		174°03.3	14:40
7	72°53.2	318° 47.7	02.5	245°36.9	42.5	326°05.9	29.3	71°09.3	54.7	Jupiter		09:21
8	87°55.7	333° 47.0	02.3	260°38.0	43.2	341°07.9	29.3	86°11.9	54.8	Saturn		02:24
9	102°58.2	348° 46.3	•• 01.8	275°39.0	· · 43.8	356°09.8	29.2	101°14.5	. 54.8	Jatuill	555 55.5	02.27
	102 56.2 118°00.6	3° 45.6		275 39.0 290°40.0	44.5	11°11.7	29.2	101 14.5 116°17.1	54.9	Aug 18 Mon	SHA	Mer.pass
10 11			01.5					131°17.1		Venus	$247^{\circ}32.3$	09:44
11	133°03.1	18°44.9	01.1	305°41.0	45.2	26°13.7	29.1		55.0		173°28.6	14:39
12	148°05.5	33°44.2	N21°00.8	320°42.0	S02°45.8	41°15.6	N22°29.0	146°22.2			253°29.2	09:18
13	163°08.0	48° 43.5	00.4	335°43.0	46.5	56°17.6	29.0	161°24.8	55.1		358°12.2	02:20
14	178°10.5	63°42.8	21°00.1	350°44.0	47.1	71°19.5	28.9	176°27.4	55.1			
15	193°12.9	78° 42.1	20°59.7	5°45.1	• • 47.8	86°21.4	• • 28.9	191°30.0	• • 55.2	Aug 19 Tue	SHA	Mer.pass
16	208°15.4	93°41.4	59.4	20°46.1	48.4	101°23.4	28.8	206°32.6	55.3		246°16.5	09:45
17	223°17.9	108°40.8	59.0	35°47.1	49.1	116°25.3	28.8	221°35.2	55.3		172°53.9	14:37
18	238°20.3	123°40.1	N20°58.6		S02°49.7	131°27.2	N22°28.7		S01°55.4		253°16.4	09:15
19	253°22.8	138°39.4	58.3	65°49.1	50.4	146°29.2	28.6	251°40.4	55.5	Saturn	$358^{\circ}15.2$	02:16
20	268°25.3	153° 38.7	57.9	80°50.1	51.0	161°31.1	28.6	266°43.0	55.5			
21	283°27.7	168°38.0	• • 57.6	95°51.1	• • 51.7	176°33.0	• • 28.5	281°45.6	• • 55.6	Horizont	al parallax	
22	298°30.2	183°37.3	57.2	110°52.1	52.3	191°35.0	28.5	296°48.2	55.7		Venus:	0.1
23	313°32.6	198°36.6	56.8	125°53.1	53.0	206°36.9	28.4	311°50.7	55.7		Mars:	0.1
Mara	ass. 02:09	1/_N 7/ 4 0	0.3' m-3.96	1/1 N/ AN	.7′ m1.62	1/1 0/ d 0	.1′ m-1.95	1/2 6/ 40	.1′ m0.71			
ivier.p	uss. U4.U9	$\nu$ -0.1 $u$ -0	111-3.90	$\nu$ 1.0 $u$ 0.	. IIII.UZ	ν1.9 U-U	T 111-T.90	ν2.0 UU	I 1110.11			

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°57.9	N13°24.1	263°53.7	5.0'	N26°04.6	7.3'	59.1'
1	193°58.0	23.3	278°17.7	5.0'	26°11.9	7.2'	59.1'
2 3	208°58.2 223°58.3	22.5 · · 21.7	292°41.7 307°05.6	4.9' 4.8'	26°19.1 26°26.1	7.0' 6.8'	59.1' 59.1'
4	238°58.4	20.9	321°29.4	4.8'	26°32.9	6.6'	59.1'
5	253°58.6	20.1	$335^{\circ}53.2$	4.7'	26°39.5	6.5'	59.0'
6	268°58.7	N13° 19.3	350°16.9 4°40.5	4.6'	N26°46.0	6.3'	59.0'
7 8	283°58.8 298°59.0	18.5 17.7	4°40.5 19°04.1	4.6' 4.5'	26°52.3 26°58.4	6.1' 5.9'	59.0' 59.0'
9	313°59.1	. 16.9	33°27.6	4.5'	27°04.3	5.8'	59.0'
10	328°59.2	16.1	47°51.0	4.4'	$27^{\circ}10.1$	5.6'	59.0'
11	343°59.4 358°59.5	15.3 N13°14.5	62°14.4	4.3'	27°15.7	5.4'	59.0' 59.0'
12 13	358°59.5 13°59.7	N13-14.5 13.7	76°37.8 91°01.1	4.3' 4.2'	N27°21.1 27°26.3	5.2' 5.0'	59.0' 59.0'
14	28°59.8	12.9	105°24.3	4.2'	27°31.3	4.8'	59.0'
15	43°59.9	•• 12.1	119°47.5	4.2'	27°36.1	4.6'	59.0'
16	59°00.1 74°00.2	11.2 10.4	134°10.7 148°33.8	4.1' 4.1'	27°40.8 27°45.2	4.5' 4.3'	58.9'
17 18	89°00.3	N13° 09.6	148 33.8 162°56.8	4.1	N27°49.5	4.3	58.9' 58.9'
19	104°00.5	08.8	177°19.9	4.0'	27°53.6	3.9'	58.9'
20	119°00.6	0.80	191°42.9	4.0'	27°57.5	3.7'	58.9'
21	134°00.8	•• 07.2	206°05.8	3.9'	28°01.2	3.5'	58.9'
22 23	149°00.9 164°01.0	06.4 05.6	220°28.7 234°51.6	3.9' 3.9'	28°04.7 28°08.0	3.3' 3.1'	58.9' 58.9'
	SD = 15.8'	d = -0.8'			D = 16.1'		
	JD — 13.0°	u — -0.0		اد	J — 10.1		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°01.2	N13°04.8	249°14.5	3.8'	N28°11.2	2.9'	58.9'
1 2	194°01.3 209°01.4	04.0 03.2	263°37.3 278°00.2	3.8' 3.8'	28°14.1 28°16.9	2.8' 2.6'	58.8' 58.8'
3	224°01.6	02.4	292°23.0	3.8'	28° 19.4	2.4'	58.8'
4	239°01.7	01.6	$306^{\circ}45.7$	3.8'	28°21.8	2.2'	58.8'
5	254°01.9	13°00.8	321°08.5	3.8'	28°24.0	2.0'	58.8'
6 7	269°02.0 284°02.1	N12°59.9 59.1	335°31.3 349°54.0	3.7' 3.7'	N28°26.0 28°27.8	1.8' 1.6'	58.8' 58.8'
8	299°02.3	58.3	4°16.7	3.7'	28°29.4	1.4'	58.8'
9	314°02.4	• • 57.5	$18^{\circ}39.5$	3.7'	28°30.8	1.2'	58.8'
10	329°02.6 344°02.7	56.7	33°02.2	3.7'	28°32.0	1.0'	58.7'
11 12	344°02.7 359°02.8	55.9 N12°55.1	47°24.9 61°47.7	3.7' 3.7'	28°33.0 N28°33.9	0.8' 0.6'	58.7' 58.7'
13	14°03.0	54.3	76°10.4	3.7'	28°34.5	0.4	58.7'
14	29°03.1	53.5	90°33.1	3.8'	28°34.9	0.2'	58.7'
15 16	44°03.3 59°03.4	· · 52.6 51.8	104°55.9 119°18.6	3.8' 3.8'	28°35.2 28°35.2	0.1' -0.1'	58.7' 58.7'
17	74°03.6	51.0	133°41.4	3.8'	28°35.1	-0.1	58.7'
18	89°03.7	N12°50.2	148°04.2	3.8'	N28°34.8	-0.5'	58.6'
19	104°03.8	49.4	162°27.0	3.8'	28°34.3	-0.7'	58.6'
20 21	119°04.0 134°04.1	48.6 • • 47.8	176°49.9 191°12.8	3.9' 3.9'	28°33.5 28°32.6	-0.9' -1.1'	58.6' 58.6'
22	149°04.3	46.9	205°35.6	3.9'	28°31.5	-1.1	58.6'
23	164°04.4	46.1	219°58.6	4.0'	28°30.3	-1.5'	58.6'
	SD = 15.8'	d = -0.8'		SI	D = 16.1'		
_							
Tue 0	<b>GHA</b> 179°04.6	<b>Dec</b> N12° 45.3	<b>GHA</b> 234°21.5	ν 4.0'	<b>Dec</b> N28° 28.8	d -1.7'	<b>HP</b> 58.6'
1	179 04.0 194°04.7	44.5	248°44.5	4.0'	28°27.1	-1.7 -1.9'	58.5
2	209°04.8	43.7	263°07.6	4.1'	28°25.3	-2.0'	58.5'
3 4	224°05.0 239°05.1	· · 42.9 42.0	277°30.6 291°53.7	4.1' 4.2'	28°23.2 28°21.0	-2.2' -2.4'	58.5'
4 5	239°05.1 254°05.3	42.0 41.2	291°53.7 306°16.9	4.2'	28° 21.0 28° 18.6	-2.4 -2.6'	58.5' 58.5'
6	269°05.4	N12°40.4	320°40.1	4.3'	N28°16.0	-2.8'	58.5'
7	284°05.6	39.6	335°03.4	4.3'	28°13.2	-3.0'	58.5'
8 9	299°05.7 314°05.9	38.8 •• 37.9	349°26.7 3°50.0	4.4' 4.4'	28°10.2 28°07.0	-3.2' -3.3'	58.4' 58.4'
10	314 05.9 329°06.0	37.9	18°13.5	4.4 4.5'	28°03.7	-3.5'	58.4'
11	344°06.1	36.3	32°36.9	4.5'	28°00.2	-3.7'	58.4'
12	359°06.3	N12° 35.5	47°00.5	4.6'	N27° 56.5	-3.9'	58.4'
13 14	14°06.4 29°06.6	34.7 33.8	61°24.1 75°47.7	4.7' 4.7'	27°52.6 27°48.5	-4.1' -4.2'	58.4' 58.4'
15	44°06.7	• • 33.0	90°11.5	4.8'	27°44.3	-4.2 -4.4'	58.3
16	59°06.9	32.2	104°35.3	4.9'	27°39.9	-4.6'	58.3'
17	74°07.0	31.4 N12°30.6	118°59.1	4.9'	27°35.3 N27°30.5	-4.8'	58.3'
18 19	89°07.2 104°07.3	N12°30.6 29.7	133°23.1 147°47.1	5.0' 5.1'	N27°30.5 27°25.5	-4.9' -5.1'	58.3' 58.3'
20	119°07.5	28.9	162°11.2	5.2'	27°20.4	-5.1 -5.3'	58.3
21	134°07.6	• • 28.1	176°35.4	5.3'	$27^{\circ}15.1$	-5.5'	58.2'
22	149°07.8 164°07.9	27.3	190°59.7 205°24.0	5.3' 5.4'	27°09.7 27°04.0	-5.6'	58.2' 58.2'
23		26.4	205 24.0			-5.8'	38.2
	SD = 15.8'	d = -0.8'		SI	D = 16.0'		

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

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

		Sun		Moon			
Day	Eqn.o	Eqn.of Time		r. 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%	
17	04:08	04:02	12:04	06:41	19:11		
18	03:55	03:49	12:04	07:42	20:13		
19	03:42	03:35	12:04	08:44	21:14		

## August 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	328°35.1	213°35.9	N20°56.5	140°54.2		221°38.9	N22°28.4	326°53.3	S01°55.8			
1	343°37.6	228° 35.2	56.1	155°55.2	54.3	236°40.8	28.3	341°55.9	55.9	Alpheratz	357°33.9	29°14.0
2	358°40.0	243°34.5	55.7	170°56.2	55.0	251°42.7	28.3	356°58.5	55.9	Ankaa	353°06.3	-42°09.7
3	13°42.5	258° 33.9	• • 55.4	185°57.2	• • 55.6	266°44.7	• • 28.2	12°01.1	• • 56.0	Schedar	349°30.1	56°40.6
4	28°45.0	273°33.2	55.0	200°58.2	56.3	281°46.6	28.2	27°03.7	56.0	Diphda	348°46.5	-17°50.5
5	43°47.4	288°32.5	54.6	215°59.2	56.9	296°48.6	28.1	42°06.3	56.1	Achernar Hamal	335° 19.5 327° 50.5	-57°06.1 23°35.0
6	58°49.9	303°31.8	N20°54.3	231°00.2	S02°57.6	311°50.5	N22°28.1	57°08.9	S01°56.2	Polaris	313°41.3	89°22.0
7	73°52.4	318°31.1	53.9	246°01.2	58.2	326°52.4	28.0	72°11.5	56.2	Acamar	315°11.3	-40°11.8
8	88°54.8	333°30.4	53.5	261°02.2	58.9	341°54.4	28.0	87°14.1	56.3	Menkar	314°05.5	4°11.5
9	103°57.3	348°29.7	• • 53.2	276°03.3	02°59.5	356°56.3	• • 27.9	102°16.7	• • 56.4	Mirfak	308°27.5	49°57.0
10 11	118°59.8 134°02.2	3°29.0 18°28.3	52.8 52.4	291°04.3 306°05.3	03°00.2 00.9	11°58.2 27°00.2	27.9 27.8	117°19.3 132°21.9	56.4 56.5	Aldebaran	290°39.1	16°33.7
12	134 02.2 149°04.7	33° 27.7	N20°52.0	300 05.3 321°06.3	503°01.5	42°02.1	N22°27.8	132 21.9 147°24.5	50.5 S01°56.6	Rigel	281°03.5	-8°10.1
13	164°07.1	48° 27.0	51.6	336°07.3	02.2	57°04.1	27.7	162°27.0	56.6	Capella	280°21.3	46°01.3
14	179°09.6	63°26.3	51.3	351°08.3	02.8	72°06.0	27.6	177°29.6	56.7	Bellatrix	278°22.5	6°22.5
15	194°12.1	78° 25.6	• • 50.9	6°09.3	• • 03.5	87°07.9	27.6	192°32.2	56.8	Elnath	278°01.4	28°37.7
16	209°14.5	93°24.9	50.5	21°10.3	04.1	102°09.9	27.5	207°34.8	56.8	Alnilam	275°37.3	-1°11.0 7°24.8
17	224°17.0	$108^{\circ}24.2$	50.1	36°11.3	04.8	$117^{\circ}11.8$	27.5	222°37.4	56.9	Betelgeuse Canopus	270°51.7 263°52.5	-52°42.2
18	$239^{\circ}19.5$	123° 23.5	N20°49.7	51°12.3	S03°05.4	132°13.8	N22°27.4	237°40.0	S01°57.0	Sirius	258° 26.0	-16°44.9
19	254°21.9	138°22.8	49.4	66°13.4	06.1	147°15.7	27.4	252°42.6	57.0	Adhara	255° 05.7	-29°00.2
20	269°24.4	153°22.2	49.0	81°14.4	06.7	162°17.6	27.3	267°45.2	57.1	Procyon	244°50.6	5°09.7
21	284°26.9	168°21.5	• • 48.6	96°15.4	• • 07.4	177°19.6	• • 27.3	282°47.8	• • 57.1	Pollux	243°17.0	27°57.9
22	299°29.3	183°20.8	48.2	111°16.4	08.0	192°21.5	27.2	297°50.4	57.2	Avior	234°15.1	-59°35.3
23	314°31.8	198°20.1	47.8	126°17.4	08.7	207°23.5	27.2	312°53.0	57.3	Suhail	222°46.4	-43°32.0
Mer.p	ass. 02:05	$\nu$ -0.7′ $d$ -0	).4′ m-3.96	$\nu$ 1.0′ d0	.7′ m1.62	$\nu 1.9' \ d-0$	.1'  m-1.96	$\nu$ 2.6′ d0.	1'  m0.71	Miaplacidus	221°39.1	-69°49.2
										Alphard	217°47.6	-8°46.1
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.2	11°50.6
0	329°34.3	213° 19.4	N20°47.4	141°18.4	S03°09.4	222°25.4	N22°27.1	327°55.6	S01°57.3	Dubhe	193°41.0	61°36.9
1	344°36.7	$228^{\circ}18.7$	47.0	156°19.4	10.0	237°27.3	27.1	342°58.2	57.4	Denebola	182°24.7 175°43.3	14°25.8 -17°41.0
2	359°39.2	243°18.0	46.6	171°20.4	10.7	252°29.3	27.0	358°00.8	57.5	Gienah	175 43.3 173°00.1	-17 41.0 -63°14.6
3	$14^{\circ}41.6$	$258^{\circ}17.3$	• • 46.2	186°21.4	• • 11.3	267°31.2	• • 27.0	13°03.4	• • 57.5	Gacrux	173 00.1 171°51.5	-57°15.6
4	29°44.1	$273^{\circ}16.7$	45.9	201°22.4	12.0	282°33.2	26.9	28°06.0	57.6	Alioth	166° 12.9	55°49.5
5	44°46.6	288°16.0	45.5	216°23.4	12.6	297°35.1	26.9	43°08.6	57.7	Spica	158°21.9	-11°17.7
6	59°49.0	303°15.3	N20°45.1	231°24.4	S03°13.3	312°37.1	N22°26.8	58°11.2	S01°57.7	Alkaid	152°51.8	49°11.3
7	74°51.5	318° 14.6	44.7	246°25.4	13.9	327°39.0	26.7	73°13.8	57.8	Hadar	148°35.6	-60°30.0
8	89°54.0	333°13.9	44.3	261°26.5	14.6	342°40.9 357°42.9	26.7	88°16.4 103°19.0	57.9 • • 57.9	Menkent	$147^{\circ}57.2$	-36°29.9
9 10	104° 56.4 119° 58.9	348° 13.2 3° 12.5	• • 43.9	276°27.5 291°28.5	· · 15.2 15.9	357 42.9 12°44.8	• • 26.6	103 19.0 118°21.5		Arcturus	145°47.6	19°03.1
10	119 58.9 135°01.4	3 12.5 18° 11.9	43.5 43.1	291 28.5 306°29.5	15.9 16.6	12 44.8 27°46.8	26.6 26.5	118 21.5 133°24.1	58.0 58.1	Rigil Kent.	139°39.8	-60°56.7
12	150°03.8	33°11.2	N20°42.7	321°30.5	503°17.2	42°48.7	N22°26.5	148°26.7	S01°58.1	Kochab	137°20.0	74°03.2
13	165°06.3	48° 10.5	42.3	336°31.5	17.9	57°50.7	26.4	163°29.3	58.2	Zuben'ubi	136°55.5	-16°08.9
14	180°08.8	63°09.8	41.9	351°32.5	18.5	72°52.6	26.4	178°31.9	58.3	Alphecca	126°03.3	26°37.9
15	195°11.2	$78^{\circ}09.1$	• • 41.5	6°33.5	• • 19.2	87°54.5	• • 26.3	193°34.5	• • 58.3	Antares Atria	112°15.1 107°08.7	-26°29.4 -69°04.6
16	$210^{\circ}13.7$	93°08.4	41.1	21°34.5	19.8	102°56.5	26.3	208°37.1	58.4	Sabik	107 08.7 102°02.1	-15°45.4
17	$225^{\circ}16.1$	$108^{\circ}07.7$	40.7	36°35.5	20.5	117°58.4	26.2	223°39.7	58.5	Shaula	96°09.5	-37°07.4
18	240° 18.6	123°07.1	N20°40.2	51°36.5	S03°21.1	133°00.4	N22°26.2	238°42.3	S01°58.5	Rasalhague	95°57.9	12°32.6
19	255°21.1	138°06.4	39.8	66°37.5	21.8	148°02.3	26.1	253°44.9	58.6	Eltanin	90°41.7	51°29.3
20	270°23.5	153°05.7	39.4	81°38.5	22.4	163°04.3	26.1	268°47.5	58.7	Kaus Aust.	83°31.6	-34°22.4
21 22	285°26.0 300°28.5	168°05.0	· · 39.0 38.6	96°39.5 111°40.5	· · 23.1 23.8	178°06.2 193°08.1	· · 26.0 25.9	283°50.1 298°52.7	• • 58.7	Vega	80°32.6	38°48.6
23	300 28.5 315°30.9	183°04.3 198°03.6	38.2	111 40.5 126°41.5	23.6	208°10.1	25.9 25.9	313°55.3	58.8 58.9	Nunki	75°46.8	-26°15.9
										Altair	61°59.2	8°56.3
Mer.p	ass. 02:01	$\nu$ -0.7′ $d$ -0	).4′ m-3.96	$\nu$ 1.0′ d0	.7′ m1.62	$\nu 1.9' \ d$ -0	$.1^\prime$ m-1.96	$\nu$ 2.6′ d0.	1' m0.70	Peacock	53°04.3	-56°39.2
										Deneb Enif	49°25.0 33°38.0	45°22.4 9°59.7
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.8	-46°50.1
0	$330^{\circ}33.4$	213°03.0	N20°37.8	141°42.5	S03°25.1	223°12.0	N22°25.8	328°57.9	S01°58.9	Fomalhaut	15° 13.6	-40° 30.1° -29° 29.0
1	345°35.9	228°02.3	37.4	156°43.6	25.7	238°14.0	25.8	344°00.5	59.0	Scheat	13°44.4	28°13.4
2	0°38.3	243°01.6	37.0	171°44.6	26.4	253°15.9	25.7	359°03.1	59.1	Markab	13°29.1	15°20.7
3	15°40.8	258°00.9	• • 36.5	186°45.6	• • 27.0	268°17.9	• • 25.7	14°05.7	• • 59.1	Aug 20 14/	CIIA	N4====
4	30°43.2	273°00.2	36.1	201°46.6	27.7	283°19.8	25.6	29°08.3	59.2	Aug 20 Wed	<b>SHA</b> 245° 00.8	Mer.pass
5 6	45°45.7 60°48.2	287°59.5 302°58.9	35.7 N20°35.3	216°47.6 231°48.6	28.3 \$03°29.0	298°21.8 313°23.7	25.6 N22°25.5	44°10.9	59.3 S01°59.3		245°00.8 172°19.0	09:46 14:35
	75° 50.6									Jupiter		09:12
7 8	75 50.6 90°53.1	317°58.2 332°57.5	34.9 34.4	246°49.6 261°50.6	29.6 30.3	328°25.6 343°27.6	25.5 25.4	74°16.1 89°18.7	59.4 59.5	Saturn		02:12
9	90°55.1 105°55.6	347° 56.8	• • 34.0	276°51.6	• • 30.9	358°29.5	• • 25.4	104°21.3	• • 59.5			
10	120°58.0	2°56.1	33.6	291°52.6	31.6	13°31.5	25.3	119°23.9	59.6	Aug 21 Thu	SHA	Mer.pass
11	136°00.5	17° 55.5	33.2	306°53.6	32.3	28°33.4	25.3	134°26.5	59.7		243°45.2	09:47
12	151°03.0	32°54.8	N20°32.7	321°54.6	<b>S</b> 03°32.9	43°35.4	N22°25.2	149°29.1		!	171°44.1	14:34
13	166°05.4	47°54.1	32.3	336°55.6	33.6	58°37.3	25.1	164°31.7	59.8	Saturn	252°51.2 358°21.3	09:09 02:08
14	181°07.9	62°53.4	31.9	351°56.6	34.2	73°39.3	25.1	179°34.3	59.9	Jaturn	JJU 21.3	∪∠:∪0
15	196°10.4	77°52.7	• • 31.5	6°57.6	• • 34.9	88°41.2	• • 25.0	194°36.9	01°59.9	Aug 22 Fri	SHA	Mer.pass
16	211°12.8	92°52.0	31.0	21°58.6	35.5	103°43.2	25.0	209°39.5	02°00.0		242°29.6	09:48
17	226° 15.3	107°51.4	30.6	36°59.6	36.2	118°45.1	24.9 N22°24.0	224°42.1	00.1		171°09.2	14:32
18 19	241°17.7 256°20.2	122°50.7 137°50.0	N20°30.2 29.7	52°00.6 67°01.6	\$03°36.8 37.5	133°47.1 148°49.0	N22°24.9 24.8	239°44.7 254°47.3	\$02°00.1 00.2		252°38.6	09:06
20	250 20.2 271°22.7	157 50.0 152°49.3	29.7 29.3	82°02.6	37.5	148 49.0 163°51.0	24.8	254 47.3 269°49.9	00.2	Saturn	358°24.5	02:04
21	286°25.1	167° 48.6	• • 28.9	97°03.6	• • 38.8	178°52.9	24.7	284°52.5	• • 00.3	Horizont	al parallax	
22	301°27.6	182°48.0	28.4	112°04.6	39.5	193°54.8	24.7	299°55.1	00.4		Venus:	0.1
23	$316^{\circ}30.1$	197°47.3	28.0	127°05.6	40.1	208°56.8	24.6	314°57.7	00.5		Mars:	0.1
Mern	ass. 01:57	ν-0.7' d-0	0.4' m-3.96	$\nu$ 1 0' d0	.7′ m1.62	ν1 9' d-0	.1′ m-1.96	ν2 6' dΩ	.1′ m0.70			
г			0.50									

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°08.1	N12°25.6	219°48.4	5.5'	N26°58.2	-6.0'	58.2'
1	194°08.2 209°08.4	24.8	234°12.9	5.6'	26° 52.2	-6.1'	58.2'
2	209°08.4 224°08.5	24.0 •• 23.1	248°37.5 263°02.2	5.7' 5.8'	26°46.1 26°39.8	-6.3' -6.5'	58.2' 58.1'
4	239°08.7	22.3	277°27.0	5.9'	26°33.4	-6.6'	58.1
5	254°08.8	21.5	291°51.8	6.0'	$26^{\circ}26.7$	-6.8'	58.1'
6	269°09.0	N12°20.7	306°16.8	6.1'	N26°19.9	-6.9'	58.1'
7 8	284°09.1 299°09.3	19.8 19.0	320°41.9 335°07.0	6.1' 6.2'	26°13.0 26°05.9	-7.1' -7.3'	58.1' 58.1'
9	314°09.4	. 18.2	349°32.2	6.3'	25° 58.7	-7.4'	58.0'
10	329°09.6	17.4	3°57.6	6.4'	25°51.2	-7.6'	58.0'
11	344°09.7	16.5	18°23.0	6.5'	25°43.7	-7.7'	58.0'
12 13	359°09.9 14°10.0	N12°15.7 14.9	32°48.6 47°14.2	6.6' 6.7'	N25°36.0 25°28.1	-7.9' -8.0'	58.0' 58.0'
14	29° 10.2	14.9	61°39.9	6.8'	25°20.1	-8.2'	58.0'
15	44° 10.3	• • 13.2	76°05.8	6.9'	25°11.9	-8.3'	57.9'
16	59° 10.5	12.4	90°31.7	7.0'	25°03.6	-8.4'	57.9'
17	74° 10.6 89° 10.8	11.6	104°57.8	7.2'	24°55.2	-8.6'	57.9'
18 19	89° 10.8 104° 10.9	N12°10.7 09.9	119°23.9 133°50.2	7.3' 7.4'	N24°46.6 24°37.9	-8.7' -8.9'	57.9' 57.9'
20	119° 11.1	09.1	148°16.6	7.5'	24° 29.0	-0.9 -9.0'	57.8'
21	134°11.2	08.2	162°43.0	7.6'	24°20.0	-9.1'	57.8'
22	149° 11.4	07.4	177°09.6	7.7'	24°10.8	-9.3'	57.8'
23	164°11.5	06.6	191°36.3	7.8'	24°01.6	-9.4'	57.8'
	SD = 15.8'	d = -0.8'		SI	O = 15.9'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°11.7	N12°05.7	206°03.1	7.9'	N23°52.1	-9.5'	57.8'
1	194°11.8	04.9	220°30.0	8.0'	23°42.6	-9.7'	57.7'
2 3	209°12.0 224°12.1	04.1 •• 03.2	234°57.0 249°24.1	8.1' 8.2'	23°32.9 23°23.1	-9.8' -9.9'	57.7'
3 4	239° 12.3	02.4	249 24.1 263°51.4	8.3'	23°13.2	-9.9 -10.0'	57.7' 57.7'
5	254° 12.4	01.6	278°18.7	8.5'	23°03.2	-10.2'	57.7'
6	269°12.6	N12°00.7	292°46.2	8.6'	N22°53.0	-10.3'	57.6'
7	284°12.8	11°59.9	307°13.7	8.7'	22°42.7	-10.4'	57.6'
8 9	299° 12.9 314° 13.1	59.1 •• 58.2	321°41.4 336°09.2	8.8' 8.9'	22°32.3 22°21.8	-10.5' -10.6'	57.6' 57.6'
10	329° 13.2	57.4	350°37.1	9.0'	22°11.1	-10.8	57.6'
11	344° 13.4	56.6	5°05.1	9.1'	22°00.4	-10.9'	57.5'
12	359° 13.5	N11°55.7	19°33.2	9.2'	N21°49.5	-11.0'	57.5'
13 14	14°13.7 29°13.8	54.9 54.0	34°01.4 48°29.8	9.3' 9.4'	21°38.5 21°27.4	-11.1' -11.2'	57.5' 57.5'
15	44° 14.0	• • 53.2	62°58.2	9.4	21°16.2	-11.2 -11.3'	57.5'
16	59° 14.2	52.4	77°26.8	9.7'	21°04.9	-11.4'	57.4'
17	74° 14.3	51.5	91°55.4	9.8'	20°53.5	-11.5'	57.4'
18 19	89° 14.5 104° 14.6	N11°50.7 49.9	106°24.2 120°53.1	9.9' 10.0'	N20°42.0 20°30.4	-11.6' -11.7'	57.4' 57.4'
20	119° 14.8	49.9 49.0	120 55.1 135°22.1		20° 18.7		57.4 57.4'
21	134° 14.9	• • 48.2	149°51.2	10.2'	20°06.8	-11.9'	57.3'
22	149°15.1	47.3	$164^{\circ}20.4$	10.3'	19°54.9	-12.0'	57.3'
23	164° 15.3	46.5	178°49.7	10.4'	19°42.9	-12.1'	57.3'
	SD = 15.8'	d = -0.8'		SI	D = 15.8'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179° 15.4 194° 15.6	N11°45.7 44.8	193°19.1 207°48.6	10.5' 10.6'	N19°30.8 19°18.7	-12.2' -12.3'	57.3' 57.2'
1 2	194° 15.6 209° 15.7	44.8 44.0	207°48.6 222°18.3	10.6	19° 18.7 19° 06.4	-12.3' -12.4'	57.2'
3	224° 15.9	• • 43.1	236°48.0	10.8'	18°54.0	-12.4	57.2'
4	239°16.0	42.3	251°17.8	10.9'	18°41.6	-12.5'	57.2'
5	254°16.2 269°16.4	41.4 N11°40.6	265°47.8	11.1'	18°29.0	-12.6' -12.7'	57.2'
6 7	284° 16.5	39.8	280°17.8 294°48.0	11.2' 11.3'	N18°16.4 18°03.7	-12.7 -12.8'	57.1' 57.1'
8	299° 16.7	38.9	309°18.2	11.4'	17°51.0	-12.9'	57.1'
9	314°16.8	• • 38.1	323°48.6	11.5'	$17^{\circ}38.1$	-12.9'	57.1'
10	329° 17.0	37.2	338°19.1	11.6'	17°25.2	-13.0'	57.0'
11 12	344° 17.2 359° 17.3	36.4 N11°35.5	352°49.6 7°20.3	11.7' 11.8'	17°12.2 N16°59.1	-13.1' -13.2'	57.0' 57.0'
13	14° 17.5	34.7	21°51.0	11.9'	16°45.9	-13.2'	57.0'
14	29° 17.6	33.9	$36^{\circ}21.9$	11.9'	16°32.7	-13.3'	57.0'
15	44°17.8	• • 33.0	50°52.8	12.0'	16° 19.4	-13.4'	56.9'
16 17	59° 18.0 74° 18.1	32.2 31.3	65°23.9 79°55.0	12.1' 12.2'	16°06.1 15°52.6	-13.4' -13.5'	56.9' 56.9'
18	89° 18.3	N11°30.5	79 55.0 94°26.2	12.2	N15°39.1	-13.5	56.9
19	104° 18.5	29.6	108°57.6	12.4'	15°25.6	-13.6'	56.8'
20	119° 18.6	28.8	123°29.0	12.5'	15°12.0	-13.7'	56.8'
21	134° 18.8 149° 18.9	• • 27.9	138°00.5 152°32.1	12.6'	14°58.3 14°44.6	-13.7'	56.8'
22 23	149° 18.9 164° 19.1	27.1 26.2	152°32.1 167°03.8	12.7' 12.8'	14°44.6 14°30.8	-13.8' -13.8'	56.8' 56.7'
	SD = 15.8'	d = -0.8'			D = 15.6'		

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

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

ı			Sun				
	Day	Eqn.of	Eqn.of Time		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	12-2%
	20	03:28	03:21	12:03	09:44	22:12	
	21	03:13	03:06	12:03	10:39	23:05	
	22	02:58	02:51	12:03	11:30	23:53	

August 23, 24, 25 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
											эпа	Dec
0	331°32.5	212°46.6	N20°27.6	142°06.6	S03°40.8	223°58.7	N22°24.6	330°00.3	S02°00.5	Alpheratz	357°33.9	29°14.0
1	346°35.0	227° 45.9	27.1	157°07.6	41.4	239°00.7	24.5	345°02.9	00.6	Ankaa	353°06.3	-42°09.7
2	1°37.5	242°45.2	26.7	172°08.6	42.1	254°02.6	24.4	0°05.5	00.7	Schedar	349°30.0	56°40.6
3	16°39.9	257° 44.6	• • 26.2	187°09.6	• • 42.7	269°04.6	• • 24.4	15°08.1	• • 00.7		348°46.5	-17°50.5
4	31°42.4	272°43.9	25.8	202°10.6	43.4	284°06.5	24.3	30°10.7	8.00	Diphda		
5	46°44.9	287°43.2	25.4	217°11.6	44.0	299°08.5	24.3	45°13.3	00.9	Achernar	335°19.4	-57°06.1
6	61°47.3	302°42.5	N20°24.9	232°12.6	S03°44.7	314°10.4	N22°24.2	60°15.9	S02°00.9	Hamal	327°50.4	23°35.1
7	76°49.8	317°41.9	24.5	247°13.6	45.3	329°12.4	24.2	75°18.5	01.0	Polaris	313°39.9	89°22.0
										Acamar	$315^{\circ}11.2$	-40°11.8
8	91°52.2	332°41.2	24.0	262°14.6	46.0	344°14.3	24.1	90°21.1	01.1	Menkar	$314^{\circ}05.5$	$4^{\circ}11.6$
9	106°54.7	347°40.5	• • 23.6	277°15.6	• • 46.7	359°16.3	• • 24.1	105°23.7	• • 01.1	Mirfak	308° 27.4	49°57.0
10	121°57.2	2°39.8	23.1	292°16.6	47.3	14°18.2	24.0	120°26.3	01.2	Aldebaran	290°39.1	16°33.7
11	136°59.6	$17^{\circ}39.1$	22.7	307°17.6	48.0	29°20.2	24.0	135°28.9	01.3		281°03.5	
12	152°02.1	32°38.5	N20°22.2	322°18.6	S03°48.6	44°22.1	N22°23.9	150°31.5	S02°01.3	Rigel		-8°10.1
13	167°04.6	47° 37.8	21.8	337°19.6	49.3	59°24.1	23.9	165°34.1	01.4	Capella	280°21.3	46°01.3
14	182°07.0	62°37.1	21.3	352°20.6	49.9	74°26.0	23.8	180°36.7	01.5	Bellatrix	278°22.4	6°22.5
15	197°09.5	77°36.4	20.9	7°21.6	50.6	89°28.0	23.8	195°39.3	01.5	Elnath	278°01.3	28°37.7
16	212°12.0	92°35.8	20.4	22°22.6	51.2	104°29.9	23.7	210°41.9	01.6	Alnilam	275°37.3	$-1^{\circ}11.0$
										Betelgeuse	$270^{\circ}51.7$	$7^{\circ}24.8$
17	227°14.4	107°35.1	20.0	37°23.6	51.9	119°31.9	23.6	225°44.5	01.7	Canopus	263°52.5	-52°42.2
18	242°16.9	122°34.4	N20° 19.5	52°24.6	S03°52.5	134°33.8	N22°23.6	240°47.1	S02°01.8	Sirius	258° 26.0	-16°44.9
19	$257^{\circ}19.3$	137°33.7	19.0	67°25.6	53.2	149°35.8	23.5	255°49.7	01.8	Adhara	255°05.7	-10° 44.9 -29° 00.2
20	272°21.8	152°33.0	18.6	82°26.6	53.8	164°37.7	23.5	270°52.3	01.9			
21	287°24.3	167°32.4	• • 18.1	97°27.6	• • 54.5	179°39.7	• • 23.4	285°54.9	• • 02.0	Procyon	244°50.5	5°09.7
22	302°26.7	182°31.7	17.7	112°28.6	55.2	194°41.6	23.4	300°57.5	02.0	Pollux	243°17.0	27°57.9
23	317°29.2	197°31.0	17.2	127°29.6	55.8	209°43.6	23.3	316°00.1	02.1	Avior	234° 15.1	-59°35.3
23	J11 29.2		-							Suhail	222°46.4	-43°32.0
Mer.p	ass. 01:54	$\nu$ -0.7′ d-0	0.4′ m-3.96	$\nu 1.0' \ d0$	.7′ m1.62	$\nu$ 1.9′ d-0	.1′ m-1.96	$\nu 2.6' \ d0.$	1'  m0.69	Miaplacidus	221°39.1	-69°49.2
									<del>-</del>	Alphard	217°47.6	-8°46.1
										Regulus	207°34.2	11°50.6
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.0	61°36.9
0	332°31.7	212°30.3	N20° 16.8	142°30.6	S03°56.5	224°45.5	N22°23.3	331°02.7	S02°02.2			
1	347°34.1	227°29.7	16.3	157°31.6	57.1	239°47.5	23.2	346°05.3	02.2	Denebola	182°24.7	14°25.8
2	2°36.6	242°29.0	15.8	172°32.6	57.8	254°49.4	23.2	1°07.9	02.3	Gienah	175°43.3	-17°41.0
3	17°39.1	257°28.3	• • 15.4	187°33.6	58.4	269°51.4	23.1	16°10.5	02.4		173°00.1	-63°14.6
	32°41.5									Gacrux	171°51.6	-57°15.5
4		272°27.6	14.9	202°34.6	59.1	284°53.3	23.1	31°13.1	02.4	Alioth	$166^{\circ}12.9$	55°49.4
5	47°44.0	287°27.0	14.4	217°35.6	03°59.7	299°55.3	23.0	46°15.7	02.5	Spica	158°21.9	-11°17.7
6	62°46.5	302°26.3	N20° 14.0	232°36.6	S04°00.4	314°57.3	N22°22.9	61°18.4	S02°02.6	Alkaid	152°51.8	49°11.3
7	77°48.9	317°25.6	13.5	247°37.6	01.0	329°59.2	22.9	$76^{\circ}21.0$	02.6	Hadar	148°35.6	-60°30.0
8	92°51.4	332°25.0	13.0	262°38.6	01.7	345°01.2	22.8	91°23.6	02.7		140°57.2	-36°29.9
9	107°53.8	347°24.3	• • 12.6	277°39.6	• • 02.4	0°03.1	• • 22.8	106°26.2	• • 02.8	1		
10	122°56.3	2°23.6	12.1	292°40.6	03.0	15°05.1	22.7	121°28.8	02.8	Arcturus	145°47.6	19°03.1
11	137°58.8	17°22.9	11.6	307°41.6	03.7	30°07.0	22.7	136°31.4	02.9	Rigil Kent.	139°39.8	-60°56.7
										Kochab	$137^{\circ}20.1$	74°03.2
12	153°01.2	32°22.3	N20°11.1	322°42.6	S04°04.3	45°09.0	N22°22.6	151°34.0	S02°03.0	Zuben'ubi	136°55.5	-16°08.9
13	168°03.7	47°21.6	10.7	337°43.6	05.0	60°10.9	22.6	166°36.6	03.1	Alphecca	126°03.3	26°37.9
14	183°06.2	62°20.9	10.2	352°44.6	05.6	75°12.9	22.5	181°39.2	03.1	Antares	112° 15.1	-26°29.4
15	198°08.6	77° 20.2	• • 09.7	7°45.6	• • 06.3	90°14.8	• • 22.5	196°41.8	• • 03.2	Atria	107°08.7	-69°04.7
16	213°11.1	92°19.6	09.2	22°46.6	06.9	105°16.8	22.4	211°44.4	03.3			-09 04.7 -15°45.4
17	228°13.6	107° 18.9	08.7	37°47.6	07.6	120°18.7	22.3	226°47.0	03.3	Sabik	102°02.1	
18	243°16.0	122° 18.2	N20°08.3	52°48.5	S04°08.2	135°20.7	N22°22.3	241°49.6	502°03.4	Shaula	96°09.5	-37°07.4
19	258°18.5	137° 17.5	07.0	67°49.5	08.9	150°22.7	22.2	256°52.2	03.5	Rasalhague	95°57.9	12°32.6
			07.8							Eltanin	90°41.7	51°29.3
20	273°20.9	152°16.9	07.3	82°50.5	09.5	165°24.6	22.2	271°54.8	03.5	Kaus Aust.	83°31.6	-34°22.4
21	288°23.4	167° 16.2	• • 06.8	97°51.5	• 10.2	180°26.6	• • 22.1	286°57.4	• • 03.6	Vega	80°32.6	38°48.6
22	303°25.9	182° 15.5	06.3	112°52.5	10.9	195°28.5	22.1	302°00.0	03.7	Nunki	75°46.8	-26°15.9
23	318°28.3	$197^{\circ}14.9$	05.9	127°53.5	11.5	$210^{\circ}30.5$	22.0	$317^{\circ}02.6$	03.7	Altair	61°59.2	8°56.3
N 4	01.50	- 0 7/ -1 0	0.5′ m-3.96	- 1 0/ -10	7/1 60	- 2 0/ -1 0	1/ 1.07	- 2 6/ -10	1/ 0.60	Peacock	53°04.3	-56°39.2
ivier.p	ass. 01:50	$\nu$ -0.7 a-0	0.5 m-3.90	$\nu$ 1.0 au	.7′ m1.62	$\nu$ 2.0 a-0	.1′ m-1.97	$\nu$ 2.0 au.	1′ m0.69			
										Deneb	49°25.0	45°22.4
Mon	CHV	CHV	Doc	СПУ	Doc	GHA	Doc	GHA	Doc	Enif	33°38.0	9°59.7
Mon	GHA	GHA	Dec	GHA	<b>Dec</b> \$04° 12.2		Dec		<b>Dec</b> <b>S</b> 02°03.8	Al Na'ir	27°31.8	-46°50.1
0	333°30.8	212°14.2	N20°05.4	142°54.5		225°32.4	N22°22.0			Fomalhaut	$15^{\circ}13.6$	-29°29.0
1	348°33.3	227° 13.5	04.9	157°55.5	12.8	240°34.4	21.9	347°07.8	03.9	Scheat	13°44.4	28°13.4
2	3°35.7	242°12.9	04.4	172°56.5	13.5	255° 36.3	21.9	2°10.4	04.0	Markab	$13^{\circ}29.1$	15°20.7
3	18°38.2	257° 12.2	• • 03.9	187°57.5	• • 14.1	270°38.3	• • 21.8	17°13.1	• • 04.0			
4	33°40.7	272°11.5	03.4	202°58.5	14.8	285°40.2	21.8	32°15.7	04.1	Aug 23 Sat	SHA	Mer.pass
5	48°43.1	287°10.8	02.9	$217^{\circ}59.5$	15.4	300°42.2	21.7	47°18.3	04.2	Venus	$241^{\circ}14.1$	09:49
6	63°45.6	302°10.2	N20°02.4	233°00.5	S04°16.1	315°44.2	N22°21.6	62°20.9	S02°04.2	Mars	$170^{\circ}34.1$	14:31
7	78°48.1	317°09.5	01.9	248°01.5	16.7	330°46.1	21.6	77°23.5	04.3	1	252°26.2	09:03
8	93°50.5	317 09.5 332°08.8	01.9	263°02.5	17.4	345°48.1	21.5	92°26.1	04.3	Saturn	358° 27.8	02:00
9	93°50.5 108°53.0	347°08.2		203 02.5 278°03.5		0°50.0	21.5	92 20.1 107°28.7		Jatuill	555 21.0	02.00
			•• 01.0		• • 18.0				• • 04.4	Aug 24 Sun	SHA	Mer.pass
10	123°55.4	2°07.5	00.5	293°04.5	18.7	15°52.0	21.4	122°31.3	04.5	_	239°58.7	09:50
11	138°57.9	17°06.8	20°00.0	308°05.4	19.4	30°53.9	21.4	137°33.9	04.6		169°58.9	14:29
12	154°00.4	32°06.2	N19°59.5	323°06.4	S04°20.0	45°55.9	N22°21.3		S02°04.6	Jupiter		09:00
13	$169^{\circ}02.8$	47° 05.5	59.0	338°07.4	20.7	60°57.9	21.3	$167^{\circ}39.1$	04.7	Saturn	358°31.1	
14	$184^{\circ}05.3$	62°04.8	58.5	353°08.4	21.3	75°59.8	21.2	182°41.7	04.8	Saturn	JJU J1.1	01:55
15	199°07.8	77°04.2	• • 58.0	8°09.4	22.0	91°01.8	• • 21.2	197°44.3	• • 04.9	Aug 25 Mon	SHA	Mer.pass
16	214°10.2	92°03.5	57.5	23°10.4	22.6	106°03.7	21.1	212°46.9	04.9		238°43.4	09:51
	214 10.2 229°12.7	107° 02.8	57.0	38°11.4	23.3	100 05.7 121°05.7	21.1	212 40.9 227°49.5	05.0			
17	244°15.2			58 11.4 53°12.4	23.3 \$04°23.9		N22°21.0				169°23.7	14:27
18		122°02.2	N19° 56.5			136°07.6		242°52.2		Jupiter		08:57
19	259°17.6	137°01.5	56.0	68°13.4	24.6	151°09.6	20.9	257°54.8	05.1	Saturn	358°34.4	01:51
20	274°20.1	152°00.8	55.5	83°14.4	25.2	166°11.6	20.9	272°57.4	05.2			
21	289°22.5	167°00.2	• • 54.9	98°15.4	• • 25.9	181°13.5	• • 20.8	288°00.0	•• 05.3	Horizont	al parallax	
22	$304^{\circ}25.0$	181°59.5	54.4	113°16.4	26.5	196°15.5	20.8	303°02.6	05.3		Venus:	0.1
23	319°27.5	196°58.8	53.9	128°17.3	27.2	211°17.4	20.7	318°05.2	05.4		Mars:	0.1
											•	
Mer.p	ass. 01:46	$\nu$ -0.7′ d-0	).5′ m-3.95	$\nu$ 1.0′ d0	.7′ m1.62	$\nu 2.0' \ d-0$	.1' m-1.97	$\nu 2.6' \ d0.$	1′ m0.68			

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	179°19.3	N11°25.4	181°35.6	12.9'	N14°16.9	-13.9'	56.7'
1	194°19.4	24.5	196°07.5	13.0'	14°03.0	-14.0'	56.7'
2	209°19.6	23.7	210°39.4	13.0'	13°49.1	-14.0'	56.7'
3 4	224°19.8 239°19.9	· · 22.8 22.0	225°11.5 239°43.6	13.1' 13.2'	13°35.1 13°21.0	-14.1' -14.1'	56.7' 56.6'
4 5	254°20.1	22.0	254°15.8	13.2	13 21.0 13°06.9	-14.1 -14.1'	56.6'
6	269°20.2	N11°20.3	268°48.1	13.4'	N12°52.8	-14.2'	56.6'
7	284°20.4	19.4	283°20.5	13.5'	12°38.6	-14.2'	56.6'
8	299°20.6	18.6	297°52.9	13.5'	12°24.3	-14.3'	56.5'
9	314°20.7	• • 17.7	312°25.4	13.6'	12°10.1	-14.3'	56.5'
10 11	329°20.9 344°21.1	16.9 16.0	326°58.1 341°30.7	13.7' 13.8'	11°55.7 11°41.4	-14.4' -14.4'	56.5' 56.5'
12	359°21.2	N11° 15.2	356°03.5	13.8'	N11°27.0	-14.4	56.4
13	14°21.4	14.3	10°36.4	13.9'	11°12.5	-14.5'	56.4
14	29°21.6	13.5	25°09.3	14.0'	10°58.0	-14.5'	56.4'
15	44°21.7	• • 12.6	39°42.3	14.1'	10°43.5	-14.5'	56.4'
16 17	59°21.9 74°22.1	11.8 10.9	54°15.3 68°48.5	14.1' 14.2'	10°29.0 10°14.4	-14.6' -14.6'	56.3' 56.3'
18	89°22.2	N11° 10.1	83°21.7	14.3'	N09°59.8	-14.6'	56.3
19	104°22.4	09.2	97°54.9	14.3'	09°45.1	-14.7'	56.3'
20	119°22.6	08.4	112°28.3	14.4'	09°30.5	-14.7'	56.3'
21	134°22.7	• • 07.5	127°01.7	14.5'	09°15.8	-14.7'	56.2'
22 23	149°22.9 164°23.1	06.7 05.8	141°35.2 156°08.7	14.5' 14.6'	09°01.1 08°46.3	-14.8' -14.8'	56.2' 56.2'
23			130 00.7			-14.0	50.2
	SD = 15.8'	d = -0.8'		SI	D = 15.5'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°23.2 194°23.4	N11°04.9	170°42.3 185°15.9	14.7'	N08°31.5 08°16.7	-14.8'	56.2'
1 2	194 · 23.4 209 ° 23.6	04.1 03.2	185°15.9 199°49.7	14.7' 14.8'	08°16.7	-14.8' -14.8'	56.1' 56.1'
3	224°23.7	02.4	214°23.5	14.8'	07°47.1	-14.9'	56.1'
4	239°23.9	01.5	228°57.3	14.9'	07°32.2	-14.9'	56.1'
5	254°24.1	11°00.7	243°31.2	15.0'	07°17.3	-14.9'	56.0'
6	269°24.2	N10°59.8	258°05.1	15.0'	N07°02.4 06°47.5	-14.9'	56.0'
7 8	284°24.4 299°24.6	58.9 58.1	272°39.2 287°13.2	15.1' 15.1'	06°47.5 06°32.6	-14.9' -14.9'	56.0' 56.0'
9	314°24.7	57.2	301°47.3	15.2'	06°17.7	-15.0'	56.0'
10	329°24.9	56.4	$316^{\circ}21.5$	15.2'	06°02.7	-15.0'	55.9'
11	344°25.1	55.5	330°55.7	15.3'	05°47.8	-15.0'	55.9'
12	359°25.2 14°25.4	N10°54.7	345°30.0 0°04.3	15.3'	N05°32.8 05°17.8	-15.0'	55.9'
13 14	29°25.6	53.8 52.9	14°38.7	15.4' 15.4'	05°17.8 05°02.8	-15.0' -15.0'	55.9' 55.8'
15	44°25.7	52.1	29°13.1	15.5'	04°47.8	-15.0'	55.8'
16	59°25.9	51.2	43°47.5	15.5'	04°32.8	-15.0'	55.8'
17	74°26.1	50.4	58°22.0	15.5'	04°17.8	-15.0'	55.8'
18 19	89°26.3 104°26.4	N10° 49.5 48.6	72°56.6 87°31.1	15.6' 15.6'	N04°02.8 03°47.8	-15.0' -15.0'	55.7' 55.7'
20	119°26.6	47.8	102°05.8	15.7'	03°32.7	-15.0'	55.7'
21	134°26.8	• • 46.9	116°40.4	15.7'	03°17.7	-15.0'	55.7'
22	149°26.9	46.0	$131^{\circ}15.1$	15.7'	03°02.7	-15.0'	55.7'
23	164°27.1	45.2	145°49.9	15.8'	02°47.7	-15.0'	55.6'
	SD = 15.8'	d = -0.9'		SI	O = 15.3'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°27.3	N10°44.3	160°24.6	15.8'	N02°32.7	-15.0'	55.6'
1 2	194°27.5 209°27.6	43.5 42.6	174°59.4 189°34.3	15.8' 15.9'	02°17.7 02°02.6	-15.0' -15.0'	55.6' 55.6'
3	209°27.6 224°27.8	42.6 · · 41.7	189°34.3 204°09.2	15.9' 15.9'	02°02.6 01°47.6	-15.0' -15.0'	55.5'
4	239°28.0	40.9	218°44.1	15.9'	01°32.6	-15.0'	55.5'
5	254°28.1	40.0	233°19.0	16.0'	01°17.7	-15.0'	55.5'
6	269°28.3	N10°39.1	247°54.0	16.0'	N01°02.7	-15.0'	55.5'
7 8	284°28.5 299°28.7	38.3 37.4	262°28.9 277°04.0	16.0' 16.0'	00°47.7 00°32.7	-15.0' -15.0'	55.5' 55.4'
9	314°28.8	36.5	277 04.0 291°39.0	16.1	00° 32.7	-13.0 -14.9'	55.4'
10	329°29.0	35.7	$306^{\circ}14.1$	16.1'	N00°02.8	-14.9'	55.4'
11	344°29.2	34.8	320°49.2	16.1'	S00°12.1	14.9'	55.4'
12	359°29.4 14°29.5	N10°33.9	335°24.3 349°59.4	16.1'	\$00°27.0 00°41.9	14.9'	55.3'
13 14	14°29.5 29°29.7	33.1 32.2	349°59.4 4°34.6	16.2' 16.2'	00°41.9 00°56.8	14.9' 14.9'	55.3' 55.3'
15	44°29.9	31.3	19°09.7	16.2'	01°11.7	14.9'	55.3'
16	59°30.0	30.5	33°44.9	16.2'	01°26.6	14.8'	55.3'
17	74°30.2	29.6	48°20.1	16.2'	01°41.4	14.8'	55.2'
18	89°30.4	N10°28.7	62°55.3	16.2'	\$01°56.2 02°11.0	14.8'	55.2'
19 20	104°30.6 119°30.7	27.9 27.0	77°30.6 92°05.8	16.2' 16.3'	02°11.0 02°25.8	14.8' 14.8'	55.2' 55.2'
21	134°30.9	26.1	106°41.1	16.3'	02°25.6	14.7	55.2'
22	149°31.1	25.3	121°16.4	16.3'	02°55.3	14.7'	55.1'
23	164°31.3	24.4	135°51.6	16.3'	03°10.0	14.7'	55.1'
	SD = 15.8'	d = -0.9'		SI	O = 15.2'		

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

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

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

h	Aries	Vei	` nus	М	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	334°29.9	211°58.2	N19°53.4	143°18.3	S04°27.9	226°19.4	N22°20.7	333°07.8	S02°05.5			
1	349°32.4	226° 57.5	52.9	158°19.3	28.5	241°21.4	20.6	348°10.4	05.6	Alpheratz	357°33.9	29°14.0
2	4°34.9	241°56.8	52.4	173°20.3	29.2	256°23.3	20.6	3°13.0	05.6	Ankaa	353°06.2	-42°09.7
3	19°37.3	256° 56.2	51.9	188°21.3	29.8	271°25.3	20.5	18° 15.6	05.7	Schedar	349°30.0	56°40.6
4	34°39.8	271°55.5	51.4	203°22.3	30.5	286°27.2	20.5	33°18.2	05.8	Diphda	348°46.5	-17°50.5
5	49°42.3	286° 54.8	50.9	218°23.3	31.1	301°29.2	20.4	48°20.8	05.8	Achernar	335°19.4	-57°06.1
6	64°44.7	301°54.2	N19°50.3	233°24.3	S04°31.8	316°31.2	N22°20.3	63°23.4	S02°05.9	Hamal	327°50.4	23°35.1
7	79°47.2	316°53.5	49.8	248°25.3	32.4	331°33.1	20.3	$78^{\circ}26.1$	06.0	Polaris	313°38.5	89°22.0
8	94°49.7	331°52.8	49.3	263°26.3	33.1	346°35.1	20.2	93°28.7	06.0	Acamar Menkar	315°11.2 314°05.5	-40°11.8 4°11.6
9	$109^{\circ}52.1$	346°52.2	• • 48.8	278°27.2	• • 33.7	1°37.0	• • 20.2	108°31.3	• • 06.1	Mirfak	308° 27.4	49°57.0
10	124°54.6	1°51.5	48.3	293°28.2	34.4	16°39.0	20.1	123°33.9	06.2	Aldebaran	290°39.0	16°33.7
11	139°57.0	16°50.8	47.8	308°29.2	35.0	31°41.0	20.1	138°36.5	06.3	Rigel	281°03.4	-8°10.1
12	154°59.5	31°50.2	N19°47.2	323°30.2	S04°35.7	46°42.9	N22°20.0	153°39.1	S02°06.3	Capella	280°21.2	46°01.3
13	170°02.0	46°49.5	46.7	338°31.2	36.4	61°44.9	20.0	168°41.7	06.4	Bellatrix	278°22.4	6°22.5
14	185°04.4	61°48.9	46.2	353°32.2	37.0	76°46.8	19.9	183°44.3 198°46.9	06.5	Elnath	278°01.3	28°37.7
15 16	200°06.9 215°09.4	76°48.2 91°47.5	• • 45.7 45.1	8°33.2 23°34.2	· · 37.7 38.3	91°48.8 106°50.8	· · 19.9 19.8	213°49.5	• • 06.5	Alnilam	275°37.3	-1°11.0
17	230°11.8	91 47.5 106°46.9	45.1 44.6	25 34.2 38°35.2	39.0	100 50.8 121°52.7	19.6	213 49.5 228°52.1	06.6 06.7	Betelgeuse	$270^{\circ}51.7$	7°24.8
18	245°14.3	121°46.2	N19°44.1	53°36.1	S04°39.6	136°54.7	N22°19.7	243°54.8	S02°06.8	Canopus	263°52.5	-52°42.2
19	260°16.8	136°45.5	43.6	68°37.1	40.3	151°56.6	19.6	258°57.4	06.8	Sirius	258°26.0	-16°44.9
20	275° 19.2	151°44.9	43.0	83°38.1	40.9	166°58.6	19.6	274°00.0	06.9	Adhara	255°05.7	-29°00.1
21	290°21.7	166°44.2	42.5	98°39.1	• • 41.6	182°00.6	19.5	289°02.6	07.0	Procyon	244°50.5	5°09.7
22	305°24.2	181°43.6	42.0	113°40.1	42.2	197°02.5	19.5	304°05.2	07.0	Pollux	243°16.9	27°57.9
23	320°26.6	196°42.9	41.4	128°41.1	42.9	212°04.5	19.4	319°07.8	07.1	Avior	234°15.1	-59°35.3
N 4	01.40	0.7/ 1.0			7/ 1.60	-	1/ 1.07	-		Suhail	222°46.4	-43°32.0
Mer.p	ass. 01:42	$\nu$ -0.7 d-0	.5′ m-3.95	$\nu$ 1.0′ d0	.7′ m1.62	$\nu$ 2.0′ $d$ -0.	.1′ m-1.97	$\nu$ 2.6′ $d0$	.1′ m0.68	Miaplacidus	221°39.1	-69°49.2
										Alphard Regulus	217°47.6 207°34.2	-8°46.1 11°50.6
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.0	61°36.9
0	$335^{\circ}29.1$	211°42.2	N19°40.9	143°42.1	S04°43.5	227°06.5	N22°19.4	$334^{\circ}10.4$	S02°07.2	Denebola	182°24.7	14°25.8
1	350°31.5	226°41.6	40.4	158°43.1	44.2	242°08.4	19.3	349°13.0	07.2	Gienah	175°43.3	-17°41.0
2	5°34.0	241°40.9	39.8	173°44.0	44.8	257°10.4	19.3	4°15.6	07.3	Acrux	173°00.1	-63°14.6
3	20°36.5	256°40.3	• • 39.3	188°45.0	• • 45.5	272°12.4	• • 19.2	19°18.2	• • 07.4	Gacrux	171°51.6	-57°15.5
4	35°38.9	271°39.6	38.8	203°46.0	46.2	287°14.3	19.1	34°20.9	07.5	Alioth	166°12.9	55°49.4
5	50°41.4	286°38.9	38.2	218°47.0	46.8	302°16.3	19.1	49°23.5	07.5	Spica	158°22.0	-11°17.7
6	65°43.9	301°38.3	N19°37.7	233°48.0	S04°47.5	317°18.2	N22°19.0	64°26.1	S02°07.6	Alkaid	152°51.8	49°11.3
7	80°46.3	316° 37.6	37.1	248°49.0	48.1	332°20.2	19.0	79°28.7	07.7	Hadar	148°35.6	-60°30.0
8	95°48.8	331°37.0 346°36.3	36.6	263°50.0	48.8	347°22.2	18.9	94°31.3	07.7 •• 07.8	Menkent	$147^{\circ}57.2$	-36°29.9
9	110°51.3 125°53.7	340 30.3 1°35.6	36.1	278°51.0 293°51.9	• • 49.4	2°24.1	• • 18.9	109°33.9 124°36.5		Arcturus	145°47.6	19°03.1
10 11	125 53.7 140°56.2	1 35.0 16°35.0	35.5 35.0	293 51.9 308°52.9	50.1 50.7	17°26.1 32°28.1	18.8 18.8	124 30.5 139°39.1	07.9 08.0	Rigil Kent.	139°39.9	-60°56.7
12	155°58.6	31°34.3	N19°34.4	306 52.9 323°53.9	50.7 S04°51.4	47°30.0	N22°18.7	159° 59.1 154° 41.7	502°08.0	Kochab	137°20.1	74°03.2
13	171°01.1	46° 33.7	33.9	338°54.9	52.0	62°32.0	18.7	169°44.4	08.1	Zuben'ubi	136°55.5	-16°08.9
14	186°03.6	61°33.0	33.3	353°55.9	52.7	77°34.0	18.6	184°47.0	08.2	Alphecca	126°03.3	26°37.9
15	201°06.0	76° 32.4	• • 32.8	8°56.9	53.3	92°35.9	• • 18.5	199°49.6	. 08.2	Antares	112°15.2	-26°29.4
16	216°08.5	91°31.7	32.3	23°57.8	54.0	107°37.9	18.5	214°52.2	08.3	Atria	107°08.8	-69°04.7
17	231°11.0	106°31.0	31.7	38°58.8	54.6	122°39.9	18.4	229°54.8	08.4	Sabik	102°02.1	-15°45.4
18	246°13.4	121°30.4	N19°31.2	53°59.8	S04°55.3	137°41.8	N22°18.4	244°57.4	S02°08.5	Shaula	96°09.5 95°57.9	-37°07.4 12°32.6
19	261°15.9	136°29.7	30.6	69°00.8	56.0	152°43.8	18.3	260°00.0	08.5	Rasalhague	95° 57.9 90° 41.7	51°29.3
20	$276^{\circ}18.4$	151°29.1	30.0	84°01.8	56.6	167°45.8	18.3	275°02.6	08.6	Eltanin Kaus Aust.	83°31.6	-34°22.4
21	291°20.8	166°28.4	• • 29.5	99°02.8	•• 57.3	182°47.7	• • 18.2	290°05.2	• • 08.7	Vega	80°32.6	38°48.6
22	306°23.3	181°27.8	28.9	114°03.8	57.9	197°49.7	18.2	305°07.9	08.7	Nunki	75°46.9	-26°15.9
23	321°25.8	196°27.1	28.4	129°04.7	58.6	212°51.7	18.1	320°10.5	8.80	Altair	61°59.2	8°56.3
Mer n	ass. 01:38	$\nu$ -0.7' d-0	.5′ m-3.95	$\nu 1.0' d0$	.7′ m1.62	$\nu 2.0' d-0$	.1′ m-1.98	$\nu^2 6' d0$	.1′ m0.67	Peacock	53°04.3	-56°39.2
		- U.I U U		- I.O GO		- Z.O U O.				Deneb	49°25.0	45°22.5
			_		_		_		_	Enif	33°38.0	9°59.7
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	$27^{\circ}31.8$	-46°50.1
0	336°28.2	211°26.5	N19°27.8	144°05.7	\$04°59.2	227°53.6	N22°18.1		S02°08.9	Fomalhaut	$15^{\circ}13.6$	-29°29.0
1	351°30.7	226° 25.8	27.3	159°06.7	04°59.9	242°55.6	18.0	350°15.7 5°18.3	09.0	Scheat	13°44.4	28°13.4
2	6°33.1 21°35.6	241°25.1 256°24.5	26.7 •• 26.2	174°07.7 189°08.7	05°00.5 · · 01.2	257°57.6 272°59.5	17.9 • • 17.9	20°20.9	09.0 · · 09.1	Markab	13°29.1	15°20.7
4	36°38.1	271°23.8	25.6	204°09.7	01.8	272 59.5 288°01.5	17.9	35°23.5	09.1	Aug 26 Tue	SHA	Mer.pass
5	51°40.5	286°23.2	25.0	219°10.6	02.5	303°03.5	17.8	50°26.2	09.2		237°28.2	09:53
6	66°43.0	301°22.5	N19°24.5	234°11.6		318°05.4	N22°17.7	65°28.8			168°48.4	14:26
7	81°45.5	316°21.9	23.9	249°12.6	03.8	333°07.4	17.7	80°31.4	09.4	Jupiter		08:54
8	96°47.9	331°21.2	23.3	264°13.6	04.4	348°09.4	17.6	95°34.0	09.5	Saturn	358° 37.9	01:47
9	111°50.4	346° 20.6	• • 22.8	279°14.6	• • 05.1	3°11.3	• • 17.6	110°36.6	• • 09.5			
10	126°52.9	1°19.9	22.2	294°15.5	05.7	18°13.3	17.5	125°39.2	09.6	Aug 27 Wed	SHA	Mer.pass
11	141°55.3	$16^{\circ}19.3$	21.7	$309^{\circ}16.5$	06.4	$33^{\circ}15.3$	17.4	$140^{\circ}41.8$	09.7		236° 13.2	09:54
12	156°57.8	31° 18.6	N19°21.1	324°17.5	S05°07.1	48°17.2	N22°17.4	155°44.4	S02°09.7		168° 13.0 251° 37.4	14:24 08:50
13	172°00.2	46° 18.0	20.5	339°18.5	07.7	63°19.2	17.3	170°47.1	09.8	Saturn		08:50
14	187°02.7	61°17.3	19.9	354°19.5	08.4	78°21.2	17.3	185°49.7	09.9	Jatuill	JJU 71.J	01.43
15	202°05.2	76°16.7	· · 19.4	9°20.5	• • 09.0	93°23.1	• • 17.2	200°52.3	• • 10.0	Aug 28 Thu	SHA	Mer.pass
16	217°07.6	91°16.0	18.8	24°21.4	09.7	108°25.1	17.2	215°54.9	10.0	1	234°58.2	09:55
17	232°10.1	106° 15.4	18.2	39°22.4	10.3	123°27.1	17.1	230°57.5	10.1		167°37.5	14:23
18	247°12.6	121°14.7	N19°17.7	54°23.4	\$05°11.0	138°29.0	N22°17.1	246°00.1 261°02.7	S02°10.2		251°25.4	08:47
19	262° 15.0 277° 17.5	136° 14.1	17.1 16.5	69°24.4 84°25.4	11.6	153°31.0	17.0	261°02.7 276°05.4	10.3	Saturn	358°44.9	01:39
20 21	277°17.5 292°20.0	151° 13.4 166° 12.8	16.5 •• 15.9	99°26.3	12.3 · · 12.9	168°33.0 183°35.0	17.0 •• 16.9	276°05.4 291°08.0	10.3 · · 10.4	Horizont	al parallax	
22	292 20.0 307°22.4	100 12.8 181°12.1	15.4	99 20.3 114°27.3	13.6	183 35.0 198°36.9	16.8	306°10.6	10.4		Venus:	0.1
23	307 22.4 322°24.9	196° 11.5	14.8	114 27.3 129°28.3	14.2	213°38.9	16.8	300 10.0 321°13.2	10.5		Mars:	0.1
Mer.p	ass. 01:34	$\nu$ -0.7′ d-0	.6′ m-3.95	$\nu$ 1.0′ d0	.7′ m1.62	$\nu 2.0' \ d-0.$	$.1^\prime$ m-1 $.98$	$\nu$ 2.6′ d0.	1'  m0.67			

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°31.4	N10°23.5	$150^{\circ}26.9$	16.3'	S03°24.7	14.7'	55.1'
1	194°31.6	22.7	165°02.2	16.3'	03°39.4	14.6'	55.1'
2	209°31.8 224°32.0	21.8 •• 20.9	179°37.5 194°12.8	16.3' 16.3'	03°54.0 04°08.7	14.6' 14.6'	55.1' 55.0'
4	239° 32.2	20.0	208°48.2	16.3	04°03.3	14.6'	55.0'
5	254°32.3	19.2	223°23.5	16.3'	04°37.8	14.5'	55.0'
6	269°32.5	N10°18.3	237°58.8	16.3'	S04°52.4	14.5'	55.0'
7 8	284°32.7 299°32.9	17.4 16.6	252°34.1 267°09.4	16.3' 16.3'	05°06.9 05°21.3	14.5' 14.4'	55.0' 54.9'
9	314° 33.0	. 15.7	207 09.4 281°44.8	16.3'	05°21.3	14.4	54.9'
10	329° 33.2	14.8	296°20.1	16.3'	05°50.2	14.4'	54.9'
11	344°33.4	13.9	310°55.4	16.3'	06°04.6	14.3'	54.9'
12 13	359°33.6 14°33.7	N10°13.1 12.2	325°30.7 340°06.0	16.3' 16.3'	506°18.9 06°33.2	14.3' 14.3'	54.9' 54.9'
13	29° 33.9	11.3	354° 41.3	16.3	06°47.5	14.3	54.8'
15	44°34.1	• • 10.4	9°16.6	16.3'	07°01.8	14.2'	54.8'
16	59°34.3	09.6	23°51.9	16.3'	07°16.0	14.2'	54.8'
17 18	74°34.5 89°34.6	08.7 N10°07.8	38°27.2 53°02.4	16.3' 16.3'	07°30.1 507°44.3	14.1' 14.1'	54.8' 54.8'
19	104°34.8	06.9	67°37.7	16.2'	07°58.4	14.1	54.7'
20	119°35.0	06.1	82°12.9	16.2'	08°12.4	14.0'	54.7'
21	134° 35.2	•• 05.2	96°48.2	16.2'	08°26.4	14.0'	54.7'
22	149°35.4 164°35.5	04.3 03.4	111°23.4 125°58.6	16.2' 16.2'	08°40.4 08°54.4	13.9' 13.9'	54.7' 54.7'
23			125 50.0			13.9	54.7
	SD = 15.8'	d = -0.9'		SE	0 = 15.0'		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°35.7	N10°02.6	140°33.8	16.2'	S09°08.2	13.8'	54.7'
1	194°35.9	01.7	155°08.9 169°44.1	16.1'	09°22.1 09°35.9	13.8'	54.7'
2	209°36.1 224°36.3	10°00.8 09°59.9	169°44.1 184°19.2	16.1' 16.1'	09°35.9 09°49.7	13.8' 13.7'	54.6' 54.6'
4	239° 36.4	59.1	198°54.3	16.1	10°03.4	13.7'	54.6'
5	254°36.6	58.2	213°29.4	16.1'	$10^{\circ}17.0$	13.6'	54.6'
6	269°36.8	N09°57.3	228°04.5	16.0'	\$10°30.7	13.6'	54.6'
7 8	284°37.0 299°37.2	56.4 55.6	242°39.5 257°14.5	16.0' 16.0'	10°44.2 10°57.8	13.5' 13.5'	54.6' 54.5'
9	314° 37.3	• • 54.7	271°49.5	16.0'	11°11.2	13.4	54.5'
10	329° 37.5	53.8	286°24.5	15.9'	11°24.7	13.4'	54.5'
11	344°37.7	52.9	300°59.5	15.9'	11°38.0	13.3'	54.5'
12 13	359°37.9 14°38.1	N09°52.0 51.2	315°34.4 330°09.2	15.9' 15.9'	\$11°51.4 12°04.6	13.3' 13.2'	54.5' 54.5'
14	29°38.3	50.3	344°44.1	15.8'	12°17.9	13.2'	54.5'
15	44°38.4	• • 49.4	$359^{\circ}18.9$	15.8'	$12^{\circ}31.0$	13.1'	54.5'
16	59°38.6 74°38.8	48.5	13°53.7 28°28.5	15.8'	12°44.1 12°57.2	13.1'	54.4'
17 18	74 38.8 89°39.0	47.6 N09°46.8	28 28.5 43°03.2	15.7' 15.7'	12 57.2 \$13°10.2	13.0' 12.9'	54.4' 54.4'
19	104°39.2	45.9	57°37.9	15.7'	13°23.1	12.9'	54.4'
20	119°39.3	45.0	72°12.5		13°36.0		54.4'
21 22	134° 39.5 149° 39.7	· · 44.1 43.2	86°47.2 101°21.8	15.6' 15.5'	13°48.9 14°01.6	12.8' 12.7'	54.4' 54.4'
23	149 39.7 164°39.9	43.2 42.3	101 21.8 115°56.3	15.5'	14 01.6 14°14.3	12.7'	54.4'
20	SD = 15.8'	d = -0.9'			0 = 14.9'		
	<u>JD = 13.0</u>	<u>u = -0.9</u>		JL	7 — 14.9		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°40.1	N09°41.5	130°30.8 145°05.3	15.5'	\$14°27.0	12.6'	54.3'
1 2	194° 40.3 209° 40.5	40.6 39.7	145°05.3 159°39.7	15.4' 15.4'	14°39.6 14°52.1	12.5' 12.5'	54.3' 54.3'
3	224° 40.6	• • 38.8	174°14.1	15.3'	15°04.6	12.4'	54.3'
4	239°40.8	37.9	188°48.4	15.3'	15°17.0	12.3'	54.3'
5	254°41.0 269°41.2	37.0 N09°36.2	203°22.7 217°57.0	15.3' 15.2'	15°29.3 \$15°41.6	12.3' 12.2'	54.3' 54.3'
6 7	209 41.2 284°41.4	35.3	217 57.0 232°31.2	15.2'	15°53.8	12.2	54.3'
8	299°41.6	34.4	247°05.3	15.1'	16°05.9	12.1'	54.3'
9	314°41.7	• • 33.5	261°39.5	15.1'	16°18.0	12.0'	54.3'
10 11	329°41.9 344°42.1	32.6 31.7	276°13.5 290°47.6	15.0' 15.0'	16°30.0 16°42.0	11.9' 11.9'	54.3' 54.2'
12	359° 42.3	N09°30.8	305°21.5	14.9'	\$16°53.8	11.8	54.2'
13	14°42.5	30.0	$319^{\circ}55.5$	14.9'	17°05.6	11.7'	54.2'
14	29° 42.7	29.1	334°29.3	14.8'	17°17.4	11.7'	54.2'
15 16	44° 42.9 59° 43.0	· · 28.2 27.3	349°03.2 3°36.9	14.8' 14.7'	17°29.0 17°40.6	11.6' 11.5'	54.2' 54.2'
17	74°43.2	27.3 26.4	18°10.6	14.7'	17°52.1	11.5	54.2'
18	89°43.4	N09°25.5	32°44.3	14.6'	<b>S</b> 18°03.6	11.4'	54.2'
19	104° 43.6 119° 43.8	24.6	47°17.9 61°51.5	14.6'	18°14.9	11.3'	54.2'
20 21	119°43.8 134°44.0	23.7 •• 22.9	61°51.5 76°25.0	14.5' 14.4'	18°26.2 18°37.4	11.2' 11.1'	54.2' 54.2'
22	149°44.2	22.9	90°58.4	14.4'	18°48.6	11.1	54.2'
23	164° 44.4	21.1	105°31.8	14.3'	18°59.6	11.0'	54.2'
	SD = 15.8'	d = -0.9'		SE	0 = 14.8'		

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

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

		Sun		Moon				
Day	Eqn.of Time		Mer.	Mer.	Pass.	Age		
uy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	3-5		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	8-21%		
26	01:54	01:46	12:02	14:22	02:02			
27	01:37	01:28	12:01	15:03	02:42			
28	01:20	01:11	12:01	15:45	03:24			

# August 29, 30, 31 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
											ЗПА	Dec
0	337°27.4	211°10.8	N19°14.2	144°29.3	S05°14.9	228°40.9	N22° 16.7	336° 15.8	S02°10.6	Alpheratz	357°33.9	29°14.0
1	352°29.8	226°10.2	13.6	159°30.3	15.5	243°42.8	16.7	351°18.4	10.7	Ankaa	353°06.2	-42°09.8
2	7°32.3	241°09.5	13.0	174°31.2	16.2	258°44.8	16.6	6°21.0	10.8		349°30.0	56°40.6
3	22°34.7	256°08.9	• • 12.5	189°32.2	• • 16.8	273°46.8	• • 16.6	21°23.7	• • 10.8	Schedar		
4	37°37.2	271°08.2	11.9	204°33.2	17.5	288°48.8	16.5	36°26.3	10.9	Diphda	348°46.5	-17°50.5
5	52°39.7	286°07.6	11.3	219°34.2	18.1	303°50.7	16.5	51°28.9	11.0	Achernar	335°19.4	-57°06.1
6	67°42.1	301°06.9	N19° 10.7	234°35.2	S05°18.8	318°52.7	N22° 16.4	66°31.5	S02°11.1	Hamal	327°50.4	23°35.1
7	82°44.6	316°06.3	10.1	249°36.1	19.5	333°54.7	16.4	81°34.1	11.1	Polaris	313°36.8	89°22.0
										Acamar	$315^{\circ}11.2$	-40°11.8
8	97°47.1	331°05.6	09.5	264°37.1	20.1	348°56.6	16.3	96°36.7	11.2	Menkar	314°05.5	4°11.6
9	112°49.5	346°05.0	• • 09.0	279°38.1	. 20.8	3°58.6	• • 16.2	111°39.3	• 11.3	Mirfak	308°27.4	49°57.0
10	127°52.0	1°04.3	08.4	294°39.1	21.4	19°00.6	16.2	126° 42.0	11.3	Aldebaran	290°39.0	16°33.7
11	142°54.5	16°03.7	07.8	309°40.0	22.1	34°02.6	16.1	141°44.6	11.4	Rigel	281°03.4	-8°10.1
12	157°56.9	31°03.0	$N19^{\circ}07.2$	324°41.0	S05°22.7	49°04.5	N22°16.1	156° 47.2	S02°11.5	Capella	280°21.2	46°01.3
13	172°59.4	46°02.4	06.6	339°42.0	23.4	64°06.5	16.0	171°49.8	11.6	Bellatrix	278° 22.4	6°22.5
14	188°01.9	61°01.7	06.0	354°43.0	24.0	79°08.5	16.0	186°52.4	11.6			
15	203°04.3	$76^{\circ}01.1$	• • 05.4	9°44.0	• • 24.7	94°10.4	• • 15.9	201°55.0	• • 11.7	Elnath	278°01.3	28°37.7
16	218°06.8	91°00.5	04.8	24°44.9	25.3	109°12.4	15.9	216° 57.7	11.8	Alnilam	275°37.3	-1°11.0
17	233°09.2	105°59.8	04.2	39°45.9	26.0	124°14.4	15.8	232°00.3	11.8	Betelgeuse	270°51.6	7°24.8
18	248°11.7	120°59.2	N19°03.6	54°46.9	S05°26.6	139°16.4	N22° 15.7	247°02.9	S02°11.9	Canopus	263°52.4	-52°42.2
	263°14.2	135°58.5		69°47.9	27.3	154°18.3		262°05.5	12.0	Sirius	258°26.0	-16°44.8
19 20	203 14.2 278°16.6		03.0	84°48.8	27.3 27.9	169°20.3	15.7 15.6	202 05.5 277°08.1		Adhara	255°05.7	-29°00.1
		150°57.9	02.4				15.6		12.1	Procyon	244°50.5	5°09.7
21	293°19.1	165°57.2	• • 01.8	99°49.8	• • 28.6	184°22.3	• • 15.6	292°10.7	• • 12.1	Pollux	243°16.9	27°57.9
22	308°21.6	180°56.6	01.2	114°50.8	29.2	199°24.3	15.5	307°13.4	12.2	Avior	234°15.1	-59°35.2
23	323°24.0	195°55.9	00.6	129°51.8	29.9	214°26.2	15.5	322°16.0	12.3	Suhail	222°46.4	-43°32.0
Mern	pass. 01:30	$\nu$ -0.6' d-0	0.6′ m-3.95	$\nu$ 1 0' d0	.7′ m1.62	ν2 0' d-0	.1′ m-1.98	$\nu$ 2.6′ d0.	1′ m0 66	Miaplacidus	221°39.1	-69°49.2
										Alphard	217°47.5	-8°46.1
										Regulus	207°34.2	11°50.6
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.0	61°36.8
0	338°26.5	210°55.3	$N19^{\circ}00.0$	144°52.8	S05°30.5	229°28.2	N22° 15.4	$337^{\circ}18.6$	S02°12.4	Denebola	182°24.7	14°25.8
1	353°29.0	225°54.7	$18^{\circ}59.4$	159°53.7	31.2	244°30.2	15.4	352°21.2	12.4	Gienah	175°43.3	-17°41.0
2	8°31.4	240°54.0	58.8	174°54.7	31.8	259°32.2	15.3	7°23.8	12.5		173°43.3	-63°14.6
3	23°33.9	255°53.4	• • 58.2	189°55.7	• • 32.5	274°34.1	• • 15.3	22°26.4	• • 12.6		171°51.6	-57°15.5
4	38°36.3	270°52.7	57.6	204°56.7	33.1	289°36.1	15.2	$37^{\circ}29.1$	12.7		166° 12.9	55°49.4
5	53°38.8	285°52.1	57.0	219°57.6	33.8	304°38.1	15.1	52°31.7	12.7			
6	68°41.3	300°51.4	N18° 56.4	234°58.6	S05°34.5	319°40.1	N22° 15.1	67°34.3	502°12.8	Spica	158°22.0	-11°17.7
7	83°43.7	315°50.8	55.8	249°59.6	35.1	334°42.0	15.0	82°36.9	12.9	Alkaid	152°51.9	49°11.3
8	98°46.2	330°50.2	55.2	265°00.6	35.8	349°44.0	15.0	97°39.5	12.9	Hadar	148°35.6	-60°30.0
9	113°48.7	345°49.5	• • 54.6	280°01.5	36.4	4°46.0	. 14.9	112°42.1	13.0	Menkent	147°57.2	-36°29.9
10	128°51.1	0°48.9	54.0	295°02.5	37.1	19°48.0	14.9	127° 44.8	13.1	Arcturus	145°47.6	19°03.1
11	143°53.6	15°48.2	53.4	310°03.5	37.7	34°49.9	14.8	142° 47.4	13.1	Rigil Kent.	139°39.9	-60°56.7
12	158° 56.1	30°47.6	N18° 52.7	325°04.5	505°38.4	49°51.9	N22°14.8	157° 50.0	502°13.2	Kochab	137°20.2	74°03.2
				340°05.4				172°52.6		Zuben'ubi	$136^{\circ}55.6$	-16°08.9
13	173°58.5	45°47.0	52.1		39.0	64°53.9	14.7		13.3	Alphecca	126°03.4	26°37.9
14	189°01.0 204°03.5	60°46.3	51.5	355°06.4	39.7	79°55.9	14.6	187°55.2	13.4	Antares	112° 15.2	-26°29.4
15		75°45.7	• • 50.9	10°07.4	• • 40.3	94°57.9	• • 14.6	202°57.9	• • 13.5	Atria	107°08.8	-69°04.7
16	219°05.9	90°45.0	50.3	25°08.3	41.0	109°59.8	14.5	218°00.5	13.5	Sabik	$102^{\circ}02.1$	-15°45.4
17	234°08.4	105°44.4	49.7	40°09.3	41.6	125°01.8	14.5	233°03.1	13.6	Shaula	96°09.5	-37°07.4
18	249°10.8	120°43.8	N18°49.0	55°10.3	S05°42.3	140°03.8	N22°14.4	248°05.7		Rasalhague	95°57.9	12°32.6
19	264°13.3	135°43.1	48.4	70°11.3	42.9	155°05.8	14.4	263°08.3	13.8	Eltanin	90°41.7	51°29.4
20	279°15.8	150°42.5	47.8	85°12.2	43.6	170°07.7	14.3	278° 10.9	13.8	Kaus Aust.	83°31.6	-34°22.4
21	294°18.2	165°41.9	• • 47.2	100°13.2	• • 44.2	185°09.7	• • 14.3	293°13.6	• • 13.9	Vega	80°32.6	38°48.6
22	309°20.7	180°41.2	46.6	115°14.2	44.9	200°11.7	14.2	308°16.2	14.0	Nunki	75°46.9	-26°15.9
23	324°23.2	195°40.6	45.9	130°15.2	45.5	$215^{\circ}13.7$	14.2	323°18.8	14.0	Altair	61°59.2	8°56.3
Morn	pass. 01:26	11 0 6' d 0	0.6' m-3.95	11 0' d0	.7′ m1.62	"3 0' d 0	.1′ m-1.99	$\nu$ 2.6′ d0.	1′ m0.66	Peacock	53°04.4	-56°39.2
ivier.p	Dass. 01.20	$\nu$ -0.0 $u$ -0	7.0 111-3.93	ν1.0 α0	.7 1111.02	ν2.0 <b>u</b> -0.	.1 111-1.99	ν2.0 d0.	1 1110.00	Deneb	49°25.0	45°22.5
										Enif	33°38.0	9°59.7
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.8	-46°50.1
0	339°25.6	210°39.9	N18° 45.3	145°16.1		230°15.7	N22°14.1	338°21.4		Fomalhaut	27 31.8 15°13.6	-46 50.1 -29°29.0
1	354°28.1	225°39.3	44.7	160°17.1	46.8	245°17.6	14.0	353°24.0	14.2		15 13.0 13°44.3	
2	9°30.6	240°38.7	44.1	175°18.1	47.5	260°19.6	14.0	8°26.7	14.3	Scheat		28°13.4
3	24°33.0	255°38.0	• • 43.4	190°19.0	• • 48.1	275°21.6	. 13.9	23°29.3	• • 14.3	Markab	13°29.0	15°20.7
4	39°35.5	270°37.4	42.8	205°20.0	48.8	290°23.6	13.9	38°31.9	14.4	Aug 29 Fri	SHA	Mer.pass
5	54°38.0	285°36.8	42.2	220°21.0	49.4	305°25.5	13.8	53°34.5	14.5		233°43.5	09:56
6	69°40.4	300°36.1	N18°41.6		S05°50.1	320°27.5	N22° 13.8		S02°14.6		167°01.9	14:21
7	84°42.9	315°35.5	40.9	250°22.9	50.7	335°29.5	13.7	83°39.7	14.6		251°13.5	08:44
8	99°45.3	330°34.9	40.9	265°23.9	51.4	350°31.5	13.7	98° 42.4	14.7	Saturn		01:35
9	99°45.3 114°47.8	345°34.2	•• 39.7	280°24.9	• • 52.0	5°33.5	•• 13.6	113° 45.0	• 14.8			01.00
10	129°50.3	0°33.6	39.0	295°25.8	52.7	20°35.4	13.5	113 45.0 128° 47.6	14.9	Aug 30 Sat	SHA	Mer.pass
11	129 50.5 144°52.7	15°33.0	38.4	310°26.8	53.3	35°37.4	13.5	143°50.2	14.9		232°28.8	09:57
	159°55.2	30°32.3	36.4 N18°37.8	310 20.8 325°27.8	53.3 \$05°54.0	50°39.4	N22°13.4	143 50.2 158° 52.8	\$02°15.0		$166^{\circ}26.3$	14:20
12	159 55.2 174°57.7	30 32.3 45°31.7	37.8	340°28.8		50 39.4 65°41.4	13.4	158 52.8 173°55.5	15.1	Jupiter	$251^{\circ}01.7$	08:41
13					54.6						$358^{\circ}52.1$	01:30
14	190°00.1	60°31.1	36.5	355°29.7	55.3	80°43.4	13.3	188°58.1	15.2			
15	205°02.6	75°30.4	• • 35.8	10°30.7	• • 55.9	95°45.4	• • 13.3	204°00.7	• • 15.2	Aug 31 Sun		Mer.pass
16	220°05.1	90°29.8	35.2	25°31.7	56.6	110°47.3	13.2	219°03.3	15.3		231°14.3	09:58
17	235°07.5	105°29.2	34.6	40°32.6	57.2	125°49.3	13.2	234°05.9	15.4		165°50.5	14:18
18	250°10.0	120°28.5	N18°33.9	55°33.6	\$05°57.9	140°51.3	N22° 13.1	249°08.6	S02°15.5		250°50.0	08:38
19	265°12.5	135°27.9	33.3	70°34.6	58.5	155°53.3	13.1	264°11.2	15.5	Saturn	358°55.8	01:26
20	280°14.9	150°27.3	32.6	85°35.5	59.2	170°55.3	13.0	279°13.8	15.6	Horizont	al parallax	
21	295°17.4	165°26.6	• • 32.0	100°36.5	05°59.9	185°57.2	• • 12.9	294°16.4	• • 15.7	1101120111	Venus:	0.1
22	310°19.8	180°26.0	31.4	115°37.5	06°00.5	200°59.2	12.9	309°19.0	15.7		Mars:	0.1
23	325°22.3	195°25.4	30.7	130°38.4	01.2	216°01.2	12.8	324°21.7	15.8		ividi 3.	U.1
Mer.n	pass. 01:22	$\nu$ -0.6' d-0	0.6′ m-3.95	$\nu 1.0' \ d0$	.7′ m1.62	$\nu 2.0' \ d-0$	.1′ m-1.99	$\nu 2.6' \ d0.$	1' m0.66			

h	Su	n	Moon				
Fri	GHA	Dec	GHA	ν	Dec	d	НР
0	179°44.5	N09°20.2	120°05.2	14.3'	S19°10.6	10.9'	54.2'
1	194°44.7	19.3	134°38.4	14.2'	19°21.5	10.8'	54.2'
2	209°44.9	18.4	149°11.6	14.2'	19°32.4	10.7'	54.2'
3 4	224°45.1 239°45.3	· · 17.5 16.6	163°44.8 178°17.9	14.1' 14.0'	19°43.1 19°53.8	10.7' 10.6'	54.2' 54.1'
5	259 45.5 254°45.5	15.7	176 17.9 192°50.9	14.0'	19 55.6 20°04.3	10.5	54.1'
6	269°45.7	N09° 14.9	207°23.9	13.9'	\$20°14.8	10.4	54.1'
7	284°45.9	14.0	221°56.8	13.9'	20°25.2	10.3'	54.1'
8	299°46.0	13.1	236°29.7	13.8'	20°35.6	10.2'	54.1'
9	314°46.2	• • 12.2	251°02.5	13.7'	20°45.8	10.2'	54.1'
10 11	329°46.4 344°46.6	11.3 10.4	265°35.2 280°07.9	13.7' 13.6'	20°56.0 21°06.0	10.1' 10.0'	54.1' 54.1'
12	359°46.8	N09°09.5	294°40.5	13.5'	S21°16.0	9.9'	54.1
13	14°47.0	08.6	309°13.0	13.5'	21°25.9	9.8'	54.1'
14	29°47.2	07.7	323°45.5	13.4'	21°35.7	9.7'	54.1'
15	44°47.4	06.8	338°17.9	13.3'	21°45.4	9.6'	54.1'
16 17	59°47.6 74°47.8	05.9 05.0	352°50.2 7°22.5	13.3' 13.2'	21°55.0 22°04.5	9.5' 9.4'	54.1' 54.1'
18	89°47.9	N09°04.1	21°54.7	13.1'	S22°14.0	9.3'	54.1
19	104°48.1	03.3	36°26.8	13.1'	22°23.3	9.2'	54.1'
20	119°48.3	02.4	50°58.9	13.0'	22°32.6	9.2'	54.1'
21	134°48.5	• • 01.5	65°30.9	12.9'	22°41.7	9.1'	54.1'
22 23	149°48.7 164°48.9	09°00.6 08°59.7	80°02.8 94°34.7	12.9' 12.8'	22°50.8 22°59.7	9.0' 8.9'	54.1' 54.1'
23			94 34.7			0.9	J4.1
	SD = 15.8'	d = -0.9'		SE	0 = 14.8'		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0 1	179°49.1 194°49.3	N08° 58.8 57.9	109°06.5 123°38.2	12.7' 12.7'	\$23°08.6 23°17.3	8.8' 8.7'	54.1' 54.1'
2	209°49.5	57.9 57.0	123 36.2 138°09.9	12.7	23°26.0	8.6'	54.1'
3	224°49.7	• • 56.1	152°41.5	12.5'	23°34.6	8.5'	54.1'
4	239°49.9	55.2	$167^{\circ}13.0$	12.5'	23°43.0	8.4'	54.2'
5	254°50.1	54.3	181°44.5	12.4'	23°51.4	8.3'	54.2'
6 7	269°50.2 284°50.4	N08° 53.4 52.5	196°15.8 210°47.2	12.3' 12.2'	\$23°59.6 24°07.8	8.2' 8.0'	54.2' 54.2'
8	299°50.6	52.5 51.6	210 47.2 225°18.4	12.2'	24 07.8 24°15.8	7.9'	54.2'
9	314°50.8	50.7	239°49.6	12.1'	24°23.8	7.8'	54.2'
10	329°51.0	49.8	254°20.7	12.0'	24°31.6	7.7'	54.2'
11	344°51.2	48.9	268°51.7	12.0'	24°39.3	7.6'	54.2'
12 13	359°51.4 14°51.6	N08° 48.0 47.1	283°22.7 297°53.6	11.9' 11.8'	\$24°47.0 24°54.5	7.5' 7.4'	54.2' 54.2'
14	29°51.8	46.2	312°24.4	11.8'	25°01.9	7.4	54.2'
15	44°52.0	• • 45.3	326°55.1	11.7'	25°09.2	7.2'	54.2'
16	59°52.2	44.4	341°25.8	11.6'	25°16.4	7.1'	54.2'
17	74°52.4	43.5	355°56.4	11.5'	25°23.4	7.0'	54.2'
18 19	89°52.6 104°52.8	N08° 42.6 41.7	10°27.0 24°57.4	11.5' 11.4'	\$25°30.4 25°37.2	6.8' 6.7'	54.2' 54.2'
20	119°53.0	40.8	39°27.8	11.3'	25°44.0	6.6'	54.2'
21	134°53.1	• • 39.9	53°58.2	11.3'	25°50.6	6.5'	54.3'
22	149°53.3	39.0	68°28.4	11.2'	25°57.1	6.4'	54.3'
23	164°53.5	38.1	82°58.6	11.1'	26°03.5	6.3'	54.3'
	SD = 15.8'	d = -0.9'		SE	0 = 14.8'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°53.7	N08°37.2	97°28.8	11.1'	\$26°09.7	6.1'	54.3'
1	194°53.9 209°54.1	36.3	111°58.8	11.0'	26°15.9	6.0'	54.3' 54.3'
2	209°54.1 224°54.3	35.4 •• 34.5	126°28.8 140°58.7	10.9' 10.9'	26°21.9 26°27.8	5.9' 5.8'	54.3'
4	239°54.5	33.6	155°28.6	10.9	26°33.6	5.7'	54.3
5	254°54.7	32.7	169°58.3	10.7'	$26^{\circ}39.2$	5.5'	54.3'
6	269°54.9	N08°31.8	184°28.1	10.7'	S26°44.8	5.4'	54.3'
7	284°55.1 299°55.3	30.9	198°57.7 213°27.3	10.6'	26°50.2 26°55.5	5.3'	54.4'
8 9	299°55.3 314°55.5	30.0 •• 29.1	213°27.3 227°56.8	10.5' 10.5'	26°55.5 27°00.7	5.2' 5.0'	54.4' 54.4'
10	329°55.7	28.2	242°26.3	10.4	27°05.7	4.9'	54.4'
11	344°55.9	27.3	256°55.7	10.3'	27°10.6	4.8'	54.4'
12	359°56.1	N08°26.4	271°25.0	10.3'	\$27°15.4	4.7'	54.4'
13 14	14°56.3 29°56.5	25.5 24.6	285°54.3 300°23.5	10.2' 10.1'	27°20.1 27°24.6	4.5' 4.4'	54.4' 54.4'
15	29 50.5 44°56.7	23.7	314°52.6	10.1	27°29.0	4.4	54.4 54.5'
16	59°56.9	22.8	$329^{\circ}21.7$	10.0'	27°33.3	4.1'	54.5'
17	74°57.1	21.9	343°50.7	10.0'	27°37.4	4.0'	54.5'
18	89°57.3	N08°21.0	358°19.6	9.9'	\$27°41.4	3.9'	54.5'
19 20	104°57.5 119°57.7	20.1 19.2	12°48.5 27°17.4	9.8' 9.8'	27°45.3 27°49.1	3.7' 3.6'	54.5' 54.5'
21	134°57.9	19.2	41°46.2	9.6 9.7'	27°52.7	3.5'	54.6'
22	149°58.1	17.3	56°14.9	9.7'	27°56.1	3.3'	54.6'
23	164°58.3	16.4	70°43.5	9.6'	27°59.5	3.2'	54.6'
	SD = 15.8'	d = -0.9'		SE	0 = 14.8'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
	Naut.	Civil	<b>C</b> annot	Carrott	Civil	Naut.
N 72°	////	02:18	03:52	20:05	21:37	////
<b>N</b> 70°	////	02:49	04:07	19:51	21:07	////
68°	01:12	03:12	04:19	19:39	20:46	22:39
66°	01:58	03:29	04:29	19:30	20:29	21:57
64°	02:27	03:44	04:38	19:22	20:15	21:30
62°	02:48	03:55	04:45	19:15	20:04	21:09
60°	03:05	04:05	04:51	19:09	19:54	20:53
N 58°	03:19	04:14	04:56	19:04	19:46	20:40
56°	03:31	04:21	05:01	18:59	19:39	20:29
54° 52°	03:41	04:27	05:05	18:55	19:32	20:19
50°	03:49 03:57	04:33 04:38	05:09 05:12	18:51 18:48	19:27 19:22	20:10 20:03
45°	03.57	04:38	05:12	18:41	19:22	19:47
N 40°						
35°	04:25 04:35	04:58 05:05	05:26 05:31	18:34 18:29	19:02 18:55	19:35 19:26
30°	04:33	05:05	05:36	18:25	18:49	19:20
20°	04:45	05:12	05:44	18:17	18:39	19:05
N 10°	05:05	05:30	05:51	18:10	18:31	18:56
0°	05:12	05:36	05:57	18:04	18:25	18:49
<b>S</b> 10°	05:18	05:42	06:04	17:58	18:19	18:43
20°	05:22	05:48	06:10	17:51	18:14	18:39
30°	05:26	05:53	06:17	17:44	18:08	18:36
35°	05:27	05:56	06:22	17:40	18:05	18:35
40°	05:28	05:59	06:26	17:35	18:03	18:34
45°	05:28	06:02	06:32	17:30	18:00	18:34
<b>S</b> 50°	05:28	06:06	06:38	17:24	17:56	18:34
52°	05:28	06:07	06:41	17:21	17:55	18:34
54°	05:28	06:09	06:44	17:18	17:53	18:34
56°	05:28	06:10	06:48	17:14	17:52	18:35
58°	05:27	06:12	06:52	17:10	17:50	18:35
<b>S</b> 60°	05:26	06:14	06:56	17:06	17:48	18:36
Lat.	Fri	Moonris Sat	s <b>e</b> Sun	F:	Moonset Sat	t Sun
N 70°	Fri	Sat	Sun	Fri	Sat	Sun
N 72°						
N 70° 68°		=	=			
66°	14:42			18:03		
64°	14:04	16:22		18:42	18:01	
62°	13:37	15:24	17:33	19:10	19:01	18:36
60°	13:17	14:51	16:25	19:31	19:34	19:44
N 58°	13:00	14:26	15:50	19:49	19:59	20:19
56°	12:46	14:07	15:25	20:03	20:19	20:45
54°	12:33	13:51	15:05	20:16	20:36	21:05
52°	12:23	13:37	14:48	20:27	20:50	21:22
50°	12:13	13:25	14:33	20:37	21:02	21:37
45°	11:53	13:00	14:04	20:58	21:28	22:06
<b>N</b> 40°	11:37	12:40	13:41	21:16	21:49	22:30
35°	11:24	12:23	13:23	21:30	22:06	22:49
30°	11:12	12:09	13:07	21:43	22:21	23:05
20°	10:52	11:45	12:39	22:04	22:46	23:33
N 10°	10:35	11:24	12:16	22:23	23:08	23:57
0°	10:19	11:05	11:55	22:41	23:29	
<b>S</b> 10°	10:03	10:46	11:33	22:58	23:49	
20°	09:46	10:26	11:10	23:17		00:11
	09:26	10:02	10:43	23:39		00:37
30°	(10.15	09:48	10:28	23:52		00:52
35°	09:15		10.00	1	00.07	01 10
35° 40°	09:02	09:33	10:09		00:07	01:10
35° 40° 45°	09:02 08:47	09:33 09:14	09:48		00:25	01:31
35° 40° 45° <b>S</b> 50°	09:02 08:47 08:29	09:33 09:14 08:50	09:48 09:20		00:25 00:48	01:31 01:58
35° 40° 45°	09:02 08:47	09:33 09:14	09:48		00:25	01:31

		Sun			Moon	
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age
Day	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%
29	01:02	00:53	12:01	16:30	04:07	
30	00:44	00:34	12:01	17:17	04:53	
31	00:25	00:16	12:00	18:07	05:42	

08:32

08:10

00:03

00:15

08:12

07:55

56°

58° **S** 60°

07:59

07:47

02:44

03:06 03:35

01:24

01:41

# September 01, 02, 03 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	340°24.8	210°24.8	N18°30.1	145°39.4	S06°01.8	231°03.2	N22°12.8	339°24.3	S02°15.9			Dec
1	355°27.2	210 24.6 225°24.1	29.4	145 39.4 160°40.4	02.5	231 03.2 246°05.2	12.7	354°26.9	16.0	Alpheratz	357°33.9	29°14.0
		240°23.5						9°29.5		Ankaa	$353^{\circ}06.2$	-42°09.8
2	10°29.7 25°32.2		28.8	175°41.4	03.1 · · 03.8	261°07.2 276°09.1	12.7	9 29.5 24°32.2	16.0	Schedar	349°30.0	56°40.6
3 4	25 32.2 40°34.6	255°22.9 270°22.2	· · 28.1 27.5	190°42.3 205°43.3		276 09.1 291°11.1	· · 12.6 12.6	24 32.2 39°34.8	16.1	Diphda	348°46.5	-17°50.5
5	55°37.1	285°21.6	26.8	200°44.3	04.4 05.1	306°13.1	12.5	54°37.4	16.2 16.3	Achernar	$335^{\circ}19.3$	-57°06.1
6	70°39.6	300°21.0	N18°26.2	235° 45.2	S06°05.7	300 15.1 321°15.1	N22°12.4	69°40.0	502°16.3	Hamal	$327^{\circ}50.4$	23°35.1
7	85°42.0	315°20.3	25.5	250° 46.2	06.4	336°17.1	12.4	84°42.6	16.4	Polaris	$313^{\circ}35.1$	89°22.1
8	100°44.5	330°19.7	24.9	265° 47.2	07.0	351°19.1	12.3	99°45.3	16.5	Acamar	$315^{\circ}11.2$	-40°11.8
9	115°46.9	345°19.1	24.2	280°48.1	• • 07.7	6°21.0	12.3	114°47.9	16.6	Menkar	314°05.5	4°11.6
10	130°49.4	0°18.5	23.6	295°49.1	08.3	21°23.0	12.2	129°50.5	16.6	Mirfak	308°27.3	49°57.0
11	145°51.9	15°17.8	22.9	310°50.1	09.0	36°25.0	12.2	144°53.1	16.7	Aldebaran	290°39.0	16°33.7
12	160°54.3	30°17.2	N18°22.2	325°51.0	S06°09.6	51°27.0	N22°12.1	159°55.7	S02°16.8	Rigel	281°03.4	-8°10.1
13	175°56.8	45°16.6	21.6	340°52.0	10.3	66°29.0	12.1	174°58.4	16.9	Capella	280°21.2	46°01.3
14	190°59.3	60°16.0	20.9	355°53.0	10.9	81°31.0	12.0	190°01.0	16.9	Bellatrix	278°22.4	6°22.5
15	206°01.7	75°15.3	· · 20.3	10°53.9	• • 11.6	96°33.0	• • 12.0	205°03.6	• • 17.0	Elnath	278°01.3	28°37.7
16	221°04.2	90°14.7	19.6	25°54.9	12.2	111°34.9	11.9	220°06.2	17.1	Alnilam	275°37.3	-1°11.0 7°24.8
17	$236^{\circ}06.7$	$105^{\circ}14.1$	18.9	40°55.9	12.9	126°36.9	11.8	235°08.9	17.2	Betelgeuse	270°51.6 263°52.4	-52°42.2
18	251°09.1	120°13.5	N18°18.3	55° 56.8	S06°13.5	141°38.9	N22°11.8	250°11.5	S02°17.2	Canopus Sirius	258° 25.9	-32 42.2 -16°44.8
19	$266^{\circ}11.6$	135°12.8	17.6	70°57.8	14.2	$156^{\circ}40.9$	11.7	$265^{\circ}14.1$	17.3	Adhara	255°05.7	-10 44.8 -29°00.1
20	281°14.1	150°12.2	17.0	85°58.8	14.8	171°42.9	11.7	280°16.7	17.4	Procyon	244°50.5	5°09.7
21	$296^{\circ}16.5$	$165^{\circ}11.6$	•• 16.3	100°59.7	•• 15.5	186°44.9	•• 11.6	$295^{\circ}19.3$	• • 17.5	Pollux	244° 30.3 243° 16.9	27°57.9
22	311°19.0	180°11.0	15.6	116°00.7	16.1	201°46.9	11.6	310°22.0	17.5	Avior	234° 15.1	-59°35.2
23	$326^{\circ}21.4$	195°10.3	15.0	131°01.6	16.8	216°48.8	11.5	325°24.6	17.6	Suhail	222°46.3	-43°32.0
Mern	ass. 01:18	ν-0.6' d-0	0.6' m-3.95	ν1 0 <sup>7</sup> d0	.7′ m1.62	ν2 0' d-0	.1′ m-1.99	ν2 6' dΩ	1′ m0.65	Miaplacidus	221°39.1	-69°49.2
- IVICI.P	a33. U1.1U	ν-0.0 α-0	7.0 111-3.93	ν1.0 do	.7 1111.02	ν2.0 u-0	.1 111-1.99	ν2.0 do.	1110.05	Alphard	217° 47.5	-8°46.1
										Regulus	207°34.2	11°50.6
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.0	61°36.8
0	341°23.9	210°09.7	N18°14.3	146°02.6	S06°17.4	231°50.8	N22°11.5	340°27.2	S02°17.7	Denebola	182°24.7	14°25.8
1	356°26.4	225°09.1	13.6	161°03.6	18.1	246°52.8	11.4	355°29.8	17.8	Gienah	175°43.3	-17°41.0
2	11°28.8	240°08.5	13.0	176°04.5	18.7	261°54.8	11.3	10°32.5	17.8	1	173°00.2	-63°14.6
3	26°31.3	255°07.8	. 12.3	191°05.5	• • 19.4	276°56.8	• • 11.3	25°35.1	• • 17.9		171°51.6	-57°15.5
4	41°33.8	270°07.2	11.6	206°06.5	20.0	291°58.8	11.2	40°37.7	18.0	Alioth	166° 12.9	55°49.4
5	56°36.2	285°06.6	10.9	221°07.4	20.7	307°00.8	11.2	55°40.3	18.1	Spica	$158^{\circ}22.0$	-11°17.7
6	71°38.7	300°06.0	N18°10.3	236°08.4	S06°21.3	322°02.8	N22°11.1	70°42.9	S02°18.1	Alkaid	$152^{\circ}51.9$	49°11.3
7	86°41.2	315°05.4	09.6	251°09.4	22.0	337°04.7	11.1	85°45.6	18.2	Hadar	$148^{\circ}35.7$	-60°30.0
8	101°43.6	330°04.7	08.9	266°10.3	22.6	352°06.7	11.0	100°48.2	18.3	Menkent	$147^{\circ}57.2$	-36°29.9
9	116°46.1	345°04.1	•• 08.2	281°11.3	• • 23.3	7°08.7	• • 11.0	115°50.8	. 18.4	Arcturus	$145^{\circ}47.6$	19°03.1
10	131°48.6	0°03.5	07.6	296°12.2 311°13.2	23.9	22°10.7	10.9	130°53.4 145°56.1	18.4	Rigil Kent.	139°39.9	-60°56.7
11 12	146°51.0 161°53.5	15°02.9 30°02.3	06.9 N18°06.2	311 13.2 326°14.2	24.6 \$06°25.2	37° 12.7 52° 14.7	10.8 N22°10.8	145°50.1	18.5 \$02°18.6	Kochab	137°20.3	74°03.2
13	176° 55.9	45°01.6	05.5	341°15.1	25.9	67° 16.7	10.7	176°01.3	18.7	Zuben'ubi		-16°08.9
14	170 55.9 191°58.4	60°01.0	04.8	356°16.1	26.5	82° 18.7	10.7	191°03.9	18.7	Alphecca	126°03.4	26°37.9
15	207°00.9	75°00.4	. 04.2	11°17.1	27.1	97°20.7	. 10.6	206°06.6	•• 18.8	Antares	112° 15.2	-26°29.4
16	222°03.3	89°59.8	03.5	26°18.0	27.8	112°22.6	10.6	221°09.2	18.9	Atria	107°08.8	-69°04.7
17	237°05.8	104°59.2	02.8	41°19.0	28.4	127°24.6	10.5	236°11.8	19.0	Sabik	102°02.1	-15°45.4
18	252°08.3	119°58.5	N18°02.1	56° 19.9	S06°29.1	142°26.6	N22°10.5	251°14.4	S02°19.0	Shaula	96°09.5	-37°07.4
19	267° 10.7	134°57.9	01.4	71°20.9	29.7	157° 28.6	10.4	266°17.0	19.1	Rasalhague	95°58.0	12°32.6
20	282°13.2	149°57.3	00.7	86°21.9	30.4	172°30.6	10.4	281°19.7	19.2	Eltanin	90°41.7	51°29.4
21	297° 15.7	164°56.7	18°00.1	101°22.8	• • 31.0	187°32.6	• • 10.3	296°22.3	• • 19.3	Kaus Aust.	83°31.6 80°32.7	-34°22.4 38°48.7
22	312° 18.1	179°56.1	17°59.4	116°23.8	31.7	202°34.6	10.2	311°24.9	19.3	Vega Nunki	75°46.9	-26°15.9
23	$327^{\circ}20.6$	194°55.5	58.7	131°24.8	32.3	$217^{\circ}36.6$	10.2	326°27.5	19.4	Altair	61°59.2	8°56.3
N/au =	01.14	0 6/ 4 0	).7′ m-3.95	1 0/ 40	.6′ m1.62	20/ 40	.1′ m-2.00	6/ 40	1' m0.65	Peacock	53°04.4	-56°39.2
ivier.p	ass. 01:14	$\nu$ -0.0 $a$ -0	0.7 m-3.95	$\nu_{1.0}$ au	.0 111.02	ν2.0 <i>a</i> -0	.1 m-2.00	ν2.0 d0.	1 1110.05	Deneb	49°25.1	45°22.5
										Enif	33°38.0	9°59.7
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.8	-46°50.1
0	342°23.1	209°54.8	N17°58.0	146°25.7	S06°33.0	232° 38.6	$N22^{\circ}10.1$	341°30.2	S02°19.5	Fomalhaut	15° 13.5	-29°29.0
1	357°25.5	224°54.2	57.3	161°26.7	33.6	247°40.6	10.1	356°32.8	19.6	Scheat	13°44.3	28°13.4
2	12°28.0	239°53.6	56.6	176°27.6	34.3	262°42.6	10.0	11°35.4	19.6	Markab	13°29.0	15°20.7
3	27°30.4	254°53.0	• • 55.9	191°28.6	• • 34.9	277°44.5	• • 10.0	26°38.0	· · 19.7			
4	42°32.9	269°52.4	55.2	206°29.6	35.6	292°46.5	09.9	41°40.7	19.8	Sep 01 Mon	SHA	Mer.pass
5	57°35.4	284°51.8	54.5	221°30.5	36.2	307°48.5	09.9	56°43.3	19.9	Venus	230°00.0	09:59
6	72°37.8	299°51.2	N17°53.8	236°31.5	\$06°36.9	322°50.5	N22°09.8	71°45.9	S02°19.9	Mars	165°14.6	14:16
7	87°40.3	314°50.5	53.1	251°32.4	37.5	337°52.5	09.7	86°48.5	20.0	Jupiter	250°38.4	08:35
8	102°42.8	329°49.9	52.5	266°33.4	38.2	352°54.5	09.7	101°51.2	20.1	Saturn	358° 59.5	01:22
9	117°45.2	344°49.3	• • 51.8	281°34.3	38.8	7°56.5	•• 09.6	116°53.8	• • 20.2	Sep 02 Tue	SHA	Mer.pass
10 11	132°47.7 147°50.2	359°48.7 14°48.1	51.1 50.4	296°35.3 311°36.3	39.5 40.1	22°58.5 38°00.5	09.6 09.5	131°56.4 146°59.0	20.2	Venus	228°45.8	10:00
11	147 50.2 162°52.6	14 48.1 29°47.5	50.4 N17°49.7	311 36.3 326°37.2	506°40.8	53°02.5	09.5 N22°09.5	146 59.0 162°01.7	20.3 \$02°20.4	Mars		14:15
13	102 52.0 177°55.1	29 47.5 44°46.9	N17 49.7 49.0	320 37.2 341°38.2	41.4	53 02.5 68°04.5	09.4	102 01.7 177°04.3	20.5	Jupiter	$250^{\circ}26.9$	08:31
14	177 55.1 192° 57.5	59°46.2	48.3	356°39.1	42.1	83°06.5	09.4	177 04.3 192°06.9	20.5	Saturn	359°03.3	01:18
15	208°00.0	74°45.6	• • 47.6	11°40.1	• • 42.7	98°08.5	09.3	207°09.5	• • 20.6	Sep 03 Wed	SHA	Mer pass
16	200°00.0	89°45.0	46.8	26°41.1	43.4	113° 10.5	09.3	207 09.3 222°12.2	20.7	Venus		Mer.pass 10:01
17	238°04.9	104°44.4	46.1	41°42.0	44.0	128° 12.5	09.2	237°14.8	20.8	1	164°02.7	14:13
18	253°07.4	119°43.8	N17°45.4	56°43.0	S06°44.7	143° 14.4	N22°09.1	252°17.4	S02°20.9	Jupiter		08:28
19	268°09.9	134°43.2	44.7	71°43.9	45.3	158° 16.4	09.1	267°20.0	20.9	Saturn	359°07.1	01:14
20	283°12.3	149°42.6	44.0	86°44.9	46.0	173° 18.4	09.0	282°22.7	21.0			V1.17
21	298°14.8	164°42.0	• • 43.3	101°45.8	• • 46.6	188°20.4	• • 09.0	297°25.3	21.1	Horizont	al parallax	
22	$313^{\circ}17.3$	179°41.4	42.6	$116^{\circ}46.8$	47.3	203°22.4	08.9	$312^{\circ}27.9$	21.2		Venus:	0.1
23	$328^{\circ}19.7$	194°40.7	41.9	131°47.8	47.9	$218^{\circ}24.4$	08.9	327°30.5	21.2		Mars:	0.1
Mars	ass. 01:10	ν-0 6/ d 0	).7′ m-3.94	1/1 n/ dn	.6′ m1.62	1/2 N/ d N	.1′ m-2.00	1/2 6/ d0	.1′ m0.64			
.vici.p		₽ 0.0 u-0	111 3.37	ν 1.0 UU		₽ <u>₽</u> . U · U · U	2.00	ν 2.0 u0.				

L	C		Moon						
h	Su	n							
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP		
0 1	179°58.4 194°58.6	N08° 15.5 14.6	85°12.1 99°40.7	9.6' 9.5'	\$28°02.7 28°05.8	3.1' 2.9'	54.6' 54.6'		
2	209°58.8	13.7	114°09.2	9.5'	28° 08.7	2.8'	54.6'		
3	224°59.0	• • 12.8	128°37.7	9.4'	28°11.5	2.7'	54.7'		
4	239°59.2	11.9	$143^{\circ}06.1$	9.3'	28°14.1	2.5'	54.7'		
5	254°59.4	11.0	157°34.4	9.3'	28°16.6	2.4'	54.7'		
6 7	269°59.6 284°59.8	N08° 10.1 09.2	172°02.7 186°31.0	9.2' 9.2'	\$28° 19.0 28° 21.3	2.2' 2.1'	54.7' 54.7'		
8	300°00.0	08.3	200°59.2	9.2'	28°23.4	2.1	54.7'		
9	315°00.2	• • 07.4	215°27.3	9.1'	28°25.3	1.8'	54.8'		
10	330°00.4	06.5	229°55.4	9.1'	28°27.1	1.7'	54.8'		
11	345°00.6 0°00.8	05.5	244°23.5	9.0'	28°28.8	1.5'	54.8'		
12 13	0°00.8 15°01.0	N08°04.6 03.7	258°51.5 273°19.5	9.0' 8.9'	\$28°30.3 28°31.7	1.4' 1.2'	54.8' 54.8'		
14	30°01.2	02.8	287°47.4	8.9'	28° 32.9	1.1'	54.9'		
15	45°01.4	•• 01.9	$302^{\circ}15.3$	8.9'	28°34.0	0.9'	54.9'		
16	60°01.6	01.0	316°43.2	8.8'	28°35.0	0.8'	54.9'		
17	75°01.8 90°02.0	08°00.1 N07°59.2	331°11.0 345°38.8	8.8' 8.7'	28°35.8 \$28°36.4	0.7' 0.5'	54.9' 54.9'		
18 19	90 02.0 105°02.2	58.3	0°06.5	8.7'	28°36.9	0.5	54.9 55.0'		
20	120°02.4	57.4	14°34.2	8.7'	28° 37.3	0.4	55.0'		
21	135°02.6	• • 56.4	29°01.9	8.6'	28°37.5	0.1'	55.0'		
22	150°02.8	55.5	43°29.6	8.6'	28° 37.6	-0.1'	55.0'		
23	165°03.0	54.6	57°57.2	8.6'	28°37.5	-0.2'	55.1'		
	SD = 15.8'	d = -0.9'		SI	O = 14.9'				
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP		
0	180°03.2	N07°53.7	72°24.8	8.6'	S28°37.2	-0.4'	55.1'		
1	195°03.4	52.8	86°52.3	8.5'	28°36.9	-0.5'	55.1'		
2	210°03.7 225°03.9	51.9 •• 51.0	101°19.9 115°47.4	8.5' 8.5'	28°36.3 28°35.6	-0.7' -0.8'	55.1' 55.2'		
4	240°04.1	50.1	130°14.9	8.5'	28° 34.8	-1.0'	55.2'		
5	255°04.3	49.1	144°42.3	8.4'	28°33.8	-1.1'	55.2'		
6	270°04.5	N07°48.2	159°09.8	8.4'	S28°32.7	-1.3'	55.2'		
7	285°04.7	47.3	173°37.2	8.4'	28°31.4	-1.4'	55.3'		
8 9	300°04.9 315°05.1	46.4 •• 45.5	188°04.6 202°32.0	8.4' 8.4'	28° 30.0 28° 28.4	-1.6' -1.7'	55.3' 55.3'		
10	330°05.3	44.6	216°59.4	8.4'	28° 26.7	-1.9'	55.3'		
11	345°05.5	43.7	231°26.7	8.3'	28°24.8	-2.0'	55.4'		
12	0°05.7	N07°42.8	245°54.1	8.3'	S28°22.7	-2.2'	55.4'		
13 14	15°05.9 30°06.1	41.8 40.9	260°21.4 274°48.7	8.3' 8.3'	28° 20.5 28° 18.2	-2.3' -2.5'	55.4' 55.4'		
15	45°06.3	• • 40.0	289°16.0	8.3'	28° 15.7	-2.7'	55.5'		
16	60°06.5	39.1	303°43.3	8.3'	28°13.0	-2.8'	55.5'		
17	75°06.7	38.2	318°10.6	8.3'	28° 10.2	-3.0'	55.5'		
18 19	90°06.9 105°07.1	N07°37.3 36.3	332°37.9 347°05.2	8.3' 8.3'	\$28°07.3 28°04.2	-3.1' -3.3'	55.5' 55.6'		
20	120°07.3	35.4	1°32.5	8.3'	28°00.9	-3.4'	55.6'		
21	135°07.5	• • 34.5	15°59.8	8.3'	27°57.5	-3.6'	55.6'		
22	150°07.7	33.6	$30^{\circ}27.1$	8.3'	27°53.9	-3.7'	55.7'		
23	165°07.9	32.7	44°54.3	8.3'	27°50.2	-3.9'	55.7'		
	SD = 15.8'	d = -0.9'		SI	O = 15.0'				
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP		
0	180°08.1	N07°31.8	59°21.6	8.3'	\$27°46.3	-4.0'	55.7'		
1 2	195°08.3 210°08.5	30.8 29.9	73°48.9 88°16.2	8.3' 8.3'	27°42.3 27°38.1	-4.2' -4.3'	55.7' 55.8'		
3	210 08.5 225°08.7	. 29.9	102°43.5	8.3'	27°33.8	-4.5'	55.8'		
4	240°08.9	28.1	117°10.8	8.3'	27°29.3	-4.6'	55.8'		
5	255°09.1	27.2	131°38.2	8.3'	27°24.7	-4.8'	55.9'		
6	270°09.3	N07°26.3	146°05.5	8.3'	\$27°19.9	-4.9'	55.9'		
7 8	285°09.6 300°09.8	25.3 24.4	160°32.8 175°00.2	8.4' 8.4'	27°14.9 27°09.8	-5.1' -5.2'	55.9' 55.9'		
9	315°10.0	• • 23.5	189°27.6	8.4'	27°04.6	-5.4'	56.0'		
10	330°10.2	22.6	203°54.9	8.4'	26°59.2	-5.5'	56.0'		
11	345°10.4	21.7	218°22.3	8.4'	26°53.6	-5.7'	56.0'		
12 13	0°10.6 15°10.8	N07°20.7 19.8	232°49.8 247°17.2	8.4' 8.5'	\$26° 47.9 26° 42.1	-5.8' -6.0'	56.1' 56.1'		
13 14	30°11.0	19.8 18.9	247°17.2 261°44.7	8.5'	26° 42.1 26° 36.1	-6.0' -6.1'	56.1		
15	45°11.2	18.0	276°12.1	8.5	26°29.9	-6.3	56.2		
16	60°11.4	17.1	290°39.6	8.5'	26°23.7	-6.4'	56.2'		
17	75°11.6	16.1	305°07.1	8.5'	26°17.2	-6.6'	56.2		
18 19	90°11.8 105°12.0	N07° 15.2 14.3	319°34.7 334°02.3	8.6' 8.6'	\$26° 10.6 26° 03.9	-6.7' -6.9'	56.2' 56.3'		
20	105 12.0 120°12.2	13.4	348°29.9	8.6'	26 03.9 25°57.0	-0.9 -7.0'	56.3		
21	135°12.4	• • 12.5	2°57.5	8.6'	25°49.9	-7.2'	56.3'		
22	150°12.6	11.5	17°25.1	8.7'	25° 42.7	-7.3'	56.4		
23	165°12.9	10.6	31°52.8	8.7'	25°35.4	-7.5'	56.4'		
	SD = 15.8'	d = -0.9'		SI	D = 15.2'				

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

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

		Sun		Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	9-11
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	57-76%
01	00:06	00:03	12:00	19:00	06:33	
02	00:13	00:23	12:00	19:54	07:26	
03	00:32	00:42	11:59	20:48	08:21	

## September 04, 05, 06 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	343°22.2	209°40.1	N17°41.2	146°48.7	S06°48.6	233°26.4	N22°08.8	342°33.2	S02°21.3			
1	358°24.7	224°39.5	40.5	161°49.7	49.2	248° 28.4	08.8	357°35.8	21.4	Alpheratz	357°33.9	29°14.0
2	13°27.1	239°38.9	39.8	176° 50.6	49.8	263°30.4	08.7	12°38.4	21.5	Ankaa	353°06.2	-42°09.8
3	28°29.6	254°38.3	39.1	191°51.6	50.5	278°32.4	08.6	27°41.1	. 21.5	Schedar	349°29.9	56°40.7
4	43°32.0	269°37.7	38.3	206°52.5	51.1	293°34.4	08.6	42°43.7	21.6	Diphda	348°46.4	-17°50.5
5	58°34.5	284°37.1	37.6	221°53.5	51.8	308°36.4	08.5	57°46.3	21.7	Achernar	335°19.3	-57°06.1
6	73°37.0	299°36.5	N17°36.9	236° 54.5	S06°52.4	323°38.4	N22°08.5	72°48.9	502°21.8	Hamal	327°50.4	23°35.1
7	88°39.4	314°35.9	36.2	251°55.4	53.1	338°40.4	08.4	87°51.6	21.8	Polaris	313°33.6	89°22.1
8	103°41.9	329°35.3	35.5	266° 56.4	53.7	353°42.4	08.4	102°54.2	21.9	Acamar	315°11.1	-40°11.8
9	118°44.4	344°34.7	• • 34.8	281°57.3	• • 54.4	8°44.4	• • 08.3	117°56.8	• • 22.0	Menkar	314°05.4	4°11.6
10	133°46.8	359°34.1	34.0	296°58.3	55.0	23°46.4	08.3	132°59.4	22.1	Mirfak	308°27.3	49°57.0
11	148°49.3	14°33.5	33.3	311°59.2	55.7	38°48.4	08.2	$148^{\circ}02.1$	22.1	Aldebaran	290°39.0	16°33.7
12	163°51.8	29°32.9	N17°32.6	327°00.2	S06°56.3	53°50.4	N22°08.1	163°04.7	502°22.2	Rigel	281°03.4	-8°10.1 46°01.3
13	178°54.2	44°32.2	31.9	342°01.1	57.0	68°52.4	08.1	178°07.3	22.3	Capella Bellatrix	280°21.1 278°22.3	6°22.5
14	193°56.7	59°31.6	31.2	$357^{\circ}02.1$	57.6	83°54.4	08.0	193°09.9	22.4	Elnath	278°22.3	28° 37.7
15	208°59.2	74°31.0	• • 30.4	12°03.0	• • 58.3	98°56.4	• • 08.0	$208^{\circ}12.6$	• • 22.5	Alnilam	276 01.2 275°37.2	-1°11.0
16	224°01.6	89°30.4	29.7	27°04.0	58.9	113°58.4	07.9	223°15.2	22.5	Betelgeuse	270°51.6	7°24.8
17	239°04.1	104°29.8	29.0	42°05.0	06°59.6	129°00.4	07.9	238° 17.8	22.6	Canopus	263°52.4	-52°42.2
18	254°06.5	119°29.2	N17°28.3	57°05.9	<b>S</b> 07°00.2	144°02.4	N22°07.8	253°20.5	502°22.7	Sirius	258°25.9	-32 42.2 -16°44.8
19	269°09.0	134°28.6	27.5	72°06.9	00.9	159°04.4	07.8	$268^{\circ}23.1$	22.8	Adhara	255°05.6	-10° 44.0 -29° 00.1
20	284°11.5	149°28.0	26.8	87°07.8	01.5	174°06.4	07.7	283°25.7	22.8	Procyon	244°50.5	5°09.7
21	299°13.9	164°27.4	• • 26.1	102°08.8	•• 02.1	189°08.4	•• 07.7	298°28.3	• • 22.9	Pollux	244° 30.3 243° 16.9	27°57.9
22	314°16.4	179°26.8	25.3	$117^{\circ}09.7$	02.8	204°10.4	07.6	313°31.0	23.0	Avior	234°15.0	-59°35.2
23	329°18.9	194°26.2	24.6	132° 10.7	03.4	219° 12.4	07.5	328°33.6	23.1	Suhail	222°46.3	-43°32.0
Marn	pass. 01:06	ν-0.6′ d-0	0.7' m-3.94	v1 0' d0	.6′ m1.62	1/2 0' d-0	.1′ m-2.00	v2 6' d0	1′ m0.64	Miaplacidus	221°39.1	-69°49.1
- ivier.p	Dass. 01.00	ν-0.0 <i>u</i> -0	.7 111-3.94	ν1.0 d0	.0 1111.02	ν2.0 u-0	.1 111-2.00	ν2.0 do		Alphard	221 39.1 217°47.5	-8°46.0
										Regulus	207°34.2	11°50.6
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°41.0	61°36.8
0	344°21.3	209°25.6	N17°23.9	147° 11.6	S07°04.1	234° 14.4	N22°07.5	343°36.2	S02°23.1	Denebola	182°24.7	14°25.8
1	359°23.8	224°25.0	23.2	$162^{\circ}12.6$	04.7	249°16.4	07.4	358° 38.8	23.2	Gienah	175°43.3	-17°41.0
2	14°26.3	239°24.4	22.4	$177^{\circ}13.5$	05.4	264°18.4	07.4	13°41.5	23.3	Acrux	173°00.2	-63°14.6
3	29°28.7	254°23.8	• • 21.7	192° 14.5	• • 06.0	279°20.4	•• 07.3	$28^{\circ}44.1$	• • 23.4		171°51.6	-57° 15.5
4	44°31.2	269°23.2	20.9	207° 15.4	06.7	294°22.4	07.3	43°46.7	23.4	Alioth	166°12.9	55°49.4
5	59°33.7	284°22.6	20.2	222°16.4	07.3	309°24.4	07.2	58°49.4	23.5	Spica	158°22.0	-11° 17.7
6	74°36.1	299°22.0	N17°19.5	237° 17.3	S07°08.0	324°26.4	N22°07.2	73°52.0	S02°23.6	Alkaid	152°51.9	49°11.3
7	89°38.6	314°21.4	18.7	252° 18.3	08.6	339°28.4	07.1	88°54.6	23.7	Hadar	148°35.7	-60° 30.0
8	104°41.0	329°20.8	18.0	267° 19.2	09.3	354°30.4	07.0	103°57.2	23.7	Menkent	147°57.2	-36° 29.8
9	119°43.5	344°20.2	• • 17.3	282°20.2	• • 09.9	9°32.4	• • 07.0	118°59.9	• • 23.8	Arcturus	145°47.6	19°03.1
10	134°46.0	359°19.6	16.5	297°21.1	10.6	24°34.4	06.9	134°02.5	23.9	Rigil Kent.	139°39.9	-60°56.7
11	149°48.4	14°19.0	15.8	312°22.1	11.2	39°36.4	06.9	149°05.1	24.0	Kochab	137°20.3	74°03.2
12	164°50.9	29°18.4	N17°15.0	327°23.0	S07°11.8	54°38.4	N22°06.8	164°07.8	S02°24.1	Zuben'ubi	136°55.6	-16°08.9
13	179°53.4	44°17.8	14.3	342°24.0	12.5	69°40.4	06.8	179° 10.4	24.1	Alphecca	126°03.4	26°37.9
14	194°55.8	59°17.2	13.6	357°24.9	13.1	84°42.4	06.7	194°13.0	24.2	Antares	$112^{\circ}15.2$	-26°29.4
15	209°58.3	74°16.6	• • 12.8	12°25.9	• • 13.8	99°44.4	• • 06.7	209°15.6	• • 24.3	Atria	107°08.9	-69°04.7
16	225°00.8	89°16.0	12.1	27°26.8	14.4	114°46.4	06.6	224°18.3	24.4	Sabik	102°02.1	-15°45.4
17	240°03.2	104°15.4	11.3	42°27.8	15.1	129°48.4	06.5	239°20.9	24.4	Shaula	96°09.5	-37°07.4
18	255°05.7	119°14.8	N17°10.6	57°28.7	S07°15.7	144°50.4	N22°06.5	254°23.5	S02°24.5	Rasalhague	95°58.0	12°32.6
19	270°08.1	134°14.2	09.8	72°29.7	16.4	159°52.4	06.4	269°26.2	24.6	Eltanin	90°41.8	51°29.4
20	285°10.6 300°13.1	149°13.6 164°13.0	09.1 •• 08.3	87°30.6 102°31.6	17.0 •• 17.7	174° 54.4 189° 56.4	06.4 •• 06.3	284°28.8 299°31.4	24.7 •• 24.7	Kaus Aust.	83°31.6	-34°22.4
21 22	315° 15.5	104 13.0 179°12.4	07.6	102 31.0 117°32.5	18.3	204° 58.4	06.3	314°34.0	24.7	Vega	80°32.7	38°48.7
23	330°18.0	179 12.4 194°11.9	06.8	132° 33.5	19.0	220° 00.4	06.2	329°36.7	24.8	Nunki	75°46.9	-26°15.9
	330 16.0	194 11.9	00.8	132 33.3	19.0	220 00.4	00.2			Altair	61°59.2	8°56.3
Mer.p	ass. 01:02	$\nu$ -0.6' d-0	).7′ m-3.94	$\nu 1.0' \ d0$	.6′ m1.62	$\nu$ 2.0′ d-0	.1' m-2.01	$\nu 2.6' \ d0$	1'  m0.64	Peacock	53°04.4	-56°39.2
										Deneb	49°25.1	45°22.5
Sa+	GHA	GHA	Doc	GHA	Doc	GHA	Doc	GHA	Doc	Enif	33°37.9	9°59.7
Sat 0	345°20.5	209°11.3	<b>Dec</b> N17°06.1	147°34.4	<b>Dec</b> <b>S</b> 07°19.6	235°02.4	<b>Dec</b> N22°06.2	344°39.3	<b>Dec</b> \$02°25.0	Al Na'ir	27°31.7	-46°50.1
1	0°22.9	209 11.3 224°10.7	05.3	162° 35.4	20.2	250°04.4	06.1	359°41.9	25.1	Fomalhaut	15°13.5	-29°29.0
2	15°25.4	239°10.1	03.5	102 35.4 177°36.3	20.2	265°06.4	06.1	14° 44.6	25.1	Scheat	13°44.3	28°13.4
3	30°27.9	254°09.5	03.8	192°37.3	. 21.5	280°08.4	•• 06.0	29°47.2	. 25.2	Markab	13°29.0	15°20.7
4	45°30.3	269°08.9	03.1	207°38.2	22.2	295° 10.4	05.9	44°49.8	25.3	Sep 04 Thu	SHA	Mer.pass
5	60°32.8	284°08.3	02.3	222°39.2	22.8	310° 12.4	05.9	59°52.4	25.4	Venus		10:02
6	75°35.3	299°07.7	N17°01.6	237°40.1		325° 14.4	N22°05.8	74°55.1	S02°25.4	Mars		14:12
7	90°37.7	314°07.1	00.8	252°41.1	24.1	340° 16.5	05.8	89°57.7	25.5	Jupiter		08:25
8	105°40.2	329°06.5	17°00.0	267°42.0	24.8	355° 18.5	05.7	105°00.3	25.6	Saturn	359°11.0	01:10
9	120°42.6	344°05.9	16°59.3	282°43.0	• • 25.4	10° 20.5	05.7	120°03.0	25.7			
10	135°45.1	359°05.3	58.5	297°43.9	26.1	25° 22.5	05.6	135°05.6	25.7	Sep 05 Fri	SHA	Mer.pass
11	150°47.6	14°04.7	57.8	312°44.8	26.7	40°24.5	05.6	150°08.2	25.8	Venus		10:03
12	165°50.0	29°04.1	N16°57.0	327° 45.8	S07°27.3	55° 26.5	N22°05.5	165° 10.8	S02°25.9		162°50.3	14:10
13	180°52.5	44°03.6	56.2	342°46.7	28.0	70°28.5	05.4	180° 13.5	26.0	Jupiter		08:22
14	195°55.0	59°03.0	55.5	357°47.7	28.6	85°30.5	05.4	195°16.1	26.1	Saturn	359°14.9	01:05
15	210°57.4	74°02.4	• • 54.7	12°48.6	• • 29.3	100°32.5	• • 05.3	$210^{\circ}18.7$	• • 26.1	Sep 06 Sat	SHA	Mer.pass
16	225°59.9	89°01.8	53.9	27°49.6	29.9	115°34.5	05.3	225°21.4	26.2	Venus		10:04
17	241°02.4	104°01.2	53.2	42°50.5	30.6	130°36.5	05.2	240°24.0	26.3		162°14.0	14:09
18	256°04.8	119°00.6	N16°52.4	57°51.5	S07°31.2	145°38.5	N22°05.2	255°26.6	S02°26.4	Jupiter		08:19
19	271°07.3	134°00.0	51.6	$72^{\circ}52.4$	31.9	160°40.5	05.1	$270^{\circ}29.3$	26.4	Saturn	359°18.8	01:01
20	286°09.8	148°59.4	50.9	$87^{\circ}53.4$	32.5	175°42.5	05.1	$285^{\circ}31.9$	26.5			
21	301°12.2	163°58.8	•• 50.1	$102^{\circ}54.3$	• • 33.1	190°44.6	• • 05.0	$300^{\circ}34.5$	• • 26.6	Horizont	al parallax	
22	316°14.7	178°58.3	49.3	117°55.2	33.8	205°46.6	05.0	315° 37.2	26.7		Venus:	0.1
23	331°17.1	193°57.7	48.6	132°56.2	34.4	220°48.6	04.9	330°39.8	26.8		Mars:	0.1
Mern	pass. 00:58	ν-0.6/ d.0	0.8' m-3.94	νη α/ <b>Α</b> η	.6′ m1.62	ν2 0' d-0	.1′ m-2.01	1/2 6/ d0	1′ m0.63			
- iviei.p		ν 0.0 u-0	111-3.34	νσ.σ u0	.5 1111.02	∠2.0 U-0	2.U1	uU	1110.00			

h	Su	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°13.1	N07°09.7	46°20.5	8.7'	<b>S</b> 25°27.9	-7.6'	56.4'
1	195°13.3	8.80	60°48.2	8.8'	25°20.3	-7.8'	56.5'
2	210°13.5	07.9	75° 16.0	8.8'	25°12.5	-7.9'	56.5'
3	225°13.7 240°13.9	• • 06.9	89°43.8 104°11.6	8.8' 8.9'	25°04.6 24°56.6	-8.1'	56.5' 56.6'
4 5	240 13.9 255°14.1	06.0 05.1	104 11.6 118°39.5	8.9'	24 50.0 24°48.4	-8.2' -8.3'	56.6'
6	270°14.3	N07° 04.2	133° 07.4	8.9'	\$24°40.0	-8.5'	56.6
7	285°14.5	03.2	147°35.3	9.0'	24°31.5	-8.6'	56.7'
8	300°14.7	02.3	162°03.3	9.0'	24°22.9	-8.8'	56.7'
9	315°14.9	•• 01.4	176°31.3	9.0'	$24^{\circ}14.1$	-8.9'	56.7'
10	330°15.1	07°00.5	190°59.4	9.1'	24°05.2	-9.0'	56.8'
11	345°15.3	06°59.5	205°27.5	9.1'	23°56.2	-9.2'	56.8'
12 13	0°15.6 15°15.8	N06°58.6 57.7	219°55.6 234°23.7	9.2' 9.2'	\$23°47.0 23°37.7	-9.3' -9.5'	56.8' 56.9'
14	30°16.0	56.8	234 23.7 248°51.9	9.2'	23°28.2	-9.5 -9.6'	56.9'
15	45°16.2	• • 55.9	263° 20.2	9.3'	23°18.6	-9.7'	56.9'
16	60°16.4	54.9	277° 48.4	9.3'	23°08.9	-9.9'	57.0'
17	75°16.6	54.0	292°16.8	9.4'	22°59.0	-10.0'	57.0'
18	90°16.8	N06°53.1	306°45.1	9.4'	S22°49.0	-10.1'	57.0'
19	105°17.0	52.1	321°13.5	9.4'	22°38.9	-10.3'	57.1'
20	120°17.2	51.2	335°42.0	9.5'	22°28.6	-10.4'	57.1'
21 22	135°17.4 150°17.6	· · 50.3 49.4	350° 10.4 4° 39.0	9.5' 9.6'	22°18.2 22°07.7	-10.5' -10.7'	57.1' 57.2'
23	165°17.9	49.4 48.4	4 39.0 19°07.5	9.6' 9.6'	22 07.7 21°57.0	-10.7 -10.8'	57.2'
						_0.0	
	SD = 15.9'	d = -0.9'		SL	D = 15.4'		
Fri	GHA	Dec	GHA	u 9.7'	Dec	d 10.0'	HP
0 1	180°18.1 195°18.3	N06° 47.5 46.6	33°36.2 48°04.8	9.7' 9.7'	\$21°46.2 21°35.3	-10.9' -11.0'	57.2' 57.3'
2	210°18.5	45.7	62°33.5	9.7'	21°24.2	-11.0	57.3'
3	225°18.7	• • 44.7	77°02.3	9.8'	21°13.1	-11.3'	57.3'
4	240°18.9	43.8	91°31.0	9.8'	21°01.8	-11.4'	57.4'
5	255°19.1	42.9	105°59.9	9.9'	20°50.3	-11.5'	57.4'
6	270°19.3	N06° 42.0	120°28.7	9.9'	\$20°38.8	-11.7'	57.4'
7	285°19.5 300°19.7	41.0 40.1	134° 57.7 149° 26.6	10.0' 10.0'	20°27.1 20°15.3	-11.8' -11.9'	57.5' 57.5'
8 9	300 19.7 315°20.0	39.2	149 26.6 163°55.6	10.0'	20 15.3 20°03.4	-11.9 -12.0'	57.5'
10	330°20.2	38.2	178° 24.7	10.1	19°51.4	-12.2'	57.6'
11	345°20.4	37.3	192°53.8	10.1'	19°39.2	-12.3'	57.6'
12	0°20.6	N06°36.4	207°22.9	10.2'	<b>S</b> 19°27.0	-12.4'	57.6'
13	15°20.8	35.5	221°52.1	10.2'	19°14.6	-12.5'	57.7'
14 15	30°21.0 45°21.2	34.5 · · 33.6	236°21.3 250°50.6	10.3' 10.3'	19°02.1 18°49.5	-12.6' -12.7'	57.7' 57.7'
16	60°21.4	32.7	265° 19.9	10.3	16 49.5 18°36.7	-12.7 -12.8'	57.7 57.8'
17	75°21.6	31.7	279°49.2	10.4	18°23.9	-13.0'	57.8'
18	90°21.9	N06°30.8	294° 18.6	10.4	S18°10.9	-13.1'	57.8'
19	105°22.1	29.9	308°48.1	10.5'	17°57.9	-13.2'	57.9'
20	120°22.3	29.0	323° 17.5	10.5'	17°44.7	-13.3'	57.9'
21	135°22.5	• • 28.0	337°47.1	10.6'	17°31.4	-13.4'	57.9'
22 23	150°22.7 165°22.9	27.1 26.2	352°16.6 6°46.2	10.6' 10.6'	17°18.1 17°04.6	-13.5' -13.6'	58.0' 58.0'
23	$\frac{105 \ 22.9}{\text{SD} = 15.9'}$	d = -0.9'	0 40.2		D = 15.6'	-13.0	36.0
_							
Sat	GHA	Dec	GHA	ν 10.7'	Dec	d 12.7'	HP
0 1	180°23.1 195°23.3	N06°25.2 24.3	21° 15.9 35° 45.6	10.7' 10.7'	\$16°51.0 16°37.3	-13.7' -13.8'	58.0' 58.1'
2	210°23.6	23.4	50° 15.3	10.7	16°23.5	-13.9'	58.1'
3	225°23.8	• • 22.4	64°45.1	10.8'	$16^{\circ}09.6$	-14.0'	58.1'
4	240°24.0	21.5	79° 14.9	10.8'	15°55.6	-14.1'	58.2'
5	255°24.2	20.6	93°44.7	10.9'	15°41.5	-14.2'	58.2'
6	270°24.4	N06° 19.6	108° 14.6	10.9'	\$15°27.3	-14.3'	58.2'
7 8	285°24.6 300°24.8	18.7 17.8	122°44.5 137°14.5	11.0' 11.0'	15°13.0 14°58.6	-14.4' -14.5'	58.3' 58.3'
9	300 24.8 315°25.0	17.8	151° 44.5	11.0'	14 58.0 14°44.2	-14.5 -14.6'	58.3'
10	330°25.3	15.9	166° 14.5	11.1'	14°29.6	-14.7'	58.4
11	345°25.5	15.0	180°44.6	11.1'	14°15.0	-14.7'	58.4'
12	0°25.7	N06°14.0	195° 14.7	11.1'	S14°00.2	-14.8'	58.4'
13	15°25.9	13.1	209°44.8	11.2'	13°45.4	-14.9'	58.4'
14 15	30°26.1 45°26.3	12.2 •• 11.2	224° 15.0 238° 45.2	11.2' 11.2'	13°30.5 13°15.5	-15.0' -15.1'	58.5' 58.5'
15 16	45°26.3 60°26.5	10.3	238° 45.2 253° 15.4	11.2	13°15.5 13°00.4	-15.1' -15.2'	58.5'
17	75°26.8	09.4	267° 45.7	11.3'	13° 00.4 12° 45.2	-15.2'	58.6'
18	90°27.0	N06°08.4	282°16.0	11.3'	<b>S</b> 12°30.0	-15.3'	58.6'
19	105°27.2	07.5	296° 46.3	11.4'	12°14.6	-15.4'	58.6'
20	120°27.4	06.6	311°16.7	11.4'	11°59.2	-15.5'	58.7'
21 22	135°27.6 150°27.8	· · 05.6 04.7	325° 47.0 340° 17.5	11.4' 11.4'	11°43.7 11°28.2	-15.6' -15.6'	58.7' 58.7'
23	165°28.0	04.7	354° 47.9	11.4	11°12.6	-15.0 -15.7'	58.7'
	SD = 15.9'	d = -0.9'			D = 15.8'		

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

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

		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	84-96%
04	00:52	01:02	11:59	21:41	09:14	
05	01:12	01:22	11:59	22:32	10:07	
06	01:33	01:43	11:58	23:22	10:57	

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

h	Aries	Ve	nus		ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	346° 19.6	208°57.1	N16°47.8	147°57.1	S07°35.1	235°50.6	N22°04.8	345°42.4	S02°26.8		3114	
1	1°22.1	208 57.1 223°56.5	47.0	162°58.1	35.7	250°52.6	04.8	0°45.0	26.9	Alpheratz	357°33.9	29°14.0
	16°24.5	238°55.9		102 58.1 177°59.0	36.4	265°54.6		15°47.7		Ankaa	353°06.2	-42°09.8
2			46.2				04.7		27.0	Schedar	349°29.9	56°40.7
3	31°27.0	253°55.3	• • 45.5	193°00.0	• • 37.0	280° 56.6	• • 04.7	30°50.3	• • 27.1	Diphda	348° 46.4	-17°50.5
4	46°29.5	268°54.7	44.7	208°00.9	37.7	295° 58.6	04.6	45°52.9	27.1	Achernar	335°19.3	-57°06.1
5	61°31.9	283°54.2	43.9	223°01.9	38.3	$311^{\circ}00.6$	04.6	60°55.6	27.2	Hamal	327°50.3	23°35.1
6	76°34.4	298°53.6	N16°43.1	238°02.8	S07°38.9	326°02.6	N22°04.5	75°58.2	<b>S</b> 02°27.3	Polaris	313°32.3	89°22.1
7	91°36.9	313°53.0	42.4	253°03.7	39.6	341°04.6	04.5	91°00.8	27.4	1	315° 11.1	-40°11.8
8	106°39.3	328°52.4	41.6	268°04.7	40.2	356°06.7	04.4	106°03.5	27.4	Acamar		
9	121°41.8	343°51.8	• • 40.8	283°05.6	• • 40.9	11°08.7	• • 04.3	121°06.1	• • 27.5	Menkar	314°05.4	4°11.6
10	136°44.2	358°51.2	40.0	298°06.6	41.5	26° 10.7	04.3	136°08.7	27.6	Mirfak	308° 27.3	49°57.0
11	151°46.7	13°50.6	39.2	313°07.5	42.2	41° 12.7	04.2	151°11.4	27.7	Aldebaran	290°39.0	16°33.7
12	166°49.2	28°50.1	N16°38.5	328°08.5	S07°42.8	56° 14.7	N22°04.2	166°14.0	S02°27.8	Rigel	281°03.4	-8°10.1
13	181°51.6	43°49.5		343°09.4		71°16.7	04.1	181°16.6		Capella	$280^{\circ}21.1$	46°01.3
	196°54.1	58°48.9	37.7	358° 10.3	43.4	86°18.7		196°19.2	27.8	Bellatrix	278°22.3	6°22.5
14			36.9		44.1		04.1		27.9	Elnath	278°01.2	28°37.7
15	211°56.6	73°48.3	• • 36.1	13°11.3	• • 44.7	101°20.7	• • 04.0	211°21.9	• • 28.0	Alnilam	275°37.2	-1°11.0
16	226°59.0	88°47.7	35.3	28° 12.2	45.4	116°22.7	04.0	226°24.5	28.1	Betelgeuse	270°51.6	7°24.8
17	242°01.5	103°47.1	34.5	43°13.2	46.0	131°24.8	03.9	241°27.1	28.1	Canopus	263°52.3	-52°42.2
18	257°04.0	118°46.6	N16°33.8	58° 14.1	S07°46.7	146°26.8	N22°03.9	256°29.8	S02°28.2	Sirius	258° 25.9	-16°44.8
19	272°06.4	133°46.0	33.0	73° 15.0	47.3	161°28.8	03.8	271°32.4	28.3	1		-10 44.0 -29°00.1
20	287°08.9	148°45.4	32.2	88° 16.0	48.0	176°30.8	03.7	286°35.0	28.4	Adhara	255°05.6	
21	302°11.4	163°44.8	• • 31.4	103° 16.9	• • 48.6	191°32.8	• • 03.7	301°37.7	• • 28.5	Procyon	244°50.5	5°09.7
22	317° 13.8	178°44.2	30.6	118° 17.9	49.2	206° 34.8	03.6	316°40.3	28.5	Pollux	243°16.9	27°57.9
23	332°16.3	193°43.7	29.8	133° 18.8	49.9	221°36.8	03.6	331°42.9	28.6	Avior	234° 15.0	-59°35.2
			-							Suhail	222°46.3	-43°32.0
Mer.p	ass. 00:55	$\nu$ -0.6' d-0	).8′ m-3.94	$ u$ 0.9 $^{\prime}$ d0	.6′ m1.62	$\nu 2.0' \ d-0$	.1' m-2.01	$\nu$ 2.6′ d0.	1'  m0.63	Miaplacidus	221°39.0	-69°49.1
										Alphard	$217^{\circ}47.5$	-8°46.0
	CIIA	CILL	Б	6114	Б	C115	Б	CI15	Б	Regulus	$207^{\circ}34.2$	11°50.6
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.9	61°36.8
0	347°18.7	208°43.1	N16°29.0	148° 19.7	S07°50.5	236° 38.8	N22°03.5	346°45.6	S02°28.7	Denebola	182°24.7	14°25.8
1	2°21.2	223°42.5	28.2	163°20.7	51.2	251°40.9	03.5	1°48.2	28.8	Gienah	175°43.3	-17°41.0
2	17°23.7	238°41.9	27.4	178°21.6	51.8	266°42.9	03.4	16°50.8	28.8	1	173°00.2	-63°14.6
3	32°26.1	253°41.3	• • 26.6	193°22.6	• • 52.5	281°44.9	• • 03.4	31°53.5	• • 28.9		171°51.6	-57°15.5
4	47°28.6	268°40.8	25.8	208°23.5	53.1	296°46.9	03.3	46°56.1	29.0	Alioth	166° 12.9	55°49.4
5	62°31.1	283°40.2	25.0	223°24.4	53.7	311°48.9	03.3	61°58.7	29.1	1		
6	77° 33.5	298°39.6	N16°24.2	238°25.4	S07°54.4	326° 50.9	N22°03.2	77°01.4	502°29.2	Spica	158°22.0	-11°17.7
7	92°36.0	313°39.0	23.5	253°26.3	55.0	341°52.9	03.1	92°04.0	29.2	Alkaid	152°51.9	49°11.3
8	107°38.5	328°38.5	22.7	268° 27.3	55.7	356° 55.0	03.1	107°06.6	29.3	Hadar	148° 35.7	-60°30.0
9	107 30.3 122°40.9	343°37.9	. 21.9	283°28.2	56.3	11°57.0	•• 03.0	122°09.3	. 29.4	Menkent	147°57.2	-36°29.8
						26°59.0				Arcturus	145°47.6	19°03.1
10	137°43.4	358°37.3	21.1	298°29.1	57.0		03.0	137°11.9	29.5	Rigil Kent.	139°40.0	-60°56.7
11	152° 45.8	13°36.7	20.3	313°30.1	57.6	42°01.0	02.9	152°14.5	29.5	Kochab	137°20.3	74°03.2
12	167° 48.3	28°36.2	N16°19.5	328°31.0	S07°58.2	57°03.0	N22°02.9	167°17.1	S02°29.6	Zuben'ubi	136°55.6	-16°08.9
13	182°50.8	43°35.6	18.7	343°31.9	58.9	72°05.0	02.8	182°19.8	29.7	Alphecca	126°03.4	26°37.9
14	197°53.2	58°35.0	17.8	358°32.9	07°59.5	87°07.1	02.8	197°22.4	29.8	Antares	112° 15.2	-26°29.4
15	212°55.7	73°34.4	• • 17.0	13°33.8	08°00.2	$102^{\circ}09.1$	• • 02.7	212°25.0	• • 29.9	Atria	107°08.9	-69°04.7
16	227°58.2	88°33.9	16.2	28°34.8	8.00	$117^{\circ}11.1$	02.6	227°27.7	29.9	Sabik	102°02.1	-15°45.4
17	243°00.6	103°33.3	15.4	43°35.7	01.5	$132^{\circ}13.1$	02.6	242°30.3	30.0	1		
18	258°03.1	118°32.7	N16°14.6	58°36.6	S08°02.1	147° 15.1	N22°02.5	257°32.9	502°30.1	Shaula	96°09.6	-37°07.4
19	273°05.6	133°32.1	13.8	73°37.6	02.7	162° 17.1	02.5	272°35.6	30.2	Rasalhague	95°58.0	12°32.6
20	288°08.0	148°31.6	13.0	88°38.5	03.4	177° 19.2	02.4	287°38.2	30.2	Eltanin	90°41.8	51°29.4
21	303°10.5	163°31.0	. 12.2	103°39.4	• • 04.0	192°21.2	• • 02.4	302°40.8	. 30.2	Kaus Aust.	83°31.6	-34°22.4
								317°43.5		Vega	80°32.7	38°48.7
22	318° 13.0	178°30.4	11.4	118° 40.4	04.7	207°23.2	02.3		30.4	Nunki	75°46.9	-26°15.9
23	333° 15.4	193°29.8	10.6	133°41.3	05.3	222°25.2	02.3	332°46.1	30.5	Altair	61°59.2	8°56.3
Mer.n	ass. 00:51	$\nu$ -0.6' d-0	).8′ m-3.94	$\nu$ 0.9 d0	.6′ m1.62	$\nu 2.0' d-0$	.1′ m-2.02	$\nu$ 2.6' d0	1' m0.63	Peacock	53°04.4	-56°39.2
										Deneb	49°25.1	45°22.5
										Enif	33°38.0	9°59.7
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.7	-46°50.1
0	$348^{\circ}17.9$	208°29.3	$N16^{\circ}09.8$	148°42.2	S08°05.9	237°27.2	N22°02.2	347°48.7	S02°30.6	Fomalhaut	15° 13.5	-29°29.0
1	3°20.3	223°28.7	09.0	163°43.2	06.6	252°29.2	02.2	2°51.4	30.6	Scheat	13°44.3	28°13.5
2	18° 22.8	238°28.1	08.1	178°44.1	07.2	267°31.3	02.1	17°54.0	30.7	Markab	13° 29.0	26 13.5 15°20.7
3	33°25.3	253°27.6	07.3	193°45.0	07.9	282° 33.3	02.0	32°56.6	30.8	iviarkab	13 ∠9.0	10 20.1
4	48° 27.7	268°27.0	06.5	208°46.0	08.5	297°35.3	02.0	47°59.3	30.9	Sep 07 Sun	SHA	Mer.pass
5	63°30.2	283°26.4	05.7	223°46.9	09.2	312°37.3	01.9	63°01.9	30.9		222°37.5	10:05
6	78° 32.7	298°25.8	N16°04.9	238° 47.8	S08°09.8	327°39.3	N22°01.9	78°04.5	S02°31.0		161°37.5	14:07
										1	249°31.0	08:16
7	93°35.1	313°25.3	04.1	253°48.8	10.4	342°41.4	01.8	93°07.2	31.1			
8	108° 37.6	328°24.7	03.3	268°49.7	11.1	357°43.4	01.8	108°09.8	31.2	Saturn	359°22.8	00:57
9	123°40.1	343°24.1	• • 02.4	283°50.7	• • 11.7	12°45.4	•• 01.7	123°12.4	· · 31.3	Sep 08 Mon	SHA	Mer.pass
10	138° 42.5	358°23.6	01.6	298°51.6	12.4	27° 47.4	01.7	138°15.1	31.3		221°24.3	10:06
11	153°45.0	13°23.0	8.00	313°52.5	13.0	42°49.4	01.6	153°17.7	31.4	1	161°01.0	14:06
12	168°47.4	28°22.4	N16°00.0	328°53.5	S08°13.6	57°51.5	N22°01.6	168°20.3	S02°31.5	Jupiter		08:12
13	183°49.9	43°21.9	15°59.2	343°54.4	14.3	72°53.5	01.5	183°23.0	31.6	Saturn	359°26.8	
14	$198^{\circ}52.4$	58°21.3	58.3	358°55.3	14.9	87°55.5	01.4	198°25.6	31.6	Saturn	JJ9 ∠0.ŏ	00:53
15	213°54.8	73°20.7	• • 57.5	13°56.2	• • 15.6	102°57.5	• • 01.4	213°28.2	• • 31.7	Sep 09 Tue	SHA	Mer.pass
16	228° 57.3	88°20.2	56.7	28°57.2	16.2	117°59.5	01.3	228°30.9	31.8		220°11.4	10:06
17	243°59.8	103°19.6	55.9	43°58.1	16.8	133°01.6	01.3	243°33.5	31.9	1	160°24.4	14:04
18	259°02.2	118°19.0	N15°55.0	58°59.0	S08°17.5	148°03.6	N22°01.2	258°36.1	S02°32.0	Jupiter		08:09
19	274°04.7	133°18.5	54.2	74°00.0	18.1	163°05.6	01.2	273°38.8	32.0	Saturn		00:49
20	289° 07.2	148°17.9	53.4	89°00.9	18.8	178° 07.6	01.2	288°41.4	32.1	Saturn	JUS 30.9	00:49
20	304° 09.6	146 17.9 163°17.3	• • 52.6	104° 01.8	. 19.4	178 07.0 193°09.7	•• 01.1	303°44.0	32.1	Horizont	al parallax	
	304 09.6 319°12.1			104 01.8 119°02.8		193 09.7 208°11.7	01.0	303 44.0 318°46.7			Venus:	0.1
22		178°16.8	51.7		20.0				32.3		Mars:	0.1
23	334°14.6	193°16.2	50.9	134°03.7	20.7	223°13.7	01.0	333°49.3	32.4		111013.	0.1
Mer.n	ass. 00:47	$\nu$ -0.6' d-0	).8′ m-3.94	$\nu 0.9' \ d0$	.6′ m1.61	$\nu 2.0' d-0$	.1′ m-2.02	$\nu 2.6' \ d0$	1′ m0.62			
					• -	0	·					

h	Su	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°28.3	N06°02.8	9°18.4	11.5'	\$10°56.9	-15.8'	58.8'
1 2	195°28.5 210°28.7	01.9 01.0	23°48.8 38°19.4	11.5' 11.5'	10°41.1 10°25.2	-15.8' -15.9'	58.8' 58.8'
3	225°28.9	06°00.0	52°49.9	11.6'	10° 23.2	-16.0'	58.9'
4	240°29.1	$05^{\circ}59.1$	67°20.5	11.6'	$09^{\circ}53.3$	-16.0'	58.9'
5	255°29.3	58.2	81°51.0	11.6'	09°37.3	-16.1'	58.9'
6 7	270° 29.5 285° 29.8	N05°57.2 56.3	96°21.6 110°52.3	11.6' 11.6'	\$09°21.2 09°05.0	-16.2' -16.2'	58.9' 59.0'
8	300°30.0	55.4	125°22.9	11.7'	08°48.8	-16.3	59.0'
9	315°30.2	• • 54.4	$139^{\circ}53.6$	11.7'	08°32.5	-16.3'	59.0'
10	330°30.4 345°30.6	53.5 52.5	154°24.2 168°54.9	11.7' 11.7'	08°16.1 07°59.7	-16.4' -16.5'	59.0' 59.1'
11 12	0°30.8	N05°51.6	100 54.9 183°25.6	11.7'	507°43.3	-16.5	59.1
13	15°31.0	50.7	197°56.3	11.7'	07°26.8	-16.6'	59.1'
14	30°31.3	49.7	212°27.1	11.7'	07° 10.2	-16.6'	59.1'
15 16	45°31.5 60°31.7	· · 48.8 47.9	226°57.8 241°28.6	11.8' 11.8'	06°53.6 06°36.9	-16.7' -16.7'	59.2' 59.2'
17	75°31.9	46.9	255°59.3	11.8'	06°20.2	-16.8'	59.2'
18	90°32.1	N05°46.0	270°30.1	11.8'	<b>S</b> 06°03.5	-16.8'	59.2'
19	105°32.3	45.0	285°00.9	11.8'	05°46.7	-16.8'	59.3'
20 21	120° 32.6 135° 32.8	44.1 •• 43.2	299°31.7 314°02.5	11.8' 11.8'	05°29.8 05°12.9	-16.9' -16.9'	59.3' 59.3'
22	150°33.0	42.2	328°33.3	11.8'	05 12.9 04°56.0	-10.9 -17.0'	59.3'
23	165°33.2	41.3	343°04.1	11.8'	04°39.0	-17.0'	59.4'
	SD = 15.9'	d = -0.9'		SI	O = 16.0'		
Mon 0	<b>GHA</b> 180° 33.4	<b>Dec</b> N05°40.3	<b>GHA</b> 357°34.9	u 11.8'	Dec 504° 22.0	d -17.0'	<b>HP</b> 59.4'
1	195°33.6	39.4	12°05.7	11.8'	04°05.0	-17.1	59.4
2	210°33.9	38.5	$26^{\circ}36.5$	11.8'	03°47.9	-17.1'	59.4'
3	225°34.1	• • 37.5	41°07.3	11.8'	03°30.9	-17.1'	59.4'
4 5	240° 34.3 255° 34.5	36.6 35.6	55°38.1 70°08.9	11.8' 11.8'	03°13.7 02°56.6	-17.2' -17.2'	59.5' 59.5'
6	270°34.7	N05°34.7	84°39.7	11.8'	S02°39.4	-17.2	59.5'
7	285°34.9	33.8	99°10.5	11.8'	$02^{\circ}22.2$	-17.2'	59.5'
8	300°35.2	32.8	113°41.2	11.8'	02°05.0	-17.2	59.5'
9 10	315° 35.4 330° 35.6	· · 31.9 30.9	128°12.0 142°42.8	11.8' 11.8'	01°47.7 01°30.4	-17.3' -17.3'	59.6' 59.6'
11	345°35.8	30.9	157°13.5	11.7'	01°13.2	-17.3'	59.6'
12	0°36.0	N05°29.1	171°44.3	11.7'	<b>S</b> 00°55.9	-17.3'	59.6'
13	15°36.2 30°36.5	28.1	186°15.0	11.7'	00°38.5 00°21.2	-17.3'	59.6'
14 15	30° 36.5 45° 36.7	27.2 •• 26.2	200°45.7 215°16.4	11.7' 11.7'	500°03.9	-17.3' -17.4'	59.6' 59.7'
16	60°36.9	25.3	229°47.1	11.7'	N00° 13.5	17.4	59.7'
17	75° 37.1	24.4	244°17.8	11.6'	00°30.8	17.4'	59.7'
18 19	90°37.3 105°37.5	N05°23.4 22.5	258°48.4 273°19.0	11.6' 11.6'	N00°48.2 01°05.6	17.4' 17.4'	59.7' 59.7'
20	105 37.5 120° 37.8	21.5	273 19.0 287°49.6		01°03.0		59.7'
21	135°38.0	20.6	302°20.2	11.6'	01°40.3	17.4	59.8'
22	150°38.2	19.6	316°50.8	11.5'	01°57.7	17.4	59.8'
23	165°38.4	18.7	331°21.3	11.5'	02°15.1	17.4'	59.8'
	SD = 15.9'	d = -0.9'		SI	O = 16.2'		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°38.6	N05°17.8	345°51.8	11.5'	N02°32.4	17.4	59.8'
1 2	195°38.8 210°39.1	16.8 15.9	0°22.3 14°52.7	11.5' 11.4'	02°49.8 03°07.1	17.4' 17.3'	59.8' 59.8'
3	210 39.1 225°39.3	. 14.9	29°23.2	11.4'	03°24.5	17.3'	59.8'
4	240°39.5	14.0	43°53.6	11.4'	03°41.8	17.3'	59.8'
5	255° 39.7	13.0	58°23.9	11.3'	03°59.1	17.3'	59.9'
6 7	270°39.9 285°40.2	N05°12.1 11.2	72°54.2 87°24.5	11.3' 11.3'	N04°16.4 04°33.7	17.3' 17.3'	59.9' 59.9'
8	300°40.4	10.2	101°54.8	11.2'	04°51.0	17.2	59.9'
9	315° 40.6	• • 09.3	116°25.0	11.2'	05°08.2	17.2'	59.9'
10 11	330°40.8 345°41.0	08.3 07.4	130°55.2 145°25.3	11.1' 11.1'	05°25.4 05°42.6	17.2' 17.2'	59.9' 59.9'
11	345 41.0 0°41.2	07.4 N05°06.4	145°25.3 159°55.4	11.1'	N05° 59.8	17.2	59.9'
13	15°41.5	05.5	174°25.5	11.0'	06° 17.0	17.1'	59.9'
14	30°41.7	04.5	188°55.5	11.0'	06°34.1	17.1'	59.9'
15 16	45°41.9 60°42.1	· · 03.6 02.7	203°25.5 217°55.4	10.9' 10.9'	06°51.2 07°08.2	17.1' 17.0'	60.0' 60.0'
17	75°42.3	02.7	232°25.3	10.9	07 06.2 07°25.2	17.0'	60.0
18	90°42.6	N05°00.8	246°55.1	10.8'	N07°42.2	16.9'	60.0'
19	105° 42.8	04°59.8	261°24.9	10.7'	07°59.2	16.9'	60.0'
20 21	120°43.0 135°43.2	58.9 •• 57.9	275°54.6 290°24.3	10.7' 10.6'	08° 16.1 08° 32.9	16.9' 16.8'	60.0' 60.0'
22	150°43.4	57.0	304°53.9	10.6'	08°49.7	16.8'	60.0
23	165°43.7	56.0	319°23.5	10.5'	09°06.5	16.7'	60.0'
	SD = 15.9'	d = -0.9'		SI	D = 16.3'		

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

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

		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%	
07	01:53	02:03	11:58	-:-	11:46		
08	02:14	02:24	11:58	00:10	12:34		
09	02:35	02:45	11:57	00:58	13:23		

# September 10, 11, 12 UT (Wed., Thu., Fri.)

Month   Mon	h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
1	Wod -	GHA	CH4	Dec	CHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
1													
19											Alpheratz		
3 A 1/24											1		
4 47269 2867144 467 2007084 235 200738 077 49705 227 14 19709 1020 107 40 107 107 107 107 107 107 107 107 107 10													
Section   Color   Co													
19	5	64°29.3	283°12.8	45.9	224°09.3	24.5	313°25.8	00.6	64°05.1	32.8	1		
100   100	6	79°31.8	298°12.3	N15°45.1	239° 10.2	S08°25.2	328°27.9	N22°00.6	79°07.8	S02°32.9	1		
10   1394   13   1397	7	94°34.3	313°11.7	44.2	254°11.1	25.8	343°29.9	00.5	94°10.4	33.0			
19   19   19   19   19   19   19   19	8	109°36.7	328°11.1	43.4	$269^{\circ}12.1$	26.5	358°31.9	00.5	109°13.0	33.1	1		
11 11 11 11 11 11 11 11 11 11 11 11 11	9			• • 42.6		• • 27.1		• • 00.4		• • 33.1	1		
12   15   16   17   17   18   18   18   18   18   18											1		
14   100° 45.0   32° 538   713° 1010   32° 152° 38° 201   32° 620   32° 62													
14 199°81.5   59°17.8   38.4   39°17.6   30.3   80°4.1   00.1   199°8.8   31.5   1.5   1.6													
15 224*540													
229"96.6 30"06.1 310"06.1 35.8 4"06.4 32.2 31.5 118"88.1 00.0 22"91.3 33.7 4											Elnath	$278^{\circ}01.2$	28°37.7
17   24-47869   370-10.1   187-05.5   157-10.2   157-05.5   157-10.2   157-05.5   157-											Alnilam	275°37.2	
18 200°01.4 181°05.5 N15°35.0 59°14.5 508°32.8 146°52.2 N21°59.0 279°42.0 33.9 4.0 20°20.3 130°01.4 190°4.4 33.3 89°32.2 34.1 1776°52.2 58.8 29°44.6 34.0 Process 25°05.5 -20°0.1 Process 25°05.5 -20°													
19   275°038   33°050   341   74°223   33.5   103°542   59.9   274°420   33.9   36°163   145°044   50.07													
20 90°063											1		
22 330°13.7 1970°0.7 30.8 134°26.0 36.0 224°0.3 59.7 31°49.9 34.2 Mer. pass. 00.43 190°0.3 59.6 334°5.6 34.2 Mer. pass. 00.43 190°0.7 30°0.7											I .		
Mort   Part									304°47.3		1		
Mer. pass. 0.0.43											1		
Mer.pass. 00.43					$134^{\circ}26.0$	36.0	224°02.3		334°52.6				
Thu GHA  OHA  OHA  OHA  OHA  OHA  OHA  OHA	Mara	DES 00.42	1/-U 6/ d C	) 8' m 3 04	νη α/ Αα	6' m1 61	1/2 O/ 4 O	1/ m 2.02	1/2 6/ AO	1′ m0.62	1		
This   GHA   CHA   Dec   GHA   Dec   GHA   Dec   CHA   Dec   Dubbe   1973 42   11°506   Obbbe   1973 42   11°506   Obbbe   1973 42   11°506   Obbbe   1973 43   Obbbe   1973 43   11°506   Obbbe   1973 43   11	ivier.p	ass. 00:43	$\nu$ -0.0° $a$ -0	.o m-3.94	νυ.9 αυ	.0 101.01	ν2.0 <b>α-</b> 0	.1 111-2.02	ν2.0 a0.	1 1110.02			
The GHA GHA CHA Dec GHA DEC GH													
390-16.2 208-02.2 N15-29 149-269 508-36.7 337 256-06.4 59.5 49.78 344 (Gienah 177-243.3 17-14.0 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2											1		
1 5°18.6 g											1		
2 90°21.1 283°01.1 28.2 179°28.8 38.0 286°08.4 595. 20°00.5 34.5 3 35°03.1 1.3 28.2 179°28.8 38.0 286°08.4 595. 20°00.5 34.5 4 50°26.5 282°39.4 25.7 226°31.5 39.9 314°14.5 593. 38°03.1 34.5 45.6 45.6 50°26.5 282°39.4 25.7 22°31.5 39.9 314°14.5 593. 36°18.4 34.7 45.6 50°30.9 39.7 58.8 115°28.8 229°32.5 506°40.5 329°18.5 10.5 10.5 10.5 10.5 10.5 10.5 10.5 10											1		
4 50°26.0 \$28°80.0 \$26.5 \$20°30.6 \$39.2 \$29°31.6 \$39.5 \$50°60.5 \$34.6 \$56°60.8 \$4 \$34.7 \$56°60.8 \$4 \$34.7 \$56°60.8 \$4 \$34.7 \$56°60.8 \$4 \$34.7 \$56°60.8 \$4 \$34.7 \$56°60.8 \$4 \$34.7 \$56°60.8 \$4 \$34.7 \$56°60.8 \$4 \$34.7 \$56°60.8 \$4 \$34.7 \$56°60.8 \$4 \$34.7 \$56°60.8 \$4 \$34.7 \$56°60.8 \$4 \$34.7 \$56°60.8 \$4 \$34.7 \$56°60.8 \$4 \$34.9 \$56°60.8 \$4 \$34.9 \$56°60.8 \$4 \$34.9 \$56°60.8 \$4 \$34.9 \$56°60.8 \$4 \$34.9 \$56°60.8 \$4 \$34.9 \$56°60.8 \$4 \$34.9 \$56°60.8 \$4 \$34.9 \$56°60.8 \$4 \$34.9 \$56°60.8 \$4 \$34.9 \$56°60.8 \$4 \$34.9 \$56°60.8 \$4 \$36.9 \$56°60.8 \$4 \$34.9 \$56°60.8 \$4 \$36.9 \$56°60.8 \$4 \$36.9 \$56°60.8 \$4 \$36.9 \$56°60.8 \$4 \$36.9 \$56°60.8 \$4 \$36.9 \$56°60.8 \$6 \$36.9 \$6 \$56.9 \$6 \$56°60.8 \$6 \$6 \$6 \$6 \$6 \$6 \$6 \$6 \$6 \$6 \$6 \$6 \$6												173°00.2	
6 86°38.5 282°59.4 25.7 224°31.5 39.9 314°14.5 99.3 65°08.4 34.7 Albert 96.8 80°30.9 297°8.8 N15°48.8 N15°48.2 293°32.5 80°30.5 329°16.5 N221°59.3 80°11.0 50°24.8 Albert 96.8 N15°48.2 293°32.5 80°30.5 329°16.5 N221°59.3 80°11.0 50°24.8 Albert 96.8 N15°48.2 293°32.5 80°30.5 329°1.0 10°16.3 34.9 Albert 96.8 N15°48.2 298°38.2 41.8 359°20.6 59.2 10°16.3 34.9 Albert 48°35.7 36°20.8 Albert 48°											Gacrux	$171^{\circ}51.6$	-57° 15.5
6 80°30.9 29°78.8 N15°24.8 239°325 508°40.5 329°16.5 N21°50.3 80°11.0 502°34.8 1 10°35.7 950.3 431°4 31.3 349 1 10°35.9 32°797.7 231.1 26°33.4 11.3 349°11.3 349 1 10°35.9 32°797.7 231.1 26°30.6 10°140°40.8 35°76.6 214 299°36.2 43.1 29°24.6 50.0 140°21.5 35.1 11.55°43.3 12°66.1 20.5 314°37.1 43.7 44°6.6 50.0 155°24.2 35.2 Kochab. 13°37.0 66°51.0 11.55°43.3 12°66.1 20.5 314°37.1 43.7 44°6.6 50.0 155°24.2 35.2 Kochab. 13°37.0 66°51.0 11.55°43.2 35.2 Kochab. 13°37.0 66°51.0 11.55°43.2 35.2 Kochab. 13°37.0 66°51.0 11.55°45.2 35.2 Kochab. 13°57.5 1.6°61.0 11.55°45.2 35.2 Kochab. 13°57.5 1.6°61.0 11.55°45.2 35.2 Kochab. 13°57.5 1.6°61.0 11.55°45.2 35.2 Kochab. 13°57.5 1.6°61.0 11.55°45.2 35.2 Kochab. 13°57.5 1.6°61.0 11.55°45.2 35.2 Kochab. 13°57.5 1.6°61.0 11.55°45.2 35.2 Kochab. 13°47.2 1.5°61.0 11.5°61.2 1.5°61.0 11.5°61.2 1.5°61.0 11.5°61.2 1.5°61.0 11.5°61.2 1.5°61.0 11.5°61.											Alioth	$166^{\circ}12.9$	55°49.4
8 110°35 9 32°57 7 231 26°34.3 41.1 344°18.5 59.2 95°13.6 34.9 Menkert 14°57.3 36°29.8 10°16.3 34.9 Menkert 14°57.3 36°29.8 10°16.3 34.9 Menkert 14°57.3 36°29.8 10°16.3 34.9 Menkert 14°57.3 36°29.8 10°16.3 34.9 Menkert 14°57.3 36°29.8 10°16.3 34.9 Menkert 14°57.3 36°29.8 10°16.3 34.9 Menkert 14°57.3 36°29.8 10°16.3 34.9 Menkert 14°57.3 36°29.8 10°16.3 34.9 Menkert 14°57.3 36°29.8 11°155°43.3 12°56.1 20.5 314°37.1 43.7 44°26.6 59.0 15°24.2 35.2 Kochab 13°20.4 60°36.7 12°16.7 12°16.7 12°16.3 13°1.1 155°43.3 12°56.1 20.5 314°37.1 43.7 44°26.6 59.0 15°24.2 35.2 Kochab 13°20.4 74°03.2 21°16.2 12°16.5 12°											Spica		
8 110°35.9 327°57.7 23.1 269°34.3 41.8 359°20.6 59.2 110°16.3 34.9 91.0°16.3 34.0 91.0°16.3 34.9 91.0°16.3 34.0 91.0°16.3 34.9 91.0°16.3 34.0 91.0°16.3 34.0 91.0°16.3 34.0 91.0°16.3 34.0 91.0°16.3 34.0 91.0°16.3 34.0 91.0°16.3 34.0 91.0°16.3 34.0 91.0°16.3 34.0 91.0°16.3 34.0 91.0°16.3 34.0 91.0°16.3 34.0 91.0°16.3 34.0 91.0°16.3 34.0											1		
9 125°83 3 342°572											1		
140°40.8   337°56.6   21.4   299°36.2   43.1   29°24.6   59.0   140°21.5   35.1											1		
11   155°43,3   12°56,1   20.5   314°37,1   44,7   44°26,6   59.0   155°24,2   35.2   Northal 197°20,4   74°30,7   318°348,2   42°55,0   18.8   344°38,9   45.0   74°30,7   58.9   10°26,8   50°23,3   33.3   Northal 197°20,4   74°30,7   359°39,9   45.6   80°32,7   58.8   200°32,1   33.4   Northal 197°20,4   74°30,7   359°39,9   45.6   80°32,7   58.8   200°32,1   35.4   Northal 197°20,4   74°30,7   359°39,9   45.6   80°32,7   58.8   200°32,1   35.5   Northal 197°20,4   74°30,7   24°45,8   Northal 197°20,8   14°40,8   44°42,6   44°4,8   14°40,8   44°4,6   44°4,6   47.5   14°40,8   44°4,6   47.5   14°40,8   44°4,6   47.5   14°40,8   44°4,6   48.8   46°4,2   48.8   46°4,2   48.8   46°4,2   48.8   46°4,2   48.8   46°4,2   48.8   46°4,2   48.8   48.											1		
12 170°45.7 27°55.5 0 18.8 344°38.9 45.0 74°30.7 5.9 185°25.3 3.3 16.2 29°38.0 84°3.3 46°3.9 45.0 74°30.7 5.9 185°25.3 35.3 14 200°50.7 57°54.4 17.9 35°93.9 45.0 74°30.7 5.9 185°25.3 35.4 Alphacea 126°03.4 26°37.0 16°230°55.6 87°53.3 16.2 29°41.7 46.0 10°34.8 5.8 21°34.7 35.5 16.2 20°32.1 35°6.1 12°55.2 11°52.2 11°32°3.3 16.2 29°41.7 46.9 119°36.8 58.7 245°94.0 35.6 12°32.3 16.2 29°41.7 46.9 119°36.8 58.7 245°94.0 35.6 12°32.3 16.2 29°41.7 46.9 119°36.8 58.7 245°94.0 35.6 12°32.2 11°32°3.4 48°42.2 149°40.9 821°38.6 25°37.4 35.6 12°32.2 11°32°3.5 1.7 13.6 74°44.5 48.8 164°42.9 58.5 290°47.9 35.9 12°30.0 11°52.2 115°14.5 58°43.6 508°48.2 149°40.9 821°38.6 25°37.4 35.9 12°30.0 11°30.0 11°30.0 11°34.2 50.7 290°49.0 58.4 305°90.5 36.0 12°32.6 12°32.6 12°32.3 36°12.8 192°49.5 10.0 116°47.2 50.7 290°49.0 58.4 305°90.5 36.0 12°32.6 12°33.3 6°12.8 192°49.5 10.0 116°47.2 50.7 290°49.0 58.4 305°95.5 36.0 12°32.3 36°12.8 192°49.5 10.0 134°48.2 51.4 224°81.0 58.3 335°55.8 36.1 Nunki 75°46.9 26°51.0 12°32.3 36°12.8 192°49.5 10.0 134°48.2 51.4 224°81.0 58.3 335°55.8 36.1 Nunki 75°46.9 26°51.0 12°32.0											1 -		
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16 230°55.6 87°53.3 16.2 29°41.7 46.9 119°36.8 58.7 230°37.4 35.6 Sabik 102°02.115°45.4 17°45.0 102°02.115°45.4 17°55.0 102°02.115°45.4 18 261°00.5 117°52.2 N15°14.5 59°43.6 508°48.2 149°40.9 N21°88.6 260°42.6 502°35.7 26°40.0 35.6 Sabik 102°02.115°45.4 18.2 21°306°70.3 132°51.7 13.6 74°44.5 48.8 164°42.9 58.6 260°42.6 502°35.7 25°45.3 35.8 18.2 21°306.7 30°40.8 110°40.1 110°40.9 N21°88.6 260°42.6 502°35.7 29°45.3 35.8 18.2 21°306.7 30°40.9 110°40.9 N21°88.6 260°42.6 502°35.7 29°45.3 35.8 18.2 21°306.7 30°40.9 110°40.9 110°40.9 N21°88.6 200°47.9 35.9 40°40.1 10°40.9 N21°89.0	15	215°53.1	72°53.9	• • 17.1	14°40.8	• • 46.3	104°34.8	• • 58.8		• • 35.5	1		
17 245*58.0 102*52.8 15.4 44*42.6 47.5 134*38.8 5.87 245*40.0 35.6 1   8 261*00.5 117*52.2 115*12.5 59*43.6 508*48.2 149*40.9 \$8.6 260*42.6 502*35.7 1   1306*07.9 132*51.7 13.6 74*44.5 48.8 164*42.9 58.6 275*45.3 35.8   120 291*05.4 147*51.1 12.8 89*45.4 49.4 179*44.9 58.5 20*47.9 35.9   121 306*07.9 162*50.6 11.9 104*46.3 50.1 194*46.9 58.4 300*50.5 36.0   122 323*10.4 177*50.0 11.0 119*47.2 50.7 209*99.0 58.4 300*50.5 36.0   122 336*12.8 192*49.5 10.2 134*48.2 51.4 224*51.0 58.3 335*58.8 36.1   128 192*49.5 10.2 134*48.2 51.4 224*51.0 58.3 335*58.8 36.1   128 192*49.5 10.2 134*48.2 51.4 224*51.0 58.3 335*58.8 36.1   128 192*49.5 10.2 134*48.2 51.4 224*51.0 58.3 335*58.8 36.1   128 192*49.5 10.2 134*48.2 51.4 224*51.0 58.3 335*58.8 36.1   128 192*49.5 10.2 134*49.1 508*52.0 236*33.0   129 12*40.2 237*47.8 07.6 179*50.9 53.3 269*57.1 58.2 21*03.7 36.4   150 12*12*12*2 237*47.8 07.6 179*50.9 53.3 269*57.1 58.2 21*03.7 36.4   151 155*2.1 267*46.7 05.8 209*52.8 54.5 300*01.2 58.1 51*09.0 36.5   15 66*27.6 282*46.2 05.0 224*53.7 55.2 315*03.2 58.0 66*11.6 36.6   18 11*35.0 327*44.5 02.3 269*58.5 56.4 345*07.3 57.9 96*16.9 36.7   18 11*35.0 327*44.5 02.3 269*58.5 56.4 345*07.3 57.9 96*16.9 36.7   18 11*35.0 327*44.5 02.3 269*58.5 56.4 345*07.3 57.9 96*16.9 36.7   18 11*35.0 327*44.5 02.3 269*58.5 56.4 345*07.3 57.9 96*16.9 36.7   18 11*35.0 327*44.5 02.3 269*58.5 56.4 345*07.3 57.9 96*16.9 36.7   18 11*35.0 327*44.5 02.3 269*58.5 56.4 345*07.3 57.9 96*16.9 36.7   18 11*35.0 327*44.5 02.3 269*58.5 56.4 345*07.3 57.9 96*16.9 36.7   18 11*35.0 327*44.5 02.3 269*58.5 56.4 345*07.3 57.9 96*16.9 36.7   18 11*35.0 327*44.5 02.3 269*58.5 56.4 345*07.3 57.9 96*16.9 36.7   18 11*35.0 327*44.5 02.3 269*58.5 56.4 345*07.3 57.9 96*16.9 36.7   18 11*35.0 327*45.0 02.3 269*56.5 57.1 0*09.3 57.8 11*19.9 53.6   18 26*22 36*9.6 11*39.1 N14*58.6 830*00.1 508*96.6 60*17.4 N21*57.6 171*30.1 502*37.1   19 277*02.1 132*38.5 52.7 75*06.6 04.1 106*31.7 57.3 26*48.6 37.7   19 274*08.5 57.4 138*05.5 57.7 50.0 04.1 106*31.7													
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16 231°54.7 87°40.2 55.3 30°03.8 02.2 120°25.6 57.4 231°40.6 37.5 Venus 216°33.6 10:09 17 246°57.2 102°39.6 54.4 45°04.7 02.8 135°27.6 57.4 246°43.3 37.5 18 261°59.6 117°39.1 N14°53.6 60°05.6 S09°03.4 150°29.7 N21°57.3 261°45.9 S02°37.6 19 277°02.1 132°38.5 52.7 75°06.6 04.1 165°31.7 57.3 276°48.6 37.7 20 292°04.6 147°38.0 51.8 90°07.5 04.7 180°33.7 57.2 291°51.2 37.8 21 307°07.0 162°37.5 · 50.9 105°08.4 · 05.4 195°35.8 · 57.1 306°53.8 · 37.9 22 322°09.5 177°36.9 50.0 120°09.3 06.0 210°37.8 57.1 321°56.5 37.9 23 337°12.0 192°36.4 49.2 135°10.2 06.6 225°39.8 57.0 336°59.1 38.0 Mars: 0.1		$216^{\circ}52.3$	$72^{\circ}40.7$	• • 56.2		•• 01.5		• • 57.5		• • 37.4	Sep 12 Fri	SHA	Mer.pass
17       246° 57.2       102° 39.6       54.4       45° 04.7       02.8       135° 27.6       57.4       246° 43.3       37.5       Mars       158° 33.8       14:00         18       261° 59.6       117° 39.1       N14° 53.6       60° 05.6       509° 03.4       150° 29.7       N21° 57.3       261° 45.9       502° 37.6       Jupiter       248° 37.8       07:59         19       277° 02.1       132° 38.5       52.7       75° 06.6       04.1       165° 31.7       57.3       276° 48.6       37.7         20       292° 04.6       147° 38.0       51.8       90° 07.5       04.7       180° 33.7       57.2       291° 51.2       37.8         21       307° 07.0       162° 37.5       · 50.9       105° 08.4       · · 05.4       195° 35.8       · · 57.1       306° 53.8       · 37.9         22       322° 09.5       177° 36.9       50.0       120° 09.3       06.0       210° 37.8       57.1       321° 56.5       37.9         23       337° 12.0       192° 36.4       49.2       135° 10.2       06.6       225° 39.8       57.0       336° 59.1       38.0       Mars:       0.1				55.3				57.4					
19 277°02.1 132°38.5 52.7 75°06.6 04.1 165°31.7 57.3 276°48.6 37.7 20 292°04.6 147°38.0 51.8 90°07.5 04.7 180°33.7 57.2 291°51.2 37.8 21 307°07.0 162°37.5 · 50.9 105°08.4 · 05.4 195°35.8 · 57.1 306°53.8 · 37.9 22 322°09.5 177°36.9 50.0 120°09.3 06.0 210°37.8 57.1 321°56.5 37.9 336°59.1 38.0    Horizontal parallax Venus: 0.1 337°12.0 192°36.4 49.2 135°10.2 06.6 225°39.8 57.0 336°59.1 38.0											1		
20 292°04.6 147°38.0 51.8 90°07.5 04.7 180°33.7 57.2 291°51.2 37.8 21 307°07.0 162°37.5 · 50.9 105°08.4 · 05.4 195°35.8 · 57.1 306°53.8 · 37.9 22 322°09.5 177°36.9 50.0 120°09.3 06.0 210°37.8 57.1 321°56.5 37.9 23 337°12.0 192°36.4 49.2 135°10.2 06.6 225°39.8 57.0 336°59.1 38.0 Mars: 0.1											Jupiter	248°37.8	07:59
21       307°07.0       162°37.5       · · 50.9       105°08.4       · · 05.4       195°35.8       · · 57.1       306°53.8       · · 37.9       Horizontal parallax         22       322°09.5       177°36.9       50.0       120°09.3       06.0       210°37.8       57.1       321°56.5       37.9       Venus: 0.1         23       337°12.0       192°36.4       49.2       135°10.2       06.6       225°39.8       57.0       336°59.1       38.0       Mars: 0.1											Saturn	359°43.2	00:36
22 322°09.5 177°36.9 50.0 120°09.3 06.0 210°37.8 57.1 321°56.5 37.9 Venus: 0.1 23 337°12.0 192°36.4 49.2 135°10.2 06.6 225°39.8 57.0 336°59.1 38.0 Mars: 0.1											Horizont	al narallav	
23 337°12.0 192°36.4 49.2 135°10.2 06.6 225°39.8 57.0 336°59.1 38.0 Mars: 0.1											1131120111	-	0.1
25 337 22.0 152 30.1 15.2 153 10.2 30.0 225 35.0 37.0 30 35.1													
Mer.pass. 00:35 $\nu$ -0.5' d-0.9' m-3.94 $\nu$ 0.9' d0.6' m1.61 $\nu$ 2.0' d-0.1' m-2.03 $\nu$ 2.6' d0.1' m0.61													-
	Mer.p	ass. 00:35	$\nu$ -0.5′ d-0	).9′ m-3.94	$\nu$ 0.9′ d0	.6′ m1.61	$\nu 2.0' d-0$	.1′ m-2.03	$\nu 2.6' d0$	1′ m0.61			

h	Su	n	Moon					
Wed	GHA	Dec	GHA	ν	Dec	d	HP	
0	180°43.9	N04°55.1	333°53.0	10.5'	N09°23.2	16.7'	60.0'	
1 2	195° 44.1 210° 44.3	54.1 53.2	348°22.5 2°51.9	10.4' 10.3'	09°39.9 09°56.5	16.6' 16.6'	60.0' 60.0'	
3	225° 44.5	52.2	17°21.2	10.3	10° 13.1	16.5	60.0'	
4	240°44.8	51.3	31°50.5	10.2'	10°29.6	16.5'	60.0'	
5	255° 45.0 270° 45.2	50.3 N04°49.4	46°19.7 60°48.9	10.2' 10.1'	10°46.1 N11°02.5	16.4' 16.3'	60.0' 60.0'	
6 7	270 45.2 285°45.4	N04 49.4 48.5	60 48.9 75°18.0	10.1	N11 02.5 11°18.8	16.3	60.0	
8	300°45.6	47.5	89°47.0	10.0'	11°35.1	16.2'	60.0'	
9	315°45.9	• • 46.6	104°16.0	9.9'	11°51.3	16.1'	60.0'	
10 11	330° 46.1 345° 46.3	45.6 44.7	118°44.9 133°13.8	9.8' 9.8'	12°07.5 12°23.5	16.1' 16.0'	60.0' 60.0'	
12	0°46.5	N04°43.7	147°42.6	9.7	N12°39.5	15.9'	60.0	
13	15°46.7	42.8	$162^{\circ}11.3$	9.6'	$12^{\circ}55.5$	15.9'	60.0'	
14	30° 47.0	41.8	176°39.9 191°08.5	9.6'	13°11.3 13°27.1	15.8'	60.0'	
15 16	45° 47.2 60° 47.4	· · 40.9 39.9	205°37.0	9.5' 9.4'	13 27.1 13°42.8	15.7' 15.6'	60.0' 60.0'	
17	75°47.6	39.0	220°05.4	9.4'	13°58.5	15.5'	60.0'	
18	90°47.8	N04°38.0	234°33.8	9.3'	N14° 14.0	15.5'	60.0'	
19 20	105° 48.1 120° 48.3	37.1 36.1	249°02.0 263°30.3	9.2' 9.1'	14°29.5 14°44.9	15.4' 15.3'	60.0' 60.0'	
21	135° 48.5	35.2	203 30.3 277°58.4	9.1	15°00.2	15.2'	60.0	
22	150°48.7	34.2	292°26.5	9.0'	$15^{\circ}15.4$	15.1'	60.0'	
23	165°48.9	33.3	306°54.4	8.9'	15°30.5	15.0'	60.0'	
	SD = 15.9'	d = -0.9'		SI	O = 16.4'			
Thu	GHA	Dec	GHA	ν	Dec	d	HP	
0	180°49.2	N04°32.3	321°22.3	8.8'	N15°45.5	14.9'	60.0'	
1	195° 49.4	31.4	335°50.2	8.7'	16°00.4	14.8'	60.0'	
2	210° 49.6 225° 49.8	30.4 •• 29.5	350°17.9 4°45.6	8.7' 8.6'	16°15.3 16°30.0	14.7' 14.6'	60.0' 60.0'	
4	240° 50.0	28.5	19°13.2	8.5'	16°44.6	14.5	60.0	
5	255° 50.3	27.6	33°40.7	8.4'	16°59.2	14.4'	60.0'	
6	270° 50.5 285° 50.7	N04°26.6 25.7	48°08.1 62°35.4	8.3' 8.3'	N17°13.6 17°27.9	14.3' 14.2'	60.0' 60.0'	
7 8	285 50.7 300°50.9	25.7 24.7	62 35.4 77°02.7	8.2'	17 27.9 17°42.2	14.1	60.0	
9	315°51.1	• • 23.8	91°29.9	8.1'	17°56.3	14.0'	60.0'	
10	330°51.4	22.8	105°57.0	8.0'	18° 10.3	13.9'	60.0'	
11 12	345°51.6 0°51.8	21.9 N04°20.9	120°24.0 134°50.9	7.9' 7.8'	18°24.2 N18°37.9	13.8' 13.7'	60.0' 59.9'	
13	15° 52.0	20.0	149°17.8	7.8'	18°51.6	13.5'	59.9'	
14	30°52.2	19.0	163°44.5	7.7'	$19^{\circ}05.1$	13.4'	59.9'	
15 16	45° 52.5 60° 52.7	· · 18.1 17.1	178°11.2 192°37.8	7.6' 7.5'	19° 18.5 19° 31.8	13.3' 13.2'	59.9' 59.9'	
17	75°52.9	16.1	207°04.3	7.5 7.4'	19 31.6 19°45.0	13.1	59.9'	
18	90°53.1	N04°15.2	221°30.8	7.3'	N19°58.1	12.9'	59.9'	
19	105°53.4	14.2	235°57.1	7.3'	20°11.0	12.8'	59.9'	
20 21	120°53.6 135°53.8	13.3 •• 12.3	250°23.3 264°49.5	7.2' 7.1'	20°23.8 20°36.5	12.7' 12.5'	59.9' 59.9'	
22	150° 54.0	11.4	279°15.6	7.0'	20°49.0	12.4	59.9'	
23	165°54.2	10.4	293°41.6	6.9'	21°01.4	12.3'	59.8'	
	SD = 15.9'	d = -1.0'		SI	O = 16.4'			
Fri	GHA	Dec	GHA	ν	Dec	d	HP	
0	180°54.5	$N04^{\circ}09.5$	308°07.5	6.8'	$N21^{\circ}13.7$	12.1'	59.8'	
1	195°54.7	08.5	322°33.3	6.7'	21°25.8	12.0'	59.8'	
2 3	210° 54.9 225° 55.1	07.6 •• 06.6	336°59.1 351°24.7	6.7' 6.6'	21°37.8 21°49.6	11.9' 11.7'	59.8' 59.8'	
4	240°55.3	05.7	5°50.3	6.5	21°49.0 22°01.3	11.6'	59.8'	
5	255° 55.6	04.7	20°15.8	6.4'	22°12.9	11.4'	59.8'	
6 7	270° 55.8 285° 56.0	N04°03.8 02.8	34°41.2 49°06.5	6.3' 6.2'	N22°24.3 22°35.6	11.3' 11.1'	59.8' 59.7'	
8	300° 56.2	02.8	63°31.8	6.2	22° 46.7	11.1	59.7'	
9	315°56.5	04°00.9	77°56.9	6.1'	22°57.7	10.8'	59.7'	
10	330° 56.7 345° 56.9	03°59.9	92°22.0 106°47.0	6.0'	23°08.5 23°19.2	10.7'	59.7'	
11 12	345°56.9 0°57.1	59.0 N03°58.0	106°47.0 121°11.9	5.9' 5.8'	23° 19.2 N23° 29.7	10.5' 10.4'	59.7' 59.7'	
13	15°57.3	57.1	$135^{\circ}36.8$	5.8'	$23^{\circ}40.1$	10.2'	59.7'	
14	30°57.6	56.1	150°01.5	5.7'	23°50.3	10.0'	59.7'	
15 16	45° 57.8 60° 58.0	· · 55.2 54.2	164°26.2 178°50.8	5.6' 5.5'	24°00.3 24°10.2	9.9' 9.7'	59.6' 59.6'	
17	75°58.2	53.2	176 50.8 193°15.3	5.5'	24° 10.2 24° 19.9	9.6'	59.6'	
18	90°58.5	N03°52.3	207°39.8	5.4'	N24°29.5	9.4'	59.6'	
19 20	105° 58.7 120° 58.9	51.3 50.4	222°04.1 236°28.5	5.3' 5.2'	24°38.9 24°48.1	9.2' 9.1'	59.6' 59.6'	
21	135° 59.1	• • 49.4	250° 52.7	5.2'	24° 57.2	9.1 8.9'	59.5'	
22	150°59.3	48.5	265°16.8	5.1'	25°06.1	8.7'	59.5'	
23	165°59.6	47.5	279°40.9	5.0'	25°14.8	8.6'	59.5'	
	SD = 15.9'	D = 15.9'  d = -1.0' $SD = 16.3'$						

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.	Age		
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	18-20	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	93-77%	
10	02:56	03:06	11:57	01:48	14:14		
11	03:17	03:27	11:57	02:40	15:08		
12	03:38	03:48	11:56	03:36	16:05		

# September 13, 14, 15 UT (Sat., Sun., Mon.)

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0 0	352° 14.4	207°35.8	N14°48.3	150°11.2		240°41.9	N21°57.0	352°01.7	502°38.1			Dec
	7° 16.9	207 35.6 222°35.3		165° 12.1	07.9	240 41.9 255°43.9		7°04.4		Alpheratz	357°33.9	29°14.1
1			47.4			255 45.9 270°46.0	56.9		38.2	Ankaa	353°06.2	-42°09.8
2	22°19.4	237°34.7	46.5	180°13.0 195°13.9	08.5		56.9	22°07.0	38.2	Schedar	349°29.9	56°40.7
3	37°21.8	252°34.2	• • 45.6		• • 09.2	285°48.0	• • 56.8	37°09.7	• • 38.3	Diphda	348°46.4	-17°50.5
4	52°24.3	267°33.7	44.7	210°14.8	09.8	300°50.0	56.8	52°12.3	38.4	Achernar	$335^{\circ}19.2$	-57°06.1
5	67°26.8	282°33.1	43.8	225°15.7	10.4	315°52.1	56.7	67°14.9	38.5	Hamal	327°50.3	23°35.1
6	82°29.2	297°32.6	N14°42.9	240°16.7	S09°11.1	330°54.1	N21°56.7	82°17.6	S02°38.6	Polaris	313°29.2	89°22.1
7	97°31.7	312°32.0	42.1	255° 17.6	11.7	345°56.1	56.6	97°20.2	38.6	Acamar	$315^{\circ}11.1$	-40°11.8
8	112°34.1 127°36.6	327°31.5	41.2	270°18.5	12.3	0°58.2	56.5	112°22.8	38.7	Menkar	314°05.4	4°11.6
9		342°31.0	• • 40.3	285°19.4	• • 13.0	16°00.2	• • 56.5	127°25.5	• • 38.8	Mirfak	308°27.2	49°57.0
10	142°39.1 157°41.5	357°30.4	39.4	300°20.3	13.6	31°02.3 46°04.3	56.4	142°28.1	38.9	Aldebaran	290°38.9	16°33.7
11	157 41.5 172°44.0	12°29.9	38.5	315°21.2	14.3 \$09°14.9	46 04.3 61°06.3	56.4	157°30.8 172°33.4	39.0	Rigel	281°03.3	-8°10.1
12	172 44.0 187°46.5	27°29.4	N14°37.6	330°22.1		76°08.4	N21°56.3	172 33.4 187°36.0	S02°39.0	Capella	$280^{\circ}21.0$	46°01.3
13	202°48.9	42°28.8 57°28.3	36.7	345°23.1 0°24.0	15.5 16.2	76 08.4 91°10.4	56.3	202°38.7	39.1	Bellatrix	278°22.3	6°22.5
14 15	202 46.9 217°51.4	72°27.7	35.8 •• 34.9	15°24.9	. 16.2	106° 12.5	56.2 •• 56.2	202 36.7 217°41.3	39.2 · · 39.3	Elnath	278°01.2	28°37.7
16	217 51.4 232°53.9	87°27.2	34.0	30°25.8	17.4	100 12.5 121°14.5	56.1	232°43.9	39.4	Alnilam	275°37.2	-1°11.0
17	247° 56.3	102°26.7	33.1	45°26.7	18.1	136° 16.5	56.1	232 43.9 247°46.6	39.4	Betelgeuse	$270^{\circ}51.5$	7°24.8
										Canopus	263°52.3	-52°42.2
18	262°58.8 278°01.3	117°26.1 132°25.6	N14°32.2	60°27.6 75°28.5	S09°18.7	151° 18.6 166° 20.6	N21°56.0	262°49.2 277°51.9	S02°39.5	Sirius	258° 25.9	-16°44.8
19 20	276 01.3 293°03.7	132 25.0 147°25.1	31.3 30.4	90°29.5	19.3 20.0	181° 22.7	56.0 55.9	277 51.9 292°54.5	39.6	Adhara	255°05.6	-29°00.1
20	308° 06.2	162°24.5	29.5	90 29.5 105°30.4	. 20.6	101 22.7 196°24.7	55.8	292 54.5 307°57.1	39.7 · · 39.7	Procyon	244°50.4	5°09.7
21	308 06.2 323°08.6	102 24.5 177°24.0	28.6	105 30.4 120°31.3	21.2	211° 26.8	55.8	307 57.1 322°59.8	39.7	Pollux	243°16.8	27°57.8
22	323 08.6 338°11.1	177 24.0 192°23.5	28.0 27.7	120 31.3 135°32.2	21.2	211 26.8 226°28.8	55.8 55.7	322 59.8 338°02.4	39.8 39.9	Avior	$234^{\circ}15.0$	-59°35.2
					<del></del>					Suhail	222°46.3	-43°31.9
Mer.p	ass. 00:31	$\nu$ -0.5' d-0	).9′ m-3.94	$ u$ 0.9 $^{\prime}$ d0	.6'  m1.61	$\nu$ 2.0′ <i>d</i> -0	.1′ m-2.04	$\nu 2.6' \ d0$	1'  m0.61	Miaplacidus	221°39.0	-69°49.1
										Alphard	217° 47.5	-8°46.0
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.1	11°50.6
Sun O	353° 13.6	207°22.9	N14°26.8	150°33.1	S09°22.5	241°30.8	N21°55.7	353°05.1	S02°40.0	Dubhe	193°40.9	61°36.8
1	353 13.0 8°16.0	207 22.9 222°22.4	N14 26.8 25.9	165°34.0	23.1	241 30.8 256°32.9	N21 55.7 55.6	353 U5.1 8°07.7	40.1	Denebola	182°24.7	14°25.8
2	23° 18.5	222 22.4 237°21.9	25.9 25.0	180°34.9	23.1	250 32.9 271°34.9	55.6	23°10.3	40.1	Gienah	175°43.3	-17°41.0
3	38°21.0	252°21.3	• • 24.1	195°35.8	24.4	271 34.9 286° 37.0	• • 55.5	38°13.0	• • 40.1		173°00.2	-63°14.5
4	53°23.4	267°20.8	23.2	210°36.7	25.0	301°39.0	55.5	53°15.6	40.2	1	171°51.6	-57°15.5
5	68° 25.9	282°20.3	22.3	210 30.7 225°37.7	25.7	316°41.1	55.4	68°18.2	40.4	Alioth	166°13.0	55°49.4
6	83°28.4	202° 20.3 297° 19.7	N14°21.4	240°38.6	S09°26.3	331°43.1	N21°55.4	83°20.9	S02°40.5	Spica	158°22.0	-11°17.7
7	98°30.8	312°19.2	20.5	255° 39.5	26.9	346°45.1	55.3	98°23.5	40.5	Alkaid	152°51.9	49°11.3
8	113°33.3	327°18.7	19.6	270°40.4	27.6	1°47.2	55.3	113°26.2	40.5	Hadar	148° 35.7	-60°29.9
9	113° 35.3 128° 35.8	342°18.1	. 18.6	285°41.3	• • 28.2	16°49.2	• • 55.2	113 20.2 128°28.8	• • 40.7	1	147°57.3	-36°29.8
10	143°38.2	357°17.6	17.7	300°42.2	28.8	31°51.3	55.1	143°31.4	40.8	Arcturus	145° 47.6	19°03.1
11	158°40.7	12°17.1	16.8	315°43.1	29.5	46° 53.3	55.1	158°34.1	40.9	Rigil Kent.	139°40.0	-60°56.6
12	173°43.1	27°16.5	N14°15.9	330°44.0	509°30.1	61°55.4	N21°55.0	173°36.7	\$02°40.9	Kochab	137°20.5	74°03.2
13	188°45.6	42°16.0	15.0	345°44.9	30.7	76° 57.4	55.0	188°39.4	41.0	Zuben'ubi	136°55.6	-16°08.9
14	203°48.1	57°15.5	14.1	0°45.8	31.4	91°59.5	54.9	203°42.0	41.1	Alphecca	126°03.4	26°37.9
15	218°50.5	72°14.9	13.2	15°46.8	• • 32.0	107°01.5	• • 54.9	218°44.6	41.2	Antares	112°15.2	-26°29.4
16	233°53.0	87°14.4	12.3	30°47.7	32.6	122°03.5	54.8	233°47.3	41.2	Atria	107°09.0	-69°04.7
17	248°55.5	102°13.9	11.3	45°48.6	33.3	137°05.6	54.8	248°49.9	41.3	Sabik		-15°45.4
18	263°57.9	117°13.4	N14°10.4	60°49.5	S09°33.9	152°07.6	N21°54.7	263°52.5	S02°41.4	Shaula	96°09.6	-37°07.4
19	279°00.4	132°12.8	09.5	75°50.4	34.5	167°09.7	54.7	278°55.2	41.5	Rasalhague	95°58.0	12°32.6
20	294°02.9	147°12.3	08.6	90°51.3	35.2	182° 11.7	54.6	293°57.8	41.6	Eltanin	90°41.8	51°29.4
21	309°05.3	162°11.8	• • 07.7	105°52.2	• • 35.8	197° 13.8	• • 54.6	309°00.5	41.6	Kaus Aust.	83°31.7	-34°22.4
22	324°07.8	177°11.3	06.8	120°53.1	36.4	212° 15.8	54.5	324°03.1	41.7	Vega	80°32.7	38°48.7
23	339° 10.2	192°10.7	05.8	135°54.0	37.1	227° 17.9	54.5	339°05.7	41.8	Nunki	75°46.9	-26°15.9
										Altair	61°59.2	8°56.3
Mer.p	ass. 00:27	$\nu$ -0.5′ $d$ -0	).9′ m-3.94	u0.9′ d0	$.6^\prime$ m $1.61$	$\nu 2.0' d-0$	.1′ m-2.04	$\nu$ 2.6′ d0.	1'  m0.60	Peacock	53°04.4	-56°39.2
										Deneb	49°25.1	45°22.5
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.0	9°59.7
0	354° 12.7	207°10.2	N14°04.9	150°54.9	S09°37.7	242°19.9	N21°54.4	354°08.4	S02°41.9	Al Na'ir	27°31.7	-46°50.2
1	9°15.2	222°09.7	04.0	165°55.8	38.3	257° 22.0	54.3	9°11.0	42.0	Fomalhaut	15° 13.5	-29°29.0
2	24° 17.6	237°09.1	03.1	180°56.7	39.0	272°24.0	54.3	24°13.7	42.0	Scheat	13°44.3	28°13.5
3	39°20.1	252°08.6	02.2	195°57.7	• • 39.6	287°26.1	• • 54.2	39°16.3	42.1	Markab	13°29.0	15°20.8
4	54°22.6	267°08.1	01.2	210°58.6	40.2	302°28.1	54.2	54°18.9	42.2	Sep 13 Sat	SHA	Mer.pass
5	69°25.0	282°07.6	14°00.3	225°59.5	40.8	317°30.2	54.1	69°21.6	42.3		215°21.4	10:10
6	84°27.5	297°07.0	N13°59.4	241°00.4		332° 32.2	N21°54.1		S02°42.4		157° 56.7	13:58
7	99°30.0	312°06.5	58.5	256°01.3	42.1	347°34.3	54.0	99°26.9	42.4	1	248° 27.5	07:56
8	114°32.4	327°06.0	57.5	271°02.2	42.7	2°36.3	54.0	114°29.5	42.5	Saturn	359° 47.3	00:32
9	129°34.9	342°05.5	56.6	286°03.1	• • 43.4	17° 38.4	• • 53.9	129°32.1	42.6			
10	144° 37.4	357°05.0	55.7	301°04.0	44.0	32°40.4	53.9	144°34.8	42.7	Sep 14 Sun	SHA	Mer.pass
11	159°39.8	12°04.4	54.8	316°04.9	44.6	47° 42.4	53.8	159°37.4	42.7	1	214°09.3	10:11
12	174°42.3	27°03.9	N13°53.8	331°05.8	S09°45.3	62°44.5	N21°53.8	174°40.1	S02°42.8	1	157°19.5	13:57
13	189°44.7	42°03.4	52.9	346°06.7	45.9	77° 46.5	53.7	189°42.7	42.9		248°17.3	07:53
14	204°47.2	57°02.9	52.0	1°07.6	46.5	92°48.6	53.6	204°45.3	43.0	Saturn	359°51.5	00:28
15	219°49.7	72°02.3	• • 51.0	16°08.5	• • 47.2	107° 50.7	• • 53.6	219°48.0	• • 43.1	Sep 15 Mon	SHA	Mer.pass
16	$234^{\circ}52.1$	87°01.8	50.1	31°09.4	47.8	122°52.7	53.5	234°50.6	43.1		212°57.5	10:12
17	249°54.6	102°01.3	49.2	46°10.3	48.4	137°54.8	53.5	249°53.2	43.2		156° 42.2	13:55
18	264°57.1	117°00.8	N13°48.3	$61^{\circ}11.2$	S09°49.1	152°56.8	N21°53.4	264°55.9	S02°43.3		248°07.2	07:50
19	279°59.5	132°00.3	47.3	$76^{\circ}12.1$	49.7	167°58.9	53.4	279°58.5	43.4		359°55.7	00:23
20	295°02.0	146°59.7	46.4	$91^{\circ}13.0$	50.3	183°00.9	53.3	$295^{\circ}01.2$	43.5			
21	$310^{\circ}04.5$	161°59.2	• • 45.5	106° 13.9	• • 50.9	198°03.0	• • 53.3	310°03.8	• • 43.5	Horizont	al parallax	
22	325°06.9	176°58.7	44.5	121° 14.8	51.6	213°05.0	53.2	325°06.4	43.6		Venus:	0.1
23	340°09.4	191°58.2	43.6	136° 15.7	52.2	228°07.1	53.2	340°09.1	43.7		Mars:	0.1
Mern	ass. 00:23	ν-0.5/ d.0	).9′ m-3.93	νη α/ Αη	.6′ m1.61	ν2 0′ d₋0	.1′ m-2.05	1/2 6/ d0	.1′ m0.60			
сг.р		- 0.5 u-0	5.55	- 5.5 40			2.05					

h	Su			Moon			
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	180°59.8	N03°46.6	294°05.0	5.0'	N25°23.4	8.4'	59.5'
1	196°00.0	45.6	308°28.9	4.9'	25°31.8	8.2'	59.5'
2 3	211°00.2 226°00.5	44.6 •• 43.7	322°52.8 337°16.6	4.8' 4.8'	25°40.0 25°48.0	8.0' 7.9'	59.5' 59.4'
4	241°00.7	42.7	351°40.4	4.7'	25°55.9	7.7'	59.4'
5	256°00.9	41.8	$6^{\circ}04.1$	4.6'	26°03.6	7.5'	59.4'
6	271°01.1	N03°40.8	20°27.7	4.6'	N26°11.1	7.3'	59.4
7 8	286°01.3 301°01.6	39.9 38.9	34°51.3 49°14.8	4.5' 4.5'	26°18.4 26°25.6	7.2' 7.0'	59.4' 59.4'
9	316°01.8	• • 37.9	63°38.3	4.4'	26°32.5	6.8	59.3'
10	331°02.0	37.0	78°01.7	4.4'	26°39.3	6.6'	59.3'
11	346°02.2	36.0	92°25.1	4.3'	26°45.9	6.4'	59.3'
12 13	1°02.5 16°02.7	N03°35.1 34.1	106°48.4 121°11.7	4.3' 4.2'	N26°52.4 26°58.6	6.2' 6.1'	59.3' 59.3'
14	31°02.9	33.2	135°34.9	4.2'	27°04.7	5.9'	59.3'
15	46°03.1	• • 32.2	149°58.1	4.1'	27° 10.5	5.7'	59.2'
16	61°03.3 76°03.6	31.2	164°21.2 178°44.3	4.1'	27°16.2 27°21.7	5.5'	59.2'
17 18	91°03.8	30.3 N03°29.3	178°44.3 193°07.4	4.1' 4.0'	N27°27.0	5.3' 5.1'	59.2' 59.2'
19	106°04.0	28.4	207°30.4	4.0'	27°32.1	4.9'	59.2'
20	121°04.2	27.4	221°53.4	4.0'	$27^{\circ}37.1$	4.7'	59.1'
21	136°04.5	• • 26.4	236°16.3	3.9'	27°41.8	4.6'	59.1'
22 23	151°04.7 166°04.9	25.5 24.5	250°39.2 265°02.1	3.9' 3.9'	27° 46.4 27° 50.7	4.4' 4.2'	59.1' 59.1'
23						7.∠	33.1
	SD = 15.9'	d = -1.0'		SI	D = 16.2'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°05.1	N03°23.6	279°25.0	3.9'	N27°54.9	4.0'	59.1'
1	196°05.4 211°05.6	22.6 21.6	293°47.9 308°10.7	3.8' 3.8'	27°58.9 28°02.6	3.8' 3.6'	59.0' 59.0'
2	211 05.6 226°05.8	. 20.7	308 10.7 322°33.5	3.8'	28°02.0	3.4'	59.0'
4	241°06.0	19.7	336°56.3	3.8'	28°09.6	3.2'	59.0'
5	256°06.2	18.8	351°19.1	3.8'	28°12.8	3.0'	59.0'
6	271°06.5 286°06.7	N03°17.8 16.9	5°41.9 20°04.6	3.8' 3.8'	N28° 15.9 28° 18.7	2.8' 2.6'	58.9' 58.9'
7 8	286 06.7 301°06.9	16.9 15.9	20 04.6 34°27.4	3.8'	28° 21.3	2.0 2.4'	58.9'
9	316°07.1	• • 14.9	48°50.1	3.8'	28°23.7	2.2'	58.9'
10	331°07.4	14.0	63°12.9	3.8'	28°26.0	2.0'	58.9'
11 12	346°07.6 1°07.8	13.0 N03°12.0	77°35.6 91°58.4	3.8' 3.8'	28°28.0 N28°29.9	1.9' 1.7'	58.8' 58.8'
13	16°08.0	11.1	91 56.4 106°21.2	3.8'	28°31.6	1.7	58.8'
14	31°08.2	10.1	120°43.9	3.8'	28°33.0	1.3'	58.8'
15	46°08.5	•• 09.2	135°06.7	3.8'	28°34.3	1.1'	58.8'
16 17	61°08.7 76°08.9	08.2 07.2	149°29.5 163°52.3	3.8' 3.8'	28°35.4 28°36.3	0.9' 0.7'	58.7' 58.7'
18	91°09.1	N03° 06.3	178°15.1	3.8'	N28°37.0	0.7	58.7'
19	106°09.4	05.3	192°38.0	3.9'	28° 37.5	0.3'	58.7'
20	121°09.6	04.4	207°00.9		28°37.8	0.1'	58.7'
21 22	136°09.8 151°10.0	· · 03.4 02.4	221°23.7 235°46.7	3.9' 4.0'	28°37.9 28°37.8	-0.1' -0.3'	58.6' 58.6'
23	166°10.3	01.5	250°09.6	4.0'	28°37.6	-0.5	58.6'
	SD = 15.9'	d = -1.0'		SI	D = 16.1'		
	<u> </u>						
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	181°10.5 196°10.7	N03°00.5 02°59.6	264°32.6 278°55.6	4.0' 4.1'	N28°37.1 28°36.5	-0.6' -0.8'	58.6' 58.5'
2	211°10.9	58.6	276 55.0 293°18.7	4.1'	28°35.6	-0.6 -1.0'	58.5'
3	226°11.1	• • 57.6	307°41.8	4.1'	28°34.6	-1.2'	58.5'
4	241°11.4	56.7	322°04.9	4.2'	28°33.4	-1.4'	58.5'
5 6	256°11.6 271°11.8	55.7 N02° 54.7	336°28.1 350°51.3	4.2' 4.3'	28°32.0 N28°30.4	-1.6' -1.8'	58.5' 58.4'
7	286°12.0	53.8	5°14.6	4.3'	28°28.6	-2.0'	58.4
8	301°12.3	52.8	19°38.0	4.4'	28°26.7	-2.1'	58.4'
9	316°12.5	• • 51.9	34°01.3	4.4'	28°24.5	-2.3'	58.4'
10 11	331°12.7 346°12.9	50.9 49.9	48°24.8 62°48.3	4.5' 4.6'	28°22.2 28°19.7	-2.5' -2.7'	58.4' 58.3'
12	1°13.2	N02°49.0	77°11.8	4.6'	N28° 17.0	-2.7	58.3'
13	16°13.4	48.0	91°35.5	4.7'	28°14.1	-3.1'	58.3'
14	31°13.6	47.0	105°59.1 120°22.9	4.7'	28°11.1 28°07.8	-3.2'	58.3'
15 16	46°13.8 61°14.0	· · 46.1 45.1	120°22.9 134°46.7	4.8' 4.9'	28°07.8 28°04.4	-3.4' -3.6'	58.2' 58.2'
17	76°14.3	44.1	149°10.6	5.0'	28°00.8	-3.8'	58.2'
18	91°14.5	N02°43.2	163°34.5	5.0'	N27°57.1	-3.9'	58.2'
19	106°14.7	42.2	177°58.6	5.1'	27°53.1	-4.1'	58.2'
20 21	121°14.9 136°15.2	41.3 •• 40.3	192°22.7 206°46.8	5.2' 5.3'	27°49.0 27°44.7	-4.3' -4.5'	58.1' 58.1'
22	151°15.4	39.3	221°11.1	5.3'	27°40.3	-4.6'	58.1
23	166°15.6	38.4	235°35.4	5.4'	27°35.6	-4.8'	58.1'
	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°	02:01	03:51	05:04	18:45	19:56	21:43
<b>N</b> 70°	02:34	04:05	05:09	18:39	19:43	21:12
68°	02:58	04:15	05:14	18:35	19:33	20:49
66°	03:16	04:24	05:17	18:32	19:24	20:32
64°	03:30	04:32	05:21	18:29	19:17	20:18
62°	03:41	04:38	05:23	18:26	19:11	20:07
60°	03:51	04:43	05:26	18:24	19:06	19:58
N 58°	03:59	04:48	05:28	18:22	19:01	19:50
56°	04:06	04:52	05:30	18:20	18:57	19:43
54°	04:13	04:56	05:32	18:18	18:54	19:37
52°	04:18	04:59	05:33	18:17	18:51	19:31
50°	04:23	05:02	05:35	18:15	18:48	19:27
45°	04:33	05:08	05:38	18:13	18:42	19:17
<b>N</b> 40°	04:41	05:13	05:40	18:10	18:37	19:09
35°	04:47	05:17	05:42	18:08	18:34	19:03
30°	04:52	05:20	05:44	18:06	18:30	18:58
20°	04:59	05:25	05:47	18:03	18:26	18:51
<b>N</b> 10°	05:04	05:29	05:50	18:01	18:22	18:46
0°	05:08	05:32	05:52	17:59	18:19	18:43
<b>S</b> 10°	05:09	05:34	05:55	17:57	18:18	18:42
20°	05:09	05:35	05:57	17:54	18:16	18:42
30°	05:08	05:35	05:59	17:52	18:16	18:44
35°	05:06	05:36	06:01	17:51	18:16	18:45
40°	05:04	05:35	06:02	17:49	18:16	18:48
45°	05:01	05:35	06:04	17:48	18:17	18:51
<b>S</b> 50°	04:57	05:34	06:06	17:46	18:18	18:56
52°	04:54	05:34	06:07	17:45	18:18	18:58
54°	04:52	05:33	06:08	17:44	18:19	19:00
56°	04:49	05:32	06:09	17:43	18:20	19:03
58°	04:46	05:31	06:10	17:42	18:21	19:07
<b>S</b> 60°	04:42	05:30	06:12	17:40	18:22	19:11

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

		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	66-44%
13	03:59	04:10	11:56	04:35	17:05	
14	04:21	04:31	11:55	05:36	18:07	
15	04:42	04:53	11:55	06:38	19:08	

## September 16, 17, 18 UT (Tue., Wed., Thu.)

The   CHA   CHA   Dec   CHA   Dec   CHA   Dec   De	h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
100   10	Tue	GHA	CHA	Dec	GHA	Dec	GHA	Dec	CH4	Dec		SHA	Dec
1 1971-14 20 291-57													
2 2°18 8 29°56 6 40 111140 541 27°1131 530 25170 439 8 100°193 100°19													I
0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1											I		
5 97 17 200 56 83 9 211 202 95 4 303 17.3 25.9 57.23 441   7 100 73.1 211 214 131 31 131 4 131 5 131 20 20 20 20 20 20 20 20 20 20 20 20 20													I
No.   Part   P	4	55°21.7				55.4		52.9		44.1			
8 11871.6 1.0874.5 3.0 3.4 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	5	70°24.2	281°55.1	38.0	226°21.2	56.0	318° 19.4	52.9	70°24.9		I		
18				N13°37.0		S09°56.6				502°44.3			
10													
10   15   16   16   17   17   18   18   18   18   18   18													I
14   100"390   11   125.20   23.3   131"205   09"398   48"31.7   52.5   160"0.00   44.6													
175   175											Aldebaran	290°38.9	16°33.7
191 190°43.9											Rigel	281°03.3	
Second   1.5   1													
220°838   18°490   286   18°390   29.23   20°391   20°391   20°400													
267-517   107   40.0   26.6   147-110   26.5   139"   40.0   25.2   2675-120   2675-12		220°48.8				• • 02.3		• • 52.3		• • 45.0			
18   2007-202   1117-203   2417   270-203	16	235°51.3	86°49.4	27.6	31°31.0	02.9	123°42.0	52.3	235°54.0	45.0	I		
Section   18	17	250°53.7	101°48.9	26.6	46°31.9	03.5	138°44.0	52.2	250° 56.6	45.1	1		
200 380 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	18			N13°25.7		S10°04.2		N21°52.2		S02°45.2			
200   101   101   102   103													
11   11   11   13   13   13   14   15   15   15   15   15   15   15													
Mer.pass. 00:19													
Werl   GHA   CHA   CHA   Dec											Avior	234°14.9	-59°35.2
Wed GHA GHA GHA GHA GHA GHA GHA GHA GHA GHA	23	341 08.5	191 45.8	20.9	130 37.3	07.3	228 50.4	51.9	341 12.4	45.0	Suhail	222°46.3	-43°31.9
Fragman   Chi	Mer.p	ass. 00:19	$\nu$ -0.5 $'$ d-0	).9′ m-3.93	$\nu 0.9' \ d0$	6′ m1.60	$\nu 2.1' \ d-0$	.1' m-2.05	$\nu 2.6' \ d0.$	1'  m0.60			
GHA													
366°11.0 206°46.3 N13°20.0 151°38.2 \$10°07.9 245°58.4 N21°51.8 \$366°151. \$00°45.7 \$00°50.5 \$1.8 \$11°17.7 \$4.9 \$2.9 \$10°50.5 \$2.0 \$1.0 \$10°17.3 \$2.0 \$1.0 \$10°39.1 \$0.0 \$6. \$29°0.0 \$5.1 \$1.0 \$10°17.0 \$4.5 \$4.5 \$4.5 \$4.5 \$4.5 \$4.5 \$4.5 \$4.5	Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec			
1 11-13.5   221-44.8   18.1   1161-400   09.2   274-02.6   51.8   11-117.4   45.8   Acrus   175-04.3   3.79-14.0   3.40-02.6   51.7   41-23.0   4.59   4.50-02.6   51.7   41-23.0   4.59   4.50-02.6   51.7   41-23.0   4.59   4.50-02.6   51.7   41-23.0   4.59   4.50-02.6   51.7   41-23.0   4.59   4.50-02.6   51.7   41-23.0   4.59   4.50-02.6   51.7   41-23.0   4.59   4.50-02.6   51.7   41-23.0   4.59   4.50-02.6   51.7   41-23.0   4.59   4.50-02.6   51.7   41-23.0   4.59   4.50-02.6   51.7   41-23.0   4.59   4.50-02.6   51.7   41-23.0   4.59   4.50-02.6   51.7   41-23.0   4.59   4.50-02.6   51.7   41-23.0   4.59   4.50-02.6   51.7   41-23.0   4.59   4.50-02.6   51.7   41-23.0   4.59   4.50-02.6   51.7   41-23.0   4.59   4.50-02.6	0	$356^{\circ}11.0$	206°45.3	N13°20.0	151°38.2	S10°07.9	243°58.4	N21°51.8	$356^{\circ}15.1$	S02°45.7			
2 2615.9 286*43.8 18.1 18.1 18.1 40.0 09.2 274*02.6 31.7 26*20.4 45.8 3 4718.4 2514.3 8 17.1 196*40.9 09.2 274*02.6 31.7 26*20.4 45.8 45*20.4 45.8 3 4712.3 45*20.4 45.8 45*20.2 42.1 41.8 10.4 304*06.7 31.6 56*25.6 46.0 Alloth 16.5 17.2 3.2 326*42.7 11.5 22.2 42*42.8 11.3 31.0 40*06.7 51.6 56*25.6 46.0 Alloth 16.5 17.2 3.2 326*42.7 11.5 22.2 42*42.8 11.3 334*01.8 7.5 15.6 56*25.6 46.0 Alloth 16.5 13.0 55*49.3 57.0 10.1 28.2 31.4 11.3 32*2.8 3.5 15.1 11.3 334*01.8 7.5 15.5 86*30.5 50*2.4 6.2 Alloth 16.5 13.0 55*49.3 57.0 10.1 28.2 31.4 11.3 11.3 349*12.8 3.5 15.1 11.3 334*01.8 32*13.5 15.1 12.3 349*12.8 3.5 15.1 12.3 349*12.8 3.5 15.1 12.3 349*12.8 3.5 15.1 12.3 349*12.8 3.5 15.1 12.3 349*12.8 3.5 15.1 12.3 349*12.8 3.5 15.1 12.3 349*12.8 3.5 15.1 12.3 349*12.8 3.5 15.1 12.3 349*12.8 3.5 15.1 12.3 349*12.8 3.5 15.1 12.3 349*12.8 3.5 15.1 12.3 349*12.8 3.5 15.1 12.3 349*12.8 3.5 15.1 12.3 349*12.8 3.5 15.1 12.3 349*12.8 3.5 15.5 64*23.1 N21.5 12.0 12.4 46.5 Kochab 31.3 191*33.0 41*38.7 0.0 5.5 64*23.1 N21.5 12.0 191*94.4 46.7 Kochab 31.3 191*33.0 41*38.7 0.0 5.5 64*23.1 N21.5 12.0 191*94.4 46.7 Kochab 31.3 191*33.0 41*38.7 0.0 5.5 64*23.1 N21.5 12.0 191*94.4 46.7 Kochab 31.3 191*33.0 41*38.7 0.0 5.3 46*99.1 16.1 79*25.2 51.2 191*94.4 46.7 Kochab 31.3 191*33.0 41*38.7 0.0 5.5 64*23.1 N21.5 12.0 191*94.4 46.7 Kochab 31.3 191*33.0 41*38.7 0.0 5.5 64*23.1 N21.5 12.0 191*94.4 46.7 Kochab 31.3 191*33.0 41*38.7 0.0 5.5 64*23.1 N21.5 12.0 191*94.4 46.7 Kochab 31.0 12.2 191*94.4 46.7 Kochab 31.0 12.2 191*94.4 46.7 Kochab 31.0 12.2 191*94.4 46.7 Kochab 31.0 12.2 191*94.4 46.7 Kochab 31.0 12.2 191*94.4 46.7 Kochab 31.0 12.2 191*94.1 46.7 Kochab 31.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 1										45.8	1		
5 7°20.9 26°43.3 16.2 211'1.8 10.4 304°6.7 51.6 56°2.6 40.0   5 7°20.3 28°14.27 15.2 226°42.7 11.1 31°6.8 7 51.6 71'28.3 46.1 71'28.3													
5 71°23 3 281°27 1 5.2 226°427 11.1 319°68.7 51.6 71′28 3 44.1 56.8 68°39.9 20′46.2 113°14.2 241°33.6 510°11.7 334°10.8 N21°51.5 86°39.9 20′46.2 Alaid 158°25.7 30′29.2 81°14.7 13.3 256°44.5 12.3 349°12.8 51.5 101°33.6 46.2 Alaid 158°25.7 30′29.9 131°38.7 11.4 286°46.3 13.6 19°17.0 51.4 116°36.2 46.3 Martin 16°38.1 11°39.7 09.4 316°48.1 14.2 34°19.0 51.3 16°44.1 46.5 11.1 16°38.1 11°39.7 09.4 316°48.1 14.8 49°21.1 51.3 161°44.1 46.5 11.1 16°38.1 11°39.7 09.4 316°48.1 14.8 49°21.1 51.3 161°44.1 46.5 11.1 16°38.1 11°39.7 09.4 316°48.1 14.8 49°21.1 51.3 161°44.1 46.5 11.1 16°38.1 11°39.7 09.4 316°48.1 14.8 49°21.1 51.3 161°44.1 46.5 11.1 16°38.1 11°39.7 09.4 316°48.1 14.8 49°21.1 51.3 161°44.1 46.5 11.1 16°38.1 11°39.7 09.4 316°48.1 14.8 49°21.1 51.3 16°47.6 16°48.9 11.1 16°38.1 11°39.7 0.5 140°49.9 16.1 79°25.2 51.2 19°49.4 46.7 14.2 46.8 14.2 46.5 11.2 16°4.5											Gacrux	171°51.6	-57°15.4
86°288 296°422 Mil*314.7 133 56°445 123 349°108 N21*91.5 86°30.9 502*46.2 7 101°82 311*41.7 133 256°445 123 349°108 N21*91.5 86°30.9 502*46.2 8 116°30.7 326°41.2 12.3 271°45.4 13.0 4°14.9 51.4 116°36.2 46.3 9 131°33.2 341*40.7 1.11.4 286°46.3 13.6 19°17.0 51.4 116°36.2 46.3 10 146°35.6 356°40.2 10.4 301°47.2 14.2 34°19.0 51.3 160°41.5 46.5 11 161°38.1 11°39.7 09.4 301°47.2 14.2 34°19.0 51.3 161°41.5 46.5 12 176°40.6 26°39.2 N13°08.5 331°49.0 51°15.5 64°23.1 N21°51.2 176°46.8 502*46.6 12 176°40.6 26°39.2 N13°08.5 331°49.0 51°15.5 64°23.1 N21°51.2 176°46.8 502*46.6 13 191°43.0 41°38.7 07.5 346°49.9 16.1 79°52.2 51.2 11°49.4 46.7 14 206°45.5 56°38.2 06.6 16°51.7 17.3 106°93.3 51.1 206°52.1 46.8 15 221°48.0 71°37.7 0.56.6 16°51.7 17.3 106°93.3 51.1 206°52.1 46.8 15 221°48.0 71°37.7 0.56.6 03.7 46°35.2 18.6 139°33.5 50.9 25°00.0 47.0 16 236°50.4 86°37.2 04.6 31°52.6 18.0 124°31.4 51.0 236°57.3 46.9 17 251°52.9 101°36.6 03.7 6°55.2 18.6 139°3.5 50.9 25°00.0 47.0 18 266°55.3 116°36.1 N13°0.7 61°54.3 100°19.2 154°35.5 N21°50.9 25°00.0 47.0 18 266°55.3 16°36.1 N13°0.8 91°56.1 20.5 184°99.6 50.8 227°07.9 47.3 20 297°0.3 146°35.1 13°0.8 91°56.1 20.5 184°99.6 50.8 227°07.9 47.3 21 312°0.7 161°34.6 12°59.8 106°57.0 21.1 199°1.7 50.7 312°10.5 47.3 22 327°05.2 176°34.1 58.8 121°57.9 21.7 214°43.8 50.7 327°13.2 47.4 22 327°15.1 236°32.1 50.8 126°51.5 106°57.0 23.6 256°0.0 50.5 12°21.1 47.7 21 31°26.2 26°55.9 186°57.3 50.9 182°10.5 24.2 227°45.8 50.6 342°13.8 47.5 21 12°12.6 221°32.6 55.9 186°57.5 182°0.1 50.5 12°21.7 47.7 21 31°29.3 340°17.5 55.0 182°0.1 50.0 50.0 50.0 50.2 12°21.7 47.7 21 31°29.3 340°17.5 55.0 182°10.5 24.2 274°52.0 50.5 27°23.7 47.7 21 31°29.3 340°17.5 55.0 182°10.5 24.2 274°52.0 50.5 27°23.7 47.7 21 31°29.3 340°17.5 55.0 182°10.5 24.2 274°52.0 50.5 27°23.7 47.7 21 31°29.3 340°1.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 5											Alioth		
8 116°307 336°412 123 25°445 123 349°12.8 51.5 101°33.6 46.2   8 116°307 336°412 123 271°45.4 130 4°149 51.4 116°33.6 46.2   9 131°33.2 341°40,7 11.4 286°46.3 13.6 19°17.0 51.4 131°33.9 46.4   11 161°33.1 11°39.7 09.4 316°48.1 14.8 49°21.1 51.3 161°44.1 46.5   12 176°40.6 26°39.2 N13°08.5 331°49.0 51.3 16°41.4 44.1 46.5   13 191°43.0 41°38.7 07.5 346°49.9 16.1 79°55.2 51.2 191°49.4 46.7   14 206°45.5 56°38.2 06.6 1°50.8 16.7 99°7.3 51.1 206°52.1 16°48.8 24.8   16 221°48.0 71°37.7 05.6 16°51.7 17.3 100°9.3 51.1 221°48.7 4.49.   16 221°48.0 71°37.7 05.6 16°51.7 17.3 100°9.3 51.1 221°48.7 4.49.   17 251°52.9 101°36.6 03.7 46°33.5 18.6 139°33.5 50.9 25°20.0 4.0   18 206°55.3 116°36.1 N13°0.7 61°54.3 19.9 15.5 102°35.1 40.2 46.7   19 281°57.8 131°35.6 01.7 76°55.2 19.8 160°37.6 50.8 220°0.3 47.2   19 281°57.8 131°35.6 01.7 76°55.2 19.8 160°37.6 50.8 220°0.3 47.2   10 292°0.3 146°35.1 13°00.8 91°56.1 02.0 1143.8 50.7 321°15.5 121°15.   12 21°24.7 101°35.6 57.9 136°58.8 22.4 229°45.8 50.6 342°15.8 47.5    Mer.pass. 00:15 V-0.5' d-1.0' m-3.93 V-0.9' d.0.6' m1.60 V-2.1' d-0.1' m-2.05 V-2.6' d-1.1' m-5.9   12 21°25.1 221°25.5 59°1 10°0.6 23.6 25°3.0 37°1.5 49°2.2 11°33.8 00°2.2 11°33.8 00°3.0 12°32.6   13 342°0.7 191°33.6 55.9 136°58.8 22.4 229°45.8 50.6 342°15.8 47.5    Mer.pass. 00:15 V-0.5' d-1.0' m-3.93 V-0.9' d.0.6' m1.60 V-2.1' d-0.1' m-2.05 V-2.6' d-1.1' m-5.9   12 22°151. 226°23.1 55.0 11°20.0 24°2.2 25°30.0 50.5 12°21.5 47.3   12 12°12.6 221°32.5 55.0 11°0.0 2.5 186°9.5 50.5 12°21.5 50°47.6   12 22°151. 226°29.1 50.0 132°0.1 1.2 22°1.1 50°4.3 1.1 30°4.0 1.1 3													I
8 116°30.7 326°41.2 12.3 271°48.4 130 4°14.9 51.4 116°36.2 46.3 46.4 14.6 59 11.6 13.2 271°48.4 131°39.3 46.4 131°32.3 341°40.7 11.1.4 286°40.3 13.6 14.8 49°12.1 51.3 161°44.1 46.5 16.5 11. 161°38.1 11°39.7 094 316°48.1 14.8 49°21.1 51.3 161°44.1 46.5 16.6 12.1 161°38.1 11°39.7 094 316°48.1 14.8 49°21.1 51.3 161°44.1 46.5 16.5 12.1 161°40.6 26°39.2 N13°08.5 331°49.0 \$10°15.5 64°23.1 N21°81.2 176°40.6 26°39.2 N13°08.5 331°49.0 \$10°15.5 64°23.1 N21°81.2 176°40.6 \$0.00°45.5 56°38.2 06.6 1°50.8 16°7.7 99°5.2 51.2 191°49.4 46.7 14.0 14.0 14.0 14.0 14.0 14.0 14.0 14.0													
131°33.2   341°40.7   11.4   266°46.3   1.13   19°17.0   51.4   131°38.9   1.46   1.													
10 146°35.6 356°40.2 10.4 316°48.1 14.8 34°19.0 51.3 16°41.5 46.5 11 161°38.1 1197 09.4 316°48.1 14.8 92°21.1 51.3 161°41.5 46.5 (Kochab 137°20.5 74°36.3 12°176°40.6 26°39.2 N13°08.5 313°49.0 510°15.5 64°23.1 N21°51.2 176°46.8 502°46.6 Kochab 137°20.5 74°36.3 12°174.0 14°30.4 14.8 31°49.0 510°15.5 64°23.1 N21°51.2 176°46.8 502°46.6 Kochab 137°20.5 74°36.3 12°174.0 14°30.4 14.8 14.8 14.8 14.8 14.8 14.8 14.8 14	9		341°40.7										
11 101'38.1 11'39.7 094 310'48.1 14.8 49'21.1 51.3 161'44.1 40.5 de 302'46.6 12'10'40.6 20'39.2 N13'08.5 331'40'0 510'15.5 de'23.1 N21'51.2 170'64.8 502'46.6 502'46.6 13'08.2 06.6 1'50.8 16.7 99'25.2 51.2 191'04.9 4 d6.7 d6.7 d6.7 d6.7 d6.7 d6.7 d6.7 d6.7	10	146°35.6	356°40.2	10.4	301°47.2	14.2	34°19.0	51.3		46.5	I		
13 191°43.0 41°38.7 07.5 346°49.9 16.1 79°55.2 51.2 191°49.4 46.7 46.7 12°20°45.5 56°38.2 06.6 1°50.8 16.7 4°27.3 51.1 201°55.1 46.8 126°37.6 16. 236°59.4 86°31.2 04.6 31°52.6 18.0 12°31.4 51.0 236°57.3 46.9 16. 236°59.4 86°31.2 04.6 31°52.6 18.0 12°31.4 51.0 236°57.3 46.9 18.0 12°31.4 51.0 236°57.3 46.9 18.0 12°31.4 18.2 26°55.3 16.6 30.7 46°33.5 18.6 139°33.5 50.9 252°0.0 47.0 5abik 102°02.2 15°45.4 18.0 236°57.3 46.9 201°57.8 131°35.6 01.7 76°55.2 19.8 169°37.6 50.8 282°55.3 47.2 20 297°0.3 146°35.1 13°03.8 91°56.1 20.5 184°39.6 50.8 282°55.3 47.2 21 312°02.7 161°34.6 12°59.8 106°57.0 21.1 19°41.7 **50.7 312°10.5 **47.3 22 327°05.2 176°34.1 58.8 121°57.9 130°88.8 22.4 229°45.8 50.6 332°13.5 47.4 40.1 40.1 40.1 40.1 40.1 40.1 40.1 40													
14 206°45.5 56°38.2 06.6 1°90.8 16.7 94°27.3 5.1.1 206°52.1 46.8 Aprile 2.20°29.4 1 2.20°2.2 1.20°2.2											Zuben'ubi		
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9 132°32.3 341°28.6 · · · 48.2 287°07.7 · · · 28.6 20°06.5 · · · 50.1 132°42.2 · · · 48.3 10 147°34.8 356°28.1													
10											Saturn	339 39.9	00.19
11 162°37.2 11°27.6 46.2 317°09.5 29.9 50°10.6 50.0 162°47.5 48.4 12 177°39.7 26°27.1 N12°45.2 332°10.4 \$10°30.5 65°12.7 N21°50.0 177°50.2 \$02°48.5 13 192°42.2 41°26.6 44.3 347°11.3 31.1 80°14.7 49.9 192°52.8 48.6 14 207°44.6 56°26.1 43.3 2°12.2 31.7 95°16.8 49.8 207°55.4 48.7 15 222°47.1 71°25.6 · 42.3 17°13.1 · 32.4 110°18.9 · 49.8 222°58.1 · 48.8 16 237°49.6 86°25.1 41.3 32°13.9 33.0 125°20.9 49.7 238°00.7 48.8 17 252°52.0 101°24.6 40.3 47°14.8 33.6 140°23.0 49.7 253°03.4 48.9 18 267°54.5 116°24.1 N12°39.4 62°15.7 \$10°34.2 155°25.1 N21°49.6 268°06.0 \$02°49.0 19 282°57.0 131°23.6 38.4 77°16.6 34.9 170°27.1 49.6 283°08.6 49.1 20 297°59.4 146°23.1 37.4 92°17.5 35.5 185°29.2 49.5 298°11.3 49.2 21 313°01.9 161°22.6 · 36.4 107°18.4 · 36.1 200°31.3 · 49.5 313°13.9 · 49.2 22 328°04.3 176°22.1 35.4 122°19.3 36.7 215°33.3 49.4 328°16.6 49.3 23 343°06.8 191°21.6 34.5 137°20.2 37.4 230°35.4 49.4 343°19.2 49.4  Wenus 210°34.3 Mars 155°27.2 13:53  Jupiter 247°47.4 07:43  Saturn 0°04.1 00:15  Sep 18 Thu SHA Mer.pass Venus 209°23.0 10:14  Mars 154°49.6 13:51  Jupiter 247°37.8 07:40  Saturn 0°08.3 00:11  Horizontal parallax Venus: 0.1  Mars: 0.1													
12 177°39.7 26°27.1 N12°45.2 332°10.4 S10°30.5 65°12.7 N21°50.0 177°50.2 S02°48.5 13 192°42.2 41°26.6 44.3 347°11.3 31.1 80°14.7 49.9 192°52.8 48.6 14 207°44.6 56°26.1 43.3 2°12.2 31.7 95°16.8 49.8 207°55.4 48.7 15 222°47.1 71°25.6 ··· 42.3 17°13.1 ··· 32.4 110°18.9 ··· 49.8 222°58.1 ··· 48.8 16 237°49.6 86°25.1 41.3 32°13.9 33.0 125°20.9 49.7 238°00.7 48.8 17 252°52.0 101°24.6 40.3 47°14.8 33.6 140°23.0 49.7 253°03.4 48.9 18 267°54.5 116°24.1 N12°39.4 62°15.7 \$10°34.2 155°25.1 N21°49.6 268°06.0 \$02°49.0 19 282°57.0 131°23.6 38.4 77°16.6 34.9 170°27.1 49.6 283°08.6 49.1 20 297°59.4 146°23.1 37.4 92°17.5 35.5 185°29.2 49.5 298°11.3 49.2 21 313°01.9 161°22.6 ··· 36.4 107°18.4 ··· 36.1 200°31.3 ··· 49.5 313°13.9 ··· 49.2 22 328°04.3 176°22.1 35.4 122°19.3 36.7 215°33.3 49.4 328°16.6 49.3 23 343°06.8 191°21.6 34.5 137°20.2 37.4 230°35.4 49.4 343°19.2 49.4 Mars: 0.1											<b>I</b>		
13 192 42.2 41 26.6 44.3 347 11.3 31.1 80 14.7 49.9 192 52.8 48.6   14 207° 44.6 56° 26.1 43.3 2° 12.2 31.7 95° 16.8 49.8 207° 55.4 48.7   15 222° 47.1 71° 25.6 · · 42.3 17° 13.1 · · 32.4 110° 18.9 · · · 49.8 222° 58.1 · · · 48.8   16 237° 49.6 86° 25.1 41.3 32° 13.9 33.0 125° 20.9 49.7 238° 00.7 48.8   17 252° 52.0 101° 24.6 40.3 47° 14.8 33.6 140° 23.0 49.7 253° 03.4 48.9   18 267° 54.5 116° 24.1 N12° 39.4 62° 15.7 \$10° 34.2 155° 25.1 N21° 49.6 268° 06.0 \$02° 49.0   19 282° 57.0 131° 23.6 38.4 77° 16.6 34.9 170° 27.1 49.6 283° 08.6 49.1   20 297° 59.4 146° 23.1 37.4 92° 17.5 35.5 185° 29.2 49.5 298° 11.3 49.2   21 313° 01.9 161° 22.6 · · · 36.4 107° 18.4 · · · 36.1 200° 31.3 · · · 49.5 313° 13.9 · · · 49.2   22 328° 04.3 176° 22.1 35.4 122° 19.3 36.7 215° 33.3 49.4 328° 16.6 49.3   23 343° 06.8 191° 21.6 34.5 137° 20.2 37.4 230° 35.4 49.4 343° 19.2 49.4    Saturn 0° 04.1 00:15  Saturn 0° 04.1 00:15  Sep 18 Thu SHA Mer.pass Venus 209° 23.0 10:14  Mars 154° 49.6 13:51  Jupiter 247° 37.8 07:40  Saturn 0° 08.3 00:11  Horizontal parallax  Venus: 0.1  Mars: 0.1			26°27.1		332°10.4		65°12.7						
14 200°44.6 56°26.1 43.3 2°12.2 31.7 95°16.8 49.8 207°55.4 48.7  15 222°47.1 71°25.6 · · 42.3 17°13.1 · · · 32.4 110°18.9 · · · 49.8 222°58.1 · · · 48.8  16 237°49.6 86°25.1 41.3 32°13.9 33.0 125°20.9 49.7 238°00.7 48.8  17 252°52.0 101°24.6 40.3 47°14.8 33.6 140°23.0 49.7 253°03.4 48.9  18 267°54.5 116°24.1 N12°39.4 62°15.7 \$10°34.2 155°25.1 N21°49.6 268°06.0 \$02°49.0  19 282°57.0 131°23.6 38.4 77°16.6 34.9 170°27.1 49.6 283°08.6 49.1  20 297°59.4 146°23.1 37.4 92°17.5 35.5 185°29.2 49.5 298°11.3 49.2  21 313°01.9 161°22.6 · · · 36.4 107°18.4 · · · 36.1 200°31.3 · · · 49.5 313°13.9 · · · 49.2  22 328°04.3 176°22.1 35.4 122°19.3 36.7 215°33.3 49.4 328°16.6 49.3  23 343°06.8 191°21.6 34.5 137°20.2 37.4 230°35.4 49.4 343°19.2 49.4  Sep 18 Thu SHA Mer.pass Venus 209°23.0 10:14  Mars 154°49.6 13:51  Jupiter 247°37.8 07:40  Saturn 0°08.3 00:11  Horizontal parallax  Venus: 0.1  Mars: 0.1													
16 237°49.6 86°25.1 41.3 32°13.9 33.0 125°20.9 49.7 238°00.7 48.8 17 252°52.0 101°24.6 40.3 47°14.8 33.6 140°23.0 49.7 253°03.4 48.9 18 267°54.5 116°24.1 N12°39.4 62°15.7 \$10°34.2 155°25.1 N21°49.6 268°06.0 \$02°49.0 19 282°57.0 131°23.6 38.4 77°16.6 34.9 170°27.1 49.6 283°08.6 49.1 20 297°59.4 146°23.1 37.4 92°17.5 35.5 185°29.2 49.5 298°11.3 49.2 19 313°01.9 161°22.6 · 36.4 107°18.4 · 36.1 200°31.3 · 49.5 313°13.9 · 49.2 22 328°04.3 176°22.1 35.4 122°19.3 36.7 215°33.3 49.4 328°16.6 49.3 23 343°06.8 191°21.6 34.5 137°20.2 37.4 230°35.4 49.4 343°19.2 49.4      Venus 200°23.0 10:14													
17													
18											I		
19 282°57.0 131°23.6 38.4 77°16.6 34.9 170°27.1 49.6 283°08.6 49.1 20 297°59.4 146°23.1 37.4 92°17.5 35.5 185°29.2 49.5 298°11.3 49.2 21 313°01.9 161°22.6 · 36.4 107°18.4 · 36.1 200°31.3 · 49.5 313°13.9 · 49.2 22 328°04.3 176°22.1 35.4 122°19.3 36.7 215°33.3 49.4 328°16.6 49.3 23 343°06.8 191°21.6 34.5 137°20.2 37.4 230°35.4 49.4 343°19.2 49.4    Saturn 0°08.3 00:11     Horizontal parallax   Venus: 0.1     Mars: 0.1													
20 297°59.4 146°23.1 37.4 92°17.5 35.5 185°29.2 49.5 298°11.3 49.2 21 313°01.9 161°22.6 ·· 36.4 107°18.4 ·· 36.1 200°31.3 ·· 49.5 313°13.9 ·· 49.2 22 328°04.3 176°22.1 35.4 122°19.3 36.7 215°33.3 49.4 328°16.6 49.3 23 343°06.8 191°21.6 34.5 137°20.2 37.4 230°35.4 49.4 343°19.2 49.4  Horizontal parallax Venus: 0.1 Mars: 0.1													
22 328°04.3 176°22.1 35.4 122°19.3 36.7 215°33.3 49.4 328°16.6 49.3 Venus: 0.1 23 343°06.8 191°21.6 34.5 137°20.2 37.4 230°35.4 49.4 343°19.2 49.4 Mars: 0.1													
23 343°06.8 191°21.6 34.5 137°20.2 37.4 230°35.4 49.4 343°19.2 49.4 Mars: 0.1											Horizont	•	0.7
25 545 00.0 151 21.0 54.5 151 20.2 51.4 250 55.4 45.4 545 15.2 45.4													
Mer.pass. 00:11 $\nu$ -0.5' $d$ -1.0' m-3.93 $\nu$ 0.9' $d$ 0.6' m1.60 $\nu$ 2.1' $d$ -0.1' m-2.06 $\nu$ 2.6' $d$ 0.1' m0.59	23	343~06.8										ividI5.	0.1
	Mer.p	ass. 00:11	$\nu$ -0.5' d-1	0′ m-3.93	$\nu$ 0.9′ d0.	6′ m1.60	$\nu$ 2.1′ d-0	.1′ m-2.06	$\nu$ 2.6′ d0.	1′ m0.59			

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	181°15.8	N02°37.4	249°59.9	5.5'	N27°30.8	-5.0'	58.0'
1	196°16.1	36.4	264°24.4	5.6'	27°25.9	-5.1'	58.0'
2	211°16.3	35.5	278°49.0	5.7'	27°20.7	-5.3'	58.0'
3	226°16.5	• • 34.5	293°13.6	5.8'	27°15.4	-5.5'	58.0'
4	241°16.7	33.5	307°38.4	5.9'	27°09.9	-5.6'	58.0'
5	256°16.9	32.6	322°03.2	5.9'	27°04.3	-5.8'	57.9'
6	271°17.2 286°17.4	N02°31.6 30.7	336°28.2 350°53.2	6.0' 6.1'	N26°58.5 26°52.6	-6.0' -6.1'	57.9' 57.9'
7 8	301°17.6	30.7 29.7	5°18.4	6.2	26°46.4	-6.1 -6.3	57.9'
9	316°17.8	28.7	19°43.6	6.3'	26°40.4	-6.4	57.8'
10	331°18.1	27.8	34°08.9	6.4'	26°33.7	-6.6'	57.8'
11	346°18.3	26.8	48°34.3	6.5'	26°27.2	-6.7'	57.8'
12	1°18.5	N02°25.8	62°59.8	6.6'	N26°20.4	-6.9'	57.8'
13	16°18.7	24.9	77°25.4	6.7'	26°13.5	-7.0'	57.8'
14	31°19.0	23.9	91°51.1	6.8'	26°06.5	-7.2'	57.7'
15 16	46°19.2 61°19.4	· · 22.9 22.0	106°16.9 120°42.8	6.9' 7.0'	25°59.3 25°51.9	-7.3' -7.5'	57.7' 57.7'
17	76°19.6	21.0	135°08.9	7.0 7.1'	25°44.4	-7.6'	57.7'
18	91°19.8	N02° 20.0	149°35.0	7.2'	N25°36.8	-7.8'	57.7'
19	106°20.1	19.1	164°01.2	7.3'	25°29.0	-7.9'	57.6'
20	121°20.3	18.1	178°27.5	7.4'	25°21.1	-8.1'	57.6'
21	136°20.5	•• 17.1	$192^{\circ}53.9$	7.5'	$25^{\circ}13.0$	-8.2'	57.6'
22	151°20.7	16.2	207°20.5	7.6'	25°04.8	-8.3	57.6'
23	166°21.0	15.2	221°47.1	7.7'	24°56.5	-8.5'	57.5'
	SD = 15.9'	d = -1.0'		SI	O = 15.8'		
Wed	GHA	Dec	GHA	ν	Dec	d	НР
0	181°21.2	N02°14.2	236°13.8	7.8'	N24°48.0	-8.6'	57.5'
1	196°21.4	13.3	250°40.7	8.0'	24°39.4	-8.7'	57.5'
2	211°21.6	12.3	265°07.6	8.1'	24°30.7	-8.9'	57.5'
3	226°21.9	• • 11.3	279°34.7	8.2'	24°21.8	-9.0'	57.5'
4	241°22.1	10.4	294°01.9	8.3'	24°12.8	-9.1'	57.4'
5	256°22.3	09.4	308°29.2	8.4'	24°03.6	-9.3'	57.4
6 7	271°22.5 286°22.7	N02°08.4 07.5	322°56.5 337°24.0	8.5' 8.6'	N23°54.4 23°45.0	-9.4' -9.5'	57.4' 57.4'
8	301°23.0	07.5 06.5	351° 51.7	8.7'	23 45.0 23°35.5	-9.5 -9.6'	57.4 57.3'
9	316°23.2	05.5	6°19.4	8.8'	23°25.8	-9.8'	57.3'
10	331°23.4	04.6	20°47.2	8.9'	23°16.1	-9.9'	57.3'
11	346°23.6	03.6	$35^{\circ}15.1$	9.0'	23°06.2	-10.0'	57.3'
12	1°23.9	N02°02.6	49°43.2	9.1'	N22°56.2	-10.1'	57.3'
13	16°24.1	01.7	64°11.3	9.3'	22°46.1	-10.2'	57.2'
14	31°24.3	02°00.7	78°39.6	9.4'	22°35.9 22°25.5	-10.3'	57.2'
15 16	46°24.5 61°24.8	01°59.7 58.8	93°07.9 107°36.4	9.5' 9.6'	22°25.5 22°15.1	-10.5' -10.6'	57.2' 57.2'
17	76°25.0	56.8 57.8	107 30.4 122°05.0	9.0 9.7'	22°04.5	-10.0 -10.7'	57.2 57.1'
18	91°25.2	N01°56.8	136°33.7	9.8'	N21°53.8	-10.8	57.1
19	106°25.4	55.9	151°02.5	9.9'	21°43.1	-10.9'	57.1'
20	121°25.6	54.9	165°31.4	10.0'	21°32.2	-11.0'	57.1'
21	136°25.9	• • 53.9	180°00.4	10.1'	21°21.2	-11.1'	57.1'
22	151°26.1	53.0	194°29.5	10.2'	21°10.1	-11.2'	57.0'
23	166°26.3	52.0	208°58.7	10.3'	20°58.9	-11.3'	57.0'
	SD = 15.9'	d = -1.0'		SI	O = 15.7'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°26.5	N01°51.0	223°28.0	10.4'	N20°47.6	-11.4'	57.0'
1	196°26.8 211°27.0	50.1 49.1	237°57.5 252°27.0	10.5'	20°36.2	-11.5'	57.0'
2	211°27.0 226°27.2	49.1 • • 48.1	252°27.0 266°56.7	10.6' 10.7'	20°24.7 20°13.2	-11.6' -11.7'	57.0' 56.9'
3 4	241°27.4	47.2	200 50.7 281°26.4	10.7	20°13.2	-11. <i>1</i> -11.8'	56.9'
5	256°27.7	46.2	295°56.3	11.0'	19°49.7	-11.9	56.9'
6	271°27.9	N01°45.2	310°26.2	11.1'	N19°37.9	-11.9'	56.9'
7	286°28.1	44.2	$324^{\circ}56.3$	11.2'	$19^{\circ}25.9$	-12.0'	56.8'
8	301°28.3	43.3	339°26.4	11.3'	19°13.9	-12.1'	56.8'
9	316°28.5	• • 42.3	353°56.7	11.4'	19°01.8	-12.2'	56.8'
10 11	331°28.8 346°29.0	41.3 40.4	8°27.0 22°57.5	11.5' 11.6'	18°49.6 18°37.3	-12.3' -12.4'	56.8' 56.8'
11	1°29.2	40.4 N01°39.4	22°57.5 37°28.1	11.6	18°37.3 N18°24.9	-12.4' -12.4'	56.7'
13	16°29.4	38.4	51°58.7	11.8'	18° 12.5	-12.5'	56.7
14	31°29.7	37.5	66°29.5	11.8'	18°00.0	-12.6'	56.7'
15	46°29.9	• • 36.5	81°00.3	11.9'	17°47.4	-12.7'	56.7'
16	61°30.1	35.5	95°31.2	12.0'	17°34.7	-12.8'	56.7'
17	76°30.3	34.6	110°02.3	12.1'	17°21.9	-12.8'	56.6'
18	91°30.5	N01°33.6	124°33.4 139°04.6	12.2'	N17°09.1 16°56.2	-12.9'	56.6'
19 20	106°30.8 121°31.0	32.6 31.7	139°04.6 153°36.0	12.3' 12.4'	16°56.2 16°43.2	-13.0' -13.0'	56.6' 56.6'
21	136°31.2	30.7	168°07.4	12.5'	16°30.2	-13.1'	56.5
22	151°31.4	29.7	182°38.9	12.6'	16° 17.1	-13.2	56.5
23	166°31.7	28.7	197°10.5	12.7'	16°03.9	-13.2'	56.5'
	SD = 15.9'	d = -1.0'		SI	D = 15.5'		

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

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

# September 19, 20, 21 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	358°09.3	206°21.1	N12°33.5	152°21.1	S10°38.0	245°37.5	N21°49.3	358°21.8	S02°49.5			
1	13° 11.7	221°20.6	32.5	167°21.9	38.6	260°39.5	49.3	13°24.5	49.6	Alpheratz	357°33.8	$29^{\circ}14.1$
2	28° 14.2	236°20.1	31.5	182°22.8	39.2	275°41.6	49.2	28°27.1	49.6	Ankaa	353°06.1	-42°09.8
3	43° 16.7	251°19.6	30.5	197°23.7	39.8	290°43.7	49.2	43°29.8	• • 49.7	Schedar	349°29.9	56°40.7
4	58° 19.1	266°19.1	29.5	212°24.6	40.5	305° 45.7	49.1	58°32.4	49.8	Diphda	348°46.4	-17°50.5
5	73°21.6	281°18.6	28.5	227°25.5	41.1	320° 47.8	49.1	73°35.1	49.9	Achernar	335°19.2	-57°06.1
6	88°24.1	296°18.1	N12°27.6	242°26.4	S10°41.7	335° 49.9	N21°49.0	88°37.7	S02°49.9	Hamal	327°50.3	23°35.1
7	103°26.5	311°17.6	26.6	257°27.3	42.3	350° 52.0	49.0	103°40.3	50.0	Polaris	313°26.5	89°22.1
8	118° 29.0	326°17.1	25.6	272°28.1	43.0	5°54.0	48.9	118°43.0	50.1	Acamar	$315^{\circ}11.0$	-40°11.8
9	133°31.4	341°16.6	24.6	287°29.0	• • 43.6	20°56.1	• • 48.9	133°45.6	50.2	Menkar	314°05.3	$4^{\circ}11.6$
10	148°33.9	356°16.1	23.6	302°29.9	44.2	35°58.2	48.8	148°48.3	50.3	Mirfak	308°27.2	49°57.1
11	163°36.4	11°15.7	22.6	317°30.8	44.8	51°00.2	48.8	163°50.9	50.3	Aldebaran	290°38.9	16°33.7
12	178° 38.8	26°15.2	N12°21.6	332°31.7	S10°45.5	66°02.3	N21°48.7	178°53.5	S02°50.4	Rigel	281°03.3	-8°10.1
13	193°41.3	41°14.7	20.6	347°32.6	46.1	81°04.4	48.6	193°56.2	50.5	Capella	$280^{\circ}21.0$	46°01.3
14	208° 43.8	56°14.2	19.6	2°33.4	46.7	96°06.5	48.6	208°58.8	50.6	Bellatrix	278°22.2	6°22.5
15	223° 46.2	71°13.7	. 18.6	17°34.3	• • 47.3	111°08.5	• • 48.5	224°01.5	• • 50.7	Elnath	278°01.1	28°37.7
16	238°48.7	86°13.2	17.7	32°35.2	47.9	126° 10.6	48.5	239°04.1	50.7	Alnilam	275°37.1	-1°10.9
17	253°51.2	101°12.7	16.7	47°36.1	48.6	141° 12.7	48.4	254°06.7	50.8	Betelgeuse	$270^{\circ}51.5$	7°24.8
18	268°53.6	116°12.2	N12°15.7	62°37.0	\$10°49.2	156° 14.7	N21°48.4	269°09.4	S02°50.9	Canopus	263°52.2	-52°42.2
19	283°56.1	131°11.7	14.7	77°37.9	49.8	171°16.8	48.3	284°12.0	51.0	Sirius	258°25.8	-16°44.8
20	298°58.6	146°11.2	13.7	92°38.7	50.4	171 10.8 186° 18.9	48.3	299°14.7	51.0	Adhara	255°05.5	-29°00.1
21	314°01.0	161°10.7	•• 12.7	107°39.6	51.1	201°21.0	• • 48.2	314°17.3	. 51.1	Procyon	244°50.4	5°09.7
22	329°03.5	176° 10.7	11.7	107 39.0 122°40.5	51.7	216°23.0	48.2	329°20.0	51.1	Pollux	243°16.8	27°57.8
23	344°05.9	191°09.8	10.7	137°41.4	52.3	231°25.1	48.1	344°22.6	51.2	Avior	234°14.9	-59°35.2
							_			Suhail	222°46.2	-43°31.9
Mer.p	pass. 00:07	$\nu$ -0.5' d-1	L.0′ m-3.93	$\nu$ 0.9′ d0	.6′ m1.60	$\nu 2.1' \ d$ -0	.1′ m-2.06	$\nu$ 2.6′ d0.	1′ m0.59	Miaplacidus	221°38.9	-69°49.1
										Alphard	217°47.5	-8°46.0
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.1	11°50.6
0 0	359°08.4	206°09.3	N12°09.7	152°42.3	\$10°52.9	246°27.2	N21°48.1	359°25.2	S02°51.4	Dubhe	193°40.9	61°36.7
1	14° 10.9	200 09.3 221°08.8	08.7	167°43.2	53.5	261°29.3	48.0	14°27.9	51.4	Denebola	182°24.7	14°25.8
2	29° 13.3	236°08.3	07.7	182°44.0	54.2	276°31.3	48.0	29°30.5	51.5	Gienah	175°43.3	-17°41.0
3	29 13.3 44°15.8	250°08.3 251°07.8	• • 06.7	197°44.9	• • 54.8	270 31.3 291°33.4	• • 47.9	44°33.2	. 51.6	Acrux	173°00.2	-63°14.5
4	59° 18.3	266°07.3	05.7	212°45.8	55.4	306°35.5	47.9	59°35.8	51.7		171°51.6	-57°15.4
5	74° 20.7	281°06.8	04.7	227°46.7	56.0	321°37.6	47.8	74°38.4	51.8	Alioth	166°13.0	55°49.3
6	89°23.2	296°06.3	N12°03.7	242°47.6	S10°56.6	336°39.6	N21°47.8	89°41.1	S02°51.8	Spica	158°22.0	-11°17.7
7	104° 25.7	311°05.8	02.7	257°48.4	57.3	351°41.7	47.7	104°43.7	51.9	Alkaid	152°51.9	49°11.2
8	119°28.1	326°05.4	01.7	272°49.3	57.9	6°43.8	47.7	119°46.4	52.0	Hadar	148°35.8	-60°29.9
9	134°30.6	341°04.9	12°00.7	287°50.2	• • 58.5	21° 45.9	• • 47.6	134°49.0	• • 52.1		147°57.3	-36°29.8
10	149°33.0	356°04.4	11°59.7	302°51.1	59.1	36° 47.9	47.6	149°51.7	52.2	Arcturus	145°47.6	19°03.0
11	164°35.5	11°03.9	58.7	317°52.0	10°59.7	51°50.0	47.5	164°54.3	52.2	Rigil Kent.	139°40.0	-60°56.6
12	179°38.0	26°03.4	N11°57.7	332°52.8	S11°00.4	66°52.1	N21°47.5	179°56.9	S02°52.3	Kochab	137°20.5	74°03.1
13	194°40.4	41°02.9	56.6	347°53.7	01.0	81°54.2	47.4	194°59.6	52.4	Zuben'ubi	136°55.6	-16°08.9
14	209°42.9	56°02.4	55.6	2°54.6	01.6	96°56.2	47.4	210°02.2	52.5	Alphecca	126°03.4	26°37.9
15	224° 45.4	71°02.0	• • 54.6	17°55.5	02.2	111°58.3	• • 47.3	225°04.9	• • 52.6	Antares	112°15.2	-26°29.4
16	239° 47.8	86°01.5	53.6	32°56.4	02.8	127°00.4	47.3	240°07.5	52.6	Atria	107°09.1 102°02.2	-69°04.7 -15°45.4
17	254°50.3	101°01.0	52.6	47°57.2	03.5	142°02.5	47.2	255°10.1	52.7	Sabik	96°09.6	-15 45.4 -37°07.4
18	269°52.8	116°00.5	N11°51.6	62°58.1	S11°04.1	157°04.6	N21°47.2	270°12.8	S02°52.8	Shaula	96 09.6 95°58.0	-37 07.4 12°32.6
19	284°55.2	131°00.0	50.6	77°59.0	04.7	172°06.6	47.1	285°15.4	52.9	Rasalhague		
20	299° 57.7	145°59.5	49.6	92°59.9	05.3	187°08.7	47.1	300°18.1	52.9	Eltanin	90°41.9	51°29.4 -34°22.4
21	315°00.2	160°59.1	• • 48.6	108°00.7	• • 05.9	202°10.8	• • 47.0	315°20.7	• • 53.0	Kaus Aust.	83°31.7	
22	330°02.6	175°58.6	47.6	123°01.6	06.6	217° 12.9	46.9	330°23.4	53.1	Vega	80°32.8	38°48.7
23	345°05.1	190°58.1	46.6	138°02.5	07.2	232°14.9	46.9	345°26.0	53.2	Nunki	75°46.9	-26°15.9
										Altair	61°59.2	8°56.3
Mer.p	pass. 23:59	$\nu$ -0.5′ d-1	l.0′ m-3.93	$\nu$ 0.9′ d0	.6′ m1.60	$\nu^{2.1'} d^{-0}$	.1′ m-2.07	$\nu$ 2.6′ $d$ 0.	1′ m0.58	Peacock	53°04.4 49°25.1	-56°39.3 45°22.6
										Deneb Enif	49° 25.1 33° 38.0	45°22.6 9°59.7
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		33° 38.0 27° 31.7	9°59.7 -46°50.2
0	0°07.5	205°57.6	N11°45.5	153°03.4		247° 17.0	N21°46.8	0°28.6	S02°53.3	Al Na'ir Fomalhaut	27 31.7 15°13.5	-40 50.2 -29°29.1
1	15° 10.0	220°57.1	44.5	168°04.2	08.4	262°19.1	46.8	15°31.3	53.3	Scheat	15 13.5 13°44.3	-29 29.1 28°13.5
2	30° 12.5	235°56.6	43.5	183°05.1	09.0	277°21.2	46.7	30°33.9	53.4	Markab	13° 29.0	26 13.5 15°20.8
3	45° 14.9	250°56.2	• • 42.5	198°06.0	• • 09.7	292°23.3	• • 46.7	45°36.6	• • 53.5	iviarkab	13 29.0	13 20.0
4	60° 17.4	265°55.7	41.5	213°06.9	10.3	307°25.3	46.6	60°39.2	53.6	Sep 19 Fri	SHA	Mer.pass
5	75° 19.9	280°55.2	40.5	228°07.8	10.9	322°27.4	46.6	75°41.8	53.7	Venus	208°11.8	10:15
6	90°22.3	295°54.7	N11°39.5	243°08.6	S11°11.5	337°29.5	N21°46.5	90°44.5	S02°53.7	Mars	$154^{\circ}11.8$	13:50
7	105°24.8	310°54.2	38.4	258°09.5	12.1	352°31.6	46.5	105°47.1	53.8	Jupiter	247°28.2	07:36
8	120°27.3	325°53.8	37.4	273°10.4	12.8	7°33.7	46.4	120°49.8	53.9	Saturn	$0^{\circ}12.6$	00:07
9	135°29.7	340°53.3	• • 36.4	288°11.3	• 13.4	22°35.8	• • 46.4	135°52.4	• • 54.0	C 20 C :	CIIA	N.4
10	150°32.2	355°52.8	35.4	303°12.1	14.0	37°37.8	46.3	150°55.1	54.0	Sep 20 Sat	SHA	Mer.pass
11	$165^{\circ}34.6$	10°52.3	34.4	$318^{\circ}13.0$	14.6	52°39.9	46.3	165°57.7	54.1		207°00.9	10:16
12	180°37.1	25°51.8	N11°33.3	333°13.9	S11°15.2	67°42.0	N21°46.2	181°00.3	S02°54.2		153°33.9	13:48
13	195°39.6	40°51.4	32.3	348°14.7	15.8	82°44.1	46.2	196°03.0	54.3		247°18.8	07:33
14	$210^{\circ}42.0$	55°50.9	31.3	$3^{\circ}15.6$	16.5	97°46.2	46.1	211°05.6	54.4	Saturn	0°16.8	00:02
15	225°44.5	70°50.4	• • 30.3	$18^{\circ}16.5$	• • 17.1	112°48.2	• • 46.1	226°08.3	• • 54.4	Sep 21 Sun	SHA	Mer.pass
16	240°47.0	85°49.9	29.3	33°17.4	17.7	127°50.3	46.0	241°10.9	54.5		205°50.1	10:16
17	255°49.4	100°49.4	28.2	48°18.2	18.3	142°52.4	46.0	$256^{\circ}13.5$	54.6		152°55.8	13:47
18	270°51.9	115°49.0	N11°27.2		S11°18.9	157° 54.5	N21°45.9	271°16.2	S02°54.7		247°09.5	07:30
19	285°54.4	130°48.5	26.2	78°20.0	19.5	172°56.6	45.9	286°18.8	54.8	Saturn	$0^{\circ}21.1$	23:54
20	300° 56.8	145°48.0	25.2	93°20.9	20.2	187° 58.7	45.8	301°21.5	54.8			
21	315°59.3	160°47.5	• • 24.1	108°21.7	• • 20.8	203°00.8	• • 45.8	316°24.1	• • 54.9	Horizont	al parallax	0.4
22	331°01.8	175°47.1	23.1	123°22.6	21.4	218°02.8	45.7	331°26.8	55.0		Venus:	0.1
23	346°04.2	190°46.6	22.1	138°23.5	22.0	233°04.9	45.7	346°29.4	55.1		Mars:	0.1
Merr	pass. 23:56	$\nu$ -0.5' d-1	1.0′ m-3.93	ν0 9' d0	.6′ m1.59	ν2 1' d-0	.1′ m-2.07	$\nu 2.6' d0.$	1′ m0 58			
		- 0.0 4 1										

h	Su	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	181°31.9	N01°27.8	211°42.1	12.8'	$N15^{\circ}50.7$	-13.3'	56.5'
1	196°32.1	26.8	226°13.9	12.9'	15°37.4	-13.4'	56.5'
2	211°32.3 226°32.5	25.8 •• 24.9	240°45.8 255°17.7	12.9'	15°24.0 15°10.6	-13.4'	56.4'
3 4	226 32.5 241°32.8	23.9	255°17.7 269°49.7	13.0' 13.1'	15°10.6 14°57.1	-13.5' -13.5'	56.4' 56.4'
5	256°33.0	22.9	284°21.8	13.1	14°43.6	-13.6'	56.4
6	271°33.2	N01°22.0	298°54.0	13.3'	N14°30.0	-13.6'	56.4'
7	286°33.4	21.0	313°26.3	13.4'	$14^{\circ}16.4$	-13.7'	56.3'
8	301°33.7	20.0	327°58.6	13.4'	14°02.7	-13.8'	56.3'
9	316°33.9	• • 19.0	342°31.1	13.5'	13°48.9	-13.8'	56.3'
10 11	331°34.1 346°34.3	18.1 17.1	357°03.6 11°36.2	13.6' 13.7'	13°35.1 13°21.2	-13.9' -13.9'	56.3' 56.3'
12	1°34.5	N01°16.1	26°08.9	13.7'	N13°07.3	-14.0'	56.2
13	16°34.8	15.2	40°41.6	13.8'	12°53.4	-14.0'	56.2'
14	31°35.0	14.2	55°14.4	13.9'	12°39.4	-14.0'	56.2'
15	46°35.2	• • 13.2	69°47.3	14.0'	12°25.3	-14.1'	56.2'
16 17	61°35.4 76°35.7	12.3 11.3	84°20.3 98°53.3	14.0' 14.1'	12°11.2 11°57.1	-14.1' -14.2'	56.1' 56.1'
18	91°35.9	N01°10.3	113°26.4	14.1	N11°42.9	-14.2'	56.1
19	106°36.1	09.3	127°59.6	14.2'	11°28.7	-14.3'	56.1'
20	121°36.3	08.4	142°32.9	14.3'	$11^{\circ}14.5$	-14.3'	56.1'
21	136°36.5	•• 07.4	157°06.2	14.4'	11°00.2	-14.3'	56.0'
22	151°36.8 166°37.0	06.4	171°39.5	14.4' 14.5'	10°45.9 10°31.5	-14.4'	56.0'
23		05.5	186°13.0			-14.4'	56.0'
	SD = 15.9'	d = -1.0'		SI	D = 15.4'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°37.2	N01°04.5	200°46.5	14.6'	$N10^{\circ}17.1$	-14.4'	56.0'
1	196°37.4	03.5	215°20.1	14.6'	10°02.7	-14.5'	56.0'
2	211°37.7	02.5	229°53.7	14.7'	09°48.2	-14.5'	55.9'
3 4	226°37.9 241°38.1	·· 01.6 01°00.6	244°27.4 259°01.2	14.8' 14.8'	09°33.7 09°19.2	-14.5' -14.6'	55.9' 55.9'
5	256°38.3	01 00.0 00°59.6	273°35.0	14.9'	09°19.2	-14.6'	55.9'
6	271°38.5	N00°58.7	288°08.9	14.9'	N08°50.1	-14.6'	55.9'
7	286°38.8	57.7	302°42.8	15.0'	08°35.5	-14.6'	55.8'
8	301°39.0	56.7	317°16.8	15.0'	08°20.8	-14.7'	55.8'
9	316°39.2 331°39.4	• • 55.7 54.8	331°50.8 346°24.9	15.1' 15.1'	08°06.2 07°51.5	-14.7' -14.7'	55.8' 55.8'
10 11	331 39.4 346°39.6	54.8 53.8	0°59.1	15.1 15.2'	07 51.5 07°36.8	-14.7' -14.7'	55.8'
12	1°39.9	N00°52.8	15°33.3	15.2'	N07°22.1	-14.7'	55.7'
13	16°40.1	51.9	30°07.5	15.3'	$07^{\circ}07.3$	-14.8'	55.7'
14	31°40.3	50.9	44°41.8	15.3'	06°52.6	-14.8'	55.7'
15	46°40.5 61°40.8	• • 49.9	59°16.1 73°50.5	15.4'	06°37.8 06°23.0	-14.8'	55.7' 55.7'
16 17	76°41.0	48.9 48.0	73 50.5 88°25.0	15.4' 15.5'	06 23.0 06°08.2	-14.8' -14.8'	55.6'
18	91°41.2	N00°47.0	102°59.4	15.5'	N05°53.4	-14.8'	55.6'
19	106°41.4	46.0	117°34.0	15.6'	05°38.6	-14.8'	55.6'
20	121°41.6	45.1	132°08.5	15.6'	05°23.7	-14.9'	55.6'
21 22	136°41.9 151°42.1	· · 44.1 43.1	146°43.1 161°17.8	15.6' 15.7'	05°08.9 04°54.0	-14.9' -14.9'	55.6' 55.6'
23	166°42.3	43.1	101 17.0 175°52.5	15.7'	04°39.1	-14.9'	55.5'
20	SD = 15.9'	d = -1.0'			D = 15.3'	2 1.13	
	<u>JD = 13.9</u>	<u>u = -1.0</u>		JI	D = 13.5		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°42.5	N00°41.2	190°27.2 205°02.0	15.8'	N04°24.2	-14.9'	55.5'
1 2	196°42.7 211°43.0	40.2 39.2	205°02.0 219°36.8	15.8' 15.8'	04°09.3 03°54.4	-14.9' -14.9'	55.5' 55.5'
3	226°43.2	• • 38.3	234°11.6	15.9'	03°39.5	-14.9'	55.5'
4	241°43.4	37.3	248°46.5	15.9'	03°24.6	-14.9'	55.4'
5	256°43.6	36.3	263°21.3	15.9'	03°09.7	-14.9'	55.4'
6	271°43.8	N00°35.3	277°56.3	16.0'	N02°54.8	-14.9'	55.4'
7 8	286°44.1 301°44.3	34.4 33.4	292°31.2 307°06.2	16.0' 16.0'	02°39.9 02°25.0	-14.9' -14.9'	55.4' 55.4'
9	316°44.5	• • 32.4	321°41.2	16.0'	02°25.0	-14.9'	55.3'
10	331°44.7	31.4	$336^{\circ}16.3$	16.1'	01°55.1	-14.9'	55.3'
11	346°44.9	30.5	350°51.3	16.1'	01°40.2	-14.9'	55.3'
12	1°45.2	N00°29.5	5°26.4 20°01.6	16.1'	N01°25.3	-14.9'	55.3'
13 14	16°45.4 31°45.6	28.5 27.6	20°01.6 34°36.7	16.1' 16.2'	01°10.4 00°55.5	-14.9' -14.9'	55.3' 55.3'
15	46°45.8	26.6	49°11.8	16.2'	00°55.5	-14.9'	55.2'
16	61°46.0	25.6	63°47.0	16.2'	00°25.7	-14.9'	55.2'
17	76°46.3	24.6	78°22.2	16.2'	N00°10.9	-14.9'	55.2'
18	91°46.5	N00°23.7	92°57.4	16.2'	\$00°04.0	14.9'	55.2'
19 20	106°46.7 121°46.9	22.7 21.7	107°32.7 122°07.9	16.3' 16.3'	00°18.9 00°33.7	14.8' 14.8'	55.2' 55.1'
21	121 46.9 136°47.1	20.7	122 07.9 136°43.2	16.3'	00° 48.6	14.8	55.1'
22	151°47.4	19.8	151°18.5	16.3'	01°03.4	14.8'	55.1'
23	166°47.6	18.8	165°53.8	16.3'	01°18.2	14.8'	55.1'
	SD = 15.9'	d = -1.0'		SI	D = 15.1'		

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

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

# September 22, 23, 24 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	1°06.7	205°46.1	N11°21.1	153° 24.3	S11°22.6	248° 07.0	N21°45.6	1°32.0	502°55.1		JIIA	Dec
						248 07.0 263°09.1				Alpheratz	357°33.8	29°14.1
1	16°09.1	220°45.6	20.0	168°25.2	23.2		45.6	16°34.7	55.2	Ankaa	353°06.1	-42°09.8
2	31°11.6	235°45.2	19.0	183°26.1	23.9	278°11.2	45.5	31°37.3	55.3	Schedar	349°29.9	56°40.8
3	46°14.1	250°44.7	• • 18.0	198°27.0	• • 24.5	293°13.3	• • 45.5	46°40.0	• • 55.4	Diphda	348°46.4	-17°50.6
4	61°16.5	265°44.2	16.9	213°27.8	25.1	308° 15.4	45.4	61°42.6	55.5	Achernar	$335^{\circ}19.2$	-57°06.1
5	76°19.0	280°43.7	15.9	228°28.7	25.7	323°17.4	45.4	76°45.2	55.5	Hamal	327°50.3	23°35.1
6	91°21.5	295°43.3	N11°14.9	243°29.6	S11°26.3	338° 19.5	N21°45.3	91°47.9	S02°55.6	Polaris	313°25.4	89°22.1
7	106°23.9	310°42.8	13.9	258° 30.4	26.9	353°21.6	45.3	106°50.5	55.7	Acamar	315°11.0	-40°11.8
8	121°26.4	325°42.3	12.8	273°31.3	27.6	8°23.7	45.2	121°53.2	55.8	Menkar	314°05.3	4°11.6
9	136°28.9	340°41.8	• • 11.8	288°32.2	• • 28.2	23°25.8	• • 45.2	136°55.8	• • 55.9	Mirfak	308°27.1	49°57.1
10	151°31.3	355°41.4	10.8	303°33.0	28.8	38°27.9	45.1	151°58.5	55.9	Aldebaran	290°38.8	16°33.7
11	166° 33.8	10°40.9	09.7	318°33.9	29.4	53°30.0	45.1	167°01.1	56.0	Rigel	281°03.2	-8°10.1
12	181°36.2	25°40.4	N11°08.7	333°34.8	S11°30.0	68°32.0	N21°45.0	182°03.7	S02°56.1	Capella	280° 20.9	46°01.3
13	196°38.7	40°39.9	07.7	348°35.6	30.6	83°34.1	45.0	197°06.4	56.2	Bellatrix	278° 22.2	6°22.5
14	211°41.2	55°39.5	06.6	3°36.5	31.3	98°36.2	44.9	212°09.0	56.2	Elnath	278°01.1	28°37.7
15	226°43.6	70°39.0	• • 05.6	18°37.4	• • 31.9	113°38.3	• • 44.9	$227^{\circ}11.7$	· · 56.3	Alnilam	275°37.1	-1°10.9
16	241°46.1	85°38.5	04.6	33°38.3	32.5	128°40.4	44.8	242°14.3	56.4	Betelgeuse	270°51.5	7°24.8
17	256°48.6	100°38.1	03.5	48°39.1	33.1	143°42.5	44.8	257°16.9	56.5	Canopus	263°52.2	-52°42.2
18	271°51.0	115°37.6	N11°02.5	63°40.0	S11°33.7	158° 44.6	N21°44.7	272°19.6	S02°56.6	Sirius	258° 25.8	-32 42.2 -16°44.8
19	286°53.5	130°37.1	01.4	78°40.9	34.3	173°46.7	44.7	287°22.2	56.6	Adhara	255° 05.5	-10 44.8 -29°00.1
20	301°56.0	145°36.7	11°00.4	93°41.7	34.9	188°48.8	44.6	302°24.9	56.7	1		
21	$316^{\circ}58.4$	160°36.2	10°59.4	108°42.6	• • 35.6	203°50.9	• • 44.6	$317^{\circ}27.5$	• • 56.8	Procyon	244° 50.4 243° 16.8	5°09.7
22	332°00.9	175°35.7	58.3	123°43.5	36.2	218°52.9	44.5	332°30.2	56.9	Pollux		27°57.8
23	347°03.4	190°35.2	57.3	138°44.3	36.8	233°55.0	44.5	347°32.8	57.0	Avior	234°14.9	-59°35.2
		-				-				Suhail	222°46.2	-43°31.9
ivler.p	ass. 23:52	$\nu$ -0.5′ $d$ -1	0′ m-3.93	$\nu$ 0.9′ $d$ 0	.6′ m1.59	$\nu$ 2.1' d-0	.1′ m-2.08	$\nu$ 2.0′ $d$ 0	1′ m0.58	Miaplacidus	221°38.9	-69°49.1
										Alphard	217°47.4	-8°46.0
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.1	11°50.6
0	2°05.8	205°34.8	N10°56.2	153°45.2	S11°37.4	248° 57.1	N21°44.4	2°35.4	S02°57.0	Dubhe	193°40.9	61°36.7
1	17°08.3	220°34.3	55.2	168°46.1	38.0	263°59.2	44.4	17°38.1	57.1	Denebola	182°24.7	14°25.8
2	32° 10.7	235°33.8	54.2	183°46.9	38.6	279°01.3	44.3	32°40.7	57.2	Gienah	175°43.3	-17°41.0
3	47° 13.2	250°33.4	53.1	198° 47.8	39.2	294°03.4	• • 44.3	47°43.4	•• 57.3		173°00.2	-63°14.5
4	62° 15.7	265°32.9	52.1	213°48.6	39.2	309°05.5	44.2	62°46.0	57.3		171°51.6	-57°15.4
5	77°18.1		51.0	213 46.0 228°49.5	40.5	309 03.5 324°07.6		77°48.6		Alioth	166°13.0	55°49.3
		280°32.4					44.2		57.4	Spica	$158^{\circ}22.0$	-11°17.7
6	92°20.6	295°32.0	N10°50.0	243°50.4	\$11°41.1	339°09.7	N21°44.1	92°51.3	S02°57.5	Alkaid	152°51.9	49°11.2
7	107°23.1	310°31.5	48.9	258°51.2	41.7	354°11.8	44.1	107°53.9	57.6	Hadar	148°35.8	-60°29.9
8	122°25.5	325°31.0	47.9	273°52.1	42.3	9°13.9	44.0	122°56.6	57.7	Menkent	147°57.3	-36°29.8
9	137°28.0	340°30.6	• • 46.9	288°53.0	• • 42.9	24° 16.0	• • 44.0	137°59.2	• • 57.7	Arcturus	145°47.7	19°03.0
10	152°30.5	355°30.1	45.8	303°53.8	43.5	39° 18.0	43.9	153°01.9	57.8	Rigil Kent.	139°40.1	-60°56.6
11	167°32.9	10°29.6	44.8	318°54.7	44.1	54°20.1	43.9	168°04.5	57.9	Kochab	$137^{\circ}20.6$	74°03.1
12	182°35.4	25°29.2	N10°43.7	333°55.6	S11°44.8	69° 22.2	N21°43.8	183°07.1	S02°58.0	Zuben'ubi	136°55.6	-16°08.9
13	197°37.9	40°28.7	42.7	348°56.4	45.4	84°24.3	43.8	198°09.8	58.0	Alphecca	126°03.5	26°37.9
14	212°40.3	55°28.2	41.6	3°57.3	46.0	99°26.4	43.7	213°12.4	58.1	Antares	112°15.3	-26°29.4
15	227°42.8	70°27.8	• • 40.6	18°58.1	• • 46.6	114° 28.5	• • 43.7	228°15.1	• • 58.2	Atria	107°09.1	-69°04.6
16	242°45.2	85°27.3	39.5	33°59.0	47.2	129°30.6	43.6	243°17.7	58.3	Sabik	102°02.2	-15°45.4
17	257° 47.7	100°26.8	38.5	48°59.9	47.8	144°32.7	43.6	258°20.3	58.4	Shaula	96°09.6	-37°07.4
18	272°50.2	115°26.4	N10°37.4	64°00.7	S11°48.4	159°34.8	N21°43.5	273°23.0	S02°58.4	Rasalhague	95°58.0	12°32.6
19	287°52.6	130°25.9	36.4	79°01.6	49.0	174°36.9	43.5	288°25.6	58.5	Eltanin	90°41.9	51°29.4
20	302°55.1	145°25.5	35.3	94°02.5	49.7	189°39.0	43.4	303°28.3	58.6	Kaus Aust.	83°31.7	-34°22.4
21	317°57.6	160°25.0	• • 34.3	109°03.3	• • 50.3	204°41.1	• • 43.4	318°30.9	• • 58.7		80°32.8	38°48.7
22	333°00.0	175°24.5	33.2	124°04.2	50.9	219°43.2	43.3	333°33.6	58.8	Vega		
23	348°02.5	190°24.1	32.2	139°05.0	51.5	234° 45.3	43.3	348°36.2	58.8	Nunki	75°47.0	-26°15.9
	22.40	0.5/ 1.1	0/ 2.02	0.0/.10	<i>cl</i> 1.50	0.1/ / 0	1/ 0.00	0.6/10	1/ 0.50	Altair	61°59.3	8°56.3
Mer.p	ass. 23:48	$\nu$ -0.5′ $d$ -1	0′ m-3.93	$\nu$ 0.9' d0	.6′ m1.59	$\nu 2.1' \ d-0$	.1′ m-2.08	$\nu$ 2.6′ d0.	1′ m0.59	Peacock	53°04.5	-56°39.3
										Deneb	49°25.1	45°22.6
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.0	9°59.7
0	3°05.0	205°23.6	N10°31.1	154°05.9	\$11°52.1	249° 47.4	N21°43.2	3°38.8	S02°58.9	Al Na'ir	27°31.8	-46°50.2
1	18°07.4	220°23.1	30.1	169°06.8	52.7	264°49.5	43.2	18°41.5	59.0	Fomalhaut	15° 13.5	-29°29.1
2	33°09.9	235°22.7	29.0	184°07.6	53.3	279°51.6	43.1	33°44.1	59.1	Scheat	13°44.3	28°13.5
3	48° 12.3	250°22.2	. 28.0	199°08.5	53.9	294°53.7	• • 43.1	48°46.8	59.1	Markab	13°29.0	15°20.8
4	63°14.8	265°21.8	26.9	214°09.3	54.5	309°55.8	43.0	63°49.4	59.2	Sep 22 Mon	SHA	Mer.pass
5	78° 17.3	280°21.3	25.8	229° 10.2	55.2	324°57.9	43.0	78°52.0	59.3		204°39.4	10:17
6	93° 19.7	295°20.8	N10°24.8		S11°55.8	340°00.0	N21°42.9		S02°59.4		152° 17.7	13:46
7	108°22.2	310°20.4	23.7	259°11.9	56.4	355°02.1	42.9	108°57.3	59.5		247°00.3	07:26
8	100°22.2 123°24.7	325°19.9	22.7	274° 12.8	57.0	10°04.2	42.8	100° 57.5 124° 00.0	59.5	Saturn	0°25.4	23:50
9	138°27.1	340°19.5	21.6	289° 13.6	• • 57.6	25°06.3	• • 42.8	139°02.6	• • 59.6			
10	153° 29.6	355°19.0	20.6	304° 14.5	58.2	40°08.4	42.7	154°05.3	59.7	Sep 23 Tue	SHA	Mer.pass
11	168°32.1	10°18.5	19.5	319° 15.3	58.8	55° 10.5	42.7	169°07.9	59.8		203°29.0	10:18
12	183°34.5	25°18.1	N10°18.4	334°16.2		70° 12.6	N21°42.6	184°10.5	S02°59.8	1	151°39.4	13:44
13	198°37.0	40°17.6	17.4	349°17.1	12°00.0	85° 14.7	42.6	199°13.2	02°59.9		246°51.3	07:23
14	213°39.5	55°17.2	16.3	4° 17.9	00.6	100° 16.8	42.5	214°15.8	02 59.9 03°00.0	Saturn	0°29.6	23:45
15	213 39.5 228°41.9	70°16.7	15.3	19° 18.8	01.3	100 10.8 115° 18.9	• • 42.5	214 15.6 229°18.5	•• 00.1	Cor 24 14/	CIIA	Marrie
	243°44.4	70 16.7 85°16.2	14.2	19 18.8 34° 19.6	01.9	115 18.9 130°21.0	42.5	229 18.5 244°21.1	00.1	Sep 24 Wed	SHA	Mer.pass
16 17											202°18.6	10:19
17	258°46.8 273°49.3	100°15.8	13.1 N10°12.1	49°20.5	02.5 \$12°03.1	145°23.1	42.4 N21°42.3	259°23.7 274°26.4	00.2		151°00.9	13:43
18		115°15.3	N10°12.1	79° 22.2		160° 25.2 175° 27.3					246°42.4	07:20
19	288°51.8	130°14.9	11.0		03.7		42.3	289°29.0	00.4	Saturn	0°33.9	23:41
20	303°54.2	145°14.4	09.9	94°23.1	04.3	190°29.4	42.2	304°31.7	00.5	Horizont	al parallax	
21	318° 56.7	160°14.0	•• 08.9	109°23.9	•• 04.9	205°31.5	· · 42.2	319°34.3	00.5	1.01120111	Venus:	0.1
22	333°59.2	175°13.5	07.8	124°24.8	05.5	220°33.6	42.1	334°36.9	00.6		Mars:	0.1
23	349°01.6	190°13.0	06.7	139°25.6	06.1	235°35.7	42.1	349°39.6	00.7		141013.	0.1
Mer.n	ass. 23:44	$\nu$ -0.5' d-1	1′ m-3.93	$\nu 0.9' \ d0$	.6′ m1.59	$\nu 2.1' \ d-0$	.0′ m-2.09	$\nu 2.6' \ d0$	1′ m0.59			

h	Su	n		-011	Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	181°47.8	$N00^{\circ}17.8$	180°29.1	16.3'	<b>S</b> 01°33.0	14.8'	55.1'
1 2	196°48.0 211°48.2	16.9 15.9	195°04.4 209°39.7	16.3' 16.3'	01°47.8 02°02.5	14.8' 14.7'	55.1' 55.0'
3	211 46.2 226°48.5	. 14.9	209 39.7 224°15.1	16.3	02 02.5 02°17.3	14.7	55.0'
4	241°48.7	13.9	238°50.4	16.3'	02°32.0	14.7'	55.0'
5	256°48.9	13.0	253°25.7	16.4'	02°46.7	14.7'	55.0'
6 7	271°49.1 286°49.3	N00° 12.0 11.0	268°01.1 282°36.5	16.4' 16.4'	\$03°01.4 03°16.1	14.7' 14.6'	55.0' 55.0'
8	301°49.6	10.0	202 30.3 297°11.8	16.4	03°30.7	14.6'	54.9'
9	316°49.8	•• 09.1	311°47.2	16.4'	03°45.3	14.6'	54.9'
10	331°50.0	08.1	326°22.6	16.4'	03°59.9	14.6'	54.9'
11 12	346°50.2 1°50.4	07.1 N00°06.2	340°57.9 355°33.3	16.4' 16.4'	04°14.5 \$04°29.1	14.6' 14.5'	54.9' 54.9'
13	16°50.7	05.2	10°08.7	16.4	04°43.6	14.5	54.9'
14	31°50.9	04.2	24°44.0	16.4'	04°58.1	14.5'	54.8'
15	46°51.1	• • 03.2	39°19.4	16.4'	05°12.6	14.4'	54.8'
16 17	61°51.3 76°51.5	02.3 01.3	53°54.7 68°30.1	16.4' 16.3'	05°27.0 05°41.4	14.4' 14.4'	54.8' 54.8'
18	91°51.8	N00°00.3	83°05.4	16.3	S05°55.8	14.4	54.8
19	106°52.0	S00°00.7	97°40.8	16.3'	06°10.2	14.3'	54.8'
20	121°52.2	01.6	112°16.1	16.3'	06°24.5	14.3'	54.7'
21	136°52.4	• • 02.6	126°51.4	16.3'	06°38.8	14.3'	54.7'
22 23	151°52.6 166°52.9	03.6 04.6	141°26.7 156°02.0	16.3' 16.3'	06°53.1 07°07.3	14.2' 14.2'	54.7' 54.7'
23	SD = 15.9'	d = -1.0'	130 02.0		07.07.3 0 = 15.0'	17.4	JT.1
	$5D = 15.9^{\circ}$	$a = -1.0^{\circ}$		SL	$O = 15.0^{\circ}$		
Tue	GHA	Dec	GHA	ν 16 2'	Dec	d	HP
0 1	181°53.1 196°53.3	\$00°05.5 06.5	170°37.3 185°12.6	16.3' 16.3'	\$07°21.5 07°35.6	14.2' 14.1'	54.7' 54.7'
2	211°53.5	07.5	199°47.9	16.2'	07°49.8	14.1'	54.7'
3	226°53.7	• • 08.5	$214^{\circ}23.1$	16.2'	08°03.8	14.0'	54.6'
4	241°53.9	09.4	228°58.3	16.2'	08°17.9	14.0'	54.6'
5 6	256°54.2 271°54.4	10.4 S00°11.4	243°33.5 258°08.7	16.2' 16.2'	08°31.9 \$08°45.8	14.0' 13.9'	54.6' 54.6'
7	286°54.6	12.3	272°43.9	16.2'	08°59.8	13.9'	54.6'
8	301°54.8	13.3	$287^{\circ}19.1$	16.1'	09°13.6	13.8'	54.6'
9	316°55.0	• • 14.3	301°54.2	16.1'	09°27.5	13.8'	54.6'
10 11	331°55.3 346°55.5	15.3 16.2	316°29.3 331°04.4	16.1' 16.1'	09°41.3 09°55.0	13.8' 13.7'	54.5' 54.5'
12	1°55.7	500°17.2	345°39.5	16.0'	S10°08.7	13.7	54.5
13	16°55.9	18.2	$0^{\circ}14.5$	16.0'	$10^{\circ}22.4$	13.6'	54.5'
14	31°56.1	19.2	14°49.5	16.0'	10°36.0	13.6'	54.5'
15 16	46°56.3 61°56.6	· · 20.1 21.1	29°24.5 43°59.5	16.0' 15.9'	10°49.6 11°03.1	13.5' 13.5'	54.5' 54.5'
17	76°56.8	22.1	58°34.4	15.9'	11°16.6	13.4	54.4
18	91°57.0	S00°23.1	73°09.4	15.9'	S11°30.0	13.4'	54.4'
19	106°57.2	24.0	87°44.2		11°43.4		54.4'
20 21	121°57.4 136°57.7	25.0 •• 26.0	102°19.1 116°53.9	15.8' 15.8'	11°56.7 12°10.0	13.3' 13.2'	54.4' 54.4'
22	151°57.9	27.0	131°28.7	15.8'	12°23.2	13.2'	54.4
23	166°58.1	27.9	146°03.5	15.7'	12°36.4	13.1'	54.4'
	SD = 15.9'	d = 1.0'		SE	0 = 14.9'		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	181°58.3	S00°28.9	160°38.2	15.7'	\$12°49.5	13.1'	54.4'
1 2	196°58.5 211°58.7	29.9	175°12.9 189°47.5	15.7' 15.6'	13°02.5 13°15.5	13.0' 12.9'	54.4' 54.3'
3	211°58.7 226°59.0	30.8 •• 31.8	189°47.5 204°22.1	15.6'	13°15.5 13°28.5	12.9'	54.3'
4	241°59.2	32.8	218°56.7	15.5'	13°41.3	12.8	54.3'
5	256°59.4	33.8	233°31.3	15.5'	13°54.2	12.8'	54.3'
6	271°59.6	\$00°34.7	248°05.8	15.5'	\$14°06.9	12.7'	54.3'
7 8	286°59.8 302°00.0	35.7 36.7	262°40.2 277°14.6	15.4' 15.4'	14°19.6 14°32.3	12.6' 12.6'	54.3' 54.3'
9	302 00.0 317°00.3	37.7	277 14.0 291°49.0	15.4	14 32.3 14°44.9	12.5'	54.3'
10	332°00.5	38.6	$306^{\circ}23.4$	15.3'	14°57.4	12.5'	54.3'
11	347°00.7	39.6	320°57.7	15.3'	15°09.9	12.4'	54.2'
12 13	2°00.9 17°01.1	S00°40.6 41.6	335°31.9 350°06.1	15.2' 15.2'	\$15°22.3 15°34.6	12.3' 12.3'	54.2' 54.2'
13	32°01.3	41.6 42.5	4°40.3	15.2 15.1'	15 34.6 15°46.8	12.3	54.2'
15	47°01.6	• • 43.5	19°14.4	15.1'	15°59.0	12.1'	54.2'
16	62°01.8	44.5	33°48.5	15.0'	16°11.2	12.1'	54.2'
17	77°02.0 92°02.2	45.5 \$00°46.4	48°22.6 62°56.5	15.0' 14.9'	16°23.2 \$16°35.2	12.0' 11.9'	54.2' 54.2'
18 19	92°02.2 107°02.4	500°46.4 47.4	62°56.5 77°30.5	14.9'	16°47.2	11.9'	54.2'
20	122°02.6	48.4	92°04.4	14.8'	16°59.0	11.8'	54.2
21	137°02.9	• • 49.4	106°38.2	14.8'	17°10.8	11.7'	54.2'
22	152°03.1 167°03.3	50.3 51.3	121°12.0 135°45.7	14.7' 14.7'	17°22.5 17°34.2	11.6' 11.6'	54.1' 54.1'
23	SD = 15.9'	$\frac{51.3}{d=1.0'}$	135 45./		0 = 14.8'	11.0	54.1
	-2 10.3	_ 1.0		JL			

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

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

		Sun		Moon			
Day	Eqn.of	f Time	Mer.	Mer.Pass.		Age	
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	1-3	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	0-5%	
22	07:11	07:22	11:53	12:18	-:-		
23	07:32	07:43	11:52	12:59	00:39		
24	07:53	08:04	11:52	13:41	01:20		

# September 25, 26, 27 UT (Thu., Fri., Sat.)

Dec	h _	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
1	Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
1 19700   207121   540   507723   371   207320   307400   141   347475   500   555402   347020   576400   410   41475   500   500   555402   347020   576400   410   41475   500   500   555402   347020   576020									4°42.2				
2									19°44.9				1
1					184°28.2	07.9							
Section   Sect													
5						09.2	310°46.2	41.8		01.1			
6 91188 295098 1007893 24731.6 512 100 300760 102141.7 91751 505701.2 100760 10076 1007 1007 1007 1007 1007 1	5	79°16.4	280°10.3	10°00.3	229°30.8	09.8	325°48.3	41.8	79°55.4				
1.0   1.0	6	94°18.9	295°09.9	N09°59.3		S12°10.4	340°50.4	N21°41.7	94°58.1	S03°01.2			
19   19   19   19   19   19   19   19	7	109°21.3	310°09.4	58.2	259°32.5	11.0	355°52.5	41.7	110°00.7	01.3			
11   109716   3.50	8	124°23.8	325°08.9	57.1	274°33.3	11.6	10°54.6	41.6	125°03.4	01.4			
19	9	139°26.3	340°08.5	• • 56.1	289°34.2	• • 12.2	25°56.7	• • 41.6	140°06.0	• • 01.5			1
12	10	154°28.7	355°08.0	55.0	304°35.0	12.8	40°58.8	41.5	155°08.6	01.5			
196   196	11	169°31.2	10°07.6	53.9	319°35.9	13.4	56°00.9	41.5	170°11.3	01.6			<b>I</b>
13 197 30.4 397 00.5 3.4 397 30.1 13.8 10.5 80 00.7 3.4 3.0 00.9 50.0 11.5 15. 2097 11.1 170 170 58 40.8 1973 03.1 13.8 11.5 11.5 11.5 11.5 11.5 11.5 11.5 11	12	184°33.7	25°07.1	N09°52.9	334° 36.7	S12°14.0	71°03.0	N21°41.4	185° 13.9	S03°01.7			
15 244-13.5 85°05.3 46.6 34°01.0 156.5 111°09.3 - 13.3 200°12.8 - 0.09 16 244-13.5 85°05.3 46.6 34°0.0 1 16.5 111°15.5 41.2 265°24.5 0.09 17 260°46.0 113°04.0 47.5 40°41.0 11.5 11.1 146°13.6 41.2 260°27.1 0.1 18 274°46.4 113°04.0 45.3 70°42.7 13.1 146°13.6 41.2 260°27.1 0.1 18 274°46.3 113°04.0 45.3 70°42.7 13.1 176°17.8 41.1 200°27.4 250°22. 22 335°60.0 15°02.6 42.1 124°45.2 20.1 221°24.1 40.0 335°0.0 0.5 22 335°60.0 15°02.6 42.1 124°45.2 20.1 221°24.1 40.0 335°0.0 0.5 22 335°60.0 15°02.6 42.1 124°45.2 20.1 221°24.1 40.0 335°0.0 0.5 23 350°0.0 15°02.6 42.1 124°45.2 20.1 221°24.1 40.0 335°0.0 0.5 25 350°0.0 15°02.6 42.1 124°45.2 20.1 221°24.1 40.0 335°0.0 0.5 26 350°0.0 15°02.6 42.1 124°45.2 20.1 221°24.1 40.0 335°0.0 0.5 27 350°0.0 15°02.6 42.1 124°45.2 20.1 221°24.1 40.0 350°0.0 0.5 28 350°0.0 15°02.6 42.1 124°45.2 20.1 221°24.1 40.0 350°0.0 0.5 29 350°0.0 15°02.2 24.0 133°46.0 150°0.0 0.5 20 50°0.0 150°0.0 0.5 20 50°0.0 150°0.0 0.5 20 50°0.0 150°0.0 0.5 20 50°0.0 150°0.0 0.5 20 50°0.0 150°0.0 0.5 20 50°0.0 150°0.0 0.5 20 50°0.0 150°0.0 0.5 20 50°0.0 150°0.0 0.5 20 50°0.0 150°0.0 0.5 20 50°0.0 150°0.0 0.5 20 50°0.0 150°0.0 0.5 20 50°0.0 150°0.0 0.5 20 50°0.0 150°0.0 0.5 20 50°0.0 150°0.0 0.5 20 50°0.0 150°0.0 0.5 20 50°0.0 150°0.0 0.5 20 50	13	199°36.1	40°06.7	51.8	349°37.6	14.6	86°05.1	41.4	$200^{\circ}16.6$	01.8			
1-1	14	214°38.6	55°06.2	50.7		15.2	101°07.2	41.3	215° 19.2	01.9			
18	15		70°05.8	• • 49.6	19°39.3	• • 15.8	$116^{\circ}09.3$	• • 41.3	230°21.8	• • 01.9			
19   289*04   110*04*04   110*044	16	244°43.5	85°05.3	48.6	$34^{\circ}40.1$	16.5	$131^{\circ}11.5$	41.2	245°24.5	02.0			<b>I</b>
Simple   S	17	259°46.0			49°41.0	17.1	$146^{\circ}13.6$	41.2	$260^{\circ}27.1$	02.1			
Adham   25   26   27   27   28   28   28   28   28   28	18	274°48.4	115°04.4	N09°46.4	64°41.8	<b>S</b> 12°17.7	161°15.7	N21°41.1	275°29.8	503°02.2			
23 3197358   180°031	19	289°50.9	130°04.0	45.3	79°42.7	18.3	$176^{\circ}17.8$	41.1	290°32.4	02.2			
Pollar   243   176   176   177   1	20	304°53.4	145°03.5	44.3	94°43.5	18.9	$191^{\circ}19.9$	41.0		02.3			
23 380'08 8 100'02 410 139'401 207 230'502 409 380'430 02.6  Mer.pass. 23:40	21	319°55.8	160°03.1	• • 43.2	109°44.4	• • 19.5	206°22.0	• • 41.0	320°37.7	• • 02.4			
Sub-part   Sub-part	22	334°58.3	175°02.6	42.1	124°45.2	20.1	221°24.1	40.9	335°40.3	02.5			1
Maple   Mapl	23	350°00.8	190°02.2	41.0	$139^{\circ}46.1$	20.7	236° 26.2	40.9	350°43.0	02.6			
Fri GHA  OFFI  OFF	Morn	23:40	υ 0 5' d 1	1' m 3 03	υ0 0′ d0	6' m1 50	1/2 1/ d 0	0' m 2 00	12 6' d0	1′ m0 50			
Fri GHA GHA CHA CHA CHA CHA CHA CHA CHA CHA CHA C	ivier.p	Dass. 23:40	$\nu$ -0.5 $a$ -1	1 111-3.93	νο.9 αυ	.0 111.59	ν2.1 <i>α</i> -0	.0 m-2.09	ν2.0 d0.	1 1110.59			
Fire GHA													
0 5 03.2 205 01.7 N09 399 184 409 512 21.3 21.9 286 30 N2 4 038 203 02.6 Clearly 176 220 11.2 205 230 14.0 8 25 25 25 25 25 25 25 25 25 25 25 25 25	Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	_		1
2 35°08.2 25°08.8 38.9 169°47.8 21.9 266°30.4 40.8 20°48.3 0.27 2 35°08.2 25°08.8 37.8 189°48.6 22.9 286°30.4 40.8 20°48.3 0.27 3 50°10.6 20°00.4 50.7 199°49.5 0.23.1 290°34.6 40.7 50°35.3 0.29 4 6°11.1 26°49.8 35.6 21.4°20.2 21.1°20.2 31.3 31°36.8 40.6 6°356.8 0.2 66°3	0	5°03.2		N09°39.9		S12°21.3	251°28.3	N21°40.9	5°45.6	S03°02.6			
2 35°08.2 25°00.8 37.8 184′48.6 22.5 281′32.5 40.8 35°50.9 0.28 3 50°00.4 36.7 199′49.5 2.25 2.1 299′41.6 4.07 50°35.5 2.09 4.6 6°13.1 6°13.0 25°00.4 3.6 2.14′50.3 23.7 311′38.8 40.7 65°56.2 0.29 4.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1	1	20°05.7	220°01.3	38.9	169°47.8	21.9	266°30.4	40.8	20°48.3	02.7			<b>I</b>
3 50°10.0 250°00.4 · 36.7 199′495 · 23.1 296′34.6 · 40.7 50°35.5 · 0.29   4 66°13.1 264°50.9 35.6 244°50.9 32.7 311″56.8 · 40.7 60°56.2 0.29   5 80°15.5 0°15.6 0°15.5 0°15.6 0°15.5 0°1	2	35°08.2		37.8	184°48.6	22.5	281°32.5	40.8	35°50.9	02.8			
6 65 13.1 264 699 3 35.6 214 50.3 23.7 311 36.8 40.7 65 56.2 0.2.9  5 80 155 6 275 995 34.6 2295 12 24.3 326 88 9 40.6 80 58.8 30.3 0  5 80 156 275 995 34.6 2295 12 24.3 326 88 9 40.6 80 58.8 30.3 0  5 80 156 275 995 34.6 2295 12 24.3 326 88 9 40.6 80 58.8 30.3 0  5 80 150 50 30 58 68 0 32.4 257 52.9 31 31 36.1 11 36	3	50°10.6	250°00.4	• • 36.7	199°49.5	• • 23.1	296°34.6	• • 40.7	50°53.5	• • 02.9			
5 80°15.6 270°99.5 34.6 229°12.2 24.3 326°38.9 40.6 80°58.8 30.3 31.1    6 95°18.0 296°99.0 N09°33.9 244°52.0 \$12°24.9 348°41.0 N21°40.6 80°58.8 30°30.1    7 110°20.5 300°58.6 32.4 259°52.9 25.5 356°43.1 40.5 111°04.1 30.2    8 125°22.9 324°58.1 31.3 274′53.7 20.1 11°45.2 40.5 11°04.1 30.2    9 140°25.4 339°57.7 30.2 289°54.6 0.26.7 26°47.3 40.4 141′09.4 0.33    10 155°27.9 394°57.2 20.1 31°59.5 3 28.0 14.0 156°12.0 0.34    11 170°30.3 395°57.7 20.1 31°59.5 3 28.0 56°51.5 40.3 17°14.7 0.35    11 170°30.3 40°55.8 20.1 31°59.5 3 28.0 56°51.5 40.3 17°14.7 0.35    12 20°52.3 45°56.5 N09°27.0 344°51.0 151°26.6 71°55.0 N12°40.3 186°17.3 50°30.6    13 20°52.5 40.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	4	65°13.1	264°59.9	35.6	214°50.3	23.7	311°36.8	40.7	65° 56.2	02.9			1
6 99°18.0 294°99.0 N09°33.5 244°52.0 \$12°24.9 341°41.0 N21°40.6 96°13.5 \$30°35.1 Alkald 152°82.0 49°11.2 710°10.5 300°38.6 324 \$20°52.9 255 356°43.1 40.5 110°04.1 03.2 Hadri 148°53.6 60°29.9 180°25.4 339°57.7 30.2 289°54.6 - 26.7 26°47.3 40.4 136°12.0 03.4 Hadri 148°53.3 65°29.8 10 155°27.9 \$54°57.2 29.1 304°55.4 27.3 41°49.4 40.4 156°12.0 03.4 Hadri 148°53.3 36°29.8 11 170°30.3 9°56.8 28.1 319°56.3 28.0 56°51.5 40.3 171°14.7 03.5 Kochab 137°20.6 12.1 185°32.8 24°56.3 N09°27.0 334°57.1 \$12°28.6 71°53.6 N21°40.3 186°17.3 \$03°03.6 Kochab 137°20.6 13.2 185°32.8 24°56.3 N09°27.0 334°57.1 \$12°28.6 71°53.6 N21°40.3 186°17.3 \$03°03.6 Kochab 137°20.6 13.2 185°32.8 24°56.3 N09°27.0 334°57.1 \$12°28.6 71°53.6 N21°40.3 186°17.3 \$03°03.6 Kochab 137°20.6 13.2 185°32.8 30°59.9 2.9 9 49°58.0 29.2 86°55.7 40.2 201°20.0 36.6 Kochab 137°20.6 180°55.0 120°43.3 30°55.0 140°50.0 30.4 117°00.0 40.1 231°25.2 0.38 Atria 10°709.2 65°50.2 23.7 19°59.6 30.4 117°00.0 40.1 231°25.2 0.38 Atria 10°709.2 65°02.5 \$15.0 40.1 132°02.1 40.1 246°27.9 03.9 Sabi 10°20.2 15°45.4 10°20.2 15°45.4 10°20.2 15°45.4 10°40.2 15°45.1 10°40.2 10°40.2 15°45.2 10°40.2 10°40.2 15°45.2	5	80°15.6	279°59.5	34.6	229°51.2	24.3	326°38.9	40.6	80°58.8	03.0			
8 125°229 334°851 31.3 274°537 261 1175°2 40.5 126°067 03.2 40°451 319°358 60°29.9 140°254 339°57.7 30.2 280°84.6 ~ 26.7 26°47.3 ~ 40.4 141′09.4 ~ 03.3 40°151 110°30.3 9°56.8 28.1 319°56.3 280. 56°51.5 40.3 171°14.7 03.5 110°19.3 03°55.4 28.1 319°56.3 280. 56°51.5 40.3 171°14.7 03.5 110°19.3 03°55.4 28.1 319°56.3 280. 56°51.5 40.3 171°14.7 03.5 110°19.3 03°55.4 28.1 319°56.3 280. 56°51.5 40.3 171°14.7 03.5 110°19.3 03°55.4 28.1 319°56.3 280. 56°51.5 40.3 171°14.7 03.5 110°19.0 03.6 112°19.5 03.0 112°19.5 03°19.5 110°19.5 03°19.5 110°19.5 03°19.5 110°19.5 03°19.5 110°19.5 03°19.5 110°19.5 03°19.5 110°19.5 03°19.5 110°19.5 03°19.5 110°19.5 03°19.5 110°19	6	95°18.0	294°59.0	N09°33.5	244°52.0	<b>S</b> 12°24.9		N21°40.6		503°03.1			
8   125°22-9   324°58-1   31.3   274°53-7   26.1   11°45/2   40.5   126°06.7   03.2   9   140°25-4   339°57-7   03.0   289°54.6   26.7   260°7-3   40.4   141°09.4   03.3   10   155°27-9   334°57-7   03.0   289°54.6   27.3   41°49.4   40.4   136°12.0   03.4   11   170°30.3   9°56.8   28.1   319°56.3   28.0   56°11.5   40.3   171°14-7   03.5   12   185°32.8   24°56.3   80°27.0   334°57.1   512°28.6   71°53.6   8012°40.3   171°14-7   03.5   13   200°35.3   39°55.9   25.9   349°58.0   29.2   86°55.7   40.2   201°20.0   03.6   14   215°37.7   54°55.5   24.8   4°58.8   29.8   101°57.9   40.2   201°20.0   03.6   15   220°40.2   69°55.0   23.7   19°59.6   30.4   117°00.0   40.1   231°25.2   03.8   17   200°45.1   99°45.1   21.6   50°01.3   31.6   147°04.2   40.0   261°30.5   03.9   18   275°47.6   14°53.7   80°20.5   65°02.2   512°32.2   162°06.3   801°38.4   04.2   19   200°50.0   129°53.2   194.   80°30.3   23.8   117°08.4   39.9   201°35.8   04.1   21   320°55.0   159°52.3   17.2   110°04.7   34.0   207°12.7   34.9   309°30.4   04.1   21   320°55.0   159°52.3   17.2   110°04.7   34.0   207°12.7   34.9   309°30.4   04.4   22   335°57.4   174°51.9   16.1   125°05.6   34.6   222°14.8   39.8   330°43.7   04.3   23   350°99.9   189°51.4   15.0   140°06.4   35.2   237°16.9   337.7   317°46.4   04.4   24   240°451.0   809°13.9   155°07.3   512°35.8   252°19.0   821°32.3   300°40.4   25   36°07.3   224°50.6   12.8   170°06.1   36.4   222°14.8   39.8   330°43.7   04.3   26   36°17.2   294°46.3   808°5.7   200°13.8   370°10.8   240°40.9   04.6	7		309°58.6	32.4		25.5	$356^{\circ}43.1$	40.5		03.2			
10 155°79 334°57.2 29.1 304°55.4 27.3 4.4°49.4 40.4 156°12.0 3.4 11°09.4 · 0.3.4 11°09.3 0.34 11°09.3 136°17.3 ° 030.3 136°17.3 ° 030.3 136°17.3 ° 030.3 136°17.3 ° 030.3 136°17.3 ° 030.3 136°17.3 ° 030.3 136°17.3 ° 030.3 136°17.3 ° 030.3 136°17.3 ° 030.3 136°17.3 ° 030.3 136°17.3 ° 030.3 136°17.3 ° 030.3 136°17.3 ° 030.3 136°17.0 ° 030.3 136°17.0 ° 030.3 136°17.0 ° 030.3 136°17.0 ° 030.3 136°17.0 ° 030.3 136°17.0 ° 030.3 136°17.0 ° 030.3 136°17.0 ° 030.3 136°17.0 ° 030.3 136°17.0 ° 030.3 136°17.0 ° 030.3 136°17.0 ° 030.3 ° 030°18.5 ° 030.3 ° 030°18.5 ° 030.3 ° 030°18.5 ° 030.3 ° 030°18.5 ° 030°19.5 ° 030			324°58.1	31.3	274°53.7	26.1		40.5		03.2			
10 155°27.9 354°57.2 29.1 304°55.4 27.3 41′49.4 40.4 156°12.0 03.4 11 10′30.3 9°56.8 28.1 319°56.3 28.0 56°51.5 40.3 171′47.7 03.5 6×14.7 03.5 12′28.6 71′53.6 N21′40.3 171′47.7 03.5 6×14.7 03.5 12′28.6 71′53.6 N21′40.3 171′47.7 03.5 6×14.7 03.5 12′28.6 71′53.6 N21′40.3 186°17.3 503°03.6 13.2 00′35.3 39°55.9 25.9 349°58.0 29.2 86°55.7 40.2 20′10′20.0 03.6 Achter 10′20′20.0 03.6 15°23′40.2 69°55.0 23.7 19°59.6 29.8 101′57.9 40.2 21′6′22.6 03.7 Achter 11′2′15′37.7 54°55.5 24.8 4°58.8 29.2 10′10′57.9 40.2 21′6′22.6 03.7 Achter 11′2′15′37.7 54°55.0 23.7 19°59.6 30.4 11′2′00.0 40.1 231′25′2 03.8 Achter 11′2′15.3 26°29.4 Achter 11′2°15.0 Achter 11′2°15.5 26°29.3 Achter 11′2°15.5 26°29.3 Achter 11′2°15.5 26°29.3 Achter 11′2°15.5 26°29.3 Achter 11′2°15.5 26°29.3 Achter 11′2°15.5 26°29.3 Achter 11′2°15.3 26°29.4 Achter 11′2°15.3 26°29.4 Achter 11′2°15.3 26°29.4 Achter 11′2°15.3 26°29.4 Achter 11′2°15.3 26°29.4 Achter 11′2°15.3 26°29.4 Achter 11′2°15.3 26°29.4 Achter 11′2°15.3 26°29.4 Achter 11′2°15.3 26°29.4 Achter 11′2°15.3 26°29.4 Achter 11′2°15.3 26°29.4 Achter 11′2°15.3 26°29.4 Achter 11′2°15.3 26°29.4 Achter 11′2°15.3 26°29.4 Achter	9			• • 30.2		• • 26.7		• • 40.4		• • 03.3			
11   170°30.3   9°56.8   281   319°56.3   280   56°51.5   40.3   171°14.7   03.5   12   185°32.8   24°56.3   N09°27.0   334°57.1   512°28.6   71°53.6   N21°20.3   386°13.5   330°30.5   13   200°35.3   39°55.9   25.9   349°58.0   29.2   86°55.7   40.2   201°20.0   03.6   14   215°37.7   54°55.5   24.8   4°58.8   29.8   101°57.9   40.2   216°22.6   03.7   15   230°40.2   69°55.0   -23.7   16°59.6   -30.4   117°00.0   -40.1   224°2.7   03.9   16   245°42.7   84°46.9   22.6   35°00.5   31.0   132°02.1   40.1   246°2.7   03.9   18   275°47.6   114°33.7   N09°20.5   65°02.2   512°32.2   162°63.8   121°20.0   276°33.2   503°04.0   18   275°47.6   114°33.7   N09°20.5   65°02.2   512°32.2   162°63.8   121°20.0   276°33.2   503°04.0   19   290°50.0   129°53.2   19.4   86°03.0   32.8   177°08.4   39.9   291°35.8   40.1   21   320°55.0   149°52.3   -17.2   110°04.7   -34.0   207°12.7   -39.8   331°41.1   -04.2   22   335°57.4   174°51.9   16.1   125°05.6   34.6   222°14.8   39.8   336°41.7   04.3   23   350°59.9   189°51.4   15.0   140°06.4   35.2   237°16.9   39.7   351°46.4   04.4   24   340°3.5   346°50.5   248°40.7   -10.1   11.8   185°08.9   37.0   222°14.8   39.6   236°14.5   04.6   25   36°07.3   234°50.1   11.8   185°08.9   37.0   282°33.2   39.6   36°43.4   04.2   26   66°12.2   246°49.9   -0.1   11.8   185°08.9   37.0   282°33.2   39.6   36°43.4   04.2   25   81°14.7   279°48.8   08.5   230°11.5   38.8   232°29.6   39.5   36°40.9   04.6	10												
12 185*32.8 24*50.3 009*27.0 349*58.0 29.2 86*55.7 40.2 201°02.0 0.3.6 Alpheca 1.36*55.6 -16°08.9 Alpheca 1.36*55.8 -10°09.9 Alpheca 1.36*55.8 -10°09.9 Alpheca 1.36*55.8 -10°09.9 Alpheca 1.36*55.8 -10°09.9 Alpheca 1.36*55.8 -10°09.9 Alpheca 1.36*55.8 -10°09.9 Alpheca 1.36*55.8 -10°09.9 Alpheca 1.36*55.8 -10°09.9 Alpheca 1.30*55.9 Alpheca 1.30*55.9 Alpheca 1.30*55.9 Alpheca 1.30*55.9 Alpheca 1.30*55.9 Alpheca 1.30*55.9 Alpheca 1.30*55.9 Alpheca 1.30*											_		
13 200°35.3 39°55.9 25.9 349°58.0 29.2 86°55.7 40.2 201°20.0 03.6   Alphecca 126°03.5 26°37.4   12°37.7 55°55.5 24.8 4°58.8 29.8 101°57.9 40.2 216°22.6 03.7   Alphecca 26°03.5 26°37.4   15°20.4° 21°50.5   230°40.2 60°55.0 0.23.7   10°59.6 30.4   117°00.0 0.40.1 231°25.2 0.38   Alria 107°09.2 66°04.1   12°00.5   12°00.5   11°00.0 0.40.1   12°10.1   12°10.5   13°00.5   13°00.1   12°00.5   14°04.2   14°0.1   24°10.0   26°33.2   03°04.0   12°30.5   03.9   12°00.0   12°53.2   19.4   80°03.0   32.8   177°08.4   39°9.2   91°35.8   04.1   12°30.5   13°00.5   13°00.3   13°00.5   13°00.3   13°00.5   13°00.3   13°00.5   13°00.3   13°00.5   13°00.3   13°00.5   13°00.3   13°00.5   13°00.3   13°00.5   13°00.3   13°00.5   13°00.3   13°00.3   13°00.5   13°00.3													1
14 215'37.7 54'955 24.8 4'58.8 29.8 101'57.9 40.2 216'22.6 03.7 Antares 112'15.3 26'29.4 15 230'40.2 69'95.0 23.7 19'99.6 30.4 117'00.0 40.1 231'25.2 . 03.8 Antare 112'15.3 26'29.4 16 245'42.7 84'94.6 22.6 35'00.5 31.0 132'02.1 40.1 246'27.9 03.9 180'54.5 19'95.4 21.6 50'01.3 31.6 132'02.1 40.1 246'27.9 03.9 180'54.1 21.6 50'01.3 31.6 132'02.1 40.0 26'13.05 03.9 180'50.0 120'50.0 120'53.2 19.4 80'03.0 32.8 17'08.4 40.0 26'13.05 03.9 180'50.0 120'50.0 120'53.2 19.4 80'03.0 32.8 17'08.4 39.9 291'58.8 04.1 22'3.00'50.0 120'53.2 19.4 80'03.0 32.8 17'08.4 39.9 291'58.8 04.1 18.2 18.2 18.3 99'03.9 33.4 192'10.5 39.9 306'38.4 04.2 18.2 13.2 18.2 18.2 18.3 99'03.9 33.4 192'10.5 39.9 306'38.4 04.2 18.2 18.2 18.2 18.2 18.2 18.2 18.2 18													
15 230°40.2 69°55.0 · · · · · · · · · · · · · · · · · · ·													
16   245*42.7   84°\$4.6   22.6   35°00.5   31.0   132°02.1   40.0   246°27.9   03.9     17   260°\$45.1   95°\$4.1   21.6   50°01.3   31.6   147°04.2   40.0   267°33.5   503°04.0     19   290°\$50.0   129°53.2   194   80°03.0   32.8   177°08.4   39.9   291°35.8   04.1     20   305°\$2.5   144°\$5.8   18.3   95°03.9   33.4   192°10.5   39.9   306°38.4   04.2     21   320°\$5.0   159°\$5.3   17.2   110°04.7   34.0   200°12.7   39.8   330°43.7   04.3     22   335°\$7.4   174°\$1.9   16.1   125°05.6   34.6   222°14.8   39.8   336°43.7   04.3     Mer.pass. 23:36   \$\nu_{\sigma}0.4'\ d^4-1.1' m-3.93   \$\nu_{\sigma}0.8'\ d0.6'\ d1.1' m-3.93   \$\nu_{\sigma}0.													
18   275°47.6   114°53.7   N09°20.5   65°02.2   S12°32.2   162°06.3   N21°40.0   276°33.2   503°04.0     19   290°50.0   129°53.2   194   80°03.0   32.8   177°08.1   39.9   291°35.8   04.1     21   320°55.5   144°52.8   18.3   95°03.9   33.4   192°10.5   39.9   306°38.4   04.2     22   335°57.4   174°51.9   16.1   125°05.6   34.6   222°14.8   39.8   321°41.1   04.2     23   350°59.9   189°51.4   15.0   140°06.4   35.2   237°16.9   39.7   351°46.4   04.4     Mer.pass. 23:36   \( \nu \)-0.4' \( \nu \)-1.1' \( \nu \)-3.93   \( \nu \)-0.6' \( \nu \)-1.5' \( \nu \)-0.6' \( \nu \)-1.1' \( \nu \)-3.93   \( \nu \)-0.6' \( \nu \)-1.1' \( \nu \)-3.93   \( \nu \)-0.6' \( \nu \)-1.1' \( \nu \)-3.93   \( \nu \)-0.6' \( \nu \)-1.1' \( \nu \)-3.93   \( \nu \)-0.6' \( \nu \)-1.1' \( \nu \)-3.93   \( \nu \)-0.6' \( \nu \)-1.1' \( \nu \)-0.5' \( \nu \)-0.2' \( \nu \)-0.0' \( \nu \)-0.1' \( \nu \)-0.0' \( \nu \)-0.1' \( \nu \)-0.0' \( \nu \)-0.1' \( \nu \)-0.0' \( \nu \)-0.1' \( \nu \)-0.0' \( \nu \)-0.1' \( \nu \)-0.0' \( \nu											Sabik	102°02.2	-15°45.4
18   2/5*47.6   114*53.7   N09*20.5   65*02.2   S12*32.2   177*08.8   4   39.9   29*05.8   04.1     29*095.0   129*05.2   144*52.8   18.3   95*03.9   33.8   177*08.4   39.9   306*38.4   04.2     20   305*95.5   144*52.8   18.3   95*03.9   33.4   129*10.5   39.9   306*38.4   04.2     22   335*05.5   144*52.8   18.3   95*03.9   33.4   129*10.5   39.9   306*38.4   04.2     22   335*05.5   144*52.8   18.3   95*03.9   33.4   129*10.5   39.9   306*38.4   04.2     23   350*59.9   189*51.4   15.0   16.1   125*05.6   34.6   222*14.8   39.8   335*43.7   04.3     Mer.pass. 23:36   \( \nu \cdot 0.4' \) \( \nu \cdo 0.4' \) \( \nu \cdot 0.4' \) \( \nu \cdot 0.4' \) \( \nu \cdot 0.4' \) \( \nu \cdot 0.4' \											Shaula	96°09.6	-37°07.4
20 305°52.5 144°52.8 18.3 95°03.9 33.4 192°10.5 39.9 306°38.4 04.2 21 21 320°55.0 150°52.3 · 17.2 110°04.7 · 34.0 207°12.7 · 39.8 321°41.1 · 04.2 Vega 80°32.8 38°43.7 22.3 335°57.4 174°51.9 16.1 125°05.6 34.6 222°14.8 39.8 336°43.7 04.3 Nunki 75°47.0 · 26°15.9 Nunki 75°				N09°20.5						\$03°04.0	Rasalhague	95°58.1	
21 320°55.0 159°52.3 ···17.2 110°04.7 ···34.0 207°12.7 ···39.8 321°41.1 ···04.2 238°48.7 ···04.3 238°48.7 ···04.4 ···0											Eltanin	90°42.0	51°29.4
22   335°57.4   174°51.9   16.1   125°05.6   34.6   222°14.8   39.8   336°43.7   04.3     23   350°59.9   189°51.4   15.0   140°06.4   35.2   237°16.9   39.7   351°46.4   04.4     24   25   25   25   25   25   25   25											Kaus Aust.	83°31.7	-34°22.4
Mer.pass. 23:36   ν-0.4' d-1.1' m-3.93   ν-0.8' d0.6' m1.58   ν-0.1' d-0.0' m-2.10   ν-0.6' d0.1' m0.60   ν-0.6' δ0.3' δ0.4' δ0.1' μ											Vega	80°32.8	38°48.7
Mer.pass. 23:36											Nunki	75°47.0	-26° 15.9
Sat         GHA         GHA         Dec         Al Nair         27°31.8         46°50.2         70°30.8         22°31.8         25°10.9         0.0°2.4         20°50.6         12.8         170°83.8         25°10.9         0.0°2.1         30°6         42°50.2         18°10.9         30°30.0         9°59.7         Al Nair         27°31.8         46°50.2         50°6.9         0.0°6.4         0.0°6.4         0.0°6.4         0.0°6.4         0.0°6.4         0.0°6.4         0.0°6.4         0.0°6.4         0.0°6.4         0.0°6.4         0.0°6.4         0.0°6.4         0.0°6.4         0.0°6.2         0.0°6.3	23	350°59.9	189°51.4	15.0	140°06.4	35.2	237°16.9	39.7	351°46.4	04.4	Altair	61°59.3	8°56.3
Sat         GHA         CHA         Dec         GHA         AB         Cabe?         Cabe         Cabe?	Mer.p	ass. 23:36	$\nu$ -0.4' d-1	1′ m-3.93	$\nu$ 0.8′ d0	.6′ m1.58	$\nu 2.1' \ d-0$	.0′ m-2.10	$\nu 2.6' \ d0.$	1′ m0.60	Peacock	53°04.5	-56°39.3
Sat         GHA         CHA         Dec         GHA         Dec         CH         A         C           4											Deneb	49°25.2	45°22.6
0 6 02.4 204 51.0 N09 13.9 155 07.3 S12 35.8 252 19.0 N21 39.7 6 49.0 503 04.5 1 20 04.6 1 21 04.8 219 50.6 12.8 170 08.1 36.4 267 21.1 39.6 21 51.6 04.6 36.7 32.1 39.6 36.9 37.0 282 23.2 36.6 36 54.3 04.6 3 51 09.8 249 49.7 10.7 200 09.8 1	_			_		_		_		_	Enif	33°38.0	9°59.7
1 21°04.8 219°50.6 12.8 170°08.1 36.4 267°21.1 39.6 21°51.6 04.6 238°07.3 234°50.1 11.8 185°08.9 37.0 282°23.2 39.6 36°54.3 04.6 Markab 13°29.0 15°20.8 35°10°08.2 249°49.7 · 10.7 200°09.8 · 37.6 297°25.3 · 39.5 51°56.9 · 04.7 4 66°12.2 264°49.2 09.6 215°10.6 38.2 312°27.5 39.5 66°59.6 04.8 52°02.2 04.9 66°17.2 294°48.3 N09°07.4 245°12.3 S12°39.4 342°31.7 N21°39.4 97°04.8 S03°04.9 7 111°19.6 309°47.9 06.3 260°13.2 40.0 357°33.8 39.4 112°07.5 05.0 Jupiter 246°33.7 07:16 8 126°22.1 324°47.5 05.2 275°14.0 40.6 12°35.9 39.3 127°10.1 05.1 11°19.6 309°47.0 · 04.1 290°14.8 · 41.2 27°38.0 · 39.3 142°12.8 · 05.2 11 171°29.5 9°46.1 01.9 320°16.5 42.4 57°42.3 39.2 157°15.4 05.2 11 171°29.5 9°46.1 01.9 320°16.5 42.4 57°42.3 39.2 172°18.0 05.3 12 186°31.9 24°45.7 N09°00.8 335°17.4 \$122°43.0 72°44.4 N21°39.1 187°20.7 \$03°05.4 199°43.7 13.40 1216°36.9 \$54°44.8 \$58.6 5°19.0 44.2 102°48.6 39.0 217°26.0 05.6 15 231°39.3 69°44.4 · 57.5 20°19.9 · 44.8 117°50.7 · 39.0 232°28.6 · 05.6 15 231°39.3 69°44.4 · 57.5 20°19.9 · 44.8 117°50.7 · 39.0 232°28.6 · 05.6 15 246°44.3 99°43.5 55.3 \$00°12.6 46.0 147°55.0 38.9 262°33.9 05.8 16 246°41.8 84°43.9 56.4 35°20.7 45.4 132°52.9 38.9 247°31.2 05.7 17 261°44.3 99°43.5 55.3 50°12.6 46.0 147°55.0 38.9 262°33.9 05.8 16 246°41.8 84°43.9 56.4 35°20.7 45.4 132°52.9 38.9 247°31.2 05.7 17 261°44.3 99°43.5 55.3 50°12.6 46.0 147°55.0 38.9 262°33.9 05.8 16 246°41.8 84°43.9 56.4 35°20.7 45.4 132°52.9 38.9 247°31.2 05.7 17 246°40.7 114°43.1 N08°54.2 65°22.4 \$12°46.6 162°57.1 N21°38.8 277°36.5 \$03°05.9 199°46.6 23:29 20 306°51.7 144°42.2 52.0 95°24.1 47.8 193°01.3 38.7 307°41.8 06.0 199°40.9 125°25.8 49.0 223°05.6 38.6 337°47.1 06.2 190°40.2 180°40.9 180°40.9 125°25.8 49.0 223°05.6 38.6 337°47.1 06.2 190°40.2 180°40.9 180°40.9 125°25.8 49.0 223°05.6 38.6 35°249.7 06.2 140°40.2 180°40.9 180°40.9 180°40.9 125°25.8 49.0 223°05.6 38.6 35°249.7 06.2 140°40.2 180°40.9 125°25.8 140°20.5 140°40.9 180°40.9 180°40.9 125°25.8 140°40.9 125°25.8 140°40.9 125°25.9 180°40.7 180°40.9 125°25.8 140°40.9 125°25.9 180°40.9 180°											Al Na'ir	27°31.8	
2 36°07.3 234°50.1 11.8 185°08.9 37.0 282°23.2 39.6 36°54.3 04.6 35°50.9 11.8 185°08.9 37.0 282°23.2 39.6 36°54.3 04.6 35°00.9 15°20.8 351°09.8 249°49.7 10.7 200°09.8 1.3 1.0 11.8 297°25.3 1.0 15°20.8 15°20.9 15°20.9 15°20.8 15°20.9 15°20											Fomalhaut		
\$\frac{3}{4}\$ 66^{9}12.2 266^{4}49.2  \text{0.9}{6}  \text{0.9}{6}  \text{0.9}{6}  \text{0.9}{6}  \text{0.15}{10.6}  \text{38.2}  \text{312}^{\circ 27.5}  \text{39.5}  \text{66}^{\circ 95.6}   \text{0.4.8}\$  \$\frac{5}{8}\$  \text{0.17}{11}^{\circ 19.6}  \text{0.9}{8.8}   \text{0.21}{30}^{\circ 11.5}   \text{38.8}    \text{327}{27.5}   \qua													
4 66°12.2 264°49.2 09.6 215°10.6 38.2 312°27.5 39.5 66°59.6 04.8 54.4 72°94.8 08.5 230°11.5 38.8 327°29.6 39.5 82°02.2 04.9 69°17.2 294°48.3 N09°07.4 245°12.3 \$12°39.4 342°31.7 N21°39.4 97°04.8 \$03°04.9 Mars 150°22.4 13:41 11°19.6 309°47.9 06.3 260°13.2 40.0 357°33.8 39.4 112°07.5 05.0 Jupiter 246°33.7 07:16 8 126°22.1 324°47.5 05.2 275°14.0 40.6 12°35.9 39.3 127°10.1 05.1 5.1 5.1 5.1 5.1 5.1 5.1 5.1 5.1 5.1											Markab	13°29.0	15°20.8
5 81°14.7 279°48.8 08.5 230°11.5 38.8 327°29.6 39.5 82°02.2 04.9 6 96°17.2 294°48.3 N09°07.4 245°12.3 S12°39.4 342°31.7 N21°39.4 97°04.8 S03°04.9 7.11°19.6 309°47.9 06.3 260°13.2 40.0 357°33.8 39.4 112°07.5 05.0 5.1   8 126°22.1 324°47.5 05.2 275°14.0 40.6 12°35.9 39.3 127°10.1 05.1   9 141°24.5 339°47.0 · 04.1 290°14.8 · 41.2 27°38.0 · 39.3 142°12.8 · 05.2   10 156°27.0 354°46.6 03.0 305°15.7 41.8 42°40.2 39.2 157°15.4 05.2   11 171°29.5 9°46.1 01.9 320°16.5 42.4 57°42.3 39.2 172°18.0 05.3   12 186°31.9 24°45.7 N09°00.8 335°17.4 S12°43.0 72°44.4 N21°39.1 187°20.7 S03°05.4   13 201°34.4 39°45.3 08°59.7 350°18.2 43.6 87°46.5 39.1 202°23.3 05.5   14 216°36.9 54°44.8 58.6 5°19.0 44.2 102°48.6 39.0 217°26.0 05.6   15 231°39.3 69°44.4 · 57.5 20°19.9 · 44.8 117°50.7 · 39.0 232°28.6 · 05.6   16 246°41.8 84°43.9 56.4 35°20.7 45.4 132°52.9 38.9 247°31.2 05.7   17 261°44.3 99°43.5 55.3 50°21.6 46.0 147°55.0 38.9 262°33.9 05.8   18 276°46.7 114°43.1 N08°54.2 65°22.4 S12°46.6 162°57.1 N21°38.8 277°36.5 S03°05.9   18 276°46.7 114°43.1 N08°54.2 65°22.4 S12°46.6 162°57.1 N21°38.8 277°36.5 S03°05.9   20 306°51.7 144°42.2 52.0 95°24.1 47.8 193°01.3 38.7 307°41.8 06.0   21 321°54.1 159°41.7 · 51.0 110°24.9 · 48.4 208°03.5 · 38.7 322°44.4 · 06.1   321°55.0 188°40.9 48.8 140°26.6 49.6 238°07.7 38.6 352°49.7 06.2    Venus 201°08.5 10:19   Mars 150°22.4 13:41   Jupiter 246°33.7 07:16   Saturn 0°38.1 23:41   Jupiter 246°33.7 07:16   Saturn 0°38.1 23:37   Sep 26 Fri SHA Mer.pass Venus 199°58.5   Venus 199°58.5 10:20   Mars 149°43.7 13:40   Jupiter 246°33.7 07:16   Saturn 0°38.1 23:33   Sep 27 Sat SHA Mer.pass Venus 199°43.6 50:0   Saturn 0°46.6 23:29   Jupiter 246°16.6 07:10   Saturn 0°46.6 23:29   Horizontal parallax Venus: 0.1   Mars: 0.1   Mars: 0.1											Son OF The	C L V	Mor noss
6 96°17.2 294°48.3 N09°07.4 245°12.3 S12°39.4 342°31.7 N21°39.4 97°04.8 S03°04.9   7 111°19.6 309°47.9 06.3 260°13.2 40.0 357°33.8 39.4 112°07.5 05.0   8 126°22.1 324°47.5 05.2 275°14.0 40.6 12°35.9 39.3 127°10.1 05.1   9 141°24.5 339°47.0 · 04.1 290°14.8 · 41.2 27°38.0 · 39.3 142°12.8 · 05.2   10 156°27.0 354°46.6 03.0 305°15.7 41.8 42°40.2 39.2 157°15.4 05.2   11 171°29.5 9°46.1 01.9 320°16.5 42.4 57°42.3 39.2 172°18.0 05.3   12 186°31.9 24°45.7 N09°00.8 335°17.4 \$12°43.0 72°44.4 N21°39.1 187°20.7 \$03°05.4   13 201°34.4 39°45.3 08°59.7 350°18.2 43.6 87°46.5 39.1 202°23.3 05.5   14 216°36.9 54°44.8 58.6 5°19.0 44.2 102°48.6 39.0 217°26.0 05.6   15 231°39.3 69°44.4 · 57.5 20°19.9 · 44.8 117°50.7 · 39.0 232°28.6 · 05.6   16 246°41.8 84°43.9 56.4 35°20.7 45.4 132°52.9 38.9 247°31.2 05.7   17 261°44.3 99°43.5 55.3 50°21.6 46.0 147°55.0 38.9 262°33.9 05.8   18 276°46.7 114°43.1 N08°54.2 65°22.4 \$12°46.6 162°57.1 N21°38.8 277°36.5 \$03°05.9   19 291°49.2 129°42.6 53.1 80°23.2 47.2 177°59.2 38.8 292°39.2 05.9   20 306°51.7 144°42.2 52.0 95°24.1 47.8 193°01.3 38.7 307°41.8 06.0   21 321°54.1 159°41.7 · 51.0 110°24.9 · 48.4 208°03.5 · 38.7 322°44.4 · 06.1   321°559.0 189°40.9 48.8 140°26.6 49.6 238°07.7 38.6 352°49.7 06.2    Mars 150°22.4 13:41   Jupiter 246°33.7 07:16   Saturn 0°38.1 23:37    Sep 26 Fri SHA Mer.pass   Venus 199°58.5 10:20   Mars 149°43.7 13:40   Jupiter 246°31.7 07:16   Saturn 0°38.1 23:37    Sep 26 Fri SHA Mer.pass   Venus 199°48.6 10:21   Mars 149°43.7 13:40   Jupiter 246°31.0 05.2   Mars 149°43.7 13:40   Jupiter 246°16.6 07:10   Saturn 0°42.4 23:33    Sep 26 Fri SHA Mer.pass   Venus 199°48.6 10:21   Mars 149°43.7 13:40   Jupiter 246°25.1 07:13   Saturn 0°42.4 23:33    Sep 26 Fri SHA Mer.pass   Venus 199°48.6 10:21   Mars 149°43.7 13:40   Jupiter 246°25.1 07:13   Saturn 0°42.4 23:33    Sep 27 Sat SHA Mer.pass   Venus 199°48.6 10:21   Mars 149°43.7 05.2   Saturn 0°42.4 23:33    Sep 27 Sat SHA Mer.pass   Venus 199°48.6 10:21   Mars 149°43.7 05.0   Saturn 0°42.4 23:33    Sep 27 Sat SHA Mer.pass   Venus													
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10											Jatuin	0 30.1	25.31
11 171°29.5 9°46.1 01.9 320°16.5 42.4 57°42.3 39.2 172°18.0 05.3 12 186°31.9 24°45.7 N09°00.8 335°17.4 \$12°43.0 72°44.4 N21°39.1 187°20.7 \$03°05.4 13 201°34.4 39°45.3 08°59.7 350°18.2 43.6 87°46.5 39.1 202°23.3 05.5 14 216°36.9 54°44.8 58.6 5°19.0 44.2 102°48.6 39.0 217°26.0 05.6 15 231°39.3 69°44.4 · · · 57.5 20°19.9 · · · 44.8 117°50.7 · · · 39.0 232°28.6 · · · 05.6 16 246°41.8 84°43.9 56.4 35°20.7 45.4 132°52.9 38.9 247°31.2 05.7 17 261°44.3 99°43.5 55.3 50°21.6 46.0 147°55.0 38.9 262°33.9 05.8 18 276°46.7 114°43.1 N08°54.2 65°22.4 \$12°46.6 162°57.1 N21°38.8 277°36.5 \$03°05.9 19 291°49.2 129°42.6 53.1 80°23.2 47.2 177°59.2 38.8 292°39.2 05.9 20 306°51.7 144°42.2 52.0 95°24.1 47.8 193°01.3 38.7 307°41.8 06.0 21 321°54.1 159°41.7 · · · 51.0 110°24.9 · · · 48.4 208°03.5 · · · 38.7 322°44.4 · · · 06.1 22 336°56.6 174°41.3 49.9 125°25.8 49.0 223°05.6 38.6 337°47.1 06.2 23 351°59.0 189°40.9 48.8 140°26.6 49.6 238°07.7 38.6 352°49.7 06.2											Sep 26 Fri	SHA	Mer.pass
12 186°31.9 24°45.7 N09°00.8 335°17.4 \$12°43.0 72°44.4 N21°39.1 187°20.7 \$03°05.4 13 201°34.4 39°45.3 08°59.7 350°18.2 43.6 87°46.5 39.1 202°23.3 05.5 14 216°36.9 54°44.8 58.6 5°19.0 44.2 102°48.6 39.0 217°26.0 05.6 15 231°39.3 69°44.4 ·· 57.5 20°19.9 ·· 44.8 117°50.7 ·· 39.0 232°28.6 ·· 05.6 16 246°41.8 84°43.9 56.4 35°20.7 45.4 132°52.9 38.9 247°31.2 05.7 17 261°44.3 99°43.5 55.3 50°21.6 46.0 147°55.0 38.9 262°33.9 05.8 18 276°46.7 114°43.1 N08°54.2 65°22.4 \$12°46.6 162°57.1 N21°38.8 277°36.5 \$03°05.9 19 291°49.2 129°42.6 53.1 80°23.2 47.2 177°59.2 38.8 292°39.2 05.9 20 306°51.7 144°42.2 52.0 95°24.1 47.8 193°01.3 38.7 307°41.8 06.0 21 321°54.1 159°41.7 ·· 51.0 110°24.9 ·· 48.4 208°03.5 ·· 38.7 322°44.4 ·· 06.1 22 336°56.6 174°41.3 49.9 125°25.8 49.0 223°05.6 38.6 337°47.1 06.2 23 351°59.0 189°40.9 48.8 140°26.6 49.6 238°07.7 38.6 352°49.7 06.2 Mars: 0.1											Venus	199°58.5	10:20
13  201°34.4  39°45.3  08°59.7  350°18.2  43.6  87°46.5  39.1  202°23.3  05.5   14  216°36.9  54°44.8  58.6  5°19.0  44.2  102°48.6  39.0  217°26.0  05.6   15  231°39.3  69°44.4  ·· 57.5  20°19.9  ·· 44.8  117°50.7  ·· 39.0  232°28.6  ·· 05.6   16  246°41.8  84°43.9  56.4  35°20.7  45.4  132°52.9  38.9  247°31.2  05.7   17  261°44.3  99°43.5  55.3  50°21.6  46.0  147°55.0  38.9  262°33.9  05.8   18  276°46.7  114°43.1  N08°54.2  65°22.4  512°46.6  162°57.1  N21°38.8  277°36.5  503°05.9   19  291°49.2  129°42.6  53.1  80°23.2  47.2  177°59.2  38.8  292°39.2  05.9   20  306°51.7  144°42.2  52.0  95°24.1  47.8  193°01.3  38.7  307°41.8  06.0   21  321°54.1  159°41.7  ·· 51.0  110°24.9  ·· 48.4  208°03.5  ·· 38.7  322°44.4  ·· 06.1   22  336°56.6  174°41.3  49.9  125°25.8  49.0  223°05.6  38.6  337°47.1  06.2   23  351°59.0  189°40.9  48.8  140°26.6  49.6  238°07.7  38.6  352°49.7  06.2    13  21°33  305°54.0  189°40.9  48.8  140°26.6  49.6  238°07.7  38.6  352°49.7  06.2											Mars		13:40
14 216°36.9 54°44.8 58.6 5°19.0 44.2 102°48.6 39.0 217°26.0 05.6 15 231°39.3 69°44.4 ··· 57.5 20°19.9 ··· 44.8 117°50.7 ··· 39.0 232°28.6 ··· 05.6 16 246°41.8 84°43.9 56.4 35°20.7 45.4 132°52.9 38.9 247°31.2 05.7 17 261°44.3 99°43.5 55.3 50°21.6 46.0 147°55.0 38.9 262°33.9 05.8 18 276°46.7 114°43.1 N08°54.2 65°22.4 512°46.6 162°57.1 N21°38.8 277°36.5 S03°05.9 19 291°49.2 129°42.6 53.1 80°23.2 47.2 177°59.2 38.8 292°39.2 05.9 20 306°51.7 144°42.2 52.0 95°24.1 47.8 193°01.3 38.7 307°41.8 06.0 21 321°54.1 159°41.7 ··· 51.0 110°24.9 ··· 48.4 208°03.5 ··· 38.7 322°44.4 ··· 06.1 22 336°56.6 174°41.3 49.9 125°25.8 49.0 223°05.6 38.6 337°47.1 06.2 23 351°59.0 189°40.9 48.8 140°26.6 49.6 238°07.7 38.6 352°49.7 06.2 Saturn 0°42.4 23:33 2333 23°47.1 06.2 23°49.7 06.2											Jupiter	$246^{\circ}25.1$	07:13
15 231°39.3 69°44.4 · · · 57.5 20°19.9 · · · 44.8 117°50.7 · · · 39.0 232°28.6 · · · 05.6 16 246°41.8 84°43.9 56.4 35°20.7 45.4 132°52.9 38.9 247°31.2 05.7 17 261°44.3 99°43.5 55.3 50°21.6 46.0 147°55.0 38.9 262°33.9 05.8 18 276°46.7 114°43.1 N08°54.2 65°22.4 512°46.6 162°57.1 N21°38.8 277°36.5 503°05.9 19 291°49.2 129°42.6 53.1 80°23.2 47.2 177°59.2 38.8 292°39.2 05.9 20 306°51.7 144°42.2 52.0 95°24.1 47.8 193°01.3 38.7 307°41.8 06.0 21 321°54.1 159°41.7 · · · 51.0 110°24.9 · · · 48.4 208°03.5 · · · 38.7 322°44.4 · · · 06.1 22 336°56.6 174°41.3 49.9 125°25.8 49.0 223°05.6 38.6 337°47.1 06.2 23 351°59.0 189°40.9 48.8 140°26.6 49.6 238°07.7 38.6 352°49.7 06.2 Sep 27 Sat SHA Mer.pass Venus 198°48.6 10:21    Sep 27 Sat SHA Mer.pass Venus 198°48.6 10:21    Nars 149°04.9 13:39    Jupiter 246°16.6 07:10    Saturn 0°46.6 23:29    Horizontal parallax Venus: 0.1    Venus: 0.1    Nars: 0.1											Saturn	0°42.4	23:33
16       246°41.8       84°43.9       56.4       35°20.7       45.4       132°52.9       38.9       247°31.2       05.7       Venus 198°48.6       10:21         17       261°44.3       99°43.5       55.3       50°21.6       46.0       147°55.0       38.9       262°33.9       05.8       Mars 149°04.9       13:39         18       276°46.7       114°43.1       N08°54.2       65°22.4       512°46.6       162°57.1       N21°38.8       277°36.5       503°05.9       Jupiter 246°16.6       07:10         19       291°49.2       129°42.6       53.1       80°23.2       47.2       177°59.2       38.8       292°39.2       05.9       Saturn 0°46.6       23:29         20       306°51.7       144°42.2       52.0       95°24.1       47.8       193°01.3       38.7       307°41.8       06.0         21       321°54.1       159°41.7       · 51.0       110°24.9       · 48.4       208°03.5       · 38.7       322°44.4       · 06.1         22       336°56.6       174°41.3       49.9       125°25.8       49.0       223°05.6       38.6       337°47.1       06.2       Mars: 0.1         23       351°59.0       189°40.9       48.8       140°26.6											San 27 San	CH A	Mo: ::
17													-
18													
19 291°49.2 129°42.6 53.1 80°23.2 47.2 177°59.2 38.8 292°39.2 05.9 20 306°51.7 144°42.2 52.0 95°24.1 47.8 193°01.3 38.7 307°41.8 06.0 21 321°54.1 159°41.7 · 51.0 110°24.9 · 48.4 208°03.5 · 38.7 322°44.4 · 06.1 22 336°56.6 174°41.3 49.9 125°25.8 49.0 223°05.6 38.6 337°47.1 06.2 23 351°59.0 189°40.9 48.8 140°26.6 49.6 238°07.7 38.6 352°49.7 06.2 Mars: 0.1													
20 306°51.7 144°42.2 52.0 95°24.1 47.8 193°01.3 38.7 307°41.8 06.0 21 321°54.1 159°41.7 · · 51.0 110°24.9 · · 48.4 208°03.5 · · 38.7 322°44.4 · · 06.1 22 336°56.6 174°41.3 49.9 125°25.8 49.0 223°05.6 38.6 337°47.1 06.2 23 351°59.0 189°40.9 48.8 140°26.6 49.6 238°07.7 38.6 352°49.7 06.2  Horizontal parallax Venus: 0.1 Mars: 0.1													
21       321°54.1       159°41.7       ·· 51.0       110°24.9       ·· 48.4       208°03.5       ·· 38.7       322°44.4       ·· 06.1       Horizontal parallax         22       336°56.6       174°41.3       49.9       125°25.8       49.0       223°05.6       38.6       337°47.1       06.2       Venus: 0.1         23       351°59.0       189°40.9       48.8       140°26.6       49.6       238°07.7       38.6       352°49.7       06.2       Mars: 0.1											Saturn	U 40.0	25:29
22 336°56.6 174°41.3 49.9 125°25.8 49.0 223°05.6 38.6 337°47.1 06.2 Venus: 0.1 23 351°59.0 189°40.9 48.8 140°26.6 49.6 238°07.7 38.6 352°49.7 06.2 Mars: 0.1											Horizont	al parallax	
23 351°59.0 189°40.9 48.8 140°26.6 49.6 238°07.7 38.6 352°49.7 06.2 Mars: 0.1												-	0.1
												Mars:	
wier.pass. 23:32 $\nu$ -0.4′ $d$ -1.1′ m-3.93 $\nu$ 0.8′ $d$ 0.6′ m1.58 $\nu$ 2.1′ $d$ -0.0′ m-2.10 $\nu$ 2.6′ $d$ 0.1′ m0.60													
	ivler.p	bass. 23:32	$\nu$ -0.4' d-1	ı′ m-3.93	νυ.8′ d0	.σ΄ m1.58	$\nu$ 2.1′ $d$ -0	.u′ m-2.10	$\nu$ 2.0′ $d$ 0.	1' m0.60			

h	Sui	า			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	182°03.5	\$00°52.3	$150^{\circ}19.4$	14.6'	S17°45.7	11.5'	54.1'
1	197°03.7	53.2	164°53.1	14.6'	17°57.2	11.4'	54.1'
2	212°03.9 227°04.2	54.2 •• 55.2	179°26.7 194°00.2	14.5' 14.5'	18°08.6 18°20.0	11.3' 11.3'	54.1' 54.1'
3 4	242°04.4	56.2	208°33.7	14.5 14.4'	18°31.2	11.3	54.1
5	257°04.6	57.1	223°07.1	14.4	18° 42.4	11.1'	54.1'
6	272°04.8	S00°58.1	237°40.5	14.3'	S18°53.5	11.0'	54.1'
7	287°05.0	00°59.1	252°13.8	14.3'	19°04.6	10.9'	54.1'
8	302°05.2 317°05.4	01°00.1	266°47.0 281°20.2	14.2'	19° 15.5 19° 26.4	10.9' 10.8'	54.1
9 10	317°05.4 332°05.7	· · 01.0 02.0	281 20.2 295°53.4	14.1' 14.1'	19° 26.4 19° 37.2	10.8	54.1' 54.1'
11	347°05.9	03.0	310°26.5	14.0'	19°47.9	10.6'	54.1'
12	2°06.1	S01°04.0	324°59.5	14.0'	S19°58.5	10.5'	54.1'
13	17°06.3	04.9	339°32.5	13.9'	20°09.0	10.5'	54.0'
14 15	32°06.5 47°06.7	05.9 •• 06.9	354°05.4 8°38.3	13.9' 13.8'	20° 19.5 20° 29.8	10.4' 10.3'	54.0' 54.0'
16	62°06.9	07.9	23°11.1	13.7'	20°40.1	10.2	54.0'
17	77°07.2	08.8	37°43.8	13.7'	20°50.3	10.1'	54.0'
18	92°07.4	S01°09.8	52°16.5	13.6'	S21°00.4	10.0'	54.0'
19	107°07.6 122°07.8	10.8	66°49.1 81°21.7	13.6' 13.5'	21°10.4 21°20.4	9.9'	54.0'
20 21	122 07.8 137°08.0	11.8 •• 12.7	81 21.7 95°54.2	13.4	21°20.4 21°30.2	9.8' 9.7'	54.0' 54.0'
22	152°08.2	13.7	110°26.6	13.4	21°39.9	9.7'	54.0'
23	167°08.5	14.7	124°59.0	13.3'	21°49.6	9.6'	54.0'
	SD = 15.9'	d = 1.0'		SE	0 = 14.8'		
_							
Fri 0	<b>GHA</b> 182°08.7	<b>Dec</b> \$01°15.6	<b>GHA</b> 139°31.3	u  13.3'	Dec \$21°59.2	<i>d</i> 9.5'	<b>HP</b> 54.0'
1	197°08.9	16.6	159° 51.5	13.2'	22° 08.6	9.3 9.4'	54.0'
2	212°09.1	17.6	168°35.8	13.1'	22°18.0	9.3'	54.0'
3	227°09.3	• • 18.6	183°07.9	13.1'	22°27.3	9.2'	54.0'
4	242°09.5	19.5	197°39.9	13.0'	22°36.4	9.1'	54.0'
5 6	257°09.7 272°09.9	20.5 S01°21.5	212°11.9 226°43.9	12.9' 12.9'	22°45.5 \$22°54.5	9.0' 8.9'	54.0' 54.0'
7	287°10.2	22.5	241°15.8	12.8'	23°03.4	8.8'	54.0'
8	302°10.4	23.4	255°47.6	12.7'	23°12.2	8.7'	54.0'
9	317°10.6	• • 24.4	270°19.3	12.7'	23°20.9	8.6'	54.0'
10 11	332°10.8 347°11.0	25.4 26.4	284°51.0 299°22.6	12.6' 12.6'	23°29.5 23°37.9	8.5' 8.4'	54.0' 54.0'
12	2°11.2	S01°27.3	313°54.2	12.5'	\$23°46.3	8.3'	54.0'
13	17°11.4	28.3	328°25.7	12.4	23°54.6	8.2'	54.0'
14	32°11.7	29.3	$342^{\circ}57.1$	12.4'	24°02.8	8.1'	54.0'
15	47°11.9 62°12.1	· · 30.3	357°28.5 11°59.8	12.3' 12.2'	24°10.8 24°18.8	8.0'	54.0'
16 17	77°12.3	32.2	26°31.0	12.2'	24 18.8 24°26.7	7.9' 7.7'	54.0' 54.0'
18	92°12.5	S01°33.2	41°02.2	12.1'	S24°34.4	7.6'	54.0'
19	107°12.7	34.1	55°33.3	12.0'	24°42.1	7.5'	54.0'
20	122°12.9	35.1	70°04.3	12.0'	24°49.6	7.4'	54.0'
21 22	137°13.1 152°13.4	· · 36.1 37.1	84°35.3 99°06.2	11.9' 11.9'	24°57.0 25°04.3	7.3' 7.2'	54.0' 54.0'
23	167°13.6	38.0	113°37.1	11.8'	25°11.5	7.1	54.0'
	SD = 15.9'	d = 1.0'		SE	0 = 14.7'		
_							
Sat 0	<b>GHA</b> 182°13.8	Dec 501°39.0	<b>GHA</b> 128°07.9	u 11.7'	<b>Dec</b> \$25° 18.6	d 7.0'	<b>HP</b> 54.0'
1	197°14.0	40.0	142°38.6	11.7'	25°25.6	6.9'	54.0'
2	212°14.2	41.0	$157^{\circ}09.2$	11.6'	25°32.5	6.7'	54.0'
3	227°14.4 242°14.6	• • 41.9	171°39.8 186°10.4	11.5'	25°39.2	6.6'	54.0'
4 5	242°14.6 257°14.8	42.9 43.9	186°10.4 200°40.9	11.5' 11.4'	25° 45.8 25° 52.4	6.5' 6.4'	54.0' 54.0'
6	272°15.1	S01°44.9	215°11.3	11.4'	\$25°58.8	6.3	54.0'
7	287°15.3	45.8	229°41.6	11.3'	26°05.0	6.2'	54.1'
8	302°15.5	46.8	244°11.9	11.2'	26°11.2	6.0'	54.1'
9 10	317°15.7 332°15.9	· · 47.8 48.7	258°42.2 273°12.3	11.2' 11.1'	26°17.3 26°23.2	5.9' 5.8'	54.1' 54.1'
11	347°16.1	49.7	273 12.3 287°42.4	11.1	26° 29.0	5.7'	54.1
12	2°16.3	S01°50.7	302°12.5	11.0'	S26°34.7	5.6'	54.1'
13	17°16.5	51.7	316°42.5	10.9'	26°40.2	5.4'	54.1'
14 15	32°16.7 47°17.0	52.6 •• 53.6	331°12.4 345°42.3	10.9' 10.8'	26°45.7 26°51.0	5.3' 5.2'	54.1' 54.1'
15 16	47°17.0 62°17.2	54.6	345 42.3 0°12.1	10.8	26°51.0 26°56.2	5.2 5.1'	54.1' 54.1'
17	77°17.4	55.6	14°41.9	10.7	27°01.3	4.9'	54.1'
18	92°17.6	S01°56.5	29°11.6	10.6'	\$27°06.2	4.8'	54.1'
19	107°17.8	57.5	43°41.2	10.6'	27°11.0	4.7'	54.1'
20 21	122°18.0 137°18.2	58.5 01°59.4	58°10.8 72°40.4	10.5' 10.5'	27°15.7 27°20.3	4.6' 4.4'	54.1' 54.2'
22	152°18.4	01 39.4 02°00.4	87°09.9	10.5	27°24.8	4.3	54.2
23	167°18.6	01.4	101°39.3	10.4	27°29.1	4.2'	54.2'
	SD = 15.9'	d = 1.0'		SE	0 = 14.7'		

N 72°         03:23         04:50         05:57         17:43         18:50         20           N 70°         03:39         04:56         05:57         17:44         18:44         20           68°         03:52         05:00         05:56         17:45         18:40         19           66°         04:02         05:04         05:55         17:45         18:36         19	:15 :00 :48 :38 :30 :23 :18
Naut.         Civil         Civil         Naut.           N 72°         03:23         04:50         05:57         17:43         18:50         20           N 70°         03:39         04:56         05:57         17:44         18:44         20           68°         03:52         05:00         05:56         17:45         18:40         19           66°         04:02         05:04         05:55         17:45         18:36         19	:15 :00 :48 :38 :30 :23
N 70°         03:39         04:56         05:57         17:44         18:44         20           68°         03:52         05:00         05:56         17:45         18:40         19           66°         04:02         05:04         05:55         17:45         18:36         19	:00 :48 :38 :30 :23
68° 03:52 05:00 05:56 17:45 18:40 19 66° 04:02 05:04 05:55 17:45 18:36 19	:48 :38 :30 :23
66° 04:02 05:04 05:55 17:45 18:36 19	:38 :30 :23
10   1000   2000	:30 :23
64° 04:10 05:07 05:55 17:46 18:33 19	:23
	:18
60° 04:23 05:13 05:54 17:47 18:28 19	
<b>N</b> 58° 04:28 05:15 05:54 17:48 18:27 19	:13
56° 04:33 05:16 05:53 17:48 18:25 19	:09
	:05
	:02
	:59
45° 04:49 05:23 05:52 17:50 18:19 18	:53
	:49
	:45
	:43
	:40
	:39
	:39
	:41
	:45
	:50
	:55
	:00
45° 04:37 05:12 05:41 18:02 18:31 19	:06
	:15
	:19
	:23
	:29
	:35
<b>S</b> 60° 04:03 04:54 05:35 18:09 18:51 19	:42

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

		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%
25	08:14	08:24	11:52	14:24	02:02	
26	08:35	08:45	11:51	15:10	02:47	
27	08:55	09:05	11:51	15:59	03:34	

## September 28, 29, 30 UT (Sun., Mon., Tue.)

h	Aries	Ve	enus		ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	7°01.5	204°40.4	N08°47.6	155°27.4	\$12°50.2	253°09.8	N21°38.5	7°52.4	S03°06.3		3114	
1	22°04.0	219°40.0	46.5	170°28.3	50.8	268°11.9	38.5	22°55.0	06.4	Alpheratz	357°33.8	29°14.1
2	37°06.4	234°39.5	45.4	170 28.3 185°29.1	51.4	283°14.1	38.5	37°57.6	06.5	Ankaa	353°06.1	-42°09.8
3	52°08.9	249°39.1	• • 44.3	200°30.0	52.0	298° 16.2	• • 38.4	53°00.3	• • 06.5	Schedar	$349^{\circ}29.8$	56°40.8
4	67°11.4	264°38.7	43.2	200°30.0 215°30.8	52.6	313° 18.3	38.4	68°02.9	06.6	Diphda	348° 46.4	-17°50.6
										Achernar	$335^{\circ}19.2$	-57°06.2
5 6	82°13.8 97°16.3	279°38.2	42.1	230°31.6 245°32.5	53.2	328°20.4	38.3	83°05.6 98°08.2	06.7	Hamal	$327^{\circ}50.2$	23°35.1
	97 10.3 112° 18.8	294°37.8	N08°41.0	245 32.5 260°33.3	S12°53.8	343°22.6 358°24.7	N21°38.3	96 06.2 113°10.8	\$03°06.8	Polaris	$313^{\circ}22.6$	89°22.2
7		309°37.4	39.9		54.4		38.2		06.8	Acamar	$315^{\circ}11.0$	-40°11.8
8	127°21.2	324°36.9	38.8	275°34.1	55.0	13°26.8	38.2	128°13.5	06.9	Menkar	$314^{\circ}05.3$	4°11.6
9	142°23.7	339°36.5	• • 37.7	290°35.0	• • 55.6	28°28.9	• • 38.1	143°16.1	• • 07.0	Mirfak	$308^{\circ}27.1$	49°57.1
10	157°26.2	354°36.1	36.6	305°35.8	56.2	43°31.0	38.1	158°18.8	07.1	Aldebaran	290°38.8	16°33.7
11	172°28.6	9°35.6	35.5	320°36.6	56.8	58° 33.2	38.0	173°21.4	07.2	Rigel	281°03.2	-8°10.1
12	187°31.1	24°35.2	N08°34.4	335°37.5	S12°57.4	73°35.3	N21°38.0	188°24.0	S03°07.2	Capella	280° 20.9	46°01.3
13	202°33.5	39°34.7	33.3	350°38.3	58.0	88°37.4	37.9	203°26.7	07.3	Bellatrix	278°22.2	6°22.5
14	217°36.0	54°34.3	32.2	5°39.2	58.6	103°39.5	37.9	218°29.3	07.4	Elnath	278°01.0	28°37.7
15	232°38.5	69°33.9	• • 31.1	20°40.0	• • 59.2	118°41.7	• • 37.8	233°32.0	• • 07.5	Alnilam	275°37.1	-1°11.0
16	247°40.9	84°33.4	30.0	35°40.8	12°59.8	133° 43.8	37.8	248°34.6	07.5	Betelgeuse	270°51.4	7°24.8
17	262°43.4	99°33.0	28.9	50°41.7	13°00.4	148°45.9	37.7	263°37.2	07.6	Canopus	263°52.1	-52°42.2
18	277° 45.9	114°32.6	N08°27.8	65°42.5	S13°01.0	163°48.0	N21°37.7	278°39.9	S03°07.7	Sirius	258° 25.7	-16°44.8
19	292°48.3	129°32.1	26.7	80°43.3	01.6	178° 50.2	37.7	293°42.5	07.8	Adhara	255°05.5	-29°00.1
20	307°50.8	144°31.7	25.5	95°44.2	02.2	193°52.3	37.6	308°45.2	07.8	Procyon	244°50.3	5°09.7
21	322°53.3	159°31.3	• • 24.4	110°45.0	• • 02.8	208°54.4	• • 37.6	323°47.8	• • 07.9	Pollux	243°16.7	27°57.8
22	337°55.7	174°30.8	23.3	125° 45.8	03.4	223°56.5	37.5	338°50.4	08.0	Avior	234° 14.8	-59°35.2
23	352°58.2	189°30.4	22.2	140°46.7	04.0	238°58.7	37.5	353°53.1	08.1	Suhail	222°46.2	-43°31.9
Mern	ass. 23:28	$\nu$ -0.4' d-1	l.1′ m-3.93	ν0 8 <sup>7</sup> 40	.6′ m1.58	ν2 1' d-0	.0′ m-2.11	ν2 6' d0	1' m0.60	Miaplacidus	221°38.8	-69°49.1
.vici.p		. ∪.¬ u-1	5.95	- J.J UU	.5 1111.50	u-0	2.11	- Z.O UO	- 110.00	Alphard	217°47.4	-8°46.0
										Regulus	207°34.1	11°50.6
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.9	61°36.7
0	8°00.6	204°30.0	N08°21.1	155°47.5	S13°04.6	254°00.8	N21°37.4	8°55.7	S03°08.1	Denebola	182°24.7	14°25.8
1	23°03.1	219°29.5	20.0	170°48.3	05.2	269°02.9	37.4	23°58.4	08.2	Gienah	175°43.3	-17°41.0
2	38°05.6	$234^{\circ}29.1$	18.9	185°49.2	05.8	284°05.1	37.3	39°01.0	08.3	1	173°00.2	-63°14.5
3	53°08.0	249°28.7	• • 17.8	200°50.0	• • 06.4	299°07.2	• • 37.3	54°03.6	• • 08.4		173 00.2 171°51.6	-57°15.4
4	68° 10.5	264°28.2	16.7	215°50.8	06.9	$314^{\circ}09.3$	37.2	69°06.3	08.4	Alioth	166° 13.0	55°49.3
5	83°13.0	279°27.8	15.5	230°51.7	07.5	329°11.4	37.2	84°08.9	08.5	Spica	158° 22.0	-11°17.7
6	98°15.4	294°27.4	N08°14.4	245°52.5	S13°08.1	344°13.6	N21°37.1	99°11.6	S03°08.6	Alkaid	150° 52.0	49°11.2
7	113° 17.9	309°27.0	13.3	260°53.3	08.7	$359^{\circ}15.7$	37.1	$114^{\circ}14.2$	08.7	Hadar	148° 35.8	-60°29.9
8	128°20.4	324°26.5	12.2	275°54.1	09.3	$14^{\circ}17.8$	37.1	129°16.8	08.7		146 55.8 147°57.3	-36°29.8
9	143°22.8	339°26.1	• • 11.1	290°55.0	• • 09.9	29°20.0	• • 37.0	144°19.5	• • 08.8	1	147 37.3 145°47.7	19°03.0
10	158° 25.3	354°25.7	10.0	305°55.8	10.5	44°22.1	37.0	159°22.1	08.9	Arcturus	139°40.1	-60°56.6
11	173°27.8	9°25.2	08.9	320°56.6	11.1	59°24.2	36.9	174°24.8	09.0	Rigil Kent.	139 40.1 137°20.7	74°03.1
12	188°30.2	24°24.8	N08°07.7	335°57.5	S13°11.7	74° 26.3	N21°36.9	189°27.4	S03°09.0	Kochab		
13	203°32.7	39°24.4	06.6	350°58.3	12.3	89°28.5	36.8	204°30.0	09.1	Zuben'ubi	136°55.6	-16°08.9
14	218°35.1	54°23.9	05.5	5°59.1	12.9	104°30.6	36.8	219°32.7	09.2	Alphecca	126°03.5	26°37.8
15	233°37.6	69°23.5	• • 04.4	21°00.0	• • 13.5	119°32.7	• • 36.7	234°35.3	• • 09.3	Antares	112°15.3	-26°29.4
16	248°40.1	84°23.1	03.3	36°00.8	14.1	134°34.9	36.7	249°37.9	09.3	Atria	107°09.2	-69°04.6
17	263°42.5	99°22.7	02.1	51°01.6	14.7	149°37.0	36.6	264°40.6	09.4	Sabik	102°02.2	-15°45.4
18	278°45.0	114°22.2	N08°01.0		S13°15.3	164°39.1	N21°36.6	279°43.2	S03°09.5	Shaula	96°09.7	-37°07.4
19	293°47.5	129°21.8	07°59.9	81°03.3	15.9	179°41.3	36.5	294°45.9	09.6	Rasalhague	95°58.1	12°32.6
20	308°49.9	144°21.4	58.8	96°04.1	16.5	194°43.4	36.5	309°48.5	09.7	Eltanin	90°42.0	51°29.4
21	323°52.4	159°20.9	• • 57.7	111°04.9	17.1	209° 45.5	36.5	324°51.1	09.7	Kaus Aust.	83°31.7	-34°22.4
22	338°54.9	174°20.5	56.6	126°05.8	17.6	224° 47.7	36.4	339°53.8	09.8	Vega	80°32.8	38°48.7
23	353°57.3	189°20.1	55.4	141°06.6	18.2	239°49.8	36.4	354°56.4	09.9	Nunki	75° 47.0	-26°15.9
										Altair	61°59.3	8°56.3
Mer.p	ass. 23:24	$\nu$ -0.4′ d-1	$1.1^\prime$ m- $3.93$	u 0.8' d0	.6′ m1.58	$\nu 2.1' \ d-0$	.0′ m-2.11	$\nu$ 2.6′ d0.	1' m0.61	Peacock	53°04.5	-56°39.3
										Deneb	49°25.2	45°22.6
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.0	9°59.7
0	8°59.8	204°19.7	N07°54.3	156° 07.4		254°51.9	N21°36.3		S03°10.0	Al Na'ir	27°31.8	-46°50.2
1	24° 02.3	219°19.2	53.2	171°08.2	19.4	269°54.1	36.3	25°01.7	10.0	Fomalhaut	15° 13.5	-29°29.1
2	39°04.7	234°18.8	52.1	186°09.1	20.0	284° 56.2	36.2	40°04.3	10.0	Scheat	13°44.3	28°13.5
3	54° 07.2	249°18.4	50.9	201°09.1	. 20.6	299° 58.3	36.2	55°07.0	• 10.1	Markab	13°29.0	15°20.8
4	69°09.6	264°17.9	49.8	216° 10.7	21.2	315°00.5	36.1	70°09.6	10.2	Sep 28 Sun	SHA	Mer.pass
5	84°12.1	279°17.5	48.7	231°11.5	21.8	330°02.6	36.1	85°12.3	10.3		197°38.9	10:22
6	99° 14.6	294°17.1	N07°47.6	246° 12.4	\$13°22.4	345°04.7	N21°36.0	100°14.9	S03°10.4		148° 25.9	13:37
7	114° 17.0	309°16.7	46.4	261°13.2	23.0	0°06.9	36.0	115°17.5	10.5	1	246°08.3	07:06
8	129° 19.5	324°16.2	45.3	276° 14.0	23.6	15°09.0	35.9	130°20.2	10.5	Saturn	0°50.9	23:24
9	144°22.0	339°15.8	• • 44.2	291°14.8	• • 24.2	30°11.1	• • 35.9	145°22.8	. 10.6			
10	159° 24.4	354°15.4	43.1	306° 15.7	24.8	45° 13.3	35.9	160°25.4	10.7	Sep 29 Mon	SHA	Mer.pass
11	174°26.9	9°15.0	41.9	321°16.5	25.3	60° 15.4	35.8	175°28.1	10.7		196°29.3	10:22
12	189°29.4	24°14.5	N07°40.8	336°17.3		75° 17.5	N21°35.8	190°30.7	S03°10.9		147°46.8	13:36
13	204°31.8	39°14.1	39.7	351°18.1	26.5	90°19.7	35.7	205°33.4	10.9		246°00.2	07:03
14	219°34.3	54°13.7	38.6	6°19.0	27.1	105°21.8	35.7	220°36.0	11.0	Saturn	0°55.1	23:20
15	234° 36.8	69°13.3	37.4	21°19.8	27.7	120°24.0	• • 35.6	235°38.6	•• 11.1	Sep 30 Tue	SHA	Mor pass
16	249°39.2	84°12.8	36.3	36°20.6	28.3	135°26.1	35.6	250°41.3	11.2		5ПА 195°19.9	Mer.pass 10:23
17	264° 41.7	99°12.4	35.2	51°21.4	28.9	150°28.2	35.5	265°43.9	11.2	1	195 19.9 147°07.6	13:35
18	279° 44.1	114°12.0	N07°34.1	66°22.3	\$13°29.5	165°30.4	N21°35.5	280°46.6	S03°11.3	1	245°52.1	07:00
19	294° 46.6	129°11.6	32.9	81°23.1	30.1	180° 32.5	35.4	295°49.2	11.4	Saturn	0°59.3	23:16
20	309°49.1	144°11.1	31.8	96°23.9	30.7	195°34.6	35.4	310°51.8	11.4	Saturn	0 09.3	25:10
21	324°51.5	159°10.7	30.7	111°24.7	• • 31.2	210°36.8	• • 35.4	325°54.5	11.5	Horizont	al parallax	
22	339°54.0	174°10.3	29.5	126° 25.5	31.8	225°38.9	35.3	340°57.1	11.6		Venus:	0.1
23	354°56.5	189°09.9	28.4	141°26.4	32.4	240°41.1	35.3	355°59.7	11.7		Mars:	0.1
										-		
Mer.p	ass. 23:20	$\nu$ -0.4' d-1	l.1′ m-3.93	$\nu$ 0.8′ d0	.6′ m1.57	$\nu 2.1' \ d-0$	.0′ m-2.12	$\nu 2.6' d0$	.1′ m0.61			

h	Sui	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	182°18.8	<b>S</b> 02°02.4	$116^{\circ}08.7$	10.3'	<b>S</b> 27°33.3	4.1'	54.2'
1	197°19.1	03.3	130°38.0	10.3'	27° 37.3	3.9'	54.2'
2 3	212°19.3 227°19.5	04.3 •• 05.3	145°07.3 159°36.5	10.2' 10.2'	27°41.2 27°45.0	3.8' 3.7'	54.2' 54.2'
4	242°19.7	06.3	174°05.7	10.1	27°48.7	3.5'	54.2'
5	257°19.9	07.2	188°34.8	10.1'	$27^{\circ}52.2$	3.4'	54.2'
6	272°20.1	502°08.2	203°03.9	10.0'	\$27°55.6 27°58.9	3.3'	54.3'
7 8	287°20.3 302°20.5	09.2 10.1	217°32.9 232°01.9	10.0' 9.9'	27°58.9 28°02.0	3.1' 3.0'	54.3' 54.3'
9	317°20.7	•• 11.1	246°30.8	9.9'	28°05.0	2.9'	54.3'
10	332°20.9	12.1	260°59.7	9.9'	28°07.9	2.7'	54.3'
11	347°21.2 2°21.4	13.1 <b>S</b> 02°14.0	275°28.6 289°57.4	9.8'	28° 10.6 528° 13.2	2.6'	54.3'
12 13	17°21.6	15.0	289°57.4 304°26.2	9.8' 9.7'	28° 15.6	2.5' 2.3'	54.3' 54.3'
14	32°21.8	16.0	318°54.9	9.7'	28° 18.0	2.2'	54.4'
15	47°22.0	•• 17.0	333°23.6	9.6'	28°20.1	2.0'	54.4'
16	62°22.2 77°22.4	17.9 18.9	347°52.2 2°20.8	9.6' 9.6'	28°22.2 28°24.1	1.9' 1.8'	54.4'
17 18	92°22.6	502°19.9	2 20.8 16°49.4	9.6	528°25.9	1.6'	54.4' 54.4'
19	107°22.8	20.8	31°18.0	9.5'	28° 27.5	1.5'	54.4'
20	122°23.0	21.8	45°46.5	9.5'	28°29.0	1.3'	54.4'
21 22	137°23.2 152°23.4	· · 22.8 23.8	60°14.9 74°43.4	9.4' 9.4'	28° 30.3 28° 31.5	1.2' 1.1'	54.5' 54.5'
23	167°23.7	24.7	89°11.8	9.4' 9.4'	28°32.6	0.9'	54.5'
-	SD = 16.0'	d = 1.0'			0 = 14.8'		
	<u> </u>	<u>u — 1.0</u>		JL	_ 17.0		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	182°23.9 197°24.1	\$02°25.7 26.7	103°40.1 118°08.5	9.3' 9.3'	\$28°33.5 28°34.3	0.8' 0.6'	54.5' 54.5'
2	212°24.3	20.7 27.6	118 08.5 132°36.8	9.3 9.3'	28°34.3	0.6	54.5 54.6'
3	227°24.5	• • 28.6	147°05.1	9.3'	28° 35.4	0.4	54.6'
4	242°24.7	29.6	161°33.3	9.2'	28°35.8	0.2'	54.6'
5 6	257°24.9 272°25.1	30.6 \$02°31.5	176°01.6 190°29.8	9.2' 9.2'	28° 36.0 \$28° 36.1	0.1'	54.6' 54.6'
7	272 25.1 287°25.3	32.5	204°58.0	9.2' 9.2'	28°36.0	-0.1	54.6'
8	302°25.5	33.5	219°26.1	9.1'	28°35.8	-0.4	54.7'
9	317°25.7	• • 34.4	233°54.3	9.1'	28°35.4	-0.5'	54.7'
10 11	332°25.9 347°26.1	35.4 36.4	248°22.4 262°50.5	9.1' 9.1'	28° 34.9 28° 34.3	-0.7' -0.8'	54.7' 54.7'
12	2°26.3	502°37.4	202 50.5 277°18.6	9.1	528° 33.5	-0.8	54.7
13	17°26.6	38.3	291°46.7	9.1'	28°32.5	-1.1'	54.8'
14	32°26.8	39.3	306°14.8	9.0'	28°31.4	-1.2'	54.8'
15 16	47°27.0 62°27.2	· · 40.3 41.2	320°42.8 335°10.8	9.0' 9.0'	28° 30.2 28° 28.8	-1.4' -1.5'	54.8' 54.8'
17	77°27.4	42.2	349°38.9	9.0'	28° 27.3	-1.7'	54.9'
18	92°27.6	<b>S</b> 02°43.2	4°06.9	9.0'	S28°25.6	-1.8'	54.9'
19	107°27.8 122°28.0	44.2	18°34.9	9.0'	28°23.8	-2.0' -2.1'	54.9'
20 21	122°28.0 137°28.2	45.1 •• 46.1	33°02.9 47°30.9	9.0' 9.0'	28°21.9 28°19.8	-2.1 -2.3'	54.9' 54.9'
22	152°28.4	47.1	61°58.8	9.0'	28° 17.5	-2.4	55.0'
23	167°28.6	48.0	76°26.8	9.0'	$28^{\circ}15.1$	-2.5'	55.0'
	SD = 16.0'	d = 1.0'		SD	= 14.9'		
<b>T</b>	CUA	D	CHA		Dec	.,	LID
Tue 0	<b>GHA</b> 182°28.8	<b>Dec</b> \$02°49.0	<b>GHA</b> 90°54.8	u 9.0'	S28° 12.6	d -2.7'	<b>HP</b> 55.0'
1	197°29.0	50.0	105°22.8	9.0'	$28^{\circ}09.9$	-2.8'	55.0'
2	212°29.2	50.9	119°50.8	9.0'	28°07.0	-3.0'	55.1'
3 4	227°29.4 242°29.6	· · 51.9 52.9	134°18.7 148°46.7	9.0' 9.0'	28°04.0 28°00.9	-3.1' -3.3'	55.1' 55.1'
5	257°29.8	53.9	163°14.7	9.0'	27°57.6	-3.4'	55.1
6	272°30.0	S02°54.8	177°42.7	9.0'	S27°54.2	-3.6'	55.2'
7	287°30.3 302°30.5	55.8 56.8	192°10.7 206°38.6	9.0' 9.0'	27°50.6 27°46.9	-3.7' -3.9'	55.2' 55.2'
8 9	302°30.5 317°30.7	50.8	206°38.6 221°06.6	9.0'	27°46.9 27°43.1	-3.9 -4.0'	55.2'
10	332°30.9	58.7	235°34.6	9.0'	27°39.0	-4.2'	55.3'
11	347°31.1	02°59.7	250°02.7	9.0'	27°34.9	-4.3'	55.3'
12 13	2°31.3 17°31.5	\$03°00.7 01.6	264°30.7 278°58.7	9.0' 9.0'	\$27°30.6 27°26.1	-4.4' -4.6'	55.3' 55.3'
14	32°31.7	02.6	276 56.7 293°26.8	9.0	27°21.6	-4.0 -4.7'	55.4'
15	47°31.9	• • 03.6	307°54.8	9.1'	$27^{\circ}16.8$	-4.9'	55.4'
16	62°32.1	04.5	322°22.9	9.1'	27°11.9	-5.0'	55.4'
17 18	77°32.3 92°32.5	05.5 \$03°06.5	336°51.0 351°19.1	9.1' 9.1'	27°06.9 <b>S</b> 27°01.7	-5.2' -5.3'	55.5' 55.5'
19	92 32.5 107°32.7	07.4	5°47.2	9.1 9.1'	26°56.4	-5.5'	55.5'
20	122°32.9	08.4	20°15.4	9.2'	$26^{\circ}51.0$	-5.6'	55.5'
21	137°33.1 152°33.3	•• 09.4	34°43.5 49°11.7	9.2'	26°45.3 26°39.6	-5.7'	55.6'
22 23	152°33.3 167°33.5	10.3 11.3	49°11.7 63°39.9	9.2' 9.2'	26°39.6 26°33.7	-5.9' -6.0'	55.6' 55.6'
_0	SD = 16.0'	d = 1.0'			0 = 15.0'	0.0	
	<u> </u>	<u>u — 1.0</u>		JL	_ 13.0		

N 72° N 70° 68° 66° 64° 62° 60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° 20° N 10° 0°	Naut. 03:40 03:53	Civil 05:03	Sunrise	Sunset		
N 70° 68° 64° 62° N 58° 55° 54° 52° 50° 45° N 40° 30° 20° N 10° 0°		05:03			Civil	Naut.
68° 64° 62° N 58° 550° 45° N 40° 35° N 40° 30° 20° N 10° 0°	03.23		06:11	17:27	18:34	19:57
66° 64° 62° 60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° 20° N 10° 0°	05.55	05:08	06:08	17:30	18:30	19:44
64° 62° 60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° 20° N 10° 0°	04:04	05:11	06:06	17:32	18:27	19:34
62° 60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° 20° N 10° 0°	04:13	05:14	06:05	17:34	18:25	19:25
60° N 58° 56° 54° 52° 50° 45° N 40° 35° 30° 20° N 10° 0°	04:20	05:16	06:03	17:35	18:23	19:19
56° 54° 52° 50° 45° N 40° 35° 30° 20° N 10° 0°	04:26	05:18	06:02	17:37	18:21	19:13
56° 54° 52° 50° 45° N 40° 35° 30° 20° N 10° 0°	04:31	05:20	06:01	17:38	18:19	19:08
54° 52° 50° 45°  N 40° 35° 30° 20°  N 10° 0°	04:35	05:21	06:00	17:39	18:18	19:04
52° 50° 45° <b>N</b> 40° 35° 30° 20° <b>N</b> 10° 0°	04:39	05:22	05:59	17:40	18:17	19:00
50° 45° N 40° 35° 30° 20° N 10° 0°	04:42	05:23	05:59	17:41	18:16	18:57
45° N 40° 35° 30° 20° N 10° 0°	04:45	05:24	05:58	17:42	18:15	18:54
N 40° 35° 30° 20° N 10° 0°	04:47	05:25	05:57	17:42	18:15	18:52
35° 30° 20° <b>N</b> 10° 0°	04:52	05:26	05:56	17:44	18:13	18:47
30° 20° <b>N</b> 10° 0°	04:56	05:27	05:54	17:45	18:12	18:44
20° N 10° 0°	04:59	05:28	05:53	17:47	18:12	18:41
N 10° 0°	05:01	05:28	05:52	17:48	18:12	18:39
0°	05:03	05:28	05:50	17:50	18:12	18:37
-	05:03	05:28	05:49	17:52	18:13	18:37
	05:02	05:26	05:47	17:53	18:14	18:38
<b>S</b> 10°	05:00	05:24	05:45	17:55	18:16	18:41
20°	04:55	05:21	05:43	17:58	18:20	18:45
30°	04:49	05:17	05:41	18:00	18:24	18:52
35°	04:44	05:14	05:39	18:02	18:27	18:57
40°	04:39	05:10	05:38	18:04	18:31	19:03
45°	04:31	05:06	05:36	18:06	18:35	19:10
<b>S</b> 50°	04:22	05:01	05:33	18:08	18:41	19:20
52°	04:18	04:58	05:32	18:10	18:44	19:24
54°	04:13	04:55	05:31	18:11	18:47	19:29
56°	04:07	04:52	05:29	18:12	18:50	19:35
58°	04:00	04:48	05:28	18:14	18:54	19:42
<b>S</b> 60°	03:53	04:44	05:26	18:16	18:58	19:50
		Moonris	se		Moonset	 :
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
N 72°						

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

			Sun		Moon				
	Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age		
١	,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	7-9		
		mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	31-50%		
	28	09:15	09:25	11:51	16:50	04:24			
İ	29	09:35	09:45	11:50	17:43	05:16			
İ	30	09:55	10:05	11:50	18:36	06:09			

# October 01, 02, 03 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	9°58.9	204°09.5	N07°27.3	156° 27.2	\$13°33.0	255°43.2	N21°35.2	11°02.4	S03°11.7			
1	25°01.4	219°09.0	26.1	171°28.0	33.6	270°45.3	35.2	26°05.0	11.8	Alpheratz		29°14.1
2	40°03.9	234°08.6	25.0	186°28.8	34.2	285° 47.5	35.1	41°07.7	11.9	Ankaa	353°06.1	-42°09.8
3	55°06.3	249°08.2	23.9	201°29.7	• • 34.8	300°49.6	35.1	56°10.3	12.0	Schedar	349°29.8	56°40.8
4	70°08.8	264°07.8	22.7	216°30.5	35.4	315°51.8	35.0	71°12.9	12.0	Diphda	348°46.4	-17°50.6
5	85°11.2	279°07.3	21.6	231°31.3	36.0	330°53.9	35.0	86° 15.6	12.1	Achernar	335°19.1	-57°06.2 23°35.2
6	100°13.7	294°06.9	N07°20.5	246°32.1	S13°36.5	345°56.0	N21°35.0	101°18.2	S03°12.2	Hamal	327°50.2 313°21.4	23 35.2 89°22.2
7	$115^{\circ}16.2$	309°06.5	19.3	261°32.9	37.1	0°58.2	34.9	116°20.8	12.3	Acamar	315°11.0	-40°11.8
8	$130^{\circ}18.6$	324°06.1	18.2	276°33.8	37.7	16°00.3	34.9	131°23.5	12.3	Menkar	314°05.3	4°11.6
9	145°21.1	339°05.7	• • 17.1	291°34.6	• • 38.3	31°02.5	• • 34.8	146°26.1	• • 12.4	Mirfak	308° 27.0	49°57.1
10	160°23.6	354°05.2	15.9	306°35.4	38.9	46°04.6	34.8	161°28.8	12.5	Aldebaran	290°38.8	16°33.7
11	175°26.0	9°04.8	14.8	321°36.2	39.5	61°06.7	34.7	176°31.4	12.6	Rigel	281°03.2	-8°10.1
12	190°28.5	24°04.4 39°04.0	N07°13.7	336°37.0	\$13°40.1	76°08.9	N21°34.7	191°34.0 206°36.7	S03°12.6	Capella	$280^{\circ}20.8$	46°01.3
13 14	205°31.0 220°33.4	54°03.6	12.5 11.4	351°37.8 6°38.7	40.7 41.3	91°11.0 106°13.2	34.6 34.6	200 30.7 221°39.3	12.7 12.8	Bellatrix	$278^{\circ}22.1$	6°22.5
15	235°35.9	69°03.1	10.3	21°39.5	• • 41.8	100 15.2 121°15.3	• • 34.5	236°41.9	. 12.0	Elnath	$278^{\circ}01.0$	28°37.7
16	250°38.4	84°02.7	09.1	36°40.3	42.4	136° 17.5	34.5	251° 44.6	12.9	Alnilam	275°37.0	-1°11.0
17	265°40.8	99°02.3	08.0	51°41.1	43.0	151° 19.6	34.5	266°47.2	13.0	Betelgeuse	270°51.4	7°24.8
18	280°43.3	114°01.9	N07°06.9	66°41.9	S13°43.6	166°21.8	N21°34.4	281°49.9	S03°13.1	Canopus	263°52.1	-52°42.2
19	295°45.7	129°01.5	05.7	81°42.8	44.2	181°23.9	34.4	296° 52.5	13.2	Sirius	258°25.7	-16°44.8
20	310°48.2	144°01.0	04.6	96°43.6	44.8	196°26.0	34.3	311°55.1	13.2	Adhara	255°05.4	-29°00.1
21	325°50.7	159°00.6	• • 03.4	111°44.4	• • 45.4	211°28.2	• • 34.3	326° 57.8	• • 13.3	Procyon	244° 50.3 243° 16.7	5°09.7 27°57.8
22	340°53.1	174°00.2	02.3	$126^{\circ}45.2$	45.9	226° 30.3	34.2	$342^{\circ}00.4$	13.4	Pollux Avior	243 10.7 234° 14.8	-59°35.2
23	355°55.6	188°59.8	01.2	141°46.0	46.5	241°32.5	34.2	357°03.0	13.5	Suhail	234 14.6 222°46.2	-39 35.2 -43°31.9
Mern	ass. 23:16	$\nu$ -0 4' d-1	1′ m-3.93	ν0 8 <sup>7</sup> 40	.6′ m1.57	ν2 1' d-Ω	.0′ m-2.12	v2 6' d0	1' m0.62	Miaplacidus	221°38.8	-69°49.0
- vici.p		<i>ν</i> 0.∓ u-1		- J.J UU		ν <u>2.1</u> α-0	2.12	- 2.0 uU	- 1110.02	Alphard	217°47.4	-8°46.0
										Regulus	207°34.1	11°50.6
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.8	61°36.7
0	10°58.1	203°59.4	N07°00.0	156° 46.8	\$13°47.1	256° 34.6	N21°34.1	12°05.7	S03°13.5	Denebola	$182^{\circ}24.7$	14°25.8
1	26°00.5	218°59.0	06°58.9	171°47.6	47.7	271°36.8	34.1	27°08.3	13.6	Gienah	$175^{\circ}43.3$	-17°41.0
2	41°03.0	233°58.5	57.7	186°48.5	48.3	286°38.9	34.1	42°11.0	13.7	Acrux	$173^{\circ}00.2$	-63°14.5
3 4	56°05.5 71°07.9	248°58.1 263°57.7	· · 56.6 55.5	201°49.3 216°50.1	•• 48.9 49.5	301°41.1 316°43.2	· · 34.0 34.0	57°13.6 72°16.2	· · 13.8 13.8	Gacrux	$171^{\circ}51.6$	-57°15.4
5	86°10.4	203 57.7 278°57.3	55.5 54.3	210 50.1 231°50.9	50.0	310 45.2 331°45.4	33.9	72 10.2 87°18.9	13.0	Alioth	$166^{\circ}13.0$	55°49.3
6	101°12.9	276 57.3 293°56.9	N06°53.2	246°51.7	\$13°50.6	346° 47.5	N21°33.9	102°21.5	503°14.0	Spica	158° 22.0	-11°17.7
7	116° 15.3	308°56.4	52.0	261°52.5	51.2	1°49.7	33.8	117°24.1	14.0	Alkaid	152°52.0	49°11.2
8	131°17.8	323°56.0	50.9	276°53.4	51.8	16°51.8	33.8	132°26.8	14.1	Hadar	148°35.8	-60°29.9
9	146°20.2	338°55.6	• • 49.7	291°54.2	52.4	31°53.9	33.7	147°29.4	14.2		147°57.3	-36°29.8
10	161°22.7	353°55.2	48.6	306°55.0	53.0	46° 56.1	33.7	162°32.0	14.3	Arcturus	145°47.7	19°03.0
11	176°25.2	8°54.8	47.5	321°55.8	53.6	61°58.2	33.7	177°34.7	14.3	Rigil Kent.	139°40.1 137°20.7	-60°56.6 74°03.1
12	191°27.6	23°54.4	N06°46.3	336° 56.6	S13°54.1	77°00.4	N21°33.6	192°37.3	S03°14.4	Kochab Zuben'ubi	137 20.7 136°55.6	-16°08.9
13	206°30.1	38°54.0	45.2	351°57.4	54.7	92°02.5	33.6	207°40.0	14.5	Alphecca	126°03.5	26°37.8
14	221°32.6	53°53.5	44.0	6°58.2	55.3	107°04.7	33.5	222°42.6	14.6	Antares	112° 15.3	-26°29.4
15	236°35.0	68°53.1	• • 42.9	21°59.0	•• 55.9	122°06.8	• • 33.5	237°45.2	•• 14.6	Atria	107°09.2	-69°04.6
16	251°37.5	83°52.7	41.7	36° 59.9	56.5	137°09.0	33.4	252° 47.9	14.7	Sabik	102°02.2	-15°45.4
17	266°40.0	98°52.3	40.6	52°00.7	57.1	152° 11.1	33.4	267°50.5	14.8	Shaula	96°09.7	-37°07.4
18	281°42.4	113°51.9	N06°39.4		S13°57.6	167° 13.3	N21°33.4	282°53.1	S03°14.9	Rasalhague	95°58.1	12°32.6
19	296°44.9	128°51.5	38.3	82°02.3	58.2	182° 15.4	33.3	297°55.8	14.9	Eltanin	90°42.0	51°29.4
20	311°47.3 326°49.8	143°51.0 158°50.6	37.1 · · 36.0	97°03.1 112°03.9	58.8 13°59.4	197° 17.6 212° 19.8	33.3 · · 33.2	312°58.4 328°01.0	15.0 •• 15.1	Kaus Aust.	83°31.7	-34°22.4
21 22	341°52.3	173° 50.0	34.8	112 03.9 127°04.7	14°00.0	212 19.8 227°21.9	33.2	343°03.7	15.1	Vega	80°32.8	38°48.7
23	356°54.7	188°49.8	33.7	142° 05.5	00.6	242°24.1	33.1	358° 06.3	15.2	Nunki	75° 47.0	-26°15.9
										Altair	61°59.3	8°56.3
Mer.p	ass. 23:12	$\nu$ -0.4' d-1	1' m-3.93	$\nu$ 0.8′ d0	.6′ m1.57	$\nu 2.1' \ d-0$	.0′ m-2.13	$\nu 2.6' \ d0$	1'  m0.62	Peacock	53°04.5	-56°39.3
										Deneb	49°25.2	45°22.6
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif Al Na'ir	33°38.0 27°31.8	9°59.8 -46°50.2
0	11°57.2	203°49.4	N06°32.5	157°06.3	\$14°01.1	257° 26.2	N21°33.1	13°09.0	S03°15.3	Fomalhaut	27 31.8 15°13.5	-46 50.2 -29°29.1
1	26°59.7	218°49.0	31.4	$172^{\circ}07.1$	01.7	272°28.4	33.0	$28^{\circ}11.6$	15.4	Scheat	13°44.3	28°13.5
2	42°02.1	233°48.6	30.2	187°08.0	02.3	287° 30.5	33.0	43°14.2	15.4	Markab	13°29.0	15°20.8
3	57°04.6	248°48.1	• • 29.1	202°08.8	• • 02.9	302°32.7	• • 33.0	58° 16.9	• • 15.5			
4	72°07.1	263°47.7	27.9	217°09.6	03.5	317°34.8	32.9	73°19.5	15.6	Oct 01 Wed	SHA	Mer.pass
5	87°09.5	278°47.3	26.8	232°10.4	04.0	332°37.0	32.9	88°22.1	15.7	I	194° 10.5	10:24
6	102°12.0	293°46.9	N06°25.6		\$14°04.6	347°39.1	N21°32.8		S03°15.7		146°28.3	13:33
7 8	117°14.5 132°16.9	308°46.5 323°46.1	24.5 23.3	262°12.0 277°12.8	05.2 05.8	2°41.3 17°43.4	32.8 32.7	118°27.4 133°30.0	15.8 15.9	Saturn	245°44.3 1°03.5	06:56 23:12
9	132°16.9 147°19.4	323°46.1 338°45.7	22.2	277°12.8 292°13.6	· · 06.4	17°43.4 32°45.6	· · 32.7	133° 30.0 148° 32.7	15.9	Jatum	1 03.3	23.12
10	147 19.4 162°21.8	353°45.3	21.0	307° 14.4	06.9	32 45.0 47°47.7	32.7	146 32.7 163°35.3	16.0	Oct 02 Thu	SHA	Mer.pass
11	102 21.8 177°24.3	8°44.8	19.9	307 14.4 322°15.2	00.9	62°49.9	32.6	103 33.3 178°38.0	16.0	I	193°01.3	10:24
12	192°26.8	23°44.4	N06°18.7	337°16.0	\$14°08.1	77°52.1	N21°32.6	193°40.6	S03°16.2		145°48.8	13:32
13	207°29.2	38°44.0	17.6	352°16.8	08.7	92°54.2	32.5	208°43.2	16.2		245°36.6	06:53
14	222°31.7	53°43.6	16.4	7° 17.7	09.3	107°56.4	32.5	223°45.9	16.3	Saturn	1°07.6	23:08
15	237°34.2	68°43.2	•• 15.3	$22^{\circ}18.5$	• • 09.8	122°58.5	• • 32.4	238°48.5	• • 16.4	Oct 03 Fri	SHA	Mer.pass
16	252°36.6	83°42.8	14.1	$37^{\circ}19.3$	10.4	138°00.7	32.4	$253^{\circ}51.1$	16.5		191°52.2	10:25
17	267°39.1	98°42.4	13.0	$52^{\circ}20.1$	11.0	153°02.8	32.4	268°53.8	16.5	1	145°09.1	13:31
18	282°41.6	113°42.0	N06°11.8		\$14°11.6	168°05.0	N21°32.3	283°56.4		Jupiter	$245^{\circ}29.0$	06:49
19	297°44.0	128°41.6	10.6	82°21.7	12.2	183°07.2	32.3	298°59.0	16.7	Saturn	1°11.8	23:03
20	312°46.5	143°41.1	09.5	97°22.5	12.7	198°09.3	32.2	314°01.7	16.8	Horizont	al parallax	
21	327°49.0	158°40.7	· · 08.3	112°23.3	13.3	213° 11.5	· · 32.2	329°04.3	16.8	1131120111	Venus:	0.1
22 23	342°51.4 357°53.9	173°40.3 188°39.9	07.2 06.0	127°24.1 142°24.9	13.9 14.5	228° 13.6 243° 15.8	32.1 32.1	344°06.9 359°09.6	16.9 17.0		Mars:	0.1
										L	=====	-
Mer.p	ass. 23:08	$\nu$ -0.4′ d-1	1′ m-3.92	$\nu$ 0.8′ d0	.6′ m1.56	$\nu$ 2.2′ d-0	.0′ m-2.13	$\nu 2.6' d0$	.1′ m0.63			

h	Sui	n	Moon				
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	182° 33.7	S03°12.3	78°08.1	9.2'	S26°27.7	-6.2'	55.7'
1 2	197°33.9 212°34.1	13.3 14.2	92°36.4 107°04.6	9.3' 9.3'	26°21.5 26°15.2	-6.3' -6.5'	55.7' 55.7'
3	212 34.1 227°34.3	15.2	107 04.0 121°32.9	9.3'	26°08.7	-6.6'	55.8'
4	242°34.5	16.2	$136^{\circ}01.2$	9.3'	$26^{\circ}02.1$	-6.7'	55.8'
5	257°34.7	17.1	150°29.6	9.4'	25°55.4	-6.9'	55.8'
6 7	272°34.9 287°35.1	\$03°18.1 19.1	164°58.0 179°26.3	9.4' 9.4'	\$25°48.5 25°41.4	-7.0' -7.2'	55.9' 55.9'
8	302°35.3	20.0	193°54.8	9.4	25°34.3	-7.2 -7.3	55.9'
9	317°35.5	• • 21.0	$208^{\circ}23.2$	9.5'	25°27.0	-7.4'	56.0'
10	332°35.7 347°35.9	22.0	222°51.7 237°20.2	9.5'	25°19.5 25°11.9	-7.6'	56.0'
11 12	2°36.1	22.9 \$03°23.9	251° 48.7	9.5' 9.6'	525°04.2	-7.7' -7.9'	56.0' 56.0'
13	17°36.3	24.9	266° 17.3	9.6'	24°56.4	-8.0'	56.1'
14	32° 36.5	25.8	280°45.9	9.6'	24°48.4	-8.1'	56.1'
15 16	47°36.7 62°36.9	· · 26.8 27.8	295°14.5 309°43.2	9.7' 9.7'	24°40.2 24°31.9	-8.3' -8.4'	56.1' 56.2'
17	77° 37.1	28.8	309 43.2 324°11.9	9.7'	24°23.5	-8.5'	56.2'
18	92°37.3	S03°29.7	338°40.6	9.8'	S24°15.0	-8.7'	56.3'
19	107°37.5	30.7	353°09.3	9.8'	24°06.3	-8.8'	56.3'
20 21	122°37.7 137°37.9	31.7 · · 32.6	7°38.1 22°06.9	9.8' 9.9'	23°57.5 23°48.6	-8.9' -9.1'	56.3' 56.4'
22	152° 38.1	33.6	36°35.8	9.9'	23°39.5	-9.1 -9.2'	56.4
23	167°38.3	34.6	51°04.7	9.9'	23°30.3	-9.3'	56.4'
	SD = 16.0'	d = 1.0'		SI	O = 15.2'		
TI.	CILA	D	CUA		D-:	J	LIP
Thu 0	<b>GHA</b> 182° 38.5	Dec \$03° 35.5	<b>GHA</b> 65°33.6	u  10.0'	Dec 523°20.9	<i>d</i> -9.5′	<b>HP</b> 56.5'
1	197°38.7	36.5	80°02.6	10.0'	23°11.4	-9.6'	56.5'
2	212°38.9	37.5	94°31.6	10.0'	23°01.8	-9.7'	56.5'
3 4	227°39.1 242°39.3	· · 38.4 39.4	109°00.6 123°29.7	10.1' 10.1'	22°52.1 22°42.2	-9.9' -10.0'	56.6' 56.6'
5	257° 39.5	39.4 40.4	125 29.7 137°58.8	10.1	22°32.2	-10.0	56.6'
6	272°39.7	S03°41.3	152°27.9	10.2'	S22°22.1	-10.2'	56.7'
7	287°39.9	42.3	166°57.1	10.2'	22°11.9	-10.4'	56.7'
8 9	302°40.1 317°40.3	43.3 •• 44.2	181°26.3 195°55.6	10.3' 10.3'	22°01.5 21°51.0	-10.5' -10.6'	56.7' 56.8'
10	317 40.5 332°40.5	45.2	210°24.9	10.3	21°40.4	-10.6	56.8
11	347°40.7	46.2	224°54.2	10.4'	21°29.6	-10.9'	56.9'
12	2°40.9	S03°47.1	239°23.5	10.4'	S21°18.7	-11.0'	56.9'
13 14	17° 41.1 32° 41.3	48.1 49.1	253°52.9 268°22.4	10.4' 10.5'	21°07.7 20°56.6	-11.1' -11.2'	56.9' 57.0'
15	47°41.5	50.0	282°51.8	10.5'	20°45.4	-11.4'	57.0'
16	62°41.7	51.0	297°21.4	10.5'	20°34.0	-11.5'	57.0'
17 18	77°41.9 92°42.1	52.0 \$03° 52.9	311°50.9 326°20.5	10.6' 10.6'	20°22.5 <b>5</b> 20°10.9	-11.6' -11.7'	57.1' 57.1'
19	107° 42.3	53.9	340°50.1	10.6'	19°59.2	-11. <i>1</i> -11.8'	57.1 57.2'
20	122°42.5	54.9	$355^{\circ}19.7$		19°47.4	-12.0'	57.2'
21	137° 42.7	• • 55.8	9°49.4	10.7'	19°35.4	-12.1'	57.2'
22 23	152° 42.9 167° 43.1	56.8 57.8	24°19.1 38°48.9	10.8' 10.8'	19°23.4 19°11.2	-12.2' -12.3'	57.3' 57.3'
23	SD = 16.0'	d = 1.0'			0 = 15.4'	-12.5	31.5
	3D = 10.0	<u>u = 1.0</u>		J.	7 — 13.4		
Fri	GHA	Dec	GHA	ν	Dec	d 12.4	HP
0 1	182°43.3 197°43.5	\$03°58.7 03°59.7	53° 18.7 67° 48.5	10.8' 10.9'	\$18°58.9 18°46.5	-12.4' -12.5'	57.4' 57.4'
2	212° 43.7	04°00.7	82°18.4	10.9'	18°34.0	-12.6'	57.4
3	227°43.9	•• 01.6	96°48.3	10.9'	18°21.3	-12.7'	57.5'
4 5	242°44.1 257°44.3	02.6 03.6	111°18.2 125°48.1	11.0' 11.0'	18°08.6 17°55.8	-12.8' -13.0'	57.5' 57.5'
6	257°44.3 272°44.5	504°04.5	125°48.1 140°18.1	11.0'	517°42.8	-13.1'	57.6'
7	287°44.7	05.5	$154^{\circ}48.2$	11.1'	17°29.7	-13.2'	57.6'
8	302°44.9	06.4	169°18.2	11.1'	17°16.6	-13.3'	57.7'
9 10	317° 45.1 332° 45.2	· · 07.4 08.4	183°48.3 198°18.4	11.1' 11.1'	17°03.3 16°49.9	-13.4' -13.5'	57.7' 57.7'
11	347°45.4	09.3	212°48.6	11.2'	16°36.4	-13.6'	57.8'
12	2°45.6	S04°10.3	227° 18.8	11.2'	S16°22.8	-13.7'	57.8'
13 14	17° 45.8 32° 46.0	11.3 12.2	241°49.0 256°19.2	11.2' 11.3'	16°09.2 15°55.4	-13.8' -13.9'	57.9' 57.9'
14 15	47°46.2	12.2	256° 19.2 270° 49.5	11.3'	15°55.4 15°41.5	-13.9 -14.0'	57.9' 57.9'
16	62°46.4	14.2	$285^{\circ}19.8$	11.3'	$15^{\circ}27.5$	-14.1'	58.0'
17	77°46.6	15.1	299°50.1	11.3'	15°13.4	-14.2'	58.0'
18 19	92°46.8 107°47.0	S04°16.1 17.1	314°20.4 328°50.8	11.4' 11.4'	\$14°59.2 14°45.0	-14.3' -14.4'	58.1' 58.1'
20	107 47.0 122°47.2	18.0	343°21.2	11.4'	14°45.0	-14.4 -14.5'	58.1
21	137° 47.4	• • 19.0	$357^{\circ}51.6$	11.4'	14°16.1	-14.6'	58.2'
22	152° 47.6 167° 47.8	19.9	12°22.0 26°52.5	11.5' 11.5'	14°01.6 13°46.9	-14.6'	58.2'
23		20.9	20-52.5			-14.7'	58.2'
	SD = 16.0'	d = 1.0'		SE	0 = 15.6'		

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

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

		Sun					
Day	Eqn.of Time		Eqn.of Time Mer		Mer.	Mer.	Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	10-12	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	60-79%	
01	10:15	10:25	11:50	19:28	07:02		
02	10:34	10:44	11:49	20:19	07:54		
03	10:53	11:03	11:49	21:09	08:44		

## October 04, 05, 06 UT (Sat., Sun., Mon.)

h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	12°56.3	203°39.5	N06°04.9	157°25.7	S14°15.1	258°17.9	N21°32.1	14°12.2	S03°17.0			
1	27°58.8	218°39.1	03.7	172°26.5	15.6	273°20.1	32.0	29°14.8	17.1	Alpheratz		29°14.1
2	43°01.3	233°38.7	02.6	187°27.3	16.2	288°22.3	32.0	44°17.5	17.2	Ankaa	$353^{\circ}06.1$	-42°09.9
3	58°03.7	248°38.3	01.4	202°28.1	. 16.8	303°24.4	31.9	59°20.1	17.3	Schedar	349°29.8	56°40.8
4	73°06.2	263°37.9	06°00.2	217°28.9	17.4	318°26.6	31.9	74°22.7	17.3	Diphda	348° 46.4	-17°50.6
5	88°08.7	278°37.5	05°59.1	232°29.7	18.0	333°28.7	31.8	89°25.4	17.4	Achernar	335° 19.1	-57°06.2
6	103°11.1	293°37.1	N05°57.9	247°30.5	\$14°18.5	348°30.9	N21°31.8	104°28.0	S03°17.5	Hamal	327°50.2	23°35.2
7	118° 13.6	308°36.6	56.8	262°31.3	19.1	3°33.1	31.8	119°30.7	17.6	Polaris	313°20.5	89°22.2
8	133° 16.1	323°36.2	55.6	277°32.1	19.7	18°35.2	31.7	134°33.3	17.6	Acamar	$315^{\circ}10.9$	-40°11.8
9	148° 18.5	338°35.8	• • 54.4	292°32.9	. 20.3	33°37.4	31.7	149°35.9	17.7	Menkar	314°05.3	4°11.6
10	163°21.0	353°35.4	53.3	307°33.7	20.8	48°39.5	31.6	164°38.6	17.8	Mirfak	308°27.0	49°57.1
11	178° 23.4	8°35.0	52.1	322°34.5	21.4	63°41.7	31.6	179°41.2	17.8	Aldebaran	290°38.7	16°33.7
12	193°25.9	23°34.6	N05°51.0	337°35.3	S14°22.0	78°43.9	N21°31.5	194°43.8	S03°17.9	Rigel	281°03.2	-8°10.1
13	208° 28.4	38°34.2	49.8	352°36.1	22.6	93°46.0	31.5	209°46.5	18.0	Capella	280° 20.8	46°01.3
14	223°30.8	53°33.8	48.6	7°36.9	23.1	108°48.2	31.5	224°49.1	18.1	Bellatrix	278°22.1	6°22.5
15	238° 33.3	68°33.4	• • 47.5	22°37.7	23.7	123°50.4	• • 31.4	239°51.7	18.1	Elnath	278°01.0	28°37.7
16	253°35.8	83°33.0	46.3	37°38.5	24.3	138°52.5	31.4	254°54.4	18.2	Alnilam	275° 37.0	-1°11.0
17	268°38.2	98°32.6	45.1	52°39.3	24.9	153°54.7	31.3	269°57.0	18.3	Betelgeuse	270°51.4	7°24.8
18	283°40.7	113°32.2	N05°44.0	67°40.1	\$14°25.4	168°56.8	N21°31.3	284°59.6	S03°18.4	Canopus	263°52.1	-52°42.2
19	298°43.2	128°31.7	42.8	82°40.9	26.0	183°59.0	31.2	300°02.3	18.4	Sirius	258° 25.7	-16°44.8
20	313°45.6	143°31.3	41.7	97°41.7	26.6	199°01.2	31.2	315°04.9	18.5	Adhara	255°05.4	-29°00.1
21	328° 48.1	158°30.9	40.5	112°42.5	• • 27.2	214°03.3	31.2	330°07.5	• 18.6	Procyon	244°50.3	5°09.7
22	343°50.6	173°30.5	39.3	127°43.3	27.7	229°05.5	31.1	345°10.2	18.6	Pollux	243°16.7	27°57.8
23	358° 53.0	188°30.1	38.2	142°44.1	28.3	244°07.7	31.1	0°12.8	18.7	Avior	234°14.8	-59°35.1
								-		Suhail	222°46.1	-43°31.9
Mer.p	ass. 23:04	$\nu$ -0.4' d-1	l.2′ m-3.92	$\nu$ 0.8′ d0	.6'  m1.56	$\nu$ 2.2′ <i>d</i> -0	.0′ m-2.14	$\nu 2.6' \ d0.$	1' m0.63	Miaplacidus	221°38.7	-69°49.0
										Alphard	217° 47.4	-8°46.0
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.0	11°50.6
0	13° 55.5	203°29.7	N05°37.0	157°44.9	S14°28.9	259°09.8	N21°31.0	15°15.4	S03°18.8	Dubhe	193°40.8	61°36.6
1	28° 57.9	218°29.3	35.8	172°45.7	29.5	274°12.0	31.0	30°18.1	18.9	Denebola	182°24.6	14°25.8
2	44°00.4	233°28.9	34.7	187°46.5	30.0	289°14.2	31.0	45°20.7	18.9	Gienah	175°43.3	-17°41.0
3	59°02.9	248°28.5	33.5	202°47.3	• • 30.6	304°16.3	30.9	60°23.3	19.0	1	173°00.2	-63°14.4
4	74°05.3	263°28.1	32.3	217°48.1	31.2	319°18.5	30.9	75°26.0	19.1		171°51.6	-57°15.4
5	89° 07.8	278°27.7	31.2	232°48.9	31.8	334°20.7	30.8	90°28.6	19.1	Alioth	166° 13.0	55°49.2
6	104° 10.3	293°27.3	N05°30.0	247°49.7	\$14°32.3	349°22.8	N21°30.8	105°31.2	S03°19.2	Spica	158° 22.0	-11°17.7
7	119° 12.7	308°26.9	28.8	262°50.5	32.9	4°25.0	30.7	120°33.9	19.3	Alkaid	152°52.0	49°11.2
8	134° 15.2	323°26.5	27.7	277°51.3	33.5	19°27.2	30.7	135°36.5	19.4	Hadar	148°35.8	-60°29.9
9	149° 17.7	338°26.1	26.5	292°52.1	• • 34.1	34°29.3	• • 30.7	150°39.1	19.4	1	147°57.3	-36°29.8
10	164° 20.1	353°25.7	25.3	307°52.9	34.6	49°31.5	30.6	165°41.8	19.5	Arcturus	145° 47.7	19°03.0
11	179° 22.6	8°25.3	24.2	322°53.7	35.2	64°33.7	30.6	180°44.4	19.5	Rigil Kent.		-60°56.6
12	194° 25.0	23°24.9	N05°23.0	337°54.5	S14°35.8	79°35.8	N21°30.5	195°47.0	S03°19.6	Kochab	137°20.7	74°03.1
13	209° 27.5	38°24.4	21.8	352°55.3	36.4	94°38.0	30.5	210°49.7	19.7	Zuben'ubi	136°55.6	-16°08.9
14	224° 30.0	53°24.0	20.7	7°56.1	36.9	109°40.2	30.5	225°52.3	19.8	Alphecca	126°03.5	26°37.8
15	239° 32.4	68°23.6	• • 19.5	22°56.9	• • 37.5	124°42.4	• • 30.4	240°54.9	19.9	Antares	112° 15.3	-26°29.4
16	254° 34.9	83°23.2	18.3	37°57.7	38.1	139°44.5	30.4	255°57.6	19.9	Atria	107°09.2	-69°04.6
17	269°37.4	98°22.8	17.1	52°58.5	38.6	154°46.7	30.3	271°00.2	20.0	Sabik	102°02.2	-15°45.4
18	284°39.8	113°22.4	N05°16.0		S14°39.2	169°48.9	N21°30.3	286°02.8	S03°20.1	Shaula	96°09.7	-37°07.4
19	299°42.3	128°22.0	14.8	83°00.0	39.8	184°51.0	30.2	301°05.5	20.1	Rasalhague	95°58.1	12°32.6
20	314°44.8	143°21.6	13.6	98°00.8	40.4	199°53.2	30.2	316°08.1	20.2	Eltanin	90°42.0	51°29.4
21	329° 47.2	158°21.2	. 12.5	113°01.6	• • 40.9	214°55.4	30.2	331°10.7	20.3	Kaus Aust.	83°31.8	-34°22.4
22	344°49.7	173°20.8	11.3	128°02.4	41.5	229°57.5	30.1	346°13.4	20.4	Vega	80°32.9	38°48.7
23	359°52.2	188°20.4	10.1	143°03.2	42.1	244°59.7	30.1	1°16.0	20.4	Nunki	75°47.0	-26°15.9
										Altair	61°59.3	8°56.3
Mer.p	ass. 23:01	$\nu$ -0.4′ d-1	l.2′ m-3.92	$\nu$ 0.8′ d0	.6′ m1.56	$\nu 2.2' \ d-0$	.0′ m-2.15	$\nu$ 2.6′ d0.	1' m0.63	Peacock	53°04.5	-56°39.3
										Deneb	49°25.2	45°22.6
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.0	9°59.8
0	14°54.6	203°20.0	N05°08.9	158°04.0		260°01.9	N21°30.0	16°18.6	S03°20.5	Al Na'ir	27°31.8	-46°50.2 -29°29.1
1	29°57.1	218°19.6	07.8	173°04.8	43.2	275°04.1	30.0	31°21.3	20.6	Fomalhaut	15° 13.5	
2	44°59.5	233°19.2	06.6	188°05.6	43.8	290°06.2	30.0	46°23.9	20.6	Scheat	13°44.3 13°29.0	28°13.5 15°20.8
3	60°02.0	248°18.8	05.4	203°06.4	• • 44.3	305°08.4	• • 29.9	61°26.5	20.7	Markab	13 29.0	10 ZU.8
4	75°04.5	263°18.4	04.3	218°07.2	44.9	320°10.6	29.9	76°29.2	20.8	Oct 04 Sat	SHA	Mer.pass
5	90°06.9	278°18.0	03.1	233°08.0	45.5	335°12.8	29.8	91°31.8	20.9	1	190°43.2	10:26
6	105°09.4	293°17.6	N05°01.9	248°08.8	S14°46.1	350°14.9	N21°29.8	106°34.4			$144^{\circ}29.4$	13:30
7	120°11.9	308°17.2	05°00.7	263°09.5	46.6	5°17.1	29.8	121°37.1	21.0		245°21.6	06:46
8	135° 14.3	323°16.8	04°59.6	278°10.3	47.2	20°19.3	29.7	136°39.7	21.1	Saturn	1°15.9	22:59
9	150° 16.8	338°16.4	• • 58.4	293°11.1	• • 47.8	35°21.5	29.7	151°42.3	21.1			
10	$165^{\circ}19.3$	353°16.0	57.2	308°11.9	48.3	50°23.6	29.6	166°45.0	21.2	Oct 05 Sun	SHA	Mer.pass
11	$180^{\circ}21.7$	8°15.6	56.0	323°12.7	48.9	65°25.8	29.6	181°47.6	21.3		189°34.2	10:26
12	195°24.2	23°15.2	N04°54.9	338°13.5	<b>S</b> 14°49.5	80°28.0	N21°29.6	196°50.2			143°49.4	13:28
13	210° 26.7	38°14.8	53.7	353°14.3	50.0	95°30.2	29.5	211°52.8	21.4		245°14.4	06:42
14	$225^{\circ}29.1$	53°14.4	52.5	$8^{\circ}15.1$	50.6	110°32.3	29.5	226°55.5	21.5	Saturn	1°20.0	22:55
15	240°31.6	68°14.0	• • 51.3	23°15.9	• • 51.2	125°34.5	• • 29.4	241°58.1	• • 21.6	Oct 06 Mon	SHA	Mer.pass
16	255°34.0	83°13.6	50.2	$38^{\circ}16.6$	51.7	140°36.7	29.4	257°00.7	21.6		188°25.4	10:27
17	270°36.5	98°13.2	49.0	53°17.4	52.3	155°38.9	29.3	272°03.4	21.7	1	143°09.4	13:27
18	285°39.0	113°12.8	N04°47.8		S14°52.9	170°41.0	N21°29.3	287°06.0	S03°21.8	1	245°07.3	06:39
19	300°41.4	128°12.4	46.6	83°19.0	53.4	185°43.2	29.3	302°08.6	21.8	Saturn	1°24.0	22:51
20	315°43.9	143°12.0	45.4	98°19.8	54.0	200°45.4	29.2	317°11.3	21.9			
21	330°46.4	158°11.6	• • 44.3	113°20.6	• • 54.6	215°47.6	• • 29.2	332°13.9	• • 22.0	Horizont	al parallax	
22	345°48.8	173°11.2	43.1	128°21.4	55.1	230°49.7	29.1	$347^{\circ}16.5$	22.1		Venus:	0.1
23	0°51.3	188°10.8	41.9	$143^{\circ}22.2$	55.7	245°51.9	29.1	2°19.2	22.1		Mars:	0.1
Max :-	200 22.57		l.2′ m-3.92		.6′ m1.56		.0′ m-2.15		.1′ m0.64			
ivier.p	ass. 22:57	ν-υ.4′ <b>α-</b> 1	L.2 m-3.92	νυ.σ΄ αυ	.u iut.pp	ν2.2 a-0	.v m-2.15	ν2.0' <b>α</b> 0.	1 1110.04			

h	Sui	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	182°48.0	504°21.9	41°23.0	11.5'	S13°32.2	-14.8'	58.3'
1	197°48.2	22.8	55°53.5	11.5'	13° 17.4	-14.9'	58.3'
2	212°48.3	23.8	70°24.0	11.6'	13°02.5	-15.0'	58.4'
3	227°48.5	• • 24.8	84°54.6	11.6'	12°47.5	-15.1'	58.4'
4 5	242°48.7 257°48.9	25.7 26.7	99°25.2 113°55.8	11.6' 11.6'	12°32.4 12°17.3	-15.2' -15.2'	58.4' 58.5'
6	272°49.1	504°27.7	113 55.6 128°26.4	11.6'	\$12°02.0	-15.2	58.5
7	287°49.3	28.6	142°57.0	11.6'	11°46.7	-15.4'	58.6'
8	302°49.5	29.6	157°27.6	11.7'	11°31.3	-15.5'	58.6'
9	317°49.7	• • 30.5	171°58.3	11.7'	11° 15.8	-15.6'	58.6'
10	332°49.9	31.5	186°28.9	11.7'	11°00.3	-15.6'	58.7'
11	347°50.1	32.5	200°59.6	11.7'	10°44.6	-15.7'	58.7'
12	2°50.3 17°50.5	S04°33.4 34.4	215°30.3 230°01.0	11.7' 11.7'	\$10°28.9 10°13.1	-15.8'	58.7'
13 14	32°50.7	34.4 35.4	230°01.0 244°31.7	11.7' 11.7'	10° 13.1 09° 57.3	-15.9' -15.9'	58.8' 58.8'
15	47°50.8	36.3	259°02.4	11.7'	09° 41.3	-15.9 -16.0'	58.9'
16	62°51.0	37.3	273°33.2	11.7'	09°25.3	-16.1	58.9'
17	77°51.2	38.2	288°03.9	11.7'	09°09.3	-16.1'	58.9'
18	92°51.4	504°39.2	302°34.6	11.7'	S08°53.2	-16.2'	59.0'
19	107°51.6	40.2	317°05.4	11.8'	08° 37.0	-16.3'	59.0'
20	122°51.8	41.1	331°36.1	11.8'	08°20.7	-16.3'	59.0'
21 22	137°52.0 152°52.2	· · 42.1 43.0	346°06.9 0°37.6	11.8' 11.8'	08°04.4 07°48.0	-16.4' -16.4'	59.1' 59.1'
22	152°52.2 167°52.4	43.0 44.0	0°37.6 15°08.4	11.8'	07°48.0 07°31.5	-16.4° -16.5'	59.1' 59.1'
23			13 00.4			10.5	55.1
	SD = 16.0'	d = 1.0'		SI	D = 15.9'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	182°52.6 197°52.7	\$04°45.0 45.9	29°39.2 44°09.9	11.8' 11.8'	\$07°15.0 06°58.5	-16.6' -16.6'	59.2' 59.2'
2	197 52.7 212°52.9	45.9 46.9	44°09.9 58°40.7	11.8'	06°58.5	-16.6° -16.7'	59.2' 59.2'
3	227°53.1	• • 47.9	73°11.4	11.7'	06°25.2	-16.7	59.3'
4	242°53.3	48.8	87°42.2	11.7'	06°08.5	-16.8'	59.3'
5	257°53.5	49.8	102°12.9	11.7'	$05^{\circ}51.7$	-16.8'	59.4'
6	272°53.7	S04°50.7	116°43.6	11.7'	S05°34.8	-16.9'	59.4'
7	287°53.9	51.7	131°14.4	11.7'	05°18.0	-16.9'	59.4'
8 9	302°54.1 317°54.3	52.7 •• 53.6	145°45.1 160°15.8	11.7' 11.7'	05°01.1 04°44.1	-17.0' -17.0'	59.5' 59.5'
10	332°54.4	54.6	174°46.5	11.7'	04° 44.1	-17.1'	59.5'
11	347°54.6	55.5	189°17.2	11.7'	04° 10.0	-17.1	59.6'
12	2°54.8	S04°56.5	203°47.8	11.7'	S03°52.9	-17.1'	59.6'
13	17°55.0	57.5	218°18.5	11.6'	03°35.8	-17.2'	59.6'
14	32°55.2	58.4	232°49.1	11.6'	03°18.6	-17.2	59.6'
15 16	47°55.4 62°55.6	04°59.4 05°00.3	247°19.7 261°50.4	11.6' 11.6'	03°01.4 02°44.2	-17.2' -17.3'	59.7' 59.7'
10 17	02 55.0 77°55.7	05 00.3	201 50.4 276°20.9	11.6'	02 44.2 02°26.9	-17.3'	59.7' 59.7'
18	92°55.9	505°02.3	290°51.5	11.5'	S02°09.6	-17.3	59.8'
19	107°56.1	03.2	305°22.0	11.5'	01°52.3	-17.4'	59.8'
20	122°56.3	04.2	319°52.6	11.5'	$01^{\circ}34.9$	-17.4'	59.8'
21	137°56.5	•• 05.1	334°23.1	11.5'	01° 17.5	-17.4'	59.9'
22	152°56.7	06.1	348°53.5	11.4'	01°00.1	-17.4'	59.9'
23	167°56.9	07.0	3°24.0	11.4'	00°42.7	-17.5'	59.9'
	SD = 16.0'	d = 1.0'		SI	D = 16.1'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	182°57.1	S05°08.0	$17^{\circ}54.4$	11.4'	S00°25.2	-17.5'	60.0'
1	197°57.2	09.0	32°24.8	11.4'	S00°07.7	-17.5'	60.0'
2	212°57.4	09.9	46°55.1	11.3'	N00°09.8	17.5'	60.0'
3 4	227°57.6 242°57.8	· · 10.9 11.8	61°25.4 75°55.7	11.3' 11.3'	00°27.3 00°44.8	17.5' 17.5'	60.0' 60.1'
5	257°58.0	12.8	90°26.0	11.3	00 44.8 01°02.3	17.5'	60.1
6	272°58.2	S05°13.8	104°56.2	11.2'	N01°19.9	17.6	60.1
7	287°58.3	14.7	119°26.4	11.1'	01°37.4	17.6'	60.1
8	302°58.5	15.7	133°56.5	11.1'	01°55.0	17.6'	60.2'
9	317°58.7	• • 16.6	148°26.6	11.1'	02°12.6	17.6'	60.2'
10	332°58.9	17.6	162°56.7	11.0'	02°30.1	17.6'	60.2'
11 12	347°59.1 2°59.3	18.5 \$05°19.5	177°26.7 191°56.7	11.0' 10.9'	02°47.7 N03°05.3	17.6' 17.6'	60.2' 60.3'
13	2 59.5 17°59.4	20.5	206°26.6	10.9'	03°22.8	17.6'	60.3
14	32°59.6	21.4	220°56.5	10.8'	03°40.4	17.6'	60.3
15	47°59.8	• • 22.4	235°26.3	10.8'	$03^{\circ}58.0$	17.5'	60.3'
16	63°00.0	23.3	249°56.1	10.7'	04° 15.5	17.5'	60.4
17	78°00.2 93°00.4	24.3 \$05°25.2	264°25.9 278°55.6	10.7'	04°33.0 N04°50.6	17.5'	60.4
18 19	93°00.4 108°00.5	26.2	278°55.6 293°25.2	10.6' 10.6'	05°08.1	17.5' 17.5'	60.4' 60.4'
20	123°00.7	27.2	307°54.8	10.5'	05°25.6	17.5	60.4
21	138°00.9	• • 28.1	322°24.3	10.5'	$05^{\circ}43.1$	17.5'	60.5'
22	153°01.1	29.1	336°53.8	10.4'	06°00.5	17.4'	60.5'
23	168°01.3	30.0	351°23.2	10.4'	06°18.0	17.4'	60.5'
	SD = 16.0'	d = 1.0'		SI	D = 16.4'		

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

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

		Sun			Moon		ı
Day	Eqn.of	f Time	Mer.	Mer.	Pass.	Age	ĺ
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	13-15	١
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	87-98%	ı
04	11:12	11:21	11:49	21:57	09:33		ı
05	11:30	11:39	11:48	22:46	10:22		ı
06	11:48	11:57	11:48	23:36	11:11		ı

## October 07, 08, 09 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	15°53.8	203°10.4	N04°40.7	158° 22.9	\$14°56.3	260°54.1	N21°29.1	17°21.8	S03°22.2			
1	30°56.2	218°10.0	39.6	173° 23.7	56.8	275° 56.3	29.0	32°24.4	22.3	Alpheratz	357°33.8	29°14.1
2	45°58.7	233°09.6	38.4	188°24.5	57.4	290° 58.5	29.0	47°27.1	22.3	Ankaa	353°06.1	-42°09.9
3	61°01.1	248°09.2	37.2	203°25.3	• • 58.0	306°00.6	28.9	62°29.7	22.4	Schedar	349°29.8	56°40.8
4	76°03.6	263°08.8	36.0	218°26.1	58.5	321°02.8	28.9	77°32.3	22.5	Diphda	348°46.4	-17°50.6
5	$91^{\circ}06.1$	278°08.4	34.8	233°26.9	59.1	336°05.0	28.9	92°35.0	22.5	Achernar	335°19.1	-57°06.2
6	106°08.5	293°08.0	N04°33.7	248°27.7	S14°59.7	351°07.2	N21°28.8	107°37.6	S03°22.6	Hamal	327°50.2 313°19.5	23°35.2 89°22.2
7	$121^{\circ}11.0$	308°07.6	32.5	263°28.4	15°00.2	6°09.4	28.8	122°40.2	22.7	Polaris Acamar	315° 10.9	-40°11.8
8	136°13.5	323°07.2	31.3	278°29.2	8.00	$21^{\circ}11.5$	28.7	137°42.8	22.8	Menkar	314°05.2	4°11.6
9	$151^{\circ}15.9$	338°06.8	• • 30.1	293°30.0	• • 01.4	36° 13.7	• • 28.7	152°45.5	• • 22.8	Mirfak	308° 27.0	49°57.1
10	166°18.4	353°06.4	28.9	308°30.8	01.9	51° 15.9	28.7	167°48.1	22.9	Aldebaran	290°38.7	16°33.7
11	181°20.9	8°06.0	27.7	323°31.6	02.5	66°18.1	28.6	182°50.7	23.0	Rigel	281°03.1	-8°10.1
12	196°23.3	23°05.6	N04°26.6	338°32.4	\$15°03.1	81°20.3	N21°28.6	197°53.4	S03°23.0	Capella	280°20.8	46°01.3
13	211°25.8 226°28.3	38°05.2 53°04.8	25.4 24.2	353°33.1 8°33.9	03.6 04.2	96° 22.5 111° 24.6	28.5 28.5	212°56.0 227°58.6	23.1 23.2	Bellatrix	$278^{\circ}22.1$	6°22.5
14 15	241°30.7	68°04.4	. 23.0	23° 34.7	04.2	111 24.0 126° 26.8	28.5	243°01.3	. 23.2	Elnath	278°01.0	28°37.7
16	256°33.2	83°04.0	21.8	38° 35.5	05.3	141°29.0	28.4	258°03.9	23.3	Alnilam	275°37.0	-1°11.0
17	271°35.6	98°03.6	20.6	53°36.3	05.9	156° 31.2	28.4	273°06.5	23.4	Betelgeuse	270°51.3	7°24.8
18	286°38.1	113°03.2	N04°19.5	68°37.0	S15°06.5	171°33.4	N21°28.3	288°09.1	S03°23.5	Canopus	263°52.0	-52°42.2
19	301°40.6	128°02.8	18.3	83°37.8	07.0	186° 35.6	28.3	303°11.8	23.5	Sirius	258°25.7	-16°44.8
20	316°43.0	143°02.4	17.1	98°38.6	07.6	201°37.7	28.3	318° 14.4	23.6	Adhara	255°05.4	-29°00.1
21	331°45.5	158°02.0	• • 15.9	113°39.4	• • 08.1	216°39.9	• • 28.2	333°17.0	• • 23.7	Procyon	244°50.3	5°09.7 27°57.8
22	346°48.0	173°01.6	14.7	128°40.2	08.7	231°42.1	28.2	$348^{\circ}19.7$	23.7	Pollux Avior	243° 16.6 234° 14.7	-59°35.1
23	1°50.4	188°01.2	13.5	143°41.0	09.3	246° 44.3	28.2	3°22.3	23.8	Suhail	222°46.1	-43°31.9
Mern	ass. 22:53	$\nu$ -0 4' d-1	2′ m-3.92	ν0 8' 40	.6′ m1.55	v2 2' d-0	.0′ m-2.16	v2 6' d0	.1' m0.64	Miaplacidus	221°38.7	-69°49.0
-viei.p		ν U.Ψ U-1	111-3.34	νσ.σ u0.	1111.33	ν2.2 U-0	.0 111-4.10	ν Δ.Ο UU	1110.04	Alphard	217°47.4	-8°46.0
										Regulus	207°34.0	11°50.6
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.8	61°36.6
0	16°52.9	203°00.8	N04°12.4	158° 41.7	S15°09.8	261°46.5	N21°28.1	18°24.9	S03°23.9	Denebola	182°24.6	14°25.8
1	31°55.4	218°00.4	11.2	173°42.5	10.4	276°48.7	28.1	33°27.6	23.9	Gienah	175°43.3	-17°41.0
2	46°57.8	233°00.0	10.0	188° 43.3	11.0	291°50.9	28.0	48°30.2	24.0	Acrux	$173^{\circ}00.2$	-63°14.4
3	62°00.3	247°59.6	• • 08.8	203°44.1	• • 11.5	306°53.0	• • 28.0	63°32.8	• • 24.1	Gacrux	$171^{\circ}51.6$	-57°15.4
4 5	77°02.7 92°05.2	262°59.2 277°58.8	07.6 06.4	218°44.9 233°45.6	12.1 12.6	321°55.2 336°57.4	28.0 27.9	78°35.4 93°38.1	24.1 24.2	Alioth	$166^{\circ}13.0$	55°49.2
6	92 05.2 107°07.7	217 56.6 292°58.4	N04°05.2	248° 46.4	\$15°13.2	351°59.6	N21°27.9	95 36.1 108°40.7	\$03°24.3	Spica	158°22.0	-11°17.7
7	122°10.1	307°58.0	04.0	263°47.2	13.8	7°01.8	27.8	123°43.3	24.4	Alkaid	152°52.0	49°11.2
8	137°12.6	322°57.6	02.9	278° 48.0	14.3	22°04.0	27.8	138° 46.0	24.4	Hadar	148°35.8	-60°29.9
9	152°15.1	337°57.2	• • 01.7	293°48.7	. 14.9	37°06.2	27.8	153° 48.6	24.5	Menkent	147°57.3	-36°29.8
10	167°17.5	352°56.8	04°00.5	308°49.5	15.4	52°08.4	27.7	168°51.2	24.6	Arcturus	145°47.7	19°03.0
11	182°20.0	7°56.4	03°59.3	323°50.3	16.0	67° 10.5	27.7	183°53.9	24.6	Rigil Kent.	139°40.1 137°20.8	-60°56.6 74°03.1
12	197°22.5	22°56.0	N03°58.1	338°51.1	S15°16.6	82°12.7	N21°27.6	198°56.5	S03°24.7	Kochab Zuben'ubi	136°55.7	-16°08.9
13	$212^{\circ}24.9$	37°55.6	56.9	353°51.9	17.1	97°14.9	27.6	213°59.1	24.8	Alphecca	130° 55.7 126° 03.5	26°37.8
14	227°27.4	52°55.2	55.7	8°52.6	17.7	$112^{\circ}17.1$	27.6	229°01.7	24.8	Antares	112° 15.3	-26°29.4
15	242°29.9	67°54.8	• • 54.5	23°53.4	•• 18.2	$127^{\circ}19.3$	• • 27.5	244°04.4	• • 24.9	Atria	107°09.3	-69°04.6
16	257°32.3	82°54.4	53.4	38°54.2	18.8	142°21.5	27.5	259°07.0	25.0	Sabik	102°02.3	-15°45.4
17	272°34.8	97°54.1	52.2	53°55.0	19.4	157°23.7	27.4	274°09.6	25.0	Shaula	96°09.7	-37°07.4
18	287°37.2	112°53.7	N03°51.0		\$15°19.9	172°25.9	N21°27.4	289°12.3	S03°25.1	Rasalhague	95°58.1	12°32.6
19	302°39.7	127°53.3	49.8	83°56.5	20.5	187°28.1	27.4	304°14.9	25.2	Eltanin	$90^{\circ}42.1$	51°29.4
20 21	317°42.2 332°44.6	142°52.9 157°52.5	48.6 • • 47.4	98°57.3 113°58.1	21.0 •• 21.6	202°30.3 217°32.4	27.3 •• 27.3	319°17.5 334°20.1	25.2 •• 25.3	Kaus Aust.	83°31.8	-34°22.4
22	347°47.1	172°52.1	46.2	113 58.1 128° 58.8	22.2	232°34.6	27.3	349°22.8	25.4	Vega	80°32.9	38°48.7
23	2°49.6	187°51.7	45.0	143°59.6	22.7	247°36.8	27.2	4°25.4	25.5	Nunki	75°47.0	-26°15.9
										Altair	61°59.3	8°56.3
Mer.p	ass. 22:49	$\nu$ -0.4′ d-1	2′ m-3.92	$\nu 0.8' \ d0$	.6′ m1.55	$\nu 2.2' \ d-0$	.0′ m-2.16	$\nu 2.6' d0$	.1′ m0.65	Peacock	53°04.6	-56°39.3
										Deneb Enif	49°25.2 33°38.0	45°22.6 9°59.8
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27° 31.8	-46°50.2
0	17°52.0	202°51.3	N03°43.8	159°00.4	S15°23.3	262°39.0	N21°27.2	19°28.0	S03°25.5	Fomalhaut	15° 13.5	-40° 30.2 -29° 29.1
1	32°54.5	217°50.9	42.6	174°01.2	23.8	277°41.2	27.1	34°30.7	25.6	Scheat	13°44.3	28°13.6
2	47°57.0	232°50.5	41.4	189°01.9	24.4	292°43.4	27.1	49°33.3	25.7	Markab	13° 29.0	15°20.8
3	62°59.4	247°50.1	• • 40.3	204°02.7	• • 24.9	307°45.6	• • 27.1	64°35.9	• • 25.7			
4	78°01.9	262°49.7	39.1	219°03.5	25.5	322°47.8	27.0	79°38.5	25.8	Oct 07 Tue	SHA	Mer.pass
5	93°04.4	277°49.3	37.9	234°04.2	26.1	337°50.0	27.0	94°41.2	25.9		187° 16.6 142° 29.2	10:28 13:26
6 7	108°06.8	292°48.9	N03°36.7	249°05.0		352° 52.2 7° 54.4	N21°26.9	109°43.8	S03°25.9	Jupiter		06:35
8	123°09.3 138°11.7	307°48.5 322°48.1	35.5 34.3	264°05.8 279°06.6	27.2 27.7	7°54.4 22°56.6	26.9 26.9	124°46.4 139°49.0	26.0 26.1	Saturn	1°28.0	22:47
9	158 11.7 153°14.2	322 48.1 337°47.7	33.1	279 06.6 294°07.3	•• 28.3	22 50.0 37°58.8	26.8	154° 51.7	26.1			22.71
10	168°16.7	352°47.3	31.9	309°08.1	28.8	53°01.0	26.8	169°54.3	26.2	Oct 08 Wed	SHA	Mer.pass
11	183°19.1	7°46.9	30.7	324°08.9	29.4	68°03.2	26.8	184°56.9	26.3		186°07.9	10:28
12	198°21.6	22°46.5	N03°29.5	339°09.6	S15°30.0	83°05.4	N21°26.7	199°59.6	S03°26.3		141°48.8	13:25
13	$213^{\circ}24.1$	$37^{\circ}46.1$	28.3	354°10.4	30.5	98°07.5	26.7	$215^{\circ}02.2$	26.4		244°53.6	06:32
14	$228^{\circ}26.5$	52°45.8	27.1	9°11.2	31.1	113°09.7	26.6	230°04.8	26.5	Saturn	1°32.0	22:42
15	243°29.0	67°45.4	• • 25.9	24° 12.0	• • 31.6	128° 11.9	• • 26.6	245°07.4	• • 26.5	Oct 09 Thu	SHA	Mer.pass
16	258°31.5	82°45.0	24.7	39° 12.7	32.2	143° 14.1	26.6	260°10.1	26.6		$184^{\circ}59.3$	10:29
17	273°33.9	97°44.6	23.5	54° 13.5	32.7	158° 16.3	26.5	275°12.7	26.7		141°08.3	13:23
18	288°36.4	112°44.2	N03°22.3	69°14.3		173° 18.5	N21°26.5		S03°26.7		244°47.0	06:28
19	303°38.8	127°43.8	21.2	84°15.0	33.8	188° 20.7	26.5	305°17.9	26.8	Saturn	1°36.0	22:38
20 21	318°41.3 333°43.8	142°43.4 157°43.0	20.0 •• 18.8	99° 15.8 114° 16.6	34.4 •• 35.0	203°22.9 218°25.1	26.4 •• 26.4	320°20.6 335°23.2	26.9 •• 27.0	Horizont	al parallax	
21	333 43.8 348°46.2	157 43.0 172°42.6	17.6	114 10.0 129° 17.3	35.5	218 25.1 233°27.3	26.3	350°25.8	27.0		Venus:	0.1
23	3°48.7	187°42.2	16.4	144° 18.1	36.1	248° 29.5	26.3	5°28.5	27.0		Mars:	0.1
Mer.p	ass. 22:45	$\nu$ -0.4' $d$ -1	2′ m-3.92	$\nu$ 0.8′ $d$ 0.	.6′ m1.55	$\nu$ 2.2′ d-0	.0′ m-2.17	$\nu$ 2.6′ $d0$	.1′ m0.65			

h	Sui	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	183°01.5	<b>S</b> 05°31.0	5°52.6	10.3'	N06°35.4	17.4'	60.5'
1 2	198°01.6 213°01.8	31.9 32.9	20°21.9 34°51.2	10.2' 10.2'	06°52.8 07°10.1	17.4' 17.3'	60.5' 60.6'
3	213 01.8 228°02.0	33.8	49°20.3	10.2	07 10.1 07°27.4	17.3	60.6
4	243°02.2	34.8	63°49.5	10.1'	07°44.7	17.3'	60.6
5	258°02.4	35.8	78° 18.5	10.0'	08°02.0	17.2'	60.6'
6	273°02.5 288°02.7	\$05°36.7 37.7	92°47.5 107°16.4	9.9' 9.9'	N08°19.2 08°36.4	17.2' 17.1'	60.6' 60.6'
7 8	303°02.9	37.7 38.6	107 16.4 121°45.3	9.9 9.8'	08°53.6	17.1' 17.1'	60.7
9	318°03.1	• • 39.6	136°14.1	9.7'	09°10.7	17.1'	60.7'
10	333°03.3	40.5	150° 42.8	9.6'	09°27.7	17.0'	60.7'
11 12	348°03.4 3°03.6	41.5 \$05°42.4	165°11.4 179°40.0	9.6' 9.5'	09°44.7 N10°01.7	17.0' 16.9'	60.7' 60.7'
13	18° 03.8	43.4	194°08.5	9.4'	10°18.6	16.9	60.7
14	33°04.0	44.3	$208^{\circ}37.0$	9.4'	10°35.5	16.8'	60.7'
15	48°04.2 63°04.3	• • 45.3	223°05.3 237°33.6	9.3'	10°52.3 11°09.1	16.8'	60.7'
16 17	78°04.5	46.3 47.2	252°01.8	9.2' 9.1'	11 09.1 11°25.7	16.7' 16.6'	60.8' 60.8'
18	93°04.7	S05°48.2	266°29.9	9.0'	N11°42.4	16.6'	60.8
19	108°04.9	49.1	280°58.0	9.0'	11°58.9	16.5'	60.8'
20 21	123°05.0 138°05.2	50.1 •• 51.0	295°25.9 309°53.8	8.9' 8.8'	12°15.4 12°31.9	16.4' 16.4'	60.8' 60.8'
22	158 05.2 153°05.4	52.0	309 53.8 324°21.6	8.7'	12 31.9 12°48.2	16.4	60.8
23	168°05.6	52.9	338°49.3	8.6'	13°04.5	16.2	60.8
	SD = 16.0'	d = 1.0'		SE	O = 16.5'		
\A/- 1	CUA	D	CUA		D-:	.j	LIP
Wed 0	<b>GHA</b> 183° 05.8	Dec \$05° 53.9	<b>GHA</b> 353°17.0	ν 8.6'	<b>Dec</b> N13°20.7	d 16.1'	<b>HP</b> 60.8'
1	198°05.9	54.8	7°44.5	8.5	13°36.9	16.1	60.8
2	213°06.1	55.8	22°12.0	8.4'	13°52.9	16.0'	60.8'
3 4	228°06.3 243°06.5	• • 56.7 57.7	36°39.4 51°06.7	8.3' 8.2'	14°08.9 14°24.8	15.9' 15.8'	60.8' 60.8'
5	258°06.6	57.7 58.6	65°33.9	8.1'	14° 40.6	15.7	60.8
6	273°06.8	\$05°59.6	80°01.0	8.0'	N14°56.4	15.6'	60.9'
7	288°07.0	06°00.5	94°28.0	7.9'	15°12.0	15.5'	60.9'
8 9	303°07.2 318°07.3	01.5 •• 02.4	108°55.0 123°21.8	7.8' 7.8'	15°27.5 15°43.0	15.4' 15.4'	60.9' 60.9'
10	333°07.5	03.4	123 21.6 137°48.6	7.6 7.7'	15°58.3	15.4	60.9
11	348°07.7	04.4	152° 15.2	7.6'	16°13.6	15.2'	60.9'
12	3°07.9	S06°05.3	166°41.8	7.5'	N16°28.7	15.0'	60.9'
13 14	18°08.0 33°08.2	06.3 07.2	181°08.3 195°34.7	7.4' 7.3'	16°43.8 16°58.7	14.9' 14.8'	60.9' 60.9'
15	48° 08.4	08.2	210°01.0	7.2'	17°13.6	14.7'	60.9
16	63°08.6	09.1	224°27.2	7.1'	17°28.3	14.6'	60.9'
17	78°08.7 93°08.9	10.1 S06°11.0	238°53.3 253°19.3	7.0' 6.9'	17°42.9 N17°57.4	14.5'	60.9'
18 19	93 08.9 108°09.1	12.0	253 19.3 267°45.2	6.8'	18°11.8	14.4' 14.3'	60.9' 60.9'
20	123°09.3	12.9	282°11.1	6.7'	18°26.1		60.9'
21	138°09.4	• • 13.9	296°36.8	6.6'	18°40.2	14.0'	60.8'
22 23	153°09.6 168°09.8	14.8 15.8	311°02.4 325°28.0	6.5' 6.4'	18°54.2 19°08.1	13.9' 13.8'	60.8' 60.8'
23	SD = 16.0'	d = 1.0'	323 20.0		0 = 16.6'	13.0	
	<u>JD = 10.0</u>	$\frac{u - 1.0}{}$		JL	7 — 10.0		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	183°10.0 198°10.1	\$06° 16.7 17.7	339°53.4 354°18.8	6.4' 6.3'	N19°21.9 19°35.6	13.6' 13.5'	60.8' 60.8'
2	213° 10.3	18.6	8°44.0	6.2	19°49.1	13.4	60.8
3	228° 10.5	• • 19.6	23°09.2	6.1'	20°02.5	13.2'	60.8'
4 5	243°10.6 258°10.8	20.5 21.5	37°34.2 51°59.2	6.0' 5.9'	20°15.7 20°28.8	13.1' 13.0'	60.8' 60.8'
6	258° 10.8 273° 11.0	506°22.4	66°24.1	5.8'	20°28.8 N20°41.8	13.0	60.8
7	288°11.2	23.3	80°48.9	5.7'	20°54.6	12.7'	60.8'
8	303°11.3	24.3	95°13.6	5.6'	21°07.3	12.5'	60.8'
9 10	318° 11.5 333° 11.7	· · 25.2 26.2	109°38.2 124°02.7	5.5' 5.4'	21°19.9 21°32.3	12.4' 12.2'	60.8' 60.8'
11	348°11.8	27.1	138°27.1	5.3'	21°44.5	12.1'	60.7
12	3°12.0	<b>S</b> 06°28.1	152°51.4	5.2'	N21°56.6	11.9'	60.7'
13	18° 12.2 33° 12.3	29.0	167°15.6 181°39.8	5.1' 5.1'	22°08.6 22°20.3	11.8'	60.7'
14 15	33° 12.3 48° 12.5	30.0 · · 30.9	181°39.8 196°03.8	5.1° 5.0'	22°20.3 22°32.0	11.6' 11.5'	60.7' 60.7'
16	63°12.7	31.9	$210^{\circ}27.8$	4.9'	22°43.5	11.3'	60.7'
17	78°12.9	32.8	224°51.7	4.8'	22°54.8	11.2'	60.7'
18 19	93°13.0 108°13.2	\$06°33.8 34.7	239° 15.5 253° 39.2	4.7' 4.6'	N23°05.9 23°16.9	11.0' 10.8'	60.7' 60.6'
20	100 13.2 123°13.4	35.7	268° 02.8	4.6 4.5'	23°27.8	10.6	60.6
21	138° 13.5	• • 36.6	$282^{\circ}26.3$	4.4'	23°38.4	10.5'	60.6'
22	153° 13.7	37.6	296°49.8	4.4'	23°48.9	10.3'	60.6'
23	168°13.9	38.5	311°13.1	4.3'	23°59.2	10.2'	60.6'
	SD = 16.0'	d = 0.9'		SE	0 = 16.6'		

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

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

		Sun			Moon	
Day	Eqn.of	Eqn.of Time Me		Mer.	Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	16-18
	mm:ss mm:ss		hh:mm	hh:mm	hh:mm	100-95%
07	12:06	12:14	11:48	-:-	12:01	
08	12:23	12:31	11:47	00:28	12:55	
09	12:40	12:48	11:47	01:24	13:53	

# October 10, 11, 12 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	18°51.2	202°41.8	N03°15.2	159°18.9	S15°36.6	263°31.7	N21°26.3	20°31.1	S03°27.2			
1	33°53.6	217°41.4	14.0	174°19.6	37.2	278°33.9	26.2	35°33.7	27.2	Alpheratz	357°33.8	29°14.1
										Ankaa	353°06.1	-42°09.9
2	48°56.1	232°41.0	12.8	189°20.4	37.7	293°36.1	26.2	50°36.3	27.3	Schedar	349°29.8	56°40.9
3	63°58.6	247°40.6	• • 11.6	204°21.2	• • 38.3	308°38.3	• • 26.2	65°39.0	• • 27.4	Diphda	348°46.4	-17°50.6
4	79°01.0	262°40.2	10.4	219°21.9	38.8	323°40.5	26.1	80°41.6	27.4	Achernar	335°19.1	-57°06.2
5	94°03.5	277°39.8	09.2	234°22.7	39.4	338°42.7	26.1	95°44.2	27.5	Hamal	327°50.2	23°35.2
6	$109^{\circ}06.0$	292°39.4	N03°08.0	249°23.5	<b>S</b> 15°39.9	353°44.9	N21°26.0	110°46.8	503°27.6	I	313°18.2	89°22.2
7	124°08.4	307°39.1	06.8	264°24.2	40.5	8°47.1	26.0	125°49.5	27.6	Polaris		
8	139° 10.9	322°38.7	05.6	279°25.0	41.0	23°49.3	26.0	140°52.1	27.7	Acamar	315°10.9	-40°11.8
9	154° 13.3	337°38.3	• • 04.4	294°25.8	• • 41.6	38°51.5	• • 25.9	155°54.7	• • 27.8	Menkar	314°05.2	4°11.6
10	169° 15.8	352°37.9	03.2	309°26.5	42.1	53°53.7	25.9	170°57.3	27.8	Mirfak	308°27.0	49°57.1
11	184° 18.3	7°37.5	02.0	324°27.3	42.7	68°55.9	25.9	186°00.0	27.9	Aldebaran	290°38.7	16°33.7
12	199° 20.7	22°37.1	N03°00.8	339°28.1	S15°43.2	83°58.1	N21°25.8	201°02.6	S03°28.0	Rigel	$281^{\circ}03.1$	-8°10.1
	214° 23.2									Capella	280°20.8	46°01.3
13		37°36.7	02°59.6	354°28.8	43.8	99°00.3	25.8	216°05.2	28.0	Bellatrix	278°22.1	6°22.5
14	229°25.7	52°36.3	58.4	9°29.6	44.4	114°02.5	25.7	231°07.8	28.1	Elnath	278°00.9	28°37.7
15	244°28.1	67°35.9	• • 57.2	24°30.4	• • 44.9	129°04.8	• • 25.7	246°10.5	• • 28.2	Alnilam	275°37.0	-1°11.0
16	259° 30.6	82°35.5	56.0	39°31.1	45.5	144°07.0	25.7	261°13.1	28.2	Betelgeuse	270°51.3	7°24.8
17	274°33.1	97°35.1	54.8	54°31.9	46.0	159°09.2	25.6	276°15.7	28.3	Canopus	263°52.0	-52°42.2
18	289°35.5	112°34.7	N02°53.6	69°32.6	S15°46.6	$174^{\circ}11.4$	N21°25.6	291°18.4	S03°28.4	Sirius	258°25.7	-16°44.8
19	304°38.0	127°34.3	52.4	84°33.4	47.1	189°13.6	25.6	306°21.0	28.4	Adhara	255°05.4	-10 44.0 -29°00.1
20	319°40.5	142°33.9	51.2	99°34.2	47.7	204°15.8	25.5	321°23.6	28.5			
21	334°42.9	157°33.6	• • 50.0	114°34.9	• • 48.2	219°18.0	• • 25.5	336°26.2	• • 28.6	Procyon	244°50.2	5°09.6
22	349° 45.4	172°33.2	48.8	129°35.7	48.8	234°20.2	25.5	351°28.9	28.6	Pollux	243°16.6	27°57.8
23	4° 47.8	187°32.8	47.6	144°36.5	49.3	249°22.4	25.4	6°31.5	28.7	Avior	234°14.7	-59°35.1
		-								Suhail	222°46.1	-43°31.9
Mer.p	pass. 22:41	$\nu$ -0.4' d-1	l.2′ m-3.92	$\nu$ 0.8′ d0	.6′ m1.54	$\nu$ 2.2′ d-0	.0′ m-2.17	$\nu$ 2.6′ d0.	1' m0.66	Miaplacidus	221°38.6	-69°49.0
										Alphard	217°47.3	-8°46.0
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°34.0	11°50.5
0	19°50.3	202°32.4	N02°46.4	159°37.2	S15°49.9	264°24.6	N21°25.4	21°34.1	S03°28.8		193°40.8	61°36.6
1	34°52.8	217°32.0	45.2	174°38.0	50.4	279°26.8	25.3	36°36.7	28.8	Denebola	182°24.6	14°25.8
		232°31.6		189°38.7				51°39.4		Gienah		-17°41.0
2	49°55.2		44.0		51.0	294°29.0	25.3		28.9	Acrux	173°00.2	-63°14.4
3	64°57.7	247°31.2	• • 42.8	204°39.5	• • 51.5	309°31.2	• • 25.3	66°42.0	• • 29.0	Gacrux	171°51.6	-57°15.3
4	80°00.2	262°30.8	41.6	219°40.3	52.0	324°33.4	25.2	81°44.6	29.0	Alioth	166°13.0	55°49.2
5	95°02.6	277°30.4	40.4	234°41.0	52.6	339°35.6	25.2	96°47.2	29.1	Spica	158°22.0	-11°17.7
6	110°05.1	292°30.0	N02°39.2	249°41.8	S15°53.1	354°37.8	N21°25.2	111°49.9	S03°29.2	Alkaid	152°52.0	49°11.1
7	125°07.6	307°29.6	38.0	264°42.5	53.7	9°40.1	25.1	126°52.5	29.2	Hadar	148°35.8	-60°29.8
8	140° 10.0	322°29.2	36.8	279°43.3	54.2	24°42.3	25.1	141°55.1	29.3		147°57.3	-36°29.8
9	155° 12.5	337°28.8	• • 35.6	294°44.1	• • 54.8	39°44.5	• • 25.1	156°57.7	• • 29.4		145°47.7	19°03.0
10	170° 15.0	352°28.5	34.4	309°44.8	55.3	54°46.7	25.0	172°00.3	29.4	Rigil Kent.		-60°56.6
11	185° 17.4	7°28.1	33.2	324°45.6	55.9	69°48.9	25.0	187°03.0	29.5	Kochab	137°20.8	74°03.0
12	200° 19.9	22°27.7	N02°32.0	339°46.3	S15°56.4	84°51.1	N21°24.9	202°05.6	S03°29.6	Zuben'ubi	136°55.7	-16°08.9
13	215°22.3	37°27.3	30.8	354°47.1	57.0	99°53.3	24.9	217°08.2	29.6	Alphecca	126°03.5	26°37.8
14	230°24.8	52°26.9	29.5	9°47.8	57.5	114°55.5	24.9	232°10.8	29.7	Antares	112°15.3	-26°29.4
15	245°27.3	67°26.5	• • 28.3	24°48.6	• • 58.1	129°57.7	• • 24.8	$247^{\circ}13.5$	• • 29.8	Atria	107°09.3	-69°04.6
16	260°29.7	82°26.1	27.1	39°49.4	58.6	144°59.9	24.8	$262^{\circ}16.1$	29.8	Sabik	102°02.3	-15°45.4
17	275°32.2	97°25.7	25.9	54°50.1	59.2	160°02.2	24.8	277°18.7	29.9	Shaula	96°09.7	-37°07.4
18	290°34.7	112°25.3	N02°24.7		\$15°59.7	175°04.4	N21°24.7	292°21.3	S03°30.0	Rasalhague	95°58.1	12°32.6
19	305°37.1	127°24.9	23.5	84°51.6	$16^{\circ}00.3$	190°06.6	24.7	307°24.0	30.0	Eltanin	90°42.1	51°29.4
20	320° 39.6	142°24.5	22.3	99°52.4	8.00	205°08.8	24.7	322°26.6	30.1	Kaus Aust.	83°31.8	-34°22.4
21	335°42.1	157°24.1	• • 21.1	114°53.1	• • 01.3	220°11.0	• • 24.6	337°29.2	• • 30.2	Vega	80°32.9	38°48.7
22	350°44.5	172°23.8	19.9	129°53.9	01.9	235°13.2	24.6	352°31.8	30.2	Nunki	75°47.0	-26°15.9
23	5°47.0	187°23.4	18.7	144°54.7	02.4	250°15.4	24.6	7°34.5	30.3	Altair	61°59.3	8°56.3
Morn	pass. 22:37	11 0 A' d 1	l.2′ m-3.92	1/0 8/ d0	.5′ m1.54	1/2 2 <sup>1</sup> d 0	.0′ m-2.18	12 6' d0	1′ m0.66	Peacock	53°04.6	-56°39.3
- IVICI.P	Jass. 22.51	ν-0.4 α-1		νο.σ ασ	.5 1111.54	ν2.2 u-0	.0 111-2.10	ν2.0 do.		Deneb	49°25.2	45°22.6
										Enif	33°38.0	9°59.8
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.8	-46°50.2
0	20°49.5	202°23.0	N02°17.5	159°55.4	S16°03.0	265°17.6	N21°24.5	22°37.1	S03°30.4	Fomalhaut	15° 13.5	-40° 30.2 -29° 29.1
1	$35^{\circ}51.9$	217°22.6	16.3	174°56.2	03.5	280°19.9	24.5	37°39.7	30.4	Scheat	13°44.3	28°13.6
2	50°54.4	232°22.2	15.1	189°56.9	04.1	295°22.1	24.4	52°42.3	30.5	Markab	13°29.0	15°20.8
3	65° 56.8	247°21.8	• • 13.9	204°57.7	• • 04.6	310°24.3	• • 24.4	67°45.0	• • 30.5	ividikaD	10 29.0	13 20.0
4	80°59.3	262°21.4	12.7	219°58.4	05.2	325°26.5	24.4	82°47.6	30.6	Oct 10 Fri	SHA	Mer.pass
5	96°01.8	277°21.0	11.5	234°59.2	05.7	340°28.7	24.3	97°50.2	30.7	Venus	183°50.6	10:29
6	111°04.2	292°20.6	N02°10.3	249°59.9	S16°06.2	355°30.9	N21°24.3	112°52.8	S03°30.7		140°27.7	13:22
7	126°06.7	307°20.2	09.0	265°00.7	06.8	10°33.1	24.3	127°55.4	30.8	Jupiter	244°40.6	06:25
8	141°09.2	322°19.8	07.8	280°01.4	07.3	25°35.4	24.2	142°58.1	30.9	Saturn	1°39.9	22:34
9	156° 11.6	337°19.4	06.6	295°02.2	• • 07.9	40°37.6	24.2	158°00.7	• • 30.9			
10	171°14.1	352°19.1	05.4	310°02.9	08.4	55°39.8	24.2	173°03.3	31.0	Oct 11 Sat	SHA	Mer.pass
11	186° 16.6	7°18.7	04.2	325°03.7	09.0	70°42.0	24.1	188°05.9	31.1		182°42.1	10:30
12	201°19.0	22°18.3	N02°03.0	340°04.5	S16°09.5	85°44.2	N21°24.1	203°08.6	S03°31.1		139°46.9	13:21
13	216°21.5	37°17.9	01.8	355°05.2	10.0	100°46.4	24.1	218°11.2	31.2	Jupiter		06:21
14	231°23.9	52°17.5	02°00.6	10°06.0	10.6	115°48.7	24.0	233°13.8	31.3	Saturn	1°43.8	22:30
15	246° 26.4	67°17.1	01°59.4	25°06.7	• • 11.1	130°50.9	24.0	248°16.4	• • 31.3	Oct 12 Sun	SHA	Mer.pass
16	261°28.9	82°16.7	58.2	40°07.5	11.7	145°53.1	24.0	263°19.0	31.4		181°33.5	10:31
17	276°31.3	97°16.3	57.0	55°08.2	12.2	160°55.3	23.9	278°21.7	31.5		181 33.5 139°06.0	
18	270 31.3 291°33.8	112°15.9	N01°55.8	70°09.0	\$16°12.8	175°57.5	N21°23.9	293°24.3	S03°31.5		244°28.2	13:20
19	306° 36.3	112 15.9 127°15.5	54.6	85°09.7	13.3	175°57.5	23.9	308°26.9	31.6			06:18
20	300 30.3 321°38.7	142°15.1	53.3	100°10.5	13.8	206°02.0	23.9	323°29.5	31.7	Saturn	1°47.6	22:26
21	336°41.2	142 15.1 157°14.8	52.1	100 10.5 115°11.2	13.6	200 02.0 221°04.2	. 23.8	338°32.2	• • 31.7	Horizont	al parallax	
22	351°43.7	172°14.4	50.9	130°12.0	14.4	236°06.4	23.7	353°34.8	31.8		Venus:	0.1
23	6°46.1	187°14.4	49.7	130 12.0 145°12.7	15.5	251°08.6	23.7	8°37.4	31.8		Mars:	0.1
Mer.p	pass. 22:33	$\nu$ -0.4' d-1	l.2′ m-3.92	$\nu$ 0.8′ d0	.5′ m1.54	$\nu 2.2' \ d-0$	.0′ m-2.19	$\nu$ 2.6′ d0.	1′ m0.67			

h	Sui	า			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	183°14.0	<b>S</b> 06°39.5	$325^{\circ}36.4$	4.2'	N24°09.4	10.0'	60.6'
1	198°14.2 213°14.4	40.4	339°59.6 354°22.7	4.1'	24°19.4	9.8'	60.5'
2	213°14.4 228°14.5	41.3 •• 42.3	354°22.7 8°45.8	4.1' 4.0'	24°29.2 24°38.8	9.6' 9.4'	60.5' 60.5'
4	243°14.7	43.2	23°08.8	3.9'	24°48.2	9.3'	60.5
5	258°14.9	44.2	37°31.7	3.8'	24°57.5	9.1'	60.5'
6	273°15.0 288°15.2	\$06°45.1 46.1	51°54.5 66°17.3	3.8'	N25°06.6 25°15.5	8.9'	60.5'
7 8	288°15.2 303°15.4	46.1 47.0	80°40.0	3.7' 3.6'	25°15.5 25°24.2	8.7' 8.5'	60.4' 60.4'
9	318° 15.5	• • 48.0	95°02.6	3.6'	25°32.8	8.4'	60.4
10	333°15.7	48.9	109°25.2	3.5'	25°41.1	8.2'	60.4'
11	348°15.9 3°16.0	49.8 \$06°50.8	123°47.7 138°10.1	3.4' 3.4'	25°49.3 N25°57.2	8.0' 7.8'	60.4' 60.3'
12 13	18°16.2	500 50.8	158 10.1 152°32.5	3.4	26°05.0	7.8 7.6'	60.3
14	33°16.4	52.7	166°54.8	3.3'	26°12.6	7.4	60.3
15	48°16.5	• • 53.6	181°17.1	3.2'	26°20.0	7.2'	60.3'
16 17	63°16.7 78°16.9	54.6 55.5	195°39.3 210°01.5	3.2' 3.1'	26°27.2 26°34.3	7.0' 6.8'	60.3' 60.2'
18	93°17.0	506° 56.5	210 01.5 224°23.6	3.1'	N26°41.1	6.6	60.2
19	108°17.2	57.4	238°45.7	3.0'	26°47.7	6.4	60.2'
20	123°17.3	58.3	253°07.7	3.0'	26°54.1	6.2'	60.2'
21 22	138°17.5 153°17.7	06°59.3 07°00.2	267°29.7 281°51.6	2.9' 2.9'	27°00.4 27°06.4	6.0' 5.8'	60.1' 60.1'
23	168°17.8	01.2	296°13.5	2.9'	27°12.2	5.6'	60.1
	SD = 16.0'	d = 0.9'		S	D = 16.5'		
Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	183°18.0 198°18.2	\$07°02.1 03.1	310°35.4 324°57.3	2.8' 2.8'	N27°17.8 27°23.3	5.4' 5.2'	60.1'
2	213°18.3	03.1	324 57.3 339°19.1	2.8'	27°28.5	5.2 5.0'	60.0' 60.0'
3	228°18.5	• • 04.9	353°40.9	2.8'	27°33.5	4.8'	60.0'
4	243°18.6	05.9	8°02.6	2.7'	27°38.4	4.6'	60.0'
5 6	258°18.8 273°19.0	06.8 \$07°07.8	22°24.4 36°46.1	2.7'	27°43.0 N27°47.4	4.4' 4.2'	59.9' 59.9'
7	273 19.0 288°19.1	08.7	50 40.1 51°07.8	2.7'	27°51.6	4.2 4.0'	59.9'
8	303°19.3	09.6	65°29.5	2.7'	27°55.6	3.8'	59.9'
9	318°19.4	• • 10.6	79°51.2	2.7'	27°59.5	3.6'	59.8'
10 11	333°19.6 348°19.8	11.5 12.5	94°12.9 108°34.6	2.7' 2.7'	28°03.1 28°06.5	3.4' 3.2'	59.8' 59.8'
12	3°19.9	507°13.4	122°56.2	2.7'	N28°09.7	3.0'	59.8'
13	18°20.1	14.3	$137^{\circ}17.9$	2.7'	28°12.7	2.8'	59.7'
14	33°20.2 48°20.4	15.3	151°39.6	2.7'	28°15.4 28°18.0	2.6'	59.7'
15 16	48°20.4 63°20.6	· · 16.2 17.2	166°01.3 180°23.0	2.7' 2.7'	28° 18.0 28° 20.4	2.4' 2.2'	59.7' 59.6'
17	78°20.7	18.1	194°44.7	2.7'	28°22.6	2.0'	59.6'
18	93°20.9	S07°19.0	209°06.4	2.7'	N28°24.6	1.8'	59.6'
19 20	108°21.0 123°21.2	20.0 20.9	223°28.1 237°49.9	2.8' 2.8'	28°26.3 28°27.9	1.6' 1.4'	59.6' 59.5'
21	138°21.4	. 21.9	252°11.7	2.8'	28°29.2	1.2'	59.5'
22	153°21.5	22.8	$266^{\circ}33.5$	2.8'	28°30.4	1.0'	59.5'
23	168°21.7	23.7	280°55.3	2.9'	28°31.4	0.8'	59.4'
	SD = 16.0'	d = 0.9'		S	D = 16.4'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°21.8	S07°24.7	295°17.2	2.9'	N28°32.1	0.5'	59.4'
1	198°22.0	25.6	309°39.1	2.9'	28°32.7	0.3'	59.4'
2	213°22.1 228°22.3	26.6 • • 27.5	324°01.0 338°23.0	3.0' 3.0'	28°33.0 28°33.2	0.1' -0.1'	59.4' 59.3'
4	243°22.5	28.4	352°45.0	3.1'	28°33.1	-0.1	59.3'
5	258°22.6	29.4	7°07.1	3.1'	28°32.9	-0.5'	59.3'
6	273°22.8 288°22.9	S07°30.3	21°29.2	3.2'	N28°32.4 28°31.8	-0.6' -0.8'	59.2'
7 8	288°22.9 303°23.1	31.2 32.2	35°51.3 50°13.5	3.2' 3.3'	28°31.8 28°30.9	-0.8° -1.0'	59.2' 59.2'
9	318°23.2	• • 33.1	64°35.8	3.3'	28°29.9	-1.2	59.1'
10	333°23.4	34.0	78°58.1	3.4'	28°28.6	-1.4'	59.1'
11 12	348°23.5 3°23.7	35.0 \$07°35.9	93°20.5 107°43.0	3.4' 3.5'	28°27.2 N28°25.6	-1.6' -1.8'	59.1' 59.1'
13	18°23.9	36.9	107 45.0 122°05.5	3.6'	28°23.7	-1.6 -2.0'	59.1 59.0'
14	33°24.0	37.8	136°28.1	3.6'	28°21.7	-2.2'	59.0'
15	48°24.2	• • 38.7	150°50.7	3.7'	28°19.5	-2.4'	59.0'
16 17	63°24.3 78°24.5	39.7 40.6	165°13.4 179°36.2	3.8' 3.9'	28°17.1 28°14.6	-2.6' -2.8'	58.9' 58.9'
18	93°24.6	\$07°41.5	193°59.1	4.0'	N28°11.8	-3.0'	58.9'
19	108°24.8	42.5	208°22.0	4.0'	28°08.8	-3.1'	58.8'
20	123°24.9 138°25.1	43.4	222°45.1 237°08.2	4.1'	28°05.7	-3.3'	58.8'
21 22	138°25.1 153°25.2	· · 44.3 45.3	237°08.2 251°31.4	4.2' 4.3'	28°02.4 27°58.9	-3.5' -3.7'	58.8' 58.7'
23	168°25.4	46.2	265°54.7	4.4'	27°55.2	-3.9'	58.7'
	SD = 16.0'	d = 0.9'		S	D = 16.2'		

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

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

		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	88-69%
10	12:56	13:04	11:47	02:23	14:55	
11	13:12	13:20	11:47	03:26	15:58	
12	13:27	13:35	11:46	04:30	17:02	

# October 13, 14, 15 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	21°48.6	202°13.6	N01°48.5	160°13.5	\$16°16.0	266°10.9	N21°23.7	23°40.0	S03°31.9			
1	36°51.1	217°13.2	47.3	175°14.2	16.5	281°13.1	23.6	38°42.6	32.0	Alpheratz		29°14.2
2	51°53.5	232°12.8	46.1	190°14.9	17.1	296°15.3	23.6	53°45.3	32.0	Ankaa	353°06.1	-42°09.9
3	66°56.0	247°12.4	• • 44.9	205°15.7	• • 17.6	311°17.5	23.6	68°47.9	32.1	Schedar	349°29.8	56°40.9
4	81°58.4	262°12.0	43.7	220°16.4	18.2	$326^{\circ}19.7$	23.5	83°50.5	32.2	Diphda	348°46.3	-17°50.6
5	97°00.9	$277^{\circ}11.6$	42.5	235°17.2	18.7	341°22.0	23.5	98°53.1	32.2	Achernar	335°19.1	-57°06.2
6	112°03.4	292°11.2	N01°41.2	250°17.9	S16°19.2	356°24.2	N21°23.5	113°55.7	S03°32.3	Hamal	327°50.2 313°17.1	23°35.2 89°22.2
7	$127^{\circ}05.8$	$307^{\circ}10.8$	40.0	265°18.7	19.8	11°26.4	23.4	128°58.4	32.4	Acamar	315°10.9	-40°11.9
8	$142^{\circ}08.3$	$322^{\circ}10.5$	38.8	280°19.4	20.3	26°28.6	23.4	144°01.0	32.4	Menkar	314°05.2	4°11.6
9	157° 10.8	337°10.1	• • 37.6	295°20.2	• • 20.9	41°30.9	• • 23.4	159°03.6	• • 32.5	Mirfak	308° 26.9	49°57.1
10	172° 13.2	352°09.7	36.4	310°20.9	21.4	56°33.1	23.3	174°06.2	32.6	Aldebaran	290°38.7	16°33.7
11	187° 15.7	7°09.3	35.2	325°21.7	21.9	71°35.3	23.3	189°08.8	32.6	Rigel	281°03.1	-8°10.1
12	202°18.2	22°08.9	N01°34.0	340°22.4	\$16°22.5	86°37.5	N21°23.3	204°11.5	S03°32.7	Capella	280°20.7	46°01.3
13	217°20.6	37°08.5	32.8	355°23.2	23.0	101°39.8	23.2	219°14.1	32.7	Bellatrix	278°22.0	6°22.5
14 15	232°23.1 247°25.6	52°08.1 67°07.7	31.5 · · 30.3	10°23.9 25°24.6	23.5 •• 24.1	116°42.0 131°44.2	23.2 •• 23.2	234°16.7 249°19.3	32.8 · · 32.9	Elnath	$278^{\circ}00.9$	28°37.7
16	262° 28.0	82°07.3	29.1	40°25.4	24.1	146°46.4	23.2	249 19.3 264°21.9	32.9	Alnilam	275°36.9	-1°11.0
17	277°30.5	97°06.9	27.9	55°26.1	25.2	161°48.7	23.1	279°24.6	33.0	Betelgeuse	270°51.3	7°24.8
18	292°32.9	112°06.6	N01°26.7	70°26.9	S16°25.7	176°50.9	N21°23.1	294°27.2	S03°33.1	Canopus	263°52.0	-52°42.2
19	307°35.4	127°06.2	25.5	85°27.6	26.2	191°53.1	23.0	309°29.8	33.1	Sirius	258° 25.6	-16°44.8
20	322°37.9	142°05.8	24.3	100°28.4	26.8	206°55.3	23.0	324°32.4	33.2	Adhara	255°05.3	-29°00.1
21	337°40.3	157°05.4	• • 23.1	115°29.1	• • 27.3	221°57.6	• • 23.0	339°35.0	• • 33.3	Procyon	244°50.2	5°09.6
22	352°42.8	172°05.0	21.8	130°29.9	27.8	236°59.8	22.9	354°37.7	33.3	Pollux	243°16.6	27°57.8
23	7°45.3	187°04.6	20.6	145°30.6	28.4	252°02.0	22.9	9°40.3	33.4	Avior	234° 14.7 222° 46.1	-59°35.1 -43°31.9
Morn	ass. 22:29	11 0 1/ d 1	2′ m-3.92	,,0 7' d0	.5′ m1.53	,,2 2/ d 0	.0′ m-2.19	12 6/ 40	1′ m0.67	Suhail Miaplacidus	221°38.6	-43 31.9 -69°49.0
ivier.p	ass. 22:29	ν-0.4 α-1		νο.τ αυ	.5 111.55	ν2.2 α-0	.0 m-2.19	ν2.0 d0	1 1110.07	Alphard	221 36.0 217°47.3	-8°46.0
										Regulus	207°34.0	11°50.5
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.8	61°36.6
0	22°47.7	202°04.2	N01°19.4	160°31.3	S16°28.9	267°04.2	N21°22.9	24°42.9	S03°33.4	Denebola	182°24.6	14°25.7
1	37°50.2	217°03.8	18.2	175°32.1	29.4	282°06.5	22.8	39°45.5	33.5	Gienah	175°43.3	-17°41.0
2	52°52.7	232°03.4	17.0	190°32.8	30.0	297°08.7	22.8	54°48.1	33.6		173°00.1	-63°14.4
3	67°55.1	247°03.0	• • 15.8	205°33.6	• • 30.5	312°10.9	• • 22.8	69°50.8	• • 33.6		171°51.6	-57°15.3
4	82°57.6	262°02.6	14.6	220°34.3	31.0	327°13.2	22.7	84°53.4	33.7	Alioth	$166^{\circ}13.0$	55°49.2
5	98°00.1	277°02.3	13.4	235°35.0	31.6	342°15.4	22.7	99°56.0	33.8	Spica	$158^{\circ}22.0$	-11°17.7
6	113°02.5	292°01.9	N01°12.1	250°35.8	\$16°32.1	357°17.6	N21°22.7	114°58.6	S03°33.8	Alkaid	$152^{\circ}52.0$	49°11.1
7 8	128°05.0 143°07.4	307°01.5 322°01.1	10.9 09.7	265°36.5 280°37.3	32.7 33.2	12°19.8 27°22.1	22.6 22.6	130°01.2 145°03.9	33.9 34.0	Hadar	148°35.8	-60°29.8
9	143 07.4 158°09.9	337°00.7	•• 08.5	200 37.3 295°38.0	33.7	42°24.3	• • 22.6	145 05.9 160°06.5	• • 34.0	Menkent	147°57.3	-36°29.8
10	173° 12.4	352°00.3	07.3	310°38.7	34.3	57°26.5	22.5	175°09.1	34.1	Arcturus	145° 47.7	19°03.0
11	188° 14.8	6°59.9	06.1	325°39.5	34.8	72°28.8	22.5	190°11.7	34.1	Rigil Kent.	139°40.1	-60°56.5
12	203°17.3	21°59.5	N01°04.9	340°40.2	S16°35.3	87°31.0	N21°22.5	205°14.3	503°34.2	Kochab	137°20.8	74°03.0
13	218° 19.8	36°59.1	03.6	355°41.0	35.9	102°33.2	22.4	220°17.0	34.3	Zuben'ubi	136°55.6	-16°08.9
14	233°22.2	51°58.7	02.4	10°41.7	36.4	117°35.5	22.4	235°19.6	34.3	Alphecca	126°03.5	26°37.8
15	248° 24.7	66°58.3	• • 01.2	25°42.4	• • 36.9	132°37.7	• • 22.4	250°22.2	• • 34.4	Antares Atria	112° 15.3 107° 09.3	-26°29.4 -69°04.6
16	263°27.2	81°58.0	01°00.0	40°43.2	37.4	147°39.9	22.3	265°24.8	34.5	Sabik		-09 04.0 -15°45.4
17	278°29.6	96°57.6	00°58.8	55°43.9	38.0	162°42.2	22.3	280°27.4	34.5	Shaula	96°09.7	-37°07.4
18	293°32.1	111°57.2	N00°57.6		S16°38.5	177°44.4	N21°22.3	295°30.0	S03°34.6	Rasalhague	95°58.1	12°32.6
19	308°34.6	126°56.8	56.3	85°45.4	39.0	192°46.6	22.2	310°32.7	34.6	Eltanin	90°42.1	51°29.4
20	323°37.0	141°56.4	55.1	100°46.1	39.6	207°48.9	22.2	325°35.3	34.7	Kaus Aust.	83°31.8	-34°22.4
21	338°39.5	156°56.0	• • 53.9	115°46.9	• • 40.1	222°51.1	• • 22.2	340°37.9	• • 34.8	Vega	80°32.9	38°48.7
22	353°41.9	171°55.6	52.7	130°47.6	40.6	237°53.3	22.1	355°40.5	34.8	Nunki	75°47.0	-26°15.9
23	8°44.4	186°55.2	51.5	145°48.3	41.2	252°55.6	22.1	10°43.1	34.9	Altair	$61^{\circ}59.3$	8°56.3
Mer.p	ass. 22:25	$\nu$ -0.4 $'$ d-1	2′ m-3.92	$\nu$ 0.7′ d0	.5′ m1.53	$\nu 2.2' \ d-0$	.0′ m-2.20	$\nu 2.6' \ d0$	1'  m0.68	Peacock	53°04.6	-56°39.3
										Deneb	49°25.3	45°22.6
\A/ad	GHA	GHA	Doo	GHA	Doo	GHA	Dee	GHA	Dee	Enif	33°38.0	9°59.8
Wed 0	23° 46.9	201°54.8	<b>Dec</b> N00°50.3	160°49.1	<b>Dec</b> \$16°41.7	267°57.8	<b>Dec</b> N21°22.1	25°45.7	<b>Dec</b> \$03°35.0	Al Na'ir	27°31.8	-46°50.2
1	38° 49.3	201 54.8 216°54.4	49.1	175°49.8	42.2	283°00.0	22.1	40°48.4	35.0	Fomalhaut	15° 13.5	-29°29.1
2	53°51.8	231°54.1	47.8	190°50.5	42.8	298°02.3	22.0	55°51.0	35.1	Scheat	13°44.3 13°29.0	28°13.6 15°20.8
3	68° 54.3	246°53.7	• • 46.6	205°51.3	• • 43.3	313°04.5	22.0	70°53.6	• • 35.1	Markab	13 29.0	10 20.δ
4	83°56.7	261°53.3	45.4	220°52.0	43.8	328°06.8	22.0	85°56.2	35.2	Oct 13 Mon	SHA	Mer.pass
5	98°59.2	276°52.9	44.2	235°52.7	44.3	343°09.0	21.9	100°58.8	35.3		$180^{\circ}25.0$	10:31
6	114°01.7	291°52.5	N00°43.0	250°53.5		358°11.2	N21°21.9		S03°35.3		138°24.9	13:18
7	129°04.1	306°52.1	41.8	265°54.2	45.4	13°13.5	21.9	131°04.1	35.4		244°22.3	06:14
8	144°06.6	321°51.7	40.5	280°54.9	45.9	28°15.7	21.8	146°06.7	35.5	Saturn	1°51.4	22:21
9	159°09.0	336°51.3	• • 39.3	295°55.7	• • 46.5	43°17.9	• • 21.8	161°09.3	• • 35.5	Oct 14 Tue	SHA	Mer.pass
10	174°11.5	351°50.9	38.1	310°56.4	47.0	58°20.2	21.8	176°11.9	35.6	1	179° 16.5	10:32
11	189° 14.0	6°50.5	36.9	325°57.1	47.5	73°22.4	21.7 N21°21.7	191°14.5	35.6		137°43.6	13:17
12 13	204° 16.4 219° 18.9	21°50.1 36°49.8	N00°35.7 34.4	340°57.9 355°58.6	\$16°48.0 48.6	88°24.7 103°26.9	N21°21.7 21.7	206°17.2 221°19.8	S03°35.7 35.8		$244^{\circ}16.5$	06:11
13 14	219° 18.9 234° 21.4	36°49.8 51°49.4	34.4 33.2	355 58.6 10°59.3	48.6 49.1	103°26.9 118°29.1	21.7	221°19.8 236°22.4	35.8 35.8	Saturn	1°55.2	22:17
15	249° 23.8	66°49.0	32.0	26°00.1	• 49.1	116 29.1 133°31.4	21.6	250°25.0	35.9	Oct 15 14/-	CHA	Monasia
16	249 23.6 264° 26.3	81°48.6	30.8	41°00.8	50.2	133 31.4 148°33.6	21.6	266°27.6	36.0	Oct 15 Wed	<b>SHA</b> 178° 08.0	Mer.pass 10:33
17	279° 28.8	96°48.2	29.6	56°01.5	50.2	163°35.9	21.5	281°30.2	36.0	1	178 08.0 137°02.2	13:16
18	294°31.2	111°47.8	N00°28.4		\$16°51.2	178°38.1	N21°21.5	296°32.8			244° 10.9	06:07
19	309°33.7	126°47.4	27.1	86°03.0	51.7	193°40.3	21.5	311°35.5	36.1	Saturn	1°58.9	22:13
20	324°36.2	141°47.0	25.9	101°03.7	52.3	208°42.6	21.4	326°38.1	36.2			
21	339°38.6	$156^{\circ}46.6$	• • 24.7	$116^{\circ}04.5$	• • 52.8	223°44.8	• • 21.4	341°40.7	• • 36.3	Horizont	al parallax	
22	$354^{\circ}41.1$	$171^{\circ}46.2$	23.5	131°05.2	53.3	$238^{\circ}47.1$	21.4	$356^{\circ}43.3$	36.3		Venus:	0.1
23	9°43.5	186°45.8	22.3	146°05.9	53.8	253°49.3	21.4	11°45.9	36.4		Mars:	0.1
Mern	ass. 22:21	$\nu$ -0 4' d-1	2′ m-3.92	ν0 7' d0	.5′ m1.53	ν2 2' d-Ω	.0′ m-2.21	ν2 6' dΩ	1′ m0.68			
ci.p		- U. i U-1	5.52	2 3.1 40				- 2.0 00				

h	Sur	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	183°25.5	S07°47.1	280°18.1	4.5'	N27°51.3	-4.0'	58.7'
1 2	198°25.7 213°25.8	48.1 49.0	294°41.5 309°05.1	4.6' 4.7'	27° 47.3 27° 43.0	-4.2' -4.4'	58.6' 58.6'
3	213 25.8 228°26.0	• • 49.9	323°28.7	4.7	27° 38.6	-4.4 -4.6'	58.6
4	243°26.1	50.9	$337^{\circ}52.5$	4.8'	$27^{\circ}34.1$	-4.7'	58.6'
5	258°26.3	51.8	352°16.3	4.9'	27°29.3	-4.9'	58.5'
6 7	273°26.4 288°26.6	\$07°52.7 53.7	6°40.3 21°04.3	5.0' 5.1'	N27°24.4 27°19.3	-5.1' -5.3'	58.5' 58.5'
8	303°26.7	54.6	35°28.4	5.2'	27°14.0	-5.4'	58.4
9	318°26.9	• • 55.5	49°52.7	5.4'	27°08.6	-5.6'	58.4'
10	333°27.0 348°27.2	56.5	64°17.0 78°41.5	5.5'	27°03.0 26°57.3	-5.8'	58.4' 58.3'
11 12	348 27.2 3°27.3	57.4 \$07°58.3	78 41.5 93°06.1	5.6' 5.7'	20 57.3 N26°51.3	-5.9' -6.1'	58.3
13	18°27.5	07°59.3	107°30.7	5.8'	26° 45.2	-6.2	58.3'
14	33°27.6	08°00.2	121°55.5	5.9'	26°39.0	-6.4	58.2'
15 16	48°27.8 63°27.9	· · 01.1 02.1	136°20.4 150°45.4	6.0' 6.1'	26° 32.6 26° 26.0	-6.6' -6.7'	58.2' 58.2'
17	78°28.1	03.0	165°10.5	6.2'	26° 19.3	-6.9'	58.1
18	93°28.2	S08°03.9	179°35.8	6.3'	N26° 12.5	-7.0'	58.1'
19	108°28.4	04.9	194°01.1	6.5'	26°05.4	-7.2'	58.1'
20 21	123°28.5 138°28.7	05.8 •• 06.7	208°26.6 222°52.2	6.6' 6.7'	25°58.3 25°51.0	-7.3' -7.5'	58.1' 58.0'
22	153°28.8	07.6	237°17.8	6.8'	25°43.5	-7.6'	58.0'
23	168°29.0	08.6	251°43.7	6.9'	25°35.9	-7.8'	58.0'
	SD = 16.0'	d = 0.9'		SI	O = 16.0'		
<b>T</b>	CUA	D	CIIA		D	.,	
Tue 0	<b>GHA</b> 183°29.1	<b>Dec</b> \$08°09.5	<b>GHA</b> 266°09.6	u 7.0'	<b>Dec</b> N25° 28.1	d -7.9'	<b>HP</b> 57.9'
1	198°29.3	10.4	280°35.6	7.2'	25°20.2	-8.0'	57.9'
2	213°29.4	11.4	295°01.8	7.3'	25°12.2	-8.2'	57.9'
3 4	228°29.5 243°29.7	· · 12.3 13.2	309°28.1 323°54.5	7.4' 7.5'	25°04.0 24°55.7	-8.3' -8.4'	57.8' 57.8'
5	258° 29.8	14.1	338°21.0	7.6'	24° 47.3	-8.6'	57.8'
6	273°30.0	S08°15.1	352°47.6	7.8'	N24°38.7	-8.7'	57.7'
7	288°30.1	16.0	7°14.4	7.9'	24°30.0	-8.8'	57.7'
8 9	303°30.3 318°30.4	16.9 •• 17.9	21°41.3 36°08.3	8.0' 8.1'	24°21.2 24°12.2	-9.0' -9.1'	57.7' 57.6'
10	333°30.6	18.8	50°35.4	8.2'	24°03.1	-9.2	57.6'
11	348°30.7	19.7	65°02.6	8.4'	23°53.9	-9.3'	57.6'
12 13	3°30.8 18°31.0	\$08°20.6 21.6	79°30.0 93°57.5	8.5' 8.6'	N23°44.5 23°35.1	-9.5' -9.6'	57.6' 57.5'
14	33°31.1	22.5	108°25.1	8.7'	23°25.5	-9.0 -9.7'	57.5'
15	48°31.3	• • 23.4	$122^{\circ}52.8$	8.8'	$23^{\circ}15.8$	-9.8'	57.5'
16	63°31.4 78°31.6	24.4	137°20.7	9.0'	23°05.9 22°56.0	-9.9'	57.4
17 18	78 31.6 93°31.7	25.3 \$08°26.2	151°48.6 166°16.7	9.1' 9.2'	N22°45.9	-10.1' -10.2'	57.4' 57.4'
19	108°31.8	27.1	180°44.9	9.3'	22°35.8	-10.3'	57.3'
20	123°32.0	28.1	195°13.2	9.4'	22°25.5		57.3'
21 22	138°32.1 153°32.3	· · 29.0 29.9	209°41.7 224°10.2	9.6' 9.7'	22°15.1 22°04.6	-10.5' -10.6'	57.3' 57.3'
23	168°32.4	30.8	238°38.9	9.8'	21°54.0	-10.7	57.2'
	SD = 16.0'	d = 0.9'		SI	D = 15.8'		
Wed	GHA	Dec	GHA		D	.,	HP
0 0	183°32.5	508°31.8	253°07.7	u 9.9'	Dec N21° 43.3	d -10.8'	57.2'
1	198°32.7	32.7	$267^{\circ}36.6$	10.0'	21°32.5	-10.9'	57.2'
2	213°32.8	33.6	282°05.6	10.1'	21°21.6	-11.0'	57.1'
3 4	228°33.0 243°33.1	· · 34.5 35.5	296°34.8 311°04.0	10.3' 10.4'	21°10.6 20°59.5	-11.1' -11.2'	57.1' 57.1'
5	258°33.2	36.4	325°33.4	10.5'	20°48.3	-11.3'	57.1'
6	273°33.4	S08°37.3	340°02.9	10.6'	N20°37.1	-11.4'	57.0'
7 8	288°33.5 303°33.6	38.2 39.1	354°32.5 9°02.2	10.7' 10.8'	20°25.7 20°14.2	-11.5' -11.6'	57.0' 57.0'
9	303 33.0 318°33.8	. 40.1	9 02.2 23°32.0	10.8	20°14.2 20°02.6	-11.0 -11.7'	57.0 56.9'
10	333°33.9	41.0	$38^{\circ}02.0$	11.0'	$19^{\circ}51.0$	-11.7'	56.9'
11	348°34.1	41.9 \$08°42.8	52°32.0 67°02.2	11.2'	19°39.2 N19°27.4	-11.8'	56.9'
12 13	3°34.2 18°34.3	43.8	67°02.2 81°32.4	11.3' 11.4'	N19°27.4 19°15.5	-11.9' -12.0'	56.9' 56.8'
14	33°34.5	44.7	96°02.8	11.5'	19°03.5	-12.1'	56.8
15	48°34.6	• • 45.6	110°33.3	11.6'	18°51.4	-12.2'	56.8'
16 17	63°34.7 78°34.9	46.5 47.4	125°03.9 139°34.5	11.7' 11.8'	18° 39.3 18° 27.1	-12.2' -12.3'	56.7' 56.7'
18	93°35.0	508°48.4	159° 54.5 154° 05.3	11.0	N18° 14.8	-12.4'	56.7
19	108°35.2	49.3	168°36.2	12.0'	18°02.4	-12.5'	56.7'
20	123°35.3	50.2	183°07.2	12.1'	17°49.9	-12.5'	56.6'
21 22	138°35.4 153°35.6	· · 51.1 52.0	197°38.3 212°09.5	12.2' 12.3'	17°37.4 17°24.8	-12.6' -12.7'	56.6' 56.6'
23	168°35.7	53.0	226°40.8	12.4	17°12.1	-12.7'	56.6'
	SD = 16.0'	d = 0.9'		SI	O = 15.6'		

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

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

		Sun			Moon				
Day	Eqn.of	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	59-37%			
13	13:42	13:49	11:46	05:32	18:02				
14	13:56	14:03	11:46	06:30	18:57				
15	14:10	14:17	11:46	07:23	19:47				

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

Dec   CHA	h	Aries	Ve	nus	,	ars	Jup	oiter	Sat	urn		Stars	
20   20   20   20   20   20   20   20	Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
2 99'465   219'461   190   19'077   540   239'318   219'35   385   58'768									26°48.5				
2 97-509   231-47   136   101-01   554   286-500   231-46   231-505   236-506   236									41°51.2				
8 0.783					191°08.1	55.4							
48   159   2014   39   102   221   006   56   339   005   212   80   590   307													
8 99°83 20°463 100 23°103 50°105 50°105 20°121 10°010 50°50   8 115°03 20°463 100°117 25°110 518°52 30°105 100°111 10°02 50°30   9 110°02 30°413 10°101 20°117 25°110 518°52 30°105 10°11 110°02 50°30   9 110°02 30°413 10°11 10°117 25°110 110 10°117 10°10 10°101	4					56.5	329°00.5						
15   15   15   15   15   15   15   15	5	99°58.3	276°43.5	15.0	236° 10.3	57.0	344°02.8	21.2	102°01.6				
8 Hay 10.5 32 14.23 11.5 20 11.5 20 11.5 20 11.5 20 11.7 20 11.7 21.0 21.0 21.0 21.0 21.0 21.0 21.0 21.0	6	115°00.8	291°43.1	N00°13.7	251°11.0	S16°57.5		N21°21.1	117°04.2	S03°36.8			
10   175   170   187	7	130°03.3	306°42.7	12.5	$266^{\circ}11.7$	58.0	14°07.3	21.1	132°06.8	36.9			
19   19   19   19   19   19   19   19	8	145°05.7	321°42.3	11.3	281°12.5	58.6	29°09.5	21.1	147°09.5	36.9			
11   100   131   36   44   1   107   18   122   126   107	9	160°08.2	336°41.9	• • 10.1	296° 13.2	• • 59.1	44°11.7	• • 21.0	$162^{\circ}12.1$	• • 37.0			
100   13.5   1	10	175°10.7	351°41.5	08.9	311° 13.9	$16^{\circ}59.6$	59°14.0	21.0	$177^{\circ}14.7$	37.1			
15   200   15   200   15   200   15   200   15   200   15   200   15   200   15   200	11	190°13.1	6°41.1	07.6	326° 14.6	$17^{\circ}00.1$	74°16.2	21.0	192°17.3	37.1			
13 20°130 8 130°100 00 00 00 00 00 00 00 00 00 00 00 00	12	205°15.6	21°40.8	N00°06.4	341° 15.4	S17°00.7	89° 18.5	N21°21.0	207° 19.9	503°37.2			
15 26723 0 978 90	13	220°18.0	36°40.4	05.2	$356^{\circ}16.1$	01.2	104°20.7	20.9	222°22.5	37.2			
1-1-	14	235°20.5	51°40.0	04.0	$11^{\circ}16.8$	01.7	119°23.0	20.9	237°25.1	37.3			
18	15	250°23.0	66°39.6	• • 02.8	$26^{\circ}17.5$	• • 02.2	134°25.2	• • 20.9	252°27.8	• • 37.4			
19   3017-524   117-38   3000-00   971-197   517-38   109-220   200-308   507-326   507-325   507-326	16	265°25.4	81°39.2	01.5	41° 18.3	02.7	$149^{\circ}27.5$	20.8	267°30.4	37.4			
19	17	280°27.9	96°38.8	N00°00.3	$56^{\circ}19.0$	03.3	164°29.7	20.8		37.5	_		
3573.3. 31473.0. 0.3 8873.1. 0.4. 0.5 8873.1. 0.4. 0.5 8873.1. 0.4. 0.5 8873.1. 0.4. 0.5 8873.1. 0.4. 0.5 8873.1. 0.4. 0.5 8873.1. 0.4. 0.5 8873.1. 0.4. 0.5 8873.1. 0.4. 0.5 8873.1. 0.4. 0.5 8873.1. 0.4. 0.5 8873.1. 0.4. 0.5 8873.1. 0.4. 0.5 8873.1. 0.4. 0.5 8873.1. 0.4. 0.5 8873.1. 0.4. 0.5 8873.1. 0.4. 0.5 8873.1. 0.4. 0.4. 0.4. 0.4. 0.4. 0.4. 0.4. 0	18	295°30.4	111°38.4	500°00.9	$71^{\circ}19.7$	<b>S</b> 17°03.8		N21°20.8	297°35.6	503°37.5			
23   387-302	19	310°32.8		02.1	86°20.4	04.3	194°34.2	20.7	312°38.2	37.6			
Main	20	325°35.3	141°37.6	03.3	101°21.2	04.8	209°36.5	20.7	327°40.8	37.7			
23 10*427 180*364 070 146*23 664 25*433.2 206 12*48.7 37.8	21	340°37.8	156°37.2	•• 04.6		•• 05.4		• • 20.7	342°43.4	• • 37.7			
	22	355°40.2	171°36.8	05.8	131°22.6	05.9	239°41.0	20.7	$357^{\circ}46.1$	37.8			
Mapple   M	23	10°42.7	186°36.4	07.0	146°23.3	06.4	254°43.2	20.6	12°48.7	37.8			
Fri GHA  OHA  OHA  OHA  OHA  OHA  OHA  OHA	Mern	nass 22·17	ν-0 4' d 1	2' m-3 02	νη 7' Αη	5' m1 52	ν2 2' d-Ω	0' m-2 21	v2 6' d0	1′ m0 68			
Fri GHA GHA GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA DEC G	- ivier.p	,uss. 44.11	ν-0.4 U-1	111-3.92	νυ.ι αυ	.5 1111.32	ν Δ. Δ · U · U	111-2.21	ν Δ.Ο	1110.00			
Fri GHA GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA GHA Dec GHA Dec GHA GHA GHA GHA GHA GHA GHA GHA GHA GHA													
0 25*451. 201361 500*082 161.241 517069 26*45. N21*206 27*613 93 830 Censbol 382*246 14*257. 2 55*501 23*1353 10 10 10*125. 66. 29*45. N21*206 27*513 93 830 Censbol 382*246 14*257. 2 55*501 23*1353 10 10 10*125. 66. 29*9*801 20. 20. 57*65. 30. 66. 46. 46. 47*57. 3 100*57. 26*7341 14. 3 23*27. 7 00. 5 34*66. 7 20. 4 103*04. 3 32. 5 100*57. 5 26*34. 1 41. 3 23*27. 7 00. 5 34*66. 7 20. 4 103*04. 3 32. 5 100*57. 5 26*34. 1 41. 3 23*27. 7 00. 5 34*66. 7 20. 4 103*04. 3 32. 5 100*57. 5 26*34. 1 41. 3 23*27. 7 00. 5 34*66. 7 20. 4 103*04. 3 32. 5 10. 4 10*04. 3 32. 5 10. 4 10*04. 3 32. 5 10. 4 10*04. 3 32. 5 10. 4 10*04. 3 32. 5 10. 4 10*04. 3 32. 5 10. 4 10*04. 3 32. 5 10. 4 10*04. 3 32. 5 10. 4 10*04. 3 32. 5 10. 4 10*04. 3 32. 5 10. 4 10*04. 3 32. 5 10. 4 10*04. 3 32. 5 10. 4 10*04. 3 32. 5 10. 4 10*04. 3 32. 5 10. 4 10*04. 3 32. 5 10. 4 10*04. 3 10*											_		
1 40°476   210°357   904   170°258   907   284°477   20.6   42°539   38.0   2 55°61   231°353   107   10°255   280°306   29°900   205   57°565   380   3 70°525   286°349   119   206°362   085   314°522   205   72°991   381   4 88°580   201°345   131   22°676   201°338   34°522   205   72°991   381   5 80°407   318°625   201°345   313   22°676   201°338   34°522   201°347   201°34   6 115°599   291°337   500°155   251°284   517°100   338°590   82°204   118°070   503°383   7 131°604   306°333   168   266°291   116   45°567   203   138°06   383   8 146°649   321°329   180   221°298   111   30°035   204   148°122   384   9 161°073   336°325   192   206°306   111   30°035   204   148°122   384   9 161°073   336°325   192   206°306   111   45°057   203   138°106   385   11 191°123   6°317   216   326°320   126   75°102   203   138°104   385   12 200°147   21°313   500°229   341°327   517°131   90°125   812°202   206°226   503°366   12 200°147   21°313   500°229   341°327   517°131   90°125   812°202   206°226   503°366   12 200°147   21°313   500°229   341°327   517°131   90°125   812°02   206°226   503°366   12 200°147   21°313   500°229   341°327   517°131   90°125   812°02   206°226   503°366   15 251°221   66°302   205°35   31°34   142°2   120°170   203   331°409   30°300   16 266°246   81°298   277   41°356   152   150°215   201   266°331   389   16 266°246   81°298   277   41°356   152   150°215   201   266°331   389   17 281°20   11°290   500°302   71°370   517°162   180°360   812°01   238°407   30							269°45.5		27°51.3				
2 55°50.1 231°35.3 10.7 191°25.5 08.6 314°52.2 20.5 57°56.5 38.0 4 Acrux 173°0.1 4.371°1.1 4.371				09.4				20.6		38.0			
70°525 246°349 11.9 206°262 2·085 314°522 2·05 72°591 1·38.1 4 8°550 261°345 13.1 221°269 90.5 326°455 205 8°0.17 38.1 54.00°575 261°345 13.1 221°269 90.5 326°455 205 346°567 20.4 103°043 38.2 5pica 56°229 1·10.6 15°012 2·05°383 5pica 56°202 11°17.7 11.3 0°03.5 2.0 4 133°096 38.3 5pica 56°202 11°17.7 11.3 0°03.5 2.0 4 180°07 53°383 5pica 56°202 11°17.7 11.3 0°03.5 2.0 4 180°07 53°383 5pica 56°202 11°17.5 11.3 0°03.5 2.0 4 180°07 53°383 5pica 56°202 11°17.5 11.3 0°03.5 2.0 4 180°07 53°383 5pica 56°202 11°17.5 11.1 30°03.5 2.0 4 180°10.5 38.4 5pica 56°20.5 11°10.7 11.3 0°03.5 2.0 4 180°10.5 38.4 5pica 56°20.5 11°10.5 11°10.2 2.0 50°30.6 1.1 6 45°65.7 2.0 3 163°148 2.3 46°12.7 11°10.5 11°10.2 2.0 50°30.6 1.1 6 45°65.7 2.0 3 163°148 2.3 46°12.7 11°10.5 11°10.2 2.0 50°30.6 1.1 6 45°65.7 2.0 3 163°148 2.3 46°12.7 11°10.5 11°10.2 2.0 50°30.6 1.1 6 45°65.7 2.0 3 163°148 2.3 46°12.7 11°10.5 11°10.2 2.0 50°30.5 11°10.2 2.0 50°30.5 11°10.2 2.0 50°30.5 11°10.2 2.0 50°30.2 2.0 56°30.5 11°10.2 2.0 50°30.2 2.0 56°30.5 11°10.2 2.0 50°30.2 2.0 56°30.5 11°2.0 50°30.2 2.0 50°3													
A	3	70°52.5		•• 11.9		• • 08.5	314°52.2	• • 20.5		• • 38.1			
5	4	85°55.0	261°34.5	13.1	221°26.9	09.0	329°54.5	20.5	88°01.7	38.1			
115°99.9 291°337 500°15.5 251°284 517°10.0 359°99.0 N21°20.4 118°07.0 503°38.3 Alkiald 152°92.0 49°11.1 7 131°02.4 306°333.3 16.8 266°29.1 10.6 15°01.2 20.4 18°12.2 38.4 Menkent 147°57.3 36°22.8 8 146°04.9 321°32.9 18.0 281°32.9 8 11.1 30°03.5 20.4 148°12.2 38.4 Menkent 147°57.3 36°22.8 10 176°09.8 551°32.1 20.4 311°31.3 12.1 60°08.0 20.3 178°11′.4 38.5 Menkent 147°57.3 36°22.8 11.91°12.3 6°31.7 21.6 326°32.0 12.6 75°10.2 20.3 178°11′.4 38.5 No. 137°20.7 14°03.0 12 200°14.7 21°31.3 50°02.9 341°32.7 517°13.1 90°12.5 N21°20.2 208°22.6 503°38.6 Kochab 137°20.9 74°03.0 21.2 200°14.7 21°31.3 50°02.9 341°32.7 517°13.1 90°12.5 N21°20.2 208°22.6 503°38.6 Kochab 137°20.9 74°03.0 21.2 200°14.7 21°31.3 50°02.9 341°32.7 517°13.1 90°12.5 N21°20.2 208°22.6 503°38.6 Kochab 137°20.9 74°03.0 21.2 200°14.7 21°31.3 50°02.9 341°32.7 517°13.1 190°12.5 N21°20.2 228°27.9 38.7 Alpheca 126°03.5 6°37.8 14 236°19.6 51°30.6 25.3 11°34.1 14.2 120°17.0 20.2 288°27.9 38.7 Alpheca 126°05.2 6°34.9 11°29.0 50°30.2 11°7 147 138°19.3 20.1 258°30.5 38.8 Artias 10°20.3 11°29.0 50°30.2 71°37.0 517°16.2 150°21.5 20.1 288°33.1 38.9 Artia 10°09°0.4 60°00.4 61°0.2 150°0.3 11°29.0 50°30.2 71°37.0 517°16.2 180°26.0 N21°20.1 288°33.1 38.9 Sabib 10°00°0.3 74°07.4 N0.0 18°0.0		100°57.5	276°34.1		236°27.7	09.5	344°56.7	20.4		38.2			
131 C2	6			S00°15.5		S17°10.0		N21°20.4		S03°38.3			
8 146°04-9 321°329 18.0 281°29.8 11.1 30°03.5 20.4 148°12.2 38.4 Menkent 147°87.3 36°29.8 10°10°07.3 336°32.5 19.2 296°30.6 11.6 48°05.7 2.0 3 163°14.8 38.4 14°10°09.8 351°32.1 20.4 311°31.3 12.1 60°08.0 20.3 178°17.4 38.6 38.4 11°10°19.3 6°31.7 21.6 326°32.0 12.6 78°710.2 20.3 193°20.0 38.6 Kochab 137°20.9 74°30.0 12.2 206°14.7 21°31.3 500°22.9 341°32.7 \$17°13.1 90°12.5 N21°20.2 208°22.6 503°30.6 Zuberiubi 136°55.6 1-6°80.9 13°20.1 226°20.1 26°30.0 38.6 Kochab 137°20.9 74°30.0 12.5 12°20.1 26°30.5 38.7 14°22.1 66°30.2 2.6 5.6 31.1 34.1 14.2 120°17.0 20.2 238°27.9 38.7 Alphecca 126°35.5 26°34.9 11°20.0 50°30.2 17°37.0 \$17°16.8 195°23.5 20.1 283°357.3 38.9 Alphecca 126°20.4 18.2 26°29.5 11°20.0 50°30.2 17°37.0 \$17°16.8 195°28.3 20.0 1283°357.3 38.9 Shalub 96°09.7 37°07.4 48.2 131°30.0 126°38.5 11°30.0 126°38.5 17.3 210°30.5 20.0 332°34.5 39.1 12°30.0 126°38.5 11°30.9 16°30.5 17°16.8 195°28.3 20.0 313°40.9 156°27.8 33.9 116°30.2 17.8 225°28.8 20.0 332°34.5 39.1 14°24.8 166°27.0 36.3 146°40.6 18.8 255°37.3 19.9 13°51.4 39.2 Vega 80°32.9 36°48.7 Naiva 10°26.6 500°37.5 161°41.3 517°19.3 270°39.6 N21°19.9 135°51.4 39.3 Naika 10°25.4 56°53.5 20.1 326°34.4 141°28.2 32.6 101°38.5 17.3 210°30.5 20.0 332°34.5 39.1 Naiva 10°26.6 500°37.5 161°41.3 517°19.3 270°39.6 N21°19.9 135°51.4 39.3 Naika 10°59.3 8°56.3 Peace 5.6 500°37.5 161°41.3 517°19.3 270°39.6 N21°19.9 135°51.4 39.3 Naika 10°59.3 8°56.3 Peace 5.6 500°37.5 161°41.3 517°19.3 270°39.6 N21°19.9 13°51.4 39.3 Naika 10°59.3 8°56.3 Peace 5.6 50°40.4 221°42.2 206°44.9 210°25.5 44.2 206°44.9 210°35.6 206°40.9 10°40.9 10°40.9 10°40.9 10°40.0 10°40.9 10°40.0 1									133°09.6				
9 161°07.93 335°32.1 20.4 311°31.3 12.1 60°08.0 20.3 178°11.4 8.84 8.84 11 191°12.3 6°31.7 21.6 326°32.0 12.6 75°10.2 20.3 178°11.4 8.84 1.85 11 191°12.3 6°31.7 21.6 326°32.0 12.6 75°10.2 20.3 178°20.0 38.6 1.85 11 191°12.3 6°31.7 21.6 326°32.0 12.2 6°75°10.2 20.3 178°20.0 38.6 1.85 11 191°12.3 6°31.0 24.1 366°33.4 13.7 105°14.8 20.2 223°25.2 38.7 4 12.6 1.6 26°4.6 81°29.8 27.7 41°35.6 15.2 150°21.5 021°20.2 238°25.9 38.7 15°20.9 2.2 38°27.9 38.7 15°20.9 2.2 12.2 12.2 12.2 12.2 12.2 12.2 12.													
10 176°09.8 351°32.1 20.4 311°31.3 12.1 60°08.0 20.3 178°17.4 39.5 11 191°12.3 6°31.7 21.6 326°32.0 12.6 0°78°10.2 20.3 193°20.0 38.6 12 206°14.7 21°31.3 50°02.9 341°32.7 517°13.1 90°12.5 N21°20.2 208°22.6 503°38.6 137°17.2 36°31.0 241 356°33.4 13.7 105°14.8 20.2 223°32.5 38.7 14 236°19.6 51°30.6 25.3 11°34.1 14.2 120°17.0 20.2 238°27.9 38.7 14 236°19.6 51°30.6 25.3 11°34.1 14.2 120°17.0 20.2 238°27.9 38.7 14 256°33.2 26°37.8 16.6 266°24.6 81°29.8 27.7 41°35.6 15.2 150°21.5 20.1 268°33.1 39.9 14.7 21°27.0 96°29.4 29.0 56°36.3 15.7 166°23.8 20.1 283°35.7 38.9 18.2 12°15.3 20.1 283°35.7 38.9 18.3 283°33.0 18.3 240°35.1 31.9 38.9 18.3 240°35.1 31.9 39.9 18.3 240°35.1 31.9													
11 191°12.3 6°31.7 21.6 33.4°32.0 12.6 75°10.2 20.3 193°20.0 38.6 No. chab 137°20.9 74°03.0 120 20°14.7 21°31.3 500°22.9 341°32.7 51°15.1 90°12.5 No. 2°20.2 238°22.6 53°36.6 Zuben'ubi 136°55.6 1-60°6.0 13 221°17.2 36°31.0 241 36°53.4 13.7 105°14.8 20.2 223°25.2 38.7 14°36.0 12.6 12.6 12.6 12.6 12.6 12.6 12.6 12.6													
13 221°17.2 36°31.0 24.1 356°33.4 13.7 105°14.8 20.2 233°52.5 38.7   Albert unit 120°17.0 20.2 233°52.9 38.7   Albert unit 120°17.0 20.2 233°27.9 38.7   Albert unit 120°17.0 20.2 233°27.9 38.7   Albert unit 120°17.0 20.2 233°27.9 38.7   Albert unit 120°17.0 20.2 233°27.9 38.7   Albert unit 120°17.0 20.2 233°27.9 38.7   Albert unit 120°17.0 20.2 233°27.9 38.7   Albert unit 120°27.1   Albert unit 120°27.1   Albert unit 120°27.0   Albe													
14 236°19.6 51°30.6 25.3 11°34.1 14.2 120°17.0 20.2 238°27.9 38.7 Antare 11°215.3 20°29.4 20.1 26°32.1 16°32.3 13°3.0 1 233°30.5 38.8 Artia 10°70.4 -60°07.4 16°26.6 18°29.8 27.7 41°35.6 15.2 150°21.5 20.1 268°33.1 38.9 18.2 18°29.8 27.7 41°35.6 15.2 150°21.5 20.1 268°33.1 38.9 18.2 18°29.8 20.1 28°35.7 38.9 18.2 21°21.2 28°35.7 38.9 18.2 21°21.2 28°35.7 38.9 18.2 21°32.5 21°32.5 20.1 28°35.7 38.9 18.2 21°32.5 21°32.5 20.1 28°35.7 38.9 18.2 21°32.5 21°32.5 20.1 28°35.7 38.9 18.2 21°32.5 21°											Zuben'ubi	136°55.6	-16°08.9
15   251   251   253   266   268   27   285   286   349   14.7   135   19.3   20.01   253   30.5   38.8   Africal   107   304   269   266   26											Alphecca	126°03.5	26°37.8
16 266°24.6 81°29.8 27.7 41°35.6 15.2 150°21.5 20.1 266°33.1 33.9 172°7.0 96°24.2 29.0 55°36.3 15.7 165°23.8 20.1 268°33.1 33.9 180°10.7 37°07.4 180°10.7 16.8 195°28.3 20.0 313°40.9 30.0 131°40.9 30											Antares	112°15.3	-26°29.4
18   286°29.5   119°20.5   500°30.2   713°7.5   157°6.5   165°23.8   20.1   283°35.7   33.9     18   280°29.5   119°20.5   500°30.2   713°7.5   517°6.2   180°26.0   802°20.1   283°35.7   33.9     19   311°32.0   126°28.6   31.4   86°37.7   16.8   195°28.3   20.0   313°40.9   96°09.7   37°07.4     20   326°34.4   141°28.2   32.6   101°35.5   17.3   210°30.5   20.0   328°43.5   39.1     21   341°36.9   156°7.8   33.9   116°39.2   17.3   210°30.5   225°32.8   20.0   328°43.5   39.1     22   311°41.8   186°27.0   36.3   146°40.6   18.8   240°35.1   19.9   358°48.7   39.2     311°41.8   186°27.0   36.3   146°40.6   18.8   255°37.3   19.9   135°1.4   39.3     Mer.pasc. 22:13   \$\nu \cdot \text{V-0.4'} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \											Atria	107°09.4	-69°04.6
18   296°295   111°290   S00°302   71°370   S17°162   180°260   N21°201   298°383   S03°390   Salabague   Sos											Sabik	102°02.3	
11   311   320   126°286   31.4   86°37.7   16.8   195°28.3   20.0   313°40.9   39.0   Rasiningle   93°41.   12°32.9   12°32.6   20.1   326°34.4   141°28.2   32.6   101°38.5   17.3   210°30.5   20.0   328°43.5   39.1   Rasiningle   93°42.1   51°29.4   221°34.6   34°36.9   156°27.8   33.9   116°39.2   17.8   225°32.8   20.0   343°46.1   39.2   228°32.8   20.0   343°46.1   39.2   228°32.8   20.0   343°46.1   39.2   228°32.8   20.0   343°46.1   39.2   228°32.8   20.0   343°46.1   39.2   228°32.8   20.0   343°46.1   39.2   228°32.8   20.0   343°46.1   39.3   348°32.9   38°31.8   34°22.4   32.0   32.											Shaula	96°09.7	-37°07.4
20   326°34.4   141°28.2   32.6   101°38.5   17.3   210°30.5   20.0   328°43.5   39.1     21   341°36.9   156°27.8   33.9   116°39.2   17.8   225°28.8   20.0   343°46.1   39.2     22   356°39.4   171°27.4   35.1   131°39.9   18.3   240°35.1   19.9   358°48.7   39.2     31 °41.8   186°27.0   36.3   146°40.6   18.8   255°37.3   19.9   13°51.4   39.3     31 °41.8   186°27.0   36.3   146°40.6   18.8   255°37.3   19.9   13°51.4   39.3     31 °41.8   186°27.0   36.3   146°40.6   18.8   255°37.3   19.9   13°51.4   39.3     34 °45.0   141°46.7   216°26.6   300°37.5   161°41.3   \$17°19.3   270°39.6   N21°19.9     31 °41.4   40.7   216°26.2   33.7   176°42.0   19.9   285°41.8   19.9   43°56.6   39.4     25 °6°49.2   231°25.8   40.0   191°42.8   20.4   300°44.1   19.8   58°59.2   39.5     31 °41.5   126°25.5   14.2   21°44.2   21.4   330°48.6   19.8   89°0.4   39.6     35 °101°56.6   276°24.7   43.6   236°44.9   21.9   345°50.9   19.7   114°91.7   119°0.6   \$03°39.7     31 °41.9   191°24.3   \$00°44.8   251°45.6   \$17°22.4   0°53.1   N21°19.7   119°0.6   \$03°39.7     31 °41.9   191°24.3   \$00°44.8   251°45.6   \$17°22.4   0°53.1   N21°19.7   119°0.6   \$03°39.7     31 °41.9   191°42.8   20.4   330°48.6   19.8   89°0.4   39.6     31 °41.9   191°42.8   20.4   300°44.1   19.8   58°59.2   39.5     31 °41.9   191°42.8   20.4   300°44.1   19.8   58°59.2   39.5     31 °41.6   191°42.8   20.4   300°44.1   19.8   58°59.2   39.5     31 °41.6   191°42.8   20.4   300°44.1   19.8   58°59.2   39.5     31 °41.6   191°42.8   20.4   30°48.6   19.8   89°0.4   39.6     32 °41.6   10°55.1   42.4   221°44.2   21.4   330°48.6   19.8   89°0.4   39.6     31 °41.4   191°42.3   500°44.8   251°45.6   517°22.4   0°53.1   N21°19.7   119°0.6   503°39.7     31 °41.8   10°40.3   10°40.3   10°40.3   10°40.3   10°40.3   10°40.3     32 °41.6   10°55.1   40°40.3   40°40.				04.4		460					Rasalhague	95°58.1	12°32.6
21   341°369   156°278   33.9   116°39.2 17.8   225°32.8   20.0   343°46.1   39.2   283°48.7   39.2   283°48.7   39.2   283°48.7   39.2   283°48.7   39.3   39.2   283°48.7   39.3   39.2   283°48.7   39.2   283°48.7   39.3   39.2   283°48.7   39.2   39.4   39.2   39.4   39.2   .											Eltanin	90°42.1	
22   356°39.4   171°27.4   35.1   131°39.9   18.3   240°35.1   19.9   388°48.7   39.2   Nunki   75°47.1   -26°15.9   26°16.9											Kaus Aust.	83°31.8	-34°22.4
Mer.pass. 22:13   ν-0.4' d1.2' m-3.92   ν-0.7' d0.5' m1.52   ν-0.2' d-0.0' m-2.22   ν-0.6' d0.1' m0.69											Vega	80°32.9	38°48.7
Mer.pass. 22:13											Nunki	$75^{\circ}47.1$	$-26^{\circ}15.9$
Sat         GHA         GHA         Dec         GHA         National Properties         All National Properties         All National Properties         All National Properties         All National Properties         All National Properties         All National Properties         All National Properties         All National Properties         All National Properties         All National Properties         All National Properties         All National Properties         All National Properties         All National Properties         All National Properties         All National Properties         All National Properties         All National Properties         Additional Properties         All National Properties         Additional Properties         Additional Properties         Additional Properties         Additional Properties         Additional Properties         Additional Properties         Additional Properties         Additional Properties         Additional Properties         Additional Properties         Additional Properties         Additional Properties         Additional Properties         Additional Properties         Additional Properties         Additional Properties         Additional Properties         Additional Properties         Additional Properties <td></td> <td>11 41.8</td> <td>180 27.0</td> <td>30.3</td> <td>140 40.0</td> <td>18.8</td> <td>255 37.3</td> <td>19.9</td> <td>13 51.4</td> <td>39.3</td> <td>Altair</td> <td></td> <td></td>		11 41.8	180 27.0	30.3	140 40.0	18.8	255 37.3	19.9	13 51.4	39.3	Altair		
Sat GHA GHA GHA   Dec GH	Mer.p	ass. 22:13	$\nu$ -0.4 $'$ d1	.2′ m-3.92	$\nu$ 0.7 $'$ d0	.5′ m1.52	$\nu 2.3' \ d-0$	.0′ m-2.22	$\nu$ 2.6′ d0.	1′ m0.69	Peacock	53°04.6	-56°39.3
Sat         GHA         CHA         Dec         GHA         Dec         Seryal         Parallal           2         56°44.3         201°25.8         40.0         191°42.8         20.4         300°44.1         19.8         56°59.2         39.5           4         86°54.1         26°25.1         42.4         221°44.2         21.4         330°48.6         19.8         89°04.4         39.6         Oct 16 Thu         SHA         Mer.pas           5         101°56.6         276°24.7         43.6         236°44.9         21.9         345°50.9         19.7         10°07.0         39.6         Venus         176°59.4         10.33           6         116°59.1         291°24.3         30°44.9         251°45.6         517°22.4         0°53.1											Deneb		
0 26°44.3 201°26.6 500°37.5 161°41.3 517°19.3 270°39.6 N21°19.9 28°54.0 503°39.3 14°46.7 216°26.2 38.7 176°42.0 19.9 285°41.8 19.9 43°56.6 39.4 21°41.0 186°17.6 506°49.2 21°25.8 40.0 191°42.8 20.4 300°44.1 19.8 58°59.2 39.5 56°49.2 231°25.8 40.0 191°42.8 20.4 300°44.1 19.8 58°59.2 39.5 56.4 1.2 21°41.2 21°41.3 30°48.6 19.8 89°04.4 39.6 13°29.0 15°20.8 56.4 13°24.3 28°13.6 13°29.0 15°20.8 56.4 13°29.0 15°20.8 56.4 13°29.0 15°20.8 56.4 13°29.0 15°20.8 56.4 13°29.0 15°20.8 56.4 13°29.0 15°20.8 56.4 13°29.0 15°20.8 56.4 13°29.0 15°20.8 56.4 13°29.0 15°20.8 56.4 13°29.0 15°20.8 56.4 13°29.0 15°20.8 56.4 13°29.0 15°20.8 56.4 13°29.0 15°20.8 56.4 13°29.0 15°20.8 56.4 13°29.0 15°20.8 56.4 13°29.0 15°20.8 56.4 13°29.0 15°20.8 56.4 13°29.0 15°20.8 56.4 13°29.0 15°20.8 56.4 11°20.5 13°29.0 15°20.8 56.4 11°20.5 13°29.0 15°20.8 56.4 11°20.5 13°29.0 15°20.8 56.4 11°20.5 13°29.0 15°20.8 56.4 11°20.5 13°29.0 15°20.8 56.4 11°20.5 13°29.0 15°20.8 56.4 11°20.5 13°29.0 15°20.8 56.4 11°20.5 13°29.0 15°20.0 13°20.	٠.	CILA	CIIA	Б	CIIA	Б	CIIA	Б	CILA	Б	Enif		
1 41°46.7 216°26.2 38.7 176°42.0 19.9 285°41.8 19.9 43°56.6 39.4   Scheat 13°44.3 28°13.6 25°49.2 231°25.8 40.0 191°42.8 20.4 300°44.1 19.8 58°59.2 39.5   Markab 13°29.0 15°20.8   4 86°54.1 261°25.1 42.4 221°44.2 21.4 330°48.6 19.8 89°04.4 39.6   116°59.1 291°24.3 \$00°44.8 251°45.6 \$17°22.4 0°53.1 N21°19.7 119°09.6 \$03°39.7   Mars 136°20.6 13:15   13°40.3 \$1.3 1.3 1.3 1.3   13°40.0 \$1.3 1.3 1.3 1.3   13°40.0 \$1.3 1.3 1.3 1.3   13°40.0 \$1.3 1.3 1.3 1.3   13°40.0 \$1.3 1.3 1.3 1.3   13°40.0 \$1.3 1.3 1.3 1.3 1.3 1.3   13°40.0 \$1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3													
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5 101°56.6 276°24.7 43.6 236°44.9 21.9 345°50.9 19.7 104°07.0 39.6 116°59.1 291°24.3 S00°44.8 251°45.6 S17°22.4 0°53.1 N21°19.7 119°09.6 S03°39.7 132°01.5 306°23.9 46.1 266°46.3 22.9 15°55.4 19.7 134°12.2 39.7 311°40.0 321°23.5 47.3 281°47.0 23.5 30°57.6 19.7 149°14.9 39.8 244°05.5 06:04 240°0.0 100°0.0 10.0 10.0 10.0 10.0 10.0 1											Oct 16 Th	SHA	Mer nass
6 116°59.1 291°24.3 \$00°44.8 251°45.6 \$17°22.4 0°53.1 \$N21°19.7 \$119°09.6 \$03°39.7 \$ 7 132°01.5 306°23.9 46.1 266°46.3 22.9 15°55.4 19.7 134°12.2 39.7 \$ 8 147°04.0 321°23.5 47.3 281°47.0 23.5 30°57.6 19.7 149°14.9 39.8 \$ 9 162°06.5 336°23.1 · 48.5 296°47.8 · 24.0 45°59.9 · 19.6 164°17.5 · 39.9 \$ 10 177°08.9 351°22.7 49.7 311°48.5 24.5 61°02.2 19.6 179°20.1 39.9 \$ 11 192°11.4 6°22.3 51.0 326°49.2 25.0 76°04.4 19.6 194°22.7 40.0 \$ 12 207°13.9 21°21.9 \$500°52.2 341°49.9 \$17°25.5 91°06.7 \$N21°19.5 209°25.3 \$503°40.0 \$ 14 237°18.8 51°21.1 54.6 11°51.3 26.5 121°11.2 19.5 239°30.5 40.2 \$ 15 252°21.2 66°20.7 · 55.8 26°52.0 · 27.0 136°13.5 · 19.5 254°33.1 · 40.2 \$ 16 267°23.7 81°20.3 57.1 41°52.7 27.6 151°15.7 19.4 269°35.7 40.3 \$ 17 282°26.2 96°19.9 58.3 56°53.5 28.1 166°18.0 19.4 284°38.3 40.3 \$ 18 297°28.6 111°19.5 \$500°59.5 71°54.2 \$17°28.6 181°20.3 \$N21°19.4 299°40.9 \$03°40.4 \$ 19 312°31.1 126°19.1 01°00.7 86°54.9 29.1 196°22.5 19.4 314°43.6 40.4 \$ 20 327°33.6 141°18.8 02.0 101°55.6 29.6 211°24.8 19.3 329°46.2 40.5 \$ 21 342°36.0 156°18.4 · 03.2 116°56.3 · 30.1 226°27.1 · 19.3 344°48.8 · 40.6 \$ 22 357°38.5 171°18.0 04.4 131°57.0 30.6 241°29.3 19.3 359°51.4 40.6 \$ 23 12°41.0 186°17.6 05.6 146°57.7 31.1 256°31.6 19.2 14°54.0 40.7 \$  Mars 136°20.6 13:15  Jupiter 244°05.5 06:04  Saturn 2°02.5 22:09  Oct 17 Fi SHA Mer.pass Venus 175°50.9 10:34  Mars 136°20.6 13:15  Jupiter 244°05.5 06:04  Saturn 2°02.5 22:09  Oct 18 Sat SHA Mer.pass Venus 174°42.3 10:35  Mars 134°57.0 13:13  Jupiter 243°55.3 05:56  Saturn 2°09.7 22:01  Horizontal parallax Venus: 0.1  Mars: 0.1													•
7 132°01.5 306°23.9 46.1 266°46.3 22.9 15°55.4 19.7 134°12.2 39.7 8 14°04.0 321°23.5 47.3 281°47.0 23.5 30°57.6 19.7 149°14.9 39.8 9 162°06.5 336°23.1 · · · 48.5 296°47.8 · · · 24.0 45°59.9 · · 19.6 164°17.5 · · · 39.9 10 177°08.9 351°22.7 49.7 311°48.5 24.5 61°02.2 19.6 179°20.1 39.9 11 192°11.4 6°22.3 51.0 326°49.2 25.0 76°04.4 19.6 194°22.7 40.0 12 207°13.9 21°21.9 \$00°52.2 341°49.9 \$17°25.5 91°06.7 N21°19.5 209°25.3 \$03°40.0 12 222°16.3 36°21.5 53.4 356°50.6 26.0 106°09.0 19.5 224°27.9 40.1 14 237°18.8 51°21.1 54.6 11°51.3 26.5 121°11.2 19.5 239°30.5 40.2 15 252°21.2 66°20.7 · · 55.8 26°52.0 · · 27.0 136°13.5 · · 19.5 254°33.1 · · 40.2 266°20.7 · · 55.8 26°52.0 · · 27.0 136°13.5 · · 19.5 254°33.1 · · 40.2 260°27.7 81°20.3 57.1 41°52.7 27.6 151°15.7 19.4 269°35.7 40.3 18 297°28.6 111°19.5 \$00°59.5 71°54.2 \$17°28.6 181°20.3 N21°19.4 299°40.9 \$03°40.4 134°57.0 13:13 18 297°28.6 111°19.5 \$00°59.5 71°54.2 \$17°28.6 181°20.3 N21°19.4 299°40.9 \$03°40.4 131°57.0 30.6 241°29.3 19.3 329°46.2 40.5 11°18.0 04.4 131°57.0 30.6 241°29.3 19.3 329°46.2 40.5 12°11.4 40.6 19.2 14°54.0 40.7 14°54.0 1.1 11°54.0													
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15											Saturn	2°06.1	22:05
16       267°23.7       81°20.3       57.1       41°52.7       27.6       151°15.7       19.4       269°35.7       40.3       Venus       174°42.3       10:35         17       282°26.2       96°19.9       58.3       56°53.5       28.1       166°18.0       19.4       284°38.3       40.3       Mars       134°57.0       13:13         18       297°28.6       111°19.5       500°59.5       71°54.2       517°28.6       181°20.3       N21°19.4       299°40.9       503°40.4       Jupiter       243°55.3       05:56         19       312°31.1       126°19.1       01°00.7       86°54.9       29.1       196°22.5       19.4       314°43.6       40.4       40.4       5aturn       2°09.7       22:01         20       327°33.6       141°18.8       02.0       101°55.6       29.6       211°24.8       19.3       329°46.2       40.5       40.5       5aturn       2°09.7       22:01         21       342°36.0       156°18.4       · 03.2       116°56.3       · 30.1       226°27.1       · 19.3       344°48.8       · 40.6       40.6       Venus       40.6       Venus       0.1         22       357°38.5       171°18.0       04.4       131°57.0											Oct 19 Sct	CH V	Mer pass
17       282°26.2       96°19.9       58.3       56°53.5       28.1       166°18.0       19.4       284°38.3       40.3         18       297°28.6       111°19.5       500°59.5       71°54.2       \$17°28.6       181°20.3       N21°19.4       299°40.9       \$03°40.4       \$13°57.0       13:13         19       312°31.1       126°19.1       01°00.7       86°54.9       29.1       196°22.5       19.4       314°43.6       40.4       40.4       \$20°37.3       40.5       \$20°37.1 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>													
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21       342°36.0       156°18.4       · · 03.2       116°56.3       · · 30.1       226°27.1       · · 19.3       344°48.8       · · 40.6       Horizontal parallax         22       357°38.5       171°18.0       04.4       131°57.0       30.6       241°29.3       19.3       359°51.4       40.6       Venus:       0.1         23       12°41.0       186°17.6       05.6       146°57.7       31.1       256°31.6       19.2       14°54.0       40.7       Mars:       0.1											Jatuin	2 09.1	22.01
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183°35.8   \$08°33.9   241°12.2   12.5   N16°50.4   -12.8   5	h	Sui	า			Moon		
1 198°360 548 255°437 126° 16°466 -129° 5 2 213°361 557 270°153 12.7° 16°387 -129° 5 3 228°362 556 58°57 270°153 12.7° 16°028 -130° 5 5 258°365 5585 313°506 13.0° 15′547 -131.1° 5 5 258°365 58°594 328°226 13.1° 115′547 -131.1° 5 6 273°366 508°594 328°226 13.1° 115′547 -131.1° 5 8 303°369 01.2 357°268 132° 15°152 -133.2° 5 9 318°370 0.02 11°1590 133° 15°0.0 13.3° 15°0.0 133° 31° 10° 133° 37° 10° 133° 37° 10° 133° 37° 10° 133° 37° 10° 133° 37° 10° 133° 37° 10° 133° 37° 10° 133° 37° 10° 133° 37° 10° 133° 15° 10° 10° 133° 51° 10° 133° 51° 10° 133° 51° 10° 133° 51° 10° 133° 51° 10° 133° 51° 10° 133° 51° 10° 133° 51° 10° 133° 51° 10° 133° 51° 10° 133° 51° 10° 133° 51° 10° 133° 51° 10° 133° 13° 10° 13° 13° 13° 10° 13° 13° 13° 13° 10° 13° 13° 13° 13° 13° 13° 13° 13° 13° 13	Thu	GHA	Dec	GHA	ν	Dec	d	HP
2 213°361								56.5'
3 288°36.2 · · · · 56.6 284°47.0   12.8°   16°20.8   -13.0°   5   4 243°36.4   57.6   299°18.8   12.9°   16°70.8   -13.1°   5   5 258°36.5   58.5   313°50.6   13.0°   15°54.7   -13.1°   5   6 273°36.6   508°59.4   328°22.6   13.1°   115°26.4   -13.2°   5   7 288°36.8   09°00.3   342°54.7   13.1°   115°26.4   -13.2°   5   8 303°36.9   01.2   357°26.8   13.2°   15°15.2   -13.3°   5   10 333°37.1   03.1   26°31.4   14,4°   145°5.1   -13.2°   5   11 348°37.3   04.0   41°03.8   13.5°   147°35.1   -13.5°   5   12 3°37.4   509°04.9   55°36.3   13.6°   N14°21.7   -13.5°   5   13 18°37.5   05.8   70°08.8   13.5°   14°85.1   -13.5°   5   14 33°37.7   06.7   84°41.5   13.7°   14°08.2   -13.6°   5   15 48°37.8   0.07.7   99°14.2   13.8°   13°41.0   -13.7°   5   16 63°37.9   006.6   113°47.1   13.9°   13°27.4   -13.7°   5   17 78°38.1   0.95   128°20.0   14.1°   12°59.9   -13.8°   5   19 108°38.3   11.3   15°26.0   14.1°   12°59.9   -13.8°   5   19 108°38.3   11.3   15°20.0   14.1°   12°46.1   -13.8°   5   20 123°38.4   12.2   171°59.0   14.4°   11°50.5   -14.0°   5   21 138°39.0   509°15.5   226°30.0   14.4°   11°50.5   -14.0°   5   22 133°39.7   14.1   201°05.6   14.8°   10°54.2   -14.1°   5   22 133°39.2   17.7   259°19.5   14.6°   11°05.4   -14.1°   5   24 243°39.5   19.5   288°26.8   14.8°   10°40.2   -14.1°   5   25 258°39.6   20.5   303°06.0   14.8°   10°40.2   -14.2°   5   26 273°39.7   509°21.4   317°34.4   14.9°   N10°11.8   -14.2°   5   28 303°40.0   23.2   346°42.3   15.0°   09°43.7   -14.3°   5   28 303°40.0   23.2   346°42.3   15.0°   09°43.7   -14.3°   5   29 318°40.1   -24.1   1°16.3   15.1°   09°40.0   -14.4°   5   21 338°40.1   -24.1   1°16.3   15.1°   09°40.0   -14.3°   5   22 133°31.0   509°37.8   229°33.0   15.8°   N06°51.8   -14.1°   5   23 138°40.1   -24.1   1°16.3   15.1°   09°40.0   -14.3°   5   24 138°40.3   259°3.3   30°24.5   15.5°   00°47.7   -14.4°   5   25 288°42.6   42.3   290°2.7   15.9°   05°3.2   -14.6°   5   25 288°42.6   42.3   290°47.7   15.9°   05°3.2   -14.6°   5   25 288°42.6   42.3								56.5
4 243°36.4 57.6 299°18.8 12.9 16°07.8 -13.1' 5 5 258°36.5 585' 5313°50.6 13.0' 15°54.7 -13.1' 5 6 273°36.6 508°59.4 328°22.6 13.1' N15°41.6 -132° 5 7 288°36.8 09°00.3 342°54.7 13.1' 15°18.4 -13.2' 5 8 303°36.9 01.2 357°26.8 13.2' 15°18.2 -13.3' 5 9 318°37.0 ·· 02.2 11°590.1 13.3' 15°10.9 -13.3' 5 10 333°37.1 03.1 26°31.4 13.4' 14°48.5 -13.4' 5 11 348°37.3 04.0 41°03.8 13.5' 14°35.1 -13.5' 5 12 3°37.4 509°04.9 55°36.3 13.6' N14°21.7 -13.5' 5 14 33°37.7 06.7 84°41.5 13.7' 13°54.6 -13.6' 5 15 48°37.8 ·· 07.7 99°14.2 13.8' 13°41.0 -13.7 5 16 63°37.9 08.6 113°47.1 13.9' 13°41.0 -13.7 5 17 78°38.1 095 128°20.0 14.0' 13°13.7 -13.7 5 18 03°38.2 509°10.4 142°53.0 14.1' N12°59.9 -13.8' 5 19 108°38.3 11.3 157°50.0 14.1' N12°59.9 -13.8' 5 19 108°38.3 11.3 157°50.0 14.1' N12°59.9 -13.8' 5 20 123°38.4 12.2 171°59.2 14.2' 12°32.3 -13.9' 5 21 138°38.6 ·· 13.2 186°32.4 14.3' 12°18.4 -13.9' 5 22 153°38.7 14.1 201°05.0 14.4' 11°50.5 -14.0' 5 22 13°39.3 5 168°38.8 15.0 215°39.0 14.4' 11°50.5 -14.0' 5 2 213°39.2 17.7 259°10.5 14.6' 11°22.5 -14.1' 5 2 213°39.2 17.7 259°10.5 14.6' 11°22.5 -14.1' 5 2 213°39.2 17.7 259°10.5 14.6' 11°08.4 -14.1' 5 2 213°39.1 16.8 244°45.9 14.6' 11°22.5 -14.1' 5 2 25 55°36.6 20.5 303°00.6 14.8' 10°40.2 -14.2' 5 2 556°39.6 20.5 303°00.6 14.8' 10°40.2 -14.2' 5 2 566°23.9 30°45.5 19.5 268°26.8 14.8' 10°40.2 -14.2' 5 2 566°39.8 22.3 332°03.3 15.0' 09°43.3 -14.1' 5 1 348°40.3 25.9 30°24.5 15.1' 09°4.7 -14.3' 5 1 348°40.3 25.9 30°24.5 15.1' 09°4.7 -14.3' 5 1 383°40.0 23.2 346°42.3 15.0' 09°43.3 -14.1' 5 1 348°40.3 25.9 30°24.5 15.1' 09°4.7 -14.4' 5 1 383°41.9 309°37.8 219°53.0 15.6' N07°4214.2' 5 2 133°41.7 36.0 190°43.5 15.7' 06°50.2 -14.6' 5 2 213°41.5 341.1 31.4 11°50.5 15.5' 07°33.7 14.5' 5 2 56°30.6 14.8' 150.0 09°43.3 -14.4' 5 1 383°41.9 309°47.8 219°53.0 15.6' N07°4214.5' 5 2 56°42.6 42.3 290°47.7 15.9 05°37.2 -14.6' 5 3 18°41.4 33°4.9 30°47.8 219°53.0 15.6' N07°4214.5' 5 3 18°41.4 509°48.7 346°59.1 15.5' 00°47.7 -14.5' 5 4 6 273°47.5 509°48.7 346°50.0 15.5' 07°48.2 -14.7' 5 18 333°41.1 34.4 1								56.5'
5 288°36.5 58.5 313°50.6 13.0° 15°54.7 -13.1° 56° 6 273°36.6 S08°59.4 328°22.6 13.1° N15°41.6 -13.2° 57° 288°36.8 09°00.3 342°54.7 13.1° 15°26.4 -13.2° 58° 39.6 303°36.9 01.2 357°26.8 13.2° 15°15.2 -13.3° 59° 318°37.0 0.0.2 11°59.0 13.3° 15°19.9 -13.3° 510 333°37.1 03.1 26°31.4 13.4° 14°40.5 -13.3° 511 348°37.3 0.0.0 41°03.8 13.5° 14°35.1 -13.3° 511 348°37.3 0.0.0 40 41°03.8 13.5° 14°35.1 -13.3° 512 133°35.7 0.0.7 68°41.5 13.7° 14°06.2 -13.6° 51′ 51′ 51′ 51′ 51′ 51′ 51′ 51′ 51′ 51′								56.4' 56.4'
6 233°36.6 S08°59.4 328°22.6 13.1' N15°41.6 -13.2' 5 8 303°36.9 01.2 337°26.8 13.2' 15°15.2 -13.3' 5 9 318°37.0 · · · · · · · · · · · · · · · · · · ·								56.4
7 288°36.8 09°00.3 342°54.7 13.1' 15°28.4 -13.2' 5 9 318°37.0 · · · · · · · · · · · · · · · · · · ·								56.4
9   318°37.0   .0.02.2   11°59.0   13.3'   15°01.9   -13.3'   5 ° 11   348°37.3   00.0   41°03.8   13.5'   14°48.5   -13.5'   5 ° 36.3   13.6'   N14°21.7   -13.5'   5 ° 36.3   13.6'   N14°21.7   -13.5'   5 ° 36.3   31.6'   N14°21.7   -13.5'   5 ° 36.3   31.6'   N14°21.7   -13.5'   5 ° 36.3   31.6'   N14°21.7   -13.6'   5 ° 36.3   33°37.7   06.7   84°41.5   13.7'   13°54.6   -13.6'   5 ° 36.3   13.6'   N14°21.7   -13.6'   5 ° 36.3   13.6'   N14°21.7   -13.6'   5 ° 36.3   13.6'   N14°21.7   -13.6'   5 ° 36.3   13.6'   N14°21.7   -13.6'   5 ° 36.3   13.6'   N14°21.7   -13.6'   5 ° 36.3   13.6'   N14°21.7   -13.6'   5 ° 36.3   13.6'   N14°21.7   -13.6'   5 ° 36.3   13.6'   N14°21.7   -13.6'   5 ° 36.3   13.6'   N14°21.7   -13.6'   5 ° 36.3   13.6'   N14°21.7   -13.6'   5 ° 36.3   13.6'   N14°21.7   -13.6'   5 ° 36.3   13.6'   N14°21.7   -13.6'   5 ° 36.3   13.6'   N14°21.7   -13.7'   5 ° 5 ° 36.3   N14°21.7   -13.8'   5 ° 5 ° 36.3   N14°21.7   -13.8'   5 ° 5 ° 36.3   N14°21.7   -13.8'   5 ° 5 ° 36.3   N14°21.7   -13.8'   5 ° 5 ° 36.3   N14°21.7   -13.8'   5 ° 5 ° 36.3   N14°21.7   -13.8'   5 ° 5 ° 5 ° 36.3   N14°21.7   -13.8'   5 ° 5 ° 5 ° 36.3   N14°21.7   -13.8'   5 ° 5 ° 5 ° 5 ° 36.3   N14°21.7   -13.8'   5 ° 5 ° 5 ° 5 ° 5 ° 5 ° 5 ° 5 ° 5 ° 5								56.3
10	8	303°36.9	01.2	357°26.8	13.2'	15° 15.2	-13.3'	56.3'
11   348°37.3   0.40	9		• • 02.2		13.3'		-13.3'	56.3'
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	20	123°38.4	12.2	171°59.2	14.2'	12°32.3	-13.9'	56.0'
The color of th	21	138°38.6	• • 13.2	186°32.4	14.3'	12° 18.4	-13.9'	56.0'
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Fri         GHA         Dec         GHA         ν         Dec         d         I           0         183°39.0         S09°15.9         230°12.4         14.5'         NII1°36.5         -14.0'         5           1         198°39.1         16.8         244°45.9         14.6'         11°22.5         -14.1'         5           2         213°39.2         17.7         259°19.5         14.6'         11°08.4         -14.1'         5           4         243°39.5         19.5         288°26.8         14.8'         10°40.2         -14.2'         5           5         258°39.6         20.5         303°00.6         14.8'         10°26.0         -14.2'         5           6         273°39.7         S09°21.4         317°34.4         14.9'         N10°11.8         -14.2'         5           7         288°39.8         22.3         332°00.5         15.0'         09°57.6         -14.3'         5           8         303°40.0         23.2         346°24.3         15.0'         09°43.3         -14.2'         5           10         333°40.2         25.0         15°50.4         15.1'         09°41.7         -14.3'         5           11<	23	168°38.8	15.0	215°39.0	14.4'	$11^{\circ}50.5$	-14.0'	56.0'
0		SD = 16.0'	d = 0.9'		SI	D = 15.4'		
0	F!	CUA	D	CIIA		D	.,	un
1 198°39.1 16.8 244°45.9 14.6′ 11°22.5 -14.1′ 5 2 213°39.2 17.7 259°19.5 14.6′ 11°08.4 -14.1′ 5 3 228°39.3 · 18.6 273°53.1 14.7′ 10°54.3 -14.1′ 5 4 243°39.5 19.5 268°26.8 14.8′ 10°40.2 -14.2′ 5 5 258°39.6 20.5 303°00.6 14.8′ 10°26.0 -14.2′ 5 6 273°39.7 509°21.4 317°34.4 14.9′ N10°11.8 -14.2′ 5 7 288°39.8 22.3 332°08.3 15.0′ 09°57.6 -14.3′ 5 8 303°40.0 23.2 346°42.3 15.0′ 09°57.6 -14.3′ 5 10 333°40.2 25.0 15°50.4 15.1′ 09°29.0 -14.3′ 5 11 348°40.3 25.9 30°24.5 15.2′ 09°00.3 -14.4′ 5 12 3°40.5 509°26.8 44°58.7 15.2′ 09°00.3 -14.4′ 5 13 18°40.6 27.8 59°33.0 15.3′ 08°31.6 -14.4′ 5 14 33°40.7 28.7 74°07.3 15.4′ 08°17.1 -14.4′ 5 15 48°40.8 · 29.6 88°41.6 15.4′ 08°17.1 -14.5′ 5 16 63°41.0 30.5 103°16.0 15.5′ 07°48.2 -14.5′ 5 17 78°41.1 31.4 117°50.5 15.5′ 07°48.2 -14.5′ 5 20 123°41.5 34.1 161°34.2 15.7′ 06°50.2 -14.6′ 5 21 138°41.6 · 35.0 176°08.8 15.7′ 06°50.2 -14.6′ 5 22 153°41.7 36.0 190°43.5 15.7′ 06°51.0 -14.6′ 5 22 153°41.7 36.0 190°43.5 15.7′ 06°35.6 -14.6′ 5 22 123°42.2 39.6 249°02.7 15.9′ 05°37.2 -14.6′ 5 22 213°42.2 39.6 249°02.7 15.9′ 05°37.2 -14.6′ 5 22 23°42.3 · 40.5 263°37.7 15.9′ 05°37.2 -14.6′ 5 22 23°42.3 · 40.5 263°37.7 15.9′ 05°37.2 -14.6′ 5 23 168°41.8 36.9 205°18.3 15.8′ 006°06.4 -14.6′ 5 23 268°42.8 44.1 321°57.6 16.1′ 04°33.6 -14.7′ 5 24 243°42.4 41.4 278°12.6 16.0′ 04°33.6 -14.7′ 5 25 258°42.6 42.3 292°47.6 16.0′ 04°33.6 -14.7′ 5 25 258°42.6 42.3 292°47.6 16.0′ 04°33.6 -14.7′ 5 26 273°42.7 509°33.2 30°07.2 6 16.1′ 03°54.6 -14.7′ 5 25 258°42.6 42.3 292°47.6 16.0′ 04°33.6 -14.7′ 5 26 273°42.7 509°33.2 30°07.2 6 16.1′ 03°54.6 -14.7′ 5 27 288°42.8 44.1 321°57.6 16.1′ 03°54.6 -14.7′ 5 21 33°43.4 40.8 50.9 48.7 34°53.4 16.2′ 00°30.5 -14.7′ 5 21 33°43.5 49.6 49°28.6 16.3′ 00°40.3 -14.7′ 5 21 33°43.9 5.9 351°07.9 16.2′ 03°39.9 -14.7′ 5 21 33°43.9 5.9 45.0 336°32.7 16.1′ 03°54.6 -14.7′ 5 21 33°43.9 5.9 50.0 46.0 40°3.0 16.4′ 11.4′ 5 21 33°44.5 54.9 64.9 64.9 66.1 6.3′ 00°41.1 1.47′ 5 21 33°44.1 509°54.1 122°52.2 16.4′ 00°58.2 14.7′ 5 21 33°44.1 509°54.1 122°52.1 16.4′ 00°38.5 1.47′ 5 22 153°44.5 55.0 1								<b>HP</b> 55.9'
2 213°39.2 17.7 259°19.5 14.6 11°08.4 -14.1' 5 3 228°39.3 · 18.6 273°53.1 14.7' 10°54.3 -14.1' 5 5 258°39.6 20.5 303°00.6 14.8' 10°40.2 -14.2' 5 5 258°39.6 20.5 303°00.6 14.8' 10°26.0 -14.2' 5 6 273°39.7 S09°21.4 317°34.4 14.9' N10°11.8 -14.2' 5 7 288°39.8 22.3 332°08.3 15.0' 09°57.6 -14.3' 5 8 303°40.0 23.2 346°42.3 15.0' 09°43.3 -14.3' 5 9 318°40.1 · 24.1 1°16.3 15.1' 09°29.0 -14.3' 5 10 333°40.2 25.0 15°50.4 15.1' 09°14.7 -14.3' 5 11 348°40.3 25.9 30°24.5 15.2' 09°00.3 -14.4' 5 11 348°40.3 25.9 30°24.5 15.2' 09°00.3 -14.4' 5 13 18°40.6 27.8 59°33.0 15.3' 08°31.6 -14.4' 5 14 33°40.7 28.7 74°07.3 15.4' 08°02.7 -14.5' 5 15 48°40.8 · 29.6 88°41.6 15.4' 08°02.7 -14.5' 5 16 63°41.0 30.5 103°16.0 15.5' 07°48.2 -14.5' 5 17 78°41.1 31.4 117°50.5 15.5' 07°48.2 -14.5' 5 18 93°41.2 S09°32.3 132°25.0 15.6' N07°19.2 -14.5' 5 20 123°41.5 34.1 161°34.2 15.7' 06°55.0 -14.6' 5 21 138°41.6 · 35.0 190°43.5 15.7' 06°50.2 -14.6' 5 22 153°41.7 36.0 190°43.5 15.7' 06°51.0 -14.6' 5 22 153°41.7 36.0 190°43.5 15.7' 06°51.0 -14.6' 5 22 153°41.7 36.0 190°43.5 15.7' 06°51.0 -14.6' 5 22 153°42.4 34.1 161°34.2 15.7' 06°52.0 -14.6' 5 22 213°42.2 39.6 29°518.3 15.8' 06°06.4 -14.6' 5 22 213°42.4 41.4 278°12.6 16.0' 04°33.6 -14.7' 5 2 268°42.6 42.3 39°22.6 16.1' N04°23.9 -14.7' 5 2 288°42.8 44.1 321°57.6 16.1' N04°23.9 -14.7' 5 2 288°42.8 44.1 321°57.6 16.1' N04°23.9 -14.7' 5 2 288°42.8 44.1 321°57.6 16.1' N04°23.9 -14.7' 5 2 288°42.8 44.1 321°57.6 16.1' N04°23.9 -14.7' 5 2 288°42.8 44.1 321°57.6 16.1' N04°23.9 -14.7' 5 2 288°42.8 44.1 321°57.6 16.1' N04°23.9 -14.7' 5 13 38°43.0 · 45.9 351°07.9 16.2' 03°39.9 -14.7' 5 14 33°43.5 49.6 49°3.6 16.3' 02°41.1 -14.7' 5 14 33°43.4 509°48.7 34°53.4 16.2' N03°55.2 -14.7' 5 15 48°43.7 · 51.4 78°93.2 16.3' 02°61.1 -14.7' 5 16 63°43.9 52.3 16.1' 30°54.6 -14.7' 5 17 78°44.0 53.2 10°49.8 16.4' N01°27.5 -14.7' 5 18 30°44.1 509°54.1 12°2°52.6 16.4' N01°27.5 -14.7' 5 18 33°44.1 509°54.1 12°2°52.5 16.4' N01°27.5 -14.7' 5 19 108°44.2 55.0 137°00.6 16.4' 01°12.8 -14.7' 5 21 138°44.4 556.8 166°11.4 16.4' 00°38.5 -								55.9'
3								55.9'
5         258°39.6         20.5         303°00.6         14.8'         10°26.0         -14.2'         5           6         273°39.7         S09°21.4         317°34.4         14.9'         N10°11.8         -14.2'         5           7         288°39.8         22.3         332°08.3         15.0'         09°57.6         -14.3'         5           8         303°40.0         23.2         346°42.3         15.0'         09°43.3         -14.3'         5           9         318°40.1         · 24.1         1°16.3         15.1'         09°29.0         -14.3'         5           10         333°40.2         25.0         15°50.4         15.1'         09°29.0         -14.3'         5           12         3°40.5         S09°26.8         44°58.7         15.2'         N08°46.0         -14.4'         5           13         18°40.6         27.8         59°33.0         15.3'         08°31.6         -14.4'         5           14         33°40.7         28.7         74°07.3         15.4'         08°02.7         -14.5'         5           15         48°40.8         · 29.6         88°41.6         15.4'         08°02.7         -14.5'         5 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>55.9'</td></t<>								55.9'
6         273°39.7         S09°21.4         317°34.4         14.9'         N10°11.8         -14.2'         5           7         288°99.8         22.3         332°08.3         15.0'         09°57.6         -14.3'         5           8         303°40.0         23.2         346°42.3         15.0'         09°43.3         -14.3'         5           9         318°40.1         · 24.1         1°16.3         15.1'         09°29.0         -14.3'         5           10         333°40.2         25.0         15°50.4         15.1'         09°00.3         -14.4'         5           11         348°40.5         S09°26.8         44°58.7         15.2'         09°00.3         -14.4'         5           13         18°40.6         27.8         59°33.0         15.3'         08°31.6         -14.4'         5           14         33°40.7         28.7         74°07.3         15.4'         08°02.7         -14.5'         5           14         33°40.7         28.7         74°07.3         15.4'         08°02.7         -14.5'         5           15         6°341.0         30.5         103°1.0         15.5'         08°2.7         -14.5'         5	4	243°39.5	19.5	288°26.8	14.8'	10°40.2	-14.2'	55.8'
7   288°39.8   22.3   332°08.3   15.0'   09°57.6   -14.3'   5   8   303°40.0   23.2   346°42.3   15.0'   09°43.3   -14.3'   5   9   318°40.1   - · · · · · · · · · · · · · · · · · ·	5	258°39.6		303°00.6	14.8'		-14.2'	55.8'
8	6							55.8'
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Sat         GHA         Dec         GHA         ν         Dec         d         I           0         183°41.9         \$09°37.8         219°53.0         15.8'         N05°51.8         -14.6'         5           1         198°42.1         38.7         234°27.9         15.9'         05°37.2         -14.6'         5           2         213°42.2         39.6         249°02.7         15.9'         05°22.6         -14.6'         5           3         228°42.3         · 40.5         263°37.7         15.9'         05°07.9         -14.7'         5           4         243°42.4         41.4         278°12.6         16.0'         04°53.3         -14.7'         5           5         258°42.6         42.3         292°47.6         16.0'         04°38.6         -14.7'         5           6         273°42.7         \$09°43.2         307°22.6         16.1'         N04°23.9         -14.7'         5           7         288°42.8         44.1         321°57.6         16.1'         04°09.3         -14.7'         5           8         303°42.9         45.0         336°32.7         16.1'         03°54.6         -14.7'         5           9<	23			203 10.3			-14.0	33.4
0         183°41.9         S09°37.8         219°53.0         15.8'         N05°51.8         -14.6'         5           1         198°42.1         38.7         234°27.9         15.9'         05°37.2         -14.6'         5           2         213°42.2         39.6         249°02.7         15.9'         05°22.6         -14.6'         5           3         228°42.3         · · 40.5         263°37.7         15.9'         05°07.9         -14.7'         5           4         243°42.4         41.4         278°12.6         16.0'         04°53.3         -14.7'         5           5         258°42.6         42.3         292°47.6         16.0'         04°38.6         -14.7'         5           6         273°42.7         S09°43.2         307°22.6         16.1'         N04°23.9         -14.7'         5           7         288°42.8         44.1         321°57.6         16.1'         04°09.3         -14.7'         5           8         303°42.9         45.0         336°32.7         16.1'         04°09.3         -14.7'         5           9         318°43.0         · 45.9         351°07.9         16.2'         03°39.9         -14.7'         5 <th></th> <th><math>SD = 16.0^{\circ}</math></th> <th><math>a = 0.9^{\circ}</math></th> <th></th> <th>51</th> <th><math>D = 15.3^{\circ}</math></th> <th></th> <th></th>		$SD = 16.0^{\circ}$	$a = 0.9^{\circ}$		51	$D = 15.3^{\circ}$		
1       198°42.1       38.7       234°27.9       15.9'       05°37.2       -14.6'       5         2       213°42.2       39.6       249°02.7       15.9'       05°22.6       -14.6'       5         3       228°42.3       · · 40.5       263°37.7       15.9'       05°07.9       -14.7'       5         4       243°42.4       41.4       278°12.6       16.0'       04°53.3       -14.7'       5         5       258°42.6       42.3       292°47.6       16.0'       04°38.6       -14.7'       5         6       273°42.7       S09°43.2       307°22.6       16.1'       N04°23.9       -14.7'       5         7       288°42.8       44.1       321°57.6       16.1'       04°03.3       -14.7'       5         8       303°42.9       45.0       336°32.7       16.1'       03°54.6       -14.7'       5         9       318°43.0       · 45.9       351°07.9       16.2'       03°39.9       -14.7'       5         11       348°43.3       47.7       20°18.2       16.2'       03°10.5       -14.7'       5         12       3°43.4       509°48.7       34°53.4       16.2'       03°10.5       -14	Sat	GHA	Dec	GHA	$\nu$	Dec	d	HP
2       213°42.2       39.6       249°02.7       15.9'       05°22.6       -14.6'       5         3       228°42.3       · 40.5       263°37.7       15.9'       05°07.9       -14.7'       5         4       243°42.4       41.4       278°12.6       16.0'       04°38.6       -14.7'       5         5       258°42.6       42.3       292°47.6       16.0'       04°38.6       -14.7'       5         6       273°42.7       S09°43.2       307°22.6       16.1'       N04°23.9       -14.7'       5         7       288°42.8       44.1       321°57.6       16.1'       04°09.3       -14.7'       5         8       303°42.9       45.0       336°32.7       16.1'       03°54.6       -14.7'       5         9       318°43.0       · 45.9       351°07.9       16.2'       03°39.9       -14.7'       5         10       333°43.1       46.8       5°43.0       16.2'       03°35.2       -14.7'       5         12       3°43.4       509°48.7       34°53.4       16.2'       03°10.5       -14.7'       5         13       18°43.5       49.6       49°28.6       16.3'       02°41.1       -14.7'<								55.4'
3         228°42.3         · · 40.5         263°37.7         15.9'         05°07.9         -14.7'         5           4         243°42.4         41.4         278°12.6         16.0'         04°53.3         -14.7'         5           5         258°42.6         42.3         292°47.6         16.0'         04°38.6         -14.7'         5           6         273°42.7         S09°43.2         307°22.6         16.1'         N04°23.9         -14.7'         5           7         288°42.8         44.1         321°57.6         16.1'         04°09.3         -14.7'         5           8         303°42.9         45.0         336°32.7         16.1'         03°54.6         -14.7'         5           9         318°43.0         · 45.9         351°07.9         16.2'         03°39.9         -14.7'         5           10         333°43.1         46.8         5°43.0         16.2'         03°10.5         -14.7'         5           11         348°43.3         47.7         20°18.2         16.2'         03°10.5         -14.7'         5           12         3°43.4         509°48.7         34°53.4         16.2'         03°10.5         -14.7'         5								55.4'
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5         258° 42.6         42.3         292° 47.6         16.0'         04° 38.6         -14.7'         5           6         273° 42.7         S09° 43.2         307° 22.6         16.1'         N04° 23.9         -14.7'         5           7         288° 42.8         44.1         321° 57.6         16.1'         04° 09.3         -14.7'         5           8         303° 42.9         45.0         336° 32.7         16.1'         03° 54.6         -14.7'         5           9         318° 43.0         · 45.9         351° 07.9         16.2'         03° 39.9         -14.7'         5           10         333° 43.1         46.8         5° 43.0         16.2'         03° 39.9         -14.7'         5           11         348° 43.3         47.7         20° 18.2         16.2'         03° 10.5         -14.7'         5           12         3° 43.4         S09° 48.7         34° 53.4         16.2'         N02° 55.8         -14.7'         5           13         18° 43.5         49.6         49° 28.6         16.3'         02° 41.1         -14.7'         5           14         33° 43.6         50.5         64° 03.9         16.3'         02° 11.7         -14.7'								55.3'
6         273°42.7         S09°43.2         307°22.6         16.1'         N04°23.9         -14.7'         5           7         288°42.8         44.1         321°57.6         16.1'         04°09.3         -14.7'         5           8         303°42.9         45.0         336°32.7         16.1'         03°54.6         -14.7'         5           9         318°43.0         · 45.9         351°07.9         16.2'         03°39.9         -14.7'         5           10         333°43.1         46.8         5°43.0         16.2'         03°35.2         -14.7'         5           11         348°43.3         47.7         20°18.2         16.2'         03°31.5         -14.7'         5           12         3°43.4         S09°48.7         34°53.4         16.2'         N02°55.8         -14.7'         5           13         18°43.5         49.6         49°28.6         16.3'         02°41.1         -14.7'         5           14         33°43.6         50.5         64°03.9         16.3'         02°26.4         -14.7'         5           15         48°43.7         · 51.4         78°39.2         16.3'         02°11.7         -14.7'         5 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>55.3'</td></t<>								55.3'
7       288°42.8       44.1       321°57.6       16.1'       04°09.3       -14.7'       5         8       303°42.9       45.0       336°32.7       16.1'       03°54.6       -14.7'       5         9       318°43.0       · · 45.9       351°07.9       16.2'       03°39.9       -14.7'       5         10       333°43.1       46.8       5°43.0       16.2'       03°25.2       -14.7'       5         11       348°43.3       47.7       20°18.2       16.2'       03°10.5       -14.7'       5         12       3°3.4       S09°48.7       34°53.4       16.2'       N02°55.8       -14.7'       5         13       18°43.5       49.6       49°28.6       16.3'       02°41.1       -14.7'       5         14       33°43.6       50.5       64°03.9       16.3'       02°26.4       -14.7'       5         15       48°43.7       · 51.4       78°39.2       16.3'       02°11.7       -14.7'       5         16       63°43.9       52.3       93°14.5       16.3'       02°11.7       -14.7'       5         17       78°44.0       53.2       107°49.8       16.4'       01°42.2       -14.7'								55.3' 55.3'
8       303°42.9       45.0       336°32.7       16.1'       03°54.6       -14.7'       5         9       318°43.0       · 45.9       351°07.9       16.2'       03°39.9       -14.7'       5         10       333°43.1       46.8       5°43.0       16.2'       03°25.2       -14.7'       5         11       348°43.3       47.7       20°18.2       16.2'       03°10.5       -14.7'       5         12       3°43.4       S09°48.7       34°53.4       16.2'       N02°55.8       -14.7'       5         13       18°43.5       49.6       49°28.6       16.3'       02°41.1       -14.7'       5         14       33°43.6       50.5       64°03.9       16.3'       02°26.4       -14.7'       5         15       48°43.7       · 51.4       78°39.2       16.3'       02°11.7       -14.7'       5         16       63°43.9       52.3       93°14.5       16.3'       02°51.7       -14.7'       5         17       78°44.0       53.2       107°49.8       16.4'       01°42.2       -14.7'       5         18       93°44.1       509°54.1       122°25.2       16.4'       N01°27.5       -14.7' <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>55.3'</td>								55.3'
9 318°43.0 · · 45.9 351°07.9 16.2' 03°39.9 -14.7' 5 10 333°43.1 46.8 5°43.0 16.2' 03°25.2 -14.7' 5 11 348°43.3 47.7 20°18.2 16.2' 03°10.5 -14.7' 5 12 3°43.4 \$09°48.7 34°53.4 16.2' \$02°55.8 -14.7' 5 13 18°43.5 49.6 49°28.6 16.3' 02°41.1 -14.7' 5 14 33°43.6 50.5 64°03.9 16.3' 02°26.4 -14.7' 5 15 48°43.7 · · 51.4 78°39.2 16.3' 02°11.7 -14.7' 5 16 63°43.9 52.3 93°14.5 16.3' 01°57.0 -14.7' 5 17 78°44.0 53.2 107°49.8 16.4' 01°42.2 -14.7' 5 18 93°44.1 \$09°54.1 122°25.2 16.4' \$01°27.5 -14.7' 5 19 108°44.2 55.0 137°00.6 16.4' 01°12.8 -14.7' 5 20 123°44.3 55.9 151°36.0 16.4' 00°58.2 -14.7' 5 21 138°44.4 · · 56.8 166°11.4 16.4' 00°43.5 -14.7' 5 22 153°44.5 57.7 180°46.8 16.5' 00°28.8 -14.7' 5 23 168°44.7 58.6 195°22.3 16.5' 00°14.1 -14.7' 5								55.3
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								55.2
11         348°43.3         47.7         20°18.2         16.2'         03°10.5         -14.7'         5           12         3°43.4         S09°48.7         34°53.4         16.2'         N02°55.8         -14.7'         5           13         18°43.5         49.6         49°28.6         16.3'         02°41.1         -14.7'         5           14         33°43.6         50.5         64°03.9         16.3'         02°26.4         -14.7'         5           15         48°43.7         · 51.4         78°39.2         16.3'         02°21.7         -14.7'         5           16         63°43.9         52.3         93°14.5         16.3'         01°57.0         -14.7'         5           17         78°44.0         53.2         107°49.8         16.4'         01°42.2         -14.7'         5           18         93°44.1         S09°54.1         122°25.2         16.4'         N01°27.5         -14.7'         5           19         108°44.2         55.0         137°00.6         16.4'         01°12.8         -14.7'         5           20         123°44.3         55.9         151°36.0         16.4'         00°58.2         -14.7'         5 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>55.2'</td></t<>								55.2'
12     3°43.4     S09°48.7     34°53.4     16.2'     N02°55.8     -14.7'     5       13     18°43.5     49.6     49°28.6     16.3'     02°41.1     -14.7'     5       14     33°43.6     50.5     64°03.9     16.3'     02°26.4     -14.7'     5       15     48°43.7     · 51.4     78°39.2     16.3'     02°11.7     -14.7'     5       16     63°43.9     52.3     93°14.5     16.3'     01°57.0     -14.7'     5       17     78°44.0     53.2     107°49.8     16.4'     01°42.2     -14.7'     5       18     93°44.1     S09°54.1     122°25.2     16.4'     N01°27.5     -14.7'     5       19     108°44.2     55.0     137°00.6     16.4'     01°12.8     -14.7'     5       20     123°44.3     55.9     151°36.0     16.4'     00°58.2     -14.7'     5       21     138°44.4     · 56.8     166°11.4     16.4'     00°43.5     -14.7'     5       22     153°44.5     57.7     180°46.8     16.5'     00°28.8     -14.7'     5       23     168°44.7     58.6     195°22.3     16.5'     00°14.1     -14.7'     5			47.7	20°18.2				55.2'
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	12				16.2'		-14.7'	55.2'
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								55.2'
16     63°43.9     52.3     93°14.5     16.3'     01°57.0     -14.7'     5       17     78°44.0     53.2     107°49.8     16.4'     01°42.2     -14.7'     5       18     93°44.1     S09°54.1     122°25.2     16.4'     N01°27.5     -14.7'     5       19     108°44.2     55.0     137°00.6     16.4'     01°12.8     -14.7'     5       20     123°44.3     55.9     151°36.0     16.4'     00°58.2     -14.7'     5       21     138°44.4     · · 56.8     166°11.4     16.4'     00°43.5     -14.7'     5       22     153°44.5     57.7     180°46.8     16.5'     00°28.8     -14.7'     5       23     168°44.7     58.6     195°22.3     16.5'     00°14.1     -14.7'     5								55.1'
17     78°44.0     53.2     107°49.8     16.4'     01°42.2     -14.7'     5       18     93°44.1     S09°54.1     122°25.2     16.4'     N01°27.5     -14.7'     5       19     108°44.2     55.0     137°00.6     16.4'     01°12.8     -14.7'     5       20     123°44.3     55.9     151°36.0     16.4'     00°58.2     -14.7'     5       21     138°44.4     · · 56.8     166°11.4     16.4'     00°43.5     -14.7'     5       22     153°44.5     57.7     180°46.8     16.5'     00°28.8     -14.7'     5       23     168°44.7     58.6     195°22.3     16.5'     00°14.1     -14.7'     5								55.1'
18     93°44.1     \$09°54.1     \$122°25.2     \$16.4'     \$N01°27.5     \$-14.7'     \$5       19     \$108°44.2     \$55.0     \$137°00.6     \$16.4'     \$01°12.8     \$-14.7'     \$5       20     \$123°44.3     \$55.9     \$151°36.0     \$16.4'     \$00°58.2     \$-14.7'     \$5       21     \$138°44.4     \$\cdot\$ \$56.8     \$166°11.4     \$16.4'     \$00°43.5     \$-14.7'     \$5       22     \$153°44.5     \$57.7     \$180°46.8     \$16.5'     \$00°28.8     \$-14.7'     \$5       23     \$168°44.7     \$58.6     \$195°22.3     \$16.5'     \$00°14.1     \$-14.7'     \$5								55.1'
19     108°44.2     55.0     137°00.6     16.4'     01°12.8     -14.7'     5       20     123°44.3     55.9     151°36.0     16.4'     00°58.2     -14.7'     5       21     138°44.4     • 56.8     166°11.4     16.4'     00°43.5     -14.7'     5       22     153°44.5     57.7     180°46.8     16.5'     00°28.8     -14.7'     5       23     168°44.7     58.6     195°22.3     16.5'     00°14.1     -14.7'     5								55.1'
20       123°44.3       55.9       151°36.0       16.4'       00°58.2       -14.7'       5         21       138°44.4       · · 56.8       166°11.4       16.4'       00°43.5       -14.7'       5         22       153°44.5       57.7       180°46.8       16.5'       00°28.8       -14.7'       5         23       168°44.7       58.6       195°22.3       16.5'       00°14.1       -14.7'       5								55.1' 55.1'
21     138°44.4     ··· 56.8     166°11.4     16.4'     00°43.5     -14.7'     5       22     153°44.5     57.7     180°46.8     16.5'     00°28.8     -14.7'     5       23     168°44.7     58.6     195°22.3     16.5'     00°14.1     -14.7'     5								55.0'
22     153°44.5     57.7     180°46.8     16.5'     00°28.8     -14.7'     5       23     168°44.7     58.6     195°22.3     16.5'     00°14.1     -14.7'     5								55.0'
23 168°44.7 58.6 195°22.3 16.5' 00°14.1 -14.7' 5								55.0'
$\frac{1}{5D - 16.0'} \frac{d - 0.0'}{d - 0.0'} \frac{5D - 15.1'}{5D - 15.1'}$								55.0'
3D = 10.0  0 = 0.7		SD = 16.0'	d = 0.9'		SI	D = 15.1'		

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

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

		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	27-11%
16	14:23	14:30	11:46	08:11	20:33	
17	14:36	14:42	11:45	08:55	21:16	
18	14:48	14:54	11:45	09:36	21:57	

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

h	Aries	Ve	nus		ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	27° 43.4	201°17.2	S01°06.8	161°58.4	S17°31.6	271°33.9	N21°19.2	29°56.6	S03°40.7			
1	42°45.9	216°16.8	08.1	176°59.1	32.1	286°36.1	19.2	44°59.2	40.8	Alpheratz	357°33.8	29° 14.2
2	57°48.3	231°16.4	09.3	191°59.8	32.7	301°38.4	19.2	60°01.8	40.8	Ankaa	353°06.1	-42°09.9
3	72°50.8	$246^{\circ}16.0$	• • 10.5	$207^{\circ}00.5$	• • 33.2	316°40.7	• • 19.1	75°04.4	• • 40.9	Schedar Diphda	349°29.8 348°46.3	56° 40.9 -17° 50.6
4	87°53.3	261°15.6	11.7	222°01.3	33.7	331°42.9	19.1	90°07.0	41.0	Achernar	335°19.1	-17 50.0 -57°06.3
5	$102^{\circ}55.7$	$276^{\circ}15.2$	13.0	237°02.0	34.2	346°45.2	19.1	105°09.6	41.0	Hamal	327°50.1	23°35.2
6	117°58.2	291°14.8	S01°14.2	252°02.7	S17°34.7	1°47.5	N21°19.0	120°12.3	S03°41.1	Polaris	313°15.6	89° 22.3
7	133°00.7	306°14.4	15.4	267°03.4	35.2	16°49.7	19.0	135° 14.9	41.1	Acamar	315°10.9	-40°11.9
8	148°03.1	321°14.0	16.6	282°04.1	35.7	31°52.0	19.0	150° 17.5	41.2	Menkar	314°05.2	4°11.6
9	163°05.6	336°13.6	• • 17.8	297°04.8	36.2	46°54.3	• • 19.0	165°20.1	• • 41.3	Mirfak	308°26.9	49°57.2
10	178°08.1	351°13.2	19.1	312°05.5	36.7	61°56.5	18.9	180°22.7	41.3	Aldebaran	290°38.6	16°33.8
11	193°10.5	6°12.8 21°12.4	20.3 \$01°21.5	327°06.2	37.2	76°58.8	18.9 N21°18.9	195°25.3	41.4 \$03°41.4	Rigel	281°03.1	$-8^{\circ}10.1$
12 13	208° 13.0 223° 15.5	36°12.0	22.7	342°06.9 357°07.6	\$17°37.7 38.2	92°01.1 107°03.3	18.9	210°27.9 225°30.5		Capella	280°20.7	$46^{\circ}01.3$
13	223 15.5 238° 17.9	50 12.0 51°11.6	24.0	12°08.3	38.8	107 05.5 122°05.6	18.8	240°33.1	41.5 41.5	Bellatrix	278°22.0	$6^{\circ}22.5$
15	253° 20.4	66°11.2	. 25.2	27°09.0	39.3	137°07.9	• • 18.8	255°35.7	• • 41.6	Elnath	278°00.9	28°37.7
16	268°22.8	81°10.8	26.4	42°09.7	39.8	152°10.2	18.8	270°38.3	41.7	Alnilam	275°36.9	-1°11.0
17	283°25.3	96°10.4	27.6	57°10.4	40.3	167°12.4	18.8	285°40.9	41.7	Betelgeuse	270°51.2	7°24.8
18	298° 27.8	111°10.1	S01°28.9	72°11.1	S17°40.8	182°14.7	N21° 18.7	300°43.5	S03°41.8	Canopus	263°51.9	-52°42.2
19	313°30.2	126°09.7	30.1	87°11.8	41.3	197°17.0	18.7	$315^{\circ}46.1$	41.8	Sirius	258°25.6	-16°44.9
20	328°32.7	141°09.3	31.3	$102^{\circ}12.6$	41.8	212°19.2	18.7	330°48.8	41.9	Adhara	255°05.3 244°50.2	-29°00.1 5°09.6
21	343°35.2	$156^{\circ}08.9$	• • 32.5	$117^{\circ}13.3$	• • 42.3	$227^{\circ}21.5$	• • 18.6	$345^{\circ}51.4$	• • 41.9	Procyon Pollux	244°50.2 243°16.5	5°09.6 27°57.8
22	358° 37.6	171°08.5	33.7	$132^{\circ}14.0$	42.8	242°23.8	18.6	$0^{\circ}54.0$	42.0	Avior	245 10.5 234°14.6	-59°35.1
23	13°40.1	$186^{\circ}08.1$	35.0	147°14.7	43.3	257°26.1	18.6	15°56.6	42.0	Suhail	222°46.0	-43°31.9
Mern	ass. 22:05	$\nu$ -0.4' d1	.2′ m-3.92	$\nu_{0.7'} d0$	.5′ m1.51	ν2.3' d-0	.0′ m-2.23	$\nu^{2.6'} d0$	1' m0.70	Miaplacidus	221°38.5	-69° 49.0
ρ		- 0.1 01					2.29			Alphard	217°47.3	-8°46.1
	C	e	ь.		-	<b>611</b>		<b></b>	-	Regulus	207°34.0	11°50.5
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.7	61°36.6
0	28° 42.6	201°07.7	S01°36.2	162°15.4	\$17°43.8	272°28.3	N21°18.6	30°59.2	503°42.1	Denebola	182°24.6	14°25.7
1	43°45.0	216°07.3	37.4	177°16.1 192°16.8	44.3	287°30.6 302°32.9	18.5	46°01.8	42.2	Gienah	175°43.3	-17°41.0
2	58° 47.5 73° 50.0	231°06.9 246°06.5	38.6 •• 39.9	192°16.8 207°17.5	44.8 •• 45.3	302°32.9 317°35.2	18.5 •• 18.5	61°04.4 76°07.0	42.2 •• 42.3		173°00.1	-63°14.4
3 4	73 50.0 88° 52.4	240 00.5 261°06.1	41.1	207 17.5 222°18.2	45.8	332°37.4	18.5	91°09.6	42.3	l .	171°51.5	-57° 15.3
5	103°54.9	276°05.7	42.3	237°18.9	46.3	347°39.7	18.4	106°12.2	42.4	Alioth	166°12.9	55°49.2
6	118° 57.3	291°05.3	S01°43.5	252°19.6	\$17°46.8	2°42.0	N21°18.4	121°14.8	S03°42.4	Spica	158°22.0	-11°17.7
7	133°59.8	306°04.9	44.7	267°20.3	47.3	17°44.3	18.4	136° 17.4	42.5	Alkaid	152°52.0	49°11.1
8	149°02.3	321°04.5	46.0	282°21.0	47.8	32°46.5	18.4	151°20.0	42.6	Hadar	148°35.8	-60°29.8
9	164°04.7	336°04.1	47.2	297°21.7	• • 48.3	47°48.8	• • 18.3	166°22.6	• • 42.6		147°57.3	-36°29.7
10	179°07.2	351°03.7	48.4	312°22.4	48.8	62°51.1	18.3	181°25.2	42.7	Arcturus Rigil Kent.	145°47.7 139°40.1	19°03.0 -60°56.5
11	194°09.7	6°03.3	49.6	$327^{\circ}23.1$	49.3	77°53.4	18.3	$196^{\circ}27.8$	42.7	Kochab	137°20.9	74°03.0
12	$209^{\circ}12.1$	21°02.9	S01°50.9	342°23.8	S17°49.8	92°55.6	N21°18.3	211°30.4	S03°42.8	Zuben'ubi	136°55.7	-16°08.9
13	$224^{\circ}14.6$	$36^{\circ}02.5$	52.1	357°24.5	50.3	107°57.9	18.2	226°33.0	42.8	Alphecca	126°03.5	26° 37.8
14	$239^{\circ}17.1$	51°02.1	53.3	12°25.2	50.8	123°00.2	18.2	241°35.6	42.9	Antares	112° 15.4	-26° 29.4
15	254° 19.5	66°01.7	• • 54.5	27°25.9	• • 51.3	138°02.5	• • 18.2	256° 38.3	• • 42.9	Atria	107°09.4	-69°04.6
16	269°22.0	81°01.3	55.8	42°26.6	51.8	153°04.8	18.2	271°40.9	43.0	Sabik	102°02.3	-15°45.4
17	284° 24.4	96°00.9	57.0	57°27.3	52.3	168°07.0	18.1	286°43.5	43.1	Shaula	96°09.8	-37°07.4
18	299°26.9	111°00.5	S01°58.2	72°28.0	F0.0	183°09.3	N21°18.1	301°46.1	S03°43.1	Rasalhague	95°58.2	12°32.6
19	314° 29.4	126°00.1	01°59.4	87°28.7	53.3	198°11.6	18.1	316°48.7	43.2	Eltanin	90°42.1	51°29.3
20 21	329°31.8 344°34.3	140°59.7 155°59.3	02°00.6 •• 01.9	102°29.4 117°30.1	53.8 •• 54.3	213°13.9 228°16.1	18.1 •• 18.0	331°51.3 346°53.9	43.2 •• 43.3	Kaus Aust.	83°31.8	-34°22.4
22	359° 36.8	170°58.9	03.1	132°30.8	54.8	243°18.4	18.0	1°56.5	43.3	Vega	80°32.9	38°48.7
23	14°39.2	185°58.5	04.3	147°31.5	55.3	258°20.7	18.0	16°59.1	43.4	Nunki	75°47.1	-26° 15.9
										Altair	61°59.4	8°56.3
Mer.p	ass. 22:02	$\nu$ -0.4′ $d1$	.2′ m-3.92	$ u$ 0.7 $^{\prime}$ d0	.5'  m1.51	$\nu$ 2.3′ d-0	.0′ m-2.24	$\nu$ 2.6′ d0	1' m0.70	Peacock	53°04.6	-56°39.3
										Deneb	49°25.3	45°22.6
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif Al Na'ir	33°38.0 27°31.9	9° 59.8 -46° 50.3
0	29°41.7	200°58.1	S02°05.5		S17°55.8	273°23.0	N21°18.0		503°43.4	Fomalhaut	27 31.9 15°13.6	-40 50.3 -29°29.1
1	44°44.2	215°57.7	06.8	$177^{\circ}32.8$	56.3	288°25.3	17.9	47°04.3	43.5	Scheat	13°44.3	28° 13.6
2	59° 46.6	230°57.3	0.80	192°33.5	56.8	303°27.6	17.9	62°06.9	43.6	Markab	13°29.0	15° 20.8
3	74°49.1	245°56.9	• • 09.2	207°34.2	• • 57.3	318°29.8	• • 17.9	77°09.5	• • 43.6			
4	89°51.6	260°56.5	10.4	222°34.9	57.8	333°32.1	17.9	92°12.1	43.7	Oct 19 Sun	SHA	Mer.pass
5	104°54.0	275°56.1	11.6	237°35.6	58.3	348°34.4	17.8	107°14.7	43.7		173°33.8	10:35
6	119°56.5	290°55.7	502°12.9	252°36.3	\$17°58.8	3°36.7	N21°17.8		503°43.8	l .	134°15.0	13:11
7	134°58.9	305°55.3	14.1	267°37.0	59.3	18°39.0	17.8	137° 19.9	43.8	Jupiter Saturn	243°50.4 2°13.2	05:53 21:56
8 9	150°01.4 165°03.9	320°54.9 335°54.5	15.3 •• 16.5	282°37.7 297°38.4	17°59.8 18°00.3	33°41.3 48°43.5	17.8 •• 17.7	152°22.5 167°25.1	43.9 •• 43.9	Saturn	2 13.2	21:50
9 10	180°06.3	350°54.5	17.8	312°39.1	00.8	48 43.5 63°45.8	17.7	167 25.1 182°27.7	44.0	Oct 20 Mon	SHA	Mer.pass
11	195°08.8	5°53.7	17.0	312 39.1 327°39.8	01.3	78°48.1	17.7	197°30.3	44.0		172°25.1	10:36
12	210° 11.3	20°53.3	502°20.2	342°40.5	\$18°01.8	93°50.4	N21° 17.7	212°32.9	\$03°44.1		133°32.8	13:10
13	225° 13.7	35°52.9	21.4	357°41.2	02.3	108°52.7	17.6	227° 35.5	44.2		243°45.8	05:49
14	240° 16.2	50°52.5	22.6	12°41.9	02.8	123°55.0	17.6	242°38.1	44.2	Saturn	2°16.6	21:52
15	255° 18.7	65°52.1	• • 23.9	27°42.6	• • 03.3	138°57.2	• • 17.6	257°40.7	• • 44.3	Oct 21 Tue	SHA	Mer.pass
16	$270^{\circ}21.1$	$80^{\circ}51.7$	25.1	42°43.3	03.8	153°59.5	17.6	272°43.3	44.3		171°16.4	10:36
17	285°23.6	95°51.3	26.3	57°43.9	04.3	$169^{\circ}01.8$	17.5	287°45.9	44.4		132°50.5	13:09
18	300°26.0	110°50.9	S02°27.5		S18°04.8	184°04.1	N21°17.5		S03°44.4		243°41.3	05:46
19	315°28.5	125°50.5	28.8	87°45.3	05.3	199°06.4	17.5	317°51.1	44.5	Saturn	2°20.0	21:48
20	330°31.0	140°50.1	30.0	102°46.0	05.8	214°08.7	17.5	332°53.7	44.5	Horizont	al parallax	
21	345°33.4	155°49.7	31.2	117°46.7	• • 06.3	229°11.0	•• 17.4	347°56.3	• • 44.6	HUHZUNT	Venus:	0.1
22	0°35.9	170°49.3	32.4	132°47.4	06.8	244°13.3	17.4	2°58.9	44.6		Mars:	0.1
23	15°38.4	185°48.9	33.6	147°48.1	07.2	259°15.5	17.4	18°01.5	44.7			
Mer.p	ass. 21:58	$\nu$ -0.4' $d1$	.2′ m-3.92	$ u$ 0.7 $^{\prime}$ d0	.5′ m1.50	$\nu$ 2.3′ d-0	.0′ m-2.24	$\nu$ 2.6′ d0	1′ m0.71			

h	Sui	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	183°44.8	S09°59.5	209°57.8	16.5'	500°00.6	14.7'	55.0'
1	198°44.9	10°00.4	224°33.2	16.5'	$00^{\circ}15.2$	14.7'	54.9'
2	213°45.0	01.3	239°08.7	16.5'	00°29.9	14.6'	54.9'
3	228°45.1	• • 02.2	253°44.3	16.5'	00°44.5	14.6'	54.9'
4	243°45.2 258°45.3	03.1 04.0	268°19.8 282°55.3	16.5'	00°59.2 01°13.8	14.6'	54.9'
5 6	258 45.5 273°45.5	510°04.9	282 55.3 297°30.8	16.5' 16.5'	501°28.4	14.6' 14.6'	54.9' 54.9'
7	288°45.6	05.8	312°06.4	16.6'	01°43.0	14.6'	54.8'
8	303°45.7	06.7	326°42.0	16.6'	01°57.6	14.6'	54.8'
9	318°45.8	• • 07.6	341°17.5	16.6'	$02^{\circ}12.1$	14.6'	54.8'
10	333°45.9	08.5	$355^{\circ}53.1$	16.6'	$02^{\circ}26.7$	14.5'	54.8'
11	348°46.0	09.4	10°28.7	16.6'	02°41.2	14.5'	54.8'
12	3°46.1	\$10°10.3	25°04.2	16.6'	S02°55.7	14.5'	54.8'
13 14	18°46.2 33°46.4	11.2 12.1	39°39.8 54°15.4	16.6' 16.6'	03° 10.2 03° 24.7	14.5' 14.5'	54.8' 54.7'
15	48°46.5	. 13.0	68°51.0	16.6'	03°24.7	14.5	54.7'
16	63°46.6	13.9	83°26.5	16.6'	03°53.6	14.4'	54.7'
17	78°46.7	14.8	98°02.1	16.6'	04°08.0	14.4'	54.7'
18	93°46.8	S10°15.7	112°37.7	16.6'	504°22.4	14.4'	54.7'
19	108°46.9	16.6	127°13.2	16.6'	04°36.8	14.3'	54.7'
20	123°47.0	17.5	141°48.8	16.6'	04°51.2	14.3'	54.7'
21	138°47.1	. 18.4	156°24.3	16.5'	05°05.5	14.3'	54.6'
22 23	153°47.2 168°47.3	19.3 20.2	170°59.9 185°35.4	16.5' 16.5'	05° 19.8 05° 34.0	14.3' 14.2'	54.6' 54.6'
23						17.4	J+.U
	SD = 16.0'	d = 0.9'		SL	0 = 15.0'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	183°47.5 198°47.6	\$10°21.1 22.0	200°10.9 214°46.5	16.5' 16.5'	\$05°48.3 06°02.5	14.2' 14.2'	54.6' 54.6'
2	198 47.0 213°47.7	22.0	214 40.5 229°22.0	16.5	06 02.5 06°16.7	14.2'	54.6'
3	213 47.7 228°47.8	. 23.8	243°57.5	16.5	06°30.9	14.1'	54.6'
4	243°47.9	24.7	258°32.9	16.5'	06°45.0	14.1'	54.5'
5	258°48.0	25.6	273°08.4	16.4'	06°59.1	14.1'	54.5'
6	273°48.1	S10°26.5	287°43.8	16.4'	<b>S</b> 07°13.1	14.0'	54.5'
7	288°48.2	27.4	302°19.3	16.4'	07°27.2	14.0'	54.5'
8	303°48.3	28.3	316°54.7	16.4'	07°41.2	14.0'	54.5'
9	318°48.4	• • 29.2	331°30.1 346°05.5	16.4	07°55.1 08°09.1	13.9'	54.5'
10 11	333°48.5 348°48.6	30.0 30.9	0°40.8	16.4' 16.3'	08°09.1	13.9' 13.9'	54.5' 54.4'
12	3°48.7	510°31.8	15°16.2	16.3'	508°36.8	13.8'	54.4
13	18°48.8	32.7	29°51.5	16.3'	08°50.6	13.8'	54.4'
14	33°48.9	33.6	44°26.8	16.3'	09°04.4	13.7'	54.4'
15	48°49.0	• • 34.5	59°02.1	16.2'	$09^{\circ}18.1$	13.7'	54.4'
16	63°49.1	35.4	73°37.3	16.2'	09°31.8	13.7'	54.4'
17	78°49.2 93°49.3	36.3 \$10°37.2	88°12.5 102°47.7	16.2' 16.2'	09°45.5 \$09°59.1	13.6'	54.4' 54.4'
18 19	93 49.3 108°49.5	38.1	102 47.7 117°22.9	16.2	10° 12.7	13.6' 13.5'	54.4' 54.4'
20	123°49.6	39.0	131°58.0	16.1'	10°26.2	13.5'	54.3'
21	138°49.7	39.9	146°33.1	16.1'	10°39.7	13.4'	54.3'
22	153°49.8	40.8	161°08.2	16.0'	$10^{\circ}53.1$	13.4'	54.3'
23	168°49.9	41.6	175°43.3	16.0'	$11^{\circ}06.5$	13.3'	54.3'
	SD = 16.1'	d = 0.9'		SE	0 = 14.9'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
o 0	183°50.0	S10°42.5	<b>GПА</b> 190°18.3	ν 16.0'	S11° 19.9	a 13.3'	пР 54.3'
1	198°50.1	43.4	204°53.3	16.0'	11°33.2	13.2'	54.3
2	213°50.2	44.3	219°28.2	15.9'	11°46.4	13.2'	54.3'
3	228°50.3	• • 45.2	234°03.1	15.9'	11°59.6	13.2'	54.3'
4	243°50.4	46.1	248°38.0	15.8'	12° 12.8	13.1'	54.3'
5	258°50.5	47.0	263°12.9	15.8'	12°25.9	13.0'	54.2'
6 7	273°50.6 288°50.7	\$10°47.9 48.8	277°47.7 292°22.5	15.8' 15.7'	\$12°38.9 12°51.9	13.0' 12.9'	54.2' 54.2'
8	303°50.8	40.0 49.6	306°57.2	15.7'	12 51.9 13°04.8	12.9'	54.2'
9	318°50.9	• • 50.5	321°31.9	15.7'	13° 17.7	12.8'	54.2'
10	333°51.0	51.4	$336^{\circ}06.6$	15.6'	13°30.6	12.8'	54.2'
11	348°51.1	52.3	350°41.2	15.6'	13°43.3	12.7'	54.2'
12	3°51.2	S10°53.2	5°15.7	15.5'	\$13°56.1	12.7'	54.2'
13	18°51.3	54.1	19°50.3	15.5'	14°08.7	12.6'	54.2'
14 15	33°51.3 48°51.4	55.0 •• 55.9	34°24.8 48°59.2	15.5' 15.4'	14°21.3 14°33.9	12.5' 12.5'	54.2' 54.1'
16	63°51.5	56.7	63°33.6	15.4'	14 33.9 14°46.3	12.5	54.1
17	78°51.6	57.6	78°08.0	15.3'	14°58.8	12.4	54.1
18	93°51.7	S10°58.5	92°42.3	15.3'	S15°11.1	12.3'	54.1'
19	108°51.8	10°59.4	107°16.6	15.2'	15°23.4	12.2'	54.1'
20	123°51.9	11°00.3	121°50.8	15.2'	15°35.7	12.2'	54.1'
21	138°52.0	• • 01.2	136°25.0	15.1'	15°47.8	12.1'	54.1'
22 23	153°52.1 168°52.2	02.0 02.9	150°59.1 165°33.2	15.1' 15.0'	15° 59.9 16° 12.0	12.0' 12.0'	54.1' 54.1'
23	SD = 16.1'	d = 0.9'	103 33.2		0 = 14.8'	14.0	J+.1
	2D — 10.1	u — 0.9		)L	· — 14.0		

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

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

		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%
19	14:59	15:05	11:45	10:17	22:37	
20	15:10	15:15	11:45	10:57	23:18	
21	15:20	15:25	11:45	11:38	-:-	

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

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	30°40.8	200°48.5	S02°34.9	162°48.8	\$18°07.7	274°17.8	N21°17.4	33°04.1	S03°44.8			
1	45°43.3	215°48.1	36.1	177°49.5	08.2	289°20.1	17.3	48°06.7	44.8	Alpheratz	357°33.8	29° 14.2
2	60°45.8	230°47.7	37.3	192°50.2	08.7	304°22.4	17.3	63°09.3	44.9	Ankaa	353°06.1	-42°09.9
3	75°48.2	245°47.3	38.5	207°50.8	09.2	319°24.7	17.3	78°11.9	• • 44.9	Schedar	349°29.8	56°40.9
4	90°50.7	260°46.9	39.7	222°51.5	09.7	334°27.0	17.3	93°14.5	45.0	Diphda	348°46.3	-17°50.6
5	105°53.2	275°46.5	41.0	237°52.2	10.2	349°29.3	17.2	108°17.1	45.0	Achernar	335°19.1	-57°06.3
6	120°55.6	290°46.1	S02°42.2	252°52.9	S18°10.7	4°31.6	N21°17.2	123°19.7	S03°45.1	Hamal	327°50.1 313°14.8	23°35.2
7	135°58.1	305°45.7	43.4	267°53.6	11.2	19°33.9	17.2	138°22.3	45.1	Polaris Acamar	315°10.9	89°22.3 -40°11.9
8	151°00.5	320°45.3	44.6	282°54.3	11.7	34°36.2	17.2	153°24.9	45.2	Menkar	314°05.2	4°11.6
9	166°03.0	335°44.9	• • 45.9	297°55.0	• • 12.2	49°38.5	• • 17.2	168°27.5	• • 45.2	Mirfak	308°26.9	49°57.2
10	181°05.5	350°44.5	47.1	312°55.7	12.7	64°40.7	17.1	183°30.1	45.3	Aldebaran	290°38.6	16°33.7
11	196°07.9	5°44.1	48.3	327°56.3	13.1	79°43.0	17.1	198°32.7	45.3	Rigel	281°03.0	-8° 10.1
12	211°10.4	20°43.7	\$02°49.5	342°57.0	\$18°13.6	94°45.3	N21°17.1	213°35.3	\$03°45.4	Capella	280°20.6	46°01.3
13	226°12.9	35°43.3	50.7	357°57.7	14.1	109°47.6	17.1	228°37.9	45.4	Bellatrix	278°22.0	6°22.5
14 15	241°15.3 256°17.8	50°42.9 65°42.5	52.0 •• 53.2	12°58.4 27°59.1	14.6 •• 15.1	124°49.9 139°52.2	17.0 •• 17.0	243°40.5 258°43.1	45.5 •• 45.6	Elnath	278°00.8	28°37.7
16	271°20.3	80°42.1	54.4	42°59.8	15.6	159° 52.2 154° 54.5	17.0	273°45.7	45.6	Alnilam	275°36.9	$-1^{\circ}11.0$
17	286°22.7	95°41.7	55.6	58°00.5	16.1	169°56.8	17.0	288°48.3	45.7	Betelgeuse	270°51.2	7°24.8
18	301°25.2	110°41.2	S02°56.8		\$18°16.6	184°59.1	N21°16.9	303°50.9	S03°45.7	Canopus	263°51.9	-52°42.2
19	316°27.7	125°40.8	58.1	88°01.8	17.1	200°01.4	16.9	318°53.5	45.8	Sirius	258°25.6	-16°44.9
20	331°30.1	140°40.4	02°59.3	103°02.5	17.5	215°03.7	16.9	333°56.1	45.8	Adhara	255°05.3	-29°00.1
21	346°32.6	155°40.0	03°00.5	118°03.2	• • 18.0	230°06.0	• • 16.9	348°58.7	• • 45.9	Procyon Pollux	244°50.1 243°16.5	5° 09.6 27° 57.8
22	1°35.0	$170^{\circ}39.6$	01.7	133°03.9	18.5	245°08.3	16.9	4°01.3	45.9	Avior	243°16.5 234°14.5	-59°35.1
23	16°37.5	$185^{\circ}39.2$	02.9	148°04.6	19.0	$260^{\circ}10.6$	16.8	19°03.9	46.0	Suhail	234 14.5 222°46.0	-59 35.1 -43°31.9
Mern	ass. 21:54	ν-0 4' d1	.2′ m-3.92	ν0 7' d0	.5′ m1.50	v2 3' d-0	.0′ m-2.25	v2 6' d0	.1′ m0.71	Miaplacidus	221°38.5	-43 31.9 -69°49.0
- vici.p		ν σ.¬ u1		- 5.1 00		u-0	2.23	-2.0 uU		Alphard	217°47.3	-8°46.1
										Regulus	207°33.9	11°50.5
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.7	61°36.5
0	31°40.0	200°38.8	\$03°04.2	163°05.2	\$18°19.5	275°12.9	N21°16.8	34°06.5	S03°46.0	Denebola	182°24.6	14°25.7
1	46°42.4	215°38.4	05.4	178°05.9	20.0	290°15.2	16.8	49°09.1	46.1	Gienah	175°43.2	-17°41.0
2	61°44.9	230°38.0	06.6	193°06.6	20.5	305°17.5 320°19.8	16.8	64°11.7	46.1		173°00.1	-63°14.4
3 4	76°47.4 91°49.8	245°37.6 260°37.2	· · 07.8 09.0	208°07.3 223°08.0	· · 21.0 21.4	320 19.8 335°22.1	· · 16.7 16.7	79°14.3 94°16.9	•• 46.2 46.2	Gacrux	171°51.5	-57° 15.3
5	91 49.6 106°52.3	200 37.2 275°36.8	10.3	223 08.0 238°08.7	21.4	350°24.4	16.7	109°19.5	46.2	Alioth	166°12.9	55°49.1
6	121°54.8	290°36.4	S03°11.5	253°09.3	\$18°22.4	5°26.7	N21°16.7	124°22.1	\$03°46.3	Spica	158°22.0	-11° 17.7
7	136°57.2	305°36.0	12.7	268°10.0	22.9	20°29.0	16.7	139°24.7	46.4	Alkaid	152°52.0	49°11.1
8	151°59.7	320°35.6	13.9	283°10.7	23.4	35°31.3	16.6	154°27.3	46.4	Hadar	148°35.8	-60°29.8
9	167°02.1	335°35.2	15.1	298°11.4	23.9	50°33.6	. 16.6	169°29.9	• • 46.5		147°57.3	-36°29.7
10	182°04.6	350°34.8	16.4	313°12.1	24.4	65°35.9	16.6	184°32.5	46.5	Arcturus	145°47.7	19°03.0
11	197°07.1	5°34.4	17.6	328°12.7	24.8	80°38.2	16.6	199°35.1	46.6	Rigil Kent. Kochab	139°40.1 137°20.9	-60° 56.5 74° 03.0
12	212°09.5	20°33.9	S03°18.8	343°13.4	S18°25.3	95°40.5	N21° 16.5	214°37.7	S03°46.7	Zuben'ubi	136°55.7	-16°08.9
13	$227^{\circ}12.0$	35°33.5	20.0	358°14.1	25.8	110°42.8	16.5	229°40.3	46.7	Alphecca	126°03.5	26° 37.8
14	242°14.5	50°33.1	21.2	13°14.8	26.3	125°45.1	16.5	244°42.9	46.8	Antares	112°15.4	-26° 29.3
15	257°16.9	65°32.7	• • 22.5	28°15.5	• • 26.8	140°47.4	• • 16.5	259°45.5	• • 46.8	Atria	107°09.4	-69°04.6
16	272°19.4	80°32.3	23.7	43°16.1	27.3	155°49.7	16.5	274°48.1	46.9	Sabik	102°02.3	-15°45.4
17	287°21.9	95°31.9	24.9	58°16.8	27.7	170°52.0	16.4	289°50.7	46.9	Shaula	96°09.8	-37°07.4
18	302°24.3	110°31.5	S03°26.1	73°17.5	\$18°28.2	185°54.3	N21° 16.4	304°53.3	S03°47.0	Rasalhague	95°58.2	12° 32.6
19	317°26.8 332°29.3	125°31.1 140°30.7	27.3	88°18.2 103°18.8	28.7	200°56.6 215°58.9	16.4	319°55.9 334°58.5	47.0 47.1	Eltanin	90°42.2	51°29.3
20 21	332 29.3 347°31.7	155°30.3	28.6 •• 29.8	103 16.6 118°19.5	29.2 •• 29.7	215 56.9 231°01.2	16.4 •• 16.3	350°01.1	47.1 •• 47.1	Kaus Aust.	83°31.9	-34°22.4
22	2°34.2	170°29.9	31.0	133°20.2	30.2	246°03.5	16.3	5°03.7	47.2	Vega	80°33.0	38°48.7
23	17°36.6	185°29.5	32.2	148°20.9	30.6	261°05.8	16.3	20°06.3	47.2	Nunki	75°47.1	-26°15.9
										Altair	61°59.4	8°56.3
Mer.p	ass. 21:50	$\nu$ -0.4′ d1	.2′ m-3.92	$\nu$ 0.7′ d0.	.5′ m1.50	$\nu 2.3' \ d-0$	.0′ m-2.26	$\nu$ 2.6′ d0	.1′ m0.72	Peacock	53°04.7	-56°39.3
										Deneb Enif	49°25.3 33°38.1	45° 22.6 9° 59.8
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.9	-46° 50.3
0	$32^{\circ}39.1$	$200^{\circ}29.1$	S03°33.4	$163^{\circ}21.6$	<b>S</b> 18°31.1	$276^{\circ}08.1$	$N21^{\circ}16.3$	$35^{\circ}08.9$	S03°47.3	Fomalhaut	15°13.6	-40° 30.3
1	47°41.6	215°28.6	34.6	178°22.2	31.6	291°10.4	16.3	50°11.5	47.3	Scheat	13°44.4	28° 13.6
2	62°44.0	230°28.2	35.9	193°22.9	32.1	306°12.7	16.2	65°14.0	47.4	Markab	13°29.0	15°20.8
3	77°46.5	245°27.8	• • 37.1	208°23.6	• • 32.6	321°15.0	16.2	80°16.6	• • 47.4	0-4 20 114		
4	92°49.0	260°27.4	38.3	223°24.3	33.0	336°17.3	16.2	95°19.2	47.5	Oct 22 Wed	<b>SHA</b> 170°07.7	Mer.pass
5	107°51.4	275°27.0	39.5	238°24.9	33.5	351°19.6	16.2	110°21.8	47.5		170°07.7 132°07.9	10:37 13:08
6 7	122°53.9 137°56.4	290°26.6	\$03°40.7		\$18°34.0	6°21.9 21°24.2	N21° 16.2		\$03°47.6		243°37.0	05:42
7 8	137°56.4 152°58.8	305°26.2 320°25.8	42.0 43.2	268°26.3 283°27.0	34.5 35.0	36°26.6	16.1 16.1	140°27.0 155°29.6	47.6 47.7	Saturn	2 <sup>4</sup> 3 37.0	21:44
9	168°01.3	335°25.4	• • 44.4	298°27.6	• • 35.4	50°28.9	16.1	170°32.2	• • 47.7			
10	183°03.8	350°25.0	45.6	313°28.3	35.9	66°31.2	16.1	185°34.8	47.8	Oct 23 Thu	SHA	Mer.pass
11	198°06.2	5°24.6	46.8	328°29.0	36.4	81°33.5	16.1	200°37.4	47.8		168°58.8	10:38
12	213°08.7	20°24.1	S03°48.0	343°29.6	S18°36.9	96°35.8	N21°16.0	215°40.0	S03°47.9		131°25.3	13:07
13	$228^{\circ}11.1$	$35^{\circ}23.7$	49.3	358°30.3	37.3	$111^{\circ}38.1$	16.0	230°42.6	47.9	Jupiter Saturn	243°32.9 2°26.6	05:38 21:40
14	243°13.6	50°23.3	50.5	13°31.0	37.8	126°40.4	16.0	245°45.2	48.0	Jatuin		21.40
15	258°16.1	65°22.9	• • 51.7	28°31.7	• • 38.3	141°42.7	• • 16.0	260°47.8	• • 48.0	Oct 24 Fri	SHA	Mer.pass
16	273°18.5	80°22.5	52.9	43°32.3	38.8	156°45.0	16.0	275°50.4	48.1		167°49.9	10:38
17	288°21.0	95°22.1	54.1	58°33.0	39.3	171°47.3	15.9	290°53.0	48.1		130°42.4	13:06
18	303°23.5	110°21.7	\$03°55.3		\$18°39.7	186°49.7	N21°15.9		\$03°48.2		243°29.0	05:35
19 20	318°25.9 333°28.4	125°21.3 140°20.9	56.6 57.8	88°34.4 103°35.0	40.2 40.7	201°52.0 216°54.3	15.9 15.9	320°58.1 336°00.7	48.2 48.3	Saturn	2°29.7	21:36
20	333 28.4 348°30.9	140 20.9 155°20.4	57.8 03°59.0	103 35.0 118°35.7	• 41.2	210 54.3 231°56.6	15.9	351°03.3	48.3 •• 48.3	Horizont	al parallax	
22	3°33.3	170°20.0	03° 39.0 04° 00.2	133°36.4	41.6	246°58.9	15.8	6°05.9	48.4		Venus:	0.1
23	18°35.8	185°19.6	01.4	148°37.0	42.1	262°01.2	15.8	21°08.5	48.4		Mars:	0.1
ivier.p	ass. 21:46	$\nu$ -0.4' d1	.2′ m-3.92	$\nu$ 0.7 d0.	.5′ m1.49	ν2.3 a-0	.0′ m-2.27	ν2.0° d0	.1′ m0.73			

h	Sui	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	183°52.3	S11°03.8	180°07.2	15.0'	<b>S</b> 16°24.0	11.9'	54.1'
1	198°52.4	04.7	$194^{\circ}41.2$	14.9'	16°35.9	11.8'	54.1'
2	213°52.5	05.6	$209^{\circ}15.1$	14.9'	16°47.7	11.8'	54.1'
3	228°52.6	• • 06.5	223°49.0	14.8'	16°59.5	11.7'	54.0'
4	243° 52.7 258° 52.8	07.3 08.2	238° 22.9 252° 56.6	14.8' 14.7'	17°11.2 17°22.8	11.6'	54.0'
5 6	258 52.8 273°52.9	08.2 \$11°09.1	252 50.0 267°30.4	14.7'	\$17°34.3	11.6' 11.5'	54.0' 54.0'
7	288° 53.0	10.0	282°04.0	14.6'	17°45.8	11.4	54.0'
8	303°53.1	10.9	296°37.6	14.6'	17°57.2	11.3'	54.0'
9	318°53.1	• • 11.8	$311^{\circ}11.2$	14.5'	18°08.6	11.3'	54.0'
10	333°53.2	12.6	325°44.7	14.5'	18°19.8	11.2'	54.0'
11	348°53.3	13.5	340°18.2	14.4'	18°31.0	11.1'	54.0'
12	3°53.4	S11°14.4	354°51.6 9°24.9	14.3'	\$18°42.1 18°53.1	11.0'	54.0'
13 14	18° 53.5 33° 53.6	15.3 16.2	23°58.2	14.3' 14.2'	18°53.1 19°04.1	10.9' 10.9'	54.0' 54.0'
15	48° 53.7	. 17.0	38°31.4	14.2'	19°15.0	10.8	54.0'
16	63°53.8	17.9	53°04.6	14.1'	19°25.7	10.7'	54.0'
17	78°53.9	18.8	67°37.7	14.1'	19°36.5	10.6'	54.0'
18	93°54.0	S11°19.7	82°10.8	14.0'	S19°47.1	10.5'	54.0'
19	108°54.0	20.5	96°43.8	13.9'	19°57.6	10.5'	54.0'
20	123°54.1	21.4	111°16.7	13.9'	20°08.1	10.4'	53.9'
21 22	138° 54.2 153° 54.3	· · 22.3 23.2	125°49.6 140°22.4	13.8' 13.8'	20°18.5 20°28.7	10.3' 10.2'	53.9' 53.9'
23	153 54.3 168° 54.4	23.2	140 22.4 154°55.1	13.7	20°28.7 20°38.9	10.2	53.9'
	SD = 16.1'	d = 0.9'		SL	0 = 14.7'		
Thu	GHA	Dec	GHA	ν 12.6'	Dec	d 10.0'	HP
0 1	183° 54.5 198° 54.6	\$11°24.9 25.8	169°27.8 184°00.5	13.6' 13.6'	\$20°49.1 20°59.1	10.0' 9.9'	53.9' 53.9'
2	213° 54.7	26.7	198°33.1	13.5'	20° 59.1 21° 09.0	9.8'	53.9
3	228°54.7	• • 27.6	213°05.6	13.5'	21°18.9	9.8'	53.9'
4	243°54.8	28.4	227°38.0	13.4'	21°28.6	9.7'	53.9'
5	258° 54.9	29.3	242°10.4	13.3'	21°38.3	9.6'	53.9'
6 7	273°55.0 288°55.1	\$11°30.2 31.1	256° 42.7 271° 15.0	13.3' 13.2'	\$21°47.9 21°57.3	9.5' 9.4'	53.9' 53.9'
8	303°55.2	31.1	271 15.0 285°47.2	13.1'	21 57.3 22°06.7	9.4	53.9'
9	318°55.3	32.8	300° 19.4	13.1'	22°16.0	9.2'	53.9'
10	333°55.3	33.7	$314^{\circ}51.4$	13.0'	22°25.2	9.1'	53.9'
11	348°55.4	34.6	329°23.5	13.0'	22°34.3	9.0'	53.9'
12	3°55.5	S11°35.4	343°55.4	12.9'	\$22°43.3	8.9'	53.9'
13 14	18° 55.6 33° 55.7	36.3 37.2	358°27.3 12°59.1	12.8' 12.8'	22°52.2 23°01.0	8.8' 8.7'	53.9' 53.9'
15	48°55.8	38.0	27°30.9	12.7'	23°09.7	8.6'	53.9'
16	63°55.8	38.9	42°02.6	12.6'	23°18.3	8.5'	53.9'
17	78°55.9	39.8	56°34.3	12.6'	23°26.8	8.4'	53.9'
18	93°56.0 108°56.1	S11°40.7	71°05.9 85°37.4	12.5'	\$23°35.2 23°43.5	8.3'	53.9'
19 20	106 50.1 123°56.2	41.5 42.4	100°08.8	12.5' 12.4'	23°51.7	8.2' 8.1'	53.9' 53.9'
21	138° 56.2	• • 43.3	114°40.2	12.3'	23°59.8	8.0'	53.9'
22	153° 56.3	44.1	129°11.6	12.3'	24°07.8	7.9'	53.9'
23	168°56.4	45.0	143°42.8	12.2'	24°15.7	7.8'	53.9'
	SD = 16.1'	d = 0.9'		SE	0 = 14.7'		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	183° 56.5	\$11°45.9	158° 14.0	ν 12.1'	\$24°23.4	a 7.7'	53.9'
1	198° 56.6	46.7	172°45.2	12.1'	24°31.1	7.6'	53.9'
2	213°56.6	47.6	$187^{\circ}16.3$	12.0'	24°38.7	7.4'	53.9'
3	228°56.7	• • 48.5	201°47.3	12.0'	24°46.1	7.3'	53.9'
4	243°56.8	49.3 50.2	216° 18.3	11.9'	24°53.4	7.2'	53.9'
5 6	258° 56.9 273° 57.0	50.2 \$11°51.1	230°49.2 245°20.0	11.8' 11.8'	25°00.7 \$25°07.8	7.1' 7.0'	53.9' 53.9'
7	273 57.0 288° 57.0	51.9	259° 50.8	11.7	25°14.8	6.9'	53.9'
8	303°57.1	52.8	274°21.5	11.7'	25°21.6	6.8	53.9'
9	318° 57.2	• • 53.7	288° 52.2	11.6'	25°28.4	6.7'	53.9'
10	333°57.3	54.5	303°22.8	11.5'	25°35.1	6.5'	53.9'
11	348° 57.3 3° 57.4	55.4 \$11°56.3	317°53.3 332°23.8	11.5' 11.4'	25°41.6 \$25°48.0	6.4' 6.3'	53.9'
12 13	3°57.4 18°57.5	57.1	332°23.8 346°54.3	11.4 11.4'	25°54.3	6.2'	53.9' 53.9'
14	33°57.6	58.0	1°24.6	11.3'	26°00.5	6.1	53.9'
15	48°57.7	• • 58.9	15°55.0	11.3'	26°06.6	6.0'	53.9'
16	63°57.7	11°59.7	30°25.2	11.2'	26°12.5	5.8'	53.9'
17	78° 57.8	12°00.6	44°55.4	11.2'	26°18.4	5.7'	53.9'
18 19	93°57.9 108°58.0	\$12°01.5 02.3	59°25.6 73°55.7	11.1' 11.0'	\$26°24.1 26°29.7	5.6' 5.5'	53.9' 53.9'
20	123°58.0	03.2	88°25.7	11.0'	26°35.2	5.3'	53.9'
21	138° 58.1	•• 04.1	$102^{\circ}55.7$	10.9'	26°40.5	5.2'	53.9'
22	153°58.2	04.9	117°25.7	10.9'	26°45.7	5.1'	53.9'
23	168°58.2	05.8	131°55.5	10.8'	26°50.8	5.0'	53.9'
	SD = 16.1'	d = 0.9'		SE	0 = 14.7'		

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

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

		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%
22	15:29	15:34	11:44	12:21	00:00	
23	15:38	15:42	11:44	13:06	00:43	
24	15:46	15:50	11:44	13:54	01:30	

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

h	Aries	Ver	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	33°38.2	200°19.2	S04°02.6	163°37.7	\$18° 42.6	277°03.5	N21°15.8	36°11.1	S03°48.5			
1	48° 40.7	215°18.8	03.9	178°38.4	43.1	292°05.8	15.8	51°13.7	48.5	Alpheratz	357°33.8	29° 14.2
2	63°43.2	230°18.4	05.1	193°39.0	43.5	307°08.2	15.8	66°16.3	48.6	Ankaa	353°06.1	-42°09.9
3	78° 45.6	245°18.0	06.3	208°39.7	• • 44.0	322°10.5	• • 15.7	81° 18.9	48.6	Schedar	349°29.8	56° 40.9
4	93°48.1	260°17.6	07.5	223°40.4	44.5	337°12.8	15.7	96°21.5	48.7	Diphda	348°46.3	-17°50.6
5	108° 50.6	275°17.1	08.7	238°41.0	45.0	352°15.1	15.7	111°24.1	48.7	Achernar	335°19.1	-57°06.3
6	123°53.0	290°16.7	S04°09.9	253°41.7	\$18°45.4	7°17.4	N21° 15.7	126°26.7	S03°48.8	Hamal	327°50.1	23°35.2
7	138°55.5	305°16.3	11.2	268°42.4	45.9	22°19.7	15.7	141°29.3	48.8	Polaris	313°13.9	89°22.3
8	153°58.0	320°15.9	12.4	283°43.1	46.4	37°22.0	15.6	156°31.8	48.9	Acamar	315°10.9	-40°11.9
9	169°00.4	335°15.5	• • 13.6	298°43.7	• • 46.9	52°24.4	• • 15.6	171°34.4	• • 48.9	Menkar	314°05.2	4°11.6
10	184°02.9	350°15.1	14.8	313°44.4	47.3	67°26.7	15.6	186°37.0	49.0	Mirfak	308°26.9	49°57.2 16°33.7
11	$199^{\circ}05.4$	5°14.7	16.0	328°45.1	47.8	82°29.0	15.6	201°39.6	49.0	Aldebaran	290°38.6	
12	214°07.8	20°14.2	S04°17.2	343°45.7	S18°48.3	97°31.3	N21°15.6	216°42.2	503°49.1	Rigel Capella	281°03.0 280°20.6	-8°10.1 46°01.3
13	229°10.3	35°13.8	18.4	358°46.4	48.7	112°33.6	15.5	231°44.8	49.1	Bellatrix	278°22.0	6°22.5
14	244°12.7	50°13.4	19.7	13°47.1	49.2	127°35.9	15.5	246°47.4	49.2	Elnath	278°22.0	28°37.7
15	259° 15.2	65°13.0	• • 20.9	28°47.7	• • 49.7	142°38.3	• • 15.5	261°50.0	• • 49.2	Alnilam	275°36.9	-1°11.0
16	$274^{\circ}17.7$	80°12.6	22.1	43°48.4	50.2	157°40.6	15.5	276°52.6	49.3	Betelgeuse	270°51.2	7°24.8
17	289°20.1	95°12.2	23.3	58°49.0	50.6	172°42.9	15.5	291°55.2	49.3	Canopus	263°51.9	-52°42.2
18	304°22.6	110°11.7	S04°24.5	73°49.7	S18°51.1	187°45.2	N21°15.4	306° 57.8	S03°49.4	Sirius	258°25.5	-16°44.9
19	319°25.1	125°11.3	25.7	88°50.4	51.6	202°47.5	15.4	322°00.4	49.4	Adhara	255°05.2	-29°00.1
20	334°27.5	140°10.9	26.9	103°51.0	52.0	217°49.9	15.4	337°02.9	49.5	Procyon	244°50.1	5°09.6
21	349°30.0	155°10.5	• • 28.2	118°51.7	• • 52.5	232°52.2	•• 15.4	352°05.5	• • 49.5	Pollux	243°16.5	27°57.8
22	4°32.5	170°10.1	29.4	133°52.4	53.0	247°54.5	15.4	7°08.1	49.6	Avior	234°14.5	-59°35.1
23	19°34.9	185°09.7	30.6	148°53.0	53.4	262°56.8	15.3	22°10.7	49.6	Suhail	222°46.0	-43°31.9
Mer.p	ass. 21:42	$\nu$ -0.4' d1.3	2′ m-3.92	$\nu$ 0.7' d0	.5′ m1.49	$\nu 2.3' \ d-0$	.0′ m-2.27	$\nu$ 2.6′ d0	.0′ m0.73	Miaplacidus	221°38.4	-69°49.0
										Alphard	217°47.2	-8°46.1
•	6114	6114	_		-	6114		6114	_	Regulus	207°33.9	11°50.5
Sun	GHA	GHA	Dec CO4931.0	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.6	61°36.5
0	34°37.4	200°09.2	S04°31.8	163°53.7	\$18°53.9	277°59.1	N21°15.3	37°13.3	S03°49.7	Denebola	$182^{\circ}24.6$	$14^{\circ}25.7$
1	49°39.9	215°08.8	33.0	178°54.4	54.4	293°01.5	15.3	52° 15.9	49.7	Gienah	175°43.2	$-17^{\circ}41.0$
2	64°42.3	230°08.4	34.2	193°55.0	54.8	308°03.8	15.3	67°18.5	49.7	Acrux	$173^{\circ}00.1$	-63° 14.4
3	79°44.8	245°08.0	• • 35.4	208°55.7	• • 55.3	323°06.1	• • 15.3	82°21.1	• • 49.8	Gacrux	$171^{\circ}51.5$	-57° 15.3
4	94°47.2	260°07.6	36.6	223°56.3	55.8	338°08.4	15.3	97°23.7	49.8	Alioth	$166^{\circ}12.9$	55°49.1
5	109°49.7	275°07.2	37.9	238°57.0	56.3	353°10.8	15.2	112°26.2	49.9	Spica	$158^{\circ}22.0$	-11° 17.7
6	124°52.2	290°06.7	S04°39.1	253°57.7	\$18°56.7	8°13.1	N21°15.2	127°28.8 142°31.4	S03°49.9	Alkaid	$152^{\circ}52.0$	49°11.1
7	139°54.6 154°57.1	305°06.3 320°05.9	40.3	268°58.3 283°59.0	57.2 57.7	23°15.4 38°17.7	15.2	142 31.4 157°34.0	50.0	Hadar	148°35.8	-60°29.8
8 9	154 57.1 169°59.6	320 05.9 335°05.5	41.5 •• 42.7	283 59.0 298°59.6	58.1	58 17.7 53°20.0	15.2 •• 15.2	157 34.0 172°36.6	50.0 •• 50.1	Menkent	147°57.3	-36°29.7
10	109 59.0 185°02.0	350°05.5	43.9	314°00.3	58.6	68°22.4	15.2	172 30.0 187°39.2	50.1	Arcturus	145°47.7	19°02.9
11	200°04.5	5°04.7	45.9 45.1	314 00.3 329°01.0	59.1	83°24.7	15.1	202°41.8	50.1	Rigil Kent.	139°40.1	-60° 56.5
12	215°07.0	20°04.2	504°46.3	344°01.6	\$18° 59.5	98°27.0	N21°15.1	202 41.0 217°44.4	S03°50.2	Kochab	137°20.9	74°02.9
13	230°09.4	35°03.8	47.6	359°02.3	19°00.0	113°29.3	15.1	232°47.0	50.3	Zuben'ubi	136°55.7	-16°08.9
14	245°11.9	50°03.4	48.8	14°02.9	00.4	128°31.7	15.1	247°49.5	50.3	Alphecca	126°03.5	26° 37.8
15	260° 14.4	65°03.0	• • 50.0	29°03.6	00.9	143°34.0	• • 15.1	262°52.1	• • 50.4	Antares	112°15.4	-26°29.3
16	275°16.8	80°02.6	51.2	44°04.3	01.4	158°36.3	15.0	277°54.7	50.4	Atria	107°09.4	-69°04.6
17	290° 19.3	95°02.1	52.4	59°04.9	01.8	173°38.7	15.0	292°57.3	50.5	Sabik	102°02.3	-15°45.4
18	305°21.7	110°01.7	S04°53.6	74°05.6	\$19°02.3	188°41.0	N21°15.0	307°59.9	S03°50.5	Shaula	96°09.8	-37°07.4
19	320°24.2	125°01.3	54.8	89°06.2	02.8	203°43.3	15.0	323°02.5	50.6	Rasalhague	95°58.2	12°32.6
20	335°26.7	140°00.9	56.0	104°06.9	03.2	218°45.6	15.0	338°05.1	50.6	Eltanin	90°42.2	51°29.3 -34°22.4
21	350°29.1	155°00.5	• • 57.2	119°07.6	• • 03.7	233°48.0	· · 15.0	353°07.7	• • 50.7	Kaus Aust.	83°31.9	
22	5°31.6	170°00.0	58.5	134°08.2	04.2	248°50.3	14.9	8°10.2	50.7	Vega	80°33.0	38°48.7
23	20°34.1	184°59.6	59.7	149°08.9	04.6	263°52.6	14.9	23°12.8	50.7	Nunki Altair	75°47.1 61°59.4	-26° 15.9 8° 56.3
			0/ 2.01			0.2/ 1.0		0.6/_10		l .	51 59.4 53°04.7	-56°39.3
Mer.p	ass. 21:38	$\nu$ -0.4' d1.3	2′ m-3.91	$\nu$ 0.7 d0.	.5′ m1.48	$\nu$ 2.3′ d-0	.0′ m-2.28	$\nu$ 2.6′ d0	.0′ m0.74	Peacock Deneb	49°25.3	-50 39.3 45°22.6
										Enif	33°38.1	9°59.8
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.9	-46°50.3
0	35°36.5	199°59.2	<b>S</b> 05°00.9		S19°05.1	278°55.0	N21°14.9		S03°50.8	Fomalhaut	15°13.6	-40° 50.5 -29° 29.1
1	50°39.0	214°58.8	02.1	$179^{\circ}10.2$	05.5	293°57.3	14.9	53°18.0	50.8	Scheat	13°44.4	28° 13.6
2	65°41.5	229°58.3	03.3	$194^{\circ}10.8$	06.0	308°59.6	14.9	$68^{\circ}20.6$	50.9	Markab	13°29.1	15°20.8
3	80°43.9	244°57.9	• • 04.5	$209^{\circ}11.5$	• • 06.5	324°01.9	• • 14.8	83°23.2	• • 50.9			
4	95°46.4	259°57.5	05.7	224°12.2	06.9	339°04.3	14.8	98°25.8	51.0	Oct 25 Sat	SHA	Mer.pass
5	110°48.9	274°57.1	06.9	239°12.8	07.4	354°06.6	14.8	113°28.4	51.0		166°41.0	10:39
6	125°51.3	289°56.7	S05°08.1		S19°07.9	9°08.9	N21° 14.8		S03°51.1		129°59.5	13:05
7	140°53.8	304°56.2	09.3	269°14.1	08.3	24°11.3	14.8	143°33.5	51.1		243°25.3	05:31
8	155°56.2	319°55.8	10.5	284°14.8	8.80	39°13.6	14.8	158°36.1	51.2	Saturn	2°32.9	21:32
9	170°58.7	334°55.4	• • 11.8	299°15.4	09.2	54°15.9	• • 14.7	173°38.7	• • 51.2	Oct 26 Sun	SHA	Mer.pass
10	186°01.2	349°55.0	13.0	314°16.1	09.7	69°18.3	14.7	188°41.3	51.3		165°31.9	10:40
11	201°03.6	4°54.5	14.2	329°16.7	10.2	84°20.6	14.7	203°43.9	51.3		129°16.3	13:04
12	216°06.1	19°54.1	S05°15.4	344°17.4	\$19°10.6	99°22.9	N21°14.7		S03°51.3		243°21.8	05:27
13	231°08.6	34°53.7	16.6	359°18.0	11.1	114°25.3	14.7	233°49.0	51.4 51.4	Saturn	2°35.9	21:27
14 15	246°11.0	49°53.3	17.8	14°18.7	11.5	129°27.6	14.7	248°51.6	51.4	0 . 27	C	
15 16	261°13.5	64°52.8	· · 19.0	29°19.3	· · 12.0	144°29.9	· · 14.7	263°54.2	· · 51.5	Oct 27 Mon	SHA	Mer.pass
16	276° 16.0 291° 18.4	79°52.4	20.2	44°20.0	12.5	159°32.3	14.6	278°56.8	51.5		164°22.7	10:40
17	291°18.4 306°20.9	94°52.0 109°51.6	21.4 \$05°22.6	59°20.6 74°21.3	12.9 \$19°13.4	174°34.6 189°36.9	14.6 N21°14.6	293°59.4 309°02.0	51.6 \$03°51.6		128°33.0	13:03
18 19	306 20.9 321°23.3	109 51.6 124°51.1	23.8	74 21.3 89°21.9	13.8	204°39.3	N21 14.6 14.6	309 02.0 324°04.5	51.7		243°18.4	05:23
20	321 25.3 336°25.8	124 51.1 139°50.7	25.0 25.0	104°22.6	14.3	204 39.3 219°41.6	14.6	324 04.5 339°07.1	51.7	Saturn	2°38.9	21:23
20	350 25.8 351°28.3	159 50.7 154°50.3	26.2	104 22.6 119°23.3	14.3	219 41.6 234°43.9	14.6	354°09.7	• • 51.8	Horizont	al parallax	
22	6°30.7	169°49.9	27.4	134°23.9	15.2	249°46.3	14.5	9°12.3	51.8		Venus:	0.1
23	21°33.2	184°49.4	28.7	149°24.6	15.7	264°48.6	14.5	24°14.9	51.8		Mars:	0.1
										T.		
Mer.p	ass. 21:34	$\nu$ -0.4' $d1.3$	2′ m-3.91	$\nu$ 0.7′ d0.	.5′ m1.48	$\nu 2.3' \ d-0$	.0′ m-2.29	$\nu$ 2.6′ d0	.0′ m0.74			

h	Sui	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	183°58.3	S12°06.6	146°25.4	10.8'	\$26°55.8	4.8'	53.9'
1	198°58.4	07.5	$160^{\circ}55.2$	10.7'	$27^{\circ}00.6$	4.7'	53.9'
2	213°58.5	08.4	175°24.9	10.7'	27°05.4	4.6'	53.9'
3	228°58.5	• • 09.2	189°54.6	10.6'	27°10.0	4.5'	54.0'
4 5	243°58.6 258°58.7	10.1 10.9	204°24.2 218°53.8	10.6' 10.5'	27° 14.4 27° 18.8	4.3' 4.2'	54.0' 54.0'
6	273°58.7	512°11.8	210 55.0 233°23.4	10.5'	\$27°23.0	4.2	54.0'
7	288°58.8	12.7	247°52.9	10.5	27° 27.1	4.0'	54.0'
8	303°58.9	13.5	262°22.3	10.4	27°31.0	3.8'	54.0'
9	318°59.0	• • 14.4	276°51.7	10.4'	27°34.9	3.7'	54.0'
10	333°59.0	15.2	291°21.1	10.3'	27°38.6	3.6'	54.0'
11	348°59.1	16.1	305°50.4	10.3'	27° 42.1	3.4'	54.0'
12 13	3°59.2 18°59.2	\$12°16.9 17.8	320°19.7 334°48.9	10.2' 10.2'	\$27°45.6 27°48.9	3.3' 3.2'	54.0' 54.0'
14	33°59.3	18.7	349°18.1	10.2'	27°52.0	3.0'	54.0'
15	48°59.4	. 19.5	3°47.3	10.1	27°55.1	2.9'	54.0'
16	63°59.4	20.4	18°16.4	10.1'	27°58.0	2.8'	54.0'
17	78°59.5	21.2	32°45.5	10.1'	28°00.8	2.6'	54.1'
18	93°59.6	<b>S</b> 12°22.1	47°14.6	10.0'	528°03.4	2.5'	54.1'
19	108°59.6	22.9	61°43.6	10.0'	28°05.9	2.4'	54.1'
20 21	123°59.7 138°59.8	23.8 •• 24.7	76°12.6 90°41.5	10.0' 9.9'	28° 08.3 28° 10.5	2.2' 2.1'	54.1' 54.1'
22	153°59.8	25.5	105° 10.5	9.9'	28° 12.6	2.0'	54.1'
23	168°59.9	26.4	119°39.3	9.9'	28° 14.5	1.8'	54.1'
	SD = 16.1'	d = 0.9'		ςr	0 = 14.7'		
	JD — 10.1	<u>u — 0.9</u>		JL			
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	184°00.0 199°00.0	\$12°27.2 28.1	134°08.2 148°37.0	9.8' 9.8'	\$28° 16.4 28° 18.1	1.7' 1.6'	54.1' 54.1'
2	214°00.1	28.9	163°05.8	9.8'	28° 19.6	1.4	54.1
3	229°00.2	• • 29.8	177°34.6	9.8'	28°21.0	1.3'	54.1'
4	244°00.2	30.6	192°03.4	9.7'	$28^{\circ}22.3$	1.1'	54.2'
5	259°00.3	31.5	206°32.1	9.7'	28°23.4	1.0'	54.2'
6	274°00.4 289°00.4	\$12°32.3	221°00.8 235°29.5	9.7'	\$28°24.4 28°25.3	0.9'	54.2'
7 8	289°00.4 304°00.5	33.2 34.0	235° 29.5 249° 58.2	9.7' 9.6'	28° 25.3 28° 26.0	0.7' 0.6'	54.2' 54.2'
9	319°00.5	• • 34.9	264°26.8	9.6'	28° 26.6	0.4	54.2'
10	334°00.6	35.7	278°55.5	9.6'	28° 27.0	0.3	54.2'
11	349°00.7	36.6	$293^{\circ}24.1$	9.6'	28°27.3	0.2'	54.2'
12	4°00.7	S12°37.4	307°52.7	9.6'	S28°27.5	0.0'	54.3'
13	19°00.8 34°00.9	38.3	322°21.2 336°49.8	9.6'	28° 27.5 28° 27.4	-0.1'	54.3'
14 15	49°00.9	39.1 •• 40.0	350 49.8 351°18.4	9.6' 9.5'	28° 27.2	-0.3' -0.4'	54.3' 54.3'
16	64°01.0	40.8	5°46.9	9.5'	28° 26.8	-0.5	54.3
17	79°01.0	41.7	20°15.5	9.5'	28° 26.2	-0.7'	54.3'
18	94°01.1	<b>S</b> 12°42.5	34°44.0	9.5'	S28°25.5	-0.8'	54.3'
19	109°01.2	43.4	49°12.5	9.5'	28°24.7	-1.0'	54.4'
20	124°01.2	44.2	63°41.0	9.5'	28° 23.8	-1.1'	54.4'
21 22	139°01.3 154°01.3	· · 45.1 45.9	78°09.5 92°38.0	9.5' 9.5'	28°22.7 28°21.4	-1.2' -1.4'	54.4' 54.4'
23	169°01.4	45.9 46.7	92 36.0 107°06.5	9.5' 9.5'	28°20.0	-1.4 -1.5'	54.4'
20	SD = 16.1'	d = 0.9'			0 = 14.8'	1.0	
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	184°01.4 199°01.5	\$12°47.6 48.4	121°35.0 136°03.5	9.5' 9.5'	\$28° 18.5 28° 16.8	-1.7' -1.8'	54.4' 54.5'
2	214°01.6	48.4 49.3	150° 32.0	9.5 9.5'	28°15.0	-1.8 -1.9'	54.5'
3	229°01.6	50.1	165°00.5	9.5'	28° 13.1	-2.1'	54.5
4	244°01.7	51.0	179°29.0	9.5'	28°11.0	-2.2'	54.5'
5	259°01.7	51.8	193°57.5	9.5'	28°08.8	-2.4'	54.5'
6	274°01.8	\$12°52.7	208°26.0	9.5'	\$28°06.4	-2.5'	54.5'
7	289°01.8 304°01.9	53.5	222°54.6 237°23.1	9.5'	28°03.9	-2.7'	54.6'
8 9	304°01.9 319°01.9	54.3 •• 55.2	237°23.1 251°51.6	9.5' 9.5'	28°01.2 27°58.4	-2.8' -2.9'	54.6' 54.6'
10	334°02.0	56.0	266°20.2	9.6'	27°55.5	-3.1'	54.6'
11	349°02.1	56.9	280°48.7	9.6'	27°52.4	-3.2	54.6'
12	4°02.1	<b>S</b> 12°57.7	295°17.3	9.6'	S27°49.2	-3.4'	54.6'
13	19°02.2	58.6	309°45.8	9.6'	27° 45.8	-3.5'	54.7'
14 15	34°02.2 49°02.3	12°59.4 13°00.2	324°14.4 338°43.0	9.6' 9.6'	27° 42.3 27° 38.7	-3.6' -3.8'	54.7' 54.7'
15 16	49°02.3 64°02.3	01.1	338°43.0 353°11.7	9.6'	27°38.7 27°34.9	-3.8° -3.9°	54.7' 54.7'
17	79°02.4	01.1	7°40.3	9.7'	27°31.0	-3.9 -4.1'	54.7
18	94°02.4	<b>S</b> 13°02.8	22°08.9	9.7'	S27°27.0	-4.2'	54.8'
19	109°02.5	03.6	36°37.6	9.7'	27° 22.8	-4.3'	54.8'
20	124°02.5 139°02.6	04.4	51°06.3 65°35.0	9.7'	27° 18.4 27° 14.0	-4.5'	54.8'
21 22	139°02.6 154°02.6	· · 05.3 06.1	65°35.0 80°03.7	9.7' 9.8'	27°14.0 27°09.4	-4.6' -4.7'	54.8' 54.9'
23	169°02.7	06.9	94°32.5	9.8'	27°04.6	-4.9'	54.9'
	SD = 16.1'	d = 0.8'			0 = 14.8'		

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

Lat.		Moonris	е		Moonset	t
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
N 72°						
N 70°						
68°						
66°						
64°						
62°	14:36		15:50	14:49		17:12
60°	13:07	14:15	14:48	16:18	16:58	18:14
N 58°	12:31	13:34	14:14	16:54	17:39	18:47
56°	12:05	13:06	13:49	17:20	18:07	19:12
54°	11:45	12:44	13:28	17:41	18:28	19:32
52°	11:28	12:26	13:12	17:58	18:46	19:49
50°	11:13	12:11	12:57	18:13	19:02	20:03
45°	10:43	11:40	12:28	18:43	19:33	20:32
N 40°	10:20	11:16	12:05	19:06	19:57	20:54
35°	10:01	10:56	11:46	19:26	20:16	21:13
30°	09:45	10:39	11:29	19:42	20:33	21:29
20° N 10°	09:17 08:54	10:11 09:46	11:02 10:38	20:10 20:34	21:02 21:26	21:56 22:19
0°	08:32	09:40	10:36	20:54	21:20	22:19
1						
<b>S</b> 10° 20°	08:10 07:47	09:01 08:36	09:53 09:30	21:19 21:43	22:11 22:36	23:02 23:25
30°	07:47	08:36	09:30	21:43	22:30	23:25
35°	07:20	07:51	09:02	22:11	23:20	23.32
40°	06:45	07:31	08:26	22:47	23:40	
45°	06:23	07:08	08:03	23:11		00:03
<b>S</b> 50°	05:55	06:37	07:33	23:41		00:34
52°	05:41	06:22	07:18	23:56		00:49
54°	05:25	06:05	07:01		00:14	01:06
56°	05:06	05:43	06:40		00:35	01:27
58°	04:42	05:16	06:13		01:02	01:53
<b>S</b> 60°	04:12	04:38	05:37	00:20	01:41	02:30

		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	11-25%
25	15:53	15:57	11:44	14:44	02:19	
26	16:00	16:03	11:44	15:36	03:10	
27	16:06	16:08	11:44	16:28	04:02	

## October 28, 29, 30 UT (Tue., Wed., Thu.)

h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Tuo	CH4	CHV	Dec		Dec	CHA	Doc	GHA	Dos		SHA	Dos
Tue	GHA	GHA		GHA		GHA	Dec		Dec		эна	Dec
0	36°35.7	199°49.0	S05°29.9	164°25.2	S19°16.1	279°51.0	N21° 14.5	39°17.5	S03°51.9	Alpheratz	357°33.8	29° 14.2
1	51°38.1	214°48.6	31.1	179°25.9	16.6	294°53.3	14.5	54°20.0	51.9	Ankaa	353°06.1	-42°09.9
2	66°40.6	229°48.2	32.3	194°26.5	17.0	309°55.6	14.5	69°22.6	52.0	Schedar	349°29.8	56° 40.9
3	81°43.1	244°47.7	• • 33.5	209°27.2	• • 17.5	324°58.0	• • 14.5	84°25.2	• • 52.0	Diphda	348°46.3	-17°50.6
4	96°45.5	259°47.3	34.7	224°27.8	17.9	340°00.3	14.4	99°27.8	52.1	Achernar	335°19.1	-57°06.3
5	111°48.0	274°46.9	35.9	239°28.4	18.4	355°02.7	14.4	114°30.4	52.1	Hamal	$327^{\circ}50.1$	23°35.2
6	126°50.5	289°46.5	S05°37.1	254°29.1	\$19°18.8	10°05.0	N21° 14.4	129°33.0	S03°52.2	Polaris	313°13.2	89°22.3
7	141°52.9	304°46.0	38.3	269°29.7	19.3	25°07.3	14.4	144°35.5	52.2	Acamar	$315^{\circ}10.8$	-40°11.9
8	156°55.4	319°45.6	39.5	284°30.4	19.7	40°09.7	14.4	159°38.1 174°40.7	52.3	Menkar	$314^{\circ}05.1$	$4^{\circ}11.6$
9	171°57.8	334°45.2	• • 40.7	299°31.0	• • 20.2	55°12.0	• • 14.4	174 40.7 189°43.3	• • 52.3	Mirfak	308°26.8	49°57.2
10	187°00.3 202°02.8	349°44.7 4°44.3	41.9	314°31.7 329°32.3	20.7	70°14.4 85°16.7	14.4	189 43.3 204°45.9	52.3	Aldebaran	290°38.6	16°33.7
11 12	202 02.8 217°05.2	4 44.3 19°43.9	43.1 \$05°44.3	344°33.0	21.1 \$19°21.6	100°19.0	14.3 N21°14.3	204 45.9 219°48.5	52.4 \$03°52.4	Rigel	281°03.0	-8°10.1
13	217 05.2 232°07.7	34°43.4	45.5	359°33.6	22.0	100°19.0 115°21.4	14.3	219 46.5 234°51.0	52.5	Capella	280°20.6	46°01.4
13 14	247°10.2	49°43.0	45.5 46.7	14°34.3	22.5	115 21.4 130°23.7	14.3	249°53.6	52.5 52.5	Bellatrix	278°21.9	6°22.5
15	262°12.6	64°42.6	• • 47.9	29°34.9	22.9	145°26.1	. 14.3	264°56.2	52.6	Elnath	278°00.8	28° 37.7
16	277°15.1	79°42.2	49.1	44°35.6	23.4	160°28.4	14.3	279°58.8	52.6	Alnilam	275°36.8	$-1^{\circ}11.0$
17	292°17.6	94°41.7	50.3	59°36.2	23.8	175°30.7	14.2	295°01.4	52.7	Betelgeuse	270°51.2	7°24.8
18	307°20.0	109°41.3	S05°51.5	74°36.9	S19°24.3	190°33.1	N21°14.2	310°04.0	S03°52.7	Canopus	263°51.8	-52°42.2
19	322°22.5	124°40.9	52.7	89°37.5	24.7	205°35.4	14.2	325°06.5	52.7	Sirius	258°25.5	-16°44.9
20	337°25.0	139°40.4	53.9	104°38.1	25.2	200°37.8	14.2	340°09.1	52.8	Adhara	255°05.2	-29°00.1
21	352°27.4	154°40.4	55.1	119°38.8	25.6	235°40.1	. 14.2	355°11.7	• • 52.8	Procyon	244°50.1	5°09.6
22	7°29.9	169°39.6	56.3	134°39.4	26.1	250°42.5	14.2	10°14.3	52.9	Pollux	243°16.4	27°57.8
23	22°32.3	184°39.1	57.5	149°40.1	26.5	265°44.8	14.2	25°16.9	52.9	Avior	234°14.5	-59°35.1
										Suhail	222°45.9	-43°31.9
Mer.p	ass. 21:30	$\nu$ -0.4' d1	.2′ m-3.91	$\nu$ 0.6′ d0	.5′ m1.48	$\nu$ 2.3′ d-0	.0′ m-2.29	$\nu 2.6' \ d0$	.0′ m0.75	Miaplacidus	221°38.4	-69°49.0
										Alphard	217°47.2	-8°46.1
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.9	11°50.5
0	37°34.8	199°38.7	S05°58.7	164°40.7	\$19°27.0	280°47.2	N21° 14.1	40°19.4	S03°53.0	Dubhe	193°40.6	61°36.5
1	52°37.3	214°38.3	05°59.9	179°41.4	27.4	295°49.5	14.1	55°22.0	53.0	Denebola	182°24.5	14°25.7
2	67°39.7	214 36.3 229°37.8	05° 59.9	179 41.4 194°42.0	27.4	310°51.9	14.1	70°24.6	53.0	Gienah	175°43.2	-17°41.0
3	82°42.2	244°37.4	02.3	209°42.6	28.3	325°54.2	•• 14.1	85°27.2	53.1		173°00.0	-63°14.3
4	97°44.7	259°37.0	03.5	224°43.3	28.8	340°56.5	14.1	100°29.8	53.1	l l	171°51.5	-57° 15.3
5	112°47.1	274°36.5	04.7	239°43.9	29.2	355°58.9	14.1	115°32.3	53.2	Alioth	166°12.9	55°49.1
6	127°49.6	289°36.1	S06°06.0	254°44.6	\$19°29.7	11°01.2	N21°14.1	130°34.9	S03°53.2	Spica	158°21.9	-11° 17.7
7	142°52.1	304°35.7	07.2	269°45.2	30.1	26°03.6	14.0	145°37.5	53.3	Alkaid	152°52.0	49°11.0
8	157°54.5	319°35.2	08.3	284°45.9	30.6	41°05.9	14.0	160°40.1	53.3	Hadar	148°35.8	-60°29.8
9	172°57.0	334°34.8	09.5	299°46.5	· · 31.0	56°08.3	14.0	175°42.7	53.4		147°57.3	-36°29.7
10	187°59.5	349°34.4	10.7	314°47.1	31.5	71°10.6	14.0	190°45.2	53.4	Arcturus	145°47.7	19°02.9
11	203°01.9	4°33.9	11.9	329°47.8	31.9	86°13.0	14.0	205°47.8	53.4	Rigil Kent.	139°40.1	-60°56.5
12	218°04.4	19°33.5	S06°13.1	344°48.4	S19°32.3	101°15.3	N21°14.0	220°50.4	S03°53.5	Kochab	137°20.9	74°02.9
13	233°06.8	34°33.1	14.3	359°49.1	32.8	116°17.7	14.0	235°53.0	53.5	Zuben'ubi	136°55.6	-16°08.9
14	248°09.3	49°32.6	15.5	14°49.7	33.2	131°20.0	14.0	250°55.6	53.6	Alphecca	126°03.5	26° 37.8
15	263°11.8	64°32.2	16.7	29°50.3	33.7	146°22.4	13.9	265°58.1	53.6	Antares	112°15.4	-26°29.3
16	278°14.2	79°31.8	17.9	44°51.0	34.1	161°24.7	13.9	281°00.7	53.7	Atria	107°09.4	-69°04.5
17	293°16.7	94°31.3	19.1	59°51.6	34.6	176°27.1	13.9	296°03.3	53.7	Sabik	102°02.3	-15° 45.4
18	308°19.2	109°30.9	S06°20.3	74°52.3	S19°35.0	191°29.4	N21°13.9	311°05.9	S03°53.7	Shaula	96°09.8	-37°07.4
19	323°21.6	124°30.5	21.5	89°52.9	35.5	206°31.8	13.9	326°08.4	53.8	Rasalhague	95°58.2	12°32.6
20	338°24.1	139°30.0	22.7	104°53.5	35.9	221°34.2	13.9	341°11.0	53.8	Eltanin	90°42.2	51°29.3
21	353°26.6	154°29.6	• • 23.9	119°54.2	• • 36.4	236°36.5	· · 13.9	356°13.6	• • 53.9	Kaus Aust.	83°31.9	-34°22.4
22	8°29.0	169°29.1	25.1	134°54.8	36.8	251°38.9	13.8	11°16.2	53.9	Vega	80°33.0	38°48.7
23	23°31.5	184°28.7	26.3	149°55.4	37.2	266°41.2	13.8	26°18.8	54.0	Nunki	75°47.1	-26° 15.9
										Altair	61°59.4	8°56.3
Mer.p	ass. 21:26	$\nu$ -0.4′ d1	.2′ m-3.91	$\nu$ 0.6′ d0.	.4′ m1.47	$\nu 2.3' \ d-0$	.0′ m-2.30	$\nu$ 2.6′ d0	.0′ m0.75	Peacock	53°04.7	-56°39.3
										Deneb	49°25.4	45°22.6
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif Al Na'ir	33°38.1 27°31.9	9°59.8
0	38°33.9	199°28.3	S06°27.5	164°56.1	S19°37.7	281°43.6	N21°13.8	41°21.3		Fomalhaut	27°31.9 15°13.6	-46° 50.3 -29° 29.1
1	53°36.4	214°27.8	28.7	179°56.7	38.1	296°45.9	13.8	56°23.9	54.0	Scheat	15 13.6 13°44.4	-29 29.1 28°13.6
2	68°38.9	229°27.4	29.9	194°57.4	38.6	311°48.3	13.8	71°26.5	54.1	Markab	13°29.1	26 13.0 15°20.8
3	83°41.3	244°27.0	• • 31.1	209°58.0	• • 39.0	326°50.6	• • 13.8	86°29.1	• • 54.1	ividikaD	10 49.1	13 20.0
4	98°43.8	259°26.5	32.3	224°58.6	39.4	341°53.0	13.8	101°31.6	54.2	Oct 28 Tue	SHA	Mer.pass
5	113°46.3	274°26.1	33.5	239°59.3	39.9	356°55.3	13.8	116°34.2	54.2		$163^{\circ}13.3$	10:41
6	128°48.7	289°25.6	S06°34.7		S19°40.3	11°57.7	N21° 13.7		S03°54.2	Mars	$127^{\circ}49.5$	13:02
7	143°51.2	304°25.2	35.9	270°00.5	40.8	27°00.1	13.7	146°39.4	54.3	Jupiter	243°15.3	05:20
8	158°53.7	$319^{\circ}24.8$	37.1	285°01.2	41.2	42°02.4	13.7	161°42.0	54.3	Saturn	$2^{\circ}41.8$	21:19
9	173°56.1	334°24.3	• • 38.3	300°01.8	• • 41.7	57°04.8	• • 13.7	176°44.5	• • 54.4	Oot 20 14/	CIIA	Ma:: :-
10	188°58.6	349°23.9	39.5	315°02.4	42.1	72°07.1	13.7	191°47.1	54.4	Oct 29 Wed	SHA 162°03.0	Mer.pass
11	204°01.1	4°23.4	40.7	330°03.1	42.5	87°09.5	13.7	206°49.7	54.5		162°03.9	10:42
12	219°03.5	19°23.0	S06°41.9	345°03.7	S19°43.0	102°11.8	N21°13.7	221°52.3			127°05.9	13:01
13	234°06.0	34°22.6	43.1	$0^{\circ}04.3$	43.4	$117^{\circ}14.2$	13.7	236°54.8	54.5		243°12.4	05:16
14	249°08.4	49°22.1	44.2	$15^{\circ}05.0$	43.9	$132^{\circ}16.6$	13.6	251°57.4	54.6	Saturn	2°44.6	21:15
15	$264^{\circ}10.9$	64°21.7	• • 45.4	30°05.6	• • 44.3	$147^{\circ}18.9$	• • 13.6	267°00.0	• • 54.6	Oct 30 Thu	SHA	Mer.pass
16	$279^{\circ}13.4$	79°21.2	46.6	45°06.2	44.7	162°21.3	13.6	282°02.6	54.7		160°54.3	10:42
17	$294^{\circ}15.8$	94°20.8	47.8	$60^{\circ}06.9$	45.2	177°23.6	13.6	$297^{\circ}05.1$	54.7		126°22.1	13:00
18	309°18.3	109°20.4	S06°49.0	75°07.5	S19°45.6	192°26.0	N21°13.6		S03°54.7		243°09.6	05:12
19	324°20.8	124°19.9	50.2	$90^{\circ}08.1$	46.0	207°28.4	13.6	$327^{\circ}10.3$	54.8	Saturn	2°47.4	21:11
20	339°23.2	$139^{\circ}19.5$	51.4	$105^{\circ}08.8$	46.5	222°30.7	13.6	$342^{\circ}12.9$	54.8			
21	354°25.7	$154^{\circ}19.0$	• • 52.6	$120^{\circ}09.4$	• • 46.9	237°33.1	• • 13.6	$357^{\circ}15.4$	• • 54.9	Horizont	al parallax	
22	9°28.2	169°18.6	53.8	135°10.0	47.4	252°35.4	13.5	$12^{\circ}18.0$	54.9		Venus:	0.1
23	24°30.6	184°18.1	55.0	150°10.7	47.8	267°37.8	13.5	27°20.6	54.9		Mars:	0.1
Mers	ass. 21:22	ν-0 A' A1	.2′ m-3.91	ν0 6/ d0	.4′ m1.47	1/2 A/ d O	.0′ m-2.31	1/2 6/ 40	.0′ m0.76			
.vici.p		ν U.¬ UI	5.91	- J.J UU		ν <u>-</u> . ¬ u-0		- 2.0 uU				

h	Sui	Moon					
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	184°02.7	S13°07.8	109°01.3	9.8'	S26°59.7	-5.0'	54.9'
1	199°02.8	08.6	$123^{\circ}30.1$	9.8'	$26^{\circ}54.7$	-5.2'	54.9'
2	214°02.8	09.4	137°58.9	9.8'	26°49.5	-5.3'	54.9'
3	229°02.9	• • 10.3	152°27.7	9.9'	26°44.2	-5.4'	55.0'
4	244°02.9	11.1	166°56.6	9.9'	26°38.8	-5.6'	55.0'
5 6	259°03.0 274°03.0	12.0 \$13°12.8	181°25.5 195°54.5	9.9' 10.0'	26°33.2 \$26°27.5	-5.7' -5.8'	55.0' 55.0'
7	289°03.1	13.6	210°23.4	10.0'	26°21.7	-6.0'	55.1'
8	304°03.1	14.5	224°52.4	10.0'	26°15.7	-6.1	55.1'
9	319°03.2	• • 15.3	239°21.4	10.0'	26°09.6	-6.2	55.1'
10	334°03.2	16.1	253°50.5	10.1'	26°03.4	-6.4'	55.1'
11	349°03.3	17.0	$268^{\circ}19.5$	10.1'	25°57.0	-6.5'	55.2'
12	4°03.3	S13°17.8	282°48.6	10.1'	\$25°50.5	-6.6'	55.2'
13	19°03.4	18.6	297°17.8	10.2'	25°43.9	-6.8'	55.2'
14 15	34°03.4 49°03.4	19.5 · · 20.3	311°47.0 326°16.2	10.2' 10.2'	25°37.1 25°30.2	-6.9' -7.0'	55.2' 55.3'
16	64°03.5	21.1	340°45.4	10.2	25°23.1	-7.0 -7.2	55.3'
17	79°03.5	21.9	355° 14.7	10.3	25°16.0	-7.3	55.3'
18	94°03.6	<b>S</b> 13°22.8	9°44.0	10.3'	S25°08.7	-7.4'	55.4'
19	109°03.6	23.6	$24^{\circ}13.3$	10.4'	25°01.2	-7.6'	55.4'
20	124°03.7	24.4	38°42.7	10.4'	24°53.7	-7.7'	55.4'
21	139°03.7	• • 25.3	53°12.1	10.4'	24°46.0	-7.8'	55.4'
22	154°03.8	26.1	67°41.6	10.5'	24°38.2	-7.9'	55.5'
23	169°03.8	26.9	82°11.1	10.5'	24°30.2	-8.1'	55.5'
	SD = 16.1'	d = 0.8'		SI	O = 15.0'		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	184°03.8	S13°27.8	96°40.6	10.6'	S24°22.2	-8.2'	55.5'
1	199°03.9	28.6	$111^{\circ}10.1$	10.6'	24°14.0	-8.3'	55.5'
2	214°03.9	29.4	125°39.7	10.6'	24°05.6	-8.5'	55.6'
3	229°04.0	· · 30.2	140°09.4	10.7'	23°57.2	-8.6'	55.6'
4	244°04.0	31.1	154°39.0	10.7'	23°48.6	-8.7'	55.6'
5 6	259°04.0 274°04.1	31.9 \$13°32.7	169°08.8 183°38.5	10.7' 10.8'	23°39.9 <b>S</b> 23°31.1	-8.8' -8.9'	55.7' 55.7'
7	289°04.1	33.5	198° 08.3	10.8	23°22.1	-0.9 -9.1'	55.7'
8	304°04.2	34.4	212°38.1	10.9'	23°13.1	-9.2'	55.8'
9	319°04.2	• • 35.2	227°08.0	10.9'	23°03.9	-9.3'	55.8'
10	334°04.2	36.0	241°37.9	10.9'	22°54.6	-9.4'	55.8'
11	349°04.3	36.8	256°07.8	11.0'	22°45.1	-9.6'	55.9'
12	4°04.3	\$13°37.7	270°37.8	11.0'	\$22°35.6	-9.7'	55.9'
13	19°04.4 34°04.4	38.5	285°07.8 299°37.9	11.1'	22°25.9 22°16.1	-9.8'	55.9'
14 15	49°04.4	39.3 •• 40.1	299 37.9 314°08.0	11.1' 11.1'	22 16.1 22°06.2	-9.9' -10.0'	55.9' 56.0'
16	64°04.5	41.0	328°38.1	11.2'	21°56.2	-10.0	56.0'
17	79°04.5	41.8	343°08.3	11.2'	21°46.0	-10.3	56.0'
18	94°04.5	<b>S</b> 13°42.6	357°38.5	11.3'	S21°35.8	-10.4'	56.1'
19	109°04.6	43.4	12°08.8	11.3'	21°25.4	-10.5'	56.1'
20	124°04.6	44.2	26°39.0	11.3'	21°14.9	-10.6'	56.1'
21	139°04.7 154°04.7	· · 45.1 45.9	41°09.4 55°39.7	11.4' 11.4'	21°04.3 20°53.6	-10.7'	56.2' 56.2'
22 23	154 04.7 169°04.7	45.9 46.7	55 39.7 70°10.1	11.4 11.4'	20°53.6	-10.8' -10.9'	56.2'
23	SD = 16.1'	d = 0.8'			D = 15.1'	-10.5	30.2
	3D = 10.1	u = 0.8		31	J = 15.1		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	184°04.8	S13°47.5	84°40.6	11.5'	S20°31.8	-11.1'	56.3'
1 2	199°04.8 214°04.8	48.3	99°11.1 113°41.6	11.5'	20°20.7 20°09.6	-11.2' -11.3'	56.3'
3	214°04.8 229°04.9	49.2 •• 50.0	113°41.6 128°12.1	11.6' 11.6'	20°09.6 19°58.3	-11.3' -11.4'	56.4' 56.4'
4	244°04.9	50.8	142° 42.7	11.6'	19° 46.9	-11.4 -11.5'	56.4
5	259°04.9	51.6	157° 13.3	11.7'	19°35.4	-11.6'	56.5'
6	274°05.0	S13°52.4	171°44.0	11.7'	S19°23.8	-11.7'	56.5'
7	289°05.0	53.2	186° 14.7	11.7'	19°12.1	-11.8'	56.5'
8	304°05.0	54.1	200°45.4	11.8'	19°00.3	-11.9'	56.6'
9	319°05.1 334°05.1	• • 54.9	215°16.2 229°47.0	11.8' 11.8'	18°48.3 18°36.3	-12.0'	56.6'
10 11	334°05.1 349°05.1	55.7 56.5	229° 47.0 244° 17.8	11.8′ 11.9′	18°36.3 18°24.2	-12.1' -12.2'	56.6' 56.7'
12	4°05.1	\$13°57.3	258° 48.7	11.9'	\$18°11.9	-12.2	56.7'
13	19°05.2	58.1	273° 19.5	11.9'	17°59.6	-12.4'	56.7'
14	34°05.2	58.9	$287^{\circ}50.5$	12.0'	17°47.2	-12.5'	56.8'
15	49°05.2	13°59.8	302°21.4	12.0'	17°34.6	-12.6'	56.8'
16	64°05.3	14°00.6	316°52.4	12.0'	17°22.0	-12.7'	56.9'
17	79°05.3 94°05.3	01.4 \$14°02.2	331°23.4 345°54.5	12.0' 12.1'	17°09.2 \$16°56.4	-12.8'	56.9'
18 19	94°05.3 109°05.4	03.0	345°54.5 0°25.5	12.1'	16°43.5	-12.9' -13.0'	56.9' 57.0'
20	109 05.4 124°05.4	03.0	14°56.7	12.1'	16°30.4	-13.1'	57.0'
21	139°05.4	• • 04.6	29°27.8	12.1	16° 17.3	-13.1	57.1
22	154°05.4	05.4	43°58.9	12.2'	16°04.1	-13.3'	57.1'
23	169°05.5	06.2	$58^{\circ}30.1$	12.2'	$15^{\circ}50.8$	-13.4'	57.1'
	SD = 16.1'	d = 0.8'		SI	D = 15.3'		

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

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

## October 31, 01, 02 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	39°33.1	199° 17.7	S06°56.2	165°11.3	S19°48.2	282°40.2	N21°13.5	42°23.2	S03°55.0		JIIA	
1	54°35.6	214° 17.2	57.4	180°11.9	48.7	297°42.5	13.5	57°25.7	55.0	Alpheratz	357°33.8	29°14.2
2	69°38.0	229°16.8	58.5	195° 12.5	49.1	312°44.9	13.5	72°28.3	55.1	Ankaa	$353^{\circ}06.1$	-42°10.0
3	84°40.5	244° 16.4	06°59.7	210° 13.2	• • 49.5	327°47.3	• • 13.5	87°30.9	55.1	Schedar	349°29.8	56°41.0
4	99°42.9	259° 15.9	00° 59.7 07° 00.9	210 13.2 225°13.8	50.0	342°49.6	13.5	102°33.5	55.2	Diphda	348°46.3	-17°50.6
5	99 42.9 114°45.4			240°14.4	50.0	342 49.0 357°52.0		102 33.5 117°36.0		Achernar	$335^{\circ}19.1$	-57°06.3
	114 45.4 129°47.9	274°15.5	02.1			12°54.4	13.5		55.2	Hamal	$327^{\circ}50.1$	23°35.2
6		289°15.0	S07°03.3	255° 15.1	\$19°50.8		N21°13.5	132°38.6	S03°55.2	Polaris	313°12.8	89°22.3
7	144°50.3	304°14.6	04.5	270°15.7	51.3	27°56.7	13.4	147°41.2 162°43.7	55.3	Acamar	$315^{\circ}10.8$	-40°11.9
8	159°52.8	319°14.1	05.7	285°16.3	51.7	42°59.1	13.4		55.3	Menkar	$314^{\circ}05.1$	4°11.6
9	174°55.3	334°13.7	• • 06.9	300°16.9	• • 52.1	58°01.4	• • 13.4	177°46.3	• • 55.4	Mirfak	308°26.8	49°57.2
10	189°57.7	349°13.2	08.1	315°17.6	52.6	73°03.8	13.4	192°48.9	55.4	Aldebaran	290°38.6	16°33.8
11	205°00.2	4°12.8	09.2	330°18.2	53.0	88°06.2	13.4	207°51.5	55.4	Rigel	281°03.0	-8°10.1
12	220°02.7	19° 12.3	S07°10.4	345° 18.8	S19°53.4	103°08.5	N21°13.4	222°54.0	S03°55.5	Capella	280°20.6	46°01.4
13	235°05.1	34° 11.9	11.6	0°19.5	53.9	118° 10.9	13.4	237°56.6	55.5	Bellatrix	278°21.9	6°22.5
14	250°07.6	49° 11.4	12.8	15°20.1	54.3	133° 13.3	13.4	252°59.2	55.6	Elnath	278°00.8	28°37.7
15	265°10.0	64°11.0	• • 14.0	30°20.7	• • 54.7	148° 15.6	• • 13.4	268°01.8	• • 55.6	Alnilam	275°36.8	-1°11.0
16	280°12.5	79° 10.6	15.2	45°21.3	55.2	163°18.0	13.4	283°04.3	55.6	Betelgeuse	270°51.2	7°24.8
17	295°15.0	94° 10.1	16.4	60°22.0	55.6	178°20.4	13.3	298°06.9	55.7	Canopus	263°51.8	-52°42.2
18	310°17.4	109°09.7	S07°17.6	75°22.6	S19°56.0	193°22.8	N21°13.3	313°09.5	S03°55.7	Sirius	258°25.5	-16°44.9
19	325°19.9	124°09.2	18.7	90°23.2	56.5	208°25.1	13.3	328°12.0	55.8	Adhara	255°05.2	-29°00.2
20	340°22.4	139°08.8	19.9	105°23.8	56.9	223° 27.5	13.3	343°14.6	55.8	Procyon	244°50.1	5°09.6
21	355°24.8	154°08.3	• • 21.1	120°24.5	• • 57.3	238° 29.9	• • 13.3	358°17.2	• • 55.8	Pollux	243°16.4	27°57.8
22	10°27.3	169°07.9	22.3	135°25.1	57.7	253°32.2	13.3	13°19.8	55.9	Avior	234°14.4	-59°35.1
23	25°29.8	184°07.4	23.5	150°25.7	58.2	268°34.6	13.3	28°22.3	55.9	Suhail	222°45.9	-43°31.9
Mern	pass. 21:18	v=0.4' d1	.2′ m-3.91	ν0 6' d0	.4′ m1.46	v2 4' d-0	.0′ m-2.31	v2 6' d0	0′ m0.76	Miaplacidus	221°38.3	-69°49.0
- IVICI.P	7833. 21.10	ν-0.4 α1	.2 111-3.91	νο.σ ασ		ν2. <del>4</del> u-0	.0 111-2.51	ν2.0 do.	0 1110.70	Alphard	217°47.2	-8°46.1
										Regulus	207°33.9	11°50.5
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.6	61°36.5
0	40°32.2	199°07.0	S07°24.7	$165^{\circ}26.3$	S19°58.6	283°37.0	N21°13.3	43°24.9	S03°55.9	Denebola	182°24.5	14°25.7
1	55°34.7	$214^{\circ}06.5$	25.9	180°27.0	59.0	298°39.3	13.3	58°27.5	56.0	Gienah	162 24.5 175°43.2	-17°41.0
2	70°37.2	$229^{\circ}06.1$	27.0	195°27.6	59.5	313°41.7	13.2	73°30.0	56.0	Acrux	173°43.2	-63°14.3
3	85°39.6	244°05.6	• • 28.2	210°28.2	19°59.9	328°44.1	• • 13.2	88°32.6	• • 56.1		173 00.0 171°51.5	-03 14.3 -57°15.3
4	100°42.1	259°05.1	29.4	225°28.8	20°00.3	343°46.5	13.2	103°35.2	56.1			
5	115°44.5	274°04.7	30.6	240°29.4	00.7	358°48.8	13.2	118°37.8	56.1	Alioth	166°12.9	55°49.1
6	130°47.0	289°04.2	507°31.8	255°30.1	\$20°01.2	13°51.2	N21°13.2	133°40.3	S03°56.2	Spica	158°21.9	-11°17.7 49°11.0
7	145°49.5	304°03.8	33.0	270°30.7	01.6	28°53.6	13.2	148°42.9	56.2	Alkaid	152°52.0 148°35.8	
8	160°51.9	319°03.3	34.1	285°31.3	02.0	43°56.0	13.2	163°45.5	56.3	Hadar		-60°29.8
9	175°54.4	334°02.9	35.3	300°31.9	• • 02.5	58° 58.3	· · 13.2	178°48.0	56.3	Menkent	147°57.3	-36°29.7
10	190°56.9	349°02.4	36.5	315°32.6	02.9	74°00.7	13.2	193°50.6	56.3	Arcturus	145°47.7	19°02.9
11	205°59.3	4°02.0	37.7	330°33.2	03.3	89°03.1	13.2	208°53.2	56.4	Rigil Kent.	139°40.1	-60°56.5
12	221°01.8	19°01.5	S07°38.9	345°33.8	S20°03.7	104°05.5	N21°13.2	223°55.7	S03°56.4	Kochab	137°20.9	74°02.9
13	236°04.3	34°01.1	40.0	0°34.4	04.2	119°07.8	13.1	238°58.3	56.5	Zuben'ubi	136°55.6	-16°08.9
14	251°06.7	49°00.6	41.2	15°35.0	04.6	134° 10.2	13.1	254°00.9	56.5	Alphecca	126°03.5	26°37.7
15	266°09.2	64°00.2	42.4	30°35.7	05.0	149°12.6	13.1	269°03.5	• • 56.5	Antares	112°15.4	-26°29.3
16	281°11.7	78° 59.7	43.6	45°36.3	05.4	164° 15.0	13.1	284°06.0	56.6	Atria	107°09.5	-69°04.5
17	296°14.1	93°59.3	44.8	60°36.9	05.9	179° 17.3	13.1	299°08.6	56.6	Sabik	102°02.3	-15°45.4
18	311°16.6	108° 58.8	S07°45.9	75°37.5	S20°06.3	194° 19.7	N21°13.1	314°11.2	S03°56.6	Shaula	96°09.8	-37°07.4
19	326°19.0	123°58.3	47.1	90°38.1	06.7	209°22.1	13.1	329°13.7	56.7	Rasalhague	95°58.2	12°32.6
20	341°21.5	138° 57.9	48.3	105°38.8	07.1	224°24.5	13.1	344°16.3	56.7	Eltanin	90°42.2	51°29.3
21	356°24.0	153°57.4	49.5	120°39.4	07.5	239° 26.8	13.1	359°18.9	56.8	Kaus Aust.	83°31.9	-34°22.4
22	11°26.4	168°57.0	50.7	135°40.0	08.0	254° 29.2	13.1	14°21.4	56.8	Vega	80°33.0	38°48.7
23	26°28.9	183°56.5	51.8	150° 40.6	08.4	269°31.6	13.1	29°24.0	56.8	Nunki	75°47.1	-26°15.9
23	20 20.9			130 40.0				29 24.0	30.0	Altair	61°59.4	8°56.3
Mer.p	oass. 21:14	$\nu$ -0.5 $^{\prime}$ d1	.2′ m-3.91	$ u 0.6' \ d0$	$.4'~\mathrm{m}1.46$	$\nu$ 2.4′ d-0	.0′ m-2.32	$\nu 2.6' \ d0.$	0'  m 0.77	Peacock	53°04.7	-56°39.3
										Deneb	49°25.4	45°22.6
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.1	9°59.8
Sun O	41°31.4	198°56.1	507°53.0	165°41.2		284°34.0	N21°13.0	44°26.6	503°56.9	Al Na'ir	27°31.9	-46°50.3
1	56°33.8	213°55.6	54.2	180°41.8	09.2	299°36.4	13.0	59°29.1	56.9	Fomalhaut	15°13.6	-29°29.2
2	71°36.3	213 55.0 228°55.1	54.2 55.4	195° 42.5	09.2	299 30.4 314°38.7	13.0	74°31.7	56.9	Scheat	13°44.4	28°13.6
3	86°38.8	243°54.7	56.6	210° 43.1	•• 10.1	314 36.7 329°41.1	• • 13.0	89°34.3	57.0	Markab	13°29.1	15°20.8
3 4	00 30.0 101°41.2	243 54.7 258°54.2	57.7	210 43.1 225°43.7	10.1	344°43.5	13.0	09 34.3 104°36.8	57.0	Oct 31 Fri	SHA	Mer.pass
5	101 41.2 116°43.7	273° 53.8	07°58.9	240°44.3	10.5	359°45.9	13.0	104 30.6 119°39.4	57.0 57.1	I .	159°44.6	10:43
6	110 43.7 131°46.1	273 53.8 288°53.3	508°00.1	240 44.3 255°44.9	520°11.3	359 45.9 14°48.3	N21°13.0	119 39.4 134°42.0	57.1 \$03°57.1		125°38.2	12:59
7	131 40.1 146°48.6	200 55.5 303°52.8	01.3	270° 45.5	11.8	29°50.6	13.0	134 42.0 149°44.5	57.1		243°07.1	05:09
8	140 46.0 161°51.1	318° 52.4	01.3	270 45.5 285°46.2	12.2	44°53.0	13.0	149 44.5 164°47.1	57.1 57.2	Saturn	2°50.1	21:07
9	101 51.1 176°53.5	318 52.4 333°51.9	03.6	285 46.2 300°46.8	12.2	44 53.0 59°55.4	• • 13.0	164 47.1 179°49.7	57.2	Jatuill	_ JU.1	21.01
10	170 55.5 191°56.0	348°51.5	04.8	315° 47.4	13.0	74°57.8	13.0	179 49.7 194°52.2	57.2	Nov 01 Sat	SHA	Mer.pass
11	191 56.0 206°58.5	348 51.5 3°51.0	04.8 06.0	315 47.4 330°48.0	13.0	90°00.2	13.0	194 52.2 209°54.8	57.2 57.3	Venus	158°34.7	10:44
12	200 56.5 222°00.9	18° 50.5	508°07.1	345°48.6	520°13.9	90 00.2 105°02.6	N21°12.9	209 54.8 224°57.4	503°57.3	Mars	$124^{\circ}54.1$	12:58
13	222 00.9 237°03.4	33°50.1	08.3	0°49.2	14.3	105 02.6 120°04.9	N21 12.9 12.9	224 57.4 239°59.9	503 57.3 57.4	Jupiter	243°04.7	05:05
13 14	252°05.9	48°49.6	08.3 09.5	0 49.2 15°49.8	14.3 14.7	120 04.9 135°07.3	12.9	255°02.5	57.4 57.4	Saturn	$2^{\circ}52.7$	21:03
										N. 00.0	C	14
15 16	267°08.3	63°49.2	10.7	30°50.4	· · 15.1	150° 09.7 165° 12.1	12.9	270°05.1	· · 57.4	Nov 02 Sun	SHA	Mer.pass
16 17	282°10.8	78°48.7	11.8	45°51.1	15.5		12.9	285°07.6	57.5		157°24.7	10:45
17	297°13.3	93°48.2	13.0 \$08°14.2	60°51.7	15.9	180°14.5	12.9	300°10.2	57.5		124°09.9	12:57
18	312°15.7	108°47.8		75°52.3	\$20°16.4	195°16.9	N21°12.9	315°12.8	\$03°57.5		243°02.6	05:01
19	327°18.2	123°47.3	15.3	90°52.9	16.8	210° 19.3 225° 21.6	12.9	330°15.3	57.6	Saturn	2°55.2	20:59
20	342°20.6	138°46.8	16.5	105°53.5	17.2		12.9	345°17.9	57.6	Horizont	al parallax	
21	357°23.1	153°46.4	17.7	120°54.1	17.6	240°24.0	12.9	0°20.5	· · 57.6	1.51120110	Venus:	0.1
22	12°25.6	168°45.9	18.9	135°54.7	18.0	255°26.4	12.9	15°23.0	57.7 57.7		Mars:	0.1
23	27°28.0	183°45.4	20.0	150°55.3	18.4	270°28.8	12.9	30°25.6	57.7		141013.	0.1
Mer.p	ass. 21:10	$\nu$ -0.5 $^{\prime}$ d1	.2′ m-3.91	$\nu$ 0.6′ d0	.4′ m1.45	$\nu$ 2.4′ d-0	.0′ m-2.33	$\nu 2.6' \ d0.$	0′ m0.77			

h	Sui	า			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	184°05.5	<b>S</b> 14°07.1	73°01.3	12.2'	S15°37.4	-13.5'	57.2'
1	199°05.5 214°05.5	07.9 08.7	87°32.6 102°03.8	12.3'	15°23.9 15°10.3	-13.6' -13.7'	57.2'
2	214 05.5 229°05.6	09.5	102 03.8 116°35.1	12.3' 12.3'	15 10.3 14°56.6	-13.7 -13.8'	57.2' 57.3'
4	244°05.6	10.3	131°06.4	12.3'	14°42.8	-13.9'	57.3'
5	259°05.6	11.1	145°37.7	12.3'	14°28.9	-14.0'	57.4'
6	274°05.6 289°05.7	\$14°11.9	160°09.1 174°40.4	12.4'	\$14°15.0 14°00.9	-14.0'	57.4
7 8	289°05.7 304°05.7	12.7 13.5	174°40.4 189°11.8	12.4' 12.4'	14°00.9 13°46.8	-14.1' -14.2'	57.4' 57.5'
9	319°05.7	• • 14.3	203°43.2	12.4'	13°32.6	-14.3'	57.5'
10	334°05.7	15.1	218°14.6	12.4'	13°18.3	-14.4'	57.6'
11	349°05.8 4°05.8	15.9	232°46.1	12.4'	13°03.9	-14.5'	57.6'
12 13	4°05.8 19°05.8	\$14°16.7 17.5	247°17.5 261°49.0	12.5' 12.5'	\$12°49.5 12°34.9	-14.5' -14.6'	57.6' 57.7'
14	34°05.8	18.4	276°20.4	12.5'	12°20.3	-14.7'	57.7'
15	49°05.8	• • 19.2	290°51.9	12.5'	$12^{\circ}05.6$	-14.8'	57.8'
16	64°05.9	20.0	305°23.4	12.5'	11°50.8	-14.9'	57.8'
17 18	79°05.9 94°05.9	20.8 \$14°21.6	319°54.9 334°26.5	12.5' 12.5'	11°36.0 \$11°21.0	-14.9' -15.0'	57.8' 57.9'
19	109°05.9	22.4	348°58.0	12.5'	11°06.0	-15.1'	57.9'
20	124°05.9	23.2	3°29.5	12.5'	10°51.0	-15.2'	58.0'
21	139°06.0	• • 24.0	18°01.1 32°32.6	12.5'	10°35.8 10°20.6	-15.2'	58.0'
22 23	154°06.0 169°06.0	24.8 25.6	32°32.6 47°04.2	12.6' 12.6'	10°20.6 10°05.3	-15.3' -15.4'	58.0' 58.1'
23			<del>+1</del> 04.2			-13.4	50.1
	SD = 16.1'	d = 0.8'		SI	O = 15.6'		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0 1	184°06.0 199°06.0	\$14°26.4 27.2	61°35.7 76°07.3	12.6' 12.6'	\$09°49.9 09°34.4	-15.4' -15.5'	58.1' 58.2'
2	214°06.1	28.0	90°38.9	12.6'	09° 18.9	-15.6'	58.2
3	229°06.1	• • 28.8	105°10.4	12.6'	09°03.4	-15.6'	58.3'
4	244°06.1	29.6	119°42.0	12.6'	08°47.7	-15.7'	58.3'
5	259°06.1 274°06.1	30.4 \$14°31.2	134°13.5 148°45.1	12.6' 12.6'	08°32.0 \$08°16.2	-15.8' -15.8'	58.3' 58.4'
6 7	274 06.1 289°06.1	32.0	148 45.1 163°16.6	12.5'	08°00.4	-15.8 -15.9'	58.4'
8	304°06.2	32.8	177°48.2	12.5'	07°44.5	-16.0'	58.5'
9	319°06.2	• • 33.6	192°19.7	12.5'	07°28.6	-16.0'	58.5'
10	334°06.2	34.3	206°51.3	12.5'	07°12.5	-16.1'	58.5'
11 12	349°06.2 4°06.2	35.1 \$14°35.9	221°22.8 235°54.3	12.5' 12.5'	06° 56.5 \$06° 40.3	-16.1' -16.2'	58.6' 58.6'
13	19°06.2	36.7	250°25.8	12.5'	06°24.2	-16.2'	58.7'
14	34°06.2	37.5	264°57.3	12.5'	06°07.9	-16.3'	58.7'
15	49°06.3 64°06.3	· · 38.3	279°28.7 294°00.2	12.5'	05°51.6 05°35.3	-16.3'	58.7'
16 17	79°06.3	39.1 39.9	308°31.6	12.4' 12.4'	05° 35.3 05° 18.9	-16.4' -16.4'	58.8' 58.8'
18	94°06.3	S14°40.7	323°03.1	12.4'	S05°02.4	-16.5	58.9'
19	109°06.3	41.5	337°34.5	12.4'	04°45.9	-16.5'	58.9'
20	124°06.3	42.3 •• 43.1	352°05.9 6°37.2	12.4'	04°29.4	-16.6'	58.9'
21 22	139°06.3 154°06.3	43.1	21°08.6	12.3' 12.3'	04°12.8 03°56.2	-16.6' -16.7'	59.0' 59.0'
23	169°06.4	44.7	35°39.9	12.3'	03°39.5	-16.7	59.1'
	SD = 16.1'	d = 0.8'		SI	O = 15.9'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	184°06.4	S14°45.4	50°11.2	ν 12.3'	503°22.8	-16.8'	59.1'
1	199°06.4	46.2	64°42.4	12.2'	03°06.0	-16.8'	59.1'
2	214°06.4	47.0	79°13.7	12.2'	02°49.2	-16.8'	59.2'
3 4	229°06.4 244°06.4	· · 47.8 48.6	93°44.9 108°16.1	12.2' 12.1'	02°32.4 02°15.5	-16.9' -16.9'	59.2' 59.3'
5	259°06.4	49.4	100 10.1 122°47.2	12.1'	02 15.5 01°58.6	-16.9'	59.3'
6	274°06.4	<b>S</b> 14°50.2	137°18.3	12.1'	S01°41.7	-17.0'	59.3'
7	289°06.4	51.0	151°49.4	12.0'	01°24.7	-17.0'	59.4
8 9	304°06.4 319°06.4	51.8 •• 52.5	166°20.4 180°51.5	12.0' 12.0'	01°07.7 00°50.7	-17.0' -17.1'	59.4' 59.5'
10	334°06.4	53.3	195°22.4	11.9'	00°33.7	-17.1'	59.5'
11	349°06.5	54.1	209°53.3	11.9'	S00°16.6	-17.1'	59.5'
12	4°06.5	S14°54.9	224°24.2	11.8'	N00°00.5	17.1	59.6'
13 14	19°06.5 34°06.5	55.7 56.5	238°55.1 253°25.9	11.8' 11.8'	00°17.7 00°34.8	17.1' 17.2'	59.6' 59.6'
15	49°06.5	• • 57.3	267°56.6	11.7'	00°52.0	17.2'	59.0 59.7'
16	64°06.5	58.0	282°27.3	11.7'	01°09.2	17.2'	59.7'
17	79°06.5	58.8	296°58.0	11.6'	01°26.4	17.2'	59.8'
18 19	94°06.5 109°06.5	\$14°59.6 15°00.4	311°28.6 325°59.2	11.6' 11.5'	N01°43.6 02°00.8	17.2' 17.2'	59.8' 59.8'
20	109°06.5 124°06.5	01.2	325°59.2 340°29.7	11.5'	02°00.8 02°18.0	17.2	59.8° 59.9'
21	139°06.5	01.9	355°00.1	11.4'	02°35.3	17.3'	59.9'
22	154°06.5	02.7	9°30.5	11.3'	02°52.6	17.3'	59.9'
23	169°06.5	03.5	24°00.9	11.3'	03°09.8	17.3'	60.0'
	SD = 16.1'	d = 0.8'		SI	O = 16.1'		

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

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

ſ			Sun		Moon			
	Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
	,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	10-12	
L		mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	64-83%	
	31	16:22	16:23	11:44	19:46	07:22		
١	01	16:24	16:25	11:44	20:33	08:09		
١	02	16:25	16:26	11:44	21:21	08:56		

## November 03, 04, 05 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	42°30.5	198° 45.0	S08°21.2	165°56.0	\$20°18.9	285°31.2	N21°12.9	45°28.2	\$03°57.7			
1	57°33.0	213° 44.5	22.4	180°56.6	19.3	300°33.6	12.8	60°30.7	57.8	Alpheratz	357°33.8	29°14.2
2	72°35.4	228°44.1	23.5	195°57.2	19.7	315°36.0	12.8	75°33.3	57.8	Ankaa	353°06.1	-42°10.0
3	87°37.9	243°43.6	24.7	210°57.8	20.1	330°38.4	12.8	90°35.8	57.9	Schedar	349°29.8	56°41.0
4	102°40.4	258°43.1	25.9	225°58.4	20.5	345°40.7	12.8	105°38.4	57.9	Diphda	348°46.3	-17°50.6
5	$117^{\circ}42.8$	273°42.7	27.1	240°59.0	20.9	0°43.1	12.8	120°41.0	57.9	Achernar	335°19.1 327°50.1	-57°06.3 23°35.2
6	132°45.3	288°42.2	S08°28.2	255°59.6	520°21.3	15°45.5	N21°12.8	135°43.5	S03°58.0	Hamal Polaris	313°12.5	23 35.2 89°22.4
7	147°47.7	303°41.7	29.4	271°00.2	21.8	30°47.9	12.8	150°46.1	58.0	Acamar	315°10.8	-40°11.9
8	162°50.2	318°41.3	30.6	286°00.8	22.2	45°50.3	12.8	165°48.7	58.0	Menkar	314°05.1	4°11.6
9	177°52.7	333° 40.8	• • 31.7	301°01.4	• • 22.6	60°52.7	• • 12.8	180°51.2	• • 58.1	Mirfak	308°26.8	49°57.2
10	192°55.1	348°40.3	32.9	316°02.1	23.0	75°55.1	12.8	195°53.8	58.1	Aldebaran	290°38.6	16°33.8
11	207°57.6	3°39.8	34.1	331°02.7	23.4	90°57.5	12.8	210°56.4	58.1	Rigel	281°03.0	-8°10.1
12 13	223°00.1 238°02.5	18°39.4 33°38.9	S08°35.2	346°03.3 1°03.9	\$20°23.8	105°59.9 121°02.3	N21°12.8 12.8	225°58.9 241°01.5	\$03°58.2	Capella	280°20.5	46°01.4
14	250 02.5 253°05.0	35 36.9 48°38.4	36.4 37.6	1 03.9 16°04.5	24.2 24.6	121 02.3 136°04.7	12.8	241 01.5 256°04.0	58.2 58.2	Bellatrix	$278^{\circ}21.9$	6°22.5
15	268°07.5	63°38.0	38.7	31°05.1	25.0	151°07.0	. 12.8	271°06.6	• • 58.3	Elnath	278°00.7	28°37.8
16	283°09.9	78°37.5	39.9	46°05.7	25.5	166°09.4	12.8	286°09.2	58.3	Alnilam	275°36.8	-1°11.0
17	298°12.4	93°37.0	41.1	61°06.3	25.9	181°11.8	12.7	301°11.7	58.4	Betelgeuse	270°51.1	7°24.8
18	313°14.9	108°36.6	508°42.2	76°06.9	S20°26.3	196°14.2	N21°12.7	316°14.3	S03°58.4	Canopus	263°51.8	-52°42.2
19	328°17.3	123°36.1	43.4	91°07.5	26.7	211°16.6	12.7	331°16.8	58.4	Sirius	258°25.5	-16°44.9
20	$343^{\circ}19.8$	138°35.6	44.6	106°08.1	27.1	$226^{\circ}19.0$	12.7	346°19.4	58.5	Adhara	255°05.2 244°50.0	-29°00.2 5°09.6
21	358°22.2	153°35.1	• • 45.7	121°08.7	• • 27.5	241°21.4	• • 12.7	1°22.0	• • 58.5	Procyon Pollux	244 50.0 243°16.4	27°57.8
22	13°24.7	168°34.7	46.9	136°09.3	27.9	256°23.8	12.7	16°24.5	58.5	Avior	234°14.4	-59°35.2
23	28°27.2	183°34.2	48.1	151°09.9	28.3	271°26.2	12.7	31°27.1	58.6	Suhail	222°45.9	-43°31.9
Mern	ass. 21:06	$\nu$ -0.5' d1	.2′ m-3.91	$\nu 0.6' d0$	.4′ m1.45	ν2.4' d-0	.0′ m-2.34	$\nu 2.6' d0$	.0′ m0.78	Miaplacidus	221°38.3	-69°49.0
		- 0.0 01.								Alphard	217°47.2	-8°46.1
_			_		_		_		_	Regulus	207°33.9	11°50.5
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	<b>GHA</b> 46°29.7	Dec	Dubhe	193°40.5	61°36.5
0	43°29.6	198°33.7	\$08°49.2	166°10.5	\$20°28.7	286°28.6	N21°12.7		S03°58.6	Denebola	$182^{\circ}24.5$	14°25.7
1	58°32.1 73°34.6	213°33.3 228°32.8	50.4	181°11.1 196°11.7	29.1 29.5	301°31.0 316°33.4	12.7 12.7	61°32.2 76°34.8	58.6	Gienah	$175^{\circ}43.2$	-17°41.0
2	73 34.0 88°37.0	243°32.3	51.5 • • 52.7	211°12.3	29.9	331°35.8	•• 12.7	91°37.3	58.7 •• 58.7		173°00.0	-63°14.3
4	103°39.5	258°31.8	53.9	211 12.3 226°13.0	30.4	346°38.2	12.7	106°39.9	58.7	Gacrux	171°51.4	-57°15.3
5	103° 39.3 118° 42.0	273°31.4	55.0	241°13.6	30.4	1°40.6	12.7	100 39.9 121°42.5	58.8	Alioth	166°12.9	55°49.1
6	133°44.4	288°30.9	S08°56.2	256°14.2	S20°31.2	16°43.0	N21°12.7	136°45.0	S03°58.8	Spica	158°21.9	-11°17.7
7	148°46.9	303°30.4	57.3	271°14.8	31.6	31°45.4	12.7	151°47.6	58.8	Alkaid	152°51.9	49°11.0
8	163°49.3	318°29.9	58.5	286°15.4	32.0	46°47.8	12.7	166°50.1	58.9	Hadar	148°35.8	-60°29.8
9	178°51.8	333° 29.5	08°59.7	301°16.0	• • 32.4	61°50.2	• • 12.7	181°52.7	• • 58.9	Menkent Arcturus	147°57.3 145°47.7	-36°29.7 19°02.9
10	193°54.3	348°29.0	09°00.8	316°16.6	32.8	76°52.6	12.6	196°55.3	58.9	Rigil Kent.	139°40.1	-60°56.5
11	208°56.7	3°28.5	02.0	331°17.2	33.2	91°55.0	12.6	211°57.8	59.0	Kochab	137°21.0	74°02.9
12	223°59.2	18°28.0	S09°03.1	346°17.8	S20°33.6	106°57.4	N21°12.6	227°00.4	S03°59.0	Zuben'ubi	136°55.6	-16°08.9
13	239°01.7	33°27.6	04.3	1°18.4	34.0	121°59.8	12.6	242°02.9	59.0	Alphecca	126°03.5	26°37.7
14	254°04.1	48°27.1	05.5	16°19.0	34.4	137°02.2	12.6	257°05.5	59.1	Antares	112°15.4	-26°29.3
15	269°06.6	63°26.6	• • 06.6	31°19.6	• • 34.8	152°04.6	• • 12.6	272°08.1	• • 59.1	Atria	107°09.5	-69°04.5
16	284°09.1	78°26.1	07.8	46°20.2	35.2	167°07.0	12.6	287°10.6	59.1	Sabik	$102^{\circ}02.3$	-15°45.4
17	299°11.5	93°25.6	08.9	61°20.8	35.6	182°09.4	12.6	302°13.2	59.2	Shaula	$96^{\circ}09.8$	-37°07.4
18 19	314°14.0 329°16.5	108°25.2 123°24.7	S09°10.1 11.3	76°21.4 91°22.0	\$20°36.0 36.4	197°11.8 212°14.2	N21°12.6 12.6	317°15.7 332°18.3	\$03°59.2 59.2	Rasalhague	95°58.2	12°32.6
20	344°18.9	138° 24.7	12.4	106°22.6	36.8	212 14.2 227°16.6	12.6	347°20.8	59.2	Eltanin	90°42.3	51°29.3
21	359°21.4	153° 23.7	. 13.6	121°23.2	• • 37.2	242°19.0	12.6	2°23.4	59.3	Kaus Aust.	83°31.9	-34°22.4
22	14°23.8	168°23.2	14.7	136°23.8	37.6	257°21.4	12.6	17°26.0	59.3	Vega	80°33.0	38°48.6
23	29°26.3	183°22.8	15.9	151°24.4	38.0	272°23.8	12.6	32°28.5	59.4	Nunki	75°47.1 61°59.4	-26°15.9
				0.6/10	4/ 1.44	0.4/ 1.0		_		Altair	51 59.4 53°04.8	8°56.3 -56°39.3
ivier.p	ass. 21:03	$\nu$ -0.5 a1.	.2′ m-3.91	$\nu$ 0.6 a0.	.4′ m1.44	$\nu$ 2.4° $a$ -0.	.0′ m-2.34	$\nu$ 2.6° $a$ 0.	.0′ m0.78	Peacock Deneb	49°25.4	-50 39.3 45°22.6
										Enif	33°38.1	9°59.8
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°31.9	-46°50.3
0	44°28.8	198°22.3	S09°17.0	166°25.0	S20°38.4	287°26.2	N21°12.6		S03°59.4	Fomalhaut	15°13.6	-29°29.2
1	59°31.2	213°21.8	18.2	181°25.6	38.8	302°28.6	12.6	62°33.6	59.4	Scheat	$13^{\circ}44.4$	28°13.6
2	74°33.7	228°21.3	19.3	196°26.2	39.2	317°31.0	12.6	77°36.2	59.5	Markab	$13^{\circ}29.1$	15°20.8
3	89°36.2 104°38.6	243°20.8 258°20.4	· · 20.5 21.7	211°26.8 226°27.3	· · 39.6 40.0	332°33.4 347°35.8	· · 12.6	92°38.7 107°41.3	· · 59.5	Nov 03 Mon	SHA	Mer.pass
4 5	104 38.6 119°41.1	258° 20.4 273° 19.9	21.7	226°27.3 241°27.9	40.0 40.4	347°35.8 2°38.2	12.6 12.6	107°41.3 122°43.9	59.5 59.6		3HA 156°14.5	10:45
6	119 41.1 134°43.6	273 19.9 288° 19.4	509°24.0		520°40.8	2 38.2 17°40.7	N21°12.6		59.6 S03°59.6		130°14.5	12:56
7	149°46.0	303°18.9	25.1	271°29.1	41.2	32°43.1	12.6	152°49.0	59.6	Jupiter		04:57
8	164°48.5	318° 18.4	26.3	286°29.7	41.6	47°45.5	12.6	167°51.5	59.7	Saturn	2°57.7	20:55
9	179°51.0	333° 17.9	• • 27.4	301°30.3	• • 42.0	62°47.9	12.5	182°54.1	• • 59.7			
10	194°53.4	348° 17.5	28.6	316°30.9	42.4	77°50.3	12.5	197°56.6	59.7	Nov 04 Tue	SHA 155°04 1	Mer.pass
11	209°55.9	3°17.0	29.7	$331^{\circ}31.5$	42.8	92°52.7	12.5	$212^{\circ}59.2$	59.8		155°04.1 122°40.9	10:46 12:55
12	224°58.3	18° 16.5	S09°30.9	346°32.1	S20°43.2	107°55.1	N21°12.5	228°01.8	S03°59.8		242°59.0	04:53
13	240°00.8	33°16.0	32.0	1°32.7	43.6	122°57.5	12.5	243°04.3	59.8	Saturn	3°00.0	20:50
14	255°03.3	48° 15.5	33.2	16°33.3	44.0	137°59.9	12.5	258°06.9	59.8			
15	270°05.7	63°15.0	• • 34.3	31°33.9	• • 44.4	153°02.3	• • 12.5	273°09.4	• • 59.9	Nov 05 Wed	SHA	Mer.pass
16	285°08.2	78°14.5	35.5	46°34.5	44.8	168°04.7	12.5	288°12.0	59.9		153°53.5	10:47
17 18	300°10.7 315°13.1	93°14.1 108°13.6	36.6 \$09°37.8	61°35.1	45.2 \$20°45.6	183°07.2 198°09.6	12.5 N21°12.5	303°14.5 318°17.1	03°59.9 S04°00.0		121°56.2	12:54
18	315 13.1 330°15.6	108 13.6 123°13.1	38.9	91°36.3	46.0	213°12.0	12.5	318 17.1 333°19.6	00.0		242°57.4	04:49
20	345°18.1	138° 12.6	40.1	106°36.9	46.4	213 12.0 228°14.4	12.5	348°22.2	00.0	Saturn	3°02.3	20:46
21	0°20.5	153° 12.1	• • 41.2	121°37.5	• • 46.7	243°16.8	. 12.5	3°24.8	00.1	Horizont	al parallax	
22	15°23.0	168° 11.6	42.4	136°38.0	47.1	258°19.2	12.5	18°27.3	00.1		Venus:	0.1
23	30°25.5	$183^{\circ}11.1$	43.5	151°38.6	47.5	273°21.6	12.5	33°29.9	00.1		Mars:	0.1
Mern	ass. 20:59	ν-0 5/ d1	.2′ m-3.91	ν0 6/ d0	.4′ m1.44	ν2 4' d-Ω	.0′ m-2.35	v2 6/ d0	.0′ m0.79			
- wier.p		ν 0.5 u1.	111-3.91	ν σ.σ   ασ.		ν Δ.¬ u-0	1174.33	ν 2.0 UU.				

h	Su	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	184°06.5	<b>S</b> 15°04.3	38°31.1	11.2'	N03°27.1	17.3'	60.0'
1 2	199°06.5 214°06.5	05.1 05.8	53°01.4 67°31.5	11.2' 11.1'	03°44.4 04°01.6	17.3' 17.3'	60.0' 60.1'
3	214 00.5 229°06.5	. 06.6	82°01.6	11.0'	04° 18.9	17.3	60.1
4	244°06.5	07.4	96°31.7	11.0'	04°36.2	17.3'	60.1'
5	259°06.5	08.2	111°01.6	10.9'	04°53.4	17.3'	60.2'
6 7	274°06.5 289°06.5	\$15°09.0 09.7	125°31.5 140°01.4	10.8' 10.8'	N05° 10.7 05° 27.9	17.3' 17.2'	60.2' 60.2'
8	304°06.5	10.5	154°31.1	10.7	05°45.2	17.2'	60.3
9	319°06.5	• • 11.3	169°00.8	10.6'	06°02.4	17.2'	60.3'
10	334°06.5	12.1	183°30.5	10.6'	06°19.6	17.2'	60.3
11 12	349°06.5 4°06.5	12.8 \$15°13.6	198°00.0 212°29.5	10.5' 10.4'	06°36.8 N06°54.0	17.2' 17.2'	60.4' 60.4'
13	19°06.5	14.4	226°58.9	10.3'	07°11.2	17.1	60.4
14	34°06.5	15.2	241°28.2	10.2'	$07^{\circ}28.3$	17.1'	60.5'
15	49°06.5 64°06.5	• • 15.9	255°57.5 270°26.7	10.2'	07°45.4	17.1'	60.5'
16 17	79°06.5	16.7 17.5	270° 26.7 284° 55.8	10.1' 10.0'	08°02.5 08°19.6	17.1' 17.0'	60.5' 60.6'
18	94°06.5	\$15°18.3	299°24.8	9.9'	N08°36.6	17.0'	60.6
19	109°06.5	19.0	313°53.7	9.8'	08°53.6	17.0'	60.6'
20	124°06.5	19.8	328°22.5	9.8'	09°10.6	16.9'	60.6'
21 22	139°06.5 154°06.5	· · 20.6 21.3	342°51.3 357°19.9	9.7' 9.6'	09°27.5 09°44.4	16.9' 16.9'	60.7' 60.7'
23	169°06.5	22.1	11°48.5	9.5'	10°01.3	16.8'	60.7
	SD = 16.1'	d = 0.8'		SI	0 = 16.4'		
				J.	10.7		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	184°06.5 199°06.4	\$15°22.9 23.7	26°17.0 40°45.4	9.4' 9.3'	N10°18.1 10°34.9	16.8' 16.7'	60.7' 60.8'
2	214°06.4	24.4	55°13.7	9.3 9.2'	10°51.6	16.7	60.8
3	229°06.4	• • 25.2	69°41.9	9.1'	11°08.3	16.6'	60.8
4	244°06.4	26.0	84°10.0	9.0'	11°24.9	16.6'	60.8'
5 6	259°06.4 274°06.4	26.7 \$15°27.5	98°38.0 113°06.0	8.9' 8.8'	11°41.4 N11°58.0	16.5' 16.5'	60.9' 60.9'
7	289°06.4	28.3	127°33.8	8.7'	12°14.4	16.4	60.9
8	304°06.4	29.0	142°01.5	8.6'	12°30.8	16.3'	60.9
9	319°06.4	• • 29.8	156°29.1	8.5'	12°47.1	16.3'	61.0'
10 11	334°06.4 349°06.4	30.6 31.3	170°56.7 185°24.1	8.4' 8.3'	13°03.4 13°19.6	16.2' 16.1'	61.0' 61.0'
12	4°06.3	\$1.5 \$15°32.1	105 24.1 199°51.4	8.2'	N13°35.7	16.1	61.0'
13	19°06.3	32.8	214°18.6	8.1'	13°51.8	16.0'	61.0'
14	34°06.3	33.6	228°45.7	8.0'	14°07.8	15.9'	61.1'
15 16	49°06.3 64°06.3	· · 34.4 35.1	243°12.7 257°39.6	7.9' 7.8'	14°23.7 14°39.5	15.8' 15.7'	61.1' 61.1'
17	79°06.3	35.1	272°06.4	7.6 7.7'	14°55.3	15.7	61.1
18	94°06.3	S15°36.7	286°33.1	7.6'	N15°10.9	15.6'	61.1'
19	109°06.3	37.4	300°59.7	7.5'	15°26.5	15.5'	61.1'
20 21	124°06.2 139°06.2	38.2 •• 38.9	315°26.1 329°52.5	7.4' 7.2'	15° 42.0 15° 57.4	15.4′ 15.3′	61.2' 61.2'
22	154°06.2	39.7	344°18.7	7.1'	16° 12.7	15.2'	61.2'
23	169°06.2	40.5	358°44.9	7.0'	$16^{\circ}27.9$	15.1'	61.2'
	SD = 16.1'	d = 0.8'		SE	0 = 16.6'		
Wed 0	<b>GHA</b> 184°06.2	<b>Dec</b> \$15°41.2	<b>GHA</b> 13°10.9	u 6.9'	<b>Dec</b> N16° 43.0	<i>d</i> 15.0'	<b>HP</b> 61.2'
1	199°06.2	42.0	27°36.8	6.8'	$16^{\circ}58.1$	14.9'	61.2'
2	214°06.2	42.7	42°02.6	6.7'	17° 13.0	14.8'	61.2'
3 4	229°06.1 244°06.1	· · 43.5 44.3	56°28.2 70°53.8	6.6' 6.4'	17° 27.8 17° 42.5	14.7' 14.6'	61.3' 61.3'
5	259°06.1	44.3 45.0	85°19.3	6.3'	17 42.5 17°57.1	14.5	61.3
6	274°06.1	S15°45.8	99°44.6	6.2'	$N18^{\circ}11.5$	14.4'	61.3'
7	289°06.1	46.5	114°09.8	6.1'	18°25.9	14.2'	61.3'
8 9	304°06.1 319°06.0	47.3 • • 48.0	128°34.9 142°59.9	6.0' 5.9'	18° 40.1 18° 54.3	14.1' 14.0'	61.3' 61.3'
10	334°06.0	48.8	157°24.8	5.8'	10° 08.3	13.9'	61.3
11	349°06.0	49.5	171°49.5	5.6'	$19^{\circ}22.1$	13.8'	61.3'
12	4°06.0	S15°50.3	186°14.2	5.5'	N19°35.9	13.6'	61.3'
13 14	19°06.0 34°05.9	51.0 51.8	200°38.7 215°03.1	5.4' 5.3'	19°49.5 20°03.0	13.5' 13.4'	61.3' 61.4'
15	49°05.9	• • 52.6	215 03.1 229°27.4	5.3' 5.2'	20° 16.4	13.4	61.4
16	64°05.9	53.3	243°51.6	5.1'	20°29.6	13.1'	61.4'
17	79°05.9	54.1	258°15.7	5.0'	20°42.7	12.9'	61.4'
18 19	94°05.9 109°05.8	\$15°54.8 55.6	272°39.6 287°03.5	4.8' 4.7'	N20°55.6 21°08.4	12.8' 12.6'	61.4' 61.4'
20	124°05.8	56.3	301°27.2	4.6'	21°21.0	12.5'	61.4
21	139°05.8	• • 57.1	315°50.8	4.5'	21°33.5	12.3'	61.4'
22 23	154°05.8 169°05.7	57.8 59.6	330°14.3 344°37.7	4.4' 4.3'	21°45.9 21°58.1	12.2'	61.4' 61.4'
23		58.6	344 31.1			12.0'	01.4
	SD = 16.1'	d = 0.8'		SE	0 = 16.7'		

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

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

		Sun		Moon			
Day	Eqn.of	f Time	Mer.	Mer.	Age		
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	13-15	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	91-99%	
03	16:26	16:26	11:44	22:11	09:45		
04	16:26	16:25	11:44	23:05	10:38		
05	16:25	16:24	11:44	-:-	11:34		

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

h	Aries	Ve	nus	Ma	ars	Jup	oiter	Sat	urn		Stars	
Thu -	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	45°27.9	198° 10.6	S09°44.7	166° 39.2	\$20°47.9	288°24.0	N21°12.5	48°32.4	S04°00.2			
										Alpheratz	357°33.8	29°14.2
1	60°30.4	213°10.2	45.8 46.0	181°39.8	48.3	303°26.5	12.5	63°35.0	00.2	Ankaa	353°06.1	-42°10.0
2	75°32.8	228°09.7	46.9	196°40.4	48.7	318°28.9	12.5	78° 37.5	00.2	Schedar	349°29.8	56°41.0
3	90°35.3	243°09.2	• • 48.1	211°41.0	• • 49.1	333°31.3	• • 12.5	93°40.1	00.3	Diphda	348°46.4	-17°50.6
4	105°37.8	258°08.7	49.2	226°41.6	49.5	348°33.7	12.5	108° 42.6	00.3	Achernar	335°19.1	-57°06.4
5	120°40.2	273°08.2	50.4	241°42.2	49.9	3°36.1	12.5	123°45.2	00.3	Hamal	327°50.1	23°35.2
6	135°42.7	288°07.7	S09°51.5	256° 42.8	\$20°50.3	18° 38.5	N21°12.5	138°47.7	S04°00.3	Polaris	313°11.8	89°22.4
7	150°45.2	303°07.2	52.7	271°43.4	50.7	33°40.9	12.5	153°50.3	00.4	Acamar	315°10.8	-40°12.0
8	165°47.6	$318^{\circ}06.7$	53.8	286°43.9	51.1	48°43.4	12.5	$168^{\circ}52.8$	00.4	Menkar	314°05.1	4°11.6
9	180°50.1	333°06.2	• • 55.0	301°44.5	• • 51.4	63°45.8	• • 12.5	183°55.4	• • 00.4		308°26.8	49°57.2
10	195°52.6	348°05.7	56.1	316°45.1	51.8	78°48.2	12.5	198°57.9	00.5	Mirfak		
11	210°55.0	3°05.2	57.2	331°45.7	52.2	93°50.6	12.5	214°00.5	00.5	Aldebaran	290°38.5	16°33.7
12	225°57.5	18°04.7	509°58.4	346°46.3	520°52.6	108°53.0	N21°12.5	229°03.1	S04°00.5	Rigel	281°02.9	-8°10.2
13	240°59.9	33°04.2	09°59.5	1°46.9	53.0	123°55.4	12.5	244°05.6	00.6	Capella	280°20.5	46°01.4
14	256°02.4	48°03.8	10°00.7	16° 47.5	53.4	138° 57.9	12.5	259°08.2	00.6	Bellatrix	278°21.9	6°22.5
15	271°04.9	63°03.3	01.8	31°48.1	• • 53.8	154°00.3	12.5	274° 10.7	00.6	Elnath	278°00.7	28°37.7
16	286°07.3	78°02.8	02.9	46°48.7	54.2	169°02.7	12.5	289° 13.3	00.6	Alnilam	275°36.8	$-1^{\circ}11.0$
17	301°09.8	93°02.3	04.1	61°49.2	54.6	184°05.1	12.5	304° 15.8		Betelgeuse	$270^{\circ}51.1$	7°24.8
									00.7	Canopus	263°51.7	-52°42.2
18	316°12.3	108°01.8	\$10°05.2	76°49.8	\$20°54.9	199°07.5	N21°12.5	319°18.4	\$04°00.7	Sirius	258°25.5	-16°44.9
19	331°14.7	123°01.3	06.4	91°50.4	55.3	214° 10.0	12.5	334°20.9	00.7	Adhara	255°05.1	-29°00.2
20	346°17.2	138°00.8	07.5	106°51.0	55.7	229° 12.4	12.5	349°23.5	8.00	Procyon	244°50.0	5°09.6
21	$1^{\circ}19.7$	153°00.3	•• 08.6	121°51.6	• • 56.1	244°14.8	• • 12.5	4°26.0	00.8	Pollux	243°16.4	27°57.8
22	16°22.1	$167^{\circ}59.8$	09.8	136°52.2	56.5	259° 17.2	12.5	19°28.6	8.00	Avior	234°14.4	-59°35.2
23	31°24.6	182°59.3	10.9	151°52.8	56.9	$274^{\circ}19.6$	12.5	34°31.1	00.9			
N.A -	20.55	0 5/ /3	1/ == 2.01	0.6/ 10	4/ -1 42	0 4/ 10	0/ == 2.36	6/ 10	0/ 0 70	Suhail	222°45.8	-43°31.9 -69°49.0
ivler.p	ass. 20:55	$\nu$ -0.5′ $d1$	.1′ m-3.91	$\nu$ 0.6′ $d$ 0.	.4′ m1.43	$\nu$ 2.4′ d-0	.0′ m-2.36	$\nu$ 2.6′ $d0$	.0′ m0.79	Miaplacidus	221°38.2	
										Alphard	217°47.1	-8°46.1
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.8	11°50.5
0	46°27.1		\$10°12.1		\$20°57.3		N21°12.5		S04°00.9	Dubhe	193°40.5	61°36.5
		197°58.8 212°58.3		166°53.3 181°53.9		289°22.1 304°24.5		49°33.7		Denebola	182°24.5	14°25.7
1	61°29.5		13.2		57.6		12.5	64°36.2	00.9	Gienah	175°43.2	$-17^{\circ}41.0$
2	76°32.0	227° 57.8	14.3	196°54.5	58.0	319°26.9	12.4	79°38.8	00.9	Acrux	173°00.0	-63°14.3
3	91°34.4	242°57.3	• • 15.5	211°55.1	• • 58.4	334° 29.3	• • 12.4	94°41.3	• • 01.0	Gacrux	171°51.4	$-57^{\circ}15.3$
4	106°36.9	257° 56.8	16.6	226°55.7	58.8	349°31.8	12.4	109°43.9	01.0	Alioth	166°12.9	55°49.0
5	121°39.4	272°56.3	17.7	241°56.3	59.2	4°34.2	12.4	124°46.4	01.0	Spica	158°21.9	-11°17.7
6	136°41.8	287°55.8	S10°18.9	256° 56.8	S20°59.6	19°36.6	N21°12.4	139°49.0	S04°01.1	Alkaid	152°51.9	49°11.0
7	151°44.3	$302^{\circ}55.3$	20.0	271°57.4	20°59.9	34°39.0	12.4	154°51.5	01.1	Hadar	132 31.9 148°35.7	-60°29.7
8	166°46.8	$317^{\circ}54.8$	21.1	286°58.0	21°00.3	49°41.5	12.4	$169^{\circ}54.1$	01.1		148 35.7 147°57.2	-60° 29.7 -36° 29.7
9	181°49.2	332°54.3	• • 22.3	301°58.6	• • 00.7	64° 43.9	• • 12.4	184° 56.6	• • 01.1			
10	196°51.7	347°53.8	23.4	316°59.2	01.1	79°46.3	12.4	199°59.2	01.2	Arcturus	145°47.6	19°02.9
11	211°54.2	2°53.3	24.5	331°59.8	01.5	94° 48.7	12.4	215°01.7	01.2	Rigil Kent.	139°40.1	-60°56.4
12	226°56.6	17°52.8	\$10°25.7	347°00.3	S21°01.9	109°51.2	N21°12.4	230°04.3	S04°01.2	Kochab	137°21.0	74°02.9
13	241°59.1	32°52.3	26.8	2°00.9	02.2	109 51.2 124°53.6	12.4	245°06.8	01.3	Zuben'ubi	136°55.6	-16°08.9
		32 52.3 47°51.8		2 00.9 17°01.5		124 53.0 139°56.0				Alphecca	126°03.5	26°37.7
14	257°01.6		27.9		02.6		12.4	260°09.4	01.3	Antares	112°15.4	-26°29.3
15	272°04.0	62°51.3	• • 29.1	32°02.1	• • 03.0	154°58.4	• • 12.4	275°11.9	•• 01.3	Atria	107°09.5	-69°04.5
16	287°06.5	77°50.8	30.2	47°02.7	03.4	170°00.9	12.4	290°14.5	01.3	Sabik	102°02.3	-15°45.4
17	302°08.9	92°50.3	31.3	62°03.2	03.8	185°03.3	12.4	305°17.0	01.4	Shaula	96°09.8	-37°07.4
18	317°11.4	107°49.8	\$10°32.5		S21°04.1	200°05.7	N21°12.4	320° 19.6	S04°01.4	Rasalhague	95°58.2	12°32.6
19	$332^{\circ}13.9$	122°49.2	33.6	92°04.4	04.5	215°08.2	12.4	$335^{\circ}22.1$	01.4	Eltanin	90°42.3	51°29.3
20	$347^{\circ}16.3$	137°48.7	34.7	107°05.0	04.9	$230^{\circ}10.6$	12.4	$350^{\circ}24.7$	01.5	Kaus Aust.	83°31.9	-34°22.4
21	2°18.8	152°48.2	• • 35.8	122°05.6	• • 05.3	245°13.0	• • 12.4	5°27.2	• • 01.5	Vega	80°33.0	-34 22.4 38°48.6
22	17°21.3	167°47.7	37.0	137°06.1	05.7	260° 15.4	12.4	20°29.7	01.5	_		
23	32°23.7	182°47.2	38.1	152°06.7	06.0	275° 17.9	12.4	35°32.3	01.5	Nunki	75°47.1	-26°15.9
										Altair	61°59.4	8°56.3
Mer.p	ass. 20:51	$ u$ -0.5 $^{\prime}$ d1	.1' m-3.91	$\nu$ 0.6′ d0.	.4′ m1.43	$\nu$ 2.4′ d-0	.0′ m-2.36	$\nu$ 2.6′ d0	.0′ m0.80	Peacock	53°04.8	-56°39.3
										Deneb	49°25.4	45°22.6
٠.	CIIA	CIII	Б	C114	Б	CIII	Б	6174	Г.	Enif	33°38.1	9°59.8
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.0	-46°50.3
0	47°26.2	197°46.7	S10°39.2		S21°06.4	290°20.3	N21°12.4	50°34.8	S04°01.6	Fomalhaut	15°13.6	-29°29.2
1	62°28.7	212°46.2	40.4	182°07.9	06.8	305°22.7	12.4	65°37.4	01.6	Scheat	13°44.4	28°13.6
2	77°31.1	227° 45.7	41.5	197°08.5	07.2	320°25.2	12.4	80°39.9	01.6	Markab	13°29.1	15°20.8
3	92°33.6	242°45.2	• • 42.6	212°09.0	• • 07.5	335°27.6	• • 12.4	95°42.5	• • 01.7			
4	$107^{\circ}36.1$	257° 44.7	43.7	227°09.6	07.9	350°30.0	12.4	$110^{\circ}45.0$	01.7	Nov 06 Thu	SHA	Mer.pass
5	$122^{\circ}38.5$	272°44.2	44.9	242°10.2	08.3	5°32.5	12.4	125°47.6	01.7		152°42.7	10:48
6	137°41.0	287°43.7	S10°46.0	257°10.8	S21°08.7	20°34.9	N21°12.4	140°50.1	S04°01.7	Mars	121°11.3	12:53
7	152°43.4	302°43.2	47.1	272°11.3	09.0	35° 37.3	12.4	155°52.7	01.8	Jupiter	242°56.1	04:46
8	167°45.9	317°42.6	48.2	287°11.9	09.4	50°39.8	12.4	170°55.2	01.8	Saturn	3°04.5	20:42
9	182°48.4	332°42.1	49.4	302°12.5	09.8	65°42.2	12.4	185° 57.8	01.8			
10	197°50.8	347°41.6	50.5	317° 13.1	10.2	80°44.6	12.4	201°00.3	01.8	Nov 07 Fri	SHA	Mer.pass
	212°53.3	2°41.1		317 13.1 332°13.6				201 00.3 216°02.8		Venus	$151^{\circ}31.7$	10:48
11			51.6		10.5	95°47.1	12.4		01.9	Mars	120°26.3	12:52
12	227°55.8	17°40.6	\$10°52.7		S21°10.9	110°49.5	N21°12.4	231°05.4	S04°01.9		242°55.0	04:42
13	242°58.2	32°40.1	53.8	2°14.8	11.3	125°51.9	12.4	246°07.9	01.9	Saturn	3°06.6	20:38
14	258°00.7	47°39.6	55.0	17°15.4	11.7	140°54.4	12.4	261°10.5	02.0			
15	273°03.2	62°39.1	• • 56.1	32°15.9	• • 12.0	155° 56.8	• • 12.5	276°13.0	• • 02.0	Nov 08 Sat	SHA	Mer.pass
16	288°05.6	77°38.5	57.2	47°16.5	12.4	170°59.2	12.5	$291^{\circ}15.6$	02.0	Venus	150°20.5	10:49
17	303°08.1	92°38.0	58.3	62°17.1	12.8	186°01.7	12.5	$306^{\circ}18.1$	02.0		119°41.1	12:51
18	318°10.6	107°37.5	S10°59.4		521°13.2	201°04.1	N21°12.5		504°02.1		242°54.1	04:38
19	333°13.0	122°37.0	11°00.6	92°18.2	13.5	216°06.5	12.5	336°23.2	02.1	Saturn	3°08.6	20:34
20	348°15.5	137°36.5	01.7	107° 18.8	13.9	231°09.0	12.5	351°25.7	02.1	Jatuin	3 00.0	20.34
21	3°17.9	152°36.0	02.8	122° 19.4	• • 14.3	246°11.4	12.5	6°28.3	02.1	Horizont	al parallax	
22	18°20.4	167°35.5	03.9	137° 20.0	14.6	261°13.9	12.5	21°30.8	02.1		Venus:	0.1
23	33°22.9	182°34.9	05.9	157° 20.0	15.0		12.5		02.2		Mars:	0.1
	JS 22.9	102 34.9	05.0	132 20.5	13.0	276° 16.3	12.5	36°33.4				V.2
Mer.n	ass. 20:47	$\nu$ -0.5' d1	.1′ m-3.91	$\nu 0.6' \ d0$	.4′ m1.43	$\nu 2.4' \ d0$	.0′ m-2.37	$\nu 2.5' \ d0$	.0′ m0.80			
٩٠٠٠												

h	C	_			Maan		
h	Sui				Moon		
Thu	GHA	Dec	GHA	$\nu$	Dec	d 11.0'	HP
0 1	184°05.7 199°05.7	\$15°59.3 16°00.1	359°01.0 13°24.2	4.2' 4.1'	N22°10.1 22°22.0	11.9' 11.7'	61.4' 61.4'
2	214°05.7	00.8	27°47.2	4.0'	22°33.7	11.6'	61.4
3	229°05.7	• • 01.5	42°10.2	3.8'	22°45.3	11.4'	61.4'
4	244°05.6	02.3	$56^{\circ}33.0$	3.7'	22°56.7	11.2'	61.4'
5	259°05.6	03.0	70°55.8	3.6'	23°07.9	11.1'	61.4'
6 7	274°05.6 289°05.5	\$16°03.8 04.5	85°18.4 99°40.9	3.5' 3.4'	N23°19.0 23°29.9	10.9' 10.7'	61.4' 61.4'
8	304°05.5	05.3	114°03.4	3.4	23°40.6	10.7	61.3
9	319°05.5	• • 06.0	128°25.7	3.2'	23°51.1	10.4'	61.3'
10	334°05.5	06.8	$142^{\circ}47.9$	3.1'	24°01.5	10.2'	61.3'
11	349°05.4	07.5	157°10.1	3.0'	24°11.7	10.0'	61.3'
12 13	4°05.4 19°05.4	\$16°08.2 09.0	171°32.1 185°54.1	2.9' 2.9'	N24°21.7 24°31.5	9.8' 9.6'	61.3' 61.3'
14	34°05.4	09.0	200°15.9	2.8'	24° 41.2	9.5'	61.3
15	49°05.3	• • 10.5	214°37.7	2.7'	24°50.6	9.3'	61.3'
16	64°05.3	11.2	228°59.4	2.6'	24°59.9	9.1'	61.3'
17	79°05.3	12.0 \$16°12.7	243°21.0 257°42.5	2.5'	25°09.0 N25°17.9	8.9'	61.3'
18 19	94°05.2 109°05.2	13.4	257°42.5 272°03.9	2.4' 2.3'	25°26.6	8.7' 8.5'	61.3' 61.2'
20	124°05.2	14.2	286°25.2	2.3'	25°35.1	8.3	61.2
21	139°05.1	• • 14.9	300°46.5	2.2'	25°43.4	8.1'	61.2'
22	154°05.1	15.6	315°07.7	2.1'	25°51.5	7.9'	61.2'
23	169°05.1	16.4	329°28.8	2.0'	25°59.4	7.7'	61.2'
	SD = 16.1'	d = 0.7'		SI	D = 16.7'		
Fri	GHA	Dec	GHA	ν	Dec	d	НР
0	184°05.0	\$16°17.1	343°49.9	2.0'	N26°07.1	7.5'	61.2'
1	199°05.0	17.9	$358^{\circ}10.8$	1.9'	26°14.6	7.3'	61.2'
2	214°05.0	18.6	12°31.8	1.9'	26°21.9	7.1'	61.2'
3 4	229°04.9 244°04.9	· · 19.3 20.1	26°52.6 41°13.4	1.8' 1.7'	26°29.0 26°35.9	6.9' 6.7'	61.1' 61.1'
5	259°04.9	20.1	55°34.1	1.7'	26°42.6	6.5	61.1
6	274°04.8	S16°21.5	69°54.8	1.6'	N26°49.1	6.3'	61.1
7	289°04.8	22.3	84°15.4	1.6'	26°55.4	6.1'	61.1'
8	304°04.8	23.0	98°36.0	1.5'	27°01.4	5.8'	61.0'
9 10	319°04.7 334°04.7	· · 23.7 24.5	112°56.6 127°17.0	1.5' 1.5'	27°07.3 27°12.9	5.6' 5.4'	61.0' 61.0'
11	349°04.7	25.2	141°37.5	1.4	27°18.3	5.4	61.0'
12	4°04.6	S16°25.9	155°57.9	1.4'	N27°23.5	5.0'	61.0'
13	19°04.6	26.7	170°18.3	1.4'	27°28.5	4.8'	60.9'
14	34°04.6	27.4	184°38.6	1.3'	27°33.3	4.6'	60.9'
15 16	49°04.5 64°04.5	· · 28.1 28.9	198°59.0 213°19.3	1.3' 1.3'	27°37.9 27°42.2	4.3' 4.1'	60.9' 60.9'
17	79°04.4	29.6	217°39.5	1.3'	27°46.3	3.9'	60.9
18	94°04.4	S16°30.3	241°59.8	1.2'	N27°50.3	3.7'	60.8'
19	109°04.4		256°20.0	1.2'	27°53.9	3.5'	60.8'
20	124°04.3	31.8	270°40.3	1.2'	27°57.4	3.3'	60.8'
21 22	139°04.3 154°04.2	· · 32.5	285°00.5 299°20.7	1.2' 1.2'	28°00.7 28°03.7	3.0' 2.8'	60.8' 60.7'
23	169°04.2	33.9	313°41.0	1.2'	28°06.5	2.6'	60.7
	SD = 16.1'	d = 0.7'			D = 16.7'		
Sat	<b>GHA</b> 184°04.2	<b>Dec</b> \$16°34.7	GHA	u 1.2'	Dec	d	HP
0 1	184°04.2 199°04.1	35.4	328°01.2 342°21.4	1.2'	N28°09.2 28°11.5	2.4' 2.2'	60.7' 60.7'
2	214°04.1	36.1	356°41.7	1.3'	28°13.7	1.9'	60.6
3	229°04.0	• • 36.8	11°01.9	1.3'	28°15.7	1.7'	60.6'
4	244°04.0	37.6	25°22.2	1.3'	28°17.4	1.5'	60.6'
5 6	259°04.0 274°03.9	38.3 \$16°39.0	39°42.5 54°02.8	1.3' 1.3'	28°18.9 N28°20.2	1.3' 1.1'	60.5' 60.5'
7	289°03.9	39.0	68°23.2	1.3 1.4'	28°21.3	0.9'	60.5
8	304°03.8	40.5	82°43.6	1.4'	28°22.1	0.6'	60.5
9	319°03.8	• • 41.2	97°04.0	1.4'	28°22.8	0.4'	60.4'
10	334°03.7	41.9	111°24.4	1.5'	28°23.2	0.2'	60.4
11 12	349°03.7 4°03.6	42.6 \$16°43.3	125°44.9 140°05.4	1.5' 1.6'	28°23.4 N28°23.4	-0.0' -0.2'	60.4' 60.3'
13	19°03.6	44.1	154° 26.0	1.6'	28°23.2	-0.2 -0.4	60.3
14	34°03.5	44.8	168°46.7	1.7'	28°22.8	-0.6'	60.3'
15	49°03.5	• • 45.5	183°07.3	1.7'	28°22.1	-0.9'	60.3'
16	64°03.5	46.2	197°28.1	1.8'	28°21.3	-1.1'	60.2'
17 18	79°03.4 94°03.4	46.9 \$16°47.6	211°48.9 226°09.7	1.9' 1.9'	28°20.2 N28°19.0	-1.3' -1.5'	60.2' 60.2'
19	94 03.4 109°03.3	48.4	240°30.7	2.0'	28°17.5	-1.5 -1.7'	60.2
20	124°03.3	49.1	254°51.7	2.1'	28°15.8	-1.9'	60.1
21	139°03.2	• • 49.8	269°12.7	2.1'	28°13.9	-2.1'	60.1'
22	154°03.2	50.5	283°33.9	2.2'	28°11.8	-2.3'	60.0'
23	169°03.1	51.2	297°55.1	2.3'	28°09.5	-2.5'	60.0'
	SD = 16.1'	d = 0.7'		Si	D = 16.6'		

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

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

			Sun		Moon				
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age			
	,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	16-18		
		mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	100-91%		
	06	16:23	16:22	11:44	00:04	12:35			
	07	16:20	16:19	11:44	01:08	13:41			
	00	16.17	16.15	11.44	02.14	14.47			

## November 09, 10, 11 UT (Sun., Mon., Tue.)

GIA	h	Aries	Ve	nus	Mars		Jup	oiter	Sat	urn		Stars	
1	Sun	GHA	GHA	Dec	GHA De	·C	GHA	Dec	GHA	Dec		SHA	Dec
1 0.725, 21713, 0.73													
2											Alpheratz	357°33.8	
8 87 87 7 247 929 0 · 0 99 21728 · 1 0 8 387 0 1 · 12 9 0 6 8 0 · 23 5 0 3 5 0 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1											Ankaa	$353^{\circ}06.1$	-42°10.0
100   100											Schedar	349°29.8	56°41.0
Second Color											Diphda	348°46.3	-17°50.6
18   18   18   18   18   18   18   18											Achernar	$335^{\circ}19.1$	-57°06.4
18											Hamal		
19													
18   18   19   19   19   19   19   19													
19 12 19 12													
10 189-800 97-92 17-3 312-05-0 11-4 08-4-2 12-5 200-20-3 02-5 10-32-7 12-5 12-32-14-5 12-32-32-14-5 12-32-32-14-5 12-32-32-14-5 12-32-32-32-32-32-32-32-32	9			• • 16.2		18.7		• • 12.5		• • 02.4			
13   2487-74   777-75   5110-6   247-75   5110-75   247-75   5110-75   247-75   5110-75   247-75   5110-75   247-75   5110-75   247-75	10	198°50.0		17.3		19.1		12.5		02.5	1		
19 299-404   17-907   511-101   11-505   27-101   11-505   27-101   27-101   28-101	11	213°52.4	2°28.7	18.4	332°27.4	19.4		12.5	217°03.9	02.5			
14 2 2 3 4 3 4 5 4 5 5 4 5 5 5 5 5 5 5 5 5 5 5	12	228°54.9		S11°19.5		19.8	111°48.0	N21°12.5	232°06.4	S04°02.5	_		
14   295-90.08   275-96   27	13	243°57.4	$32^{\circ}27.7$	20.6	2°28.5	20.2	126°50.5	12.5	247°09.0	02.5			
1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	14	258°59.8	$47^{\circ}27.1$	21.7	17°29.1	20.5	141°52.9	12.5	262°11.5	02.6	1		
19   19   19   19   19   19   19   19	15	274°02.3	62°26.6	• • 22.9	32°29.7 · · :	20.9	156° 55.4	· · 12.5	$277^{\circ}14.1$	• • 02.6			
17 304"072 92"256	16	289°04.8	$77^{\circ}26.1$	24.0	47°30.2	21.2	171°57.8	12.5	292°16.6	02.6			
18 319"09.7 1922 122"04.5 273 92"39.0 223 12"05.2 12.2 15.5 337"24.2 0.7 2.7 2.5 337"34.0 0.7 2.7 2.7 2.7 2.7 2.7 2.7 2.7 2.7 2.7 2	17	304°07.2		25.1		21.6	187°00.3	12.5	307°19.1				
19   349*122   122*24.5   27.3   92*31.9   22.3   217*05.2   125.   337*24.2   02.7   April   125.   127*31.5   23.1   23.2													
20													
22											Adhara		
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Mor   GHA   OPE   GHA   Dec   GHA   Dec   CHA   Dec											Pollux	243°16.3	27°57.8
Mon   GHA   CHA   Dec   GHA											Avior	$234^{\circ}14.3$	-59°35.2
Mon GHA	23	34 22.0	102 22.4	31./	152 34.2	۷٥.٥			31 34.4	02.8	Suhail	222°45.8	-43°31.9
Mon   GHA   GHA   Dec   GHA   GReguius   207-245   307-348   317-350   317-3	Mer.p	ass. 20:43	$\nu$ -0.5 $^{\prime}$ d1	.1′ m-3.91	$\nu$ 0.6′ $d$ 0.4′ $m$ 1	.42	$\nu$ 2.4′ d0.	0′ m-2.38	$\nu 2.5' \ d0$	.0′ m0.81	Miaplacidus		
Mon										<del>-</del>			
Mon   GHA   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   Dubb   137-405   173-65   173-18   S17-34   S17-3				_				-		_			
0 49°245 19°219 511°248 10°348 52°241 29°2174 N2°125 52°369 504°028 Gienah 17°246 13°257 12°267 20°267 12°													
1 64°29 4 22°20 8 33.9 182°35 3 24 5 30°19 8 125 66°39 5 028   3 97°49 4 22°20 8 35.0 197°35 9 24 5 32°20 3 125 66°39 5 028   3 94°31 9 22°20 8 35.0 197°35 9 24 5 30°19 8 125 67°39 5 028   3 94°31 9 22°20 8 35.0 197°35 9 22°30 8 35°2 1 125 9 47°44 5 0.09   4 109°34 3 25°10 8 37.2 22°30 6 25 30°20 27 125 1124°11 0.09   5 120°39 3 25°10 8 37.2 22°30 6 25°30 30°20 1 124°51 1 124°11 0.09   5 120°39 3 25°10 8 37°20 20°30 5 25°30 1 122°60 3 22°32 1 121°24 1 0.09   5 120°39 3 25°10 8 20°30 5 25°30 1 122°60 3 22°32 1 121°24 1 121°24 1 0.09   5 120°40 3 1 121°17 7 100°18 2 100°6 1 120°60 1				<b>S</b> 11°32.8									
2 979°294 227°203 350 197°359 249 322°223 172°47 125 82°420 0.99   3 94°349 242°203 350 197°359 249 322°227 125 112°471 0.99   5 124°363 6 272°192 384 242°37 6 20 0 7°296 125 112°471 0.99   5 124°363 6 272°192 384 24°37 6 20 0 7°296 125 112°471 0.99   5 124°363 6 272°192 384 24°37 6 20 0 7°296 125 112°471 0.99   5 124°363 6 272°192 384 24°37 6 20 0 7°296 125 112°471 0.99   5 124°363 6 272°192 384 24°37 6 20 0 7°296 125 112°471 0.99   5 124°363 6 272°192 384 24°37 6 20 0 7°296 125 112°471 0.99   5 124°363 6 272°192 384 24°37 6 20 0 7°296 125 112°471 0.99   5 124°363 6 272°192 384 24°37 6 20 0 7°296 125 112°471 0.99   5 124°363 6 272°192 384 24°37 6 20 0 7°296 125 112°471 0.99   5 10 199°491 347°165 449 30°293 70°40 126 187°594 0.30   10 199°491 347°165 450 332°41 0 281 97°443 126 218°049 0.31   1222°961 1 17°155 11°461 347°415 2278 55 112°468 121°26 248°099 0 31   1429°990 47°145 483 32°42 29°5 157°542 0.126 248°099 0 31   1429°990 47°145 483 32°432 0.99 1 127°466 126 289°175 9.02   15 200°039 77°144 5 0.43 32°41 29°21 12°491 126 26 289°125 0.03   16 200°039 77°144 5 505 47°338 299 172°566 126 29°175 9.02   18 320°088 107°123 11°527 7°44 9 521°90 6 20°15 12°12 6 288°125 0.03   18 320°088 107°123 11°527 7°44 9 521°90 6 20°15 12°12 6 288°125 0.03   18 320°088 107°123 11°527 7°44 9 521°90 6 20°15 12°12 6 288°125 0.33   18 320°188 13713 12°118 538 92°454 31.0 218°040 126 88°30 0 0.33   18 320°188 13713 12°118 538 92°454 31.0 218°040 126 88°30 0 0.33   18 320°188 13713 12°118 538 92°454 31.0 218°040 126 88°30 0 0.33   18 320°188 138°191 12°191 15°2477 324 278°138 126 6 23°22 8 0.33   18 320°188 1 18°191 1 12°197 1 15°41 12°19 10°41 11°41 10°41 11				33.9		24.5		12.5		02.8	1		
3 94*319 24*20.3	2	79°29.4	227° 20.8	35.0	197°35.9	24.9	322°22.3	12.5	82°42.0	02.9			
1 109"34.3 6 27"19.2 38.4 24"37.6 26.0 7"29.6 12.5 112"47.1 0.29   5 124"36.6 27"19.2 38.4 24"37.6 26.0 7"29.6 12.5 112"47.1 0.29   5 139"39.3 27"18.7 511"39.5 257"38.1 521"26.3 22"32.1 N21"12.5 142"52.2 504"03.0   8 169"44.2 31"11.7 41.7 287"39.3 27.0 52"37.0 12.6 177"57.2 03.0   9 1814"46.7 332"11.1 - 42.8 302"39.8 2.74 67"39.4 - 12.6 187"59.8 03.0   10 199"49.1 34"16.6 43.9 317"40.4 27.7 82"41.9 12.6 203"02.3 03.1   11 211"51.6 2"16.1 45.0 332"41.0 28.1 97"44.3 12.6 218"04.8 N3.1   12 229"54.1 17"15.5 511"6.1 45.0 332"41.0 28.1 97"44.3 12.6 218"04.8 N3.1   12 229"54.1 17"15.5 511"6.1 350"332"41.0 28.1 97"44.5 12.6 203"02.3 03.1   13 244"56.5 32"15.0 47.2 2"42.1 28.8 127"49.2 12.6 203"02.3 03.1   14 299"59.0 47"14.5 48.3 17"42.6 29.2 142"57.7 12.6 265"12.5 03.2   15 275"01.4 62"13.9 -49.4 32"43.2 2.9 51.5 15"54.2 12.6 265"12.5 03.2   16 290"03.9 7"13.4 50.5 47"43.8 2.9 172"56.6 12.6 29"17.5 03.2   16 290"03.9 7"13.4 50.5 47"43.8 2.9 172"56.6 12.6 29"17.5 03.2   17 305"06.4 29"12.9 51.6 62"43.3 30.2 187"59.1 12.6 308"20.1 32.2   18 200"08.8 10"12.3 511"52.7 7"7"4.9 521"26.6 20"01.5 N21"12.6 253"22.8 03.3   19 335"13.3 122"11.8 53.8 92"45.4 31.0 218"06. 12.6 338"25.1 03.3   19 335"13.3 122"11.8 53.8 92"45.4 31.0 218"06. 12.6 338"25.1 03.3   19 335"13.3 122"11.8 53.8 92"45.4 31.0 218"06. 12.6 338"25.1 03.3   19 335"13.3 122"11.8 53.8 92"45.4 31.0 218"06. 12.6 338"25.1 03.3   10 50"23.6 13"11.3 54.9 107"46.0 31.3 235"06.4 12.6 355"27.7 03.3   12 5"16.2 152"10.7 55.9 124"66.5 31.7 245"08.9 12.6 830"2.5 30.3   10 5"18.6 13"11.3 54.9 107"46.0 51.3 235"06.4 12.6 355"27.7 03.3   12 5"16.2 152"10.7 55.9 138"48.8 53.1 308"18.1 12.6 23"32.8 03.3   10 5"18.6 13"11.3 54.9 107"46.0 51.3 235"06.4 12.6 355"27.7 03.3   12 5"16.2 152"10.7 55.9 138"48.8 23"1.3 20"18.8 12.6 23"32.8 03.3   10 5"18.6 14"10.7 55.5 51.5 128"47.7 32.4 27"51.8 12.6 25"35.8 50"0.3   10 5"25.5 5"57.0 5"50.5 5"57.0 137"47.1 32.0 265"11.3 12.6 23"32.8 03.3   10 5"18.6 14"10.7 55.5 5"57.0 138"48.8 25"1"58.1 12.6 135"48.9 03.5   10 5"25.5 5"57.0 5"50.5 5"57.	3	94°31.9	242°20.3	• • 36.1	212°36.4 · · ·	25.2	337°24.7	• • 12.5	97°44.5	• • 02.9			
5 124°36.8 272°19.2 38.4 242°37.6 26.0 7°29.6 12.5 127°9.6 0.29 Spica 158°21.9 1.1°17.7 7 1.1°16°4.17 302°18.2 40.6 272°38.7 22°0.3 2°32.1 N21°212.5 127°9.6 0.29 0.030 Allaid 152°51.9 49°11.0 1.0°16°1.0 1.0°1	4	109°34.3	$257^{\circ}19.8$	37.2	227°37.0	25.6	352°27.2	12.5	112°47.1	02.9			
8   139°9.93   289°18.7   511°39.5   257°38.1   521°6.5   22°2.1   N21°12.5   142°5.2   540°3.0   Albaid   152°5.1   49°1.10   7   154°4.7   302°18.2   406   227°3.8   22°2.1   N21°12.5   142°5.2   504°0.3   Albaid   152°5.1   49°1.10   8   160°44.2   317°1.7   4.7   287°3.3   27.0   52°3.7   1.6   12°5.7   3.0   Albaid   152°5.1   49°1.10   9   184°46.7   332°1.7   4.7   4.7   287°3.3   27.0   52°3.7   1.6   12°5.7   3.3   Menher   147°5.7   30°2.7   10   199°49.1   347°16.6   43.9   317°40.4   27.7   82°41.9   1.6   203°0.3   3.1   Rigit Rem.   147°5.7   30°2.7   11   214°51.6   216.1   450   332°41.0   221.1   97°4.3   1.2   218°0.4   30.1   Rigit Rem.   139°40.1   60°5.6   12   229°44.1   17°15.5   511°40.1   347°41.5   521°8.5   112°46.8   N21°12.6   233°0.7   504°0.3   218°0.4   30.1   13   244°56.5   32°15.0   47.2   27°41.2   28.8   127°46.8   N21°12.6   233°0.7   504°0.3   218°0.4   30.1   15   275°91.4   62°13.9   4.8   31°44.2   2.9   1.7 °56.6   1.6 °0.3   2.0 °0.	5	124°36.8	272° 19.2	38.4	242°37.6	26.0	7°29.6	12.5	127°49.6	02.9			
154°41.7   302°18.2   40.6   272°38.7   26.7   37°34.5   12.6   157°54.7   33.0   Allari 148°35.7   Allari 148°35.7   A													
8   169°44.2   317°17.7   41,7   287°39.3   27.0   52°37.0   12.6   172°57.2   0.30   9   184°46.7   332°17.1   42.8   302°39.8   27.4   67°99.4   21.6   187°59.8   0.30   10   199°49.1   347°16.6   43.9   317°40.4   27.7   82°41.9   12.6   23°30.3   0.31   11   214°51.6   2°16.1   45.0   332°41.0   28.1   97°43.3   12.6   218°01.8   0.31   12   229°54.1   17°15.5   511°46.1   347°41.5   521°25.5   112°46.8   N21°12.6   233°07.4   50°03.1   13   244°56.5   32°14.5   48.3   17°42.6   29.2   142°51.7   12.6   263°12.5   0.32   14   259°59.0   47°14.5   48.3   17°42.6   29.2   142°51.7   12.6   263°12.5   0.32   15   275°01.4   62°13.9   49.4   32°43.2   29.5   157°42   21.6   233°17.5   0.32   16   290°03.9   77°13.4   50.5   47°43.8   29.9   172°56.6   12.6   238°12.5   0.32   17   305°06.4   92°12.9   51.6   62°44.3   30.2   187°9.1   12.6   338°22.1   0.32   18   320°08.8   107°12.3   51°52.7   77°44.9   521°30.4   0.32   21.3   0.34   19   335°13.1   122°11.8   53.8   92°454.4   31.0   218°40.9   12.6   338°27.7   0.33   21   55°12.1   52°10.7   55.9   122°46.0   31.3   233°06.4   12.6   38°327.7   0.33   22   20°18.7   107°10.2   57.0   137°47.1   32.0   263°11.3   12.6   23°32.8   0.33   23   35°21.2   182°09.7   58.1   152°47.7   32.4   278°13.8   12.6   23°32.8   0.33   24   55°23.5   197°90.1   511°99.2   167°48.2   21°37.7   23°16.2   122°6.6   38°32.7   0.33   25   35°21.2   182°09.7   58.1   152°47.7   32.4   278°15.8   12.6   23°32.8   0.33   26   40°23.5   127°06.0   0.10   0.06°0.4   0.14   0.06°0.8   0.14   0.06°0.8   0.04											1		
19   184°46.7   332°17.1   -42.8   302°39.8   -27.4   67°39.4   -12.6   187°59.8   -0.30     10   199°41   347°16.6   43.9   317°40.4   27.7   22°41.9   21.6   203°02.3   33.1     11   214°51.6   2°16.1   45.0   332°41.0   28.1   97°44.3   12.6   218°04.8   03.1     12   22°54.1   17°15.5   511°46.1   347°41.5   521°28.5   112°46.8   N21°12.6   233°07.4   504°03.1     13   244°56.5   32°15.0   47.2   2°42.1   28.8   127°49.2   12.6   248°09.9   03.1     14   25°95.0   47°14.5   48.3   17°42.6   29.2   12.6   248°09.9   03.1     15   275°01.4   62°13.9   -40.4   32°43.2   -29.5   157°56.2   -12.6   238°12.5   03.2     16   290°30.9   77°13.4   50.5   47°43.8   29.9   127°56.6   12.6   293°17.5   03.2     17   305°06.4   92°12.9   51.6   62°44.3   30.2   187°59.1   12.6   308°20.1   03.2     18   320°08.8   10°12.3   511°52.7   77°44.9   21°30.6   203°15.8   N21°2.6   233°22.6   504°03.2     20   350°13.8   137°11.3   54.9   107°45.0   31.3   233°06.4   12.6   338°25.1   03.3     21   5°16.2   152°10.7   -55.9   12°46.6   -31.7   248°08.9   -12.6   38°35.3   03.4     Metr.pass. 20.39   \( \text{Def} \) 0.76 \( \text{Def} \) 0.76 \( \text{Def} \) 0.76 \( \text{Def} \) 0.76 \( \text{Def} \) 0.76 \( \text{Def} \) 0.75 \( \text{Def} \) 0.76 \( \text{Def} \) 0.76 \( \text{Def} \) 0.76 \( \text{Def} \) 0.77 \( \text{Def} \) 0.76 \( \text{Def} \) 0.77 \( \text{Def} \) 0.78 \( \text{Def} \) 0.77 \( \text{Def} \) 0.78 \( \text{Def} \) 0.													
10   199°491   347°16.6   43.9   317°40.4   27.7   82°41.9   12.6   203°02.3   03.1   Arctinus   49.4°1.0   190.29     11   124°16.6   2°16.1   45.0   332°41.0   28.1   297°4.3   12.6   218°04.8   03.1   Kochab   137°21.0   74°02.9     12   229°54.1   17°15.5   \$11°66.1   347°41.5   \$21°28.5   112°46.8   \$N12°12.6   233°07.4   504°03.1   Kochab   137°21.0   74°02.9     14   259°59.0   47°14.5   48.3   17°42.6   29.2   142°61.7   12.6   263°12.5   03.2   03.1     15   279°01.4   62°13.9   -49.4   32°43.2   -9.5   157°42.2   12.6   238°12.5   03.2   Alphecca   120°03.5   26°37.7     16   290°03.9   77°13.4   50.5   47°43.8   29.9   172°86.6   12.6   293°17.5   03.2   3561k   102°03.3   52°41.3     17   305°06.4   92°12.9   51.6   62°44.3   30.2   187°9.9   12.6   308°20.1   03.2   Salik   102°03.3   55°41.3     18   330°08.8   107°12.3   \$11°52.7   77°44.9   \$21°30.6   218°04.0   12.6   333°22.6   504°03.2     19   335°11.3   122°11.8   53.8   92°45.4   31.0   218°04.0   12.6   333°25.1   03.3   Salik   102°03.3     19   35°13.8   137°11.3   54.9   107°46.0   31.3   233°06.4   12.6   333°25.1   03.3   Salik   102°03.3     22   20°18.7   167°10.2   57.0   137°47.1   32.0   256°11.3   12.6   23°328   03.3   Nunkl   75°41.2     22   20°18.7   167°10.2   57.0   31°47.1   32.0   256°11.3   12.6   23°328   03.3   Nunkl   75°41.2   256°13.3     23   35°21.2   182°09.7   58.1   152°47.7   32.4   278°13.8   12.6   23°328   03.3   Nunkl   75°41.2   256°13.3     24   280°26.5   127°09.1   511°59.2   167°48.2   221°32.7   293°16.2   N12°12.6   533°38   504°03.4   Salik   102°03.4     25   280°26.5   127°09.1   511°59.2   167°48.2   221°32.7   293°16.2   N12°12.6   533°38   504°03.4   Salik   102°03.4   Sal													
11 214°51.6 2°16.1 450 332°41.0 28.1 97°44.3 12.6 28°04.8 03.1 Kgli reft. 19.7 21.0 7°09.5 12.2 26.5 13°26.5 13°26.1 347°41.5 521°28.5 112°46.8 N21°12.6 23°07.5 04°03.1 244°56.5 32°15.0 47.2 2°42.1 28.8 127°49.2 12.6 248°09.9 03.1 Alphecca 126°03.5 26°37.7 14.5 43.8 17°42.6 29.2 142°81.7 12.6 26°31.2 5.0 3.2 14.2 25°09.0 47°41.5 43.8 17°42.6 29.2 142°81.7 12.6 26°31.2 5.0 3.2 14.2 25°09.0 47°41.5 43.8 17°42.6 29.2 142°81.7 12.6 26°31.2 5.0 3.2 Alphecca 126°03.5 26°37.7 15°27.0 14.5 43.8 17°42.6 29.2 142°81.7 12.6 26°31.5 0.0 3.2 16°29.0													
12 229°54.1 17°15.5 S11°46.1 347°41.5 S21°28.5 112°46.8 N21°12.6 248°09.9 0.31 1 36°55.6 1-60°08.9 13 24°55.5 12°50.4 42°51.5 0.4°21.5 12°40.2 12.6 248°09.9 0.31 1 36°55.6 1-60°08.9 14 259°59.0 47°14.5 43.3 17°42.6 22 142°51.7 12.6 263°12.5 0.32 140°09.7 12.3 12°13.5 43.3 12°14.8 12°14.5 12°15.0 12.6 288°12.5 0.32 140°51.7 12.6 263°12.5 0.32 140°09.7 12.3 12°14.5 12°15.0 12.6 288°12.5 0.32 140°09.7 12.3 12°14.5 12°15.0 12.6 288°12.5 0.32 140°09.7 12.3 12°14.5 12°15.0 12.6 288°12.5 0.32 140°09.7 12.3 12°14.5 12°15.0 12.6 288°12.5 0.32 140°09.7 12.3 12°14.5 12°15.0 12.6 288°12.5 0.32 140°09.7 12.3 12°14.5 12°15.0 12.6 288°12.5 0.32 140°09.7 12.3 12°14.5 12°15.0 12.6 288°12.5 0.32 140°09.7 12.3 12°14.5 12°15.0 12°15.0 12°12.6 288°12.5 0.33 12°14.5 12°14.5 12°15.0 12°15.0 12°12.6 288°12.5 10.3 13°15.7 12°12.6 288°12.5 10.3 13°15.3 12°11.3 54.9 107°46.0 31.3 238°06.4 12.6 358°27.7 0.3 3 12°14.5 12°10.2 57.0 137°47.1 32.0 263°11.3 12.6 23°32.8 0.3 3 12°15.0 12°10.2 57.0 137°47.1 32.0 263°11.3 12.6 23°32.8 0.3 3 12°15.0 12°10.2 57.0 137°47.1 32.0 263°11.3 12.6 23°32.8 0.3 3 12°15.0 12°10.0 12°10.0 12°10.0 13°10.0 12											Rigil Kent.	139°40.1	-60°56.4
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Vega   80°33.0   38°48.6	20	350°13.8	$137^{\circ}11.3$	54.9	107°46.0	31.3	233°06.4	12.6	353°27.7	03.3			
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Mer.pass   20:39   ν-0.5' d1.1' m-3.91   ν-0.6' d0.4' m1.42   ν-2.4' d0.0' m-2.39   ν-2.5' d0.0' m0.81   Peacock   S3°0.4   Altair   61°9.4   8°5.63   9°5.30   10°5.20   10°7.00   10°											_		
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12 230°53.2 17°02.6 512°12.3 347°54.9 521°37.0 113°45.8 121°12.7 249°10.8 03.7 142°55.7 32°02.1 13.4 2°55.5 37.3 128°48.2 12.7 249°10.8 03.7 14.7 01.6 14.5 17°56.0 37.7 143°50.7 12.7 264°13.3 03.7 152°16.0 14.5 17°56.0 37.7 143°50.7 12.7 279°15.8 03.7 152°16.0 14.5 17°56.0 15.2 15.2 15.2 15.2 15.2 15.2 15.2 15.2													
15													
14 260°88.1 47°01.6 14.5 17°56.0 37.7 143°50.7 12.7 264°13.3 03.7 152 276°00.6 62°01.0 · 15.6 32°56.6 · 38.0 158°53.1 · 12.7 279°15.8 · 03.7 16 291°03.0 77°00.5 16.7 47°57.2 38.3 173°55.6 12.7 294°18.4 03.7 17 306°05.5 91°59.9 17.8 62°57.7 38.7 188°58.1 12.7 309°20.9 03.8 18 321°08.0 106°59.4 \$12°18.9 77°58.3 \$21°39.0 204°00.5 \$12.7 324°23.4 \$04°03.8 19 336°10.4 121°58.8 19.9 92°58.8 39.4 219°03.0 12.7 339°26.0 03.8 20 351°12.9 136°58.3 21.0 107°59.4 39.7 234°05.5 12.7 354°28.5 03.8 21 6°15.4 151°57.7 · 22.1 122°59.9 · 40.1 249°07.9 · 12.7 9°31.0 · 03.8 22 21°17.8 166°57.2 23.2 138°00.5 40.4 264°10.4 12.7 24°33.6 03.9 24°33.6 03.9 24°33.6 03.9 36°20.3 181°56.6 24.3 153°01.0 40.8 279°12.9 12.8 39°36.1 03.9	13	245°55.7	$32^{\circ}02.1$	13.4	2°55.5	37.3	128°48.2	12.7		03.7			
16 291°03.0 77°00.5 16.7 47°57.2 38.3 173°55.6 12.7 294°18.4 03.7 Venus 146°45.5 10:52 17 306°05.5 91°59.9 17.8 62°57.7 38.7 188°58.1 12.7 309°20.9 03.8 18 321°08.0 106°59.4 \$12°18.9 77°58.3 \$21°39.0 204°00.5 N21°12.7 324°23.4 \$04°03.8 19 336°10.4 121°58.8 19.9 92°58.8 39.4 219°03.0 12.7 339°26.0 03.8 20 351°12.9 136°58.3 21.0 107°59.4 39.7 234°05.5 12.7 354°28.5 03.8 21 6°15.4 151°57.7 · · · 22.1 122°59.9 · · · 40.1 249°07.9 · · · 12.7 9°31.0 · · · 03.8 22 21°17.8 166°57.2 23.2 138°00.5 40.4 264°10.4 12.7 24°33.6 03.9 23 36°20.3 181°56.6 24.3 153°01.0 40.8 279°12.9 12.8 39°36.1 03.9    Venus 146°45.5 10:52     Mars 117°24.6 12:48     Jupiter 242°52.6 04:26     Saturn 3°14.2 20:22     Horizontal parallax     Venus 146°45.5 10:52     Venus 146°45.5 10:52     Mars 117°24.6 12:48     Jupiter 242°52.6 04:26     Saturn 3°14.2 20:22     Horizontal parallax     Venus 146°45.5 10:52     Venus 146°45.5 10:52     Mars 117°24.6 12:48     Jupiter 242°52.6 04:26     Saturn 3°14.2 20:22     Horizontal parallax     Venus 146°45.5 10:52     Venus 146°45.5 10:52     Mars 117°24.6 12:48     Jupiter 242°52.6 04:26     Saturn 3°14.2 20:22     Horizontal parallax     Venus 146°45.5 10:52     Venus 146°45.5 10:52     Mars 117°24.6 12:48     Jupiter 242°52.6 04:26     Saturn 3°14.2 20:22     October 240°52.6     Saturn 3°14.2 20:22     October 240°52.6     Saturn 3°14.2 20:22     October 240°52.6     Saturn 3°14.2 20:22     October 240°52.6     Saturn 3°14.2 20:22     October 240°52.6     Saturn 3°14.2 20:22     October 240°52.6     Saturn 3°14.2 20:22     October 240°52.6     Saturn 3°14.2 20:22     October 240°52.6     Saturn 3°14.2 20:22     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6	14	260°58.1	47°01.6	14.5			143°50.7	12.7	$264^{\circ}13.3$	03.7	Saturn	J 12.4	20:20
16 291°03.0 77°00.5 16.7 47°57.2 38.3 173°55.6 12.7 294°18.4 03.7 Venus 146°45.5 10:52 17 306°05.5 91°59.9 17.8 62°57.7 38.7 188°58.1 12.7 309°20.9 03.8 18 321°08.0 106°59.4 \$12°18.9 77°58.3 \$21°39.0 204°00.5 N21°12.7 324°23.4 \$04°03.8 19 336°10.4 121°58.8 19.9 92°58.8 39.4 219°03.0 12.7 339°26.0 03.8 20 351°12.9 136°58.3 21.0 107°59.4 39.7 234°05.5 12.7 354°28.5 03.8 21 6°15.4 151°57.7 · · · 22.1 122°59.9 · · · 40.1 249°07.9 · · · 12.7 9°31.0 · · · 03.8 22 21°17.8 166°57.2 23.2 138°00.5 40.4 264°10.4 12.7 24°33.6 03.9 23 36°20.3 181°56.6 24.3 153°01.0 40.8 279°12.9 12.8 39°36.1 03.9    Venus 146°45.5 10:52     Mars 117°24.6 12:48     Jupiter 242°52.6 04:26     Saturn 3°14.2 20:22     Horizontal parallax     Venus 146°45.5 10:52     Venus 146°45.5 10:52     Mars 117°24.6 12:48     Jupiter 242°52.6 04:26     Saturn 3°14.2 20:22     Horizontal parallax     Venus 146°45.5 10:52     Venus 146°45.5 10:52     Mars 117°24.6 12:48     Jupiter 242°52.6 04:26     Saturn 3°14.2 20:22     Horizontal parallax     Venus 146°45.5 10:52     Venus 146°45.5 10:52     Mars 117°24.6 12:48     Jupiter 242°52.6 04:26     Saturn 3°14.2 20:22     Horizontal parallax     Venus 146°45.5 10:52     Venus 146°45.5 10:52     Mars 117°24.6 12:48     Jupiter 242°52.6 04:26     Saturn 3°14.2 20:22     October 240°52.6     Saturn 3°14.2 20:22     October 240°52.6     Saturn 3°14.2 20:22     October 240°52.6     Saturn 3°14.2 20:22     October 240°52.6     Saturn 3°14.2 20:22     October 240°52.6     Saturn 3°14.2 20:22     October 240°52.6     Saturn 3°14.2 20:22     October 240°52.6     Saturn 3°14.2 20:22     October 240°52.6     Saturn 3°14.2 20:22     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6     October 240°52.6	15	276°00.6	62°01.0	• • 15.6	32°56.6 · · :	38.0	158°53.1	• • 12.7	$279^{\circ}15.8$	• • 03.7	Nov 11 Tue	SHA	Mer.pass
17       306°05.5       91°59.9       17.8       62°57.7       38.7       188°58.1       12.7       309°20.9       03.8       Mars       117°24.6       12:48         18       321°08.0       106°59.4       S12°18.9       77°58.3       S21°39.0       204°00.5       N21°12.7       324°23.4       S04°03.8       Jupiter       242°52.6       04:26         19       336°10.4       121°58.8       19.9       92°58.8       39.4       219°03.0       12.7       339°26.0       03.8       Saturn       3°14.2       20:22         20       351°12.9       136°58.3       21.0       107°59.4       39.7       234°05.5       12.7       354°28.5       03.8       Saturn       3°14.2       20:22         21       6°15.4       151°57.7       · 22.1       122°59.9       · 40.1       249°07.9       · 12.7       9°31.0       · 03.8       Horizontal parallax         22       21°17.8       166°57.2       23.2       138°00.5       40.4       264°10.4       12.7       24°33.6       03.9       Mars:       0.1         23       36°20.3       181°56.6       24.3       153°01.0       40.8       279°12.9       12.8       39°36.1       03.9       Mars:       0.1<													
18 321°08.0 106°59.4 \$12°18.9 77°58.3 \$21°39.0 204°00.5 N21°12.7 324°23.4 \$04°03.8 19 336°10.4 121°58.8 19.9 92°58.8 39.4 219°03.0 12.7 339°26.0 03.8 20 351°12.9 136°58.3 21.0 107°59.4 39.7 234°05.5 12.7 354°28.5 03.8 21 6°15.4 151°57.7 ••• 22.1 122°59.9 ••• 40.1 249°07.9 ••• 12.7 9°31.0 ••• 03.8 22 21°17.8 166°57.2 23.2 138°00.5 40.4 264°10.4 12.7 24°33.6 03.9 23 16°20.3 181°56.6 24.3 153°01.0 40.8 279°12.9 12.8 39°36.1 03.9 Mars: 0.1											1		
19 336°10.4 121°58.8 19.9 92°58.8 39.4 219°03.0 12.7 339°26.0 03.8 20 351°12.9 136°58.3 21.0 107°59.4 39.7 234°05.5 12.7 354°28.5 03.8 21 6°15.4 151°57.7 · · · 22.1 122°59.9 · · · 40.1 249°07.9 · · · 12.7 9°31.0 · · · 03.8 22 21°17.8 166°57.2 23.2 138°00.5 40.4 264°10.4 12.7 24°33.6 03.9 23 36°20.3 181°56.6 24.3 153°01.0 40.8 279°12.9 12.8 39°36.1 03.9 Mars: 0.1													
20 351°12.9 136°58.3 21.0 107°59.4 39.7 234°05.5 12.7 354°28.5 03.8 21 6°15.4 151°57.7 · · · 22.1 122°59.9 · · 40.1 249°07.9 · · 12.7 9°31.0 · · · 03.8 22 21°17.8 166°57.2 23.2 138°00.5 40.4 264°10.4 12.7 24°33.6 03.9 23 36°20.3 181°56.6 24.3 153°01.0 40.8 279°12.9 12.8 39°36.1 03.9 Mars: 0.1													
21       6°15.4       151°57.7       · · · 22.1       122°59.9       · · 40.1       249°07.9       · · 12.7       9°31.0       · · 03.8       Horizontal parallax         22       21°17.8       166°57.2       23.2       138°00.5       40.4       264°10.4       12.7       24°33.6       03.9       Venus: 0.1         23       36°20.3       181°56.6       24.3       153°01.0       40.8       279°12.9       12.8       39°36.1       03.9       Mars: 0.1											Saturn	J 14.2	20:22
22 21°17.8 166°57.2 23.2 138°00.5 40.4 264°10.4 12.7 24°33.6 03.9 Venus: 0.1 23 36°20.3 181°56.6 24.3 153°01.0 40.8 279°12.9 12.8 39°36.1 03.9 Mars: 0.1											Horizont	al parallax	
23 36°20.3 181°56.6 24.3 153°01.0 40.8 279°12.9 12.8 39°36.1 03.9 Mars: 0.1												•	0.1
25 30 20.5 101 30.0 21.5 135 01.0 10.0 21.7 12.5 37 30.1 03.5													
Mer.pass. 20:35 $\nu$ -0.5′ $d$ 1.1′ m-3.91 $\nu$ 0.6′ $d$ 0.4′ m1.41 $\nu$ 2.5′ $d$ 0.0′ m-2.39 $\nu$ 2.5′ $d$ 0.0′ m0.82					-						L		
	Mer.p	ass. 20:35	$ u$ -0.5 $^{\prime}$ $d1$	.1′ m-3.91	$ u 0.6' \ d0.4' \ m1$	.41	$\nu$ 2.5′ d0.	.0′ m-2.39	$\nu$ 2.5′ d0	.0′ m0.82			

h	Sui	า			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	184°03.1	S16°51.9	312°16.4	2.4'	N28° 07.0	-2.7'	60.0'
1	199°03.0	52.7	326°37.8	2.5'	28°04.3	-2.9'	59.9'
2	214°03.0	53.4	340°59.3	2.6'	28°01.4	-3.1'	59.9'
3	229°02.9	• • 54.1	355°20.8	2.7'	27°58.3	-3.3'	59.9'
4	244°02.9 259°02.8	54.8	9°42.5 24°04.2	2.7' 2.8'	27°55.0 27°51.5	-3.5' -3.7'	59.8'
5 6	259 02.8 274°02.8	55.5 \$16°56.2	24 04.2 38°26.1	2.8	N27°47.8	-3.1' -3.9'	59.8' 59.7'
7	289°02.7	56.9	52°48.0	3.0'	27°43.9	-3.9 -4.1'	59.7'
8	304°02.6	57.6	67°10.1	3.1'	27°39.8	-4.3'	59.7'
9	319°02.6	• • 58.3	81°32.2	3.2'	27°35.5	-4.5'	59.6'
10	334°02.5	59.1	95°54.4	3.4'	27°31.1	-4.6'	59.6'
11	349°02.5	16°59.8	110°16.8	3.5'	27°26.4	-4.8'	59.6'
12	4°02.4 19°02.4	\$17°00.5 01.2	124°39.3 139°01.8	3.6' 3.7'	N27°21.6 27°16.6	-5.0'	59.5' 59.5'
13 14	34°02.3	01.2	159 01.8 153°24.5	3. <i>1</i> 3.8'	27 10.0 27°11.4	-5.2' -5.4'	59.5'
15	49°02.3	02.6	167°47.3	3.9'	27° 11.4 27° 06.0	-5.6'	59.4'
16	64°02.2	03.3	182°10.3	4.0'	27° 00.5	-5.7'	59.4'
17	79°02.2	04.0	196°33.3	4.2'	26°54.7	-5.9'	59.3'
18	94°02.1	<b>S</b> 17°04.7	210°56.5	4.3'	N26°48.8	-6.1'	59.3'
19	109°02.0	05.4	225°19.7	4.4'	26°42.8	-6.2'	59.3'
20	124°02.0 139°01.9	06.1	239°43.1 254°06.7	4.5'	26°36.5 26°30.1	-6.4'	59.2' 59.2'
21 22	139°01.9 154°01.9	· · 06.8 07.5	254°06.7 268°30.3	4.7' 4.8'	26°30.1 26°23.5	-6.6' -6.7'	59.2' 59.2'
23	169°01.8	07.5 08.2	208 30.3 282°54.1	4.8 4.9'	26° 23.5	-6.7 -6.9'	59.2 59.1'
	SD = 16.1'	d = 0.7'			D = 16.4'	0.5	
	5D = 10.1	a = 0.7		- 51	$J = 10.4^{\circ}$		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	184°01.7 199°01.7	\$17°08.9 09.6	297°18.0 311°42.0	5.0' 5.2'	N26°09.9 26°02.8	-7.1' -7.2'	59.1' 59.0'
2	214°01.6	10.3	311 42.0 326°06.2	5.2 5.3'	20 02.6 25°55.6	-7.4'	59.0'
3	229°01.6	. 11.0	340°30.5	5.4'	25°48.2	-7.5'	59.0'
4	244°01.5	11.7	354°54.9	5.6'	25°40.6	-7.7'	58.9'
5	259°01.4	12.4	9°19.5	5.7'	25°32.9	-7.8'	58.9'
6	274°01.4	\$17°13.1	23°44.2	5.8'	N25°25.1	-8.0'	58.9'
7 8	289°01.3 304°01.3	13.8 14.5	38°09.0 52°34.0	6.0' 6.1'	25°17.1 25°08.9	-8.1' -8.3'	58.8' 58.8'
9	319°01.2	. 15.2	66°59.1	6.2'	25°00.9	-0.3 -8.4'	58.7'
10	334°01.1	15.9	81°24.3	6.4'	24°52.2	-8.6'	58.7'
11	349°01.1	16.6	95°49.7	6.5'	24°43.6	-8.7'	58.7'
12	4°01.0	<b>S</b> 17°17.3	110°15.2	6.6'	N24°34.9	-8.9'	58.6'
13	19°00.9	18.0	124°40.9	6.8'	24°26.1 24°17.1	-9.0'	58.6'
14 15	34°00.9 49°00.8	18.7 • • 19.4	139°06.6 153°32.6	6.9' 7.1'	24°17.1 24°08.0	-9.1' -9.3'	58.5' 58.5'
16	64°00.7	20.1	167°58.6	7.2'	24° 58.7	-9.3' -9.4'	58.5'
17	79°00.7	20.8	182°24.8	7.3'	23°49.3	-9.5'	58.4'
18	94°00.6	<b>S</b> 17°21.5	196°51.2	7.5'	N23°39.8	-9.6'	58.4'
19	109°00.5	22.2	211°17.6	7.6'	23°30.2	-9.8'	58.3'
20	124°00.5 139°00.4	22.9 • • 23.5	225°44.2 240°11.0	7.7' 7.9'	23°20.4 23°10.5	-9.9'	58.3' 58.3'
21 22	154°00.3	· · 23.5 24.2	240 11.0 254°37.9	7.9 8.0'	23°10.5	-10.0' -10.1'	58.2'
23	169°00.3	24.2	269°04.9	8.2'	22°50.4	-10.1	58.2
	SD = 16.1'	d = 0.7'		SI	0 = 16.1'		
_						,	
Tue 0	<b>GHA</b> 184°00.2	<b>Dec</b> \$17°25.6	<b>GHA</b> 283°32.0	ν 8.3'	<b>Dec</b> N22° 40.1	d -10.4'	<b>HP</b> 58.2'
1	199°00.1	26.3	203 32.0 297°59.3	8.4'	22°29.8	-10.4	58.1'
2	214°00.1	27.0	312°26.8	8.6'	22°19.3	-10.6'	58.1
3	229°00.0	• • 27.7	$326^{\circ}54.3$	8.7'	22°08.7	-10.7'	58.0'
4	243°59.9	28.4	341°22.0	8.8'	21°58.0	-10.8'	58.0'
5	258°59.9	29.1	355°49.9 10°17.8	9.0'	21°47.3	-10.9'	58.0' 57.9'
6 7	273°59.8 288°59.7	\$17°29.7 30.4	10°17.8 24°45.9	9.1' 9.2'	N21°36.4 21°25.3	-11.0' -11.1'	57.9' 57.9'
8	303°59.7	31.1	39°14.2	9.4	21°14.2	-11.1	57.8'
9	318°59.6	• • 31.8	53°42.5	9.5'	21°03.0	-11.3	57.8'
10	333°59.5	32.5	68°11.0	9.6'	20°51.7	-11.4'	57.8'
11	348°59.4	33.2	82°39.7	9.8'	20°40.3	-11.5'	57.7'
12 13	3°59.4 18°59.3	\$17°33.9 34.5	97°08.4 111°37.3	9.9' 10.0'	N20°28.8 20°17.3	-11.6' -11.7'	57.7' 57.7'
13 14	33°59.2	34.5 35.2	111 37.3 126°06.3	10.0	20 17.3 20°05.6	-11.7 -11.8'	57.7 57.6'
15	48°59.1	35.9	140°35.5	10.3'	19°53.8	-11.9	57.6'
16	63°59.1	36.6	155°04.8	10.4'	19°42.0	-11.9'	57.5'
17	78°59.0	37.3	169°34.2	10.5'	19°30.0	-12.0'	57.5'
18	93°58.9	S17°37.9	184°03.7	10.6'	N19°18.0	-12.1'	57.5'
19 20	108°58.8 123°58.8	38.6 39.3	198°33.3 213°03.1	10.8' 10.9'	19°05.9 18°53.7	-12.2' -12.3'	57.4' 57.4'
21	123 58.8 138°58.7	40.0	213 03.1 227°33.0	10.9	18° 41.4	-12.3'	57.4' 57.4'
22	153°58.6	40.7	242°03.0	11.1'	18° 29.1	-12.4	57.3'
23	168°58.5	41.3	256°33.1	11.2'	18° 16.7	-12.5'	57.3'
	SD = 16.1'	d = 0.7'		SI	O = 15.9'		

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

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

		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	83-63%	
09	16:12	16:10	11:44	03:19	15:51		
10	16:07	16:04	11:44	04:21	16:50		
11	16:01	15:57	11:44	05:17	17:43		

## November 12, 13, 14 UT (Wed., Thu., Fri.)

h	Aries	Ve	nus		ars	Jup	oiter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
					S21°41.1	294°15.3	N21°12.8	54°38.6				Dec
0	51°22.8	196°56.1	S12°25.4	168°01.6					S04°03.9	Alpheratz	357°33.8	29°14.2
1	66°25.2	211°55.5	26.4	183°02.1	41.5	309°17.8	12.8	69°41.2	03.9	Ankaa	353°06.2	-42° 10.0
2	81°27.7	226°55.0	27.5	198°02.7	41.8	324°20.3	12.8	84°43.7	03.9	Schedar	349°29.8	56°41.0
3	96°30.2	241°54.4	• • 28.6	213°03.2	• • 42.2	339°22.7	• • 12.8	99°46.2	• • 04.0	Diphda	348°46.3	-17° 50.6
4	111°32.6	256°53.9	29.7	228°03.8	42.5	354°25.2	12.8	114°48.8	04.0	Achernar	335°19.1	-57°06.4
5	126°35.1	271°53.4	30.8	243°04.4	42.8	9°27.7	12.8	129°51.3	04.0	Hamal	327°50.1	23°35.2
6	141°37.5	286°52.8	S12°31.8	258°04.9	S21°43.2	24°30.1	N21°12.8	144°53.8	S04°04.0			89°22.4
7	156°40.0	301°52.3	32.9	273°05.5	43.5	39°32.6	12.8	159°56.4	04.0	Polaris	313°11.1	
8	171°42.5	316°51.7	34.0	288°06.0	43.9	54°35.1	12.8	174°58.9	04.1	Acamar	315°10.8	-40°12.0
9	186°44.9	331°51.1	• • 35.1	303°06.6	• • 44.2	69°37.5	• • 12.8	190°01.4	04.1	Menkar	314°05.1	4°11.6
10	201°47.4	346°50.6	36.2	318°07.1	44.6	84°40.0	12.8	205°04.0	04.1	Mirfak	308°26.8	49°57.3
11	216°49.9	1°50.0	37.2	333°07.7	44.9	99°42.5	12.8	220°06.5	04.1	Aldebaran	290°38.5	16°33.7
	231°52.3	16°49.5	\$12°38.3	348°08.2	\$21°45.2	114°44.9	N21°12.8	235°09.0	S04°04.1	Rigel	281°02.9	-8°10.2
12										Capella	280°20.5	46°01.4
13	246°54.8	31°48.9	39.4	3°08.8	45.6	129°47.4	12.8	250°11.5	04.2	Bellatrix	278°21.9	6°22.5
14	261°57.3	46°48.4	40.5	18°09.3	45.9	144°49.9	12.9	265°14.1	04.2	Elnath	278°00.7	28° 37.8
15	276°59.7	61°47.8	• • 41.5	33°09.9	• • 46.3	159°52.3	• • 12.9	280°16.6	• • 04.2	Alnilam	275°36.8	-1°11.0
16	292°02.2	76°47.3	42.6	48°10.4	46.6	174°54.8	12.9	295°19.1	04.2	Betelgeuse	270°51.1	7°24.8
17	307°04.6	91°46.7	43.7	63°10.9	46.9	189°57.3	12.9	310°21.7	04.2	Canopus	263°51.7	-52°42.3
18	322°07.1	106°46.2	S12°44.8	78° 11.5	S21°47.3	204°59.8	N21°12.9	325°24.2	504°04.3		258°25.4	-32 42.3 -16°44.9
19	337°09.6	121°45.6	45.8	93°12.0	47.6	220°02.2	12.9	340°26.7	04.3	Sirius		
20	$352^{\circ}12.0$	136°45.1	46.9	$108^{\circ}12.6$	48.0	235°04.7	12.9	355°29.3	04.3	Adhara	255°05.1	-29°00.2
21	7°14.5	151°44.5	• • 48.0	123° 13.1	• • 48.3	250°07.2	· · 12.9	10°31.8	04.3	Procyon	244°50.0	5°09.6
22	22°17.0	166°43.9	49.0	138° 13.7	48.6	265°09.7	12.9	25°34.3	04.3	Pollux	243°16.3	27°57.7
23	37°19.4	181°43.4	50.1	153° 14.2	49.0	280°12.1	12.9	40°36.8	04.4	Avior	234°14.3	-59° 35.2
										Suhail	222°45.8	-43°31.9
Mer.p	ass. 20:31	$\nu$ -0.5' d1.	$.1^\prime$ m-3.91	$ u$ 0.6 $^{\prime}$ d0	.3'  m $1.41$	$\nu 2.5' \ d0.$	.0′ m-2.40	$\nu 2.5' \ d0$	.0′ m0.82	Miaplacidus	221°38.1	-69°49.0
										Alphard	217°47.1	-8°46.1
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.8	$11^{\circ}50.5$
					S21°49.3					Dubhe	193°40.4	61°36.4
0	52°21.9	196° 42.8 211° 42.3	\$12°51.2	168° 14.8 183° 15.3		295°14.6	N21°12.9	55°39.4	S04°04.4	Denebola	182°24.4	14°25.6
1	67°24.4		52.3		49.7	310°17.1	12.9	70°41.9	04.4	Gienah	175°43.1	-17°41.0
2	82°26.8	226°41.7	53.3	198°15.9	50.0	325°19.6	12.9	85°44.4	04.4	Acrux	172°59.9	-63°14.3
3	97°29.3	241°41.1	• • 54.4	213°16.4	• • 50.3	340°22.0	• • 13.0	100°47.0	• • 04.4	Gacrux	171°51.3	-57° 15.3
4	112°31.8	256° 40.6	55.5	228°17.0	50.7	355°24.5	13.0	115°49.5	04.5	Alioth	$166^{\circ}12.8$	55° 49.0
5	127°34.2	271°40.0	56.5	243°17.5	51.0	10°27.0	13.0	130°52.0	04.5	Spica	158°21.9	-11° 17.7
6	142°36.7	286° 39.5	S12°57.6	258° 18.1	S21°51.3	25°29.5	N21°13.0	145°54.5	S04°04.5	Alkaid	152°51.9	49° 10.9
7	$157^{\circ}39.1$	301°38.9	58.7	273°18.6	51.7	40°31.9	13.0	$160^{\circ}57.1$	04.5	Hadar	148°35.7	-60° 29.7
8	172°41.6	316°38.3	12°59.7	$288^{\circ}19.1$	52.0	55°34.4	13.0	175°59.6	04.5		147°57.2	-36° 29.7
9	$187^{\circ}44.1$	331°37.8	13°00.8	303° 19.7	• • 52.3	70°36.9	• • 13.0	191°02.1	• • 04.6	Arcturus	145°47.6	19°02.9
10	202°46.5	346°37.2	01.9	318°20.2	52.7	85°39.4	13.0	206°04.6	04.6	Rigil Kent.	139°40.0	-60° 56.4
11	217°49.0	1°36.6	02.9	333°20.8	53.0	100°41.8	13.0	221°07.2	04.6	Kochab	137°21.0	74°02.8
12	232°51.5	$16^{\circ}36.1$	S13°04.0	348°21.3	S21°53.3	115°44.3	N21°13.0	236°09.7	S04°04.6	Zuben'ubi	136°55.6	-16°08.9
13	247°53.9	31°35.5	05.0	3°21.9	53.7	130°46.8	13.0	251°12.2	04.6	Alphecca	126°03.5	26°37.7
14	262°56.4	46°35.0	06.1	18°22.4	54.0	145°49.3	13.1	266°14.8	04.6	Antares	112° 15.4	-26°29.3
15	277°58.9	61°34.4	• • 07.2	33°22.9	• • 54.3	160°51.8	• • 13.1	281°17.3	• • 04.7	Atria	107°09.5	-20°29.3 -69°04.5
16	293°01.3	76°33.8	08.2	48°23.5	54.7	175°54.2	13.1	296°19.8	04.7	Sabik	107 09.3 102°02.3	-09 04.5 -15°45.4
17	308°03.8	91°33.3	09.3	63°24.0	55.0	190°56.7	13.1	311°22.3	04.7		96°09.8	-13 45.4 -37°07.4
18	323°06.3	106°32.7	\$13°10.4	78°24.6	S21°55.3	205°59.2	N21°13.1	326°24.9	S04°04.7	Shaula	90 09.8 95°58.2	12°32.6
19	338°08.7	121°32.1	11.4	93°25.1	55.7	221°01.7	13.1	341°27.4	04.7	Rasalhague		51°29.3
20	353°11.2	136°31.6	12.5	108°25.7	56.0	236°04.2	13.1	356°29.9	04.8	Eltanin	90°42.3	
21	8°13.6	151°31.0	· · 13.5	123°26.2	• • 56.3	251°06.6	· · 13.1	11°32.4	• • 04.8	Kaus Aust.	83°31.9	-34°22.4
22	23°16.1	166° 30.4	14.6	138° 26.7	56.6	266°09.1	13.1	26°35.0	04.8	Vega	80°33.1	38°48.6
23	38°18.6	181°29.9	15.6	153°27.3	57.0	281°11.6	13.1	41°37.5	04.8	Nunki	75°47.1	-26° 15.9
										Altair	61°59.4	8°56.3
Mer.p	ass. 20:27	$\nu$ -0.6′ $d1$	.1' m-3.91	$\nu$ 0.5′ $d$ 0	.3′ m1.40	$\nu$ 2.5′ $d$ 0.	.0′ m-2.41	$\nu$ 2.5′ $d$ 0	.0′ m0.83	Peacock	53°04.8	-56° 39.3
										Deneb	49°25.5	45° 22.6
E:	CHA	CHA	Doo	CHA	Das	CHA	Doo	CHA	Don	Enif	33°38.1	9°59.8
Fri 0	<b>GHA</b> 53°21.0	<b>GHA</b> 196°29.3	Dec \$13°16.7	<b>GHA</b> 168°27.8	<b>Dec</b> \$21°57.3	<b>GHA</b> 296° 14.1	<b>Dec</b> N21°13.1	<b>GHA</b> 56°40.0	<b>Dec</b> <b>S</b> 04° 04.8	Al Na'ir	27°32.0	-46°50.3
										Fomalhaut	15°13.6	-29°29.2
1	68°23.5	211°28.7	17.8	183°28.4	57.6	311°16.6	13.2	71°42.5	04.8	Scheat	13°44.4	28° 13.6
2	83°26.0	226°28.1	18.8	198°28.9	58.0	326°19.1	13.2	86°45.1	04.9	Markab	$13^{\circ}29.1$	15°20.8
3	98°28.4	241°27.6	• • 19.9	213°29.4	• • 58.3	341°21.5	• • 13.2	101°47.6	• • 04.9			
4	113°30.9	256° 27.0	20.9	228°30.0	58.6	356°24.0	13.2	116°50.1	04.9	Nov 12 Wed	SHA	Mer.pass
5	128°33.4	271°26.4	22.0	243°30.5	58.9	11°26.5	13.2	131°52.6	04.9		145°33.3	10:53
6	143°35.8	286°25.9	\$13°23.0	258°31.1		26°29.0	N21°13.2		S04°04.9		116°38.8	12:47
7	158°38.3	301°25.3	24.1	273°31.6	59.6	41°31.5	13.2	161°57.7	04.9	Jupiter		04:22
8	173°40.7	316°24.7	25.1	288°32.1	21°59.9	56°34.0	13.2	177°00.2	05.0	Saturn	3°15.9	20:18
9	188°43.2	331°24.1	• • 26.2	303°32.7	22°00.3	71°36.5	• • 13.2	192°02.7	• • 05.0	Nov 13 Thu	SHA	Mer.pass
10	203°45.7	346°23.6	27.2	318° 33.2	00.6	86°38.9	13.2	207°05.2	05.0		144°20.9	10:54
11	218°48.1	1°23.0	28.3	333°33.7	00.9	101°41.4	13.3	222°07.8	05.0		115°52.9	12:47
12	233°50.6	16°22.4	S13°29.3	348°34.3	S22°01.2	116°43.9	N21°13.3	237°10.3	S04°05.0	Jupiter		04:18
13	248°53.1	31°21.8	30.4	3°34.8	01.6	131°46.4	13.3	252°12.8	05.0	Saturn	3°17.5	20:14
14	263°55.5	46°21.3	31.4	18° 35.4	01.9	146°48.9	13.3	267°15.3	05.1	Jatuill	J 11.J	20.14
15	278°58.0	61°20.7	• • 32.5	33°35.9	• • 02.2	161°51.4	• • 13.3	282°17.9	•• 05.1	Nov 14 Fri	SHA	Mer.pass
16	294°00.5	$76^{\circ}20.1$	33.5	48°36.4	02.5	176°53.9	13.3	297°20.4	05.1	Venus	143°08.2	10:54
17	$309^{\circ}02.9$	91° 19.5	34.6	63°37.0	02.8	191°56.4	13.3	312°22.9	05.1	Mars	115°06.8	12:46
18	324°05.4	$106^{\circ}19.0$	S13°35.6	78°37.5	S22°03.2	206°58.9	N21°13.3	327°25.4	S04°05.1	Jupiter		04:14
19	339°07.9	121°18.4	36.7	93°38.0	03.5	222°01.3	13.3	342°27.9	05.1	Saturn	3°19.0	20:10
20	$354^{\circ}10.3$	$136^{\circ}17.8$	37.7	$108^{\circ}38.6$	03.8	237°03.8	13.3	357°30.5	05.2			
21	9°12.8	151° 17.2	• • 38.8	123°39.1	•• 04.1	252°06.3	• • 13.4	12°33.0	• • 05.2	Horizont	al parallax	
22	24°15.2	166° 16.6	39.8	138° 39.6	04.5	267°08.8	13.4	27°35.5	05.2		Venus:	0.1
23	39°17.7	181°16.1	40.9	153°40.2	04.8	282°11.3	13.4	42°38.0	05.2		Mars:	0.1
Mern	ass. 20:23	$\nu$ -0.6' d1	.1′ m-3.91	$\nu$ 0.5' d0	.3′ m1.40	ν2 5′ d0	.0′ m-2.42	ν2 5' d0	.0′ m0.83			
							· ·					

h	Sui	า			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	183°58.5	S17°42.0	271°03.4	11.4'	N18°04.2	-12.6'	57.3'
1 2	198° 58.4 213° 58.3	42.7 43.4	285°33.7 300°04.2	11.5' 11.6'	17°51.6 17°39.0	-12.6' -12.7'	57.2' 57.2'
3	213 58.3 228° 58.2	• • 44.0	314°34.8	11.7'	17°26.3	-12.7	57.1
4	243°58.2	44.7	329°05.5	11.8'	$17^{\circ}13.5$	-12.8'	57.1'
5	258°58.1	45.4	343°36.4	11.9'	17°00.7	-12.9'	57.1'
6 7	273°58.0 288°57.9	\$17°46.1 46.7	358°07.3 12°38.3	12.0' 12.2'	N16°47.8 16°34.8	-13.0' -13.0'	57.0' 57.0'
8	303°57.8	47.4	27°09.5	12.3'	16°21.8	-13.1'	57.0'
9	318°57.8	• • 48.1	41°40.8	12.4'	16°08.7	-13.2'	56.9'
10	333° 57.7 348° 57.6	48.8	56°12.1 70°43.6	12.5'	15°55.5 15°42.3	-13.2'	56.9'
11 12	348 57.0 3°57.5	49.4 \$17°50.1	70 43.6 85°15.2	12.6' 12.7'	15 42.3 N15°29.0	-13.3' -13.3'	56.9' 56.8'
13	18° 57.4	50.8	99°46.9	12.8'	15°15.7	-13.4'	56.8'
14	33° 57.3	51.4	114° 18.7	12.9'	15°02.3	-13.4'	56.8'
15 16	48° 57.3 63° 57.2	· · 52.1 52.8	128°50.6 143°22.5	13.0' 13.1'	14°48.9 14°35.4	-13.5' -13.5'	56.7' 56.7'
17	78° 57.1	53.4	143 22.5 157°54.6	13.1	14 35.4 14°21.9	-13.5'	56.7'
18	93°57.0	S17°54.1	172°26.8	13.3'	N14°08.3	-13.6'	56.6'
19	108° 56.9	54.8	186°59.1	13.4'	13°54.7	-13.7'	56.6'
20 21	123° 56.8 138° 56.8	55.4 •• 56.1	201°31.5 216°03.9	13.5' 13.6'	13°41.0 13°27.3	-13.7' -13.8'	56.6' 56.5'
22	150 50.0 153°56.7	56.8	210 03.9 230°36.5	13.6'	13°13.6	-13.8'	56.5'
23	168° 56.6	57.4	245°09.1	13.7'	12°59.8	-13.8'	56.5'
	SD = 16.1'	d = 0.7'		SI	O = 15.6'		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	183° 56.5	S17°58.1	259°41.9	13.8'	N12°45.9	-13.9'	56.4
1	198° 56.4	58.8	274° 14.7	13.9'	12°32.1	-13.9'	56.4'
2	213°56.3 228°56.2	17°59.4 18°00.1	288°47.6 303°20.6	14.0' 14.1'	12°18.1 12°04.2	-14.0' -14.0'	56.4'
3 4	228°56.2 243°56.1	00.8	303°20.6 317°53.7	14.1	12°04.2 11°50.2	-14.0' -14.0'	56.3' 56.3'
5	258° 56.1	01.4	332°26.8	14.2'	11°36.2	-14.1'	56.3'
6	273°56.0	S18°02.1	347°00.1	14.3'	N11°22.1	-14.1'	56.2'
7 8	288° 55.9 303° 55.8	02.7 03.4	1°33.4 16°06.8	14.4' 14.5'	11°08.0 10°53.9	-14.1' -14.2'	56.2' 56.2'
9	318° 55.7	04.1	30°40.2	14.5	10°35.9	-14.2'	56.1'
10	333° 55.6	04.7	45°13.8	14.6'	10°25.5	-14.2'	56.1'
11	348° 55.5	05.4	59°47.4	14.7'	10°11.3	-14.2'	56.1'
12 13	3°55.4 18°55.3	\$18°06.0 06.7	74°21.1 88°54.9	14.8' 14.8'	N09°57.1 09°42.8	-14.3' -14.3'	56.1' 56.0'
14	33° 55.2	00.7 07.4	00 34.9 103°28.7	14.6	09 42.6 09°28.5	-14.3'	56.0'
15	48°55.2	• • 08.0	118°02.6	15.0'	09°14.2	-14.3'	56.0'
16	63°55.1	08.7	132°36.6	15.0'	08°59.9	-14.4'	55.9'
17 18	78°55.0 93°54.9	09.3 \$18°10.0	147°10.6 161°44.7	15.1' 15.2'	08°45.5 N08°31.1	-14.4' -14.4'	55.9' 55.9'
19	108° 54.8	10.6	176° 18.9	15.2'	08°16.7	-14.4'	55.8'
20	123°54.7	11.3	$190^{\circ}53.1$		08°02.3		55.8'
21	138° 54.6	•• 11.9	205°27.4 220°01.8	15.3'	07°47.9	-14.5'	55.8'
22 23	153° 54.5 168° 54.4	12.6 13.2	220°01.8 234°36.2	15.4' 15.5'	07°33.4 07°18.9	-14.5' -14.5'	55.8' 55.7'
20	SD = 16.2'	d = 0.7'			O = 15.4'	20	
F. *			CUA				LIE
Fri 0	<b>GHA</b> 183°54.3	<b>Dec</b> \$18° 13.9	<b>GHA</b> 249° 10.6	u 15.5'	<b>Dec</b> N07°04.5	d -14.5'	<b>HP</b> 55.7'
1	198° 54.2	14.5	263°45.1	15.6'	06°49.9	-14.5'	55.7'
2	213°54.1	15.2	278°19.7	15.6'	06°35.4	-14.5'	55.7'
3 4	228° 54.0 243° 53.9	· · 15.8 16.5	292°54.3 307°29.0	15.7' 15.7'	06°20.9 06°06.4	-14.5' -14.5'	55.6' 55.6'
4 5	243 53.9 258°53.8	10.5 17.1	307 29.0 322°03.7	15.7 15.8'	05°51.8	-14.5 -14.6'	55.6'
6	273°53.7	S18°17.8	336°38.5	15.8'	N05°37.3	-14.6'	55.5'
7	288° 53.6	18.4	351°13.3	15.9'	05°22.7	-14.6'	55.5'
8 9	303°53.5 318°53.4	19.1 •• 19.7	5°48.2 20°23.1	15.9' 16.0'	05°08.1 04°53.5	-14.6' -14.6'	55.5' 55.5'
10	333°53.3	20.4	34°58.0	16.0'	04° 38.9	-14.6'	55.4'
11	348°53.2	21.0	49°33.0	16.0'	04°24.3	-14.6'	55.4'
12	3°53.1	\$18°21.7	64°08.1	16.1'	N04°09.7	-14.6'	55.4'
13 14	18° 53.0 33° 52.9	22.3 22.9	78°43.1 93°18.2	16.1' 16.1'	03°55.1 03°40.5	-14.6' -14.6'	55.4' 55.3'
15	48° 52.8	23.6	107°53.4	16.2	03°25.9	-14.6'	55.3'
16	63°52.7	24.2	122°28.6	16.2'	03°11.3	-14.6'	55.3'
17	78° 52.6 93° 52.5	24.9 \$18°25.5	137°03.8 151°39.0	16.3'	02°56.7 N02°42.1	-14.6'	55.3'
18 19	93°52.5 108°52.4	26.2	151°39.0 166°14.3	16.3' 16.3'	02°27.5	-14.6' -14.6'	55.3' 55.2'
20	123° 52.3	26.8	180°49.6	16.3'	02°12.9	-14.6'	55.2'
21	138°52.2	• • 27.4	195°25.0	16.4'	01°58.3	-14.6'	55.2'
22 23	153°52.1 168°52.0	28.1 28.7	210°00.4 224°35.8	16.4' 16.4'	01°43.7 01°29.1	-14.6' -14.6'	55.2' 55.1'
23	SD = 16.2'	$\frac{28.7}{d=0.7'}$	224 35.8		D = 15.2'	-14.0	55.1
	JD — 10.2	u — 0.1		اد	J — 13.Z		

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

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

		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	53-32%	
12	15:54	15:50	11:44	06:08	18:31		
13	15:46	15:42	11:44	06:54	19:15		
14	15:37	15:33	11:44	07:36	19:57		

# November 15, 16, 17 UT (Sat., Sun., Mon.)

h	Aries	Ve	nus	Mars	Jupiter	Saturn	Stars	
Sat	GHA	GHA	Dec	GHA Dec	GHA Dec	GHA Dec	SHA	Dec
0	54°20.2	196° 15.5	S13°41.9	168°40.7 \$22°05.1	297°13.8 N21°13.4	57°40.6 \$04°05.2		
1	69°22.6	211°14.9	42.9	183°41.2 05.4	312°16.3 13.4	72°43.1 05.2	Alpheratz 357°33.8	
2	84°25.1	226° 14.3	44.0	198°41.8 05.7	327°18.8 13.4	87°45.6 05.3	Ankaa 353°06.2	
3	99°27.6	241°13.7	45.0	213°42.3 · · 06.1	342°21.3 · · 13.4	102°48.1 · · 05.3	Schedar 349°29.9	
4	114°30.0	256° 13.2	46.1	228°42.8 06.4	357°23.8 13.4	117°50.6 05.3	Diphda 348° 46.4	
5	129°32.5	271°12.6	47.1	243°43.4 06.7	12°26.3 13.4	132°53.2 05.3	Achernar 335°19.	
6	144°35.0	286° 12.0	\$13°48.1	258°43.9 \$22°07.0	27°28.8 N21°13.5	147°55.7 \$04°05.3	Hamal 327° 50.	
7	159°37.4	301°11.4	49.2	273°44.4 07.3	42°31.3 13.5	162°58.2 05.3	Polaris 313°11.	
8	174°39.9	316° 10.8	50.2	288°45.0 07.6	57°33.7 13.5	178°00.7 05.3	Acamar 315°10.8	
9	189°42.4	331°10.2	• • 51.3	303°45.5 · · 08.0	72°36.2 · · 13.5	193°03.2 · · 05.4	Menkar 314°05.	
10	204°44.8	346°09.7	52.3	318°46.0 08.3	87°38.7 13.5	208°05.8 05.4	Mirfak 308°26.8	
11	219°47.3	1°09.1	53.3	333°46.6 08.6	102°41.2 13.5	223°08.3 05.4	Aldebaran 290°38.5	
12	234°49.7	$16^{\circ}08.5$	S13°54.4	348°47.1 \$22°08.9	117°43.7 N21°13.5	238°10.8 <b>S</b> 04°05.4	Rigel 281°02.9 Capella 280°20.4	
13	249°52.2	31°07.9	55.4	3°47.6 09.2	132°46.2 13.5	253°13.3 05.4	Capella 280°20.4 Bellatrix 278°21.8	
14	264°54.7	46°07.3	56.4	18°48.2 09.5	147°48.7 13.6	268°15.8 05.4	Elnath 278°00.7	
15	279°57.1	61°06.7	• • 57.5	33°48.7 · · 09.9	$162^{\circ}51.2 \cdot \cdot 13.6$	283°18.3 · · 05.4	Alnilam 275°36.	
16	294°59.6	$76^{\circ}06.1$	58.5	48°49.2 10.2	177°53.7 13.6	298°20.9 05.5	Betelgeuse 270°51.	
17	310°02.1	91°05.5	13°59.5	63°49.8 10.5	192°56.2 13.6	313°23.4 05.5	Canopus 263°51.	
18	325°04.5	$106^{\circ}05.0$	<b>S</b> 14°00.6	78°50.3 <b>S</b> 22°10.8	207°58.7 N21°13.6	328°25.9 <b>S</b> 04°05.5	Sirius 258°25.4	
19	340°07.0	121°04.4	01.6	93°50.8 11.1	223°01.2 13.6	343°28.4 05.5	Adhara 255°05.	
20	355°09.5	136°03.8	02.6	108°51.3 11.4	238°03.7 13.6	358°30.9 05.5	Procyon 244°49.9	
21	10°11.9	151°03.2	• • 03.7	123°51.9 · · 11.7	253°06.2 · · 13.6	13°33.5 · · 05.5	Pollux 243°16.3	
22	25°14.4	166°02.6	04.7	138°52.4 12.1	268°08.7 13.6	28°36.0 05.5	Avior 234°14.2	
23	40°16.8	181°02.0	05.7	153°52.9 12.4	283°11.2 13.7	43°38.5 05.6	Suhail 222° 45.8	
Mer.n	pass. 20:19	$\nu$ -0.6' d1	.0′ m-3.91	ν0.5' d0.3' m1.39	ν2.5' d0.0' m-2.42	$\nu 2.5' \ d0.0' \ m0.84$	Miaplacidus 221°38.0	
							Alphard 217°47.	
_	C	<b></b>	-	CUA =	CIIA -	CIIA ==	Regulus 207°33.	
Sun	GHA	GHA	Dec	GHA Dec	GHA Dec	GHA Dec	Dubhe 193°40.4	
0	55°19.3	196°01.4	\$14°06.8	168°53.5 \$22°12.7	298°13.7 N21°13.7	58°41.0 S04°05.6	Denebola 182°24.4	
1	70°21.8	211°00.8	07.8	183°54.0 13.0	313°16.2 13.7	73°43.5 05.6	Gienah 175°43.	
2	85°24.2	226°00.2	08.8	198°54.5 13.3	328°18.7 13.7	88°46.0 05.6	Acrux 172°59.9	9 -63°14.3
3	100°26.7	240°59.6	•• 09.8	213°55.0 · · 13.6	343°21.2 · · 13.7	103°48.6 · · 05.6	Gacrux 171°51.3	3 -57°15.3
4	115°29.2	255°59.0	10.9	228°55.6 13.9	358°23.7 13.7	118°51.1 05.6	Alioth 166°12.8	3 55°49.0
5	130°31.6	270°58.4	11.9	243°56.1 14.2	13°26.2 13.7	133°53.6 05.6	Spica 158°21.9	9 -11°17.7
6	145°34.1	285°57.8	\$14°12.9	258°56.6 \$22°14.5	28°28.7 N21°13.7 43°31.2 13.8	148°56.1 S04°05.7 163°58.6 05.7	Alkaid 152°51.9	9 49°10.9
7	160°36.6	300°57.3	13.9	273°57.1 14.9			Hadar 148°35.	
8	175°39.0 190°41.5	315°56.7	15.0	288° 57.7 15.2 303° 58.2 · · 15.5	58°33.7 13.8 73°36.2 · · 13.8	179°01.1 05.7 194°03.6 · · 05.7	Menkent 147° 57.2	2 -36°29.7
9	190 41.5 205°44.0	330°56.1	• • 16.0				Arcturus 145°47.6	
10 11	205 44.0 220°46.4	345°55.5 0°54.9	17.0 18.0	318°58.7 15.8 333°59.3 16.1	88°38.7 13.8 103°41.2 13.8	209°06.2 05.7 224°08.7 05.7	Rigil Kent. 139°40.0	
12	235°48.9	15°54.3	\$14° 19.1	348°59.8 \$22°16.4	118°43.8 N21°13.8	239°11.2 \$04°05.7	Kochab 137°21.0	
13	250°51.3	30°53.7	20.1	4°00.3 16.7	133°46.3 13.8	254°13.7 05.8	Zuben'ubi 136°55.6	
14	265°53.8	45°53.1	21.1	19°00.8 17.0	148° 48.8 13.9	269°16.2 05.8	Alphecca 126°03.	
15	280°56.3	60°52.5	•• 22.1	34°01.4 · · 17.3	163°51.3 · · 13.9	284°18.7 · · 05.8	Antares 112°15.4	
16	295°58.7	75°51.9	23.1	49°01.9 17.6	178°53.8 13.9	299°21.3 05.8	Atria 107°09.	
17	311°01.2	90°51.3	24.2	64°02.4 17.9	193°56.3 13.9	314°23.8 05.8	Sabik 102°02.3	
18	326°03.7	105°50.7	\$14°25.2	79°02.9 \$22°18.2	208°58.8 N21°13.9	329°26.3 \$04°05.8	Shaula 96°09.8	
19	341°06.1	120° 50.1	26.2	94°03.4 18.5	224°01.3 13.9	344°28.8 05.8	Rasalhague 95°58.2	
20	356°08.6	135°49.5	27.2	109°04.0 18.8	239°03.8 13.9	359°31.3 05.8	Eltanin 90°42.3	
21	11°11.1	150° 48.9	28.2	124°04.5 · · 19.1	254°06.3 · · 14.0	14°33.8 · · 05.9	Kaus Aust. 83°31.9	
22	26°13.5	165°48.3	29.2	139°05.0 19.4	269°08.8 14.0	29°36.3 05.9	Vega 80°33.1	
23	41°16.0	180°47.7	30.3	154°05.5 19.8	284°11.3 14.0	44°38.8 05.9	Nunki 75°47.2	
							Altair 61°59.5	
Mer.p	bass. 20:15	$\nu$ -0.6′ d1	.0′ m-3.91	$\nu 0.5' \ d0.3' \ m1.39$	$\nu 2.5' \ d0.0' \ \text{m}-2.43$	$\nu 2.5' \ d0.0' \ m0.85$	Peacock 53°04.8	
							Deneb 49°25.5	
Mon	GHA	GHA	Dec	GHA Dec	GHA Dec	GHA Dec	Enif 33°38.3 Al Na'ir 27°32.0	
0	56°18.4	195°47.1	<b>S</b> 14°31.3	169°06.1 \$22°20.1	299°13.8 N21°14.0	59°41.4 \$04°05.9	Fomalhaut 15°13.6	
1	71°20.9	$210^{\circ}46.5$	32.3	184°06.6 20.4	314°16.4 14.0	74°43.9 05.9	Scheat 13°44.4	
2	86°23.4	225°45.8	33.3	199°07.1 20.7	329°18.9 14.0	89°46.4 05.9	Markab 13°29.	
3	101°25.8	$240^{\circ}45.2$	• • 34.3	214°07.6 · · 21.0	344°21.4 · · 14.0	104°48.9 · · 05.9		
4	$116^{\circ}28.3$	255°44.6	35.3	229°08.1 21.3	359°23.9 14.0	119°51.4 05.9	Nov 15 Sat SHA	Mer.pass
5	131°30.8	270°44.0	36.3	244°08.7 21.6	14°26.4 14.1	134°53.9 05.9	Venus 141°55.3	
6	146°33.2	285°43.4	<b>S</b> 14°37.3	259°09.2 \$22°21.9	29°28.9 N21°14.1	149°56.4 \$04°06.0	Mars 114°20.5	
7	161°35.7	300°42.8	38.4	274°09.7 22.2	44°31.4 14.1	164°58.9 06.0	Jupiter 242°53.6	
8	176°38.2	315°42.2	39.4	289°10.2 22.5	59°33.9 14.1	180°01.5 06.0	Saturn 3°20.4	1 20:06
9	191°40.6	330°41.6	• • 40.4	304°10.7 · · 22.8	74°36.4 · · 14.1	195°04.0 · · 06.0	Nov 16 Sun SHA	Mer.pass
10	206°43.1	345°41.0	41.4	319°11.3 23.1	89°39.0 14.1	210°06.5 06.0	Venus 140°42.	
11	221°45.6	0°40.4	42.4	334°11.8 23.4	104°41.5 14.2	225°09.0 06.0	Mars 113°34.	
12	236°48.0	15°39.8	\$14°43.4	349°12.3 \$22°23.7	119°44.0 N21°14.2	240°11.5 \$04°06.0	Jupiter 242°54.4	
13	251°50.5	30°39.2	44.4 45.4	4°12.8 24.0	134°46.5 14.2	255°14.0 06.0	Saturn 3°21.	
14 15	266°52.9	45°38.6	45.4	19°13.3 24.3 34°13.9 •• 24.6	149°49.0 14.2	270°16.5 06.1 285°19.0 · · 06.1	N 17 M	N.4
15 16	281°55.4 296°57.9	60° 37.9 75° 37.3	· · 46.4		164°51.5 · · 14.2 179°54.0 14.2		Nov 17 Mon SHA	Mer.pass
16 17	290 57.9 312°00.3	75 37.3 90°36.7	47.4 48.4	49°14.4 24.9 64°14.9 25.2	179°54.0 14.2 194°56.6 14.2	300°21.5 06.1 315°24.1 06.1	Venus 139°28.6	
18	312 00.3 327°02.8	105°36.1	\$14°49.4	79°15.4 \$22°25.4	209°59.1 N21°14.3	330°26.6 S04°06.1	Mars 112° 47.6 Jupiter 242° 55.4	
19	342°05.3	105°35.5	50.4	94°15.9 25.7	225°01.6 14.3	345°29.1 06.1	Jupiter 242°55.4 Saturn 3°22.9	
20	357°07.7	135°34.9	51.4	109° 16.4 26.0	240°04.1 14.3	0°31.6 06.1	Jatum 3 22.5	19:06
21	12°10.2	150°34.3	• 52.4	124°17.0 · · 26.3	255°06.6 · · 14.3	15°34.1 · · 06.1	Horizontal paralla	(
22	27°12.7	165°33.7	53.4	139°17.5 26.6	270°09.1 14.3	30°36.6 06.1	Venus	
23	42°15.1	180°33.0	54.4	154°18.0 26.9	285°11.7 14.3	45°39.1 06.1	Mars	: 0.1
ivier.p	pass. 20:11	ν-υ.υ΄ d1	.0′ m-3.91	ν0.5′ d0.3′ m1.38	ν2.5' d0.0' m-2.44	ν2.5' d0.0' m0.85		

183°51.9   S18°29.4   239°11.2   16.4   No1°14.5   -14.6   55.	h	Sur	Moon					
1 198°518 8 30.0 253°46.6 16.5 00°59.9 -14.6 55. 2 213°51.7 30.6 268°22.1 16.5 00°49.3 -14.6 55. 3 228°51.6 31.3 30.6 268°22.1 16.5 00°40.3 -14.6 55. 4 243°51.5 31.9 297°33.1 16.5 00°16.2 -14.5 55. 5 258°51.4 32.5 312°08.6 16.6 00°07.4 14.5 55. 6 273°51.3 518°32.2 326°44.2 16.6 500°12.9 14.5 55. 7 288°51.2 33.8 341°19.8 16.6 00°7.4 14.5 55. 8 303°51.1 34.4 355°55.3 16.6 00°41.9 14.5 54. 9 318°51.0 · 35.1 10°30.9 16.6 00°56.4 14.5 54. 10 333°50.8 35.7 25°06.6 16.6 01°10.9 14.5 54. 11 348°50.7 36.3 39°42.2 16.6 01°10.9 14.5 54. 11 348°50.7 36.3 39°42.2 16.6 01°10.9 14.5 54. 11 348°50.7 36.3 39°42.2 16.6 01°25.4 14.5 54. 11 348°50.7 36.3 39°42.2 16.6 01°25.4 14.5 54. 11 348°50.7 36.3 39°42.2 16.6 01°25.4 14.5 54. 11 348°50.7 36.3 39°42.2 16.6 01°25.4 14.5 54. 11 348°50.7 36.3 39°42.2 16.6 01°25.4 14.5 54. 11 348°50.7 36.3 39°42.2 16.6 01°25.4 14.5 54. 11 433°50.4 38.2 33°2.1 16.7 00°48.7 14.4 54. 12 3°50.6 518°37.0 54°17.8 16.6 501°39.9 14.4 54. 15 48°50.3 38.9 98°04.8 16.7 02°43.7 14.4 54. 16 63°50.2 39.5 112°40.5 16.7 02°43.7 14.4 54. 17 78°50.1 40.1 127°16.1 16.7 02°37.5 14.4 54. 19 108°49.9 41.4 156°27.5 16.7 02°37.5 14.4 54. 20 123°49.7 42.0 117°03.2 16.7 03°30.6 14.3 54. 21 138°49.6 · 42.6 185°38.9 16.7 03°30.6 14.3 54. 22 153°49.5 43.2 200°14.6 16.7 03°34.9 14.3 54. 22 153°49.5 43.2 200°14.6 16.7 04°03.5 14.3 54. 22 153°49.5 43.2 200°14.6 16.7 04°03.5 14.3 54. 23 168°49.4 43.9 214°50.3 16.7 04°03.5 14.3 54. 24 243°48.8 47.0 287°48.6 16.7 05°08.7 14.1 54. 5 258°48.7 47.6 302°24.3 16.6 06°08.8 14.0 54. 5 288°48.5 48.8 331°35.6 16.6 06°38.9 14.0 54. 2 2 133°49.1 45.7 258°37.3 16.7 05°00.4 14.2 54. 2 2 133°49.1 45.7 258°37.3 16.7 05°00.4 14.2 54. 3 208°49.0 51.8 320°44.3 16.6 06°08.8 19.1 54.0 10.3 18.6 14.0 54. 3 208°49.0 51.8 320°44.3 16.6 06°08.8 19.1 54.0 14.2 54. 11 388°48.5 48.8 331°35.6 16.6 06°08.8 19.1 54.0 14.2 54. 2 133°49.5 51.8 65.6 132°06.6 16.8 06°24.9 14.0 54. 3 208°48.5 51.8 69.9 318°44.1 15.1 16.4 09°44.1 13.5 54. 11 388°48.5 51.8 65.6 132°06.6 16.8 08°3.9 13.0 54. 11 388°48.6 51.8 50.9 16.6	Sat	GHA	Dec	GHA	ν	Dec	d	HP
2 213°51.7 30.6 268°22.1 16.5' 00°30.8 -14.6' 55. 4 243°51.5 31.9 297°33.1 16.5' 00°30.8 -14.6' 55. 5 258°51.4 32.5 31.9 297°33.1 16.5' 00°16.2 -14.5' 55. 5 258°51.4 32.5 31.2°08.6 16.6' N00°01.7 -14.5' 55. 7 288°51.2 33.8 341°19.8 16.6' 00°12.7 14.5' 55. 8 303°51.1 34.4 355°55.3 16.6' 00°12.9 14.5' 55. 8 303°51.1 34.4 355°55.3 16.6' 00°12.9 14.5' 54. 9 318°51.0 · 35.1 10°30.9 16.6' 00°66.4 14.5' 54. 10 333°50.8 35.7 25°06.6 16.6' 01°10.9 14.5' 54. 11 348°50.7 36.3 39°42.2 16.6' 01°10.9 14.5' 54. 12 3°50.6 518°37.0 54°17.8 16.6' 51°39.9 14.4' 54. 15 48°50.3 · 33.8 9 88°29.1 16.7' 02°08.7 14.4' 54. 15 48°50.3 · 38.9 88°04.8 16.7' 02°33.7 14.4' 54. 16 63°50.2 39.5 112°40.5 16.7' 02°37.5 14.4' 54. 16 63°50.2 39.5 112°40.5 16.7' 02°37.5 14.4' 54. 18 93°50.0 518°40.7 141°51.8 16.7' 02°37.5 14.4' 54. 19 108°49.9 41.4 156°27.5 16.7' 03°30.6 14.3' 54. 20 123°49.7 42.0 171°03.2 16.7' 03°30.6 14.3' 54. 21 138°49.6 · 42.6 185°38.9 16.7' 03°49.2 14.3' 54. 22 133°49.7 42.0 171°03.2 16.7' 04°03.5 14.3' 54. 22 133°49.1 45.7 42.0 171°03.2 16.7' 04°03.5 14.3' 54. 23 168°49.4 43.9 214°50.3 16.7' 04°01.5 14.2' 54. 24 213°48.8 47.0 287°48.6 16.7' 04°03.5 14.2' 54. 25 213°49.1 45.7 288°37.3 16.7' 04°01.5 14.2' 54. 26 22 133°49.1 45.7 288°37.3 16.7' 04°03.5 14.3' 54. 27 288°48.7 47.6 302°24.3 16.6' 05°42.8 14.1' 54. 288°48.7 47.6 302°24.3 16.6' 05°42.8 14.1' 54. 288°48.5 48.8 331°35.6 16.6' 06°62.8 17.1' 14.0' 54. 29 318°48.3 · 50.1 0°46.8 16.6' 06°49.9 14.0' 54. 29 318°48.3 · 50.1 0°46.8 16.6' 06°49.9 14.0' 54. 20 123°47.0 56.8 161°17.5 16.5' 08°05.1 13.3' 54. 21 138°46.6 58.7 50.7 15°2.2 16.6' 06°40.9 14.0' 54. 21 138°46.5 186°59.3 26°41.1 16.6' 06°40.9 14.0' 54. 22 133°40.9 34.8 4.9 34.9 34.0'	0		S18°29.4		16.4'		-14.6'	55.1'
3								55.1'
243°51.5   31.9   297°33.1   16.5'   00°16.2   -14.5'   55.								55.1'
5								55.0'
6								55.0'
8 303° 51.1 34.4 355° 55.3 16.6' 00° 41.9 14.5' 54. 9 318° 51.0 · 35.1 10° 30.9 16.6' 00° 61.9 14.5' 54. 10 333° 50.8 35.7 25° 06.6 16.6' 01° 10.9 14.5' 54. 11 348° 50.7 36.3 39° 42.2 16.6' 01° 10.9 14.5' 54. 11 348° 50.5 37.6 68° 53.5 16.7' 01° 54.3 14.4' 54. 12 3° 50.6 518° 37.0 54° 17.8 16.6' 501° 39.9 14.4' 54. 13 18° 50.5 37.6 68° 53.5 16.7' 01° 54.3 14.4' 54. 14 33° 50.4 38.2 83° 29.1 16.7' 02° 23.1 14.4' 54. 15 448° 50.3 · 38.9 98° 04.8 16.7' 02° 23.1 14.4' 54. 16 63° 50.2 39.5 112° 40.5 16.7' 02° 37.5 14.4' 54. 16 63° 50.2 39.5 112° 40.5 16.7' 02° 37.5 14.4' 54. 17 78° 50.1 40.1 127° 16.1 16.7' 02° 37.5 14.3' 54. 19 108° 49.9 41.4 156° 27.5 16.7' 03° 20.6 14.3' 54. 20 123° 49.7 42.0 171° 03.2 16.7' 03° 20.6 14.3' 54. 21 138° 49.6 · 42.6 185° 38.9 16.7' 03° 20.6 14.3' 54. 22 153° 49.5 43.2 200° 14.6 16.7' 04° 03.5 14.3' 54. 22 153° 49.5 43.2 200° 14.6 16.7' 04° 03.5 14.3' 54. 22 153° 49.5 43.2 200° 14.6 16.7' 04° 03.5 14.3' 54. 22 13° 49.1 45.7 258° 37.3 16.7' 04° 17.8 14.2' 54. 24 198° 49.2 45.1 244° 01.6 16.7' 04° 17.8 14.2' 54. 25 213° 49.1 45.7 258° 37.3 16.7' 04° 17.8 14.2' 54. 26 123° 49.1 45.7 258° 37.3 16.7' 05° 00.4 14.2' 54. 27 288° 48.7 47.6 302° 24.3 16.6' 05° 24.8 14.1' 54. 28 28° 49.0 · 46.4 273° 13.0 16.7' 05° 14.5 14.1' 54. 28 28° 48.6 318° 48.2 316° 59.9 16.6' 05° 24.8 14.1' 54. 29 318° 48.3 · 50.1 0° 46.8 16.6' 06° 02.9 14.0' 54. 303° 48.1 50.7 15° 22.4 16.6' 06° 24.9 14.0' 54. 31 38° 48.3 · 50.1 0° 46.8 16.6' 06° 02.8 13.9' 54. 11 348° 48.0 51.3 29° 58.0 16.6' 06° 24.9 14.0' 54. 11 38° 47.8 52.5 59° 09.1 16.5' 07° 34.5 13.8' 54. 12 3° 47.9 518° 51.9 44° 33.6 16.6' 06° 24.9 14.0' 54. 11 38° 46.5 518° 59.3 219° 38.9 16.6' 06° 38.9 14.0' 54. 11 38° 47.8 52.5 59° 09.1 16.5' 07° 34.5 13.8' 54. 12 3° 47.9 518° 51.9 44° 32.0 16.6' 06° 24.9 14.0' 54. 11 38° 46.5 518° 59.3 219° 38.9 16.6' 06° 38.9 13.0' 54. 11 38° 47.5 518° 59.0 24° 41.2 16.6' 06° 24.9 14.0' 54. 11 38° 45.5 518° 59.3 219° 38.9 16.3' 510° 04.5 13.4' 54. 22 138° 45.7 518° 59.3 219° 38.9 16.3' 510° 04.5 13.4' 54. 22 138° 45.0 11.								55.0'
9   318° 51.0   · · · 35.1   10° 30.9   16.6'   00° 56.4   14.5'   54.     10   333° 50.8   35.7   25° 06.6   16.6'   01° 10.9   14.5'   54.     11   348° 50.7   36.3   39° 42.2   16.6'   01° 25.4   14.5'   54.     12   3° 50.6   518° 37.0   54° 17.8   16.6'   501° 39.9   14.4'   54.     13   18° 50.5   37.6   68° 53.5   16.7'   01° 54.3   14.4'   54.     14   33° 50.4   38.2   83° 29.1   16.7'   02° 08.7   14.4'   54.     15   48° 50.3   · · · 38.9   98° 04.8   16.7'   02° 31.7   14.4'   54.     16   63° 50.2   39.5   112° 40.5   16.7'   02° 31.5   14.4'   54.     16   63° 50.2   39.5   112° 40.5   16.7'   02° 31.5   14.4'   54.     17   78° 50.1   40.1   127° 16.1   16.7'   02° 31.9   14.4'   54.     19   108° 49.9   41.4   156° 27.5   16.7'   03° 20.6   14.3'   54.     19   108° 49.9   41.4   156° 27.5   16.7'   03° 30.3   14.3'   54.     20   123° 49.7   42.0   171° 03.2   16.7'   03° 34.9   14.3'   54.     21   138° 49.6   42.6   185° 38.9   16.7'   03° 34.9   14.3'   54.     22   153° 49.5   43.2   200° 14.6   16.7'   04° 03.5   14.3'   54.     23   168° 49.4   43.9   214° 50.3   16.7'   04° 17.8   14.2'   54.     24   213° 49.1   45.7   258° 37.3   16.7'   04° 17.8   14.2'   54.     2   213° 49.1   45.7   258° 37.3   16.7'   04° 12.5   14.2'   54.     2   213° 49.1   45.7   258° 37.3   16.7'   05° 14.5   14.1'   54.     2   2   23° 49.1   45.7   258° 37.3   16.7'   05° 14.5   14.1'   54.     3   228° 49.0   46.4   273° 13.0   16.7'   05° 14.5   14.1'   54.     4   243° 48.8   47.0   287° 48.6   16.7'   05° 28.7   14.1'   54.     5   258° 48.7   47.6   30° 29.1   16.6'   06° 22.9   14.0'   54.     6   273° 48.6   518° 58.2   316° 59.9   16.6'   50° 28.7   14.1'   54.     6   273° 48.6   518° 58.9   36° 59.9   16.6'   05° 28.7   14.1'   54.     10   333° 48.1   50.7   15° 22.4   16.6'   06° 24.9   14.0'   54.     11   348° 48.0   51.3   29° 58.0   16.6'   06° 24.9   14.0'   54.     12   3° 47.9   518° 51.9   44° 33.6   16.6'   06° 24.9   14.0'   54.     13   18° 47.8   52.5   59° 09.1   16.5'   07° 34.5	7		33.8		16.6'		14.5'	55.0'
10								54.9'
11								54.9'
13								54.9'
14								54.9'
15	13	18°50.5	37.6	68°53.5	16.7'	$01^{\circ}54.3$	14.4'	54.8'
16								54.8'
17								54.8'
18								54.8'
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$								54.8'
21		108°49.9	41.4	156°27.5		03°20.6	14.3'	54.7'
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Sun         GHA         Dec         GHA         ν         Dec         d         H           0         183° 49.2         45.1         229° 25.9         16.7'         504° 32.0         14.2'         54.1           1         198° 49.2         45.1         244° 01.6         16.7'         05° 00.4         14.2'         54.2           2         213° 49.1         45.7         258° 37.3         16.7'         05° 01.4         14.2'         54.3           4         243° 48.8         47.0         288° 48.6         16.7'         05° 24.8         14.1'         54.4           5         258° 48.7         47.6         302° 24.3         16.6'         05° 28.7         14.1'         54.6           6         273° 48.6         518° 48.2         316° 59.9         16.6'         505° 56.8         14.0'         54.8           3         303° 48.4         49.5         346° 11.2         16.6'         06° 21.9         14.0'         54.8           9         318° 48.3         50.1         0° 46.8         16.6'         06° 38.9         14.0'         54.8           10         333° 48.1         50.7         15° 22.4         16.6'         06° 28.9         14.0'         54.8<	23			214 30.3			14.2	J4.1
0 183°49.3 S18°44.5 229°25.9 16.7' S04°32.0 14.2' 54. 1 198°49.2 45.1 244°01.6 16.7' 04°46.2 14.2' 54. 2 213°49.1 45.7 258°37.3 16.7' 05°00.4 14.2' 54. 4 243°48.8 47.0 287°48.6 16.7' 05°14.5 14.1' 54. 4 243°48.8 47.0 287°48.6 16.7' 05°28.7 14.1' 54. 5 258°48.7 47.6 302°24.3 16.6' 05°42.8 14.1' 54. 6 273°48.6 S18°48.2 316°59.9 16.6' S05°56.8 14.0' 54. 8 303°48.4 49.5 346°11.2 16.6' 06°10.9 14.0' 54. 9 318°48.3 · 50.1 0°46.8 16.6' 06°24.9 14.0' 54. 10 333°48.1 50.7 15°22.4 16.6' 06°24.9 14.0' 54. 11 348°48.0 51.3 29°58.0 16.6' 07°06.8 13.9' 54. 11 348°48.0 51.3 29°58.0 16.6' 507°20.7 13.9' 54. 13 18°47.8 52.5 59°09.1 16.5' 07°48.3 13.8' 54. 15 48°47.6 · 53.8 88°20.2 16.5' 08°02.1 13.8' 54. 16 63°47.4 54.4 102°55.7 16.5' 08°15.9 13.7' 54. 17 78°47.3 55.0 117°31.2 16.5' 08°29.6 13.7' 54. 20 123°47.0 56.8 161°17.5 16.4' 09°10.5 13.6' 54. 21 138°46.5 S18°59.9 234°14.2 16.3' 09°15.1 13.4' 54. 22 153°46.7 58.1 190°28.2 16.3' 09°37.6 13.5' 54. 22 153°46.7 58.1 190°28.2 16.3' 09°37.6 13.5' 54. 22 153°46.7 58.1 190°28.2 16.3' 09°37.6 13.5' 54. 23 168°46.6 58.7 205°03.6 16.3' 09°51.1 13.4' 54. 243°45.7 Ol. 1.7 277°59.8 16.2' 10°31.3 11.3 54. 4 243°46.0 01.7 277°59.8 16.2' 10°31.3 11.3 54. 6 273°45.7 S19°02.9 307°10.1 16.1' S11°24.3 13.1' 54. 10 333°45.5 04.2 336°20.3 16.0' 11°50.5 13.0' 54. 10 333°45.5 04.2 336°20.3 16.0' 11°50.5 13.0' 54. 11 388°45.6 03.5 518°59.3 219°38.9 16.3' 10°17.9 13.4' 54. 22 13°46.2 19°00.5 248°49.4 16.2' 10°31.3 13.3' 54. 3 228°46.1 · 01.1 263°24.7 16.2' 10°41.6 13.3' 54. 4 243°46.0 01.7 277°59.8 16.2' 10°57.9 13.2' 54. 10 333°45.5 04.2 336°20.3 16.0' 11°50.5 13.0' 54. 10 333°45.5 04.2 336°20.3 16.0' 11°50.5 13.0' 54. 10 333°45.5 04.2 336°20.3 16.0' 11°50.5 13.0' 54. 11 348°45.1 06.0 20°05.3 15.9' 12°29.4 12.9' 54. 11 348°45.1 06.0 20°05.3 15.9' 12°29.4 12.9' 54. 11 348°45.1 06.0 20°05.3 15.9' 12°29.4 12.9' 54. 11 348°45.1 06.0 20°05.3 15.9' 12°29.4 12.9' 54. 11 348°44.6 07.2 49°15.1 15.8' 12°07.7 12.7' 54.		SD = 16.2'	d = 0.6'		SI	D = 15.0'		
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8 303°48.4 49.5 346°11.2 16.6' 06°24.9 14.0' 54. 9 318°48.3 · · 50.1 0°46.8 16.6' 06°38.9 14.0' 54. 10 333°48.1 50.7 15°22.4 16.6' 06°38.9 14.0' 54. 11 348°48.0 51.3 29°58.0 16.6' 07°06.8 13.9' 54. 12 3°47.9 518°51.9 44°33.6 16.6' 507°20.7 13.9' 54. 13 18°47.8 52.5 59°09.1 16.5' 07°34.5 13.8' 54. 14 33°47.7 53.2 73°44.7 16.5' 07°48.3 13.8' 54. 15 48°47.6 · · 53.8 88°20.2 16.5' 08°02.1 13.8' 54. 16 63°47.4 54.4 102°55.7 16.5' 08°15.9 13.7' 54. 17 78°47.3 55.0 117°31.2 16.5' 08°29.6 13.7' 54. 18 93°47.2 518°55.6 132°06.6 16.4' 508°43.3 13.6' 54. 19 108°47.1 56.2 146°42.1 16.4' 08°56.9 13.6' 54. 20 123°47.0 56.8 161°17.5 16.4' 09°10.5 13.6' 54. 21 138°46.8 · · 57.5 175°52.9 16.4' 09°24.1 13.5' 54. 22 153°46.7 58.1 190°28.2 16.3' 09°37.6 13.5' 54. 23 168°46.6 58.7 205°03.6 16.3' 09°51.1 13.4' 54.  SD = 16.2' d = 0.6'  SD = 14.9'  Mon GHA Dec GHA ν Dec GHA ν Dec d HI 0 183°46.5 518°59.3 219°38.9 16.3' 510°04.5 13.4' 54. 2 213°46.0 01.7 277°59.8 16.2' 10°44.6 13.3' 54. 3 228°46.1 · · 01.1 263°24.7 16.2' 10°44.6 13.3' 54. 4 243°46.0 01.7 277°59.8 16.2' 10°44.6 13.3' 54. 4 243°46.0 01.7 277°59.8 16.2' 10°44.6 13.3' 54. 5 258°45.9 02.3 292°35.0 16.1' 11°11.1 13.2' 54. 6 273°45.7 519°02.9 307°10.1 16.1' 511°24.3 13.1' 54. 8 303°45.5 04.2 336°20.3 16.0' 12°03.5 13.0' 54. 10 333°45.2 05.4 5°30.3 16.0' 12°03.5 13.0' 54. 11 348°45.4 · · 04.8 350°55.3 16.0' 12°03.5 13.0' 54. 12 3°45.0 519°06.6 34°40.2 15.9' 512°92.4 12.9' 54. 13 18°44.8 07.2 49°15.1 15.8' 13°07.9 12.7' 54. 14 33°44.7 07.8 63°49.9 15.8' 13°07.9 12.7' 54.								54.5' 54.5'
9 318°48.3 ··· 50.1 0°46.8 16.6' 06°38.9 14.0' 54. 10 333°48.1 50.7 15°22.4 16.6' 06°52.8 13.9' 54. 11 348°48.0 51.3 29°58.0 16.6' 07°06.8 13.9' 54. 12 3°47.9 518°51.9 44°33.6 16.6' 507°20.7 13.9' 54. 13 18°47.8 52.5 59°09.1 16.5' 07°34.5 13.8' 54. 14 33°47.7 53.2 73°44.7 16.5' 07°48.3 13.8' 54. 15 48°47.6 ··· 53.8 88°20.2 16.5' 08°02.1 13.8' 54. 16 63°47.4 54.4 102°55.7 16.5' 08°15.9 13.7' 54. 17 78°47.3 55.0 117°31.2 16.5' 08°29.6 13.7' 54. 18 93°47.2 518°55.6 132°06.6 16.4' 508°43.3 13.6' 54. 20 123°47.0 56.8 161°17.5 16.4' 09°10.5 13.6' 54. 21 138°46.8 ··· 57.5 175°52.9 16.4' 09°24.1 13.5' 54. 22 153°46.7 58.1 190°28.2 16.3' 09°37.6 13.5' 54. 23 168°46.6 58.7 205°03.6 16.3' 09°37.6 13.5' 54. 24 213°46.2 19°00.5 248°49.4 16.2' 10°41.3 13.4' 54. 3 228°46.1 ··· 01.1 263°24.7 16.2' 10°44.6 13.3' 54. 4 243°46.0 01.7 277°59.8 16.2' 10°44.6 13.3' 54. 4 243°46.0 01.7 277°59.8 16.2' 10°44.6 13.3' 54. 4 243°46.0 01.7 277°59.8 16.2' 10°44.6 13.3' 54. 5 258°45.9 02.3 292°35.0 16.1' 11°11.1 13.2' 54. 6 273°45.7 519°02.9 307°10.1 16.1' 511°24.3 13.1' 54. 7 288°45.6 03.5 321°45.2 16.1' 11°37.4 13.1' 54. 8 303°45.5 04.2 336°20.3 16.0' 11°50.5 13.0' 54. 10 333°45.2 05.4 5°30.3 16.0' 12°03.5 13.0' 54. 11 348°45.1 06.0 20°05.3 15.9' 12°29.4 12.9' 54. 11 348°44.8 07.2 49°15.1 15.8' 13°20.7 12.7' 54. 15 48°44.6 ·· 08.4 78°24.7 15.8' 13°20.7 12.7' 54.								54.5'
11  348°48.0  51.3  29°58.0  16.6′  07°06.8  13.9′  54.  12  3°47.9  \$18°51.9  44°33.6  16.6′  \$07°20.7  13.9′  54.  13  18°47.8  52.5  59°09.1  16.5′  07°34.5  13.8′  54.  14  33°47.7  53.2  73°44.7  16.5′  07°48.3  13.8′  54.  15  48°47.6  ∴ 53.8  88°20.2  16.5′  08°02.1  13.8′  54.  16  63°47.4  54.4  102°55.7  16.5′  08°15.9  13.7′  54.  17  78°47.3  55.0  117°31.2  16.5′  08°92.1  13.7′  54.  18  93°47.2  \$18°55.6  132°06.6  16.4′  \$08°43.3  13.6′  54.  19  108°47.1  56.2  146°42.1  16.4′  08°56.9  13.6′  54.  20  123°47.0  56.8  161°17.5  16.4′  09°10.5  13.6′  54.  21  138°46.8  ∴ 57.5  175°52.9  16.4′  09°24.1  13.5′  54.  22  153°46.7  58.1  190°28.2  16.3′  09°37.6  13.5′  54.  23  168°46.6  58.7  205°03.6  16.3′  09°51.1  13.4′  54.  5D = 16.2′ $d = 0.6′$								54.5'
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	10		50.7		16.6'		13.9'	54.5'
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								54.5'
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$								54.5'
15 $48^{\circ}47.6$ $\cdot \cdot 53.8$ $88^{\circ}20.2$ $16.5'$ $08^{\circ}02.1$ $13.8'$ $54.4$ 16 $63^{\circ}47.4$ $54.4$ $102^{\circ}55.7$ $16.5'$ $08^{\circ}15.9$ $13.7'$ $54.1$ 17 $78^{\circ}47.3$ $55.0$ $117^{\circ}31.2$ $16.5'$ $08^{\circ}29.6$ $13.7'$ $54.1$ 18 $93^{\circ}47.2$ $518^{\circ}55.6$ $132^{\circ}06.6$ $16.4'$ $08^{\circ}56.9$ $13.6'$ $54.1$ 19 $108^{\circ}47.0$ $56.8$ $161^{\circ}17.5$ $16.4'$ $09^{\circ}56.9$ $13.6'$ $54.1$ 21 $138^{\circ}46.8$ $\cdot 57.5$ $175^{\circ}52.9$ $16.4'$ $09^{\circ}10.5$ $13.5'$ $54.1$ 22 $153^{\circ}46.7$ $58.1$ $190^{\circ}28.2$ $16.3'$ $09^{\circ}37.6$ $13.5'$ $54.1$ 23 $168^{\circ}46.6$ $58.7$ $205^{\circ}03.6$ $16.3'$ $09^{\circ}51.1$ $13.4'$ $54.1$ 1 $198^{\circ}46.3$ $18^{\circ}59.3$ $219^{\circ}38.9$ $16.3'$ $10^{\circ}04.5$ $13.4'$								54.4' 54.4'
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								54.4'
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	16		54.4	102°55.7	16.5'		13.7'	54.4'
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$								54.4'
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$								54.4'
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$								54.3
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$								54.3'
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	22	153°46.7			16.3'	09°37.6	13.5'	54.3'
Mon         GHA         Dec         GHA $\nu$ Dec         d         HI           0         183°46.5         \$18°59.3         219°38.9         16.3'         \$10°04.5         13.4'         54.           1         198°46.3         18°59.9         234°14.2         16.3'         10°17.9         13.4'         54.           2         213°46.2         19°00.5         248°49.4         16.2'         10°31.3         13.3'         54.           3         228°46.1         · 01.1         263°24.7         16.2'         10°44.6         13.3'         54.           4         243°46.0         01.7         277°59.8         16.2'         10°57.9         13.2'         54.           5         258°45.9         02.3         292°35.0         16.1'         11°11.1         13.2'         54.           6         273°45.7         \$19°02.9         307°10.1         16.1'         \$11°24.3         13.1'         54.           7         288°45.6         03.5         321°45.2         16.1'         11°37.4         13.1'         54.           8         303°45.5         04.2         336°20.3         16.0'         11°50.5         13.0'         54.	23	168°46.6	58.7	205°03.6	16.3'	09°51.1	13.4'	54.3'
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		SD = 16.2'	d = 0.6'		SI	D = 14.9'		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Mon	GHA	Dec	GHA	ν	Dec	d	HP
2 213°46.2 19°00.5 248°49.4 16.2' 10°31.3 13.3' 54. 3 228°46.1 ··· 01.1 263°24.7 16.2' 10°44.6 13.3' 54. 4 243°46.0 01.7 277°59.8 16.2' 10°57.9 13.2' 54. 5 258°45.9 02.3 292°35.0 16.1' 11°11.1 13.2' 54. 6 273°45.7 \$19°02.9 307°10.1 16.1' \$11°24.3 13.1' 54. 7 288°45.6 03.5 321°45.2 16.1' 11°37.4 13.1' 54. 8 303°45.5 04.2 336°20.3 16.0' 11°50.5 13.0' 54. 9 318°45.4 ··· 04.8 350°55.3 16.0' 12°03.5 13.0' 54. 10 333°45.2 05.4 5°30.3 16.0' 12°16.5 12.9' 54. 11 348°45.1 06.0 20°05.3 15.9' 12°29.4 12.9' 54. 12 3°45.0 \$19°06.6 34°40.2 15.9' \$12°42.3 12.8' 54. 13 18°44.8 07.2 49°15.1 15.8' 12°55.1 12.8' 54. 14 33°44.7 07.8 63°49.9 15.8' 13°07.9 12.7' 54. 15 48°44.6 ··· 08.4 78°24.7 15.8' 13°20.7 12.7' 54.		183°46.5	S18°59.3	219°38.9		<b>S</b> 10°04.5		54.3'
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								54.3'
4       243°46.0       01.7       277°59.8       16.2'       10°57.9       13.2'       54.         5       258°45.9       02.3       292°35.0       16.1'       11°11.1       13.2'       54.         6       273°45.7       S19°02.9       307°10.1       16.1'       S11°24.3       13.1'       54.         7       288°45.6       03.5       321°45.2       16.1'       11°37.4       13.1'       54.         8       303°45.5       04.2       336°20.3       16.0'       11°50.5       13.0'       54.         9       318°45.4       · · · 04.8       350°55.3       16.0'       12°03.5       13.0'       54.         10       333°45.2       05.4       5°30.3       16.0'       12°16.5       12.9'       54.         11       348°45.1       06.0       20°05.3       15.9'       12°29.4       12.9'       54.         12       3°45.0       S19°06.6       34°40.2       15.9'       512°42.3       12.8'       54.         13       18°44.8       07.2       49°15.1       15.8'       12°55.1       12.8'       54.         14       33°44.7       07.8       63°49.9       15.8'       13°07.9								54.3'
5       258°45.9       02.3       292°35.0       16.1'       11°11.1       13.2'       54.         6       273°45.7       S19°02.9       307°10.1       16.1'       S11°24.3       13.1'       54.         7       288°45.6       03.5       321°45.2       16.1'       11°37.4       13.1'       54.         8       303°45.5       04.2       336°20.3       16.0'       11°50.5       13.0'       54.         9       318°45.4       · 04.8       350°55.3       16.0'       12°03.5       13.0'       54.         10       333°45.2       05.4       5°30.3       16.0'       12°16.5       12.9'       54.         11       348°45.1       06.0       20°05.3       15.9'       12°29.4       12.9'       54.         12       3°45.0       S19°06.6       34°40.2       15.9'       S12°42.3       12.8'       54.         13       18°44.8       07.2       49°15.1       15.8'       12°55.1       12.8'       54.         14       33°44.7       07.8       63°49.9       15.8'       13°07.9       12.7'       54.         15       48°44.6       · 08.4       78°24.7       15.8'       13°20.7 <t< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>54.3' 54.2'</th></t<>								54.3' 54.2'
6       273°45.7       \$19°02.9       307°10.1       16.1'       \$11°24.3       13.1'       54.         7       288°45.6       03.5       321°45.2       16.1'       11°37.4       13.1'       54.         8       303°45.5       04.2       336°20.3       16.0'       11°50.5       13.0'       54.         9       318°45.4       · 04.8       350°55.3       16.0'       12°03.5       13.0'       54.         10       333°45.2       05.4       5°30.3       16.0'       12°16.5       12.9'       54.         11       348°45.1       06.0       20°05.3       15.9'       12°29.4       12.9'       54.         12       3°45.0       \$19°06.6       34°40.2       15.9'       \$12°42.3       12.8'       54.         13       18°44.8       07.2       49°15.1       15.8'       12°55.1       12.8'       54.         14       33°44.7       07.8       63°49.9       15.8'       13°07.9       12.7'       54.         15       48°44.6       · 08.4       78°24.7       15.8'       13°20.7       12.7'       54.								54.2'
8     303°45.5     04.2     336°20.3     16.0'     11°50.5     13.0'     54.       9     318°45.4     · · 04.8     350°55.3     16.0'     12°03.5     13.0'     54.       10     333°45.2     05.4     5°30.3     16.0'     12°16.5     12.9'     54.       11     348°45.1     06.0     20°05.3     15.9'     12°29.4     12.9'     54.       12     3°45.0     519°06.6     34°40.2     15.9'     512°42.3     12.8'     54.       13     18°44.8     07.2     49°15.1     15.8'     12°55.1     12.8'     54.       14     33°44.7     07.8     63°49.9     15.8'     13°07.9     12.7'     54.       15     48°44.6     · · 08.4     78°24.7     15.8'     13°20.7     12.7'     54.	6	273°45.7	S19°02.9	307°10.1	16.1'		13.1'	54.2'
9     318°45.4     · · 04.8     350°55.3     16.0'     12°03.5     13.0'     54.       10     333°45.2     05.4     5°30.3     16.0'     12°16.5     12.9'     54.       11     348°45.1     06.0     20°05.3     15.9'     12°29.4     12.9'     54.       12     3°45.0     S19°06.6     34°40.2     15.9'     S12°42.3     12.8'     54.       13     18°44.8     07.2     49°15.1     15.8'     12°55.1     12.8'     54.       14     33°44.7     07.8     63°49.9     15.8'     13°07.9     12.7'     54.       15     48°44.6     · · 08.4     78°24.7     15.8'     13°20.7     12.7'     54.								54.2'
10     333°45.2     05.4     5°30.3     16.0'     12°16.5     12.9'     54.       11     348°45.1     06.0     20°05.3     15.9'     12°29.4     12.9'     54.       12     3°45.0     S19°06.6     34°40.2     15.9'     S12°42.3     12.8'     54.       13     18°44.8     07.2     49°15.1     15.8'     12°55.1     12.8'     54.       14     33°44.7     07.8     63°49.9     15.8'     13°07.9     12.7'     54.       15     48°44.6     · · · 08.4     78°24.7     15.8'     13°20.7     12.7'     54.								54.2' 54.2'
11     348°45.1     06.0     20°05.3     15.9'     12°29.4     12.9'     54.       12     3°45.0     \$19°06.6     34°40.2     15.9'     \$12°42.3     12.8'     54.       13     18°44.8     07.2     49°15.1     15.8'     12°55.1     12.8'     54.       14     33°44.7     07.8     63°49.9     15.8'     13°07.9     12.7'     54.       15     48°44.6     · · · 08.4     78°24.7     15.8'     13°20.7     12.7'     54.								54.2'
12     3°45.0     \$19°06.6     34°40.2     15.9'     \$12°42.3     12.8'     54.       13     18°44.8     07.2     49°15.1     15.8'     12°55.1     12.8'     54.       14     33°44.7     07.8     63°49.9     15.8'     13°07.9     12.7'     54.       15     48°44.6     · · · 08.4     78°24.7     15.8'     13°20.7     12.7'     54.			06.0					54.2'
14 33°44.7 07.8 63°49.9 15.8' 13°07.9 12.7' 54. 15 48°44.6 08.4 78°24.7 15.8' 13°20.7 12.7' 54.	12		S19°06.6		15.9'		12.8'	54.2'
15 48°44.6 ·· 08.4 78°24.7 15.8' 13°20.7 12.7' 54.								54.1'
								54.1' 54.1'
555 55.0 52 55.5 15.1 15 55.5 12.0 54.								54.1'
17 78°44.3 09.6 107°34.2 15.7' 13°45.9 12.6' 54.								54.1'
18 93°44.2 S19°10.2 122°08.9 15.6' S13°58.5 12.5' 54.	18		S19°10.2	122°08.9	15.6'		12.5'	54.1'
								54.1'
								54.1' 54.1'
								54.1'
								54.1'
SD = 16.2'  d = 0.6' $SD = 14.8'$		SD = 16.2'	d = 0.6'		SI	D = 14.8'		

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

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

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

h	Aries	Ver	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	57°17.6	195°32.4	S14°55.4	169° 18.5	S22°27.2	300°14.2	N21°14.3	60°41.6	S04°06.2			
1	72°20.1	210°31.8	56.4	184° 19.0	27.5	315°16.7	14.4	75°44.1	06.2	Alpheratz	357°33.9	$29^{\circ}14.2$
2	87°22.5	225°31.2	57.4	199° 19.5	27.8	330° 19.2	14.4	90°46.6	06.2	Ankaa	353°06.2	-42° 10.0
3	102°25.0	240°30.6	• • 58.4	214°20.1	28.1	345°21.7	• • 14.4	105°49.2	06.2	Schedar	349°29.9	56°41.0
4	117°27.4	255°30.0	14°59.4	229° 20.6	28.4	0°24.3	14.4	120°51.7	06.2	Diphda	348°46.4	-17°50.7
5	132°29.9	270°29.3	15°00.4	244°21.1	28.7	15°26.8	14.4	135°54.2	06.2	Achernar	335°19.1	-57°06.4
6	147°32.4	285°28.7	S15°01.4	259°21.6	\$22°29.0	30°29.3	N21°14.4	150°56.7	S04°06.2	Hamal	$327^{\circ}50.1$	23°35.2
7	162°34.8	300°28.1	02.4	274°22.1	29.3	45°31.8	14.5	165°59.2	06.2	Polaris	313°10.9	$89^{\circ}22.5$
8	102 34.0 177°37.3	315° 27.5		289°22.6	29.6	60°34.3		181°01.7	06.2	Acamar	$315^{\circ}10.8$	-40° 12.0
9	177 37.3 192°39.8	315 27.5 330° 26.9	03.4 •• 04.4	304°23.1	29.9	75° 36.9	14.5 •• 14.5	196°04.2	. 06.2	Menkar	$314^{\circ}05.1$	$4^{\circ}11.6$
	192 39.6 207°42.2	345° 26.2		319°23.7		90°39.4		211°06.7		Mirfak	308°26.8	49°57.3
10	207 42.2 222°44.7	0° 25.6	05.4	334°24.2	30.1	90 39.4 105°41.9	14.5	211 00.7 226°09.2	06.3	Aldebaran	290°38.5	16°33.7
11			06.4		30.4 \$22°30.7		14.5		06.3	Rigel	281°02.9	-8°10.2
12	237°47.2	15°25.0	\$15°07.3	349°24.7		120°44.4	N21°14.5	241°11.7	S04°06.3	Capella	280°20.4	46°01.4
13	252°49.6	30°24.4	08.3	4°25.2	31.0	135° 47.0	14.6	256°14.2	06.3	Bellatrix	278°21.8	6°22.5
14	267°52.1	45°23.8	09.3	19°25.7	31.3	150°49.5	14.6	271°16.7	06.3	Elnath	278°00.6	28°37.8
15	282°54.5	60°23.1	· · 10.3	34°26.2	· · 31.6	165°52.0	• • 14.6	286°19.2	• • 06.3	Alnilam	275°36.7	$-1^{\circ}11.0$
16	297°57.0	75°22.5	11.3	49°26.7	31.9	180°54.5	14.6	301°21.7	06.3	Betelgeuse	270°51.0	$7^{\circ}24.8$
17	312°59.5	90°21.9	12.3	64°27.2	32.2	195°57.1	14.6	316°24.3	06.3	Canopus	263°51.6	-52° 42.3
18	328°01.9	105°21.3	S15°13.3	79°27.8	\$22°32.5	210°59.6	N21°14.6	331°26.8	S04°06.3	Sirius	258°25.4	-16°44.9
19	343°04.4	120°20.6	14.3	94°28.3	32.7	226°02.1	14.7	346°29.3	06.3	Adhara	255°05.1	-29°00.2
20	358°06.9	135°20.0	15.2	109°28.8	33.0	241°04.6	14.7	1°31.8	06.3	Procyon	244°49.9	5°09.6
21	13°09.3	150° 19.4	16.2	124°29.3	• • 33.3	256°07.2	• • 14.7	16°34.3	• • 06.4	Pollux	243°16.3	27°57.7
22	28°11.8	165° 18.8	17.2	139°29.8	33.6	271°09.7	14.7	31°36.8	06.4	Avior	234°14.2	-59° 35.2
23	43°14.3	180°18.1	18.2	154°30.3	33.9	286°12.2	14.7	46°39.3	06.4	Suhail	222°45.7	-43°31.9
Mern	ass. 20:08	$\nu$ -0.6' d1.	0′ m-3 91	$\nu$ 0.5' d0	.3′ m1.38	$\nu 2.5' d0$	.0′ m-2.45	$\nu$ 2.5′ d0	.0′ m0.85	Miaplacidus	221°38.0	-69°49.0
		<i>▶</i> 0.0 U1.		- 0.5 40	.5	- 2.5 uU.	2.73	- 2.5 uU		Alphard	217°47.0	-8°46.1
										Regulus	207°33.7	11°50.4
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.4	61°36.4
0	$58^{\circ}16.7$	$195^{\circ}17.5$	S15°19.2	$169^{\circ}30.8$	S22°34.2	$301^{\circ}14.7$	N21°14.7	$61^{\circ}41.8$	S04°06.4	Denebola	182°24.4	14°25.6
1	$73^{\circ}19.2$	$210^{\circ}16.9$	20.2	184°31.3	34.5	$316^{\circ}17.3$	14.8	76°44.3	06.4	Gienah	175°43.1	-17°41.0
2	88°21.7	$225^{\circ}16.3$	21.1	199°31.8	34.7	331°19.8	14.8	91°46.8	06.4	Acrux	175 43.1 172°59.8	-17 41.0 -63°14.3
3	103°24.1	240°15.6	• • 22.1	$214^{\circ}32.4$	• • 35.0	346°22.3	• • 14.8	106°49.3	• • 06.4		172 59.8 171°51.3	-03 14.3 -57°15.2
4	118°26.6	$255^{\circ}15.0$	23.1	229°32.9	35.3	1°24.8	14.8	121°51.8	06.4	Alioth	166°12.8	55° 49.0
5	133°29.0	270°14.4	24.1	244°33.4	35.6	16°27.4	14.8	136°54.3	06.4		158°21.8	-11°17.7
6	148°31.5	285°13.7	<b>S</b> 15°25.1	259°33.9	S22°35.9	31°29.9	N21°14.8	151°56.8	S04°06.4			49° 10.9
7	163°34.0	$300^{\circ}13.1$	26.0	274°34.4	36.2	46°32.4	14.9	166°59.3	06.4	Alkaid	152°51.9	
8	178°36.4	315° 12.5	27.0	289°34.9	36.4	61°35.0	14.9	182°01.8	06.4	Hadar	148°35.6	-60°29.7
9	193°38.9	330°11.8	• • 28.0	304°35.4	• • 36.7	76°37.5	• • 14.9	197°04.3	06.5	Menkent	147°57.2	-36°29.7
10	208°41.4	345°11.2	29.0	319°35.9	37.0	91°40.0	14.9	212°06.8	06.5	Arcturus	145°47.6	19°02.8
11	223°43.8	0° 10.6	29.9	334°36.4	37.3	106°42.6	14.9	227°09.3	06.5	Rigil Kent.	139°40.0	-60°56.4
12	238°46.3	15°09.9	S15°30.9	349°36.9	S22°37.6	121°45.1	N21°15.0	242°11.8	S04°06.5	Kochab	137°21.0	74°02.8
13	253°48.8	30°09.3	31.9	4°37.4	37.8	136°47.6	15.0	257°14.3	06.5	Zuben'ubi	136°55.6	-16°08.9
14	268°51.2	45°08.7	32.9	19°37.9	38.1	151°50.2	15.0	272°16.8	06.5	Alphecca	126°03.5	26°37.7
15	283°53.7	60°08.0	• • 33.8	34°38.5	38.4	166°52.7	15.0	287°19.3	06.5	Antares	112°15.4	-26°29.3
16	298°56.2	75°07.4	34.8	49°39.0	38.7	181°55.2	15.0	302°21.9	06.5	Atria	107°09.5	-69°04.5
17	313°58.6	90°06.8	35.8	64°39.5	39.0	196°57.8	15.0	317°24.4	06.5	Sabik	102°02.3	-15° 45.4
18	329°01.1	105°06.1	S15°36.8	79°40.0	S22°39.2	212°00.3	N21°15.1	332°26.9	S04°06.5	Shaula	96°09.8	-37°07.4
19	344°03.5	120°05.5	37.7	94°40.5	39.5	227°02.8	15.1	347°29.4	06.5	Rasalhague	95°58.2	12°32.5
20	359°06.0	135° 04.9	38.7	109°41.0	39.8	242°05.4	15.1	2°31.9	06.5	Eltanin	90°42.3	51°29.2
21	14°08.5	150°04.9	39.7	109 41.0 124°41.5	40.1	242 05.4 257° 07.9	15.1	2 31.9 17°34.4	. 06.5	Kaus Aust.	83°31.9	-34°22.4
22	29°10.9	165°03.6	40.6	139°42.0	40.1	272°10.4		32°36.9		Vega	80°33.1	38°48.6
	44°13.4						15.1	47°39.4	06.6	Nunki	75°47.2	-26° 15.9
23	44 15.4	180°02.9	41.6	154°42.5	40.6	287°13.0	15.2	47 39.4	06.6	Altair	$61^{\circ}59.5$	8°56.3
Mer.p	ass. 20:04	$\nu$ -0.6′ d1.	0′ m-3.91	$\nu$ 0.5′ d0	.3′ m1.37	$\nu 2.5' \ d0.$	.0′ m-2.45	$\nu 2.5' \ d0$	.0′ m0.86	Peacock	53°04.9	-56° 39.3
										Deneb	49°25.5	45°22.6
		6114	-	6114	_	6114	_	6114	_	Enif	33°38.1	9°59.8
Thu	GHA 50°15 0	GHA	Dec C15°40.6	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.0	-46°50.3
0	59°15.9	195°02.3	\$15°42.6	169°43.0	\$22°40.9	302°15.5	N21° 15.2	62°41.9	S04°06.6	Fomalhaut	15°13.7	-29°29.2
1	74°18.3	210°01.7	43.5	184°43.5	41.2	317°18.0	15.2	77°44.4	06.6	Scheat	13°44.4	28° 13.6
2	89°20.8	225°01.0	44.5	199°44.0	41.5	332°20.6	15.2	92°46.9	06.6	Markab	13°29.1	15°20.8
3	104°23.3	240°00.4	· · 45.5	214°44.5	41.7	347°23.1	· · 15.2	107°49.4 122°51.9	•• 06.6	Nov 18 Tue	SHA	Mor noss
4	119°25.7	254° 59.7	46.4	229°45.0	42.0	2°25.6	15.2		06.6	Venus	3HA 138°14.8	Mer.pass 10:58
5	134°28.2	269°59.1	47.4	244°45.5	42.3	17°28.2	15.3 No1°15.2	137°54.4	06.6	Mars	138 14.8 112°00.9	10:58
6	149°30.7	284° 58.5	\$15°48.3	259°46.0	\$22°42.6	32°30.7	N21°15.3	152°56.9	\$04°06.6			
7	164°33.1	299°57.8	49.3	274°46.5	42.8	47°33.3	15.3	167°59.4	06.6	Jupiter	242°56.6	03:58
8	179°35.6	314° 57.2	50.3	289°47.0	43.1	62°35.8	15.3	183°01.9	06.6	Saturn	3°24.0	19:54
9	194°38.0	329°56.5	51.2	304°47.5	• • 43.4	77°38.3	15.3	198°04.4	• • 06.6	Nov 19 Wed	SHA	Mer.pass
10	209°40.5	344°55.9	52.2	319°48.0	43.7	92°40.9	15.4	213°06.9	06.6		137°00.8	10:59
11	224°43.0	359°55.2	53.1	334°48.5	43.9	107°43.4	15.4	228°09.4	06.6		111°14.1	12:42
12	239°45.4	14°54.6	\$15°54.1	349°49.0	\$22°44.2	122°46.0	N21°15.4	243°11.9	S04°06.6		242°58.0	03:54
13	254°47.9	29°53.9	55.1	4°49.5	44.5	137°48.5	15.4	258°14.4	06.6	Saturn	3°25.1	19:50
14	269°50.4	44°53.3	56.0	19°50.0	44.7	152°51.0	15.4	273°16.9	06.7			
15	284°52.8	59°52.6	• • 57.0	34°50.5	• • 45.0	167°53.6	. 15.5	288°19.4	• • 06.7	Nov 20 Thu	SHA	Mer.pass
16	299°55.3	74°52.0	57.9	49°51.0	45.3	182°56.1	15.5	303°21.9	06.7		135°46.4	11:00
17	314°57.8	89°51.4	58.9	64°51.5	45.5	197°58.7	15.5	318°24.4	06.7		$110^{\circ}27.1$	12:41
18	330°00.2	104°50.7	\$15°59.8	79°52.0	S22°45.8	213°01.2	N21° 15.5	333°26.9	S04°06.7		242°59.6	03:50
19	345°02.7	119°50.1	16°00.8	94°52.5	46.1	228°03.8	15.5	348°29.4	06.7	Saturn	3°26.0	19:46
20	0°05.1	134°49.4	01.7	109°53.0	46.4	243°06.3	15.6	3°31.9	06.7		al me	
21	15°07.6	149°48.8	• • 02.7	124°53.5	• • 46.6	258°08.8	• • 15.6	18°34.3	• • 06.7	Horizont	al parallax	0.1
22	30°10.1	164°48.1	03.6	139° 54.0	46.9	273°11.4	15.6	33°36.8	06.7		Venus:	0.1
23	45°12.5	179°47.5	04.6	154° 54.5	47.2	288°13.9	15.6	48°39.3	06.7		Mars:	0.1
Mern	ass. 20:00	$\nu$ -0.6′ d1.	0' m-3 01	νη 5' dη	.3′ m1.37	v2 5' d0	.0′ m-2.46	ν2 5' dΩ	.0′ m0.86			
			5.51	- 0.5 40			2.70	- 2.5 00				

Tue         GHA         Dec         GHA         Dec         √         HP           0         188°43.3         144         224°10.3         15.4′         S15°12.7         12.2′         54.0°           2         213°43.2         15.0         238°44.6         15.3′         15°36.9         12.0′         54.0°           4         243°42.9         16.1         280°27.2         15.1         16°4.9         12.0°         54.0°           6         273°42.6         519°17.3         290°0.13         15.5°         16°24.6         11.8°         54.0°           8         303°42.4         18.5         326°09.4         14.9°         16°48.1         11.6°         54.0°           10         333°42.1         19.7         355°17.2         14.8°         17°11.3         15°5 74.6         11.8°         54.0°           11         348°4.0         20.3         9°51.1         14.6°         54.0°         14.1°         11.1°         54°0           15         48°4.1         12.2°         36°8.6         14.7°         18.7°         14.1°         18.1°         54.0°           10         333°4.2         19.7°         35°3.2         14.6°         17.5°         14.1°	h	Sui	Moon					
198°43 3	Tue	GHA	Dec	GHA	ν	Dec	d	HP
2	0		<b>S</b> 19°13.8					54.0'
1								
161								
The color of the								
The color of the	5				15.1'		11.8'	54.0'
Section   Sect								
19								
11								
13	10							
18								
14								
16								
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Wed         GHA         Dec         GHA         ν         Dec         d         HP           0         183°40.2         519°27.9         199°05.7         14.0'         519°45.5         10.4'         53.9'           1         198°40.0         28.5         213°38.8         14.0'         19°55.9         10.3'         53.9'           2         213°39.9         29.0         228°11.7         13.9'         20°16.5         10.2'         53.9'           4         243°39.6         30.2         257°17.4         13.8'         20°26.7         10.1'         53.9'           5         258°39.5         30.8         271°50.2         13.7'         20°36.8         10.0'         53.9'           6         273°39.3         S19°31.4         286°22.9         13.6'         520°46.8         9.9'         53.9'           7         288°39.2         31.9         300°55.6         13.6'         20°56.7         9.8'         53.9'           8         303°39.0         32.5         315°28.1         13.5'         21°66.6         9.7'         53.9'           10         333°38.8         33.7         348.1         13.3'         12°55.5         9.5'         53.9'	_5						_0.0	- 5.5
183°40.2   S19°27.9   199°05.7   14.0'   S19°45.5   10.4'   53.9'     1   198°40.0   28.5   213°38.8   14.0'   19°55.9   10.3'   53.9'     2   213°39.9   29.0   228°11.7   13.9'   20°60.3   10.3'   53.9'     3   228°39.8   ··29.6   242°44.6   13.8'   20°16.5   10.2'   53.9'     4   243°39.6   30.2   257°17.4   13.8'   20°26.7   10.1'   53.9'     5   258°39.5   30.8   271°50.2   13.7'   20°36.8   10.0'   53.9'     6   273°39.3   S19°31.4   286°22.9   13.6'   20°46.8   9.9'   53.9'     7   288°39.2   31.9   300°55.6   13.6'   20°56.7   9.8'   53.9'     8   303°39.0   32.5   315°28.1   13.5'   21°16.3   9.7'   53.9'     9   318°38.9   ··33.1   330°00.7   13.5'   21°16.3   9.7'   53.9'     10   333°38.8   33.7   344°33.1   13.4'   21°26.0   9.6'   53.9'     11   348°38.6   34.2   359°05.5   13.3'   21°16.3   9.7'   53.9'     12   3°38.5   S19°34.8   13°37.8   13.3'   21°54.0   9.4'   53.9'     13   18°38.3   35.4   228°10.1   13.2'   21°54.4   9.3'   53.9'     15   48°38.0   ··36.5   57°14.4   13.1'   22°12.9   9.1'   53.9'     16   63°37.9   37.1   71°46.5   13.0'   22°22.0   9.0'   53.9'     18   93°37.6   S19°38.2   100°50.4   12.9'   S22°31.0   8.9'   53.9'     19   108°37.5   38.8   115°22.3   12.8'   22°48.7   8.7'   53.9'     20   123°37.3   39.4   129°54.1   12.7'   22°57.4   8.6'   53.9'     21   138°37.2   ··40.0   144°25.8   12.7'   23°06.0   8.5'   53.9'     22   153°37.0   40.5   158°57.5   12.6'   23°14.6   8.4'   53.9'     22   153°37.0   40.5   158°57.5   12.6'   23°14.6   8.4'   53.9'     3   228°36.3   ··43.4   231°34.9   12.2'   22°40.35   7.8'   53.8'     4   243°36.1   43.9   246°6.2   12.2'   24°01.5   7.9'   53.8'     5   258°36.0   44.5   260°37.4   12.2'   22°40.5   7.5'   53.8'     6   273°35.8   519°41.7   188°00.7   12.0'   24°34.0   7.4'   53.9'     10   333°35.5   46.2   304°10.7   12.0'   24°34.0   7.4'   53.9'     10   333°35.5   46.2   304°10.7   12.0'   24°34.0   7.4'   53.9'     10   333°35.5   46.2   304°10.7   12.0'   24°34.0   7.4'   53.9'     11   348°35.1   47.9   318°4.0		3D = 10.2	u = 0.0°		) SL	- 14.7		
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Thu GHA Dec GHA ν Dec d HP  0 183°36.7 \$19°41.7 188°00.7 12.5' \$23°31.3 8.2' 53.9' 1 198°36.6 42.2 202°32.1 12.4' 23°39.5 8.1' 53.8' 2 213°36.4 42.8 217°03.5 12.4' 23°47.6 8.0' 53.8' 3 228°36.3 · 43.4 231°34.9 12.3' 23°55.6 7.9' 53.8' 4 243°36.1 43.9 246°06.2 12.2' 24°01.5 7.8' 53.8' 5 258°36.0 44.5 260°37.4 12.2' 24°11.3 7.7' 53.8' 6 273°35.8 \$19°45.0 275°08.6 12.1' \$24°19.0 7.6' 53.9' 7 288°35.7 45.6 289°39.7 12.0' 24°26.5 7.5' 53.9' 8 303°35.5 46.2 304°10.7 12.0' 24°34.0 7.4' 53.9' 9 318°35.4 · 46.7 318°41.7 11.9' 24°41.4 7.2' 53.9' 10 333°35.2 47.3 333°12.6 11.8' 24°48.6 7.1' 53.9' 11 348°35.1 47.9 347°43.4 11.8' 24°548.6 7.1' 53.9' 12 3°34.9 \$19°48.4 2°14.2 11.7' \$25°02.8 6.9' 53.9' 13 18°34.8 49.0 16°44.9 11.7' 25°09.7 6.8' 53.9' 14 33°34.6 49.5 31°15.6 11.6' 25°16.5 6.7' 53.9' 15 48°34.5 · 50.1 45°46.2 11.5' 25°23.2 6.6' 53.9' 16 63°34.3 50.6 60°16.7 11.5' 25°29.8 6.5' 53.9' 18 93°34.0 \$19°51.8 89°17.6 11.4' \$25°48.6 6.1' 53.9' 19 108°33.8 52.3 103°48.0 11.3' 25°48.8 6.1' 53.9' 20 123°33.7 52.9 118°18.3 11.2' 25°54.9 6.0' 53.9' 21 138°33.5 · 53.4 132°48.5 11.2' 26°00.9 5.9' 53.9' 22 153°33.4 54.0 147°18.7 11.1' 26°06.8 5.7' 53.9' 23 168°33.2 54.5 161°48.9 11.1' 26°12.5 5.6' 53.9'								
0       183° 36.7       \$19° 41.7       188° 00.7       12.5'       \$23° 31.3       8.2'       53.9'         1       198° 36.6       42.2       202° 32.1       12.4'       23° 39.5       8.1'       53.8'         2       213° 36.4       42.8       217° 03.5       12.4'       23° 47.6       8.0'       53.8'         3       228° 36.3       · · 43.4       231° 34.9       12.3'       23° 55.6       7.9'       53.8'         4       243° 36.1       43.9       246° 06.2       12.2'       24° 03.5       7.8'       53.8'         5       258° 36.0       44.5       260° 37.4       12.2'       24° 03.5       7.8'       53.8'         6       273° 35.8       \$19° 45.0       275° 08.6       12.1'       \$24° 19.0       7.6'       53.9'         7       288° 35.7       45.6       289° 39.7       12.0'       24° 26.5       7.5'       53.9'         8       303° 35.5       46.2       304° 10.7       12.0'       24° 34.0       7.4'       53.9'         9       318° 35.4       · · 46.7       318° 41.7       11.9'       24° 41.4       7.2'       53.9'         10       333° 35.2       47.3       333° 12.6 <td></td> <td>SD = 16.2'</td> <td>d = 0.6'</td> <td></td> <td>SE</td> <td>0 = 14.7'</td> <td></td> <td></td>		SD = 16.2'	d = 0.6'		SE	0 = 14.7'		
0       183° 36.7       \$19° 41.7       188° 00.7       12.5'       \$23° 31.3       8.2'       53.9'         1       198° 36.6       42.2       202° 32.1       12.4'       23° 39.5       8.1'       53.8'         2       213° 36.4       42.8       217° 03.5       12.4'       23° 47.6       8.0'       53.8'         3       228° 36.3       · · 43.4       231° 34.9       12.3'       23° 55.6       7.9'       53.8'         4       243° 36.1       43.9       246° 06.2       12.2'       24° 03.5       7.8'       53.8'         5       258° 36.0       44.5       260° 37.4       12.2'       24° 03.5       7.8'       53.8'         6       273° 35.8       \$19° 45.0       275° 08.6       12.1'       \$24° 19.0       7.6'       53.9'         7       288° 35.7       45.6       289° 39.7       12.0'       24° 26.5       7.5'       53.9'         8       303° 35.5       46.2       304° 10.7       12.0'       24° 34.0       7.4'       53.9'         9       318° 35.4       · · 46.7       318° 41.7       11.9'       24° 41.4       7.2'       53.9'         10       333° 35.2       47.3       333° 12.6 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
1       198° 36.6       42.2       202° 32.1       12.4'       23° 39.5       8.1'       53.8'         2       213° 36.4       42.8       217° 03.5       12.4'       23° 47.6       8.0'       53.8'         3       228° 36.3       · · · · 43.4       231° 34.9       12.3'       23° 55.6       7.9'       53.8'         4       243° 36.1       43.9       246° 06.2       12.2'       24° 03.5       7.8'       53.8'         5       258° 36.0       44.5       260° 37.4       12.2'       24° 01.5       7.7'       53.8'         6       273° 35.8       519° 45.0       275° 08.6       12.1'       524° 19.0       7.6'       53.9'         7       288° 35.7       45.6       289° 39.7       12.0'       24° 26.5       7.5'       53.9'         8       303° 35.5       46.2       304° 10.7       12.0'       24° 34.0       7.4'       53.9'         9       318° 35.4       · · · 46.7       318° 41.7       11.9'       24° 41.4       7.2'       53.9'         10       333° 35.2       47.3       333° 12.6       11.8'       24° 48.6       7.1'       53.9'         11       348° 35.1       47.9       347° 43.4 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
2 213°36.4 42.8 217°03.5 12.4′ 23°47.6 8.0′ 53.8′ 3 228°36.3 · · 43.4 231°34.9 12.3′ 23°55.6 7.9′ 53.8′ 4 243°36.1 43.9 246°06.2 12.2′ 24°03.5 7.8′ 53.8′ 5 258°36.0 44.5 260°37.4 12.2′ 24°01.3 7.7′ 53.8′ 6 273°35.8 519°45.0 275°08.6 12.1′ 524°19.0 7.6′ 53.9′ 7 288°35.7 45.6 289°39.7 12.0′ 24°26.5 7.5′ 53.9′ 8 303°35.5 46.2 304°10.7 12.0′ 24°34.0 7.4′ 53.9′ 9 318°35.4 · · 46.7 318°41.7 11.9′ 24°41.4 7.2′ 53.9′ 10 333°35.2 47.3 333°12.6 11.8′ 24°48.6 7.1′ 53.9′ 11 348°35.1 47.9 347°43.4 11.8′ 24°55.8 7.0′ 53.9′ 12 3°34.9 519°48.4 2°14.2 11.7′ 525°02.8 6.9′ 53.9′ 13 18°34.8 49.0 16°44.9 11.7′ 25°09.7 6.8′ 53.9′ 15 48°34.5 · · 50.1 45°46.2 11.5′ 25°16.5 6.7′ 53.9′ 16 63°34.3 50.6 60°16.7 11.5′ 25°22.2 6.6′ 53.9′ 17 78°34.1 51.2 74°47.2 11.4′ 25°36.2 6.3′ 53.9′ 18 93°34.0 519°51.8 89°17.6 11.4′ 525°42.6 6.2′ 53.9′ 19 108°33.8 52.3 103°48.0 11.3′ 25°48.8 6.1′ 53.9′ 20 123°33.7 52.9 118°18.3 11.2′ 26°00.9 5.9′ 53.9′ 21 138°33.5 · · 53.4 132°48.5 11.2′ 26°00.9 5.9′ 53.9′ 21 138°33.5 · · 53.4 132°48.5 11.2′ 26°00.9 5.9′ 53.9′ 22 153°33.4 54.0 147°18.7 11.1′ 26°06.8 5.7′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′ 53.9′ 23 168°33.2 54.5 161°48.9 11.1′ 26°12.5 5.6′								
3       228° 36.3       · · 43.4       231° 34.9       12.3'       23° 55.6       7.9'       53.8'         4       243° 36.1       43.9       246° 06.2       12.2'       24° 03.5       7.8'       53.8'         5       258° 36.0       44.5       260° 37.4       12.2'       24° 11.3       7.7'       53.8'         6       273° 35.8       S19° 45.0       275° 08.6       12.1'       S24° 19.0       7.6'       53.9'         7       288° 35.7       45.6       289° 39.7       12.0'       24° 26.5       7.5'       53.9'         8       303° 35.5       46.2       304° 10.7       12.0'       24° 34.0       7.4'       53.9'         9       318° 35.4       · · · 46.7       318° 41.7       11.9'       24° 41.4       7.2'       53.9'         10       333° 35.2       47.3       333° 12.6       11.8'       24° 48.6       7.1'       53.9'         11       348° 35.1       47.9       347° 43.4       11.8'       24° 55.8       7.0'       53.9'         12       3° 34.9       S19° 48.4       2° 14.2       11.7'       25° 02.8       6.9'       53.9'         13       18° 34.8       49.0       16° 44.9								
5       258° 36.0       44.5       260° 37.4       12.2'       24° 11.3       7.7'       53.8'         6       273° 35.8       S19° 45.0       275° 08.6       12.1'       S24° 19.0       7.6'       53.9'         7       288° 35.7       45.6       289° 39.7       12.0'       24° 26.5       7.5'       53.9'         8       303° 35.5       46.2       304° 10.7       12.0'       24° 34.0       7.4'       53.9'         9       318° 35.4       · · · 46.7       318° 41.7       11.9'       24° 41.4       7.2'       53.9'         10       333° 35.2       47.3       333° 12.6       11.8'       24° 48.6       7.1'       53.9'         11       348° 35.1       47.9       347° 43.4       11.8'       24° 48.6       7.0'       53.9'         12       3° 34.9       S19° 48.4       2° 14.2       11.7'       S25° 02.8       6.9'       53.9'         13       18° 34.8       49.0       16° 44.9       11.7'       25° 09.7       6.8'       53.9'         14       33° 34.6       49.5       31° 15.6       11.6'       25° 16.5       6.7'       53.9'         15       48° 34.5       · · 50.1       45° 46.2								
6         273°35.8         \$19°45.0         275°08.6         12.1'         \$24°19.0         7.6'         53.9'           7         288°35.7         45.6         289°39.7         12.0'         24°26.5         7.5'         53.9'           8         303°35.5         46.2         304°10.7         12.0'         24°34.0         7.4'         53.9'           9         318°35.4         · · · 46.7         318°41.7         11.9'         24°41.4         7.2'         53.9'           10         333°35.2         47.3         333°12.6         11.8'         24°48.6         7.1'         53.9'           11         348°35.1         47.9         347°43.4         11.8'         24°48.6         7.1'         53.9'           12         3°34.9         \$19°48.4         2°14.2         11.7'         \$25°02.8         6.9'         53.9'           13         18°34.8         49.0         16°44.9         11.7'         25°09.7         6.8'         53.9'           14         33°34.6         49.5         31°15.6         11.6'         25°16.5         6.7'         53.9'           15         48°34.5         · · 50.1         45°46.2         11.5'         25°23.2         6.6' <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>								
7       288° 35.7       45.6       289° 39.7       12.0'       24° 26.5       7.5'       53.9'         8       303° 35.5       46.2       304° 10.7       12.0'       24° 34.0       7.4'       53.9'         9       318° 35.4       · · · 46.7       318° 41.7       11.9'       24° 41.4       7.2'       53.9'         10       333° 35.2       47.3       333° 12.6       11.8'       24° 48.6       7.1'       53.9'         11       348° 35.1       47.9       347° 43.4       11.8'       24° 55.8       7.0'       53.9'         12       3° 34.9       519° 48.4       2° 14.2       11.7'       525° 02.8       6.9'       53.9'         13       18° 34.8       49.0       16° 44.9       11.7'       25° 09.7       6.8'       53.9'         14       33° 34.6       49.5       31° 15.6       11.6'       25° 16.5       6.7'       53.9'         15       48° 34.5       · · 50.1       45° 46.2       11.5'       25° 23.2       6.6'       53.9'         16       63° 34.3       50.6       60° 16.7       11.4'       25° 36.2       6.3'       53.9'         18       93° 34.0       519° 51.8       89° 17.6								
9       318° 35.4       · · · 46.7       318° 41.7       11.9'       24° 41.4       7.2'       53.9'         10       333° 35.2       47.3       333° 12.6       11.8'       24° 48.6       7.1'       53.9'         11       348° 35.1       47.9       347° 43.4       11.8'       24° 55.8       7.0'       53.9'         12       3° 34.9       519° 48.4       2° 14.2       11.7'       525° 02.8       6.9'       53.9'         13       18° 34.8       49.0       16° 44.9       11.7'       25° 09.7       6.8'       53.9'         14       33° 34.6       49.5       31° 15.6       11.6'       25° 16.5       6.7'       53.9'         15       48° 34.5       · · 50.1       45° 46.2       11.5'       25° 23.2       6.6'       53.9'         16       63° 34.3       50.6       60° 16.7'       11.5'       25° 29.8       6.5'       53.9'         17       78° 34.1       51.2       74° 47.2       11.4'       25° 36.2       6.3'       53.9'         18       93° 34.0       519° 51.8       89° 17.6       11.4'       \$25° 42.6       6.2'       53.9'         19       108° 33.8       52.3       103° 48.0		288°35.7	45.6	289°39.7	12.0'	$24^{\circ}26.5$	7.5'	
10         333°35.2         47.3         333°12.6         11.8'         24°48.6         7.1'         53.9'           11         348°35.1         47.9         347°43.4         11.8'         24°55.8         7.0'         53.9'           12         3°34.9         S19°48.4         2°14.2         11.7'         S25°02.8         6.9'         53.9'           13         18°34.8         49.0         16°44.9         11.7'         25°09.7         6.8'         53.9'           14         33°34.6         49.5         31°15.6         11.6'         25°16.5         6.7'         53.9'           15         48°34.5         · · 50.1         45°46.2         11.5'         25°23.2         6.6'         53.9'           16         63°34.3         50.6         60°16.7         11.5'         25°29.8         6.5'         53.9'           17         78°34.1         51.2         74°47.2         11.4'         525°42.6         6.2'         53.9'           18         93°34.0         519°51.8         89°17.6         11.4'         525°42.6         6.2'         53.9'           19         108°33.8         52.3         103°48.0         11.3'         25°48.8         6.1'         53.9'<								
11       348°35.1       47.9       347°43.4       11.8'       24°55.8       7.0'       53.9'         12       3°34.9       \$19°48.4       2°14.2       11.7'       \$25°02.8       6.9'       53.9'         13       18°34.8       49.0       16°44.9       11.7'       25°09.7       6.8'       53.9'         14       33°34.6       49.5       31°15.6       11.6'       25°16.5       6.7'       53.9'         15       48°34.5       · · 50.1       45°46.2       11.5'       25°23.2       6.6'       53.9'         16       63°34.3       50.6       60°16.7       11.5'       25°29.8       6.5'       53.9'         17       78°34.1       51.2       74°47.2       11.4'       25°36.2       6.3'       53.9'         18       93°34.0       \$19°51.8       89°17.6       11.4'       \$25°42.6       6.2'       53.9'         19       108°33.8       52.3       103°48.0       11.3'       25°48.8       6.1'       53.9'         20       123°33.7       52.9       118°18.3       11.2'       25°54.9       6.0'       53.9'         21       138°33.5       · 53.4       132°48.5       11.2'       26°00.9<								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	12	3°34.9	S19°48.4	2°14.2	11.7'	S25°02.8	6.9'	53.9'
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$								
17         78° 34.1         51.2         74° 47.2         11.4'         25° 36.2         6.3'         53.9'           18         93° 34.0         \$19° 51.8         89° 17.6         11.4'         \$25° 42.6         6.2'         53.9'           19         108° 33.8         52.3         103° 48.0         11.3'         25° 48.8         6.1'         53.9'           20         123° 33.7         52.9         118° 18.3         11.2'         25° 54.9         6.0'         53.9'           21         138° 33.5         • 53.4         132° 48.5         11.2'         26° 00.9         5.9'         53.9'           22         153° 33.4         54.0         147° 18.7         11.1'         26° 06.8         5.7'         53.9'           23         168° 33.2         54.5         161° 48.9         11.1'         26° 12.5         5.6'         53.9'								
19     108° 33.8     52.3     103° 48.0     11.3'     25° 48.8     6.1'     53.9'       20     123° 33.7     52.9     118° 18.3     11.2'     25° 54.9     6.0'     53.9'       21     138° 33.5     • 53.4     132° 48.5     11.2'     26° 00.9     5.9'     53.9'       22     153° 33.4     54.0     147° 18.7     11.1'     26° 06.8     5.7'     53.9'       23     168° 33.2     54.5     161° 48.9     11.1'     26° 12.5     5.6'     53.9'	17	78°34.1	51.2	74°47.2	11.4'	25°36.2	6.3'	53.9'
20     123°33.7     52.9     118°18.3     11.2'     25°54.9     6.0'     53.9'       21     138°33.5     • 53.4     132°48.5     11.2'     26°00.9     5.9'     53.9'       22     153°33.4     54.0     147°18.7     11.1'     26°06.8     5.7'     53.9'       23     168°33.2     54.5     161°48.9     11.1'     26°12.5     5.6'     53.9'								
21 138°33.5 ··· 53.4 132°48.5 11.2' 26°00.9 5.9' 53.9' 22 153°33.4 54.0 147°18.7 11.1' 26°06.8 5.7' 53.9' 23 168°33.2 54.5 161°48.9 11.1' 26°12.5 5.6' 53.9'								
22 153°33.4 54.0 147°18.7 11.1' 26°06.8 5.7' 53.9' 23 168°33.2 54.5 161°48.9 11.1' 26°12.5 5.6' 53.9'								
	22	153°33.4	54.0	$147^{\circ}18.7$	11.1'	26°06.8	5.7'	53.9'
SD = 16.2'  d = 0.6' $SD = 14.7'$	23	168°33.2	54.5	161°48.9	11.1'	26°12.5	5.6'	53.9'
		SD = 16.2'	d = 0.6'		SE	0 = 14.7'		

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

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

		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%		
18	14:54	14:47	11:45	10:19	22:41			
19	14:41	14:34	11:45	11:04	23:27			
20	14:27	14:20	11:46	11:51	-:-			

### November 21, 22, 23 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	60°15.0	194°46.8	S16°05.5	169°55.0	\$22°47.4	303°16.5	N21°15.6	63°41.8	S04°06.7			
	75°17.5	209°46.2		184°55.5		318° 19.0		78°44.3		Alpheratz	357°33.9	29°14.2
1			06.5		47.7		15.7		06.7	Ankaa	353°06.2	-42°10.0
2	90°19.9	224°45.5	07.4	199°56.0	48.0	333°21.6	15.7	93°46.8	06.7	Schedar	349°29.9	56°41.0
3	105°22.4	239°44.8	• • 08.4	214° 56.5	• • 48.2	348°24.1	• • 15.7	108°49.3	• • 06.7	Diphda	348°46.4	-17°50.7
4	120°24.9	254°44.2	09.3	229°57.0	48.5	3°26.7	15.7	123°51.8	06.7	Achernar	335°19.2	-57°06.4
5	135°27.3	269°43.5	10.3	244°57.5	48.8	18°29.2	15.7	138°54.3	06.7	Hamal	327°50.1	23°35.2
6	150°29.8	284°42.9	S16°11.2	259°58.0	S22°49.0	33°31.7	N21°15.8	153°56.8	S04°06.7	Polaris	313°10.7	89°22.5
7	165°32.3	299°42.2	12.2	274°58.5	49.3	48°34.3	15.8	168°59.3	06.7	1	315°10.7	-40°12.0
8	180°34.7	314°41.6	13.1	289°59.0	49.6	63°36.8	15.8	184°01.8	06.7	Acamar		
9	195°37.2	329°40.9	• • 14.0	304°59.5	• • 49.8	78°39.4	• • 15.8	199°04.3	• • 06.7	Menkar	314°05.1	4°11.6
10	210°39.6	344°40.3	15.0	320°00.0	50.1	93°41.9	15.8	214°06.8	06.7	Mirfak	308°26.7	49°57.3
11	225°42.1	359°39.6	15.9	335°00.5	50.3	108°44.5	15.9	229°09.3	06.8	Aldebaran	290°38.5	16°33.7
12	240°44.6	14°38.9	S16°16.9	350°01.0	S22°50.6	123°47.0	N21°15.9	244°11.8	S04°06.8	Rigel	281°02.9	-8°10.2
13	255°47.0	29°38.3		5°01.5	50.9	138°49.6	15.9	259°14.3		Capella	280°20.4	46°01.4
			17.8						06.8	Bellatrix	278°21.8	6°22.5
14	270°49.5	44°37.6	18.7	20°02.0	51.1	153°52.1	15.9	274°16.8	06.8	Elnath	278°00.6	28°37.8
15	285°52.0	59°37.0	• • 19.7	35°02.5	• • 51.4	168°54.7	• • 15.9	289°19.3	• • 06.8	Alnilam	275°36.7	$-1^{\circ}11.0$
16	300°54.4	74° 36.3	20.6	50°03.0	51.6	183°57.2	16.0	304°21.8	06.8	Betelgeuse	270°51.0	7°24.8
17	315°56.9	89°35.6	21.6	65°03.5	51.9	198°59.8	16.0	319°24.3	06.8	Canopus	263°51.6	-52°42.3
18	330°59.4	104°35.0	S16°22.5	80°04.0	S22°52.2	214°02.3	N21°16.0	334°26.8	S04°06.8	Sirius	258°25.3	-16°45.0
19	346°01.8	119°34.3	23.4	95°04.5	52.4	229°04.9	16.0	349°29.3	06.8	1		-10°45.0 -29°00.2
20	1°04.3	134°33.7	24.4	$110^{\circ}05.0$	52.7	244°07.4	16.1	4°31.7	06.8	Adhara	255°05.0	
21	16°06.8	149°33.0	• • 25.3	125°05.5	• • 52.9	259° 10.0	• • 16.1	19°34.2	• • 06.8	Procyon	244°49.9	5°09.6
22	31°09.2	164°32.3	26.2	140°06.0	53.2	274° 12.5	16.1	34°36.7	06.8	Pollux	243°16.2	27°57.7
23	46°11.7	179°31.7	27.2	155°06.4	53.5	289° 15.1	16.1	49°39.2	06.8	Avior	234°14.2	-59°35.2
										Suhail	222°45.7	-43°31.9
Mer.	oass. 19:56	$\nu$ -0.7′ $d0$	.9′ m-3.90	u0.5′ $d$ 0	.3′ m1.36	$\nu 2.5' \ d0.$	.0′ m-2.47	$\nu 2.5' \ d0$	.0′ m0.87	Miaplacidus	221°37.9	-69°49.0
									_	Alphard	217°47.0	-8°46.1
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.7	11°50.4
0	61°14.1	194° 31.0	\$16°28.1	170°06.9	\$22°53.7	304° 17.7	N21°16.1	64°41.7	S04°06.8	Dubhe	193°40.3	61°36.4
1	76°16.6	209°30.3	29.0	185°07.4	54.0	319°20.2	16.2	79°44.2	06.8	Denebola	182°24.4	14°25.6
2	91°19.1	224°29.7	30.0	200°07.9	54.2	334°22.8	16.2	94°46.7	06.8	Gienah	175°43.1	-17°41.0
3	106°21.5	239°29.0	• • 30.9	215°08.4	• • 54.5	349°25.3	16.2	109°49.2	06.8		172°59.8	-63°14.3
										Gacrux	171°51.2	-57°15.2
4	121°24.0	254°28.4	31.8	230°08.9	54.8	4°27.9	16.2	124°51.7	06.8	Alioth	$166^{\circ}12.7$	55°49.0
5	136°26.5	269°27.7	32.7	245°09.4	55.0	19°30.4	16.3	139°54.2	06.8	Spica	158°21.8	$-11^{\circ}17.7$
6	151°28.9	284°27.0	\$16°33.7	260°09.9	\$22°55.3	34°33.0	N21°16.3	154°56.7	S04°06.8	Alkaid	152°51.9	49°10.9
7	166°31.4	299°26.3	34.6	275°10.4	55.5	49°35.5	16.3	169°59.2	06.8	Hadar	148°35.6	-60°29.7
8	181°33.9	314°25.7	35.5	290°10.9	55.8	64°38.1	16.3	185°01.7	06.8	Menkent	147°57.2	-36°29.7
9	196°36.3	329°25.0	• • 36.4	305°11.4	• • 56.0	79°40.7	• • 16.3	200°04.1	• • 06.8	Arcturus	145°47.6	19°02.8
10	211°38.8	344° 24.3	37.4	320°11.9	56.3	94°43.2	16.4	215°06.6	06.8	Rigil Kent.	139°40.0	-60°56.4
11	226°41.3	359° 23.7	38.3	335° 12.4	56.5	109°45.8	16.4	230°09.1	06.8	Kochab	137°20.9	74°02.8
12	241°43.7	14°23.0	S16°39.2	350°12.8	S22°56.8	124°48.3	N21°16.4	245°11.6	S04°06.8	Zuben'ubi	136°55.6	-16°08.9
13	256°46.2	29°22.3	40.1	5°13.3	57.0	139°50.9	16.4	260°14.1	06.8	Alphecca	126°03.5	26°37.6
14	271°48.6	44°21.7	41.1	20°13.8	57.3	154°53.4	16.5	275°16.6	06.8	Antares	112°15.4	-26°29.3
15	286°51.1	$59^{\circ}21.0$	• • 42.0	35° 14.3	• • 57.5	169°56.0	• • 16.5	$290^{\circ}19.1$	• • 06.8	Atria	107°09.5	-69°04.4
16	301°53.6	74°20.3	42.9	50°14.8	57.8	184°58.6	16.5	305°21.6	06.8	Sabik	102°02.3	-15°45.4
17	316°56.0	89° 19.6	43.8	65°15.3	58.0	200°01.1	16.5	320°24.1	06.8	Shaula	96°09.8	-37°07.4
18	331°58.5	$104^{\circ}19.0$	S16°44.7	80° 15.8	S22°58.3	215°03.7	N21°16.5	335°26.6	S04°06.8	Rasalhague	95°58.2	12°32.5
19	$347^{\circ}01.0$	$119^{\circ}18.3$	45.6	95°16.3	58.6	230°06.2	16.6	350°29.1	06.8	Eltanin	90°42.3	51°29.2
20	2°03.4	$134^{\circ}17.6$	46.6	110°16.8	58.8	245°08.8	16.6	5°31.5	06.8	Kaus Aust.	83°31.9	-34°22.4
21	17°05.9	149°17.0	• • 47.5	125° 17.2	•• 59.1	260°11.4	• • 16.6	20°34.0	• • 06.8	Vega	80°33.1	38°48.6
22	32°08.4	$164^{\circ}16.3$	48.4	140°17.7	59.3	275°13.9	16.6	35°36.5	06.8	Nunki	75°47.2	-26°15.9
23	47°10.8	$179^{\circ}15.6$	49.3	155° 18.2	59.5	290°16.5	16.7	50°39.0	06.8	Altair	61°59.5	8°56.3
N 4	10.50	0.7/ 10	0/ 2.00	0. 5/ 10	2/ 1.26	2.6/ 10	0/ 0.47	2.5/ /0	0/ 0.07		53°04.9	-56°39.3
ivier.	pass. 19:52	$\nu$ -0.7 au	.9′ m-3.90	$\nu$ 0.5° $a$ 0	.3′ m1.36	$\nu$ 2.6° $a$ 0.	.0′ m-2.47	$\nu$ 2.5 au	.0′ m0.87	Peacock	49°25.5	-50 39.3 45°22.6
										Deneb		
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.1	9°59.8
0	62°13.3	194° 14.9	S16°50.2	170° 18.7		305°19.0	N21°16.7	65°41.5	S04°06.8	Al Na'ir	27°32.0	-46°50.3
1	77°15.8	209°14.2	51.1	185° 19.2	23°00.0	320°21.6	16.7	80°44.0	06.8	Fomalhaut	15°13.7	-29°29.2
2	92°18.2	224° 13.6	52.0	200°19.7	00.3	335°24.2	16.7	95°46.5	06.8	Scheat	13°44.4	28°13.6
3	107°20.7	239°12.9	• • 53.0	215°20.2	00.5	350°26.7	. 16.7	110°49.0	06.9	Markab	13°29.1	15°20.8
4	122°23.1	254° 12.2	53.9	230°20.7	00.8	5°29.3	16.8	125°51.5	06.9	Nov 21 Fri	SHA	Mer.pass
5	137°25.6	269°11.5	54.8	245°21.1	01.0	20°31.9	16.8	140°53.9	06.9		134°31.8	11:01
6	152°28.1	284°10.9	\$16°55.7	260°21.6	\$23°01.3	35°34.4	N21°16.8	155°56.4	S04°06.9		109°40.0	12:40
7	167°30.5	299° 10.2	56.6	275°22.1	01.5	50°37.0	16.8	170°58.9	06.9		243°01.5	03:46
8	182°33.0	314°09.5	57.5	290°22.6	01.8	65°39.6	16.9	186°01.4	06.9	Saturn	3°26.8	19:42
9	197°35.5	329°08.8	• 58.4	305°23.1	02.0	80°42.1	. 16.9	201°03.9	06.9			
10	212°37.9	344°08.1	16°59.3	320°23.6	02.3	95°44.7	16.9	216°06.4	06.9	Nov 22 Sat	SHA	Mer.pass
11	212 37.9 227°40.4	359°07.4	10° 39.3 17° 00.2	335°24.1	02.5	110°47.3	16.9	231°08.9	06.9		133°16.9	11:02
12	242°42.9	14°06.8	\$17°01.1	350°24.5	S23°02.8	125°49.8	N21°17.0	246°11.4			108°52.8	12:39
13	257°45.3	29°06.1	02.0	5°25.0	03.0	140°52.4	17.0	261°13.8	06.9		243°03.5	03:42
14	272°47.8	44°05.4	02.0	20°25.5	03.0	155°55.0	17.0	276°16.3	06.9	Saturn	3°27.6	19:38
15	287°50.2	59°04.7	• • 03.8	35°26.0	03.5	170° 57.5	17.0	291°18.8	• • 06.9	Nov 23 Sun	SHA	Mornos
16	302°52.7	74°04.0	04.7	50°26.5	03.7	186°00.1	17.1	306°21.3	06.9		3ПА 132°01.6	Mer.pass 11:04
17	317°55.2	89°03.3	05.6	65°27.0	04.0	201°02.7	17.1	321°23.8	06.9		132 01.6 108°05.4	
18	332°57.6	104°02.7	\$17°06.5	80°27.5	\$23°04.2	216° 05.2	N21°17.1	336°26.3	S04°06.9		243°05.4	12:38 03:38
19	348°00.1	119°02.0	07.4	95°27.9	04.4	231° 07.8	17.1	351°28.8	06.9	Jupiter		
20	3°02.6	134°01.3	08.3	110°28.4	04.4	246°10.4	17.1	6°31.2	06.9	Saturn	3°28.2	19:34
21	18°05.0	149°00.6	•• 09.2	125°28.9	• • 04.9	261°12.9	17.2	21°33.7	• • 06.9	Horizont	al parallax	
22	33°07.5	163°59.9	10.1	140° 29.4	05.2	276° 15.5	17.2	36°36.2	06.9		Venus:	0.1
23	48°10.0	178° 59.2	11.0	155° 29.9	05.4	291° 18.1	17.2	51°38.7	06.9		Mars:	0.1
Mer.	pass. 19:48	$\nu$ -0. $l' d0$	.9′ m-3.90	$\nu_{0.5'} d0$	.2′ m1.35	$\nu$ 2.6′ d0.	.0′ m-2.48	$\nu^{2.5'} d0$	.0′ m0.88			
_	_		_		_		_		-			

h	Sui	า			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	183°33.1	S19°55.1	176°18.9	11.0'	<b>S</b> 26°18.1	5.5'	53.9'
1	198°32.9 213°32.7	55.6	190°49.0	11.0'	26°23.6	5.4'	53.9'
2	213°32.7 228°32.6	56.2 •• 56.7	205°18.9 219°48.8	10.9' 10.9'	26°29.0 26°34.3	5.3' 5.1'	53.9' 53.9'
4	243°32.4	57.3	234°18.7	10.8'	26°39.4	5.0'	53.9'
5	258°32.3	57.8	248°48.5	10.8'	26°44.4	4.9'	53.9'
6 7	273°32.1 288°32.0	\$19°58.4 58.9	263°18.3 277°48.0	10.7' 10.7'	\$26°49.3 26°54.1	4.8' 4.6'	53.9' 53.9'
8	303°31.8	19°59.5	292°17.6	10.7	26°58.7	4.5	53.9
9	318°31.6	20°00.0	306°47.2	10.6'	27°03.2	4.4'	53.9'
10	333°31.5 348°31.3	00.6	321°16.8	10.5'	27°07.6 27°11.9	4.3'	53.9'
11 12	348°31.3 3°31.2	01.1 \$20°01.6	335°46.3 350°15.8	10.5' 10.4'	\$27°11.9	4.1' 4.0'	53.9' 53.9'
13	18°31.0	02.2	4°45.2	10.4	27°20.0	3.9'	53.9'
14	33°30.8	02.7	19°14.6	10.3'	27°23.9	3.7'	53.9'
15 16	48°30.7 63°30.5	· · 03.3 03.8	33°43.9 48°13.2	10.3' 10.3'	27°27.6 27°31.2	3.6' 3.5'	53.9' 54.0'
17	78°30.3	04.4	62°42.5	10.3	27°34.7	3.3'	54.0'
18	93°30.2	S20°04.9	77°11.7	10.2'	S27°38.1	3.2'	54.0'
19	108°30.0 123°29.9	05.4	91°40.9	10.1'	27°41.3	3.1'	54.0' 54.0'
20 21	123°29.9 138°29.7	06.0 •• 06.5	106°10.0 120°39.1	10.1' 10.1'	27°44.4 27°47.3	2.9' 2.8'	54.0' 54.0'
22	153°29.5	07.0	135°08.2	10.0'	27°50.1	2.7'	54.0'
23	168°29.4	07.6	149°37.2	10.0'	27°52.8	2.5'	54.0'
	SD = 16.2'	d = 0.6'		SE	0 = 14.7'		
Sat	GHA	Dec	GHA	ν	Dec	d	НР
0 0	183°29.2	\$20°08.1	164°06.2	10.0'	\$27°55.4	2.4'	54.0'
1	198°29.0	08.7	$178^{\circ}35.1$	9.9'	$27^{\circ}57.8$	2.3'	54.0'
2	213°28.9 228°28.7	09.2 •• 09.7	193°04.1 207°33.0	9.9'	28°00.0 28°02.2	2.1' 2.0'	54.0'
3 4	243°28.5	10.3	207 33.0 222°01.9	9.9' 9.8'	28 02.2 28°04.2	2.0 1.9'	54.0' 54.0'
5	258°28.4	10.8	236°30.7	9.8'	28°06.1	1.7'	54.0'
6	273°28.2	S20°11.3	250°59.5	9.8'	\$28°07.8	1.6'	54.0'
7 8	288°28.0 303°27.9	11.9 12.4	265°28.3 279°57.1	9.8' 9.7'	28°09.4 28°10.8	1.5' 1.3'	54.1' 54.1'
9	318°27.7	. 12.4	294°25.8	9.7'	28°12.2	1.2'	54.1'
10	333°27.5	13.5	308°54.6	9.7'	28°13.3	1.0'	54.1'
11 12	348°27.4 3°27.2	14.0 \$20°14.5	323°23.3 337°52.0	9.7' 9.7'	28°14.4 <b>S</b> 28°15.3	0.9' 0.8'	54.1' 54.1'
13	18°27.0	15.0	352°20.6	9.7 9.7'	28°16.1	0.6	54.1'
14	33°26.9	15.6	6°49.3	9.6'	28°16.7	0.5'	54.1'
15	48°26.7 63°26.5	· · 16.1 16.6	21°17.9 35°46.6	9.6'	28°17.2 28°17.5	0.3' 0.2'	54.1' 54.1'
16 17	78°26.3	17.1	50°15.2	9.6' 9.6'	28 17.5 28°17.7	0.2	54.1'
18	93°26.2	S20°17.7	64°43.8	9.6'	S28°17.8	-0.1'	54.2'
19	108°26.0 123°25.8	18.2	79°12.4	9.6'	28°17.7	-0.2' -0.3'	54.2'
20 21	123°25.8 138°25.7	18.7 •• 19.2	93°40.9 108°09.5	9.6' 9.6'	28°17.5 28°17.2	-0.5'	54.2' 54.2'
22	153°25.5	19.8	122°38.1	9.6'	28°16.7	-0.6'	54.2'
23	168°25.3	20.3	137°06.7	9.6'	28°16.0	-0.8'	54.2'
	SD = 16.2'	d = 0.5'		SE	0 = 14.7'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°25.1	\$20°20.8	151°35.2	9.6'	\$28°15.3	-0.9'	54.2'
1 2	198°25.0 213°24.8	21.3 21.8	166°03.8 180°32.3	9.6' 9.6'	28°14.4 28°13.3	-1.0' -1.2'	54.2' 54.2'
3	213 24.6 228°24.6	• • 22.4	195°00.9	9.6'	28°12.1	-1.3'	54.2'
4	243°24.4	22.9	209°29.5	9.6'	28°10.8	-1.5'	54.3'
5 6	258°24.3 273°24.1	23.4 \$20°23.9	223°58.0 238°26.6	9.6' 9.6'	28°09.3 <b>S</b> 28°07.7	-1.6' -1.7'	54.3' 54.3'
7	288°23.9	24.4	252°55.2	9.6'	28°06.0	-1.7 -1.9'	54.3
8	303°23.7	24.9	267°23.8	9.6'	28°04.1	-2.0'	54.3'
9	318°23.6	• • 25.5	281°52.4	9.6'	28°02.1	-2.2'	54.3'
10 11	333°23.4 348°23.2	26.0 26.5	296°21.0 310°49.6	9.6' 9.6'	27°59.9 27°57.6	-2.3' -2.4'	54.3' 54.3'
12	3°23.0	\$20°27.0	325°18.2	9.6'	S27°55.1	-2.6'	54.4
13	18°22.9	27.5	339°46.8	9.6'	27°52.5	-2.7'	54.4
14 15	33°22.7 48°22.5	28.0 •• 28.5	354°15.5 8°44.1	9.7' 9.7'	27°49.8 27°47.0	-2.9' -3.0'	54.4' 54.4'
16	63°22.3	29.1	23°12.8	9.7'	27°43.9	-3.1'	54.4
17	78°22.1	29.6	37°41.5	9.7'	27°40.8	-3.3'	54.4'
18 19	93°22.0 108°21.8	\$20°30.1 30.6	52°10.2 66°39.0	9.7' 9.8'	\$27°37.5 27°34.1	-3.4' -3.6'	54.4' 54.5'
20	108°21.8 123°21.6	30.6	81°07.7	9.8'	27°34.1 27°30.6	-3.6 -3.7'	54.5° 54.5°
21	138°21.4	• • 31.6	95°36.5	9.8'	27°26.9	-3.8'	54.5'
22 23	153°21.3 168°21.1	32.1	110°05.3 124°34.1	9.8' 9.9'	27°23.0 27°19.1	-4.0' -4.1'	54.5' 54.5'
23	SD = 16.2'	$\frac{32.6}{d = 0.5'}$	124 34.1			-4.1	54.5
	3D = 10.2	$u = 0.5^{\circ}$		5L	0 = 14.8'		

Lat.         Naut.         Civil         Sunrise         Sunset         Civil           N 72°         07:24         09:09         ■         14:23           N 70°         07:11         08:39         10:47         12:44         14:52           68°         07:01         08:18         09:48         13:43         15:14           66°         06:52         08:00         09:15         14:17         15:31           64°         06:44         07:46         08:50         14:41         15:45           62°         06:37         07:34         08:31         15:01         15:57           60°         06:31         07:24         08:16         15:16         16:08           N 58°         06:25         07:15         08:02         15:29         16:17           56°         06:20         07:07         07:51         15:41         16:25           54°         06:16         07:00         07:41         15:51         16:32           52°         06:12         06:54         07:32         16:00         16:38	Naut. 16:07 16:20 16:31
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	16:20
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	16.31
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	10.51
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	16:40
60°         06:31         07:24         08:16         15:16         16:08           N 58°         06:25         07:15         08:02         15:29         16:17           56°         06:20         07:07         07:51         15:41         16:25           54°         06:16         07:00         07:41         15:51         16:32           52°         06:12         06:54         07:32         16:00         16:38	16:48
N 58°         06:25         07:15         08:02         15:29         16:17           56°         06:20         07:07         07:51         15:41         16:25           54°         06:16         07:00         07:41         15:51         16:32           52°         06:12         06:54         07:32         16:00         16:38	16:55
56°         06:20         07:07         07:51         15:41         16:25           54°         06:16         07:00         07:41         15:51         16:32           52°         06:12         06:54         07:32         16:00         16:38	17:01
54°         06:16         07:00         07:41         15:51         16:32           52°         06:12         06:54         07:32         16:00         16:38	17:06
52° 06:12 06:54 07:32 16:00 16:38	17:11
	17:16
F00 0000 0040 0704 1000 4044	17:20
50° 06:08 06:48 07:24 16:08 16:44	17:24
45° 05:59 06:35 07:07 16:25 16:57	17:33
<b>N</b> 40° 05:51 06:24 06:53 16:39 17:08	17:41
35° 05:43 06:14 06:41 16:51 17:18	17:49
30° 05:36 06:05 06:31 17:01 17:27	17:56
20°   05:23	18:10
N 10° 05:09 05:35 05:57 17:35 17:57	18:23
0° 04:55 05:21 05:43 17:50 18:12	18:37
<b>S</b> 10° 04:39 05:05 05:28 18:05 18:27	18:54
20° 04:19 04:48 05:12 18:21 18:45	19:13
30° 03:55 04:26 04:53 18:40 19:06	19:38
35° 03:39 04:13 04:42 18:51 19:19	19:54
40° 03:19 03:58 04:29 19:03 19:35	20:14
45° 02:55 03:39 04:14 19:19 19:54	20:39
<b>S</b> 50° 02:20 03:15 03:56 19:37 20:18	21:14
52° 02:02 03:04 03:47 19:46 20:30	21:32
54° 01:39 02:50 03:38 19:56 20:44	21:56
56° 01:06 02:34 03:27 20:07 21:00	22:31
58°   /// 02:15 03:14   20:20 21:20	////
<b>S</b> 60°   /// 01:50 02:59   20:35 21:46	////

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

		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	1-7%	
21	14:12	14:05	11:46	12:40	00:15		
22	13:57	13:49	11:46	13:32	01:06		
23	13:41	13:32	11:46	14:24	01:58		

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

Color	h	Aries	Ve	nus	М	ars	Jup	oiter	Sat	urn		Stars	
5	Mon -	CHA	CHA	Doc	CHV.	Doc	CHV	Doc	CHV	Doc		SHV	Doc
1													
2											Alpheratz		I
1													
\$\$ 138^2.1.7 569^5.1 5.7 1.4 1.5 1.5 2.00^12.3 66.6 \$\frac{1}{2}.00 1.7 1.7 1.2 1.2 1.5 1.3 1.7 1.4 1.7 1.5 1.5 1.7 1.4 1.7 1.5 1.5 1.7 1.4 1.7 1.5 1.5 1.7 1.4 1.7 1.5 1.5 1.7 1.4 1.7 1.5 1.5 1.7 1.4 1.7 1.5 1.5 1.7 1.4 1.7 1.5 1.5 1.7 1.4 1.7 1.5 1.5 1.5 1.7 1.4 1.7 1.5 1.5 1.5 1.7 1.4 1.7 1.5 1.5 1.5 1.7 1.4 1.7 1.5 1.5 1.5 1.5 1.7 1.4 1.7 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5													
Section   Sect													
Section   Color	5												
18   18   18   18   18   18   18   18	6												
10   10   10   10   10   10   10   10	7	$168^{\circ}29.7$	298°53.7	18.1	275°33.7	07.3	51°38.7	17.4	171°58.6	06.8			
1	8	183°32.1	313°53.0	19.0	290°34.2	07.5	66°41.2	17.5	$187^{\circ}01.1$	06.8			
10 2412-1956	9	198°34.6	328°52.3	• • 19.9	305°34.7	• • 07.8	81°43.8	•• 17.5	202°03.5	• • 06.8			
1.1   2.52   3.53   3.57   3	10			20.8		08.0		17.5		06.8	l l		
14   273   264   267													
1.5   1.5											_		
28 38 38 36 38 38 38 38 38 38 38 38 38 38 38 38 38													
18											l .		
18   18   18   18   18   18   18   18											Alnilam	275°36.7	
18 333*56. 203*6a.1 \$17*279 80*59. 521*09. 91*09. 121*07. 737*29. \$04*06.8   Categor #4*01.7 \$10*04. 203 \$10*10*0.0 \$10.3 \$24*712.1 \$17.8 \$7*30.8 \$0.68   Process #4*01.7 \$10*10*10*10*10*10*10*10*10*10*10*10*10*1											Betelgeuse	$270^{\circ}51.0$	$7^{\circ}24.8$
19   348°590   178°454   237   95°395   101   232°06   177   352°28-4   0.68   2019											Canopus	263°51.6	
20											Sirius	258°25.3	
22   19"04.2   148"44.0   -0.05   125"40.4   -0.06   262"4.7   -1.78   22"33.3   -0.68   March 2015   -0.05											Adhara		
22													
Mer.pass. 19-44											l .		
Tue   GHA   Pag													
Tue GHA GHA GHA Dec GHA DEC GH				_									
Time   GHA   GHA   Dec   GHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dec   CHA   Dubble   1937-31   1719-19   2211-31   1719-19   2211-31   1719-19   2211-31   1719-19   2211-31   1719-19   1719-31   171	Mer.p	ass. 19:44	$\nu$ -0.1′ d0	.9′ m-3.90	$\nu$ 0.5′ $d$ 0	.2′ m1.34	$\nu$ 2.6′ d0.	.u′ m-2.49	$\nu$ 2.5′ d-0	.u′ m0.88			
Toc GHA													
0 64°11.6 193°41.9 517°31.1 170°41.9 523°11.3 307°25.5 191°21.9 67°40.8 504°60.8   Oblight   0.38°40.9   0.38°40.	Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	_		
1 79°140 28°41. 340 340 185°423 11.5 32°250 17.9 82'432 06.8   3 99°16.5 223°40 4 34.9 34.0 185°423 11.5 32°250 17.9 97'45.7 06.8   3 100°190 5 285°30 4 35.7 215°433 1.12 32°250 17.9 112'482 0.68   4 124'21.4 253'380 36.6 203'43 11.2 32°322 17'32.8 18.0 11'2'50.7 06.8   5 115°16.4 283'37.0 35.7 215°43.3 12.0 32°32.2 17'32.8 18.0 11'7'50.7 0.8   5 115°16.4 283'37.0 31'36.2 204'38 12.0 73'28.8 18.0 11'7'50.7 0.68   5 115°16.4 283'37.0 51'38.2 204'38.4 205'44.7 523'12.6 37'37.9 N21'38.0 115°55.5 50°68.8   5 116°16.4 283'37.0 51'38.2 204'38.4 205'44.7 523'12.6 37'37.9 N21'38.0 1157'55.1 50°68.8   5 118°16.4 21.3 313'36.2 40.1 290'45.7 13.1 67'43.1 18.1 188'00.6 06.8   112 298'35.7 388'34.1 42.7 333'47.1 13.8 112'50.9 18.2 283'08.0 06.8   112 298'35.7 388'34.1 42.7 333'47.1 13.8 112'50.9 18.2 283'16.0 06.8   112 298'36.6 283'37.3 383'47.1 13.8 112'50.9 18.2 288'10.5 504'06.8   12 248'41.1 13'33.4 517'43.6 350'47.6 523'14.0 127'53.4 N21'18.2 248'10.5 504'06.8   12 248'41.1 13'33.4 517'43.6 350'47.6 523'14.0 127'53.4 N21'18.2 248'10.5 504'06.8   12 248'41.1 13'33.4 517'43.6 350'47.6 523'14.0 127'53.4 N21'18.2 248'10.5 504'06.8   12 248'41.1 13'33.4 517'43.6 350'47.6 523'14.0 127'53.4 N21'18.2 248'10.5 504'06.8   12 248'41.1 13'33.4 517'43.6 350'47.6 523'14.0 127'53.4 N21'18.2 248'10.5 504'06.8   12 248'41.1 13'33.4 517'43.6 350'47.6 523'14.0 127'53.4 N21'18.2 248'10.5 504'06.8   12 248'40.1 34'13'1.3 517'43.6 350'47.6 523'14.0 127'53.4 N21'18.2 248'10.5 504'06.8   12 248'40.1 34'13'1.3 518'40.4 45.5 504'0.4 18.3 223'22.9 0.6 8   15 289'40.4 55.5 281'1.3 504'0.4 18.3 223'22.9 0.6 8   15 289'40.4 55.6 233'3.3 '*6.0 6.8 54.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0													
94°165   23°404   349   200°428   11.7   33°272.6   17.9   97°45.7   0.68   3   100°109   238°36.7   3.57   3.57   23°14.3   3.10°109   238°36.7   3.57   3.	1	$79^{\circ}14.0$											
109*190, 288*397	2	$94^{\circ}16.5$	223°40.4	34.9	200°42.8	11.7	337°27.6	17.9	97°45.7	06.8			
\$\frac{4}{124} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	3		238°39.7	• • 35.7	215°43.3	•• 12.0		• • 17.9		• • 06.8			
5   139°23   9   266°38   37.5   245°44   3   124   22°354   18.0   142°53   206°80   8   48.4   17.1   17.7   109°28   299°369   30.2   275°45   2   12.9   52°40.5   18.0   172°58   1   06.8   144°31   18.4   152°51   30°40.8   18.4   131°31   18.4   152°51   30°40.8   18.4   130°40.6   12.4   131°31   131°30.2   131°37	4		253°39.0	36.6		12.2		18.0		06.8			
7 156°26.4 283°37.6 S17°38.4 260°4.7 S23°12.6 37°37.9 Q22°18.0 157°35.6 S04°06.8 Alkial 152°51.8 49°10.9 C88 184°31.3 313°36.2 40.1 290°457. 13.1 0°743.1 18.1 188°00.6 0.68 Hadri 148°35.6 0°22.7 Menkent 147°57.1 3.6°29.7 18.1 18.1 188°00.6 0.68 Hadri 148°35.6 0°22.7 Menkent 147°57.1 3.6°29.7 18.1 129°33.7 326°35.5 · 41.0 390°40.4 13.3 22°45.7 · 13.1 218°05.6 0.68 Hadri 148°35.6 0°22.7 Menkent 147°57.1 3.6°29.7 18.1 129°39.7 385°41.1 4.27 335°47.1 18.8 122°59.9 18.1 218°55.6 0.68 Kochab 137°20.9 74°02.8 233°08.0 0.8 Kochab 137°20.7 74°02.8 233°08.0 0.8 Kochab 137°20.7 74°02.8 233°08.0 0.8 Kochab 137°20.7 74°02.8 233°08.0 0.8 Kochab 137°20.7 74°02.8 233°08.0 0.8 Kochab 137°20.7 74°02.8 230°0.0 0.8 Kochab 137°20.7 74°02.8 230°0.0 0.8 Kochab 137°20.7 74°02.8 20°0.0 0.8 Kochab 137°20.7 74°02.8 20°0.0 0.8 Kochab 137°20.7 74°02.8 20°0.0 0.8 Kochab 137°20.7 74°02.8 20°0.0 0.8 Kochab 137°20.7 74°02.8 20°0.0 0.8 Kochab 137°20.7 74°02.8 20°0.0 0.8 Kochab 137°20.7 74°02.8 20°0.0 0.8 Kochab 137°20.7 74°02.8 20°0.0 0.8 Kochab 137°20.7 74°02.8 20°0.0 0.8 Kochab 137°20.7 74°02.8 20°0.0 0.8 Kochab 137°20.7 74°02.8 20°0.0 0.8 Kochab 137°20.7 74°02.8 20°0.0 0.8 Kochab 137°20.7 74°02.8 20°0.0 0.8 Kochab 137°20.7 74°02.8 20°0.0 0.8 Kochab 137°20.7 74°02.8 20°0.0 0.8 Kochab 137°20.9 74°02.8 20°0.0 0.8 120°0.0 0.8 20°0.0 0.8 20°0.0 0.8 20°0.0 0.8 20°0.0 0.8 20°0.0 0.8 20°0.0 0.8 20													
Teal   160°288   290°380   30.2   275°48.2   12.9   52°40.5   18.0   172°88   200°38.7   30°26.2   40.1   30°46.2   13.1   67°43.1   18.1   188°00.6   06.8   Menker   147°57.1   36°20.7   36°20.													
8 184°31.3 313°36.2 40.1 290°45.7 13.1 67°43.1 18.1 188°00.5 06.8 10.2 14°36.2 33°37.3 328°35.5 · 41.0 305°46.2 13.3 82°45.7 18.1 203°03.1 · 06.8 112 293°37.3 338°34.1 42.7 335°47.1 13.8 112°50.9 18.2 233°06.0 06.8 12.2 244°41.1 13°33.4 51°43.6 350°47.6 523°14.0 127°53.4 121°8.2 248°10.5 006.8 13.2 59°43.6 28°32.7 44.4 5°48.1 14.2 142°56.0 18.2 263°13.0 06.8 15.2 263°43.0 06.8 15.2 263°43.0 06.8 15.2 263°45.0 14.2 142°56.0 18.2 263°13.0 06.8 15.2													
10 214*36.2 343*34.8 41.8 320*46.6 13.5 97*48.3 18.1 218*05.6 06.8 129*37*38.7 338*41.1 42.7 335*47.1 13.8 112*59.0 18.2 233*08.0 06.8 129*44*41.1 13*33.4 15*43.6 330*47.6 523*14.0 127*59.0 18.2 233*08.0 06.8 Kochab 137*20.9 74*02.8 24.8 13.2 59*43.6 28*37.2 44.4 15*45.6 18.2 263*13.0 06.8 14.2 14.2 14.2 14.2 14.2 14.2 14.2 14.2											Menkent	147°57.1	
11 229°38.7 388°34.1 42.7 338°47.1 13.8 112°50.9 18.2 233°08.0 06.8 Kochab 13°0.0 3-00.0 0.8 12 233°08.0 06.8 13°0.9 18.2 233°0.0 06.8 13°0.9 18.2 233°0.0 06.8 13°0.9 18.2 233°0.0 06.8 13°0.9 18.2 233°0.0 06.8 13°0.9 18.2 233°0.0 06.8 13°0.9 18.2 233°0.0 06.8 13°0.9 18.2 233°0.0 06.8 13°0.9 18.2 233°0.0 06.8 13°0.0 06.8 13°0.0 18.2 230°0.0 18.2 263°13.0 06.8 13°0.0 18.2 230°0.0 1											Arcturus	145°47.6	19°02.8
244*41.1   13*33.4   S17*43.6   350*47.6   S23*14.0   127*53.4   N21*18.2   248*10.5   S04*06.8     3 29*34.6   28*32.7   4.4   5*48.1   14.2   142*56.0   18.2   26*3*15.5   0.6 8.8     4 274*46.1   43*32.0   45.3   20*48.5   14.4   15*85.6   18.2   26*3*15.5   0.6 8.8     5 289*48.5   58*31.3   46.2   35*49.0   14.7   173*01.2   18.3   20*3*18.0   0.6 8.8     6 304*51.0   73*30.6   47.0   50*49.5   14.9   188*03.8   18.3   308*20.4   0.6 8.8     5 304*55.9   103*29.9   517*48.7   80*504   523*15.1   203*06.4   18.3   323*22.9   0.6 8.8     5 304*55.9   103*27.7   50.5   10*614.1   15.8   248*14.1   18.4   8*30.3   0.6 8.8     5 20 5*00.9   133*27.7   50.5   10*614.1   15.8   248*14.1   18.4   8*30.3   0.6 8.8     2 2 35*08.8   163*26.3   52.2   140*92.3   16.2   23*21.5   18.5   38*33.3   0.6.7     2 2 35*08.8   163*26.3   52.2   140*92.3   16.2   23*21.9   18.5   38*33.3   0.6.7     Mer.pass. 19:40   \$\bullet \text{CMA}\$   \$\bulet \text{CMA}\$   \$\bullet \text{CMA}\$   \$\bullet \text{CMA}\$   \$\											Rigil Kent.	$139^{\circ}40.0$	-60°56.4
14   27   46   1   43   28   28   23   7   44   4   5   48   1   14   14   14   28   66   18   2   26   26   31   30   0.6   8   16   16   16   16   16   16   16											Kochab		74°02.8
14 274"46.1 43"32.0 45.3 20"48.5 14.4 157"58.6 18.2 278"15.5 06.8 152 278"48.5 58"31.3 '.66 2 35"49.0 '.14.7 173"012 '.18.3 29"318.0 '.06.8 16 304"51.0 73"30.6 47.0 50"49.5 14.9 188"03.8 18.3 308"20.4 06.8 173 19"53.5 88"29.9 47.9 65"49.9 15.1 203"06.4 18.3 32"22.9 06.8 18.3 348"55.9 103"29.1 51"48.7 80"50.4 523"15.3 218"08.9 N21"18.3 388"25.4 504"06.8 Sabik 102"02.3 11"45.1 15.8 4.3 53"27.9 06.8 16.2 12"15.3 218"08.9 N21"18.3 388"25.4 504"06.8 Sabik 102"02.3 11"45.4 15.8 248"14.1 18.4 8"35"27.9 06.8 Eltanin 90"42.3 51"29.2 50.0 50.9 133"27.7 50.5 110"51.4 15.8 248"14.1 18.4 8"30.3 06.8 Eltanin 90"42.3 51"29.2 25"50.8 163"26.3 5.2 140"52.3 16.2 278"19.3 18.5 38"35.3 06.7 Vega 80"33.1 38"48.6 22"350.8 10.7 '.28"15.3 16.2 28"8"19.3 18.5 38"35.3 06.7 Vega 80"33.1 38"48.6 10.2 10.2 178"25.6 53.0 155"52.8 16.4 293"21.9 18.5 53"37.8 06.7 Altari 61"59.5 8"55.9 18.6 138"2.2 25"50.8 163"2.2 178"52.5 18.6 128"50.7 19"3.4 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5											Zuben'ubi	$136^{\circ}55.6$	
16 304°45.0 73°30.6 470 50°49.9 15.1 193°0.2 18.3 299°18.0 0.6.8   Atria 107°05.5 69°0.4   17 319°5.35 88°29.9 479 65°49.9 15.1 203°06.4 18.3 328°22.9 06.8   Atria 107°05.5 69°0.4   18 334°55.9 103°29.1 \$17°48.7 80°5.0 15.6 233°11.5 18.4 35°27.9 06.8   Sabik 102°02.3 -15°45.4   19 349°58.4 116°28.4 49.6 95°50.9 15.6 233°11.5 18.4 35°27.9 06.8   Sabik 102°02.3 -15°45.4   20 5°0.9 133°27.7 50.5 110°51.4 15.8 246°14.1 18.4 8°30.3 06.8   Sabik 102°02.3 19°29.2   20 5°0.9 133°27.7 50.5 11.3 125°51.8 16.0 263°16.7 18.4 23°22.8 06.7   22 35°08.8 163°26.3 52.2 140°52.3 16.2 278°19.3 18.5 38°35.3 06.7   23 50°08.2 178°25.6 53.0 155°52.8 16.2 278°19.3 18.5 38°357.8 06.7   24 30°08.2 178°25.6 53.0 155°52.8 16.2 278°19.3 18.5 53°37.8 06.7   25 35°08.6 163°26.3 52.2 140°52.3 16.2 278°19.3 18.5 53°37.8 06.7   26 40 40°52.3 165°26.3 52.2 140°52.3 156°2.8 16.4 293°21.9 18.5 53°37.8 06.7   27 40 40 40 40 40 40 40 40 40 40 40 40 40											Alphecca		
16 304°51.0 73°30.6 47.0 50°49.5 14.9 188°03.8 18.3 308°20.4 06.8 183 333°32.9 06.8 183 10°39.3 15°64.6 183 333°22.9 06.8 183 333°27.7 50.5 110°51.4 15.8 23°31.1.5 18.4 35°327.9 06.8 183 333°2.9 06.8 183 333°2.9 06.8 183 333°2.9 06.8 183 333°2.9 06.8 183 333°2.9 06.8 183 10°39.3 148°27.0 1.5 1.3 125°51.8 1.16.0 263°16.7 18.4 23°32.8 10.6 7 183°3.1 38°48.6 183 10°39.3 148°27.0 1.5 1.3 125°51.8 16.4 293°21.9 18.5 53°37.8 06.7 183°48.6 183 10°39.3 183°48.6 183 10°39.3 183°48.6 183 10°39.3 183°48.6 183 10°39.3 183°49.6 183 183°48.6 183 183°48.6 183 183°48.6 183 183°48.6 183 183°48.6 183 183°48.6 183 183°48.6 183 183°48.6 183 183°48.6 183 183°48.6 183 183°48.6 183 183°48.6 1													
18 334°559 103°291 S17°487 80°504 \$23°153 218°08,0 N21°18.3 338°254 \$04°06.8 18341 96°09.8 \$-37°07.4 193 349°88.4 \$118°28.4 \$49.6 \$9°50.9 \$15.6 \$23°11.5 \$18.4 \$35°27.9 \$06.8 \$118°28.4 \$49.6 \$9°50.9 \$15.6 \$23°11.5 \$18.4 \$35°27.9 \$06.8 \$118°28.4 \$49.6 \$9°50.9 \$15.6 \$23°11.5 \$18.4 \$35°27.9 \$06.8 \$118°28.4 \$49.6 \$9°50.9 \$15.6 \$23°11.5 \$18.4 \$35°27.9 \$06.8 \$18.2 \$10°50.3 \$13°27.7 \$50.5 \$110°51.4 \$15.8 \$248°14.1 \$18.4 \$8°30.3 \$06.8 \$18.6 \$23°15.3 \$10°20.3 \$148°27.0 \$13.3 \$125°51.8 \$16.0 \$263°16.7 \$18.4 \$23°32.8 \$06.7 \$10°28.0 \$16.2 \$278°19.3 \$18.5 \$38°35.3 \$06.7 \$10.0 \$18.2 \$10°20.3 \$10°20.2 \$16.2 \$278°19.3 \$18.5 \$38°35.3 \$06.7 \$10.0													
18 334°55.9 103°9.91 517°48.7 80°50.4 \$23°15.3 218°08.9 N221°8.3 338°25.4 \$04°06.8 183°38.1 49°0.95.2 12°32.5 20 5°00.9 133°27.7 50.5 110°51.4 15.8 248°14.1 18.4 8°30.3 06.8 21 20°0.3 148°27.0 · · · · · · · · · · · · · · · · · · ·													
19   349°884   118°284   49.6   95°50.9   15.6   233°11.5   18.4   353°27.9   06.8   Eltanim   29°34.2   17°22.9													
20   5°00.9   133°27.7   50.5   110°51.4   15.8   248°14.1   18.4   8°30.3   06.8   Kaus Aust   21   20°0.33   148°27.0   51.3   125°51.8   16.0   263°19.3   18.5   38°35.3   06.7   23°32.8											_		
22 35°05.8 163°26.3 52.2 140°52.3 16.2 278°19.3 18.5 38°35.3 06.7 Vega 80°33.1 38°48.6 Vega 50°08.2 178°25.6 53.0 155°52.8 16.4 293°21.9 18.5 53°37.8 06.7 Vega 80°33.1 38°48.6 Vega 50°08.2 178°25.6 53.0 155°52.8 16.4 293°21.9 18.5 53°37.8 06.7 Vega 80°33.1 38°48.6 Vega 50°08.2 178°25.6 53.0 155°52.8 16.4 293°21.9 18.5 53°37.8 06.7 Vega 80°33.1 38°48.6 Vega 50°08.2 178°25.6 53.0 155°52.8 16.4 293°21.9 18.5 53°37.8 06.7 Vega 50°33.1 38°48.6 Vega 50°30.2 Vega													
23 5°08.2 178°25.6 53.0 155°52.8 16.4 293°21.9 18.5 38°35.3 06.7 Minki 75°47.2 26°15.9 Mir. pass. 19:40 ν-0.7' d0.9' m-3.90 ν0.5' d0.2' m1.34 ν2.6' d0.0' m-2.49 ν2.5' d-0.0' m0.89    Wed GHA GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec GHA Dec Sep 16.5 223°23.4 55.6 200°54.2 17.1 338°29.6 18.6 98°45.2 06.7   3 110°18.1 238°22.7 56.4 215°54.7 16.9 323°27.1 18.5 83°42.7 06.7   4 125°20.6 253°22.0 57.3 230°55.1 17.5 833'32.2 18.6 133°47.7 0.66.7   4 125°20.6 253°22.0 57.3 230°55.1 17.5 834.0 N21.8.6 113°47.7 0.66.7   5 140°23.0 266°21.3 58.1 245°55.6 17.8 23°37.4 18.6 143°52.6 06.7   8 185°30.4 313°19.1 18°00.7 290°57.0 18.4 68°45.2 18.7 189°00.1 06.7   9 200°32.9 328°18.4 · 0.15 305°57.5 · 18.6 83°47.8 · 18.8 204°02.5 · 0.6.7   10 215°35.3 343°17.7 02.4 320°58.0 18.8 98°50.4 18.8 219°05.0 06.7   11 230°37.8 358°17.0 03.2 335°58.4 19.1 113°53.0 18.8 234°07.5 06.7   12 245°40.3 13°16.3 518°04.1 350°58.9 \$23°19.3 128°55.5 N21°18.8 249°10.0 \$04°06.7   13 200°42.7 28°15.5 04.9 5°59.4 19.5 143°58.1 18.9 264°12.4 06.7   15 290°47.7 58°14.1 · 0.66 36°00.3 · 19.9 174°03.3 · 18.9 249°17.4 · 0.66.7   15 290°47.7 58°14.1 · 0.66 36°00.3 · 19.9 174°03.3 · 18.9 249°17.4 · 0.66.7   16 305°50.1 73°13.4 07.4 51°00.8 20.1 189°05.9 19.0 324°22.3 06.7   18 335°55.1 103°11.9 518°09.1 81°01.7 523°20.5 219°11.1 N21°19.0 339°24.8 504°06.6   21 21°02.5 148°03.8 · 11.6 126°03.1 · 21.2 264°18.9 · 19.1 39°34.7 06.6   22 36°04.9 163°09.0 12.5 141°36.6 21.4 279°21.5 19.1 39°34.7 06.6   23 51°07.4 178°08.3 13.3 156°04.1 21.6 294°24.1 19.2 54°37.2 06.6   24 51°07.4 178°08.3 13.3 156°04.1 21.6 294°24.1 19.2 54°37.2 06.6   25 1°07.4 178°08.3 13.3 156°04.1 21.6 294°24.1 19.2 54°37.2 06.6   25 1°07.4 178°08.3 13.3 156°04.1 21.6 294°24.1 19.2 54°37.2 06.6   26 1°07.4 178°08.3 13.3 156°04.1 21.6 294°24.1 19.2 54°37.2 06.6   27 1°07.4 178°08.3 13.3 156°04.1 21.6 294°24.1 19.2 54°37.2 06.6   28 1°07.4 178°08.3 13.3 156°04.1 21.6 294°24.1 19.2 54°37.2 06.6   28 1°07.4 178°08.3 13.3 15.5 10.8 111°0.7 21.0 249°15.5 19.1 39°34.7 06.6   29 1°07.4 178°08.3 13.3 1													
Mer.pass. 19:40   \( \nu \cdot \cd	22	35°05.8	163°26.3	52.2	140°52.3	16.2	278°19.3	18.5	38°35.3	06.7			
Mer.pass. 19:40         \$\bullet - 0.7'  d0.9'  m-3.90         \$\bullet 0.2'  m1.34         \$\bullet 2.6'  d0.0'  m-2.49         \$\bullet 2.5'  d-0.0'  m0.89         Peacok 53°0.49  95°5.9  45°22.6  50°0.93         \$\bullet 6.5'  0.0'  m0.89         Peacok 45°22.6  50°3.3  20°5.5  45°22.6  50°2.6  60°0.7  18°5.3  50°0.93         \$\bullet 0.2'  m1.34  m2.6'  m2.9'	23	50°08.2	178°25.6	53.0	155°52.8	16.4	293°21.9	18.5	53°37.8	06.7			
Wed         GHA         GHA         Dec         GHA         No         26         Fenilhalut         18° 53.7         30° 59.8         30° 23° 27.1         18.5         83° 42.7         06.7         66° 40.3         504° 06.7         Fomalhaut         15° 13.7         -29° 39.2         46° 50.3           2         95° 15.6         223° 23.4         55.6         200° 54.2         17.1         338° 29.6         18.6         98° 45.2         06.7         Markab         13° 29.1         15° 20.8           3         110° 18.1         238° 22.7         56.4         215° 54.7         17.3         358° 32.2         18.6         128° 50.2         06.7         Markab         13° 29.1         15° 20.8           4         125° 20.6         253° 22.0         57.3         230° 55.6         17.8         23° 37.4         18.6         128° 50.2         06.7         Mars         10° 71.79         12.238           4         125° 20.6         517° 59.0         250° 55.6	Morn	200 10:40	· · 0 7′ d0	0/ m 2 00	**0 E/ 40	2' m1 24	1/2 6 <sup>1</sup> d0	0' m 2.40	2 5/ 4 0	0′ m0 90			
Wed         GHA         GHA         Dec         Al Na'ir         27°32.0         -46°50.3         76°50.3         76°50.3         30°8°24.5         N21°18.5         83°42.7         06.7         Charlant         15°13.7         -29°99.8         18°13.7         -29°99.2         66°50.3         76°51.6         223°27.4         16.6         18°47.7         0.06.7         67         66°41.2         28°27.7         56.4         21°54.7         17.3         353°32.2         18.6         18°47.7         0.06.7         06.7         Markab         13°99.1         15°0.08         13°34.4         28°13.6         06.7         06.7         06.7         06.7         06.7         06.7         06.7         06.7         06.7         06.7         06.7         06.7         06.7         06.7         06.7         06.7         06.7         06.7	ivier.p	ass. 19:40	ν-0.1 αυ	.9 m-3.90	νο.5 αυ	.2 111.34	ν2.0 αυ.	.U M-2.49	ν2.5 <i>a</i> -0	.0 1110.69			
Wed         GHA         CHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         GHA         Dec         GBHA         Dec         BBHA         All 7a'it         24° 13°         All 4'12													
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16 305°50.1 73°13.4 07.4 51°00.8 20.1 189°05.9 19.0 309°19.9 06.7 Venus 128°14.2 11:07 17 320°52.6 88°12.7 08.3 66°01.3 20.3 204°08.5 19.0 324°22.3 06.7 18 335°55.1 103°11.9 \$18°09.1 81°01.7 \$23°20.5 219°11.1 \$121°19.0 339°24.8 \$04°06.6 19 350°57.5 118°11.2 10.0 96°02.2 20.8 234°13.7 19.0 354°27.3 06.6 20 6°00.0 133°10.5 10.8 111°02.7 21.0 249°16.3 19.1 9°29.7 06.6 21 21°02.5 148°09.8 · 11.6 126°03.1 · 21.2 264°18.9 · 19.1 24°32.2 · 06.6 22 36°04.9 163°09.0 12.5 141°03.6 21.4 279°21.5 19.1 39°34.7 06.6 23 51°07.4 178°08.3 13.3 156°04.1 21.6 294°24.1 19.2 54°37.2 06.6  Wenus 128°14.2 11:07  Mars 105°42.6 12:36  Saturn 3°29.5 19:22  Horizontal parallax  Venus 128°14.2 11:07  Mars 105°42.6 12:36  Saturn 3°29.5 19:22  51°07.4 178°08.3 13.3 156°04.1 21.6 294°24.1 19.2 54°37.2 06.6	14	275°45.2	43°14.8	05.8	$20^{\circ}59.8$		$159^{\circ}00.7$	18.9		06.7	Saturn	J ∠9.2	19:20
16       305°50.1       73°13.4       07.4       51°00.8       20.1       189°05.9       19.0       309°19.9       06.7       Venus       128°14.2       11:07         17       320°52.6       88°12.7       08.3       66°01.3       20.3       204°08.5       19.0       324°22.3       06.7       Mars       105°42.6       12:36         18       335°55.1       103°11.9       S18°09.1       81°01.7       S23°20.5       219°11.1       N21°19.0       339°24.8       S04°06.6       Jupiter       243°13.8       03:26         20       6°00.0       133°10.5       10.8       111°02.7       21.0       249°16.3       19.1       9°29.7       06.6       Saturn       3°29.5       19:22         21       21°02.5       148°09.8       11.6       126°03.1       21.2       264°18.9       19.1       24°32.2       06.6       4       Horizontal parallax         22       36°04.9       163°09.0       12.5       141°03.6       21.4       279°21.5       19.1       39°34.7       06.6       4       Venus       0.1         23       51°07.4       178°08.3       13.3       156°04.1       21.6       294°24.1       19.2       54°37.2       06.6       M											Nov 26 Wed	SHA	Mer.pass
18 335°55.1 103°11.9 \$18°09.1 81°01.7 \$23°20.5 219°11.1 N21°19.0 339°24.8 \$04°06.6 19 350°57.5 118°11.2 10.0 96°02.2 20.8 234°13.7 19.0 354°27.3 06.6 20 6°00.0 133°10.5 10.8 111°02.7 21.0 249°16.3 19.1 9°29.7 06.6 21 21°02.5 148°09.8 · 11.6 126°03.1 · 21.2 264°18.9 · 19.1 24°32.2 · 06.6 22 36°04.9 163°09.0 12.5 141°03.6 21.4 279°21.5 19.1 39°34.7 06.6 23 51°07.4 178°08.3 13.3 156°04.1 21.6 294°24.1 19.2 54°37.2 06.6 10.6													
19 350°57.5 118°11.2 10.0 96°02.2 20.8 234°13.7 19.0 354°27.3 06.6 20 6°00.0 133°10.5 10.8 111°02.7 21.0 249°16.3 19.1 9°29.7 06.6 21 21°02.5 148°09.8 · 11.6 126°03.1 · 21.2 264°18.9 · 19.1 24°32.2 · 06.6 22 36°04.9 163°09.0 12.5 141°03.6 21.4 279°21.5 19.1 39°34.7 06.6 23 51°07.4 178°08.3 13.3 156°04.1 21.6 294°24.1 19.2 54°37.2 06.6 Mars: 0.1													12:36
20 6°00.0 133°10.5 10.8 111°02.7 21.0 249°16.3 19.1 9°29.7 06.6 21 21°02.5 148°09.8 ···11.6 126°03.1 ···21.2 264°18.9 ···19.1 24°32.2 ···06.6 22 36°04.9 163°09.0 12.5 141°03.6 21.4 279°21.5 19.1 39°34.7 06.6 23 51°07.4 178°08.3 13.3 156°04.1 21.6 294°24.1 19.2 54°37.2 06.6 Mars: 0.1													
21 21°02.5 148°09.8 · · 11.6 126°03.1 · · · 21.2 264°18.9 · · 19.1 24°32.2 · · 06.6 22 36°04.9 163°09.0 12.5 141°03.6 21.4 279°21.5 19.1 39°34.7 06.6 23 51°07.4 178°08.3 13.3 156°04.1 21.6 294°24.1 19.2 54°37.2 06.6 4 Mars: 0.1											Saturn	3°29.5	19:22
22 36°04.9 163°09.0 12.5 141°03.6 21.4 279°21.5 19.1 39°34.7 06.6 Venus: 0.1 23 51°07.4 178°08.3 13.3 156°04.1 21.6 294°24.1 19.2 54°37.2 06.6 Mars: 0.1											Horizont	al narallav	
23 51°07.4 178°08.3 13.3 156°04.1 21.6 294°24.1 19.2 54°37.2 06.6 Mars: 0.1											1101120110	•	0.1
25 51 01.7 110 00.5 15.5 15.0 04.1 21.0 257 24.1 15.2 54 51.2 00.0													
Mer.pass. 19:36 $\nu$ -0.7′ $d$ 0.9′ m-3.90 $\nu$ 0.5′ $d$ 0.2′ m1.33 $\nu$ 2.6′ $d$ 0.0′ m-2.50 $\nu$ 2.5′ $d$ -0.0′ m0.89											L		
	Mer.p	ass. 19:36	$\nu$ -0.7′ d0	.9′ m-3.90	u0.5′ d0	.2′ m1.33	$\nu$ 2.6′ d0.	.0′ m-2.50	$\nu$ 2.5′ <i>d</i> -0	.0′ m0.89			

h	Sur			Moon			
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	183°20.9	S20°33.1	139°03.0	9.9'	<b>S</b> 27° 15.0	-4.2'	54.5'
1	198°20.7	33.6	153°31.9	9.9'	27° 10.7	-4.4'	54.5'
2 3	213°20.5 228°20.3	34.1 · · 34.6	168°00.8 182°29.7	9.9' 10.0'	27°06.4 27°01.8	-4.5' -4.6'	54.6' 54.6'
3 4	243°20.2	35.1	102 29.7 196°58.7	10.0'	26°57.2	-4.0 -4.8'	54.6'
5	258°20.0	35.6	211°27.7	10.0'	26°52.4	-4.9'	54.6'
6	273°19.8	\$20°36.1	225°56.7	10.1'	S26°47.5	-5.0'	54.6'
7	288°19.6	36.6	240°25.8	10.1'	26°42.5	-5.2'	54.6'
8 9	303°19.4 318°19.2	37.1 · · 37.6	254°54.8 269°24.0	10.1' 10.2'	26° 37.3 26° 32.0	-5.3' -5.4'	54.7' 54.7'
10	318 19.2 333°19.1	· · 37.6 38.1	269 24.0 283°53.1	10.2'	26° 26.5	-5.4 -5.6'	54.7'
11	348°18.9	38.6	298°22.3	10.2'	26°21.0	-5.7'	54.7'
12	3°18.7	S20°39.1	312°51.6	10.3'	<b>S</b> 26°15.2	-5.8'	54.7'
13	18°18.5	39.6	327°20.8	10.3'	26°09.4	-6.0'	54.7'
14 15	33°18.3 48°18.1	40.1 •• 40.6	341°50.1 356°19.5	10.3' 10.4'	26°03.4 25°57.3	-6.1' -6.2'	54.8' 54.8'
16	63°18.0	41.1	10°48.8	10.4	25°51.1	-6.4	54.8
17	78°17.8	41.6	25°18.3	10.5'	25°44.8	-6.5	54.8'
18	93°17.6	S20°42.1	39°47.7	10.5'	S25°38.3	-6.6'	54.8'
19	108°17.4	42.6	54°17.2	10.5'	25°31.7	-6.7'	54.8'
20 21	123°17.2 138°17.0	43.1 •• 43.6	68°46.8 83°16.3	10.6' 10.6'	25°24.9 25°18.1	-6.9' -7.0'	54.9' 54.9'
22	150 17.0 153°16.8	44.1	97°46.0	10.0	25°11.1	-7.0 -7.1'	54.9'
23	168°16.6	44.5	112°15.6	10.7'	25°03.9	-7.2	54.9'
	SD = 16.2'	d = 0.5'		SI	O = 14.9'		
_							
Tue 0	<b>GHA</b> 183°16.4	Dec \$20°45.0	<b>GHA</b> 126°45.3	u 10.8'	Dec \$24° 56.7	d -7.4'	<b>HP</b> 54.9'
1	183°16.4 198°16.3	45.5	126 45.3 141°15.1	10.8'	24° 49.3	-7.4 -7.5'	54.9 55.0'
2	213°16.1	46.0	155°44.9	10.8'	24°41.8	-7.6'	55.0'
3	228°15.9	• • 46.5	$170^{\circ}14.7$	10.9'	24°34.2	-7.7'	55.0'
4	243°15.7	47.0	184°44.6	10.9'	24°26.5	-7.9'	55.0'
5 6	258°15.5 273°15.3	47.5 \$20°48.0	199°14.6 213°44.5	11.0' 11.0'	24° 18.6 \$24° 10.7	-8.0' -8.1'	55.1' 55.1'
7	273 15.3 288°15.1	48.4	213 44.5 228°14.6	11.1'	24°02.6	-8.2'	55.1'
8	303°14.9	48.9	242°44.6	11.1'	23°54.4	-8.3	55.1'
9	318°14.7	• • 49.4	$257^{\circ}14.8$	11.2'	23°46.0	-8.5'	55.1'
10	333°14.5	49.9	271°44.9	11.2'	23°37.6	-8.6'	55.2'
11 12	348°14.4 3°14.2	50.4 \$20°50.9	286°15.1 300°45.4	11.3' 11.3'	23°29.0 <b>S</b> 23°20.3	-8.7' -8.8'	55.2' 55.2'
13	18° 14.0	51.3	315°15.7	11.4'	23° 11.5	-8.9'	55.2'
14	33°13.8	51.8	329°46.0	11.4'	23°02.6	-9.0'	55.2'
15	48°13.6	• • 52.3	344°16.4	11.4'	22°53.5	-9.2'	55.3'
16	63°13.4 78°13.2	52.8	358°46.9	11.5'	22°44.4	-9.3'	55.3' 55.3'
17 18	78 13.2 93°13.0	53.2 \$20°53.7	13°17.4 27°47.9	11.5' 11.6'	22°35.1 \$22°25.7	-9.4' -9.5'	55.3'
19	108°12.8	54.2	42°18.5	11.6'	22° 16.3	-9.6'	55.4'
20	123°12.6	54.7	56°49.1	11.7'	22°06.7	-9.7'	55.4'
21	138°12.4	• • 55.2	71°19.8	11.7'	21°56.9	-9.8'	55.4'
22 23	153°12.2 168°12.0	55.6	85°50.5 100°21.3	11.8' 11.8'	21°47.1 21°37.2	-9.9'	55.4'
23		$\frac{56.1}{d = 0.5'}$	100 21.3			-10.0'	55.5'
	SD = 16.2'	$a = 0.5^{\circ}$		- SI	O = 15.0'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	183°11.8 198°11.6	\$20°56.6 57.0	114°52.1 129°23.0	11.9' 11.9'	\$21°27.2 21°17.0	-10.1' -10.3'	55.5' 55.5'
2	213°11.4	57.0 57.5	143°53.9	12.0'	21°17.0	-10.5 -10.4'	55.5'
3	228°11.2	• • 58.0	$158^{\circ}24.9$	12.0'	20°56.4	-10.5'	55.6'
4	243°11.0	58.5	172°55.9	12.1'	20°45.9	-10.6'	55.6'
5 6	258°10.8 273°10.6	58.9 \$20°59.4	187°27.0 201°58.1	12.1' 12.1'	20°35.4 \$20°24.7	-10.7' -10.8'	55.6' 55.6'
6 7	273°10.6 288°10.4	20°59.4 20°59.9	201°58.1 216°29.2	12.1	20° 13.9	-10.8° -10.9°	55.0 55.7'
8	303°10.2	21°00.3	231°00.4	12.2'	20°03.0	-11.0'	55.7'
9	318°10.0	• • 00.8	245°31.6	12.3'	19°52.1	-11.1'	55.7'
10	333°09.8	01.3	260°02.9	12.3'	19°41.0	-11.2'	55.8'
11 12	348°09.6 3°09.4	01.7 \$21°02.2	274°34.2 289°05.6	12.4' 12.4'	19° 29.8 \$19° 18.5	-11.3' -11.4'	55.8' 55.8'
13	3 09.4 18°09.2	02.7	289 05.0 303°37.0	12.4'	19°07.1	-11.4 -11.5'	55.8'
14	33°09.0	03.1	$318^{\circ}08.4$	12.5'	18°55.7	-11.6'	55.9'
15	48°08.8	• • 03.6	332°39.9	12.5'	18°44.1	-11.7'	55.9'
16	63°08.6	04.0	347°11.5	12.6'	18° 32.4	-11.8'	55.9'
17 18	78°08.4 93°08.2	04.5 \$21°05.0	1°43.0 16°14.7	12.6' 12.7'	18° 20.7 \$18° 08.8	-11.9' -12.0'	55.9' 56.0'
19	108°08.0	05.4	30°46.3	12.7'	17°56.9	-12.0'	56.0'
20	123°07.8	05.9	45°18.0	12.7'	17°44.8	-12.1'	56.0'
21	138°07.6	• • 06.3	59°49.7	12.8'	17°32.7	-12.2'	56.1
22 23	153°07.4 168°07.2	06.8 07.3	74°21.5 88°53.3	12.8' 12.8'	17° 20.4 17° 08.1	-12.3' -12.4'	56.1' 56.1'
23	SD = 16.2'	$\frac{07.3}{d=0.5'}$	00 55.3		D = 15.1'	-12.4	50.1
	<u>JD — 10.2</u>	<u>u = 0.5</u>		31	- 13.1 - 2.1		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
	Naut.	Civil	Jamise	Junioce	Civil	Naut.
N 72°	07:34	09:23			14:10	15:59
<b>N</b> 70°	07:20	08:51			14:43	16:13
68°	07:08	08:27	10:04	13:30	15:06	16:25
66°	06:58	08:09	09:26	14:08	15:25	16:35
64°	06:50	07:54	08:59	14:34	15:40	16:43
62°	06:43	07:41	08:39	14:54	15:53	16:51
60°	06:36	07:30	08:22	15:11	16:03	16:57
<b>N</b> 58°	06:30	07:21	08:09	15:25	16:13	17:03
56°	06:25	07:12	07:57	15:37	16:21	17:08
54°	06:20	07:05	07:46	15:47	16:29	17:13
52°	06:16	06:58	07:37	15:57	16:36	17:18
50°	06:12	06:52	07:29	16:05	16:42	17:22
45°	06:02	06:38	07:11	16:23	16:55	17:32
<b>N</b> 40°	05:53	06:27	06:56	16:37	17:07	17:40
35°	05:46	06:17	06:44	16:50	17:17	17:48
30°	05:38	06:08	06:33	17:00	17:26	17:56
20°	05:24	05:51	06:15	17:19	17:43	18:10
<b>N</b> 10°	05:10	05:36	05:59	17:35	17:58	18:24
0°	04:56	05:21	05:43	17:51	18:13	18:39
<b>S</b> 10°	04:39	05:05	05:28	18:06	18:29	18:55
20°	04:19	04:47	05:11	18:23	18:47	19:15
30°	03:53	04:25	04:52	18:42	19:09	19:41
35°	03:37	04:12	04:41	18:54	19:22	19:58
40°	03:17	03:56	04:28	19:07	19:38	20:18
45°	02:51	03:37	04:12	19:22	19:58	20:44
<b>S</b> 50°	02:15	03:12	03:53	19:42	20:23	21:20
52°	01:56	03:00	03:44	19:51	20:36	21:40
54°	01:30	02:45	03:34	20:01	20:50	22:06
56°	00:52	02:28	03:22	20:13	21:07	22:46
58°	////	02:07	03:09	20:27	21:29	////
<b>S</b> 60°	////	01:40	02:53	20:43	21:57	////
					N4	

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

١			Sun		Moon			
	Day	Eqn.of Time		Mer.	Mer.	Pass.	Age	
	,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	4-6	
L		mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	12-28%	
	24	13:24	13:15	11:47	15:15	02:50		
l	25	13:06	12:57	11:47	16:05	03:40		
ı	26	12:47	12:38	11:47	16:53	04:29		

## November 27, 28, 29 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	66°09.8	193°07.6	S18°14.1	171°04.5	S23°21.8	309°26.7	N21° 19.2	69°39.6	S04°06.6			
1	81°12.3	208°06.9	15.0	186°05.0	22.0	324°29.3	19.2	84°42.1	06.6	Alpheratz	357°33.9	29°14.2
2	96°14.8	223°06.1	15.8	201°05.5	22.2	339°31.9	19.2	99°44.6	06.6	Ankaa	353°06.2	-42°10.0
3	111°17.2	238°05.4	• • 16.6	216°05.9	• • 22.4	354° 34.5	• • 19.3	114°47.1	• • 06.6	Schedar	349°29.9	56°41.1
4	126°19.7	253°04.7	17.5	231°06.4	22.7	9°37.1	19.3	129°49.5	06.6	Diphda	348°46.4	-17°50.7
5	141°22.2	268°03.9	18.3	246°06.9	22.9	24°39.7	19.3	144°52.0	06.6	Achernar	335°19.2	-57°06.4
6	156°24.6	283°03.2	S18°19.1	261°07.3	S23°23.1	39°42.3	N21°19.4	159°54.5	S04°06.6	Hamal	327°50.1	23°35.2 89°22.5
7	171°27.1	298°02.5	20.0	276°07.8	23.3	54°44.9	19.4	174°56.9	06.6	Polaris Acamar	313°10.9 315°10.8	-40°12.0
8	186°29.6	313°01.8	20.8	291°08.3	23.5	69°47.5	19.4	189°59.4	06.6	Menkar	314°05.1	4°11.6
9	201°32.0	$328^{\circ}01.0$	• • 21.6	306°08.7	• • 23.7	84°50.1	• • 19.4	205°01.9	• • 06.6	Mirfak	308°26.7	49°57.3
10	216°34.5	343°00.3	22.4	321°09.2	23.9	99°52.7	19.5	220°04.4	06.5	Aldebaran	290°38.4	16°33.7
11	231°37.0	357° 59.6	23.3	336° 09.7	24.1	114°55.3	19.5	235°06.8	06.5	Rigel	281°02.8	-8°10.2
12	246°39.4	12°58.8	S18°24.1	351°10.1	S23°24.3	129° 57.9	N21° 19.5	250°09.3	S04°06.5	Capella	280°20.3	46°01.4
13	261°41.9	27°58.1	24.9	6°10.6	24.5	145°00.5	19.6	265°11.8	06.5	Bellatrix	278°21.8	6°22.5
14	276°44.3	42°57.4	25.7	21°11.0	24.7	160°03.1	19.6	280°14.2	06.5	Elnath	278°00.6	28°37.8
15	291°46.8	57°56.6	• • 26.6	36°11.5	• • 24.9	175°05.7	• • 19.6	295°16.7	• • 06.5	Alnilam	275°36.7	-1°11.0
16	306°49.3 321°51.7	72°55.9 87°55.2	27.4	51°12.0 66°12.4	25.1 25.3	190°08.3	19.7	310°19.2 325°21.6	06.5	Betelgeuse	$270^{\circ}51.0$	7°24.8
17 18	336°54.2	102°54.4	28.2 \$18°29.0	81° 12.4	\$23°25.5	205°10.9 220°13.5	19.7 N21° 19.7	340°24.1	06.5 \$04°06.5	Canopus	263°51.6	-52°42.3
19	351°56.7	102 54.4 117°53.7	29.8	96°13.4	25.7	235°16.1	19.7	355°26.6	06.5	Sirius	258°25.3	-16°45.0
20	6°59.1	132°53.0	30.7	111°13.8	25.7	250° 18.7	19.8	10°29.1	06.5	Adhara	255°05.0	-29°00.3
21	22°01.6	147°52.2	• • 31.5	126° 14.3	26.1	265°21.3	19.8	25°31.5	06.5	Procyon	244°49.9	5°09.5
22	37°04.1	162°51.5	32.3	141°14.8	26.3	280°23.9	19.8	40°34.0	06.5	Pollux	243°16.2	27°57.7
23	52°06.5	177° 50.7	33.1	156° 15.2	26.5	295°26.5	19.9	55°36.5	06.5	Avior	234°14.1	-59°35.2
										Suhail	222°45.6	-43°32.0
Mer.p	ass. 19:32	$\nu$ -0.7′ d0.	.8′ m-3.90	$\nu$ 0.5′ d0	.2′ m1.33	$\nu 2.6' d0.$	.0′ m-2.51	$\nu 2.5' d-0$	.0′ m0.90	Miaplacidus	221°37.8	-69°49.1
										Alphard	217°47.0	-8°46.2
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.6	11°50.4
0	67°09.0	192°50.0	S18°33.9	171°15.7	S23°26.7	310°29.1	N21°19.9	70°38.9	S04°06.4	Dubhe	193°40.2 182°24.3	61°36.4 14°25.6
1	82°11.5	207°49.3	34.7	$186^{\circ}16.1$	26.9	325°31.7	19.9	85°41.4	06.4	Denebola Gienah	162 24.3 175°43.0	-17°41.0
2	97°13.9	222°48.5	35.5	201°16.6	27.1	340°34.3	20.0	100°43.9	06.4	Acrux	175 43.0 172°59.7	-17 41.0 -63°14.3
3	112°16.4	237°47.8	• • 36.4	$216^{\circ}17.1$	• • 27.3	$355^{\circ}36.9$	• • 20.0	115°46.3	• • 06.4	Gacrux	172 59.7 171°51.2	-03 14.3 -57°15.2
4	127°18.8	252°47.0	37.2	231°17.5	27.5	$10^{\circ}39.5$	20.0	130°48.8	06.4	Alioth	166°12.7	55°48.9
5	142°21.3	267°46.3	38.0	246°18.0	27.7	25°42.1	20.1	145°51.3	06.4	Spica	158°21.8	-11°17.7
6	157°23.8	282°45.6	S18°38.8	261°18.5	S23°27.9	40°44.7	N21°20.1	160°53.7	S04°06.4	Alkaid	152°51.8	49°10.9
7	172°26.2	297°44.8	39.6	$276^{\circ}18.9$	28.1	55°47.3	20.1	175°56.2	06.4	Hadar	148°35.6	-60°29.7
8	187°28.7	312°44.1	40.4	291° 19.4	28.3	70°50.0	20.1	190°58.7	06.4		147°57.1	-36°29.7
9	202°31.2	327°43.3	• • 41.2	306° 19.8	• • 28.5	85°52.6	• • 20.2	206°01.1	•• 06.4	Arcturus	145°47.6	19°02.8
10	217°33.6	342°42.6	42.0	321°20.3	28.7	100°55.2	20.2	221°03.6	06.4	Rigil Kent.	139°39.9	-60°56.4
11	232°36.1	357°41.8	42.8	336°20.8	28.9	115°57.8	20.2	236°06.1	06.4	Kochab	$137^{\circ}20.9$	74°02.7
12	247°38.6	12°41.1	\$18°43.6	351°21.2	\$23°29.1	131°00.4	N21°20.3	251°08.5	\$04°06.3	Zuben'ubi	136°55.5	-16°08.9
13	262°41.0 277°43.5	27° 40.4 42° 39.6	44.4	6°21.7 21°22.1	29.3 29.5	146°03.0 161°05.6	20.3	266°11.0 281°13.5	06.3	Alphecca	126°03.5	26°37.6
14	217 45.5 292°45.9	42 39.0 57°38.9	45.2 •• 46.0	36° 22.6	29.7	176° 08.2	20.3	201 13.5 296°15.9	06.3 •• 06.3	Antares	112°15.3	-26°29.3
15 16	307°48.4	72°38.1	46.8	50°22.0	29.7	170 08.2 191°10.8	20.4	311°18.4	06.3	Atria	$107^{\circ}09.5$	-69°04.4
17	322°50.9	87°37.4	47.6	66°23.5	30.1	206°13.4	20.4	326°20.9	06.3	Sabik	102°02.3	-15°45.4
18	337°53.3	102°36.6	\$18°48.4	81°24.0	\$23°30.3	221°16.0	N21°20.5	341°23.3	S04°06.3	Shaula	96°09.8	-37°07.4
19	352°55.8	117°35.9	49.2	96°24.4	30.5	236° 18.7	20.5	356°25.8	06.3	Rasalhague	95°58.2	12°32.5
20	7°58.3	132°35.1	50.0	111°24.9	30.7	251°21.3	20.5	11°28.3	06.3	Eltanin	90°42.4	51°29.2
21	23°00.7	147°34.4	50.8	126°25.3	• • 30.9	266°23.9	20.5	26°30.7	06.3	Kaus Aust.	83°31.9	-34°22.4
22	38°03.2	162°33.6	51.6	141°25.8	31.0	281°26.5	20.6	41°33.2	06.3	Vega Nunki	80°33.1	38°48.6 -26°15.9
23	53°05.7	177°32.9	52.4	156°26.3	31.2	$296^{\circ}29.1$	20.6	56°35.7	06.2	Altair	75°47.2 61°59.5	-20 15.9 8°56.3
N/au	10.29	0 7/ 40	.8′ m-3.90	0 E/ 40	.2′ m1.32	2.6/ -10	.0′ m-2.52		.0′ m0.90	Peacock	53°04.9	-56°39.3
ivier.p	ass. 19:28	ν-0.7 αυ	.6 111-3.90	$\nu$ 0.5 $a$ 0	.2 111.32	ν2.0 d0.	.U M-2.52	ν2.5 α-0	.0 1110.90	Deneb	49°25.5	45°22.6
										Enif	33°38.2	9°59.7
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.1	-46°50.3
0	68°08.1	192°32.1	S18°53.2		S23°31.4	311°31.7		71°38.1	S04°06.2	Fomalhaut	15°13.7	-29°29.2
1	83°10.6	207°31.4	54.0	186°27.2	31.6	326°34.3	20.7	86°40.6	06.2	Scheat	13°44.5	28°13.6
2	98°13.1	222°30.6	54.8	201°27.6	31.8	341°36.9	20.7	101°43.0	06.2	Markab	$13^{\circ}29.1$	15°20.8
3	113°15.5	237°29.9	• • 55.6	216°28.1	• • 32.0	356°39.6	• • 20.7	116°45.5	06.2	Nov 27 Thu	SHA	Ma:: ::
4	128°18.0	252°29.1	56.4	231°28.5	32.2	11°42.2	20.8	131°48.0	06.2			Mer.pass
5	143°20.4	267°28.4	57.1 \$18°57.0	246°29.0	32.4 \$23°32.6	26°44.8	20.8 N21°20.8	146°50.4	06.2		126°57.7 104°54.7	11:08 12:35
6 7	158°22.9 173°25.4	282°27.6 297°26.8	\$18°57.9 58.7	261°29.5 276°29.9	\$23°32.6 32.7	41°47.4 56°50.0	N21 20.8 20.9	161°52.9 176°55.4	\$04°06.2 06.2		243°16.8	03:22
8	173 25.4 188°27.8	297 26.8 312°26.1	58.7 18°59.5	276 29.9 291°30.4	32. <i>1</i> 32.9	71°52.6	20.9	176 55.4 191°57.8	06.2	Saturn	3°29.8	19:18
9	203°30.3	312 20.1 327°25.3	10 59.5 19°00.3	306° 30.8	33.1	86°55.3	. 20.9	207°00.3	06.2			
10	218°32.8	342°24.6	01.1	321°31.3	33.3	101°57.9	21.0	222°02.8	06.1	Nov 28 Fri	SHA	Mer.pass
11	233°35.2	357°23.8	01.1	336°31.7	33.5	117°00.5	21.0	237°05.2	06.1		125°41.0	11:09
12	248°37.7	12°23.1	S19°02.6	351°32.2		132°03.1		252°07.7	S04°06.1		104°06.7	12:35
13	263°40.2	27° 22.3	03.4	6°32.7	33.9	147°05.7	21.1	267°10.1	06.1		243°20.1	03:17
14	278°42.6	42°21.6	04.2	21°33.1	34.0	162°08.3	21.1	282°12.6	06.1	Saturn	3°29.9	19:14
15	293°45.1	57°20.8	• • 05.0	$36^{\circ}33.6$	• • 34.2	$177^{\circ}11.0$	• • 21.1	297°15.1	• • 06.1	Nov 29 Sat	SHA	Mer.pass
16	308°47.5	$72^{\circ}20.0$	05.7	51°34.0	34.4	$192^{\circ}13.6$	21.2	$312^{\circ}17.5$	06.1		124°24.0	11:10
17	323°50.0	$87^{\circ}19.3$	06.5	66°34.5	34.6	$207^{\circ}16.2$	21.2	327°20.0	06.1		103°18.6	12:34
18	338°52.5	102° 18.5	S19°07.3	81°34.9	<b>S</b> 23°34.8	222°18.8	N21°21.2	342°22.4	S04°06.0		243°23.6	03:13
19	353°54.9	117° 17.8	08.1	96°35.4	35.0	237°21.4	21.3	357°24.9	06.0	Saturn	3°30.0	19:10
20	8°57.4	132° 17.0	8.80	111°35.8	35.1	252°24.1	21.3	12°27.4	06.0		-1 "	
21	23°59.9	147° 16.2	• • 09.6	126°36.3	• • 35.3	267°26.7	• • 21.3	27°29.8	• • 06.0	Horizont	al parallax	
22	39°02.3	162°15.5	10.4	141°36.7	35.5	282°29.3	21.4	42°32.3	06.0		Venus:	0.1
23	54°04.8	177°14.7	11.2	156°37.2	35.7	297°31.9	21.4	57°34.7	06.0		Mars:	0.1
Mer.p	ass. 19:24	$\nu$ -0.8′ d0	.8′ m-3.90	$\nu$ 0.5′ d0	.2′ m1.32	$\nu$ 2.6′ d0.	.0′ m-2.52	$\nu 2.5' \ d-0$	.0′ m0.91			

h	Sui	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	183°07.0	S21°07.7	103°25.2	12.9'	\$16°55.7	-12.5'	56.2'
1 2	198°06.8 213°06.6	08.2 08.6	117°57.0 132°29.0	12.9' 13.0'	16°43.2 16°30.6	-12.6' -12.7'	56.2' 56.2'
3	213 00.0 228°06.4	09.1	132 29.0 147°00.9	13.0'	16° 18.0	-12.7	56.2
4	243°06.2	09.5	161°32.9	13.0'	16°05.2	-12.8'	56.3'
5	258°06.0	10.0	176°04.9	13.0'	15°52.4	-12.9'	56.3'
6	273°05.8 288°05.6	\$21°10.4 10.9	190°37.0 205°09.0	13.1' 13.1'	\$15°39.4 15°26.4	-13.0' -13.1'	56.3' 56.4'
7 8	288 05.0 303°05.4	10.9	205 09.0 219°41.1	13.1	15 20.4 15°13.3	-13.1 -13.2'	56.4'
9	318°05.2	• • 11.8	234°13.3	13.2'	15°00.2	-13.3	56.4
10	333°05.0	12.2	248°45.5	13.2'	14°46.9	-13.3'	56.5'
11	348°04.8 3°04.5	12.7 <b>S</b> 21°13.1	263°17.7 277°49.9	13.2'	14°33.6 \$14°20.1	-13.4'	56.5'
12 13	3 04.5 18°04.3	13.6	277 49.9 292°22.1	13.3' 13.3'	14°06.6	-13.5' -13.6'	56.5' 56.6'
14	33°04.1	14.0	306°54.4	13.3'	13°53.1	-13.7'	56.6'
15	48°03.9	• • 14.5	$321^{\circ}26.7$	13.3'	13°39.4	-13.7'	56.6'
16	63°03.7 78°03.5	14.9	335°59.1	13.4'	13°25.7	-13.8'	56.7'
17 18	78°03.5 93°03.3	15.4 \$21°15.8	350°31.4 5°03.8	13.4' 13.4'	13°11.9 \$12°58.0	-13.9' -14.0'	56.7' 56.7'
19	108°03.1	16.3	19°36.2	13.4	12°44.0	-14.0'	56.8'
20	123°02.9	16.7	34°08.6	13.4'	12°30.0	-14.1'	56.8'
21	138°02.7	• • 17.1	48°41.0	13.5'	12° 15.9	-14.2'	56.8'
22 23	153°02.5 168°02.2	17.6 18.0	63°13.5 77°46.0	13.5' 13.5'	12°01.8 11°47.5	-14.2' -14.3'	56.9' 56.9'
23						-14.3	30.9
	SD = 16.2'	d = 0.5'		SI	D = 15.3'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	183°02.0	S21°18.5	92°18.4	13.5'	\$11°33.2	-14.4'	56.9'
1 2	198°01.8 213°01.6	18.9 19.3	106°50.9 121°23.5	13.5' 13.5'	11°18.8 11°04.4	-14.4' -14.5'	57.0' 57.0'
3	213 01.0 228°01.4	. 19.8	135°56.0	13.5'	10°49.9	-14.5'	57.0'
4	243°01.2	20.2	150°28.5	13.6'	10°35.3	-14.6'	57.1'
5	258°01.0	20.7	165°01.1	13.6'	10°20.6	-14.7'	57.1'
6	273°00.8 288°00.6	\$21°21.1 21.5	179°33.6 194°06.2	13.6' 13.6'	\$10°05.9 09°51.2	-14.8' -14.8'	57.1' 57.2'
7 8	303°00.3	21.5	194 06.2 208°38.8	13.6'	09 51.2 09°36.3	-14.8 -14.9'	57.2'
9	318°00.1	22.4	223°11.4	13.6'	09°21.4	-15.0'	57.2'
10	332°59.9	22.8	237°44.0	13.6'	09°06.5	-15.0'	57.3'
11	347°59.7 2°59.5	23.3 <b>S</b> 21°23.7	252°16.6 266°49.2	13.6'	08°51.5 \$08°36.4	-15.1' -15.1'	57.3' 57.4'
12 13	17°59.5	24.1	200°49.2 281°21.8	13.6' 13.6'	08°21.3	-15.1 -15.2'	57.4' 57.4'
14	32°59.1	24.5	295°54.4	13.6'	08°06.1	-15.2'	57.4'
15	47°58.8	•• 25.0	310°27.0	13.6'	07°50.9	-15.3'	57.5'
16	62°58.6 77°58.4	25.4 25.8	324°59.6 339°32.1	13.6' 13.6'	07°35.6 07°20.2	-15.3' -15.4'	57.5' 57.5'
17 18	92°58.2	\$21°26.3	354°04.7	13.6'	507°04.8	-15.4	57.6'
19	107°58.0	26.7	8°37.3	13.6'	06°49.4	-15.5'	57.6'
20	122°57.8	27.1	23°09.9		06°33.9		57.6'
21	137°57.5	• • 27.5	37°42.5 52°15.0	13.6'	06°18.3 06°02.7	-15.6'	57.7' 57.7'
22 23	152°57.3 167°57.1	28.0 28.4	52°15.0 66°47.6	13.6' 13.5'	06°02.7 05°47.0	-15.7' -15.7'	57.7° 57.8'
23	SD = 16.2'	d = 0.4'			D = 15.5'	15.7	31.0
		<u>u = 0.4</u>			3 – 13.3		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0 1	182°56.9 197°56.7	\$21°28.8 29.2	81°20.1 95°52.6	13.5' 13.5'	\$05°31.3 05°15.6	-15.7' -15.8'	57.8' 57.8'
2	212°56.4	29.6	110°25.2	13.5'	04°59.8	-15.8'	57.9'
3	227°56.2	• • 30.1	124°57.7	13.5'	04°44.0	-15.9'	57.9'
4	242°56.0	30.5	139°30.1	13.5'	04°28.1	-15.9'	57.9'
5 6	257°55.8 272°55.6	30.9 <b>S</b> 21°31.3	154°02.6 168°35.0	13.4' 13.4'	04°12.2 \$03°56.2	-16.0' -16.0'	58.0' 58.0'
7	287°55.3	31.7	183°07.5	13.4	03°40.2	-16.0'	58.1
8	302°55.1	32.2	197°39.8	13.4'	03°24.2	-16.1'	58.1'
9	317°54.9	• • 32.6	212°12.2	13.3'	03°08.1	-16.1'	58.1'
10 11	332°54.7 347°54.5	33.0 33.4	226°44.6 241°16.9	13.3' 13.3'	02°52.0 02°35.9	-16.1' -16.2'	58.2' 58.2'
12	2°54.2	S21°33.8	255°49.2	13.3'	S02°19.7	-16.2'	58.2'
13	17°54.0	34.2	270°21.5	13.2'	02°03.5	-16.2'	58.3'
14	32°53.8	34.7	284°53.7	13.2'	01°47.3	-16.3'	58.3'
15 16	47°53.6 62°53.4	· · 35.1 35.5	299°25.9 313°58.1	13.2' 13.1'	01°31.0 01°14.7	-16.3' -16.3'	58.4' 58.4'
17	77°53.1	35.9	328°30.2	13.1	01 14.7 00°58.4	-10.5 -16.4'	58.4'
18	92°52.9	S21°36.3	343°02.3	13.1'	S00°42.0	-16.4'	58.5'
19	107°52.7	36.7	357°34.3	13.0'	00°25.7	-16.4'	58.5'
20 21	122°52.5 137°52.2	37.1 •• 37.5	12°06.4 26°38.3	13.0' 12.9'	\$00°09.3 N00°07.2	-16.4' 16.4'	58.6' 58.6'
22	157° 52.2 152° 52.0	37.9	41°10.3	12.9'	00°23.6	16.5	58.6'
23	167°51.8	38.3	55°42.2	12.8'	00°40.1	16.5'	58.7'
	SD = 16.2'	d = 0.4'		SI	D = 15.8'		

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
uy	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	7-9	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	37-58%	
27	12:28	12:18	11:48	17:39	05:16		
28	12:08	11:58	11:48	18:24	06:02		
29	11:48	11:37	11:48	19:10	06:47	9	

## November 30, 01, 02 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	69°07.3	192°13.9	S19°11.9	171°37.6	S23°35.9	312°34.5	N21°21.4	72°37.2	S04°06.0			
	84°09.7	207°13.2		171 37.0 186°38.1		312 34.3 327°37.2		87°39.7		Alpheratz	357°33.9	29°14.2
1	99°12.2		12.7		36.1		21.5		06.0	Ankaa	353°06.2	-42°10.0
2		222°12.4	13.5	201°38.6	36.2	342°39.8	21.5	102°42.1	06.0	Schedar	349°29.9	$56^{\circ}41.1$
3	114°14.7	237°11.6	• • 14.2	216°39.0	• • 36.4	357°42.4	· · 21.5	117°44.6	• • 05.9	Diphda	348°46.4	$-17^{\circ}50.7$
4	129°17.1	252°10.9	15.0	231°39.5	36.6	12°45.0	21.6	132°47.0	05.9	Achernar	335°19.2	-57°06.5
5	144° 19.6	267°10.1	15.8	246°39.9	36.8	27°47.7	21.6	147°49.5	05.9	Hamal	327°50.1	23°35.2
6	159°22.0	282°09.4	S19° 16.5	261°40.4	S23°36.9	42°50.3	N21°21.6	162°52.0	S04°05.9	Polaris	313°11.3	89°22.5
7	174°24.5	297°08.6	17.3	276°40.8	37.1	57°52.9	21.7	177°54.4	05.9	Acamar	315°10.8	-40°12.1
8	189°27.0	312°07.8	18.1	291°41.3	37.3	72°55.5	21.7	192°56.9	05.9	Menkar	314°05.1	4°11.6
9	204°29.4	327°07.0	• • 18.8	306°41.7	• • 37.5	87°58.1	• • 21.7	207°59.3	• • 05.9	Mirfak	308° 26.7	49°57.3
10	219°31.9	342°06.3	19.6	321°42.2	37.7	103°00.8	21.8	223°01.8	05.9			
11	234°34.4	357°05.5	20.4	336°42.6	37.8	118°03.4	21.8	238°04.3	05.9	Aldebaran	290°38.4	16°33.7
12	249°36.8	12°04.7	S19°21.1	351°43.1	S23°38.0	133°06.0	N21°21.8	253°06.7	S04°05.8	Rigel	281°02.8	-8°10.2
13	264°39.3	27°04.0	21.9	6°43.5	38.2	148°08.6	21.9	268°09.2	05.8	Capella	280°20.3	46°01.4
14	279°41.8	42°03.2	22.6	21°44.0	38.4	163°11.3	21.9	283°11.6	05.8	Bellatrix	278°21.8	6°22.4
15	294°44.2	57°02.4	23.4	36°44.4	• • 38.5	178°13.9	21.9	298°14.1	• • 05.8	Elnath	278°00.6	28°37.8
16	309°46.7	72°01.7	24.1	51°44.9	38.7	193°16.5	22.0	313°16.5	05.8	Alnilam	275°36.7	$-1^{\circ}11.1$
17	324°49.2	87°00.9	24.9	66°45.3	38.9	208°19.2	22.0	328°19.0	05.8	Betelgeuse	270°51.0	7°24.8
18	339°51.6	102°00.1	\$19°25.6	81°45.8	\$23°39.0	223°21.8	N21°22.0	343°21.5	S04°05.8	Canopus	263°51.6	-52°42.4
										Sirius	258°25.3	-16°45.0
19	354°54.1	116°59.3	26.4	96°46.2	39.2	238°24.4	22.1	358°23.9	05.8	Adhara	255°05.0	-29°00.3
20	9°56.5	131°58.6	27.2	111°46.7	39.4	253°27.0	22.1	13°26.4	05.7	Procyon	244°49.8	5°09.5
21	24°59.0	146°57.8	• • 27.9	126°47.1	• • 39.6	268°29.7	• • 22.1	28°28.8	• • 05.7	Pollux	243°16.2	27°57.7
22	40°01.5	161°57.0	28.7	141°47.6	39.7	283°32.3	22.2	43°31.3	05.7	Avior	234°14.1	-59°35.2
23	55°03.9	176°56.2	29.4	156°48.0	39.9	298°34.9	22.2	58°33.7	05.7	Suhail	222°45.6	-43°32.0
Mern	ass. 19:20	v-0.8/ do	.8′ m-3.90	νη 5' dη	.2′ m1.31	v2 6' d0	.0′ m-2.53	v25' d.0	.0′ m0.91	Miaplacidus	221°37.8	-69°49.1
ivier.p	ass. 19.2U	ν-0.0 α0	.0 111-3.90	νυ.5 a0	.∠ 1111.31	ν2.0 a0.	.0 111-2.33	ν2.5 U-U	.0 1110.91	Alphard	221 37.8 217°46.9	-8°46.2
											217°46.9 207°33.6	-8°46.2 11°50.4
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus		
0	70°06.4	191°55.5	S19°30.1	171°48.5	S23°40.1	313°37.6	N21°22.2	73°36.2	S04°05.7	Dubhe	193°40.2	61°36.4
1	85°08.9	206°54.7	30.9	186°48.9	40.2	328°40.2	22.3	88°38.7	05.7	Denebola	182°24.3	14°25.6
2	100°11.3	221°53.9	31.6	201°49.4	40.4	343°42.8	22.3	103°41.1	05.7	Gienah	175°43.0	-17°41.0
										Acrux	$172^{\circ}59.7$	-63°14.3
3	115°13.8	236°53.1	• • 32.4	216°49.8	• • 40.6	358°45.4	· · 22.3	118°43.6	• • 05.6	Gacrux	$171^{\circ}51.1$	-57°15.2
4	130°16.3	251°52.4	33.1	231°50.3	40.8	13°48.1	22.4	133°46.0	05.6	Alioth	$166^{\circ}12.7$	55°48.9
5	145°18.7	266°51.6	33.9	246°50.7	40.9	28°50.7	22.4	148°48.5	05.6	Spica	158°21.8	-11°17.7
6	160°21.2	281°50.8	S19°34.6	261°51.1	S23°41.1	43°53.3	N21°22.4	163°50.9	S04°05.6	Alkaid	152°51.8	49°10.8
7	$175^{\circ}23.6$	296°50.0	35.4	276°51.6	41.3	58°56.0	22.5	178°53.4	05.6	Hadar	148°35.5	-60°29.7
8	190°26.1	311°49.2	36.1	291°52.0	41.4	73°58.6	22.5	193°55.8	05.6		147°57.1	-36°29.7
9	205°28.6	326°48.5	• • 36.8	306°52.5	• • 41.6	89°01.2	• • 22.5	208°58.3	• • 05.6	Arcturus		19°02.8
10	220°31.0	341°47.7	37.6	321°52.9	41.8	104°03.9	22.6	224°00.8	05.5	Rigil Kent.	139°39.9	-60°56.4
11	235°33.5	356°46.9	38.3	336°53.4	41.9	119°06.5	22.6	239°03.2	05.5	_		
12	250°36.0	11°46.1	S19°39.1	351°53.8	523°42.1	134°09.1	N21°22.6	254°05.7	S04°05.5	Kochab	137°20.9	74°02.7
13	265°38.4	26°45.3	39.8	6°54.3	42.3	149°11.8	22.7	269°08.1	05.5	Zuben'ubi	136°55.5	-16°08.9
14	280° 40.9	41°44.6	40.5	21°54.7	42.4	164°14.4	22.7	284°10.6	05.5	Alphecca	126°03.5	26°37.6
15	295° 43.4	56°43.8	• • 41.3	36°55.2	42.6	179° 17.0	22.8	299°13.0	• • 05.5	Antares	112°15.3	-26°29.3
										Atria	$107^{\circ}09.5$	-69°04.4
16	310°45.8	71°43.0	42.0	51°55.6	42.7	194°19.7	22.8	314°15.5	05.5	Sabik	102°02.3	-15°45.4
17	325°48.3	86°42.2	42.7	66°56.1	42.9	209°22.3	22.8	329°17.9	05.4	Shaula	96°09.8	-37°07.4
18	340°50.8	101°41.4	S19°43.5	81°56.5	S23°43.1	224°24.9	N21°22.9	344°20.4	S04°05.4	Rasalhague	95°58.2	12°32.5
19	355°53.2	116°40.6	44.2	96°56.9	43.2	239°27.6	22.9	359°22.8	05.4	Eltanin	90°42.4	51°29.2
20	10°55.7	131°39.9	44.9	111°57.4	43.4	254°30.2	22.9	14°25.3	05.4	Kaus Aust.	83°31.9	-34°22.4
21	25°58.1	146°39.1	• • 45.6	126°57.8	• • 43.6	269°32.9	• • 23.0	29°27.7	• • 05.4	Vega	80°33.1	38°48.6
22	41°00.6	161°38.3	46.4	141°58.3	43.7	284°35.5	23.0	44°30.2	05.4	Nunki	75° 47.2	-26°15.9
23	56°03.1	176°37.5	47.1	156°58.7	43.9	299°38.1	23.0	59°32.6	05.4	Altair	61°59.5	8°56.3
	10.16	0.0/	7/ 2.00	0.4/ 10	0/ 1.01	0.6/10	0/ 0.54	0.5/ 1.0	0/ 0.01	l l		
ivler.p	ass. 19:16	ν-0.8′ d0	.7′ m-3.90	νυ.4' d0	.2′ m1.31	$\nu$ 2.6′ $d0$ .	.0′ m-2.54	$\nu$ 2.5′ d-0	.0′ m0.91	Peacock	53°04.9	-56°39.3
										Deneb	49°25.6	45°22.6
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.2	9°59.7
0	71°05.5	191°36.7	\$19°47.8		\$23°44.0	314°40.8	N21°23.1	74°35.1	S04°05.3	Al Na'ir	27°32.1	-46°50.3
1	86°08.0	206°35.9	48.5	171 59.2 186°59.6	44.2	329°43.4	23.1	89°37.5	05.3	Fomalhaut	15° 13.7	-29°29.2
		200 35.9 221°35.1						104°40.0		Scheat	13°44.5	28°13.6
2	101°10.5		49.3	202°00.1	44.4	344°46.0	23.1		05.3	Markab	13°29.1	15°20.8
3	116°12.9	236°34.3	• • 50.0	217°00.5	• • 44.5	359°48.7	• • 23.2	119°42.4	•• 05.3	Nov 30 Sun	CH V	Me:: ====
4	131°15.4	251°33.5	50.7	232°00.9	44.7	14°51.3	23.2	134°44.9	05.3	1	SHA	Mer.pass
5	146°17.9	266°32.8	51.4	247°01.4	44.8	29°54.0	23.2	149°47.4	05.3		123°06.7	11:12
6	161°20.3	281°32.0	S19°52.1		\$23°45.0	44°56.6	N21°23.3	164°49.8	S04°05.3		102°30.4	12:33
7	176°22.8	296°31.2	52.9	277°02.3	45.2	59°59.2	23.3	179°52.3	05.2		243°27.3	03:09
8	191°25.3	311°30.4	53.6	292°02.7	45.3	75°01.9	23.4	194°54.7	05.2	Saturn	3°29.9	19:06
9	206°27.7	326°29.6	• • 54.3	307°03.2	• • 45.5	90°04.5	• • 23.4	209°57.2	• • 05.2	Dec 01 Mon	SHA	Mer.pass
10	221°30.2	341°28.8	55.0	322°03.6	45.6	105°07.2	23.4	224°59.6	05.2			•
11	236°32.6	356°28.0	55.7	337°04.0	45.8	120°09.8	23.5	240°02.1	05.2		121°49.1	11:13
12	251°35.1	11°27.2	S19°56.4	352°04.5	<b>S</b> 23°45.9	135°12.4	N21°23.5	255°04.5	S04°05.2		101°42.1	12:32
13	266° 37.6	26°26.4	57.2	7°04.9	46.1	150°15.1	23.5	270°07.0	05.1		243°31.2	03:05
14	281°40.0	41°25.6	57.9	22°05.4	46.2	165°17.7	23.6	285°09.4	05.1	Saturn	3°29.8	19:02
15	296° 42.5	56°24.8	• • 58.6	37°05.8	. 46.4	180°20.4	23.6	300°11.9	05.1	Dec 02 To-	CUA	Mor noon
16	311°45.0	71°24.0	19°59.3	52°06.3	46.5	195°23.0	23.6	315°14.3	05.1	Dec 02 Tue	SHA 120° 21 2	Mer.pass
											120°31.2	11:14
17	326°47.4	86°23.2	20°00.0	67°06.7	46.7	210°25.7	23.7	330°16.8	05.1		100°53.6	12:32
18	341°49.9	101°22.4	\$20°00.7		\$23°46.9	225°28.3	N21°23.7	345°19.2	\$04°05.1		243°35.2	03:01
19	356° 52.4	116°21.6	01.4	97°07.6	47.0	240°30.9	23.8	0°21.6	05.0	Saturn	3°29.6	18:59
20	11°54.8	131°20.8	02.1	112°08.0	47.2	255°33.6	23.8	15°24.1	05.0	U! ·	ol novelle:	
21	26° 57.3	146°20.0	• • 02.8	127°08.5	• • 47.3	270°36.2	• • 23.8	30°26.5	• • 05.0	norizoni	al parallax	0.1
22	41°59.7	161°19.3	03.5	142°08.9	47.5	285°38.9	23.9	45°29.0	05.0		Venus:	0.1
23	57°02.2	176°18.5	04.2	157°09.3	47.6	300°41.5	23.9	60°31.4	05.0		Mars:	0.1
1/10==	ass 10·12	1/_O 8/ 40	.7′ m-3.90	1/0 A/ A0	.2′ m1.30	1/2 6/ 40	.0′ m-2.54	1/2 5/ 4 0	.0′ m0.92			
ivier.p	ass. 19:12	ν-υ.δ΄ αυ	. r m-3.90	νυ.4' αU	.∠ m1.30	ν2.0° <b>α</b> 0.	.u 111-2.54	ν2.5 α-0	.u mu.92			

h	Sui	n			Moon		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	182°51.6	S21°38.7	$70^{\circ}14.0$	12.8'	N00°56.6	16.5'	58.7'
1	197°51.3	39.1	84°45.8	12.8'	01°13.1	16.5'	58.7'
2	212°51.1	39.5	99°17.6	12.7'	01°29.6	16.5	58.8'
3 4	227°50.9 242°50.7	· · 40.0 40.4	113°49.3 128°20.9	12.7' 12.6'	01°46.1 02°02.7	16.5' 16.6'	58.8' 58.9'
5	257°50.4	40.4	142°52.5	12.5'	02 02.7 02°19.2	16.6'	58.9'
6	272°50.2	\$21°41.2	157°24.1	12.5'	N02°35.8	16.6'	58.9'
7	287°50.0	41.6	171°55.6	12.4'	02°52.4	16.6'	59.0'
8	302°49.8	42.0	186°27.0	12.4'	03°09.0	16.6'	59.0'
9	317°49.5	• • 42.4	200°58.4	12.3'	03°25.5	16.6'	59.0'
10 11	332°49.3 347°49.1	42.8 43.2	215°29.7 230°01.0	12.3' 12.2'	03°42.1 03°58.8	16.6' 16.6'	59.1' 59.1'
12	2°48.8	521°43.6	244°32.2	12.1'	N04° 15.4	16.6'	59.2'
13	17°48.6	43.9	259°03.3	12.1'	04°32.0	16.6'	59.2'
14	32°48.4	44.3	273°34.4	12.0'	04°48.6	16.6'	59.2'
15	47°48.2	• • 44.7	288°05.4	11.9'	05°05.2	16.6'	59.3'
16 17	62°47.9 77°47.7	45.1 45.5	302°36.3 317°07.2	11.9' 11.8'	05°21.8 05°38.4	16.6' 16.6'	59.3' 59.3'
18	92°47.5	\$21°45.9	331°37.9	11.7'	N05°55.0	16.6'	59.4
19	107°47.2	46.3	346°08.7	11.6'	06° 11.5	16.6'	59.4'
20	122°47.0	46.7	0°39.3	11.6'	$06^{\circ}28.1$	16.6'	59.5'
21	137°46.8	• • 47.1	15°09.9	11.5'	06° 44.7	16.5'	59.5'
22	152°46.5	47.5	29°40.4	11.4'	07°01.2	16.5	59.5'
23	167°46.3	47.9	44°10.8	11.3'	07°17.7	16.5'	59.6'
	SD = 16.2'	d = 0.4'		SE	O = 16.0'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	182°46.1	S21°48.3	58°41.1	11.2'	N07°34.2	16.5'	59.6'
1	197°45.9 212°45.6	48.6 49.0	73°11.3 87°41.5	11.2' 11.1'	07°50.7 08°07.2	16.5'	59.6' 59.7'
2 3	212°45.6 227°45.4	49.0 • • 49.4	87°41.5 102°11.6	11.1	08°07.2	16.5' 16.4'	59.7' 59.7'
4	242°45.2	49.4	116°41.6	10.9'	08°40.1	16.4	59.7'
5	257°44.9	50.2	131°11.5	10.8'	08°56.5	16.4'	59.8'
6	272°44.7	S21°50.6	145°41.3	10.7'	N09° 12.9	16.3'	59.8'
7	287°44.5	51.0	160°11.0	10.6'	09°29.2	16.3'	59.8'
8 9	302°44.2 317°44.0	51.3 •• 51.7	174°40.6 189°10.1	10.5' 10.4'	09°45.5 10°01.8	16.3' 16.2'	59.9' 59.9'
10	332°43.8	52.1	203°39.6	10.4	10° 18.0	16.2'	59.9'
11	347°43.5	52.5	218°08.9	10.2'	10°34.3	16.2'	60.0'
12	2°43.3	S21°52.9	232°38.2	10.1'	N10°50.4	16.1'	60.0'
13	17°43.1	53.2	247°07.3	10.0'	11°06.5	16.1'	60.0'
14 15	32°42.8 47°42.6	53.6 •• 54.0	261°36.4 276°05.3	9.9' 9.8'	11°22.6 11°38.7	16.0' 16.0'	60.1' 60.1'
16	62°42.3	54.4	270 05.3 290°34.1	9.6 9.7'	11 30.7 11°54.7	15.9'	60.1
17	77°42.1	54.8	305°02.9	9.6'	12° 10.6	15.9'	60.2'
18	92°41.9	S21°55.1	319°31.5	9.5'	$N12^{\circ}26.5$	15.8'	60.2'
19	107°41.6	55.5	334°00.0	9.4'	12°42.4	15.8'	60.2'
20	122°41.4 137°41.2	55.9 •• 56.2	348°28.5 2°56.8	9.3' 9.2'	12°58.1 13°13.9	15.7' 15.7'	60.3' 60.3'
21 22	157 41.2 152°40.9	• • 56.2 56.6	2 50.8 17°24.9	9.2 9.1'	13 13.9 13°29.5	15.7 15.6'	60.3
23	167°40.7	57.0	31°53.0	9.0'	13°45.2	15.5'	60.4
	SD = 16.2'	d = 0.4'			0 = 16.3'		
_							
Tue 0	<b>GHA</b> 182°40.4	<b>Dec</b> <b>S</b> 21°57.4	<b>GHA</b> 46°21.0	u 8.9'	<b>Dec</b> N14° 00.7	d 15.5'	<b>HP</b> 60.4'
1	197°40.2	57.7	60°48.9	8.7'	14° 16.2	15.4	60.4
2	212°40.0	58.1	75°16.6	8.6'	14°31.6	15.3'	60.5'
3	227°39.7	• • 58.5	89°44.2	8.5'	14°46.9	15.3'	60.5'
4	242°39.5	58.8	104°11.7	8.4'	15°02.2	15.2'	60.5'
5 6	257°39.3 272°39.0	59.2 \$21°59.6	118°39.1 133°06.4	8.3' 8.1'	15° 17.4 N15° 32.5	15.1' 15.0'	60.5' 60.6'
7	272 39.0 287°38.8	21°59.9	133 00.4 147°33.5	8.0'	15° 47.6	15.0'	60.6
8	302°38.5	22°00.3	162°00.5	7.9'	16°02.5	14.9'	60.6
9	317°38.3	• • 00.7	176°27.4	7.8'	16° 17.4	14.8'	60.6'
10	332°38.1	01.0	190°54.2	7.7'	16°32.2	14.7'	60.7'
11	347°37.8 2°37.6	01.4 \$22°01.8	205°20.9 219°47.4	7.5' 7.4'	16° 46.9 N17° 01.5	14.6' 14.5'	60.7'
12 13	2°37.6 17°37.3	02.1	219°47.4 234°13.8	7.4	17°16.0	14.5	60.7' 60.7'
14	32°37.1	02.1	248°40.1	7.1'	17° 30.5	14.3'	60.8
15	47°36.8	• • 02.8	263°06.2	7.0'	17°44.8	14.2'	60.8'
16	62°36.6	03.2	277°32.2	6.9'	17°59.0	14.1'	60.8'
17	77°36.4	03.6	291°58.1	6.8'	18° 13.1	14.0'	60.8'
18 19	92°36.1 107°35.9	\$22°03.9 04.3	306°23.9 320°49.5	6.6' 6.5'	N18°27.1 18°41.1	13.9' 13.8'	60.9' 60.9'
20	107 35.9 122°35.6	04.5	335°15.0	6.4	18° 54.9	13.7	60.9
21	137°35.4	• • 05.0	349°40.4	6.2'	19°08.5	13.6'	60.9
22	152°35.1	05.3	4°05.7	6.1'	19°22.1	13.5'	61.0'
23	167°34.9	05.7	18°30.8	6.0'	19°35.6	13.3'	61.0'
	SD = 16.2'	d = 0.4'		SE	0 = 16.5'		

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

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

		Sun		Moon				
Day	Eqn.of	Time	Mer.	Mer.	Age			
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	10-12		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	68-87%		
30	11:26	11:15	11:49	19:57	07:33			
01	11:04	10:53	11:49	20:48	08:22			
02	10:42	10:30	11:49	21:43	09:15			

## December 03, 04, 05 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	72°04.7	191°17.7	S20°04.9	172°09.8	\$23°47.8	315°44.2	N21°23.9	75°33.9	S04°05.0			
1	87°07.1	206°16.9	05.6	187°10.2	47.9	330°46.8	24.0	90°36.3	04.9	Alpheratz	$357^{\circ}33.9$	29°14.2
2	102°09.6	221°16.1	06.3	202°10.7	48.1	345°49.5	24.0	105°38.8	04.9	Ankaa	353°06.2	-42°10.1
3	117°12.1	236°15.3	07.0	217°11.1	• • 48.2	0°52.1	24.1	120°41.2	04.9	Schedar	349°29.9	56°41.1
4	132°14.5	251°14.4	07.7	232°11.5	48.4	15°54.8	24.1	135°43.7	04.9	Diphda	348°46.4	-17°50.7
5	147°17.0	266°13.6	08.4	247°12.0	48.5	30°57.4	24.1	150°46.1	04.9	Achernar	335° 19.2 327° 50.1	-57°06.5 23°35.2
6	162°19.5	281°12.8	\$20°09.1	262°12.4	S23°48.6	46°00.0	N21°24.2	165°48.6	S04°04.9	Hamal Polaris	313°11.4	23 35.2 89°22.5
7	177°21.9	$296^{\circ}12.0$	09.8	$277^{\circ}12.9$	48.8	61°02.7	24.2	180°51.0	04.8	Acamar	315°10.8	-40°12.1
8	192°24.4	311°11.2	10.5	292°13.3	48.9	76°05.3	24.2	195°53.5	04.8	Menkar	314°05.1	4°11.6
9	207°26.9	326°10.4	• • 11.2	307°13.7	• • 49.1	91°08.0	• • 24.3	210°55.9	• • 04.8	Mirfak	308° 26.7	49°57.3
10	222°29.3	341°09.6	11.9	322°14.2	49.2	106°10.6	24.3	225°58.4	04.8	Aldebaran	290°38.4	16°33.7
11	237°31.8	356°08.8	12.6	337°14.6	49.4	121°13.3	24.3	241°00.8	04.8	Rigel	281°02.8	-8°10.2
12	252°34.2 267°36.7	11°08.0 26°07.2	S20°13.3	352°15.0 7°15.5	\$23°49.5	136°15.9 151°18.6	N21°24.4	256°03.2 271°05.7	S04°04.8	Capella	$280^{\circ}20.3$	46°01.4
13 14	282°39.2	41°06.4	14.0 14.6	7 15.5 22°15.9	49.7 49.8	166°21.2	24.4 24.5	271 05.7 286°08.1	04.7 04.7	Bellatrix	$278^{\circ}21.8$	6°22.4
15	297°41.6	56°05.6	15.3	37°16.4	50.0	181°23.9	24.5	301°10.6	• • 04.7	Elnath	278°00.6	28°37.8
16	312°44.1	71°04.8	16.0	52°16.8	50.1	196°26.5	24.5	316°13.0	04.7	Alnilam	275°36.7	-1°11.1
17	327°46.6	86°04.0	16.7	67°17.2	50.2	211°29.2	24.6	331°15.5	04.7	Betelgeuse	270°51.0	7°24.8
18	342°49.0	101°03.2	\$20°17.4	82°17.7	\$23°50.4	226°31.8	N21°24.6	346°17.9	S04°04.6	Canopus	263°51.6	-52°42.4
19	357°51.5	116°02.4	18.1	$97^{\circ}18.1$	50.5	241°34.5	24.7	1°20.4	04.6	Sirius	258°25.3	-16°45.0
20	12°54.0	131°01.6	18.8	112°18.5	50.7	256°37.1	24.7	16°22.8	04.6	Adhara	255°05.0 244°49.8	-29°00.3 5°09.5
21	27°56.4	146°00.7	• • 19.4	$127^{\circ}19.0$	• • 50.8	271°39.8	• • 24.7	31°25.3	• • 04.6	Procyon Pollux	244 49.6 243°16.1	27°57.7
22	42°58.9	160°59.9	20.1	142°19.4	51.0	286°42.4	24.8	46°27.7	04.6	Avior	234° 14.0	-59°35.3
23	58°01.4	175°59.1	20.8	157°19.8	51.1	301°45.1	24.8	61°30.1	04.6	Suhail	222°45.6	-43°32.0
Mer.p	ass. 19:09	$\nu$ -0.8' d0.	7′ m-3.90	$\nu 0.4' d0$	.1′ m1.29	$\nu 2.6' d0.$	0′ m-2.55	$\nu 2.4' \ d-0$	.0′ m0.92	Miaplacidus	221°37.7	-69°49.1
										Alphard	217°46.9	-8°46.2
	6114	6114		6114	_	6114	-	6114	_	Regulus	207°33.6	11°50.4
Thu	GHA	<b>GHA</b> 190°58.3	Dec	GHA	Dec	<b>GHA</b> 316°47.8	Dec	<b>GHA</b> 76°32.6	Dec	Dubhe	$193^{\circ}40.1$	61°36.4
0 1	73°03.8 88°06.3	190 58.3 205°57.5	\$20°21.5 22.1	172°20.3 187°20.7	\$23°51.2 51.4	310 47.8 331°50.4	N21°24.8 24.9	76 32.6 91°35.0	\$04°04.5 04.5	Denebola	182°24.3	14°25.6
2	103°08.7	200°56.7	22.1	202°21.2	51.5	346°53.1	24.9	91 33.0 106°37.5	04.5	Gienah	175°43.0	-17°41.0
3	118°11.2	235°55.9	• • 23.5	217°21.6	51.6	1°55.7	• • 25.0	100°37.3	04.5		172°59.6	-63°14.3
4	133°13.7	250°55.1	24.2	232°22.0	51.8	16°58.4	25.0	136°42.4	04.5	Gacrux	171°51.1	-57°15.2
5	148°16.1	265°54.2	24.8	247°22.5	51.9	32°01.0	25.0	151°44.8	04.4	Alioth	166°12.6	55°48.9
6	163°18.6	280°53.4	\$20°25.5	262°22.9	\$23°52.1	47°03.7	N21°25.1	166°47.2	S04°04.4	Spica	158°21.7	-11°17.7
7	$178^{\circ}21.1$	295°52.6	26.2	277°23.3	52.2	62°06.3	25.1	181°49.7	04.4	Alkaid Hadar	152°51.8 148°35.5	49°10.8 -60°29.7
8	193°23.5	310°51.8	26.9	292°23.8	52.3	77°09.0	25.1	196°52.1	04.4	Menkent	146 55.5 147°57.1	-36°29.7
9	208°26.0	$325^{\circ}51.0$	• • 27.5	307°24.2	• • 52.5	92°11.7	• • 25.2	211°54.6	• • 04.4	Arcturus	145°47.5	19°02.8
10	223°28.5	340°50.2	28.2	322°24.6	52.6	107°14.3	25.2	226°57.0	04.3	Rigil Kent.	139°39.9	-60°56.4
11	238°30.9	355°49.4	28.9	337°25.1	52.7	122°17.0	25.3	241°59.5	04.3	Kochab	137°20.9	74°02.7
12	253°33.4	10°48.5	S20°29.5	352°25.5 7°25.9	\$23°52.9	137°19.6	N21°25.3	257°01.9	S04°04.3	Zuben'ubi	$136^{\circ}55.5$	-16°08.9
13 14	268°35.9 283°38.3	25°47.7 40°46.9	30.2 30.9	7 25.9 22°26.4	53.0 53.1	152°22.3 167°24.9	25.3 25.4	272°04.3 287°06.8	04.3 04.3	Alphecca	$126^{\circ}03.5$	26°37.6
14 15	203 30.3 298°40.8	55°46.1	31.5	37°26.8	. 53.1	182°27.6	25.4	302°09.2	04.3	Antares	112° 15.3	-26°29.3
16	313°43.2	70°45.3	32.2	52°27.2	53.4	197°30.3	25.4	317°11.7	04.2	Atria	107°09.5	-69°04.4
17	328°45.7	85°44.4	32.8	67°27.7	53.5	212°32.9	25.5	332°14.1	04.2	Sabik	102°02.3	-15°45.4
18	343°48.2	100°43.6	\$20°33.5		S23°53.7	227°35.6	N21°25.5	347°16.5	S04°04.2	Shaula	96°09.8 95°58.2	-37°07.3 12°32.5
19	358°50.6	115°42.8	34.2	97°28.5	53.8	242°38.2	25.6	2°19.0	04.2	Rasalhague	95° 56.2 90° 42.4	51°29.2
20	13°53.1	130°42.0	34.8	112°29.0	53.9	257°40.9	25.6	17°21.4	04.1	Eltanin Kaus Aust.	83°31.9	-34°22.4
21	28°55.6	145°41.2	• • 35.5	127°29.4	•• 54.1	272°43.6	• • 25.7	32°23.9	•• 04.1	Vega	80°33.1	38°48.5
22	43°58.0	160°40.3	36.1	142°29.8	54.2	287°46.2	25.7	47°26.3	04.1	Nunki	75° 47.2	-26°15.9
23	59°00.5	175°39.5	36.8	157°30.3	54.3	302°48.9	25.7	62°28.7	04.1	Altair	61°59.5	8°56.3
Mer.p	ass. 19:05	$\nu$ -0.8′ d0.	7′ m-3.90	$\nu$ 0.4′ d0.	.1′ m1.29	$\nu 2.7' \ d0.$	0′ m-2.55	$\nu$ 2.4′ d-0	.0′ m0.93	Peacock	53°04.9	-56°39.3
						-				Deneb	49°25.6	45°22.6
E:	CHA	CHA	Doo	CHA	Doo	CHA	Dee	CHA	Dee	Enif	33°38.2	9°59.7
Fri 0	<b>GHA</b> 74°03.0	<b>GHA</b> 190°38.7	Dec \$20°37.4	<b>GHA</b> 172°30.7	Dec \$23°54.5	<b>GHA</b> 317°51.5	<b>Dec</b> N21°25.8	<b>GHA</b> 77°31.2	<b>Dec</b> \$04°04.1	Al Na'ir	27°32.1	-46°50.3
1	89°05.4	205°37.9	38.1	187°31.1	54.6	332°54.2	25.8	92°33.6	04.0	Fomalhaut	15°13.7	-29°29.2
2	104°07.9	220°37.0	38.7	202°31.6	54.7	347°56.9	25.8	107°36.1	04.0	Scheat Markab	13°44.5 13°29.2	28°13.6
3	119°10.4	235°36.2	• • 39.4	217°32.0	• • 54.8	2°59.5	25.9	122°38.5	• • 04.0	iviarkab	13 29.2	15°20.8
4	$134^{\circ}12.8$	250°35.4	40.0	232°32.4	55.0	18°02.2	25.9	$137^{\circ}40.9$	04.0	Dec 03 Wed	SHA	Mer.pass
5	$149^{\circ}15.3$	265°34.6	40.7	247°32.8	55.1	33°04.8	26.0	152°43.4	04.0		119° 13.0	11:15
6	164°17.7	280°33.7	\$20°41.3		\$23°55.2	48°07.5	N21°26.0	167°45.8	S04°03.9		100°05.1	12:31
7	179°20.2	295°32.9	42.0	277°33.7	55.3	63°10.2	26.0	182°48.3	03.9	Jupiter	243°39.5	02:57
8	194°22.7	310°32.1	42.6	292°34.1	55.5	78°12.8	26.1	197°50.7	03.9	Saturn	3°29.2	18:55
9	209°25.1	325°31.3	• • 43.3	307°34.6	• • 55.6	93°15.5	• • 26.1	212°53.1	• • 03.9	Dec 04 Thu	SHA	Mer.pass
10	224°27.6	340°30.4	43.9	322°35.0	55.7	108°18.2	26.2	227°55.6	03.9	l .	117°54.5	11:17
11 12	239°30.1 254°32.5	355°29.6 10°28.8	44.6 \$20°45.2	337°35.4 352°35.9	55.8 \$23°56.0	123°20.8 138°23.5	26.2 N21°26.2	242°58.0 258°00.4	03.8 \$04°03.8	Mars	$99^{\circ}16.5$	12:30
13	269° 35.0	25°27.9	45.8	7°36.3	56.1	150° 25.5° 153° 26.2	26.3	273°02.9	03.8	Jupiter		02:52
14	284°37.5	40°27.1	46.5	22°36.7	56.2	168°28.8	26.3	288°05.3	03.8	Saturn	3°28.8	18:51
15	299°39.9	55°26.3	• • 47.1	37°37.1	56.3	183°31.5	. 26.4	303°07.8	03.7	Dec 05 Fri	SHA	Mer.pass
16	314°42.4	70°25.5	47.8	52°37.6	56.5	198°34.2	26.4	318°10.2	03.7	Venus		11:18
17	329°44.9	85°24.6	48.4	67°38.0	56.6	213°36.8	26.4	333°12.6	03.7	Mars	98°27.7	12:30
18	344°47.3	100°23.8	S20°49.0	82°38.4		228°39.5	$N21^{\circ}26.5$	$348^{\circ}15.1$	S04°03.7		243°48.6	02:48
19	359°49.8	115°23.0	49.7	97°38.9	56.8	243°42.2	26.5	3°17.5	03.7	Saturn	3°28.2	18:47
20	14°52.2	130°22.1	50.3	112°39.3	57.0	258°44.8	26.6	18°19.9	03.6	Uz.des	al navall-	
21	29°54.7	145°21.3	• • 50.9	127°39.7	•• 57.1	273°47.5	• • 26.6	33°22.4	•• 03.6	Horizont	al parallax Venus:	0.1
22 23	44°57.2 59°59.6	160°20.5 175°19.6	51.6 52.2	142°40.1 157°40.6	57.2 57.3	288°50.2 303°52.8	26.6 26.7	48°24.8 63°27.2	03.6 03.6		Mars:	0.1
			_							L		7.2
Mer.p	ass. 19:01	$\nu$ -0.8′ d0.	7′ m-3.90	$\nu$ 0.4′ d0.	.1′ m1.28	$\nu 2.7' \ d0.$	0′ m-2.56	$\nu$ 2.4′ d-0	.0′ m0.93			

h	Sui	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	182°34.7	<b>S</b> 22°06.0	$32^{\circ}55.8$	5.9'	N19°48.9	13.2'	61.0'
1	197°34.4	06.4	47°20.6	5.7'	20°02.1	13.1'	61.0'
2	212°34.2 227°33.9	06.8 •• 07.1	61°45.3 76°09.9	5.6' 5.5'	20°15.2 20°28.2	13.0' 12.8'	61.0' 61.0'
4	242°33.7	07.5	90°34.4	5.3'	20°41.0	12.7'	61.1'
5	257°33.4	07.8	$104^{\circ}58.7$	5.2'	20°53.7	12.6'	61.1'
6	272°33.2	\$22°08.2	119°22.9	5.1'	N21°06.3	12.4'	61.1'
7 8	287°32.9 302°32.7	08.5 08.8	133°47.0 148°10.9	4.9' 4.8'	21°18.7 21°31.0	12.3' 12.2'	61.1' 61.1'
9	317° 32.4	09.2	162°34.7	4.7'	21°43.2	12.0'	61.1'
10	332°32.2	09.5	$176^{\circ}58.4$	4.5'	21°55.2	11.9'	61.2'
11	347°32.0 2°31.7	09.9	191°22.0	4.4'	22°07.1	11.7'	61.2'
12 13	17°31.7	\$22°10.2 10.6	205°45.4 220°08.7	4.3' 4.2'	N22°18.8 22°30.3	11.6' 11.4'	61.2' 61.2'
14	32°31.2	10.9	234°31.8	4.0'	22°41.8	11.3'	61.2'
15	47°31.0	•• 11.3	248°54.9	3.9'	22°53.0	11.1'	61.2'
16	62°30.7 77°30.5	11.6	263°17.8 277°40.6	3.8'	23°04.1 23°15.0	10.9'	61.2'
17 18	92°30.2	11.9 \$22°12.3	277°40.6 292°03.2	3.7' 3.5'	N23°25.8	10.8' 10.6'	61.3' 61.3'
19	107° 30.0	12.6	306°25.8	3.4'	23°36.4	10.4	61.3'
20	122°29.7	13.0	320°48.2	3.3'	23°46.9	10.3'	61.3'
21	137°29.5	• • 13.3	335°10.5	3.2'	23°57.1	10.1'	61.3'
22 23	152°29.2 167°29.0	13.6 14.0	349°32.7 3°54.8	3.1' 3.0'	24°07.2 24°17.2	9.9' 9.7'	61.3' 61.3'
23	SD = 16.2'		3 34.0			3.1	01.5
	SD = 10.2'	d = 0.4'		51	D = 16.6'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	182°28.7	S22°14.3	18° 16.7	2.8'	N24°26.9	9.6'	61.3'
1 2	197°28.5 212°28.2	14.6 15.0	32°38.6 47°00.3	2.7' 2.6'	24°36.5 24°45.9	9.4' 9.2'	61.3' 61.3'
3	212 26.2 227°28.0	15.3	61°21.9	2.5'	24 45.9 24°55.1	9.2	61.3
4	242° 27.7	15.6	75°43.4	2.4'	25°04.1	8.8'	61.3'
5	257° 27.5	16.0	90°04.8	2.3'	25°12.9	8.6'	61.3'
6 7	272°27.2 287°27.0	\$22°16.3 16.6	104°26.1 118°47.3	2.2' 2.1'	N25°21.6 25°30.0	8.5' 8.3'	61.3' 61.3'
8	302°26.7	17.0	116 47.3 133°08.4	2.1	25°38.3	8.1'	61.3
9	317° 26.5	• • 17.3	147°29.4	1.9'	25°46.4	7.9'	61.3'
10	332°26.2	17.6	161°50.3	1.8'	25°54.3	7.7'	61.3'
11 12	347°26.0 2°25.7	17.9 \$22°18.3	176°11.1 190°31.8	1.7' 1.6'	26°01.9 N26°09.4	7.5' 7.3'	61.3' 61.3'
13	2 25.7 17°25.4	18.6	204°52.4	1.5'	26° 16.7	7.3 7.1'	61.3
14	32° 25.2	18.9	219°13.0	1.5'	26°23.7	6.9'	61.3'
15	47°24.9	• • 19.2	233°33.4	1.4'	26°30.6	6.7'	61.3'
16 17	62°24.7 77°24.4	19.6 19.9	247°53.8 262°14.1	1.3' 1.2'	26°37.3 26°43.7	6.5' 6.2'	61.3' 61.3'
18	92°24.2	\$22°20.2	276°34.3	1.2'	N26° 50.0	6.0'	61.3'
19	107°23.9	20.5	290°54.5	1.1'	$26^{\circ}56.0$	5.8'	61.3'
20	122°23.7	20.9	305°14.6		27°01.8	5.6'	61.3'
21 22	137°23.4 152°23.2	· · 21.2 21.5	319°34.6 333°54.6	1.0' 0.9'	27°07.4 27°12.8	5.4' 5.2'	61.3' 61.3'
23	167° 22.9	21.8	348°14.5	0.8'	27° 18.0	5.0'	61.3'
	SD = 16.2'	d = 0.3'		SI	D = 16.7'		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0 1	182°22.6 197°22.4	\$22°22.1 22.4	2°34.3 16°54.1	0.8' 0.7'	N27°23.0 27°27.7	4.7' 4.5'	61.3' 61.3'
2	212° 22.1	22.8	31° 13.9	0.7	27°32.2	4.3'	61.3
3	227°21.9	• • 23.1	45°33.6	0.7'	$27^{\circ}36.5$	4.1'	61.3'
4	242°21.6 257°21.4	23.4 23.7	59°53.2 74°12.9	0.6'	27°40.6	3.9'	61.3'
5 6	257°21.4 272°21.1	23.7 \$22°24.0	74°12.9 88°32.5	0.6'	27°44.5 N27°48.1	3.6' 3.4'	61.3' 61.2'
7	287° 20.8	24.3	102°52.0	0.5'	27°51.5	3.2'	61.2'
8	302°20.6	24.6	117° 11.6	0.5'	27°54.7	3.0'	61.2'
9	317°20.3	• • 25.0	131°31.1	0.5'	27°57.7	2.7'	61.2'
10 11	332°20.1 347°19.8	25.3 25.6	145°50.6 160°10.0	0.5' 0.5'	28°00.4 28°03.0	2.5' 2.3'	61.2' 61.2'
12	2° 19.5	\$22°25.9	174°29.5	0.5	N28°05.3	2.1	61.2
13	17° 19.3	26.2	188°49.0	0.5'	28°07.3	1.8'	61.2'
14	32°19.0	26.5	203°08.4	0.5'	28°09.2	1.6'	61.1'
15 16	47° 18.8 62° 18.5	· · 26.8 27.1	217°27.9 231°47.3	0.5' 0.5'	28° 10.8 28° 12.2	1.4' 1.2'	61.1' 61.1'
17	77° 18.3	27.4	246°06.8	0.5	28°13.4	0.9'	61.1'
18	92°18.0	S22°27.7	260°26.3	0.5'	N28° 14.3	0.7'	61.1'
19	107°17.7	28.0	274°45.7	0.5'	28° 15.1	0.5'	61.1'
20 21	122°17.5 137°17.2	28.3 •• 28.6	289°05.3 303°24.8	0.5' 0.6'	28° 15.6 28° 15.8	0.3' 0.0'	61.0' 61.0'
22	152° 16.9	28.9	317°44.3	0.6'	28° 15.9	-0.2	61.0'
23	$167^{\circ}16.7$	29.2	332°03.9	0.6'	$28^{\circ}15.7$	-0.4'	61.0'
	SD = 16.2'	d = 0.3'		SI	D = 16.7'		

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

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

		Sun		Moon				
Day	Eqn.of	f Time	Mer.	Mer.	Age			
Day	00 <sup>h</sup> 12 <sup>h</sup> mm:ss mm:ss		Pass	Upper	Lower	13-15		
			hh:mm	hh:mm	hh:mm	94-100%		
03	10:19	10:07	11:50	22:44	10:13			
04	09:55	09:43	11:50	23:49	11:16			
05	09:31	09:18	11:51	-:-	12:23			

# December 06, 07, 08 UT (Sat., Sun., Mon.)

h	Aries	Ver	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
							N21°26.7				JIIA	Dec
0	75°02.1	190°18.8	S20°52.8	172°41.0	S23°57.4	318°55.5		78°29.7	S04°03.5	Alpheratz	357°33.9	29°14.2
1	90°04.6	205°18.0	53.4	187°41.4	57.5	333°58.2	26.8	93°32.1	03.5	Ankaa	353°06.2	-42°10.1
2	$105^{\circ}07.0$	$220^{\circ}17.1$	54.1	202°41.9	57.7	349°00.8	26.8	108°34.6	03.5	Schedar	349° 29.9	
3	120°09.5	235°16.3	• • 54.7	217°42.3	• • 57.8	4°03.5	• • 26.8	123°37.0	• • 03.5			56°41.1
4	135°12.0	250°15.5	55.3	232°42.7	57.9	19°06.2	26.9	138°39.4	03.5	Diphda	348°46.4	-17°50.7
5	150° 14.4	265°14.6	55.9	247°43.1	58.0	34°08.8	26.9	153°41.9	03.4	Achernar	$335^{\circ}19.2$	-57°06.5
										Hamal	$327^{\circ}50.1$	23°35.3
6	165° 16.9	280°13.8	\$20°56.6	262°43.6	\$23°58.1	49°11.5	N21°27.0	168°44.3	S04°03.4	Polaris	313°11.5	89°22.6
7	180° 19.4	295°12.9	57.2	277°44.0	58.3	64°14.2	27.0	183°46.7	03.4	Acamar	315°10.8	-40°12.1
8	195°21.8	$310^{\circ}12.1$	57.8	292°44.4	58.4	79°16.9	27.1	198°49.2	03.4			
9	210°24.3	325°11.3	• • 58.4	307°44.8	• • 58.5	94°19.5	• • 27.1	213°51.6	• • 03.3	Menkar	314°05.1	4°11.6
10	225°26.7	340°10.4	59.0	322°45.3	58.6	109°22.2	27.1	228°54.0	03.3	Mirfak	308° 26.7	49°57.3
11	240°29.2	355°09.6	20°59.7	337°45.7	58.7	124°24.9	27.2	243°56.5	03.3	Aldebaran	290°38.4	16°33.7
	255°31.7			352°46.1	\$23°58.8	139°27.6	N21°27.2	258°58.9	S04°03.3	Rigel	281°02.8	-8°10.2
12		10°08.7	521°00.3							Capella	280°20.3	46°01.4
13	270°34.1	25°07.9	00.9	7°46.5	58.9	154°30.2	27.3	274°01.3	03.2	Bellatrix	278°21.7	6°22.4
14	285°36.6	40°07.1	01.5	22°47.0	59.1	169°32.9	27.3	289°03.8	03.2	Elnath	278°00.5	28°37.8
15	300°39.1	55°06.2	• • 02.1	37°47.4	• • 59.2	184°35.6	• • 27.3	304°06.2	• • 03.2	Alnilam		-1°11.1
16	315°41.5	70°05.4	02.7	52°47.8	59.3	199°38.2	27.4	319°08.6	03.2		275°36.6	
17	330°44.0	85°04.5	03.3	67°48.2	59.4	214°40.9	27.4	334°11.1	03.2	Betelgeuse	270°50.9	7°24.7
18	345°46.5	100°03.7	S21°04.0	82°48.7	S23°59.5	229°43.6	N21°27.5	349°13.5	S04°03.1	Canopus	263°51.5	-52°42.4
								4°15.9		Sirius	258°25.3	-16°45.0
19	0°48.9	115°02.8	04.6	97°49.1	59.6	244°46.3	27.5		03.1	Adhara	255°04.9	-29°00.3
20	15°51.4	130°02.0	05.2	112°49.5	59.7	259°48.9	27.5	19°18.4	03.1	Procyon	244°49.8	5°09.5
21	30°53.9	145°01.2	•• 05.8	127°49.9	• • 59.8	274°51.6	• • 27.6	34°20.8	• • 03.1	Pollux	243°16.1	27°57.7
22	45°56.3	160°00.3	06.4	142°50.4	23°59.9	289°54.3	27.6	49°23.2	03.0			-59°35.3
23	60°58.8	174°59.5	07.0	157°50.8	24°00.0	304°57.0	27.7	64°25.6	03.0	Avior	234°14.0	
			_							Suhail	222°45.5	-43°32.0
Mer.p	ass. 18:57	$\nu$ -0.8′ d0.	6′ m-3.90	$\nu$ 0.4′ d0.	1'  m1.28	$\nu 2.7' \ d0.$	0′ m-2.57	$\nu 2.4' \ d-0$	.0′ m0.93	Miaplacidus	221°37.7	-69°49.1
										Alphard	217°46.9	-8°46.2
										Regulus	207°33.6	11°50.4
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.1	61°36.4
0	$76^{\circ}01.2$	189°58.6	S21°07.6	172°51.2	S24°00.2	319°59.6	$N21^{\circ}27.7$	79°28.1	S04°03.0		182°24.3	
1	91°03.7	204°57.8	08.2	187°51.6	00.3	335°02.3	27.8	94°30.5	03.0	Denebola		14°25.5
2	106°06.2	219°56.9	08.8	202°52.1	00.4	350°05.0	27.8	109°32.9	02.9	Gienah	175° 42.9	-17°41.1
								124°35.4			172°59.5	-63°14.3
3	121°08.6	234°56.1	• • 09.4	217°52.5	• • 00.5	5°07.7	• • 27.8		• • 02.9	Gacrux	171°51.1	-57°15.2
4	136° 11.1	249°55.2	10.0	232°52.9	00.6	20°10.4	27.9	139°37.8	02.9	Alioth	166° 12.6	55°48.9
5	151° 13.6	264°54.4	10.6	247°53.3	00.7	35°13.0	27.9	154°40.2	02.9	Spica	158°21.7	-11°17.7
6	$166^{\circ}16.0$	279°53.5	S21°11.2	262°53.8	S24°00.8	50°15.7	N21°28.0	169°42.7	S04°02.8	Alkaid	152°51.8	49°10.8
7	$181^{\circ}18.5$	294°52.7	11.8	277°54.2	00.9	65°18.4	28.0	184°45.1	02.8			
8	196°21.0	309°51.8	12.4	292°54.6	01.0	80°21.1	28.0	199°47.5	02.8	Hadar	148°35.4	-60°29.7
9	211°23.4			307°55.0		95°23.7		214°50.0		Menkent	147°57.0	-36°29.7
		324°51.0	• • 13.0		• • 01.1		· · 28.1		• • 02.8	Arcturus	145°47.5	19°02.8
10	226°25.9	339°50.1	13.6	322°55.4	01.2	110°26.4	28.1	229°52.4	02.7	Rigil Kent.	139°39.8	-60°56.4
11	241°28.4	354°49.3	14.2	337°55.9	01.3	125°29.1	28.2	244°54.8	02.7	Kochab	137°20.8	74°02.7
12	256° 30.8	9°48.4	S21°14.7	352°56.3	S24°01.4	140°31.8	N21°28.2	259°57.2	S04°02.7	1	136°55.5	
13	271°33.3	24°47.6	15.3	7°56.7	01.5	155°34.5	28.3	274°59.7	02.7	Zuben'ubi		-16°08.9
14	286°35.7	39°46.7	15.9	22°57.1	01.6	170°37.2	28.3	290°02.1	02.6	Alphecca	126°03.5	26°37.6
										Antares	112° 15.3	-26°29.3
15	301°38.2	54°45.9	• • 16.5	37°57.6	• • 01.7	185°39.8	• • 28.3	305°04.5	• • 02.6	Atria	107°09.4	-69°04.4
16	316°40.7	69°45.0	17.1	52°58.0	01.8	200°42.5	28.4	320°07.0	02.6	Sabik	102°02.3	-15°45.4
17	331°43.1	84°44.2	17.7	67°58.4	01.9	215°45.2	28.4	335°09.4	02.6	Shaula	96°09.8	-37°07.3
18	346° 45.6	99°43.3	S21°18.3	82°58.8	S24°02.0	230°47.9	N21°28.5	350°11.8	S04°02.5		95°58.2	12°32.5
19	1°48.1	114°42.5	18.9	97°59.2	02.1	245°50.6	28.5	5°14.2	02.5	Rasalhague		
20	16°50.5	129°41.6	19.4	112°59.7	02.2	260°53.2	28.6	20°16.7	02.5	Eltanin	90°42.4	51°29.2
		144°40.8		128°00.1		275°55.9		35°19.1		Kaus Aust.	83°31.9	-34°22.4
21	31°53.0		• • 20.0		• • 02.3		• • 28.6		• • 02.5	Vega	80°33.1	38°48.5
22	46° 55.5	159°39.9	20.6	143°00.5	02.4	290°58.6	28.6	50°21.5	02.4	Nunki	75°47.2	-26°15.9
23	61°57.9	174°39.0	21.2	158°00.9	02.5	306°01.3	28.7	65°24.0	02.4	Altair	61°59.5	8°56.3
N 4	10.F2	- 0.0/ -10	6/ 2.00	- 0 4/ -10	1/ 1 07	- 0 7/ -10	0/ 2.57	- 2 4/ -1 0	0/ 0 04	Peacock	53°04.9	-56°39.3
ivier.p	ass. 18:53	$\nu$ -0.8′ d0.	6 m-3.90	$\nu$ 0.4° $a$ 0.	.1'  m $1.27$	$\nu$ 2.7 a0.	0′ m-2.57	$\nu$ 2.4 a-0	.0′ m0.94	1		
										Deneb	49°25.6	45°22.6
Man	CHA	CHA	Dos	СПУ	Des	CHV	Des	CHV	Doc	Enif	33°38.2	9°59.7
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	$27^{\circ}32.1$	-46°50.3
0	77°00.4	189°38.2	S21°21.8	173°01.3	S24°02.6	321°04.0	N21°28.7	80°26.4	504°02.4	Fomalhaut	$15^{\circ}13.7$	-29°29.2
1	92°02.9	204°37.3	22.3	188°01.8	02.7	336°06.7	28.8	95°28.8	02.4	Scheat	13°44.5	28°13.6
2	107°05.3	219°36.5	22.9	203°02.2	02.8	351°09.3	28.8	110°31.2	02.3	Markab	13°29.2	15°20.8
3	122°07.8	234°35.6	• • 23.5	218°02.6	• • 02.9	6°12.0	• • 28.9	125°33.7	• • 02.3	unab		
4	137° 10.2	249°34.8	24.1	233°03.0	03.0	21°14.7	28.9	140°36.1	02.3	Dec 06 Sat	SHA	Mer.pass
5	152° 12.7	264°33.9	24.6	248°03.4	03.1	36°17.4	28.9	155°38.5	02.3	1	115° 16.7	11:19
6	167° 15.2	279°33.0	\$21°25.2		S24°03.2		N21°29.0	170°40.9	S04°02.2	Mars	97°38.9	12:29
										1		
7	182°17.6	294°32.2	25.8	278°04.3	03.3	66°22.8	29.0	185°43.4	02.2		243°53.4	02:44
8	197° 20.1	309°31.3	26.3	293°04.7	03.4	81°25.5	29.1	200°45.8	02.2	Saturn	3°27.6	18:43
9	212°22.6	324°30.5	• • 26.9	308°05.1	• • 03.5	96°28.1	• • 29.1	215°48.2	• • 02.2	Dec 07 5	SHA	Mor noss
10	227°25.0	339°29.6	27.5	323°05.5	03.6	111°30.8	29.2	230°50.6	02.1	Dec 07 Sun		Mer.pass
11	242°27.5	354°28.7	28.0	338°06.0	03.7	126°33.5	29.2	245°53.1	02.1		113°57.4	11:21
12	257°30.0	9°27.9	S21°28.6	353°06.4	S24°03.8	141°36.2		260°55.5	S04°02.1	Mars	96°50.0	12:28
	272° 32.4	24°27.0				156°38.9				Jupiter	243°58.4	02:40
13			29.2	8°06.8	03.9		29.3	275°57.9	02.0	Saturn	3°26.8	18:39
14	287° 34.9	39°26.2	29.7	23°07.2	04.0	171°41.6	29.3	291°00.3	02.0			
15	302°37.3	54°25.3	• • 30.3	38°07.6	• • 04.0	186°44.3	• • 29.4	306°02.8	• • 02.0	Dec 08 Mon	SHA	Mer.pass
16	$317^{\circ}39.8$	69°24.4	30.9	53°08.0	04.1	201°47.0	29.4	321°05.2	02.0		112°37.8	11:22
17	332°42.3	84°23.6	31.4	68°08.5	04.2	216°49.7	29.5	336°07.6	01.9	Mars	96°01.0	12:28
18	347°44.7	99°22.7	S21°32.0	83°08.9	\$24°04.3	231°52.3		351°10.0	S04°01.9	1		
											244°03.6	02:35
19	2°47.2	114°21.8	32.5	98°09.3	04.4	246°55.0	29.5	6°12.5	01.9	Saturn	3°26.0	18:35
20	$17^{\circ}49.7$	129°21.0	33.1	113°09.7	04.5	261°57.7	29.6	21°14.9	01.9			
21	32°52.1	144°20.1	• • 33.6	128°10.1	• • 04.6	277°00.4	• • 29.6	36°17.3	• • 01.8	Horizont	al parallax	
22	47°54.6	159°19.2	34.2	143°10.6	04.7	292°03.1	29.7	51°19.7	01.8		Venus:	0.1
23	62°57.1	174°18.4	34.7	158°11.0	04.8	307°05.8	29.7	66°22.2	01.8		Mars:	0.1
23	02 31.1						23.1			L		
Mer.n	ass. 18:49	$\nu$ -0.9′ d0.	6′ m-3.90	$\nu$ 0.4′ d0.	.1′ m1.27	$\nu 2.7' \ d0$	0′ m-2.58	$\nu 2.4' \ d-0$	.0′ m0.94			

h	Sui	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	182°16.4	S22°29.5	346°23.6	0.7'	N28°15.3	-0.6'	61.0'
1 2	197°16.2 212°15.9	29.8 30.1	0°43.2 15°02.9	0.7' 0.7'	28°14.7 28°13.8	-0.8' -1.1'	60.9' 60.9'
3	212 15.9 227°15.6	30.4	29°22.7	0.8	28°12.8	-1.1 -1.3'	60.9
4	242°15.4	30.7	43°42.5	0.9'	28°11.5	-1.5'	60.9'
5	257°15.1	31.0	58°02.3	0.9'	28°10.0	-1.7'	60.8
6 7	272°14.8 287°14.6	\$22°31.3 31.6	72°22.2 86°42.2	1.0' 1.0'	N28°08.3 28°06.3	-1.9' -2.2'	60.8' 60.8'
8	302°14.3	31.9	101°02.2	1.1'	28°04.2	-2.4	60.8
9	317°14.1	• • 32.2	115°22.3	1.2'	28°01.8	-2.6'	60.7'
10 11	332°13.8 347°13.5	32.5 32.8	129°42.5 144°02.7	1.2' 1.3'	27°59.2 27°56.4	-2.8' -3.0'	60.7' 60.7'
12	2°13.3	\$22°33.1	158°23.0	1.4'	N27°53.4	-3.2	60.7
13	17°13.0	33.3	172°43.4	1.5'	$27^{\circ}50.2$	-3.4'	60.6'
14	32°12.7	33.6	187°03.9 201°24.5	1.6'	27°46.7	-3.6'	60.6'
15 16	47°12.5 62°12.2	· · 33.9 34.2	201 24.5 215°45.1	1.7' 1.7'	27°43.1 27°39.3	-3.8' -4.1'	60.6' 60.6'
17	77°11.9	34.5	230°05.9	1.8'	27°35.2	-4.3'	60.5
18	92°11.7	S22°34.8	244°26.7	1.9'	N27°30.9	-4.5'	60.5'
19 20	107°11.4 122°11.1	35.1 35.4	258°47.7 273°08.7	2.0' 2.1'	27°26.5 27°21.8	-4.7' -4.9'	60.5' 60.4'
21	137°10.9	35.6	287°29.8	2.2'	27°17.0	-4.9 -5.1'	60.4
22	152°10.6	35.9	301°51.1	2.4'	27°11.9	-5.2'	60.4'
23	167°10.3	36.2	316°12.4	2.5'	27°06.7	-5.4'	60.3'
	SD = 16.2'	d = 0.3'		S	D = 16.6'		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	182°10.1	S22°36.5	330°33.9	2.6'	N27°01.2	-5.6'	60.3'
1 2	197°09.8 212°09.5	36.8 37.0	344°55.5 359°17.2	2.7' 2.8'	26°55.6 26°49.8	-5.8' -6.0'	60.3' 60.3'
3	212°09.5 227°09.3	37.0 · · 37.3	13°39.0	2.8	26°49.8 26°43.8	-6.0' -6.2'	60.2
4	242°09.0	37.6	28°00.9	3.1'	26°37.6	-6.4	60.2
5	257°08.7	37.9	42°23.0	3.2'	26°31.2	-6.6'	60.2'
6 7	272°08.5 287°08.2	\$22°38.2 38.4	56°45.1 71°07.4	3.3' 3.4'	N26°24.6 26°17.9	-6.7' -6.9'	60.1' 60.1'
8	302°07.9	38.7	85°29.9	3.6'	26°11.0	-0.9 -7.1'	60.1
9	317°07.7	• • 39.0	99°52.4	3.7'	26°03.9	-7.3'	60.0'
10 11	332°07.4 347°07.1	39.2 39.5	114°15.1 128°37.9	3.8' 4.0'	25°56.6 25°49.1	-7.4' -7.6'	60.0' 59.9'
12	2°06.8	522°39.8	126 37.9 143°00.9	4.1	N25°41.5	-7.8'	59.9
13	17°06.6	40.1	157°24.0	4.2'	25°33.8	-7.9'	59.9'
14	32°06.3	40.3	171°47.2	4.4'	25°25.8	-8.1'	59.8'
15 16	47°06.0 62°05.8	· · 40.6 40.9	186°10.6 200°34.0	4.5' 4.6'	25°17.7 25°09.4	-8.3' -8.4'	59.8' 59.8'
17	77°05.5	41.1	214°57.7	4.8'	25°01.0	-8.6'	59.7'
18	92°05.2	S22°41.4	229°21.5	4.9'	N24°52.4	-8.7'	59.7'
19 20	107°05.0 122°04.7	41.7 41.9	243°45.4 258°09.4	5.1' 5.2'	24°43.7 24°34.8	-8.9' -9.0'	59.7' 59.6'
21	137°04.4	. 42.2	272°33.6	5.3'	24°25.7	-9.0 -9.2'	59.6'
22	152°04.1	42.5	286°58.0	5.5'	24°16.6	-9.3'	59.5'
23	167°03.9	42.7	301°22.5	5.6'	24°07.2	-9.5'	59.5'
	SD = 16.2'	d = 0.3'		S	D = 16.4'		
Mon	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	182°03.6	\$22°43.0	315°47.1	5.8'	N23°57.7	-9.6'	59.5'
1 2	197°03.3 212°03.0	43.3 43.5	330°11.9 344°36.8	5.9' 6.1'	23°48.1 23°38.4	-9.8' -9.9'	59.4' 59.4'
3	227°02.8	• • 43.8	359°01.9	6.2'	23°28.5	-10.0'	59.4'
4	242°02.5	44.0	13°27.1	6.4'	23°18.4	-10.2'	59.3'
5 6	257°02.2 272°02.0	44.3 \$22°44.6	27°52.5 42°18.0	6.5' 6.7'	23°08.3 N22°58.0	-10.3' -10.4'	59.3' 59.2'
7	287°01.7	44.8	56°43.6	6.8'	22°47.6	-10.4	59.2
8	302°01.4	45.1	71°09.5	6.9'	22°37.0	-10.7'	59.2'
9 10	317°01.1 332°00.9	· · 45.3 45.6	85°35.4 100°01.5	7.1' 7.2'	22°26.4 22°15.6	-10.8' -10.9'	59.1' 59.1'
10	332 00.9 347°00.6	45.6 45.8	100 01.5 114°27.7	7.2° 7.4°	22 15.6 22°04.7	-10.9 -11.0'	59.1° 59.0'
12	2°00.3	S22°46.1	128°54.1	7.5'	N21°53.6	-11.1'	59.0'
13	17°00.0	46.3	143°20.7	7.7'	21°42.5	-11.3'	59.0'
14 15	31°59.8 46°59.5	46.6 •• 46.8	157°47.3 172°14.2	7.8' 8.0'	21°31.2 21°19.9	-11.4' -11.5'	58.9' 58.9'
16	61°59.2	47.1	186°41.1	8.1'	21°08.4	-11.6'	58.8'
17	76°58.9	47.3	201°08.2	8.3'	20°56.8	-11.7'	58.8'
18 19	91°58.7 106°58.4	\$22°47.6 47.8	215°35.5 230°02.9	8.4' 8.5'	N20°45.1 20°33.3	-11.8' -11.9'	58.8' 58.7'
20	100 58.4 121°58.1	48.1	244°30.4	8.7'	20°33.3	-11.9	58.7'
21	136°57.8	• • 48.3	$258^{\circ}58.1$	8.8'	20°09.5	-12.1'	58.6'
22 23	151°57.5 166°57.3	48.6 48.8	273°25.9 287°53.9	9.0' 9.1'	19°57.4 19°45.2	-12.2' -12.3'	58.6' 58.5'
23	SD = 16.2'	d = 0.3'	201 33.9		D = 16.2'	-12.3	20.3
	JU = 10.2′	$u = 0.3^{\circ}$		5	ט = 10.2′		

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

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

		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	98-87%		
06	09:06	08:53	11:51	00:57	13:30			
07	08:40	08:27	11:52	02:03	14:34			
08	08:14	08:01	11:52	03:04	15:32			

# December 09, 10, 11 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	77°59.5	189°17.5	S21°35.3	173°11.4	S24°04.8	322°08.5	N21°29.8	81°24.6	S04°01.8			
1	93°02.0	204°16.6	35.8	188°11.8	04.9	337°11.2	29.8	96°27.0	01.7	Alpheratz	357°33.9	29°14.2
2	108°04.5	219°15.8	36.4	203°12.2	05.0	352°13.9	29.0	111°29.4	01.7	Ankaa	353°06.3	-42°10.1
3	123°06.9	234°14.9	36.9	218°12.6	05.1	7°16.6	29.9	126°31.9	01.7	Schedar	349°30.0	56°41.1
4	138°09.4	249°14.0	37.5	233°13.1	05.2	22°19.3	29.9	141°34.3	01.6	Diphda	348°46.4	-17°50.7
5	153°11.8	264°13.2	38.0	248°13.5	05.2	37°21.9	30.0	156°36.7	01.6	Achernar	$335^{\circ}19.2$	-57°06.5
6	168°14.3	279°12.3	521°38.6	246 13.5 263°13.9	\$24°05.4	52°24.6	N21°30.0	171°39.1	504°01.6	Hamal	$327^{\circ}50.1$	23°35.3
7	183°16.8	279 12.3 294°11.4	39.1	203 13.9 278°14.3	05.4	67°27.3	30.1	171 39.1 186°41.5	01.6	Polaris	313°12.0	89°22.6
8	103 10.6 198°19.2	309°10.5		276 14.3 293°14.7	05.4	82°30.0		201°44.0		Acamar	$315^{\circ}10.8$	-40°12.1
9			39.7			97°32.7	30.1	201 44.0 216°46.4	01.5	Menkar	$314^{\circ}05.1$	4°11.6
	213°21.7	324°09.7 339°08.8	• • 40.2	308°15.1	• • 05.6		30.2		• • 01.5	Mirfak	308°26.7	49°57.3
10	228°24.2		40.8	323°15.5	05.7	112°35.4	30.2	231°48.8	01.5	Aldebaran	290°38.4	16°33.7
11	243°26.6	354°07.9	41.3	338°16.0	05.8	127°38.1	30.3 N21°30.3	246°51.2	01.4	Rigel	281°02.8	-8°10.2
12	258°29.1	9°07.1	S21°41.8	353°16.4	S24°05.9	142°40.8		261°53.7	S04°01.4	Capella	280°20.3	46°01.4
13	273°31.6	24°06.2	42.4	8°16.8	05.9	157°43.5	30.3	276°56.1	01.4	Bellatrix	278°21.7	6°22.4
14	288°34.0	39°05.3	42.9	23°17.2	06.0	172°46.2	30.4	291°58.5	01.4	Elnath	278°00.5	28°37.8
15	303°36.5	54°04.4	• • 43.4	38°17.6	• • 06.1	187°48.9	• • 30.4	307°00.9	• • 01.3	Alnilam	275°36.6	$-1^{\circ}11.1$
16	318°39.0	69°03.6	44.0	53°18.0	06.2	202°51.6	30.5	322°03.3	01.3	Betelgeuse	270°50.9	7°24.7
17	333°41.4	84°02.7	44.5	68°18.4	06.3	217°54.3	30.5	337°05.8	01.3	Canopus	263°51.5	-52°42.4
18	348°43.9	99°01.8	S21°45.0	83°18.9	S24°06.3	232°57.0	N21°30.6	352°08.2	S04°01.2	Sirius	258° 25.2	-16°45.0
19	3°46.3	114°00.9	45.6	98°19.3	06.4	247°59.7	30.6	7°10.6	01.2	Adhara	255°04.9	-29°00.3
20	18°48.8	129°00.1	46.1	113°19.7	06.5	263°02.4	30.7	22°13.0	01.2	Procyon	244°49.8	5°09.5
21	33°51.3	143°59.2	• • 46.6	128°20.1	06.6	278°05.1	· · 30.7	37°15.4	• • 01.2	Pollux	243°16.1	27°57.7
22	48°53.7	158°58.3	47.2	143°20.5	06.7	293°07.8	30.7	52°17.9	01.1	Avior	234°14.0	-59°35.3
23	63°56.2	173°57.4	47.7	158°20.9	06.7	308°10.5	30.8	67°20.3	01.1	Suhail	222°45.5	-43°32.0
Mer.p	ass. 18:45	$\nu$ -0.9' d0.	.6′ m-3.90	$\nu$ 0.4 d0	.1′ m1.26	$\nu 2.7' d0$	0′ m-2.58	$\nu 2.4' \ d-0$	.0′ m0.94	Miaplacidus	221°37.6	-69°49.1
										Alphard	217°46.9	-8°46.2
164 :	c	c	-	<b>611</b>		<b></b>	-	<b></b>	-	Regulus	207°33.5	11°50.4
Wed	GHA	GHA 100°F6 6	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°40.0	61°36.3
0	78°58.7	188°56.6	S21°48.2	173°21.3	S24°06.8	323°13.2	N21°30.8	82°22.7	S04°01.1	Denebola	182°24.2	14°25.5
1	94°01.1	203°55.7	48.7	188°21.8	06.9	338°15.9	30.9	97°25.1	01.0	Gienah	175°42.9	-17°41.1
2	109°03.6	218°54.8	49.3	203°22.2	07.0	353°18.6	30.9	112°27.5	01.0	Acrux	172°59.5	-63°14.3
3	124°06.1	233°53.9	• • 49.8	218°22.6	• • 07.0	8°21.3	• • 31.0	127°29.9	• • 01.0		171°51.0	-57°15.2
4	139°08.5	248°53.0	50.3	233°23.0	07.1	23°24.0	31.0	142°32.4	01.0	Alioth	166° 12.5	55°48.9
5	154°11.0	263°52.2	50.8	248°23.4	07.2	38°26.7	31.1	157°34.8	00.9	Spica	158°21.7	-11°17.8
6	169°13.5	278°51.3	S21°51.3	263°23.8	S24°07.3	53°29.4	N21°31.1	172°37.2	S04°00.9	Alkaid	152°51.7	49°10.8
7	184°15.9	293°50.4	51.9	278°24.2	07.3	68°32.1	31.1	187°39.6	00.9	Hadar	148°35.4	-60°29.7
8	199°18.4	308°49.5	52.4	293°24.6	07.4	83°34.8	31.2	202°42.0	8.00		147°57.0	-36°29.7
9	214°20.8	323°48.6	• • 52.9	$308^{\circ}25.1$	• • 07.5	98°37.5	• • 31.2	217°44.5	• • 00.8	Arcturus		19°02.7
10	229°23.3	338°47.8	53.4	323°25.5	07.5	113°40.2	31.3	232°46.9	8.00	Rigil Kent.	139°39.8	-60°56.4
11	244°25.8	353°46.9	53.9	338°25.9	07.6	128°42.9	31.3	247°49.3	00.7	Kochab	137°20.8	74°02.7
12	259°28.2	8°46.0	S21°54.4	353°26.3	\$24°07.7	143°45.6	N21°31.4	262°51.7	S04°00.7	Zuben'ubi	136°55.5	-16°08.9
13	274°30.7	23°45.1	54.9	8°26.7	07.8	158°48.3	31.4	277°54.1	00.7	Alphecca	126°03.4	26°37.6
14	289°33.2	38°44.2	55.4	23°27.1	07.8	173°51.0	31.5	292°56.5	00.7	Antares	112°15.3	-26°29.3
15	304°35.6	53°43.3	• • 56.0	38°27.5	• • 07.9	188°53.7	• • 31.5	307°59.0	• • 00.6	Atria	107°09.4	-69°04.4
16	$319^{\circ}38.1$	68°42.5	56.5	53°27.9	08.0	203°56.4	31.6	323°01.4	00.6	Sabik	102°02.3	-15°45.4
17	334°40.6	83°41.6	57.0	68°28.3	0.80	218°59.1	31.6	338°03.8	00.6	Shaula	96°09.8	-37°07.3
18	349°43.0	98°40.7	S21°57.5	83°28.8	S24°08.1	234°01.8	N21°31.6	353°06.2	S04°00.5	Rasalhague	95°58.2	12°32.5
19	4°45.5	113°39.8	58.0	98°29.2	08.2	249°04.5	31.7	8°08.6	00.5	Eltanin	90°42.4	51°29.1
20	19°47.9	128°38.9	58.5	113°29.6	08.2	264°07.2	31.7	23°11.0	00.5	Kaus Aust.	83°31.9	-34°22.4
21	34°50.4	143°38.0	• • 59.0	128°30.0	• • 08.3	279°09.9	• • 31.8	38°13.5	• • 00.4	Vega	80°33.1	38°48.5
22	49°52.9	158°37.1	21°59.5	143°30.4	08.4	294°12.6	31.8	53°15.9	00.4	Nunki	75°47.2	-26°15.9
23	64°55.3	173°36.3	22°00.0	158°30.8	08.4	309°15.3	31.9	68°18.3	00.4	Altair	61°59.5	8°56.3
Mern	ass. 18:41	ν-0 0' 40	.5′ m-3.90	νΩ Λ' ΔΩ	.1′ m1.25	1/2 7' d0	0′ m-2.59	1/2 A/ d O	.0′ m0.95	Peacock	53°05.0	-56°39.3
- IVIEL.P	ass. 10.41	ν-0.9 α0.	.5 111-5.90	νο.4 do	.1 1111.25	ν2.1 do.	0 111-2.39	ν2.4 u-0	.0 1110.93	Deneb	49°25.6	45°22.6
										Enif	33°38.2	9°59.7
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.1	-46°50.3
0	79°57.8	188°35.4	\$22°00.5		\$24°08.5	324°18.0	N21°31.9	83°20.7	S04°00.3	Fomalhaut	15° 13.7	-29°29.2
1	95°00.3	203°34.5	01.0	188°31.6	08.6	339°20.7	32.0	98°23.1	00.3	Scheat	13° 44.5	28°13.6
2	110°02.7	218°33.6	01.5	203°32.0	08.6	354°23.4	32.0	113°25.5	00.3	Markab	13°29.2	15°20.8
3	125°05.2	233°32.7	•• 02.0	218°32.4	• • 08.7	9°26.1	• • 32.1	128°27.9	• • 00.3			
4	140°07.7	248°31.8	02.5	233°32.9	8.80	24°28.8	32.1	143°30.4	00.2	Dec 09 Tue	SHA	Mer.pass
5	155°10.1	263°30.9	02.9	248°33.3	8.80	39°31.6	32.2	158°32.8	00.2		111°18.0	11:23
6	170°12.6	278°30.0	S22°03.4		S24°08.9	54°34.3	N21°32.2	173°35.2	S04°00.2	Mars	95°11.9	12:27
7	185°15.1	293°29.1	03.9	278°34.1	09.0	69°37.0	32.2	188°37.6	00.1		244°09.0	02:31
8	200°17.5	308°28.3	04.4	293°34.5	09.0	84°39.7	32.3	203°40.0	00.1	Saturn	3°25.1	18:31
9	215°20.0	323°27.4	• • 04.9	308°34.9	• • 09.1	99°42.4	• • 32.3	218°42.4	• • 00.1	Dec 10 Wed	SHA	Mer.pass
10	230°22.4	338°26.5	05.4	323°35.3	09.1	114°45.1	32.4	233°44.8	00.0		109° 57.9	11:25
11	245°24.9	353°25.6	05.9	338°35.7	09.2	129°47.8	32.4	248°47.3	0.00	Mars	94° 22.7	12:26
12	260°27.4	8°24.7	S22°06.4		S24°09.3	144°50.5	N21°32.5	263°49.7	S04°00.0		244° 14.5	02:27
13	275°29.8	23°23.8	06.8	8°36.5	09.3	159°53.2	32.5	278°52.1	03°59.9	Saturn	3°24.0	18:28
14	290°32.3	38°22.9	07.3	23°36.9	09.4	174°55.9	32.6	293°54.5	59.9	Satarii	J = 1.0	10.20
15	305°34.8	53°22.0	• • 07.8	38°37.4	• • 09.4	189°58.6	• • 32.6	308°56.9	• • 59.9	Dec 11 Thu	SHA	Mer.pass
16	320°37.2	68°21.1	08.3	53°37.8	09.5	205°01.4	32.7	323°59.3	59.8	Venus	108°37.6	11:26
17	335°39.7	83°20.2	08.8	68°38.2	09.6	220°04.1	32.7	339°01.7	59.8	Mars	93°33.4	12:26
18	350°42.2	98°19.3	S22°09.3		\$24°09.6	235°06.8	N21°32.8	354°04.1	S03°59.8	Jupiter	244°20.2	02:22
19	5°44.6	113°18.4	09.7	98°39.0	09.7	250°09.5	32.8	9°06.6	59.7	Saturn	3°22.9	18:24
20	20°47.1	128°17.5	10.2	113°39.4	09.7	265°12.2	32.9	24°09.0	59.7		-1 - "	
21	35°49.6	143°16.6	• • 10.7	128°39.8	• • 09.8	280°14.9	• • 32.9	39°11.4	• • 59.7	Horizont	al parallax	0.1
22	50°52.0	158° 15.7	11.1	143°40.2	09.8	295°17.6	32.9	54°13.8	59.6		Venus:	0.1
23	65°54.5	173°14.8	11.6	158°40.6	09.9	310°20.3	33.0	69°16.2	59.6		Mars:	0.1
Mern	ass. 18:37	v-0 a' do	.5′ m-3.90	ν0 4' d0	.1′ m1.25	v2 7' d0	0′ m-2.60	ν2 4' d-Ω	.0′ m0.95			
- wici.p		- 0.5 u0.	.5 111 5.50	₽ J.∓ UU		ν <u>ε.</u> ι αυ.	2.00	∠2.∓ U-U	.5 1110.33			

h	Sui	า			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	181°57.0	S22°49.1	$302^{\circ}22.0$	9.2'	$N19^{\circ}33.0$	-12.4'	58.5'
1	196° 56.7	49.3	316°50.2	9.4'	19°20.6	-12.4'	58.5'
2 3	211°56.4 226°56.2	49.6 •• 49.8	331°18.6 345°47.1	9.5' 9.6'	19°08.2 18°55.6	-12.5' -12.6'	58.4' 58.4'
4	241°55.9	50.0	0° 15.7	9.8'	18°43.0	-12.7'	58.3
5	256°55.6	50.3	$14^{\circ}44.5$	9.9'	18°30.3	-12.8'	58.3'
6	271°55.3	S22°50.5	29°13.4	10.0'	N18°17.5	-12.9'	58.3'
7 8	286°55.0 301°54.8	50.8 51.0	43°42.5 58°11.6	10.2' 10.3'	18°04.7 17°51.8	-12.9' -13.0'	58.2' 58.2'
9	316° 54.5	51.0	72°40.9	10.4	17°31.0	-13.1'	58.1
10	331°54.2	51.5	87°10.4	10.6'	17°25.7	-13.1'	58.1'
11	346°53.9	51.7	101°39.9	10.7'	17°12.5	-13.2'	58.1'
12 13	1°53.6 16°53.4	\$22°51.9 52.2	116°09.6 130°39.4	10.8' 10.9'	N16°59.3 16°46.0	-13.3' -13.4'	58.0' 58.0'
14	31°53.1	52.4	145° 09.4	11.1'	16°32.7	-13.4'	57.9'
15	46°52.8	• • 52.6	$159^{\circ}39.4$	11.2'	16°19.2	-13.5'	57.9'
16	61°52.5	52.9	174°09.6	11.3'	16°05.8	-13.5'	57.8'
17 18	76°52.2 91°52.0	53.1 \$22°53.3	188°39.9 203°10.3	11.4' 11.5'	15°52.2 N15°38.6	-13.6' -13.7'	57.8' 57.8'
19	106°51.7	53.6	203 10.3 217°40.9	11.7'	15°25.0	-13.7'	57.7'
20	121°51.4	53.8	232°11.5	11.8'	15°11.3	-13.8'	57.7'
21	136°51.1	• • 54.0	246° 42.3	11.9'	14°57.5	-13.8'	57.6'
22	151°50.8 166°50.6	54.2	261°13.2 275°44.2	12.0'	14°43.7 14°29.8	-13.9'	57.6'
23		54.5	213 44.2	12.1'		-13.9'	57.6'
	SD = 16.2'	d = 0.2'		SI	O = 16.0'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°50.3	S22°54.7	$290^{\circ}15.3$	12.2'	N14°15.9	-14.0'	57.5'
1	196°50.0	54.9	304°46.6	12.3'	14°01.9	-14.0'	57.5'
2	211° 49.7 226° 49.4	55.1 •• 55.4	319°17.9 333°49.3	12.4' 12.5'	13°47.9 13°33.9	-14.1' -14.1'	57.4' 57.4'
3 4	241°49.1	55.6	333 49.3 348° 20.9	12.5	13°19.8	-14.1'	57.4'
5	256° 48.9	55.8	2°52.5	12.8'	13°05.6	-14.2'	57.3'
6	271°48.6	S22°56.0	17°24.3	12.9'	N12°51.4	-14.2'	57.3'
7 8	286° 48.3 301° 48.0	56.2 56.5	31°56.1 46°28.1	13.0' 13.1'	12°37.2 12°22.9	-14.3' -14.3'	57.2' 57.2'
9	301 48.0 316°47.7	56.7	40 28.1 61°00.1	13.1	12 22.9 12°08.6	-14.3'	57.2'
10	331°47.4	56.9	75°32.3	13.2'	11°54.3	-14.4'	57.1'
11	346° 47.2	57.1	90°04.5	13.3'	11°39.9	-14.4'	57.1'
12	1°46.9 16°46.6	\$22°57.3 57.6	104°36.9 119°09.3	13.4' 13.5'	N11°25.5 11°11.1	-14.4'	57.1'
13 14	31° 46.3	57.6 57.8	119°09.3 133°41.8	13.6'	11°11.1 10°56.7	-14.5' -14.5'	57.0' 57.0'
15	46° 46.0	• • 58.0	148° 14.5	13.7'	10°42.2	-14.5'	56.9'
16	61°45.7	58.2	162°47.2	13.8'	10°27.7	-14.5'	56.9'
17 18	76° 45.5 91° 45.2	58.4 \$22°58.6	177°20.0 191°52.8	13.9' 14.0'	10°13.1 N09°58.5	-14.6' -14.6'	56.9' 56.8'
19	106° 44.9	58.8	206° 25.8	14.0'	09°44.0	-14.6'	56.8
20	121°44.6	59.0	220°58.9		09°29.3		56.7'
21	136°44.3	• • 59.2	235°32.0	14.2'	09°14.7	-14.7'	56.7'
22 23	151° 44.0 166° 43.7	59.5 59.7	250°05.2 264°38.5	14.3' 14.4'	09°00.1 08°45.4	-14.7' -14.7'	56.7' 56.6'
23			204 30.5			-14.7	30.0
	SD = 16.2'	d = 0.2'		SI	O = 15.7'		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181° 43.5	\$22°59.9	279°11.9	14.4'	N08°30.7	-14.7'	56.6'
1	196° 43.2 211° 42.9	23°00.1 00.3	293°45.3 308°18.8	14.5' 14.6'	08°16.0 08°01.3	-14.7' -14.7'	56.6'
2 3	211°42.9 226°42.6	· · 00.5	308° 18.8 322° 52.4	14.6	08°01.3 07°46.5	-14.7' -14.7'	56.5' 56.5'
4	241°42.3	00.7	337°26.1	14.7'	07°31.8	-14.8'	56.5
5	256° 42.0	00.9	351°59.8	14.8'	07°17.0	-14.8'	56.4'
6 7	271°41.7 286°41.4	\$23°01.1 01.3	6°33.6 21°07.4	14.9' 14.9'	N07°02.3 06°47.5	-14.8' -14.8'	56.4' 56.3'
8	286°41.4 301°41.2	01.3 01.5	21°07.4 35°41.4	14.9 15.0'	06°47.5 06°32.7	-14.8'	56.3
9	316°40.9	01.7	50° 15.4	15.1'	06°17.9	-14.8'	56.3'
10	331°40.6	01.9	64°49.4	15.1'	06°03.1	-14.8'	56.2'
11 12	346°40.3 1°40.0	02.1 <b>S</b> 23°02.3	79°23.5 93°57.7	15.2' 15.2'	05°48.3 N05°33.4	-14.8' -14.8'	56.2' 56.2'
13	1°40.0 16°39.7	02.5	93°57.7 108°32.0	15.2 15.3'	05°18.6	-14.8'	56.2 56.1'
14	31°39.4	02.7	$123^{\circ}06.2$	15.3'	05°03.8	-14.8'	56.1'
15	46°39.1	• • 02.9	137°40.6	15.4'	04°49.0	-14.8'	56.1'
16 17	61°38.8 76°38.6	03.1 03.3	152° 15.0 166° 49.5	15.5' 15.5'	04°34.1 04°19.3	-14.8' -14.8'	56.0' 56.0'
18	76°38.6 91°38.3	03.3 S23°03.4	181°24.0	15.6'	N04° 04.5	-14.8'	56.0'
19	106°38.0	03.6	195°58.5	15.6'	03°49.7	-14.8'	55.9'
20	121°37.7	03.8	210°33.1	15.7'	03°34.8	-14.8'	55.9'
21 22	136°37.4 151°37.1	· · 04.0 04.2	225°07.8 239°42.5	15.7' 15.7'	03°20.0 03°05.2	-14.8' -14.8'	55.9' 55.8'
23	166° 36.8	04.2	239 42.5 254° 17.2	15.7 15.8'	03 05.2 02°50.4	-14.8'	55.8'
-	SD = 16.2'	d = 0.2'			D = 15.4'		
	JD — 10.2	u — 0.∠		اد	J — 13.4		

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

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

		Sun		Moon			
Day	Eqn.of Time		Mer.	Mer.Pass.		Age	
,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	19-21	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	79-59%	
09	07:48	07:35	11:52	03:59	16:24		
10	07:21	07:08	11:53	04:48	17:11		
11	06:54	06:40	11:53	05:33	17:54		

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

	· · · · · · · · · · · · · · · · · · ·	,,	· · (· · · · · · ·		,							
h	Aries	Ve	nus	М	ars	lur	oiter	Sat	urn		Stars	
-												
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	80°56.9	188°13.9	S22°12.1	173°41.0	S24°10.0	325°23.0	N21°33.0	84°18.6	S03°59.6	Alpheratz	357°33.9	29°14.2
1	95°59.4	203°13.1	12.6	188°41.4	10.0	340°25.8	33.1	99°21.0	59.5	Ankaa	353°06.3	-42°10.1
2	111°01.9	218°12.2	13.0	203°41.8	10.1	355°28.5	33.1	114°23.4	59.5	Schedar	349°30.0	56°41.1
3	126°04.3	233°11.3	• • 13.5	218°42.2	• • 10.1	10°31.2	• • 33.2	129°25.8	• • 59.5	Diphda	348°46.4	-17°50.7
4	141°06.8	248° 10.4	14.0	233°42.6	10.2	25°33.9	33.2	144°28.3	59.4	Achernar	335°19.3	-57°06.5
5	156°09.3	263°09.5	14.4	248°43.0	10.2	40°36.6	33.3	159°30.7	59.4	Hamal	327°50.1	23°35.3
6	171°11.7	278°08.6	\$22°14.9	263°43.5	S24°10.3	55°39.3	N21°33.3	174°33.1	S03°59.4	Polaris	313°12.7	89°22.6
7	186°14.2	293°07.7	15.4	278°43.9	10.3	70°42.0	33.4	189°35.5	59.3	Acamar	315°10.8	-40°12.1
8	201°16.7	308°06.8	15.8	293°44.3 308°44.7	10.4 •• 10.4	85°44.8	33.4	204°37.9	59.3	Menkar	$314^{\circ}05.1$	4°11.6
9	216°19.1 231°21.6	323°05.9	16.3	308 44.7 323°45.1		100°47.5	• • 33.5	219°40.3	• • 59.3	Mirfak	308°26.7	49°57.4
10 11	231 21.6 246°24.0	338°05.0 353°04.1	16.7 17.2	323 45.1 338°45.5	10.5 10.5	115°50.2 130°52.9	33.5 33.6	234°42.7 249°45.1	59.2 59.2	Aldebaran	290°38.4	$16^{\circ}33.7$
12	240°24.0°26.5	8°03.2	\$22°17.7	353° 45.9	524°10.6	130° 52.9 145° 55.6	N21°33.6	264° 47.5	503°59.2	Rigel	281°02.8	-8°10.3
13	276°29.0	23°02.3	18.1	8°46.3	10.6	160°58.3	33.7	279°49.9	59.1	Capella	280°20.3	46°01.5
14	291°31.4	38°01.4	18.6	23°46.7	10.7	176°01.1	33.7	294°52.3	59.1	Bellatrix		6°22.4
15	306°33.9	53°00.4	19.0	38°47.1	. 10.7	191°03.8	• • 33.7	309°54.8	59.1	Elnath	278°00.5	28° 37.8
16	321°36.4	67°59.5	19.5	53°47.5	10.8	206° 06.5	33.8	324°57.2	59.0	Alnilam	275°36.6	-1°11.1
17	336°38.8	82°58.6	19.9	68°47.9	10.8	221°09.2	33.8	339°59.6	59.0	Betelgeuse	270°50.9	7°24.7
18	351°41.3	97° 57.7	S22°20.4	83°48.3	S24°10.9	236°11.9	N21°33.9	355°02.0	S03°59.0	Canopus	263°51.5	-52°42.4
19	6°43.8	112° 56.8	20.8	98° 48.7	10.9	251°14.6	33.9	10°04.4	58.9	Sirius	258°25.2	-16°45.0
20	21°46.2	127°55.9	21.3	113°49.1	11.0	266° 17.4	34.0	25°06.8	58.9	Adhara	255°04.9	-29°00.3
21	36°48.7	142°55.0	21.7	128°49.5	· · 11.0	281°20.1	• • 34.0	40°09.2	• • 58.9	Procyon	244°49.8	5°09.5
22	51°51.2	157°54.1	22.2	143°49.9	11.1	296° 22.8	34.1	55°11.6	58.8	Pollux		27°57.7
23	66°53.6	172°53.2	22.6	158° 50.3	11.1	311°25.5	34.1	70°14.0	58.8	Avior	234°14.0	-59°35.3
								-		Suhail	222°45.5	-43°32.0
Mer.p	pass. 18:33	$\nu$ -0.9′ d0	.5′ m-3.90	u 0.4' d0	.1′ m1.24	$\nu 2.7' d0$	.0′ m-2.60	$\nu$ 2.4′ d-0	.0′ m0.95	Miaplacidus	221°37.6	-69°49.1
										Alphard	217°46.8	-8°46.2
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.5	11°50.4
0	81°56.1	187°52.3	S22°23.0	173°50.7	S24°11.1	326°28.2	N21°34.2	85°16.4	S03°58.8	Dubhe		61°36.3
1	96°58.5	202°51.4	23.5	188°51.1	11.2	341°31.0	34.2	100°18.8	58.7	Denebola	182°24.2	14°25.5
2	112°01.0	217° 50.5	23.9	203°51.5	11.2	356°33.7	34.3	115°21.2	58.7	Gienah	175°42.9	-17°41.1
3	127°03.5	232°49.6	• • 24.4	218°52.0	. 11.3	11°36.4	34.3	130°23.6	• • 58.7	Acrux		-63°14.3
4	142°05.9	247° 48.7	24.8	233°52.4	11.3	26°39.1	34.4	145°26.1	58.6	Gacrux		-57° 15.2
5	157°08.4	262° 47.8	25.2	248°52.8	11.4	41°41.8	34.4	160°28.5	58.6	Alioth	166°12.5	55°48.8
6	172°10.9	277°46.9	S22°25.7	263°53.2	S24°11.4	56°44.6	N21°34.5	175°30.9	S03°58.6	Spica	158°21.7	-11°17.8
7	187°13.3	292°46.0	26.1	278°53.6	11.4	71°47.3	34.5	190°33.3	58.5	Alkaid	152°51.7 148°35.4	49° 10.8 -60° 29.7
8	202°15.8	307°45.0	26.6	293°54.0	11.5	86°50.0	34.6	205°35.7	58.5	Hadar		-80° 29.7
9	$217^{\circ}18.3$	322°44.1	• • 27.0	308°54.4	• • 11.5	101°52.7	• • 34.6	220°38.1	• • 58.5	Menkent	147 57.0 145°47.5	-30 29.7 19°02.7
10	232°20.7	337°43.2	27.4	323°54.8	11.6	116°55.4	34.7	235°40.5	58.4	Arcturus Rigil Kent.	145 47.5 139°39.8	-60° 56.4
11	247°23.2	352°42.3	27.8	338°55.2	11.6	131°58.2	34.7	250°42.9	58.4	Kochab	139 39.8 137°20.8	74°02.6
12	262°25.6	7°41.4	S22°28.3	353°55.6	S24°11.6	147°00.9	N21°34.8	265°45.3	S03°58.4	Zuben'ubi		-16°08.9
13	$277^{\circ}28.1$	22°40.5	28.7	8°56.0	11.7	162°03.6	34.8	280°47.7	58.3	Alphecca	136°03.4	26° 37.5
14	292°30.6	37°39.6	29.1	23°56.4	11.7	177°06.3	34.8	295°50.1	58.3	Antares	112° 15.3	-26° 29.3
15	307°33.0	52°38.7	• • 29.6	38°56.8	• • 11.8	192°09.1	• • 34.9	310°52.5	• • 58.2	Atria	107°09.4	-69°04.4
16	322°35.5	67°37.8	30.0	53°57.2	11.8	207°11.8	34.9	325°54.9	58.2	Sabik	102°02.3	-15° 45.4
17	337°38.0	82°36.8	30.4	68°57.6	11.8	222°14.5	35.0	340°57.3	58.2	Shaula	96°09.8	-37°07.3
18	352°40.4	97°35.9	S22°30.8	83°58.0	S24°11.9	237° 17.2	N21°35.0	355°59.7	503°58.1	Rasalhague	95°58.2	12°32.5
19	7°42.9	112°35.0	31.3	98°58.4	11.9	252°20.0	35.1	11°02.1	58.1	Eltanin	90°42.4	51°29.1
20	22°45.4	$127^{\circ}34.1$	31.7	113°58.8	11.9	267°22.7	35.1	26°04.5	58.1	Kaus Aust.	83°31.9	-34°22.4
21	37°47.8	142°33.2	• • 32.1	128°59.2	• • 12.0	282°25.4	• • 35.2	41°06.9	• • 58.0	Vega	80°33.1	38°48.5
22	52°50.3	157°32.3	32.5	143°59.6	12.0	297°28.1	35.2	56°09.3	58.0	Nunki	75°47.2	-26° 15.9
23	67°52.8	172°31.4	32.9	159°00.0	12.0	312°30.9	35.3	$71^{\circ}11.7$	58.0	Altair	61°59.5	8°56.3
Merr	pass. 18:29	v-0.9' d0	.4′ m-3.90	v0.4'.d0	.0′ m1.24	v2 7' d0	.0′ m-2.61	ν2 Δ' d-Ω	.0′ m0.96	Peacock	53°05.0	-56°39.3
- IVICI.F	7433. 10.29	ν-0.9 α0		νο. <del>+</del> αο	.0 1111.24	ν2.1 do	.0 111-2.01	ν2. <del>-</del> u-0	.0 1110.90	Deneb	49°25.6	45°22.6
										Enif	33°38.2	9°59.7
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.1	-46°50.3
0	82°55.2	187°30.5	S22°33.3	174°00.4	S24°12.1	327° 33.6		86°14.1	S03°57.9	Fomalhaut	15°13.7	-29°29.2
1	97°57.7	202°29.5	33.8	189°00.8	12.1	342°36.3	35.4	101°16.5	57.9	Scheat	$13^{\circ}44.5$	28° 13.6
2	113°00.1	217°28.6	34.2	204°01.2	12.1	357°39.0	35.4	116°18.9	57.8	Markab	$13^{\circ}29.2$	15°20.8
3	128°02.6	232°27.7	• • 34.6	219°01.6	• • 12.2	12°41.8	• • 35.5	131°21.3	• • 57.8	D 10 5:	C11.5	
4	143°05.1	247°26.8	35.0	234°02.0	12.2	27°44.5	35.5	146°23.7	57.8	Dec 12 Fri	<b>SHA</b> 107°17.0	Mer.pass
5	158°07.5	262°25.9	35.4	249°02.4	12.2	42°47.2	35.6	161°26.2	57.7	Mars	92°44.1	11:28
6	173°10.0	277°25.0	\$22°35.8	264°02.8	S24°12.3	57°49.9	N21°35.6	176°28.6	S03°57.7		92 44.1 244°26.1	12:25
7	188°12.5	292°24.0	36.2	279°03.2	12.3	72°52.7	35.7	191°31.0	57.7 57.6	Saturn	3°21.7	02:18 18:20
8	203°14.9	307°23.1	36.6	294°03.6	12.3	87°55.4	35.7	206°33.4	57.6	Saturn	3 21.7	10.20
9	218°17.4	322°22.2	•• 37.0	309°04.0	12.3	102°58.1	• • 35.8	221°35.8	•• 57.6	Dec 13 Sat	SHA	Mer.pass
10	233°19.9 248°22.3	337°21.3 352°20.4	37.4 37.8	324°04.4 339°04.8	12.4 12.4	118°00.9 133°03.6	35.8 35.9	236°38.2 251°40.6	57.6 57.5		$105^{\circ}56.2$	11:29
11 12	248 22.3 263°24.8	7°19.5	522°38.2	354°05.2	524°12.4	133 03.6 148°06.3	35.9 N21°35.9	266°43.0	57.5 \$03°57.5	Mars	91°54.7	12:24
13	203 24.6 278°27.3	7 19.5 22°18.5	38.6	9°05.6	12.5	148 00.3 163°09.1	36.0	200 45.0 281°45.4	57.4	Jupiter	244°32.2	02:14
13 14	276 27.3 293°29.7	37° 17.6	39.0	24°06.0	12.5	103 09.1 178°11.8	36.0	201 45.4 296°47.8	57.4 57.4	Saturn	3°20.3	18:16
15	308°32.2	52° 16.7	• • 39.4	39°06.4	12.5	176 11.6 193°14.5	. 36.1	311°50.2	• • 57.4	Doc 14 S	C LI A	Mornas
16	323°34.6	67° 15.8	39.4	54°06.8	12.5	208° 17.2	36.1	326°52.6	57.3	Dec 14 Sun Venus	<b>SHA</b> 104°35.2	Mer.pass 11:31
17	338°37.1	82° 14.9	40.2	69°07.2	12.5	200° 17.2 223° 20.0	36.2	341°55.0	57.3	Venus	91°05.2	
18	353°39.6	97°13.9	\$22°40.6	84°07.6	\$24°12.6	238°22.7	N21°36.2	356°57.4	503°57.3		91°05.2 244°38.4	12:24 02:09
19	8°42.0	112° 13.0	41.0	99°08.0	12.6	253° 25.4	36.3	11°59.8	57.2	Saturn	3°18.9	18:12
20	23°44.5	127°12.1	41.4	114°08.4	12.6	268° 28.2	36.3	27°02.2	57.2	Saturn	3 10.9	10.12
21	38°47.0	142°11.2	• • 41.8	129°08.8	• • 12.7	283°30.9	• 36.4	42°04.6	57.1	Horizon	tal parallax	
22	53°49.4	157° 10.2	42.2	144°09.2	12.7	298°33.6	36.4	57°07.0	57.1		Venus:	0.1
23	68°51.9	172°09.3	42.6	159°09.6	12.7	313°36.4	36.5	72°09.4	57.1		Mars:	0.1
ivier.p	pass. 18:25	$\nu$ -0.9′ $d0$	.4′ m-3.90	$\nu$ 0.4′ d0	.0′ m1.23	$\nu$ 2.1' d0	.0′ m-2.61	ν2.4′ <b>d</b> -0	.0′ m0.96			

h	Sui	n			Moon		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	181°36.5	S23°04.6	268°52.0	15.8'	N02°35.6	-14.8'	55.8'
1 2	196°36.2 211°35.9	04.8 05.0	283°26.8 298°01.7	15.9' 15.9'	02°20.8 02°06.0	-14.8' -14.8'	55.8' 55.7'
3	226°35.7	05.0	312°36.6	15.9'	02 00.0 01°51.2	-14.8'	55.7'
4	241°35.4	05.3	$327^{\circ}11.5$	16.0'	01°36.4	-14.8'	55.7'
5	256°35.1	05.5	341°46.5	16.0'	01°21.6	-14.8'	55.6'
6 7	271°34.8 286°34.5	\$23°05.7 05.9	356°21.5 10°56.6	16.0' 16.1'	N01°06.9 00°52.1	-14.7' -14.7'	55.6' 55.6'
8	301°34.2	06.1	25°31.7	16.1	00°37.4	-14.7'	55.5'
9	316°33.9	• • 06.2	40°06.8	16.1'	00°22.7	-14.7'	55.5'
10	331°33.6 346°33.3	06.4 06.6	54°41.9 69°17.1	16.2' 16.2'	N00°08.0 S00°06.7	-14.7' 14.7'	55.5' 55.5'
11 12	1°33.0	523°06.8	83°52.3	16.2'	500°00.7 500°21.4	14.7	55.4'
13	16°32.7	06.9	98°27.5	16.2'	00°36.1	14.6'	55.4'
14	31°32.4	07.1	113°02.8	16.3'	00°50.7	14.6'	55.4'
15 16	46°32.1 61°31.9	· · 07.3 07.5	127°38.0 142°13.3	16.3' 16.3'	01°05.3 01°19.9	14.6' 14.6'	55.3' 55.3'
17	76°31.6	07.6	156°48.6	16.3'	01°34.5	14.6'	55.3'
18	91°31.3	<b>S</b> 23°07.8	171°24.0	16.3'	S01°49.1	14.5'	55.3'
19	106°31.0 121°30.7	08.0	185°59.3 200°34.7	16.4	02°03.7 02°18.2	14.5'	55.2'
20 21	121°30.7 136°30.4	08.2 •• 08.3	200°34.7 215°10.1	16.4' 16.4'	02° 18.2 02° 32.7	14.5' 14.5'	55.2' 55.2'
22	151°30.1	08.5	229°45.5	16.4'	02°47.2	14.5'	55.2'
23	166°29.8	08.7	244°20.9	16.4'	03°01.6	14.4'	55.1'
	SD = 16.2'	d = 0.2'		SI	D = 15.2'		
Sat	GHA	Dec	GHA	ν	Dec	d	НР
0 0	181°29.5	\$23°08.8	258°56.3	ν 16.4'	503°16.1	14.4'	55.1'
1	196°29.2	09.0	273°31.7	16.4'	03°30.5	14.4'	55.1'
2	211°28.9 226°28.6	09.2	288°07.2 302°42.6	16.4'	03°44.9 03°59.2	14.4'	55.1'
3 4	241°28.3	· · 09.3 09.5	302 42.6 317°18.1	16.5' 16.5'	03 59.2 04°13.6	14.3' 14.3'	55.0' 55.0'
5	256°28.0	09.7	331°53.5	16.5'	04°27.9	14.3'	55.0'
6	271°27.7	S23°09.8	346°29.0	16.5'	S04°42.1	14.2'	55.0'
7 8	286°27.4 301°27.1	10.0 10.2	1°04.5 15°39.9	16.5' 16.5'	04°56.4 05°10.6	14.2' 14.2'	54.9' 54.9'
9	316°26.8	. 10.2	30°15.4	16.5	05°10.0	14.2	54.9'
10	331°26.6	10.5	44°50.9	16.5'	05°39.0	14.1'	54.9'
11	346°26.3	10.6	59°26.3	16.5'	05°53.1	14.1'	54.8'
12 13	1°26.0 16°25.7	\$23°10.8 11.0	74°01.8 88°37.3	16.5' 16.5'	\$06°07.2 06°21.2	14.1' 14.0'	54.8' 54.8'
14	31°25.4	11.1	103°12.7	16.5'	06°35.3	14.0'	54.8'
15	46°25.1	• • 11.3	117°48.2	16.4'	06°49.3	14.0'	54.8'
16 17	61°24.8 76°24.5	11.4 11.6	132°23.6 146°59.1	16.4' 16.4'	07°03.2 07°17.1	13.9' 13.9'	54.7' 54.7'
18	91°24.2	\$23°11.7	161°34.5	16.4	S07°31.0	13.8'	54.7'
19	106°23.9	11.9	$176^{\circ}09.9$	16.4'	07°44.9	13.8'	54.7'
20	121°23.6	12.0	190°45.3		07°58.7 08°12.5		54.7'
21 22	136°23.3 151°23.0	· · 12.2 12.3	205°20.7 219°56.1	16.4' 16.4'	08° 12.5 08° 26.2	13.7' 13.7'	54.6' 54.6'
23	166°22.7	12.5	234°31.4	16.3'	08°39.9	13.7'	54.6'
	SD = 16.2'	d = 0.2'	-	SI	D = 15.0'		
Sun	GHA	Dec	GHA	ν	Dec	d	НР
0	181°22.4	\$23°12.6	249°06.8	16.3'	S08°53.5	13.6'	54.6'
1	196°22.1	12.8	263°42.1	16.3'	09°07.2	13.6'	54.6'
2	211°21.8 226°21.5	12.9 •• 13.1	278°17.4 292°52.7	16.3' 16.3'	09°20.7 09°34.3	13.5' 13.5'	54.5' 54.5'
3 4	226°21.5 241°21.2	13.1	307°28.0	16.2	09° 34.3 09° 47.7	13.4	54.5' 54.5'
5	256°20.9	13.4	322°03.2	16.2'	10°01.2	13.4'	54.5'
6	271°20.6 286°20.3	\$23°13.5 13.7	336°38.5 351°13.7	16.2'	\$10°14.6 10°27.9	13.4'	54.5'
7 8	286°20.3 301°20.0	13.7 13.8	351°13.7 5°48.8	16.2' 16.2'	10°27.9 10°41.2	13.3' 13.3'	54.5' 54.4'
9	$316^{\circ}19.7$	• • 13.9	20°24.0	16.1'	10°54.5	13.2'	54.4'
10	331°19.4	14.1	34°59.1	16.1'	11°07.7	13.2'	54.4
11 12	346°19.1 1°18.8	14.2 \$23°14.4	49°34.2 64°09.3	16.1' 16.0'	11°20.9 \$11°34.0	13.1' 13.1'	54.4' 54.4'
13	16°18.5	14.5	78°44.3	16.0'	11°47.0	13.1	54.4
14	31°18.2	14.6	93°19.3	16.0'	12°00.1	13.0'	54.4'
15	46°17.9	• • 14.8	107°54.3	15.9'	12°13.0	12.9'	54.3'
16 17	61°17.6 76°17.3	14.9 15.1	122°29.3 137°04.2	15.9' 15.9'	12°25.9 12°38.8	12.9' 12.8'	54.3' 54.3'
18	91°17.0	S23°15.2	151°39.1	15.8'	S12°51.6	12.8'	54.3'
19	106°16.7	15.3	166°13.9	15.8'	13°04.3	12.7'	54.3'
20 21	121°16.4 136°16.1	15.5 •• 15.6	180°48.7 195°23.5	15.8' 15.7'	13°17.0 13°29.7	12.6' 12.6'	54.3' 54.3'
22	150°15.1 151°15.8	15.7	209°58.2	15.7' 15.7'	13°42.3	12.5	54.3'
23	166°15.5	15.9	224°32.9	15.7'	13°54.8	12.5'	54.2'
	SD = 16.2'	d = 0.1'		SI	D = 14.9'		

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

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

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.	Age		
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Upper Lower		
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	49-30%	
12	06:26	06:12	11:54	06:15	18:35		
13	05:58	05:44	11:54	06:56	19:16		
14	05:30	05:15	11:55	07:36	19:57		

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

h	Aries		nus		ars	lur	oiter	Sat	urn		Stars	
-												
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	83°54.4	187°08.4	S22°42.9	174°10.0	\$24°12.7	328°39.1	N21°36.5	$87^{\circ}11.8$	S03°57.0	Alpheratz	357°33.9	29°14.2
1	98°56.8	202°07.5	43.3	189°10.4	12.8	343°41.8	36.6	102° 14.2	57.0	Ankaa	353°06.3	-42°10.1
2	113°59.3	217°06.6	43.7	204°10.8	12.8	358°44.6	36.6	$117^{\circ}16.6$	57.0	Schedar	349°30.0	56°41.1
3	129°01.7	232°05.6	• • 44.1	$219^{\circ}11.2$	• • 12.8	13°47.3	• • 36.7	132° 19.0	• • 56.9	Diphda	348°46.4	-17°50.7
4	144°04.2	247°04.7	44.5	234°11.6	12.8	28°50.0	36.7	147°21.4	56.9		335°19.3	-17 30.7 -57°06.5
5	159°06.7	262°03.8	44.9	249°12.0	12.8	43°52.8	36.8	162°23.7	56.8	Achernar		
6	174°09.1	277°02.9	S22°45.2	264°12.4	S24°12.9	58°55.5	N21°36.8	177°26.1	S03°56.8	Hamal	327°50.1	23°35.3
7	189°11.6	292°01.9	45.6	279°12.8	12.9	73°58.2	36.9	192°28.5	56.8	Polaris	313°13.3	89°22.6
8	204°14.1	307°01.0	46.0	294°13.2	12.9	89°01.0	36.9	207°30.9	56.7	Acamar	315°10.8	-40°12.1
9	219°16.5	322°00.1	• • 46.4	309°13.6	. 12.9	104°03.7	• • 37.0	222°33.3	56.7	Menkar	314°05.1	4°11.5
10	234°19.0	336°59.2	46.8	324°14.0	12.9	119°06.4	37.0	237°35.7	56.6	Mirfak	308° 26.7	49°57.4
11	249°21.5	351°58.2	47.1	339°14.4	12.9	134°09.2	37.1	252°38.1	56.6	Aldebaran	290°38.4	16°33.7
12	264°23.9	6°57.3	S22°47.5	354°14.8	\$24°13.0	149°11.9	N21°37.1	267°40.5	S03°56.6	Rigel	281°02.8	-8°10.3
13	279°26.4	21°56.4	47.9	9°15.2	13.0	164°14.6	37.2	282°42.9	56.5	Capella	280°20.3	46°01.5
14	294°28.9	36°55.4	48.2	24°15.6	13.0	179°17.4	37.2	202 42.9 297°45.3	56.5	Bellatrix	278°21.7	6°22.4
15	309°31.3	51°54.5	• • 48.6	39°15.9	. 13.0	194°20.1	37.2	312° 47.7	56.5	Elnath	278°00.5	28°37.8
	324°33.8	66°53.6	49.0	54°16.3	13.0	209°22.9		327°50.1	56.4	Alnilam	275°36.6	$-1^{\circ}11.1$
16	339°36.2	81°52.7		69°16.7			37.3	342° 52.5		Betelgeuse	270°50.9	$7^{\circ}24.7$
17			49.3		13.0	224°25.6	37.4		56.4	Canopus	263°51.5	-52°42.5
18	354°38.7	96°51.7	S22°49.7	84°17.1	S24°13.1	239°28.3	N21°37.4	357°54.9	\$03°56.3	Sirius	258°25.2	-16°45.0
19	9°41.2	111°50.8	50.1	99°17.5	13.1	254°31.1	37.5	12°57.3	56.3	Adhara	255°04.9	-29°00.3
20	24°43.6	126°49.9	50.4	114°17.9	13.1	269°33.8	37.5	27°59.7	56.3	Procyon	244°49.7	5°09.5
21	39°46.1	141°48.9	• • 50.8	129°18.3	• • 13.1	284°36.5	• • 37.6	43°02.1	56.2	Pollux	243°16.0	27°57.7
22	54°48.6	156°48.0	51.2	144°18.7	13.1	299°39.3	37.6	58°04.5	56.2	Avior	234°13.9	-59°35.3
23	69°51.0	171°47.1	51.5	159°19.1	13.1	314°42.0	37.7	73°06.9	56.1	Suhail	222°45.5	-43°32.0
Mara	ass. 18:21	ν-0 0' 40	.4′ m-3.90	1/0 A/ A0	.0′ m1.23	1/2 7' do	.0′ m-2.62	1/2 // 4 0	.0′ m0.96	Miaplacidus	221°37.6	-43 32.0 -69°49.1
ivier.p	rass. 10.21	ν-0.9 α0.	.+ 111-3.90	νυ.4 αυ.	.0 1111.23	ν2.1 d0.	.0 111-2.02	ν2.4 U-U	.0 1110.90	Alphard	221 37.6 217°46.8	-8°46.2
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.5	11°50.3 61°36.3
0	84°53.5	186°46.2	S22°51.9	174°19.5	\$24°13.1	329°44.8	N21°37.7	88°09.3	S03°56.1	Dubhe	193°40.0	
1	99°56.0	201°45.2	52.2	189°19.9	13.1	344°47.5	37.8	103° 11.7	56.1	Denebola	182°24.2	14°25.5
2	114°58.4	216°44.3	52.6	204°20.3	13.1	359°50.2	37.8	118° 14.1	56.0	Gienah	175°42.9	-17°41.1
3	130°00.9	231°43.4	• • 52.9	219°20.7	. 13.2	14°53.0	37.9	133° 16.5	56.0	Acrux	172°59.4	-63°14.3
4	145°03.4	246°42.4	53.3	234°21.1	13.2	29°55.7	37.9	148° 18.9	55.9	Gacrux	171°50.9	-57°15.2
5	160°05.8	261°41.5	53.6	249°21.5	13.2	44°58.5	38.0	163°21.3	55.9	Alioth	$166^{\circ}12.5$	55°48.8
6			\$22°54.0		524°13.2	60°01.2	N21°38.0		S03°55.9	Spica	158°21.7	-11°17.8
	175°08.3	276°40.6		264°21.9				178°23.6 193°26.0		Alkaid	152°51.7	49°10.8
7	190°10.7	291°39.6	54.3	279°22.3	13.2	75°03.9	38.1		55.8	Hadar	148°35.3	-60°29.7
8	205°13.2	306°38.7	54.7	294°22.7	13.2	90°06.7	38.1	208°28.4	55.8	Menkent	147°57.0	-36°29.7
9	220°15.7	321°37.8	• • 55.0	309°23.1	• • 13.2	105°09.4	• • 38.2	223° 30.8	• • 55.7	Arcturus	145°47.4	19°02.7
10	235°18.1	336°36.8	55.4	324°23.5	13.2	120°12.2	38.2	238° 33.2	55.7	Rigil Kent.	139°39.7	-60°56.3
11	250°20.6	351°35.9	55.7	339°23.9	13.2	135°14.9	38.3	253°35.6	55.7	Kochab	137°20.7	74°02.6
12	265°23.1	6°35.0	\$22°56.1	354°24.3	S24°13.2	$150^{\circ}17.6$	N21°38.3	268°38.0	S03°55.6	Zuben'ubi	136°55.4	-16°08.9
13	280°25.5	21°34.0	56.4	9°24.6	13.2	165°20.4	38.4	283°40.4	55.6	Alphecca	126°03.4	26°37.5
14	295°28.0	36°33.1	56.8	24°25.0	13.2	180°23.1	38.4	298°42.8	55.5	Antares	112° 15.3	-26°29.3
15	310°30.5	51°32.2	•• 57.1	39°25.4	• • 13.2	195°25.9	• • 38.5	313°45.2	• • 55.5	1	112 15.3 107°09.4	-20°29.3 -69°04.3
16	325°32.9	66°31.2	57.4	54°25.8	13.2	210°28.6	38.5	328°47.6	55.5	Atria		-09 04.3 -15°45.4
17	340°35.4	81°30.3	57.8	69°26.2	13.3	225°31.4	38.6	343°50.0	55.4	Sabik	102°02.3	
18	355°37.9	96°29.4	S22°58.1	84°26.6	S24°13.3	240°34.1	N21°38.6	358° 52.4	S03°55.4	Shaula	96°09.8	-37°07.3
19	10°40.3	111°28.4	58.5	99°27.0	13.3	255°36.9	38.7	13°54.7	55.3	Rasalhague	95°58.2	12°32.5
20	25°42.8	126°27.5	58.8	114°27.4	13.3	270°39.6	38.7	28°57.1	55.3	Eltanin	90°42.4	51°29.1
21	40°45.2	141°26.6	• • 59.1	129°27.8	• • 13.3	285°42.3	38.8	43°59.5	55.2	Kaus Aust.	83°31.9	-34°22.3
22	55°47.7	156°25.6	59.5	144°28.2	13.3	300°45.1	38.8	59°01.9	55.2	Vega	80°33.1	38°48.5
										Nunki	75° 47.2	-26°15.9
23	70°50.2	171°24.7	59.8	159°28.6	13.3	315°47.8	38.9	74°04.3	55.2	Altair	61°59.5	8°56.3
Mer.p	ass. 18:17	$\nu$ -0.9' d0.	.4′ m-3.90	$\nu$ 0.4′ d0.	.0′ m1.22	$\nu 2.7' \ d0.$	.1′ m-2.62	$\nu$ 2.4′ d-0	.0′ m0.97	Peacock	53°05.0	-56°39.2
										Deneb	49°25.6	45°22.5
			_		_		_		_	Enif	33°38.2	9°59.7
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	$27^{\circ}32.1$	-46°50.3
0	85°52.6	186°23.7	\$23°00.1	174°29.0	S24°13.3	330°50.6	N21°38.9	89°06.7	S03°55.1	Fomalhaut	$15^{\circ}13.7$	-29°29.2
1	100°55.1	201°22.8	00.4	189°29.4	13.3	345°53.3	39.0	104°09.1	55.1	Scheat	13°44.5	28°13.6
2	115°57.6	216°21.9	8.00	204°29.8	13.3	0°56.1	39.0	119° 11.5	55.0	Markab	13°29.2	15°20.8
3	131°00.0	231°20.9	•• 01.1	219°30.2	• • 13.3	15°58.8	• • 39.1	134° 13.9	• • 55.0			
4	146°02.5	246°20.0	01.4	234°30.6	13.3	31°01.6	39.1	149°16.3	55.0	Dec 15 Mon	SHA	Mer.pass
5	$161^{\circ}05.0$	$261^{\circ}19.0$	01.7	249°30.9	13.3	46°04.3	39.2	$164^{\circ}18.7$	54.9	Venus	103°14.0	11:32
6	176°07.4	276°18.1	\$23°02.1	264°31.3	524°13.3	61°07.1	N21°39.2	179°21.0	S03°54.9	Mars	90°15.6	12:23
7	$191^{\circ}09.9$	291°17.2	02.4	279°31.7	13.3	76°09.8	39.3	194°23.4	54.8	Jupiter	244°44.7	02:05
8	$206^{\circ}12.3$	$306^{\circ}16.2$	02.7	294°32.1	13.2	91°12.5	39.3	209°25.8	54.8	Saturn	3°17.4	18:08
9	221°14.8	321°15.3	• • 03.0	309°32.5	• • 13.2	106°15.3	• • 39.4	224°28.2	• • 54.7	D. 10 T	CIIC	N4-
10	236°17.3	336°14.3	03.3	324°32.9	13.2	121°18.0	39.4	239°30.6	54.7	Dec 16 Tue	SHA	Mer.pass
11	251°19.7	351°13.4	03.7	339°33.3	13.2	136°20.8	39.5	254°33.0	54.7	Venus	101°52.7	11:34
12	266°22.2	6°12.5	\$23°04.0	354°33.7	S24°13.2	151°23.5	N21°39.5	269°35.4	S03°54.6	Mars	89°26.0	12:22
13	281°24.7	21°11.5	04.3	9°34.1	13.2	166°26.3	39.6	284°37.8	54.6	Jupiter	244°51.3	02:01
14	296°27.1	36°10.6	04.6	24°34.5	13.2	181°29.0	39.7	299°40.2	54.5	Saturn	3°15.8	18:04
15	311°29.6	51°09.6	• • 04.9	39°34.9	• • 13.2	196°31.8	•• 39.7	314° 42.5	• • 54.5	Doc 17 14/- 1	CHA	Me:: ====
	326°32.1	66°08.7		59° 34.9 54° 35.3	13.2	211°34.5		314 42.5 329°44.9		Dec 17 Wed	SHA	Mer.pass
16			05.2				39.8		54.5	Venus	100°31.1	11:35
17	341°34.5	81°07.8	05.5	69°35.7	13.2	226°37.3	39.8	344°47.3	54.4	Mars	88°36.3	12:22
18	356°37.0	96°06.8	\$23°05.8	84°36.0	\$24°13.2	241°40.0	N21°39.9	359°49.7	S03°54.4	Jupiter		01:56
19	11°39.5	111°05.9	06.1	99°36.4	13.2	256°42.8	39.9	14°52.1	54.3	Saturn	3°14.1	18:01
20	26°41.9	126°04.9	06.4	114°36.8	13.2	271°45.5	40.0	29°54.5	54.3	المسالم ال	al parallax	
21	41°44.4	141°04.0	• • 06.7	129°37.2	• • 13.2	286°48.3	• • 40.0	44°56.9	• • 54.2	HORIZONI	•	0.1
22	56°46.8	156°03.0	07.0	144°37.6	13.2	301°51.0	40.1	59°59.3	54.2		Venus:	0.1
23	71°49.3	171°02.1	07.3	159°38.0	13.1	316°53.8	40.1	75°01.6	54.2		Mars:	0.1
Mara	ass. 18:13	ν-0 0' 40	.3′ m-3.90	υ0 Δ' Δ O	0.0′ m1.21	1/2 7/ do	.1′ m-2.63	1/2 // 4 0	.0′ m0.97			
.vici.p		ν 0.5 u0.	.5 5.50	ν J.¬ u-0		- 2.1 UU.	2.00	∠ ∠.¬ u-∪				

h	Sui	n			Moon		
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	181°15.2	S23°16.0	239°07.5	15.6'	S14°07.3	12.4'	54.2'
1 2	196°14.9 211°14.6	16.1 16.2	253°42.2 268°16.7	15.6' 15.5'	14° 19.7 14° 32.1	12.4' 12.3'	54.2' 54.2'
3	226°14.3	16.4	282°51.3	15.5'	14° 32.1	12.3	54.2'
4	241°14.0	16.5	297°25.7	15.4'	$14^{\circ}56.6$	12.2'	54.2'
5	256°13.7	16.6	312°00.2	15.4'	15°08.8	12.1'	54.2'
6 7	271°13.4 286°13.1	\$23°16.7 16.9	326°34.6 341°08.9	15.3' 15.3'	\$15°20.9 15°32.9	12.1' 12.0'	54.1' 54.1'
8	301°12.8	17.0	355°43.2	15.3'	15° 32.9	11.9'	54.1'
9	316°12.5	•• 17.1	$10^{\circ}17.5$	15.2'	$15^{\circ}56.8$	11.9'	54.1'
10	331°12.2	17.2	24°51.7	15.2'	16°08.7	11.8'	54.1'
11 12	346°11.9 1°11.6	17.4 \$23°17.5	39°25.9 54°00.0	15.1' 15.1'	16° 20.5 \$16° 32.2	11.7' 11.7'	54.1' 54.1'
13	16°11.3	17.6	68°34.0	15.0'	16°43.9	11.6'	54.1'
14	31°11.0	17.7	83°08.0	15.0'	16°55.5	11.5'	54.1'
15	46°10.7 61°10.4	· · 17.8 17.9	97°42.0 112°15.9	14.9' 14.8'	17° 07.0 17° 18.5	11.5' 11.4'	54.1' 54.1'
16 17	76°10.1	18.1	112 15.9 126°49.7	14.8'	17 10.5 17°29.8	11.4	54.1°
18	91°09.8	S23°18.2	141°23.5	14.7'	\$17°41.1	11.2'	54.0'
19	106°09.5	18.3	155°57.3	14.7'	17°52.4	11.2'	54.0'
20	121°09.2 136°08.9	18.4	170°31.0 185°04.6	14.6'	18°03.6 18°14.7	11.1'	54.0'
21 22	150 08.9 151°08.6	· · 18.5 18.6	185 04.6 199°38.2	14.6' 14.5'	18 14.7 18°25.7	11.0' 10.9'	54.0' 54.0'
23	166°08.3	18.7	214°11.7	14.5'	18° 36.6	10.9	54.0'
	SD = 16.2'	d = 0.1'		SE	0 = 14.8'		
_							
Tue 0	<b>GHA</b> 181°08.0	Dec 523°18.9	<b>GHA</b> 228°45.1	u 14.4'	Dec \$18° 47.5	<i>d</i> 10.8'	<b>HP</b> 54.0'
1	181 08.0 196°07.7	19.0	243°18.5	14.4	18° 58.3	10.8	54.0'
2	211°07.4	19.1	257°51.9	14.3'	19°09.0	10.6'	54.0'
3	226°07.0	• • 19.2	272°25.2	14.2'	19°19.6	10.6'	54.0'
4 5	241°06.7 256°06.4	19.3 19.4	286°58.4 301°31.5	14.2' 14.1'	19° 30.2 19° 40.7	10.5' 10.4'	54.0' 54.0'
6	271°06.1	\$23°19.5	316°04.6	14.1	\$19°51.1	10.4	54.0'
7	286°05.8	19.6	330°37.7	14.0'	20°01.4	10.2'	54.0'
8	301°05.5	19.7	345°10.7	13.9'	20°11.6	10.2'	54.0'
9 10	316°05.2 331°04.9	· · 19.8 19.9	359°43.6 14°16.4	13.9' 13.8'	20°21.8 20°31.8	10.1' 10.0'	53.9' 53.9'
11	346°04.6	20.0	28°49.2	13.7'	20° 41.8	9.9'	53.9'
12	1°04.3	S23°20.1	43°21.9	13.7'	S20°51.7	9.8'	53.9'
13 14	16°04.0 31°03.7	20.2 20.3	57°54.6 72°27.2	13.6' 13.5'	21°01.5 21°11.3	9.7'	53.9' 53.9'
14 15	46°03.4	20.4	72 27.2 86°59.7	13.5'	21 11.3 21°20.9	9.6' 9.5'	53.9' 53.9'
16	61°03.1	20.5	101°32.2	13.4'	21°30.4	9.5'	53.9'
17	76°02.8	20.6	116°04.6	13.3'	21°39.9	9.4'	53.9'
18 19	91°02.5 106°02.2	\$23°20.7 20.8	130°36.9 145°09.2	13.3' 13.2'	\$21°49.2 21°58.5	9.3' 9.2'	53.9' 53.9'
20	100 02.2 121°01.9	20.8	145 09.2 159°41.4		21° 36.3 22° 07.7		53.9
21	136°01.6	• • 21.0	$174^{\circ}13.6$	13.1'	22°16.8	9.0'	53.9'
22	151°01.3	21.1	188°45.6	13.0'	22°25.8	8.9'	53.9'
23	166°01.0	21.2	203°17.7	12.9'	22°34.7	8.8'	53.9'
	SD = 16.2'	d = 0.1'		SE	0 = 14.7'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	181°00.6	\$23°21.3	217°49.6	12.9'	\$22°43.5	8.7'	53.9'
1 2	196°00.3 211°00.0	21.4 21.4	232°21.5 246°53.3	12.8' 12.7'	22°52.2 23°00.8	8.6' 8.5'	53.9' 53.9'
3	211 00.0 225°59.7	21.5	261°25.0	12.7'	23°09.3	8.4'	53.9'
4	240°59.4	21.6	275°56.7	12.6'	23° 17.7	8.3'	53.9'
5	255°59.1	21.7 <b>S</b> 23°21.8	290°28.3	12.5'	23°26.0	8.2'	53.9' 53.9'
6 7	270°58.8 285°58.5	\$23°21.8 21.9	304°59.8 319°31.3	12.5' 12.4'	\$23°34.2 23°42.3	8.1' 8.0'	53.9' 53.9'
8	300°58.2	22.0	334°02.7	12.3'	23°50.3	7.9	53.9'
9	315°57.9	• • 22.0	348°34.1	12.3'	23°58.2	7.8'	53.9'
10 11	330°57.6 345°57.3	22.1 22.2	3°05.3 17°36.6	12.2' 12.1'	24°06.0 24°13.7	7.7' 7.6'	53.9' 53.9'
11	345 57.3 0°57.0	523°22.3	32°07.7	12.1'	24°13.7 \$24°21.3	7.6	53.9'
13	15°56.7	22.4	46°38.8	12.0'	24°28.8	7.4'	53.9'
14	30°56.4	22.4	61°09.8	11.9'	24°36.1	7.3'	53.9'
15 16	45°56.0 60°55.7	· · 22.5 22.6	75°40.7 90°11.6	11.9' 11.8'	24° 43.4 24° 50.6	7.2' 7.0'	53.9' 53.9'
16 17	60°55.7 75°55.4	22.6 22.7	90°11.6 104°42.4	11.8'	24°50.6 24°57.6	7.0° 6.9'	53.9' 53.9'
18	90°55.1	S23°22.8	119°13.2	11.7'	S25°04.5	6.8'	53.9'
19	105°54.8	22.8	133°43.9	11.6'	25°11.3	6.7'	53.9'
20 21	120°54.5 135°54.2	22.9 •• 23.0	148°14.5 162°45.0	11.6' 11.5'	25° 18.1 25° 24.6	6.6' 6.5'	53.9' 53.9'
22	150°53.9	23.1	102 45.0 177°15.5	11.5	25°31.1	6.4	53.9'
23	165°53.6	23.1	191°46.0	11.4'	25°37.5	6.2'	53.9'
	SD = 16.2'	d = 0.1'		SE	0 = 14.7'		

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

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

		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	22-8%
15	05:01	04:46	11:55	08:18	20:39	
16	04:32	04:17	11:56	09:01	21:24	
17	04:03	03:48	11:56	09:47	22:11	

# December 18, 19, 20 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	86°51.8	186°01.2	\$23°07.6	174°38.4	S24°13.1	331°56.5	N21°40.2	90°04.0	S03°54.1			
1	101°54.2	201°00.2	07.9	189°38.8	13.1	346° 59.3	40.2	105°06.4	54.1	Alpheratz	357°33.9	29°14.2
2	116°56.7	215°59.3	08.2	204°39.2	13.1	2°02.0	40.3	120°08.8	54.0	Ankaa	353°06.3	-42°10.1
3	131°59.2	230°58.3	• • 08.5	219°39.6	• • 13.1	17°04.8	• • 40.3	135°11.2	• • 54.0	Schedar	349°30.0	56°41.1
4	147°01.6	245°57.4	08.8	234°40.0	13.1	32°07.5	40.4	150°13.6	53.9	Diphda	348°46.4	-17°50.7
5	162°04.1	260°56.4	09.1	249°40.4	13.1	$47^{\circ}10.3$	40.4	165°16.0	53.9	Achernar	335°19.3	-57°06.5
6	177°06.6	275°55.5	S23°09.4	264°40.7	S24°13.1	62°13.0	N21°40.5	180°18.4	S03°53.8	Hamal	327°50.1	23°35.3
7	192°09.0	290°54.5	09.7	279°41.1	13.0	$77^{\circ}15.8$	40.5	195°20.7	53.8	Polaris	313°13.9	89°22.6
8	207°11.5	305°53.6	10.0	294°41.5	13.0	92° 18.5	40.6	210°23.1	53.8	Acamar Menkar	315°10.8 314°05.1	-40°12.1 4°11.5
9	222°14.0	320°52.7	•• 10.3	309°41.9	• • 13.0	107°21.3	• • 40.6	225°25.5	• • 53.7	Mirfak	308°26.7	4 11.5 49°57.4
10	237°16.4	335°51.7	10.6	324°42.3	13.0	$122^{\circ}24.1$	40.7	240°27.9	53.7	Aldebaran	290°38.4	16°33.7
11	252°18.9	350°50.8	10.9	339°42.7	13.0	137°26.8	40.7	255°30.3	53.6	Rigel	281°02.8	-8°10.3
12	267°21.3	5°49.8	S23°11.2	354°43.1	\$24°13.0	152°29.6	N21°40.8	270°32.7	S03°53.6	Capella	280°20.2	46°01.5
13	282°23.8	20°48.9	11.4	9°43.5	12.9	167°32.3	40.8	285°35.0	53.5	Bellatrix	278°21.7	6°22.4
14	297°26.3	35°47.9	11.7	24°43.9	12.9	182°35.1	40.9	300°37.4	53.5	Elnath	278°00.5	28°37.8
15	312°28.7	50°47.0	• • 12.0	39°44.3	• • 12.9	197°37.8	• • 41.0	315°39.8	• • 53.5	Alnilam	275°36.6	-1°11.1
16	327°31.2	65°46.0	12.3	54°44.6	12.9	212°40.6	41.0	330°42.2	53.4	Betelgeuse	270°50.9	$7^{\circ}24.7$
17	342°33.7	80°45.1	12.6	69°45.0	12.9	227° 43.3	41.1	345°44.6	53.4	Canopus	263°51.5	-52°42.5
18	357°36.1	95°44.1	\$23°12.8	84°45.4	S24°12.9	242°46.1	N21°41.1	0°47.0	S03°53.3	Sirius	258°25.2	$-16^{\circ}45.1$
19	12°38.6	110°43.2	13.1	99°45.8	12.8	257°48.8	41.2	15°49.4	53.3	Adhara	255°04.9	-29°00.4
20	27°41.1 42°43.5	125° 42.2	13.4	114°46.2	12.8	272°51.6	41.2	30°51.7	53.2	Procyon	244°49.7	5°09.5
21 22	42°43.5 57°46.0	140°41.3 155°40.3	· · 13.7 13.9	129°46.6 144°47.0	· · 12.8 12.8	287°54.4 302°57.1	· · 41.3 41.3	45°54.1 60°56.5	· · 53.2	Pollux	243°16.0	27°57.7
22	57°46.0 72°48.5	155° 40.3 170° 39.4	13.9 14.2	144 47.0 159°47.4	12.8 12.8	302°57.1 317°59.9	41.3 41.4	75°58.9	53.1 53.1	Avior	$234^{\circ}13.9$	-59°35.3
25	12 48.5									Suhail	222°45.4	-43°32.0
Mer.p	ass. 18:10	$\nu$ -0.9 $'$ d0	.3′ m-3.90	$\nu$ 0.4′ d-0	.0′ m1.21	$\nu$ 2.8′ d0.	.1′ m-2.63	$\nu$ 2.4′ d-0	0.0′ m0.97	Miaplacidus	221°37.5	-69°49.1
										Alphard	217°46.8	-8°46.2
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.5	11°50.3
0	87°50.9	185°38.4	\$23°14.5	174°47.8	S24°12.7	333°02.6	N21°41.4	91°01.3	503°53.1	Dubhe	193°39.9	61°36.3
1	102°53.4	200°37.5	323 14.5 14.7	174 47.8 189°48.1	12.7	348° 05.4	41.5	91 01.3 106°03.7	53.0	Denebola	182°24.2	14°25.5
2	117°55.8	215°36.5	15.0	204°48.5	12.7	3°08.1	41.5	121°06.0	53.0	Gienah	175°42.8	-17°41.1
3	117 55.6 132°58.3	215 30.5 230°35.6	15.3	204 46.5 219°48.9	12.7	18° 10.9	• • 41.6	121 00.0 136°08.4	52.9	Acrux	172°59.4	-63°14.3
4	148°00.8	245°34.6	15.5	234°49.3	12.6	33°13.7	41.6	151°10.8	52.9	!	171°50.9	-57°15.3
5	163°03.2	260°33.7	15.8	249°49.7	12.6	48° 16.4	41.7	166°13.2	52.8	Alioth	166°12.5	55°48.8
6	178°05.7	275°32.7	\$23°16.1	264°50.1	S24°12.6	63°19.2	N21°41.7	181°15.6	S03°52.8	Spica	158°21.6	-11°17.8
7	193°08.2	290°31.8	16.3	279°50.5	12.6	78°21.9	41.8	196°17.9	52.7	Alkaid	152°51.6	49°10.7
8	208°10.6	305°30.8	16.6	294°50.9	12.5	93°24.7	41.8	211°20.3	52.7	Hadar	148°35.3	-60°29.7
9	223°13.1	320° 29.9	16.9	309°51.3	. 12.5	108° 27.5	41.9	226°22.7	52.6	!	147°56.9	-36°29.7
10	238°15.6	335°28.9	17.1	324°51.6	12.5	123°30.2	42.0	241°25.1	52.6	Arcturus	145°47.4	19°02.7
11	253°18.0	350° 28.0	17.4	339°52.0	12.5	138°33.0	42.0	256°27.5	52.6	Rigil Kent.	139°39.7	-60°56.3
12	268°20.5	5°27.0	\$23°17.6	354°52.4	\$24°12.4	153°35.7	N21°42.1	271°29.8	S03°52.5	Kochab	137°20.7	74°02.6
13	283°23.0	20°26.1	17.9	9°52.8	12.4	168°38.5	42.1	286°32.2	52.5	Zuben'ubi	136°55.4	-16°08.9
14	298°25.4	35°25.1	18.1	24°53.2	12.4	183°41.3	42.2	301°34.6	52.4	Alphecca	126°03.4	26°37.5
15	313°27.9	50°24.2	• • 18.4	39°53.6	· · 12.3	198°44.0	• • 42.2	316°37.0	• • 52.4	Antares	112°15.2	-26°29.3
16	328°30.3	65°23.2	18.6	54°54.0	12.3	213°46.8	42.3	331°39.4	52.3	Atria	107°09.3 102°02.2	-69°04.3 -15°45.4
17	343°32.8	80°22.2	18.9	69°54.4	12.3	228°49.5	42.3	346°41.8	52.3	Sabik		-15 45.4 -37°07.3
18	358°35.3	95°21.3	S23°19.1	84°54.8	S24°12.3	243°52.3	N21°42.4	1°44.1	S03°52.2	Shaula	96°09.7 95°58.2	-37 07.3 12°32.4
19	13°37.7	$110^{\circ}20.3$	19.4	99°55.1	12.2	258°55.1	42.4	16°46.5	52.2	Rasalhague		51°29.1
20	28°40.2	$125^{\circ}19.4$	19.6	114°55.5	12.2	273°57.8	42.5	31°48.9	52.1	Eltanin Kaus Aust.	90°42.4 83°31.9	-34°22.3
21	43°42.7	140°18.4	• • 19.9	129°55.9	• • 12.2	289°00.6	• • 42.5	46°51.3	• • 52.1	Vega	80°33.1	-34 22.3 38°48.5
22	58°45.1	$155^{\circ}17.5$	20.1	144°56.3	12.1	304°03.3	42.6	61°53.6	52.0	Nunki	75°47.2	-26°15.9
23	73°47.6	$170^{\circ}16.5$	20.4	159°56.7	12.1	$319^{\circ}06.1$	42.6	76°56.0	52.0	Altair	61°59.5	8°56.2
N/au m	19.06		3/ 2.00	0 4/1 0	0/1 20	9/ 40	1/ 2.62		0/0 00	Peacock	53°05.0	-56°39.2
ivier.p	ass. 18:06	ν-1.0 α0	.3′ m-3.90	$\nu_{0.4}$ a-0	.0′ m1.20	ν2.8° α0.	.1′ m-2.63	ν2.4° α-0	0.0′ m0.98	Deneb	49°25.6	-50 39.2 45°22.5
										Enif	33°38.2	9°59.7
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.2	-46°50.3
0	88°50.1	$185^{\circ}15.6$	\$23°20.6	$174^{\circ}57.1$	S24°12.1	334°08.9	N21°42.7	91°58.4	S03°52.0	Fomalhaut	15°13.8	-29°29.2
1	103°52.5	200°14.6	20.8	189°57.5	12.0	349°11.6	42.7	107°00.8	51.9	Scheat	13°44.5	28°13.6
2	118°55.0	215° 13.7	21.1	204°57.9	12.0	4°14.4	42.8	122°03.2	51.9	Markab	13°29.2	15°20.8
3	133°57.5	230° 12.7	• • 21.3	219°58.2	• • 12.0	19° 17.2	• • 42.9	137°05.5	• • 51.8			
4	148°59.9	245°11.7	21.6	234°58.6	11.9	34° 19.9	42.9	152°07.9	51.8	Dec 18 Thu	SHA	Mer.pass
5	164°02.4	260° 10.8	21.8	249°59.0	11.9	49°22.7	43.0	167°10.3	51.7	Venus	99°09.4	11:37
6	179°04.8	275°09.8	\$23°22.0	264°59.4	S24°11.9	64°25.4	N21°43.0	182°12.7	S03°51.7	Mars	87°46.6	12:21
7	194°07.3	290°08.9	22.3	279°59.8	11.8	79°28.2	43.1	197°15.1	51.6	Jupiter	245°04.8	01:52
8	209°09.8	305°07.9	22.5	295°00.2	11.8	94°31.0	43.1	212°17.4	51.6	Saturn	3°12.3	17:57
9	224°12.2	320°07.0	• • 22.7	310°00.6	• • 11.8	109°33.7	• • 43.2	227°19.8	• • 51.5	Dec 19 Fri	SHA	Mer.pass
10	239°14.7	335°06.0	22.9	325°01.0	11.7	124°36.5	43.2	242°22.2	51.5	Venus	97°47.5	11:38
11	254°17.2	350°05.0	23.2	340°01.3	11.7	139°39.3	43.3	257°24.6	51.4	Mars	86°56.8	12:20
12	269°19.6	5°04.1	\$23°23.4	355°01.7	\$24°11.6	154° 42.0	N21°43.3	272°26.9	\$03°51.4	Jupiter		01:47
13	284°22.1	20°03.1	23.6	10°02.1	11.6	169°44.8	43.4	287°29.3	51.3	Saturn	3°10.4	17:53
14 15	299°24.6	35°02.2	23.8	25°02.5	11.6	184°47.6	43.4	302°31.7	51.3	D 20.0		
15 16	314°27.0	50°01.2	•• 24.1	40°02.9	11.5	199°50.3	· · 43.5	317°34.1	· · 51.2	Dec 20 Sat	SHA	Mer.pass
16 17	329°29.5 344°31.9	65°00.3	24.3	55°03.3	11.5	214°53.1	43.5	332°36.4	51.2	Venus	96°25.5	11:40
17	344°31.9 359°34.4	79°59.3 94°58.3	24.5 \$23°24.7	70°03.7 85°04.0	11.4 \$24°11.4	229°55.9 244°58.6	43.6 N21°43.7	347°38.8 2°41.2	51.2 \$03°51.1	Mars	86°07.0	12:20
18 19	359 34.4 14°36.9	94 58.3 109°57.4	24.7	85 04.0 100°04.4	11.4	244 58.6 260°01.4	N21 43.7 43.7	2 41.2 17°43.6	51.1	Jupiter		01:43
20	29°39.3	109 57.4 124° 56.4	25.2	100 04.4 115°04.8	11.4	275°04.2	43.7	32°46.0	51.1	Saturn	3°08.3	17:49
21	29 39.3 44°41.8	139°55.5	. 25.4	115 04.8 130°05.2	. 11.3	275 04.2 290°06.9	· · 43.8	47°48.3	• • 51.0	Horizont	al parallax	·
22	59°44.3	159° 55.5 154° 54.5	25.6	145°05.6	11.3	305°09.7	43.9	62°50.7	50.9		Venus:	0.1
23	74°46.7	169°53.5	25.8	160°06.0	11.2	320° 12.5	43.9	77°53.1	50.9		Mars:	0.1
Mer.p	ass. 18:02	$\nu$ -1.0′ d0	.2′ m-3.90	$\nu$ 0.4′ d-0	.0′ m1.20	$\nu^{2.8'} d0.$	1′ m-2.64	$\nu^{2.4'} d-0$	0.0′ m0.98			

h	Sui	n			Moon		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°53.3	\$23°23.2	206°16.3	11.3'	S25°43.7	6.1'	53.9'
1 2	195°53.0 210°52.7	23.3 23.3	220°46.7 235°16.9	11.2' 11.2'	25°49.9 25°55.9	6.0' 5.9'	53.9' 53.9'
3	225°52.4	23.4	249°47.1	11.1'	26°01.8	5.8'	53.9'
4	240°52.1	23.5	264°17.2	11.1'	26°07.5	5.7'	53.9'
5	255°51.7 270°51.4	23.5 \$23°23.6	278°47.3 293°17.3	11.0'	26°13.2 526°18.7	5.5'	53.9'
6 7	270 51.4 285°51.1	23.7	293 17.3 307°47.2	10.9' 10.9'	26°24.1	5.4' 5.3'	54.0' 54.0'
8	300°50.8	23.7	322°17.1	10.8'	26°29.4	5.2'	54.0'
9	315°50.5	• • 23.8	336°47.0	10.8'	26°34.6	5.0'	54.0'
10 11	330°50.2 345°49.9	23.9 23.9	351°16.7 5°46.5	10.7' 10.7'	26° 39.7 26° 44.6	4.9' 4.8'	54.0' 54.0'
12	0°49.6	\$23°24.0	20°16.1	10.6'	S26°49.4	4.7'	54.0'
13	15°49.3	24.1	34°45.7	10.6'	26°54.0	4.5'	54.0'
14 15	30°49.0 45°48.7	24.1	49°15.3 63°44.8	10.5' 10.5'	26°58.6 27°03.0	4.4' 4.3'	54.0' 54.0'
16	60°48.3	24.2	78°14.3	10.5	27°03.0	4.2	54.0'
17	75°48.0	24.3	92°43.7	10.4'	$27^{\circ}11.5$	4.0'	54.0'
18 19	90°47.7 105°47.4	\$23°24.3 24.4	107°13.0 121°42.3	10.3' 10.3'	\$27° 15.5 27° 19.4	3.9' 3.8'	54.0' 54.0'
20	105°47.4 120°47.1	24.4	121°42.3 136°11.6	10.3	27° 19.4 27° 23.2	3.8	54.0'
21	135°46.8	• • 24.5	150°40.8	10.2'	27°26.8	3.5'	54.0'
22	150°46.5	24.6	165°10.0	10.1'	27°30.3	3.4'	54.0'
23	165°46.2	24.6	179°39.1	10.1'	27°33.7	3.2'	54.0'
	SD = 16.2'	d=0.1'		SD	0 = 14.7'		
Fri	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°45.9	S23°24.7	194°08.2	10.0'	S27°37.0	3.1'	54.1'
1 2	195°45.6 210°45.3	24.7 24.8	208°37.2 223°06.2	10.0' 10.0'	27°40.1 27°43.1	3.0' 2.8'	54.1' 54.1'
3	210 45.3 225°44.9	24.8	223 00.2 237°35.2	9.9'	27°45.1	2.0 2.7'	54.1'
4	240°44.6	24.9	252°04.1	9.9'	27°48.6	2.6'	54.1'
5	255°44.3 270°44.0	24.9 \$23°25.0	266°33.0 281°01.9	9.8' 9.8'	27°51.2 <b>S</b> 27°53.6	2.4'	54.1'
6 7	270 44.0 285°43.7	25.0	281 01.9 295°30.7	9.8 9.8'	27°55.9	2.3' 2.2'	54.1' 54.1'
8	300°43.4	25.1	309°59.4	9.7'	27°58.1	2.0'	54.1'
9	315°43.1	• • 25.1	324°28.2	9.7'	28°00.2	1.9'	54.1'
10 11	330°42.8 345°42.5	25.1 25.2	338°56.9 353°25.6	9.7' 9.7'	28°02.1 28°03.8	1.8' 1.6'	54.1' 54.1'
12	0°42.2	\$23°25.2	7°54.2	9.6'	S28°05.4	1.5'	54.1'
13 14	15°41.9 30°41.5	25.3 25.3	22°22.9 36°51.4	9.6' 9.6'	28°06.9 28°08.3	1.3' 1.2'	54.2' 54.2'
15	45°41.2	25.4	51°20.0	9.0 9.5'	28°09.5	1.1'	54.2'
16	60°40.9	25.4	65°48.6	9.5'	$28^{\circ}10.5$	0.9'	54.2'
17 18	75°40.6 90°40.3	25.4 \$23°25.5	80°17.1 94°45.6	9.5' 9.5'	28°11.5 528°12.3	0.8' 0.6'	54.2' 54.2'
19	105°40.0	25.5	94 45.0 109°14.1	9.5'	28° 12.9	0.6	54.2'
20	120°39.7	25.5	123°42.6	9.4'	28°13.4	0.4'	54.2'
21	135°39.4 150°39.1	• • 25.6	138°11.0	9.4'	28° 13.8 28° 14.0	0.2'	54.2'
22 23	165°38.7	25.6 25.6	152°39.4 167°07.9	9.4' 9.4'	28 14.0 28°14.1	0.1' -0.1'	54.2' 54.2'
	SD = 16.2'	d = 0.1'		SD	0 = 14.7'		
٠.			CILA				HP
Sat 0	<b>GHA</b> 180°38.4	Dec \$23°25.7	<b>GHA</b> 181°36.3	u 9.4'	Dec 528° 14.1	d -0.2'	пР 54.3'
1	195°38.1	25.7	196°04.7	9.4'	$28^{\circ}13.9$	-0.3'	54.3'
2	210°37.8	25.7	210°33.0 225°01.4	9.4'	28° 13.5 28° 13.0	-0.5'	54.3'
3 4	225°37.5 240°37.2	· · 25.8 25.8	225°01.4 239°29.8	9.4' 9.4'	28° 13.0 28° 12.4	-0.6' -0.8'	54.3' 54.3'
5	255°36.9	25.8	253°58.1	9.4'	28°11.7	-0.9'	54.3'
6	270°36.6	S23°25.8	268°26.5	9.4'	\$28°10.8	-1.0'	54.3'
7 8	285°36.3 300°36.0	25.9 25.9	282°54.9 297°23.2	9.4' 9.4'	28°09.7 28°08.5	-1.2' -1.3'	54.3' 54.3'
9	315°35.6	• • 25.9	311°51.6	9.4'	28°07.2	-1.5'	54.4'
10	330°35.3	26.0	326°19.9	9.4'	28°05.7	-1.6'	54.4'
11 12	345°35.0 0°34.7	26.0 \$23°26.0	340°48.3 355°16.6	9.4' 9.4'	28°04.1 <b>5</b> 28°02.4	-1.8' -1.9'	54.4' 54.4'
13	15°34.4	26.0	9°45.0	9.4'	$28^{\circ}00.5$	-2.0'	54.4'
14	30°34.1	26.0	24°13.4	9.4'	27°58.4	-2.2'	54.4'
15 16	45°33.8 60°33.5	· · 26.1 26.1	38°41.7 53°10.1	9.4' 9.4'	27°56.3 27°53.9	-2.3' -2.5'	54.4' 54.4'
17	75°33.2	26.1	67°38.5	9.4	27°51.5	-2.6'	54.4
18	90°32.8	\$23°26.1	82°06.9	9.4'	\$27°48.9	-2.7'	54.5
19 20	105°32.5 120°32.2	26.1 26.1	96°35.4 111°03.8	9.4' 9.5'	27°46.1 27°43.3	-2.9' -3.0'	54.5' 54.5'
21	135°31.9	. 26.2	111 03.6 125°32.3	9.5' 9.5'	27°40.2	-3.0 -3.2'	54.5'
22	150°31.6	26.2	140°00.7	9.5'	27°37.1	-3.3'	54.5'
23	165°31.3	26.2	154°29.2	9.5'	27°33.8	-3.4'	54.5'
	SD = 16.2'	d = 0.0'		SD	0 = 14.8'		

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

Lat.		Moonris	e		Moonset	
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
N 72°						
<b>N</b> 70°						
68°						
66°						
64°						
62°	09:17			11:48		
60°	08:33	09:55	10:49	12:33	12:57	13:53
<b>N</b> 58°	08:04	09:18	10:11	13:03	13:35	14:30
56°	07:42	08:51	09:45	13:25	14:02	14:57
54°	07:23	08:30	09:24	13:44	14:23	15:17
52°	07:08	08:13	09:06	14:00	14:40	15:35
50°	06:54	07:58	08:51	14:13	14:55	15:50
45°	06:27	07:28	08:21	14:41	15:25	16:20
<b>N</b> 40°	06:06	07:04	07:58	15:03	15:49	16:43
35°	05:48	06:45	07:38	15:21	16:08	17:02
30°	05:33	06:29	07:22	15:37	16:25	17:19
20°	05:07	06:01	06:54	16:04	16:53	17:46
N 10°	04:45	05:37	06:29	16:27	17:17	18:10
0°	04:24	05:15	06:07	16:48	17:40	18:32
<b>S</b> 10°	04:04	04:53	05:44	17:10	18:02	18:54
20°	03:42	04:29	05:20	17:33	18:26	19:18
30° 35°	03:16	04:01	04:52	18:00	18:55	19:45
40°	03:01 02:44	03:45 03:26	04:36 04:16	18:16 18:34	19:11 19:31	20:02 20:20
40 45°	02:44	03:20	03:53	18:57	19:51	20:20
	-					
<b>S</b> 50°	01:58	02:34	03:23	19:25	20:24	21:12
52° 54°	01:45 01:31	02:20 02:03	03:08 02:50	19:40 19:56	20:39 20:57	21:26 21:43
54 56°	01:31	02:03	02:50	20:16	20:57	21:43
58°	00:55	01:44	02:29	20:10	21:16	22:02
<b>S</b> 60°	00:30	00:46	02:03	21:13	22:22	22:59
3 00	00.30	00.40	01.23	21.13	44.44	22.39

		Sun		Moon		
Day	Eqn.of	Eqn.of Time		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	4-0%
18	03:33	03:18	11:57	10:36	23:01	
19	03:04	02:49	11:57	11:27	23:53	
20	02:34	02:19	11:58	12:20	-:-	

# December 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	89°49.2	184°52.6	\$23°26.0	175°06.4	S24°11.1	335°15.2	N21°44.0	92°55.5	S03° 50.8			
1	104°51.7	199°51.6	26.2	175 00.4 190°06.7	11.1	350°18.0	44.0	92 55.5 107°57.8	50.8	Alpheratz	357°33.9	29°14.2
2	104 51.7 119°54.1			205°07.1	11.1	5°20.8		107 57.8 123°00.2		Ankaa	353°06.3	-42°10.1
3	119 54.1 134°56.6	214°50.7	26.4				44.1		50.7	Schedar	349°30.0	56°41.1
		229°49.7	• • 26.6	220°07.5	• • 11.0	20°23.5	• • 44.1	138°02.6	• • 50.7	Diphda	348°46.4	-17°50.7
4	149°59.1	244°48.7	26.8	235°07.9	11.0	35°26.3	44.2	153°04.9	50.6	Achernar	$335^{\circ}19.3$	-57°06.5
5 6	165°01.5	259°47.8 274°46.8	27.0	250°08.3	10.9 \$24°10.9	50°29.1	44.2 N21°44.3	168°07.3	50.6	Hamal	$327^{\circ}50.1$	23°35.3
7	180°04.0 195°06.4	274 40.8 289°45.9	\$23°27.2	265°08.7 280°09.1		65°31.8 80°34.6	NZ1 44.3 44.4	183°09.7 198°12.1	\$03°50.5	Polaris	$313^{\circ}14.5$	89°22.6
8	210°08.9	209 45.9 304°44.9	27.4 27.6	295°09.4	10.8 10.8	95°37.4	44.4 44.4	213° 14.4	50.5	Acamar	$315^{\circ}10.9$	-40°12.1
9	210 08.9 225°11.4	319°43.9	27.8	310°09.8	. 10.8	95 37.4 110°40.1	• • 44.5	213 14.4 228° 16.8	50.4 •• 50.4	Menkar	$314^{\circ}05.1$	4°11.5
10	240°13.8	334°43.9	28.0	325°10.2	10.7	110 40.1 125°42.9	44.5	243°19.2	50.4	Mirfak	308°26.7	49°57.4
11	255° 16.3	349°42.0	28.2	340°10.6	10.7	125 42.9 140°45.7	44.5 44.6	243 19.2 258°21.6	50.3	Aldebaran	290°38.4	16°33.7
12	270°18.8	4°41.0	S23°28.4	355°11.0	S24°10.6	155°48.5	N21°44.6	273°23.9	50.3 503°50.2	Rigel	281°02.8	-8°10.3
13	285°21.2	19°40.1	28.6	10°11.4	10.5	170°51.2	44.7	288° 26.3	50.2	Capella	280°20.2	46°01.5
14	300°23.7	34°39.1	28.8	25°11.8	10.5	170 51.2 185°54.0	44.7	303° 28.7	50.2	Bellatrix	$278^{\circ}21.7$	6°22.4
15	315°26.2	49°38.2	29.0	40°12.1	. 10.4	200°56.8	• • 44.8	318°31.1	50.1	Elnath	278°00.5	28°37.8
16	330°28.6	64°37.2	29.2	55°12.5	10.4	215°59.5	44.8	333° 33.4	50.0	Alnilam	275°36.6	-1°11.1
17	345°31.1	79°36.2	29.4	70°12.9	10.3	231°02.3	44.9	348°35.8	50.0	Betelgeuse	270°50.9	7°24.7
18	0°33.6	94°35.3	\$23°29.6	85°13.3	S24°10.3	246°05.1	N21°45.0	3°38.2	S03°49.9	Canopus	263°51.5	-52°42.5
19	15°36.0	109°34.3	29.8	100°13.7	10.2	261°07.9	45.0	18° 40.5	49.9	Sirius	258°25.2	-16°45.1
20	30°38.5	124°33.3	30.0	115°14.1	10.2	276°10.6	45.1	33° 42.9	49.8	Adhara	255°04.9	-29°00.4
21	45°40.9	139°32.4	30.1	130°14.4	. 10.1	291°13.4	• • 45.1	48° 45.3	• • 49.8	Procyon	244°49.7	5°09.5
22	60°43.4	154°31.4	30.3	145°14.8	10.1	306°16.2	45.2	63° 47.7	49.7	Pollux	243°16.0	27°57.7
23	75°45.9	169°30.5	30.5	160°15.2	10.1	300 10.2 321°18.9	45.2	78° 50.0	49.7	Avior	234°13.9	-59°35.4
								-		Suhail	222°45.4	-43°32.1
Mer.p	ass. 17:58	$\nu$ -1.0' d0.	.2′ m-3.90	$\nu$ 0.4′ d-0	.0' m1.19	$\nu$ 2.8′ d0.	1' m-2.64	$\nu$ 2.4′ <i>d</i> -0	.0′ m0.98	Miaplacidus	221°37.5	-69°49.2
	-									Alphard	217°46.8	-8°46.2
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.4	11°50.3
0	90°48.3	184°29.5	\$23°30.7	175°15.6	S24°09.9	336°21.7	N21°45.3	93°52.4	S03° 49.6	Dubhe	193°39.9	61°36.3
1	105°50.8	199°28.5	30.9	190°16.0	09.9	351°24.5	45.3	108° 54.8	49.6	Denebola	182°24.1	14°25.5
2	100°53.3	214°27.6	31.0	205°16.4	09.9	6°27.3	45.4	100° 54.0 123° 57.1	49.5	Gienah	175°42.8	-17°41.1
3	135°55.7	229°26.6	31.2	220°16.8	09.8	21°30.0	• • 45.4	138° 59.5	49.5		172°59.3	-63°14.3
4	150°58.2	244°25.6	31.4	235°17.1	09.7	36°32.8	45.5	154°01.9	49.4		171°50.9	-57°15.3
5	166°00.7	259°24.7	31.6	250°17.5	09.7	51°35.6	45.5	169°04.3	49.4	II.	166°12.4	55°48.8
6	181°03.1	274°23.7	S23°31.8	265°17.9	S24°09.6	66°38.4	N21°45.6	184°06.6	S03°49.3	Spica	158°21.6	-11°17.8
7	196°05.6	289°22.7	31.9	280°18.3	09.5	81°41.1	45.7	199°09.0	49.3	Alkaid	152°51.6	49°10.7
8	211°08.1	304°21.8	32.1	295°18.7	09.5	96°43.9	45.7	214° 11.4	49.2	Hadar	148°35.2	-60°29.7
9	226°10.5	319°20.8	• • 32.3	310°19.1	• • 09.4	111°46.7	• • 45.8	229° 13.7	• • 49.2	Menkent		-36°29.7
10	241°13.0	334°19.8	32.4	325°19.4	09.4	126°49.5	45.8	244° 16.1	49.1	Arcturus	145°47.4	19°02.7
11	256°15.4	349°18.9	32.6	340°19.8	09.3	141°52.2	45.9	259° 18.5	49.1	Rigil Kent.	139°39.6	-60°56.3
12	271°17.9	4°17.9	\$23°32.8	355°20.2	S24°09.2	156°55.0	N21°45.9	274°20.8	503°49.0	Kochab	137°20.6	74°02.6
13	286°20.4	19°16.9	32.9	10°20.6	09.2	171°57.8	46.0	289°23.2	49.0	Zuben'ubi	136°55.4	-16°08.9
14	301°22.8	$34^{\circ}16.0$	33.1	25°21.0	09.1	187°00.6	46.0	304°25.6	48.9	Alphecca	126°03.4 112°15.2	26°37.5
15	316°25.3	49°15.0	• • 33.3	40°21.4	• • 09.1	202°03.3	• • 46.1	319°27.9	• • 48.9	Antares		-26°29.3
16	331°27.8	$64^{\circ}14.1$	33.4	55°21.7	09.0	217°06.1	46.2	334°30.3	48.8	Atria	107°09.3 102°02.2	-69°04.3 -15°45.4
17	346°30.2	79°13.1	33.6	70°22.1	08.9	232°08.9	46.2	349°32.7	48.8	Sabik Shaula	96°09.7	-15 45.4 -37°07.3
18	1°32.7	94°12.1	S23°33.7	85°22.5	S24°08.9	247°11.7	N21°46.3	4°35.1	S03°48.7	Rasalhague	95°58.2	12°32.4
19	16°35.2	109°11.2	33.9	100°22.9	8.80	262°14.4	46.3	19°37.4	48.7	_	90°42.4	51°29.1
20	31°37.6	124°10.2	34.0	115°23.3	08.7	277°17.2	46.4	34°39.8	48.6	Eltanin Kaus Aust.	83°31.9	-34°22.3
21	46°40.1	139°09.2	• • 34.2	130°23.7	• • 08.7	292°20.0	• • 46.4	49°42.2	• • 48.6	Vega	80°33.1	38°48.5
22	61°42.6	154°08.3	34.4	145°24.0	08.6	307°22.8	46.5	64°44.5	48.5	Nunki	75°47.2	-26°15.9
23	76°45.0	169°07.3	34.5	160°24.4	08.5	322°25.6	46.5	79°46.9	48.5	Altair	61°59.5	8°56.2
N/au ==	17.E4	1 0/ 40	.2′ m-3.90	0 4/ -/ 0	.1′ m1.18	2 9/ 40	1′ m-2.65		.0′ m0.98	Peacock	53°05.0	-56°39.2
ivier.p	ass. 17:54	ν-1.0 αυ	.2 m-3.90	νο.4 α-υ	.1 111.10	ν2.ο d0.	1 M-2.05	ν2.4 α-0	.0 1110.96	Deneb	49°25.6	45°22.5
										Enif	33°38.2	9°59.7
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.2	-46°50.3
0	91°47.5	184°06.3	S23°34.7	175°24.8	S24°08.5	337°28.3	N21°46.6	94°49.3	S03°48.4	Fomalhaut	15° 13.8	-40°30.3
1	$106^{\circ}49.9$	199°05.3	34.8	190°25.2	08.4	352°31.1	46.6	109°51.6	48.4	Scheat	13°44.5	28°13.6
2	121°52.4	214°04.4	35.0	$205^{\circ}25.6$	08.3	7°33.9	46.7	124°54.0	48.3	Markab	13°29.2	15°20.8
3	$136^{\circ}54.9$	229°03.4	• • 35.1	220°26.0	• • 08.3	22°36.7	• • 46.8	139°56.4	• • 48.3			
4	151°57.3	$244^{\circ}02.4$	35.2	$235^{\circ}26.3$	08.2	37°39.4	46.8	154°58.7	48.2	Dec 21 Sun	SHA	Mer.pass
5	$166^{\circ}59.8$	259°01.5	35.4	250°26.7	08.1	52°42.2	46.9	170°01.1	48.2	Venus	95°03.4	11:41
6	182°02.3	274°00.5	<b>S</b> 23°35.5	265°27.1	S24°08.1	67°45.0	N21°46.9	185°03.5	S03°48.1	Mars	85° 17.2	12:19
7	197°04.7	288°59.5	35.7	280°27.5	0.80	82°47.8	47.0	200°05.8	48.1	Jupiter		01:39
8	212°07.2	303°58.6	35.8	295°27.9	07.9	97°50.6	47.0	215°08.2	48.0	Saturn	3°06.3	17:45
9	227°09.7	318°57.6	• • 36.0	310°28.3	• • 07.9	112°53.3	• • 47.1	230° 10.6	• • 48.0	Dec 22 Mon	SHA	Mer.pass
10	242°12.1	333°56.6	36.1	325°28.6	07.8	127°56.1	47.1	245° 12.9	47.9	Venus	93°41.2	11:43
11	257°14.6	348°55.7	36.2	340°29.0	07.7	142°58.9	47.2	260° 15.3	47.9	Mars	84°27.3	12:19
12	272°17.1	3°54.7	S23°36.4	355°29.4	S24°07.6	158°01.7	N21°47.2	275° 17.7	S03°47.8	Jupiter		01:34
13	287°19.5	18°53.7	36.5	10°29.8	07.6	173°04.5	47.3	290°20.0	47.8	Saturn	3°04.1	17:42
14	302°22.0	33°52.8	36.6	25°30.2	07.5	188°07.2	47.4	305°22.4	47.7			
15	317°24.4	48°51.8	• • 36.8	40°30.6	• • 07.4	203°10.0	• • 47.4	320°24.7	• • 47.6	Dec 23 Tue	SHA	Mer.pass
16	332°26.9	63°50.8	36.9	55°30.9	07.3	218°12.8	47.5	335°27.1	47.6	Venus	92°18.8	11:44
17	347°29.4	78°49.9	37.0	70°31.3	07.3	233°15.6	47.5	350°29.5	47.5	Mars	83°37.3	12:18
18	2°31.8	93°48.9	\$23°37.1	85°31.7	\$24°07.2	248°18.4	N21°47.6	5°31.8	\$03°47.5		245°40.8	01:30
19	17°34.3	108°47.9	37.3	100°32.1	07.1	263°21.1	47.6	20°34.2	47.4 47.4	Saturn	3°01.8	17:38
20	32°36.8	123°46.9	37.4	115°32.5	07.0	278°23.9	47.7	35°36.6	47.4	Horizont	al parallax	
21 22	47°39.2 62°41.7	138°46.0 153°45.0	· · 37.5 37.6	130°32.8 145°33.2	· · 07.0 06.9	293°26.7 308°29.5	· · 47.7 47.8	50°38.9 65°41.3	· · 47.3 47.3	1.51.2511	Venus:	0.1
23	77°44.2	168°44.0	37.8	145 33.2 160°33.6	06.8	306 29.5 323°32.3	47.8 47.9	80°43.7	47.3 47.2		Mars:	0.1
											=:=:	-
Mer.p	ass. 17:50	$\nu$ -1.0′ d0.	.1′ m-3.90	$\nu$ 0.4′ d-0	.1′ m1.18	$\nu 2.8' \ d0.$	1′ m-2.65	$\nu$ 2.4′ d-0	.1′ m0.99			

	011-010 =	+0.1033 sec				J1 360	
h	Su	n			Moon		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	180°31.0 195°30.7	\$23°26.2	168°57.7 183°26.3	9.5'	\$27°30.3 27°26.7	-3.6'	54.5'
1 2	210°30.4	26.2 26.2	183 20.3 197°54.8	9.6' 9.6'	27°23.0	-3.7' -3.9'	54.6' 54.6'
3	225°30.0	26.2	212°23.4	9.6'	27°19.2	-4.0'	54.6'
4	240°29.7	26.2	226°52.0	9.6'	27°15.2	-4.1'	54.6'
5	255°29.4	26.3	241°20.6	9.7'	27°11.0	-4.3'	54.6'
6	270°29.1	\$23°26.3	255°49.3 270°18.0	9.7'	\$27°06.8	-4.4' -4.5'	54.6' 54.6'
7 8	285°28.8 300°28.5	26.3 26.3	270°18.0 284°46.7	9.7' 9.7'	27°02.3 26°57.8	-4.5° -4.7'	54.6'
9	315°28.2	. 26.3	299°15.4	9.8'	26°53.1	-4.8'	54.7'
10	330°27.9	26.3	313°44.2	9.8'	26°48.3	-5.0'	54.7'
11	345°27.6	26.3	328°13.0	9.8'	26°43.3	-5.1'	54.7'
12	0°27.2 15°26.9	\$23°26.3	342°41.8 357°10.7	9.9'	\$26°38.2 26°33.0	-5.2'	54.7'
13 14	30°26.6	26.3 26.3	11°39.6	9.9' 9.9'	26°27.7	-5.4' -5.5'	54.7' 54.7'
15	45°26.3	26.3	26°08.6	10.0'	26°22.2	-5.6'	54.7'
16	60°26.0	26.3	40°37.5	10.0'	$26^{\circ}16.5$	-5.8'	54.8'
17	75°25.7	26.3	55°06.6	10.1'	26°10.8	-5.9'	54.8'
18 19	90°25.4 105°25.1	\$23°26.3 26.3	69°35.6 84°04.7	10.1' 10.1'	\$26°04.9 25°58.9	-6.0' -6.2'	54.8' 54.8'
20	105 25.1 120°24.7	26.3	98°33.9	10.1	25°52.7	-0.∠ -6.3'	54.8'
21	135°24.4	26.3	113°03.0	10.2'	25°46.4	-6.4	54.8'
22	150°24.1	26.3	127°32.3	10.3'	25°40.0	-6.5'	54.9'
23	165°23.8	26.3	142°01.5	10.3'	25°33.5	-6.7'	54.9'
	SD = 16.2'	d = 0.0'		SI	O = 14.9'		
Mon	GHA	Dec	GHA	ν	Dec	d	НР
0	180°23.5	\$23°26.3	156°30.9	ν 10.4'	\$25°26.8	-6.8'	54.9'
1	195°23.2	26.3	171°00.2	10.4'	25°20.0	-6.9	54.9'
2	210°22.9	26.2	185°29.6	10.4'	25°13.1	-7.1'	54.9'
3	225°22.6	• • 26.2	199°59.1	10.5	25°06.0	-7.2'	54.9'
4 5	240°22.3 255°21.9	26.2 26.2	214°28.6 228°58.1	10.5' 10.6'	24°58.9 24°51.6	-7.3' -7.4'	54.9' 55.0'
6	270°21.6	523°26.2	243°27.7	10.6'	\$24°44.1	-7.4 -7.5'	55.0'
7	285°21.3	26.2	257°57.3	10.7'	24°36.6	-7.7'	55.0'
8	300°21.0	26.2	272°27.0	10.7'	24°28.9	-7.8'	55.0'
9	315°20.7	• • 26.2	286°56.8	10.8'	24°21.1	-7.9'	55.0'
10 11	330°20.4 345°20.1	26.1 26.1	301°26.5 315°56.4	10.8' 10.9'	24°13.2 24°05.2	-8.0' -8.2'	55.0' 55.1'
12	0°19.8	\$23°26.1	330°26.3	10.9	\$23°57.0	-8.3	55.1'
13	15°19.4	26.1	344°56.2	11.0'	23°48.7	-8.4'	55.1'
14	30°19.1	26.1	359°26.2	11.0'	23°40.3	-8.5'	55.1'
15	45°18.8 60°18.5	• • 26.1	13°56.3 28°26.4	11.1'	23°31.8 23°23.2	-8.6'	55.1'
16 17	75°18.2	26.0 26.0	42°56.5	11.2' 11.2'	23 23.2 23°14.4	-8.7' -8.9'	55.2' 55.2'
18	90°17.9	\$23°26.0	57°26.7	11.3'	S23°05.6	-9.0'	55.2'
19	105°17.6	26.0	71°57.0	11.3'	22°56.6	-9.1'	55.2'
20	120°17.3	26.0	86°27.3	11.4'	22°47.5	-9.2'	55.2'
21 22	135°17.0 150°16.6	· · 25.9 25.9	100°57.6 115°28.1	11.4' 11.5'	22°38.3 22°29.0	-9.3' -9.4'	55.2' 55.3'
23	165°16.3	25.9	129°58.5	11.5'	22°19.6	-9.4 -9.5'	55.3'
	SD = 16.3'	d = -0.0'		SI	D = 15.0'		
					10.0		
Tue	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	180°16.0 195°15.7	\$23°25.8 25.8	144°29.0 158°59.6	11.6' 11.6'	\$22°10.0 22°00.4	-9.6' -9.8'	55.3' 55.3'
2	210°15.4	25.8	173°30.3	11.7'	21°50.6	-9.9'	55.3'
3	225°15.1	• • 25.8	188°00.9	11.7'	21°40.8	-10.0'	55.4'
4	240°14.8	25.7	202°31.7	11.8'	21°30.8	-10.1'	55.4'
5 6	255°14.5 270°14.2	25.7 \$23° 25.7	217°02.5 231°33.3	11.8' 11.9'	21°20.7 \$21°10.6	-10.2' -10.3'	55.4' 55.4'
7	270 14.2 285°13.8	25.6 25.6	231 33.3 246°04.2	12.0'	21°00.3	-10.3 -10.4'	55.4'
8	300°13.5	25.6	260°35.2	12.0'	20°49.9	-10.5	55.4
9	315°13.2	•• 25.6	275°06.2	12.1'	20°39.4	-10.6'	55.5'
10	330°12.9	25.5	289°37.2	12.1'	20°28.8	-10.7'	55.5'
11 12	345°12.6 0°12.3	25.5 \$23°25.5	304°08.4 318°39.5	12.2' 12.2'	20°18.1 \$20°07.3	-10.8' -10.9'	55.5' 55.5'
13	15°12.0	25.4	310 39.5 333°10.7	12.2	19°56.4	-10.9	55.5'
14	30°11.7	25.4	347°42.0	12.3'	19°45.4	-11.1'	55.6'
15	45°11.4	• • 25.4	2°13.3	12.4'	19°34.3	-11.2'	55.6'
16	60°11.0 75°10.7	25.3	16°44.7 31°16.1	12.4'	19°23.2 19°11.9	-11.3'	55.6'
17 18	75°10.7 90°10.4	25.3 \$23°25.2	31°16.1 45°47.6	12.5' 12.5'	19°11.9 \$19°00.5	-11.4' -11.5'	55.6' 55.6'
19	105°10.1	25.2	60°19.1	12.6'	18°49.0	-11.6'	55.7'
20	120°09.8	25.1	74°50.7	12.6'	18°37.5	-11.7'	55.7'
21	135°09.5	• • 25.1	89°22.3	12.7'	18°25.8	-11.7'	55.7'
22	150°09.2 165°08.9	25.1	103°54.0 118°25.8	12.7'	18°14.1 18°02.2	-11.8'	55.7'
23		25.0	110 25.8	12.8'		-11.9'	55.8'
	SD = 16.3'	d = -0.0'		SI	O = 15.1'		

Naut.         Civil         Civil         Naut.           N 72°         08:26         10:58         ■         12:59         15:31           N 70°         08:06         09:55         ■         14:02         15:51           68°         07:50         09:20         ■         14:38         16:07           66°         07:37         08:54         10:35         13:22         15:03         16:20           64°         07:26         08:35         09:53         14:05         15:23         16:31           62°         07:16         08:18         09:24         14:33         15:39         16:41           60°         07:08         08:05         09:03         14:55         15:53         16:50           N 58°         07:00         07:53         08:45         15:12         16:04         16:57           56°         06:54         07:43         08:30         15:27         16:15         17:04           54°         06:47         07:34         08:18         15:40         16:24         17:10           50°         06:36         07:18         07:56         16:01         16:32         17:14           50°         06:36 </th <th>Lat.</th> <th>Twi</th> <th>light</th> <th>Sunrise</th> <th>Sunset</th> <th>Twi</th> <th>light</th>	Lat.	Twi	light	Sunrise	Sunset	Twi	light
N 70°       08:06       09:55       ■       14:02       15:51         68°       07:50       09:20       ■       14:38       16:07         66°       07:37       08:54       10:35       13:22       15:03       16:20         64°       07:26       08:35       09:53       14:05       15:23       16:31         60°       07:16       08:18       09:24       14:33       15:39       16:41         60°       07:08       08:05       09:03       14:55       15:53       16:50         N 58°       07:00       07:53       08:45       15:12       16:04       16:57         56°       06:54       07:43       08:30       15:27       16:15       17:04         52°       06:42       07:25       08:06       15:51       16:32       17:16         50°       06:36       07:18       07:56       16:01       16:39       17:21         45°       06:25       07:02       07:36       16:22       16:56       17:33         N 40°       06:14       06:48       07:19       16:39       17:21       17:43         35°       06:05       06:36       07:05       16:53 <th>Lat.</th> <th>Naut.</th> <th>Civil</th> <th>Junisc</th> <th>Juliset</th> <th>Civil</th> <th>Naut.</th>	Lat.	Naut.	Civil	Junisc	Juliset	Civil	Naut.
68°         07:50         09:20         14:38         16:07           66°         07:37         08:54         10:35         13:22         15:03         16:20           64°         07:26         08:35         09:53         14:05         15:23         16:31           62°         07:16         08:18         09:24         14:33         15:39         16:41           60°         07:08         08:05         09:03         14:55         15:53         16:50           N 58°         07:00         07:53         08:45         15:12         16:04         16:57           56°         06:54         07:43         08:30         15:27         16:15         17:04           52°         06:42         07:25         08:06         15:51         16:32         17:16           50°         06:36         07:18         07:56         16:01         16:39         17:21           45°         06:25         07:02         07:36         16:22         16:56         17:33           N 40°         06:14         06:48         07:19         16:39         17:21         17:43           35°         06:05         06:36         07:05         16:53	N 72°	08:26	10:58		_	12:59	15:31
66° 07:37 08:54 10:35 13:22 15:03 16:20 64° 07:26 08:35 09:53 14:05 15:23 16:31 62° 07:16 08:18 09:24 14:33 15:39 16:41 60° 07:08 08:05 09:03 14:55 15:53 16:50 N 58° 07:00 07:53 08:45 15:12 16:04 16:57 56° 06:54 07:43 08:30 15:27 16:15 17:04 54° 06:47 07:34 08:18 15:40 16:24 17:10 52° 06:42 07:25 08:06 15:51 16:32 17:16 50° 06:36 07:18 07:56 16:01 16:39 17:21 45° 06:25 07:02 07:36 16:22 16:56 17:33 N 40° 06:44 06:48 07:19 16:39 17:09 17:43 35° 06:05 06:36 07:05 16:52 17:05 17:05 17:05 17:32 18:01 20° 05:39 06:07 06:31 17:26 17:50 18:18 N 10° 05:23 05:50 06:12 17:45 18:08 18:34 0° 05:06 05:32 05:55 18:02 18:25 18:51 S 10° 04:47 05:14 05:37 18:20 18:43 19:10 20° 04:24 04:54 05:18 18:39 19:04 19:33 30° 03:55 04:29 04:56 19:01 19:29 20:02 35° 03:37 04:13 04:43 19:14 19:44 20:21 40° 03:13 03:55 04:29 04:56 19:01 19:29 20:02 20:44 45° 00:42 02:30 03:47 20:10 20:55 22:00 52° 01:29 02:48 03:37 20:21 21:10 22:28 54° 00:42 02:30 03:24 20:33 21:28 23:15 56° //// 02:07 03:10 20:47 21:50 //// 58° //// 01:37 02:53 21:04 22:20 ////	N 70°	08:06	09:55			14:02	15:51
64° 07:26 08:35 09:53 14:05 15:23 16:31 62° 07:16 08:18 09:24 14:33 15:39 16:41 60° 07:08 08:05 09:03 14:55 15:53 16:50    N 58° 07:00 07:53 08:45 15:12 16:04 16:57 56° 06:54 07:43 08:30 15:27 16:15 17:04 52° 06:42 07:25 08:06 15:51 16:32 17:16 50° 06:36 07:18 07:56 16:01 16:39 17:21 45° 06:25 07:02 07:36 16:22 16:56 17:33    N 40° 06:44 06:48 07:19 16:39 17:09 17:43 35° 06:05 06:36 07:05 16:52 17:05 17:32 18:01 20° 05:39 06:07 06:31 17:26 17:50 18:18   N 10° 05:23 05:50 06:12 17:45 18:08 18:34 0° 05:06 05:32 05:55 18:02 18:25 18:51   S 10° 04:47 05:14 05:37 18:20 18:43 19:10 20° 04:24 04:54 05:18 18:39 19:04 19:33 30° 03:55 04:29 04:56 19:01 19:29 20:02 35° 03:37 04:13 04:43 19:14 19:44 20:21 40° 03:13 03:55 04:29 04:56 19:01 19:29 20:02 20:44 45° 02:43 03:33 04:10 19:47 20:25 21:15 \$50° 10:57 03:03 03:24 20:33 21:28 23:15 56° //// 02:07 03:10 20:47 21:50 //// 58° //// 01:37 02:53 21:04 22:20 ////		07:50	09:20			14:38	16:07
62° 07:16 08:18 09:24 14:33 15:39 16:41 60° 07:08 08:05 09:03 14:55 15:53 16:50    N 58° 07:00 07:53 08:45 15:12 16:04 16:57 56° 06:54 07:34 08:30 15:27 16:15 17:04 54° 06:47 07:34 08:18 15:40 16:24 17:10 50° 06:36 07:18 07:56 16:01 16:39 17:21 45° 06:25 07:02 07:36 16:22 16:56 17:33    N 40° 06:14 06:48 07:19 16:39 17:09 17:43 35° 06:05 06:36 07:05 16:52 17:15 17:32 18:01 20° 05:39 06:05 06:36 07:05 16:53 17:21 17:53 30° 05:56 06:26 06:52 17:05 17:32 18:01 20° 05:39 06:07 06:31 17:26 17:50 18:18 N 10° 05:23 05:50 06:12 17:45 18:08 18:34 0° 05:06 05:32 05:55 18:02 18:25 18:51    S 10° 04:47 05:14 05:37 18:20 18:43 19:10 20° 04:24 04:54 05:18 18:39 19:04 19:33 30° 03:55 04:29 04:56 19:01 19:29 20:02 30:44 45° 02:43 03:33 04:10 19:47 20:25 21:15 \$50° 01:57 03:03 03:47 20:10 20:55 22:00 550° 01:57 03:03 03:47 20:10 20:55 22:00 550° 01:57 03:03 03:24 20:33 21:28 23:15 56° //// 02:07 03:10 20:47 21:50 //// 58° //// 01:37 02:53 21:04 22:20 ////		07:37	08:54	10:35		15:03	16:20
60°         07:08         08:05         09:03         14:55         15:53         16:50           N 58°         07:00         07:53         08:45         15:12         16:04         16:57           56°         06:54         07:43         08:30         15:27         16:15         17:04           54°         06:47         07:34         08:18         15:40         16:24         17:10           52°         06:42         07:25         08:06         15:51         16:32         17:16           50°         06:36         07:18         07:56         16:01         16:39         17:21           45°         06:25         07:02         07:36         16:22         16:56         17:33           N 40°         06:14         06:48         07:19         16:39         17:09         17:43           35°         06:05         06:36         07:05         16:53         17:21         17:53           30°         05:56         06:26         06:52         17:05         17:32         18:01           20°         05:39         06:07         06:31         17:26         17:50         18:18           N 10°         05:23         05:50		l					
N 58°         07:00         07:53         08:45         15:12         16:04         16:57           56°         06:54         07:43         08:30         15:27         16:15         17:04           54°         06:47         07:34         08:18         15:40         16:24         17:10           52°         06:42         07:25         08:06         15:51         16:32         17:16           50°         06:36         07:18         07:56         16:01         16:39         17:21           45°         06:25         07:02         07:36         16:22         16:56         17:33           N 40°         06:14         06:48         07:19         16:39         17:09         17:43           35°         06:05         06:36         07:05         16:53         17:21         17:53           30°         05:56         06:26         06:52         17:05         17:32         18:01           20°         05:39         06:07         06:31         17:26         17:50         18:18           N 10°         05:23         05:50         06:12         17:45         18:08         18:34           0°         04:47         05:14							
56°         06:54         07:43         08:30         15:27         16:15         17:04           54°         06:47         07:34         08:18         15:40         16:24         17:10           52°         06:42         07:25         08:06         15:51         16:32         17:16           50°         06:36         07:18         07:56         16:01         16:39         17:21           45°         06:25         07:02         07:36         16:22         16:56         17:33           N 40°         06:14         06:48         07:19         16:39         17:09         17:43           35°         06:05         06:36         07:05         16:53         17:21         17:53           30°         05:56         06:26         06:52         17:05         17:32         18:01           20°         05:39         06:07         06:31         17:26         17:50         18:18           N 10°         05:23         05:50         06:12         17:45         18:08         18:34           0°         05:06         05:32         05:55         18:02         18:25         18:51           S 10°         04:47         05:14		07:08	08:05	09:03	14:55	15:53	16:50
54°         06:47         07:34         08:18         15:40         16:24         17:10           52°         06:42         07:25         08:06         15:51         16:32         17:16           50°         06:36         07:18         07:56         16:01         16:39         17:21           45°         06:25         07:02         07:36         16:22         16:56         17:33           N 40°         06:14         06:48         07:19         16:39         17:09         17:43           35°         06:05         06:36         07:05         16:53         17:21         17:53           30°         05:56         06:26         06:52         17:05         17:32         18:01           20°         05:39         06:07         06:31         17:26         17:50         18:18           N 10°         05:23         05:50         06:12         17:45         18:08         18:34           0°         05:06         05:32         05:55         18:02         18:25         18:51           S 10°         04:47         05:14         05:37         18:20         18:43         19:10           20°         04:24         04:54	N 58°	07:00	07:53	08:45	15:12	16:04	16:57
52°         06:42         07:25         08:06         15:51         16:32         17:16           50°         06:36         07:18         07:56         16:01         16:39         17:21           45°         06:25         07:02         07:36         16:22         16:56         17:33           N 40°         06:14         06:48         07:19         16:39         17:09         17:43           35°         06:05         06:36         07:05         16:53         17:21         17:53           30°         05:56         06:26         06:52         17:05         17:32         18:01           20°         05:39         06:07         06:31         17:26         17:50         18:18           N 10°         05:23         05:50         06:12         17:45         18:08         18:34           0°         05:06         05:32         05:55         18:02         18:25         18:51           S 10°         04:47         05:14         05:37         18:20         18:43         19:10           20°         04:24         04:54         05:18         18:39         19:04         19:33           30°         03:55         04:29		06:54	07:43	08:30	15:27	16:15	17:04
50°         06:36         07:18         07:56         16:01         16:39         17:21           45°         06:25         07:02         07:36         16:22         16:56         17:33           N 40°         06:14         06:48         07:19         16:39         17:09         17:43           35°         06:05         06:36         07:05         16:53         17:21         17:53           30°         05:56         06:26         06:52         17:05         17:32         18:01           20°         05:39         06:07         06:31         17:26         17:50         18:18           N 10°         05:23         05:50         06:12         17:45         18:08         18:34           0°         05:06         05:32         05:55         18:02         18:25         18:51           S 10°         04:47         05:14         05:37         18:20         18:43         19:10           20°         04:24         04:54         05:18         18:39         19:04         19:33           30°         03:55         04:29         04:56         19:01         19:29         20:02           35°         03:37         04:13		06:47	07:34	08:18	15:40	16:24	17:10
45°         06:25         07:02         07:36         16:22         16:56         17:33           N 40°         06:14         06:48         07:19         16:39         17:09         17:43           35°         06:05         06:36         07:05         16:53         17:21         17:53           30°         05:56         06:26         06:52         17:05         17:32         18:01           20°         05:39         06:07         06:31         17:26         17:50         18:18           N 10°         05:23         05:50         06:12         17:45         18:08         18:34           0°         05:06         05:32         05:55         18:02         18:25         18:51           S 10°         04:47         05:14         05:37         18:20         18:43         19:10           20°         04:24         04:54         05:18         18:39         19:04         19:33           30°         03:55         04:29         04:56         19:01         19:29         20:02           35°         03:37         04:13         04:43         19:14         19:44         20:21           40°         03:13         03:55		06:42	07:25	08:06	15:51	16:32	17:16
N 40°         06:14         06:48         07:19         16:39         17:09         17:43           35°         06:05         06:36         07:05         16:53         17:21         17:53           30°         05:56         06:26         06:52         17:05         17:32         18:01           20°         05:39         06:07         06:31         17:26         17:50         18:18           N 10°         05:23         05:50         06:12         17:45         18:08         18:34           0°         05:06         05:32         05:55         18:02         18:25         18:51           S 10°         04:47         05:14         05:37         18:20         18:43         19:10           20°         04:24         04:54         05:18         18:39         19:04         19:33           30°         03:55         04:29         04:56         19:01         19:29         20:02           35°         03:37         04:13         04:43         19:14         19:44         20:21           40°         03:13         03:55         04:28         19:29         20:02         20:44           45°         02:43         03:33							
35°         06:05         06:36         07:05         16:53         17:21         17:53           30°         05:56         06:26         06:52         17:05         17:32         18:01           20°         05:39         06:07         06:31         17:26         17:50         18:18           N 10°         05:23         05:50         06:12         17:45         18:08         18:34           0°         05:06         05:32         05:55         18:02         18:25         18:51           S 10°         04:47         05:14         05:37         18:20         18:43         19:10           20°         04:24         04:54         05:18         18:39         19:04         19:33           30°         03:55         04:29         04:56         19:01         19:29         20:02           35°         03:37         04:13         04:43         19:14         19:44         20:21           40°         03:13         03:55         04:28         19:29         20:02         20:44           45°         02:43         03:33         04:10         19:47         20:25         21:15           5 50°         01:57         03:03	45°	06:25	07:02	07:36	16:22	16:56	17:33
30°         05:56         06:26         06:52         17:05         17:32         18:01           20°         05:39         06:07         06:31         17:26         17:50         18:18           N 10°         05:23         05:50         06:12         17:45         18:08         18:34           0°         05:06         05:32         05:55         18:02         18:25         18:51           S 10°         04:47         05:14         05:37         18:20         18:43         19:10           20°         04:24         04:54         05:18         18:39         19:04         19:33           30°         03:55         04:29         04:56         19:01         19:29         20:02           35°         03:37         04:13         04:43         19:14         19:44         20:21           40°         03:13         03:55         04:28         19:29         20:02         20:44           45°         02:43         03:33         04:10         19:47         20:25         21:15           5 50°         01:57         03:03         03:47         20:10         20:55         22:00           52°         01:29         02:48		06:14	06:48	07:19	16:39	17:09	17:43
20°         05:39         06:07         06:31         17:26         17:50         18:18           N 10°         05:23         05:50         06:12         17:45         18:08         18:34           0°         05:06         05:32         05:55         18:02         18:25         18:51           S 10°         04:47         05:14         05:37         18:20         18:43         19:10           20°         04:24         04:54         05:18         18:39         19:04         19:33           30°         03:55         04:29         04:56         19:01         19:29         20:02           35°         03:37         04:13         04:43         19:14         19:44         20:21           40°         03:13         03:55         04:28         19:29         20:02         20:44           45°         02:43         03:33         04:10         19:47         20:25         21:15           5 50°         01:57         03:03         03:47         20:10         20:55         22:00           52°         01:29         02:48         03:37         20:21         21:10         22:28           54°         00:42         02:30	35°	06:05	06:36	07:05	16:53	17:21	17:53
N 10°         05:23         05:50         06:12         17:45         18:08         18:34           0°         05:06         05:32         05:55         18:02         18:25         18:51           S 10°         04:47         05:14         05:37         18:20         18:43         19:10           20°         04:24         04:54         05:18         18:39         19:04         19:33           30°         03:55         04:29         04:56         19:01         19:29         20:02           35°         03:37         04:13         04:43         19:14         19:44         20:21           40°         03:13         03:55         04:28         19:29         20:02         20:44           45°         02:43         03:33         04:10         19:47         20:25         21:15           S 50°         01:57         03:03         03:47         20:10         20:55         22:00           52°         01:29         02:48         03:37         20:21         21:10         22:28           54°         00:42         02:30         03:24         20:33         21:28         23:15           56°         ///         01:37							
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$							
S 10°         04:47         05:14         05:37         18:20         18:43         19:10           20°         04:24         04:54         05:18         18:39         19:04         19:33           30°         03:55         04:29         04:56         19:01         19:29         20:02           35°         03:37         04:13         04:43         19:14         19:44         20:21           40°         03:13         03:55         04:28         19:29         20:02         20:44           45°         02:43         03:33         04:10         19:47         20:25         21:15           50°         01:57         03:03         03:47         20:10         20:55         22:00           52°         01:29         02:48         03:37         20:21         21:10         22:28           54°         00:42         02:30         03:24         20:33         21:28         23:15           56°         ////         02:07         03:10         20:47         21:50         ////           58°         ////         01:37         02:53         21:04         22:20         ////							
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	0°	05:06	05:32	05:55	18:02	18:25	18:51
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		04:47	05:14	05:37	18:20	18:43	19:10
35°   03:37	20°	04:24	04:54	05:18	18:39	19:04	19:33
40°         03:13         03:55         04:28         19:29         20:02         20:44           45°         02:43         03:33         04:10         19:47         20:25         21:15           \$ 50°         01:57         03:03         03:47         20:10         20:55         22:00           52°         01:29         02:48         03:37         20:21         21:10         22:28           54°         00:42         02:30         03:24         20:33         21:28         23:15           56°         ////         02:07         03:10         20:47         21:50         ////           58°         ////         01:37         02:53         21:04         22:20         ////					19:01		
45°         02:43         03:33         04:10         19:47         20:25         21:15           \$ 50°         01:57         03:03         03:47         20:10         20:55         22:00           52°         01:29         02:48         03:37         20:21         21:10         22:28           54°         00:42         02:30         03:24         20:33         21:28         23:15           56°         ///         02:07         03:10         20:47         21:50         ////           58°         ////         01:37         02:53         21:04         22:20         ////							
\$ 50°         01:57         03:03         03:47         20:10         20:55         22:00           52°         01:29         02:48         03:37         20:21         21:10         22:28           54°         00:42         02:30         03:24         20:33         21:28         23:15           56°         ///         02:07         03:10         20:47         21:50         ////           58°         ///         01:37         02:53         21:04         22:20         ////		l					
52°         01:29         02:48         03:37         20:21         21:10         22:28           54°         00:42         02:30         03:24         20:33         21:28         23:15           56°         ////         02:07         03:10         20:47         21:50         ////           58°         ////         01:37         02:53         21:04         22:20         ////		02:43	03:33	04:10	19:47	20:25	21:15
54°     00:42     02:30     03:24     20:33     21:28     23:15       56°     ////     02:07     03:10     20:47     21:50     ////       58°     ////     01:37     02:53     21:04     22:20     ////							
56° //// 02:07 03:10 20:47 21:50 //// 58° //// 01:37 02:53 21:04 22:20 ////	-						
58° //// 01:37 02:53 21:04 22:20 ////							
<b>S</b> 60° //// 00:46 02:33 21:25 23:11 ////	<b>S</b> 60°	////	00:46	02:33	21:25	23:11	////

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

		Sun		Moon			
Day	Eqn.of	Time	Mer.	Mer.Pass.		Age	
Duy	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%	
21	02:04	01:49	11:58	13:12	00:46		
22	01:34	01:19	11:59	14:02	01:37		
23	01:04	00:49	11:59	14:51	02:27		

## December 24, 25, 26 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	92°46.6	183°43.1	\$23°37.9	175°34.0	S24°06.7	338°35.1	N21°47.9	95°46.0	503°47.2			
1	107°49.1	198°42.1	38.0	190°34.4	06.7	353°37.8	48.0	110°48.4	47.1	Alpheratz	357°34.0	29°14.2
2	122°51.5	213°41.1	38.1	205°34.8	06.6	8°40.6	48.0	125°50.7	47.1	Ankaa	353°06.3	-42°10.1
3	137°54.0	228°40.2	• • 38.2	220°35.1	06.5	23°43.4	• • 48.1	140°53.1	• • 47.0	Schedar	349°30.1	56°41.1
4	152°56.5	243°39.2	38.4	235°35.5	06.4	38°46.2	48.1	155°55.5	47.0	Diphda	348°46.4	-17°50.7
5	167°58.9	258°38.2	38.5	250°35.9	06.3	53°49.0	48.2	170°57.8	46.9	Achernar	335°19.4 327°50.1	-57°06.5 23°35.3
6	183°01.4	273°37.2	S23°38.6	265°36.3	S24°06.3	68°51.8	N21°48.2	186°00.2	S03°46.9	Hamal Polaris	313° 15.5	23 35.3 89°22.7
7	198°03.9	288°36.3	38.7	280°36.7	06.2	83°54.5	48.3	201°02.6	46.8	Acamar	315°10.9	-40°12.2
8	213°06.3	303°35.3	38.8	295°37.0	06.1	98°57.3	48.4	216°04.9	46.7	Menkar	314°05.1	4°11.5
9	228°08.8	318°34.3	• • 38.9	310°37.4	• • 06.0	114°00.1	• • 48.4	231°07.3	• • 46.7	Mirfak	308°26.7	49°57.4
10	243°11.3	333°33.4	39.0	325°37.8	05.9	129°02.9	48.5	246°09.6	46.6	Aldebaran	290°38.4	16°33.7
11 12	258°13.7 273°16.2	348°32.4 3°31.4	39.1 \$23°39.2	340°38.2 355°38.6	05.9 \$24°05.8	144°05.7 159°08.5	48.5 N21°48.6	261°12.0 276°14.4	46.6 \$03°46.5	Rigel	281°02.8	-8°10.3
13	273 10.2 288°18.7	18°30.4	39.3	10°39.0	05.7	174°11.2	48.6	270 14.4 291°16.7	46.5	Capella	280°20.2	46°01.5
14	303°21.1	33°29.5	39.4	25°39.3	05.6	189°14.0	48.7	306°19.1	46.4	Bellatrix	278°21.7	6°22.4
15	318°23.6	48°28.5	• • 39.5	40°39.7	• • 05.5	204° 16.8	• • 48.7	321°21.5	• • 46.4	Elnath	278°00.5	28°37.8
16	333°26.0	63°27.5	39.6	55°40.1	05.4	219°19.6	48.8	336°23.8	46.3	Alnilam	275°36.6	-1°11.1
17	348°28.5	78°26.6	39.7	70°40.5	05.4	234°22.4	48.9	351°26.2	46.3	Betelgeuse	270°50.9	7°24.7 -52°42.5
18	3°31.0	93°25.6	S23°39.8	85°40.9	S24°05.3	249°25.2	N21°48.9	6°28.5	S03°46.2	Canopus Sirius	263°51.5 258°25.2	-52 42.5 -16°45.1
19	18°33.4	108°24.6	39.9	100°41.2	05.2	264°28.0	49.0	21°30.9	46.2	Adhara	255° 04.9	-10°43.1 -29°00.4
20	33°35.9	123°23.6	40.0	115°41.6	05.1	279°30.7	49.0	36°33.3	46.1	Procyon	244°49.7	5°09.5
21	48°38.4	138°22.7	• • 40.1	130°42.0	• • 05.0	294°33.5	• • 49.1	51°35.6	• • 46.0	Pollux	243°16.0	27°57.7
22	63°40.8	153°21.7	40.2	145°42.4	04.9	309°36.3	49.1	66°38.0	46.0	Avior	234°13.9	-59°35.4
23	78°43.3	168°20.7	40.3	160°42.8	04.8	324°39.1	49.2	81°40.3	45.9	Suhail	222°45.4	-43°32.1
Mer.p	ass. 17:46	$\nu$ -1.0' d0.	1'  m- 3.90	$\nu$ 0.4′ d-0	$.1^\prime$ m $1.17$	$\nu$ 2.8′ d0.	1′ m-2.65	$\nu$ 2.4′ d-0	.1' m $0.99$	Miaplacidus	221°37.4	-69°49.2
										Alphard	217°46.7	-8°46.3
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.4	11°50.3
0	93°45.8	183°19.8	\$23°40.4	175°43.1	S24°04.7	339°41.9	N21°49.2	96°42.7	S03°45.9	Dubhe Denebola	193°39.8 182°24.1	61°36.3 14°25.5
1	108°48.2	198°18.8	40.5	190°43.5	04.6	354°44.7	49.3	111°45.1	45.8	Gienah	175° 42.8	-17°41.1
2	123°50.7	213°17.8	40.6	205°43.9	04.6	9°47.5	49.4	126°47.4	45.8		172°59.3	-63°14.3
3	138°53.2	228°16.8	• • 40.7	220°44.3	• • 04.5	24°50.2	• • 49.4	141°49.8	• • 45.7	Gacrux	171°50.8	-57°15.3
4	153°55.6	243°15.9	40.7	235°44.7	04.4	39°53.0	49.5	156°52.1	45.7	Alioth	166°12.4	55°48.8
5 6	168°58.1 184°00.5	258°14.9 273°13.9	40.8 \$23°40.9	250°45.1 265°45.4	04.3 \$24°04.2	54°55.8 69°58.6	49.5 N21°49.6	171°54.5 186°56.8	45.6 \$03°45.6	Spica	158°21.6	-11°17.8
7	199°03.0	273 13.9 288°13.0	41.0	280°45.8	04.1	85°01.4	49.6	201°59.2	45.5	Alkaid	152°51.6	49°10.7
8	214°05.5	303°12.0	41.1	295°46.2	04.0	100°04.2	49.7	217°01.6	45.4	Hadar	148°35.2	-60°29.7
9	229°07.9	318°11.0	• • 41.1	310°46.6	03.9	115°07.0	• • 49.7	232°03.9	• • 45.4	Menkent	147°56.9	-36°29.7
10	244°10.4	333°10.0	41.2	325°47.0	03.8	130°09.8	49.8	247°06.3	45.3	Arcturus Rigil Kent.	145°47.4 139°39.6	19°02.7 -60°56.3
11	$259^{\circ}12.9$	$348^{\circ}09.1$	41.3	340°47.3	03.7	$145^{\circ}12.6$	49.9	262°08.6	45.3	Kochab	139° 39.0 137° 20.6	74°02.6
12	274°15.3	3°08.1	\$23°41.4	355°47.7	S24°03.6	$160^{\circ}15.3$	N21°49.9	277°11.0	S03°45.2	Zuben'ubi	136°55.4	-16°08.9
13	289°17.8	18°07.1	41.4	10°48.1	03.5	175°18.1	50.0	292°13.4	45.2	Alphecca	126°03.4	26°37.5
14	304°20.3	33°06.1	41.5	25°48.5	03.4	190°20.9	50.0	307°15.7	45.1	Antares	112°15.2	-26°29.3
15 16	319°22.7 334°25.2	48°05.2 63°04.2	· · 41.6 41.7	40°48.9 55°49.2	· · 03.4 03.3	205°23.7 220°26.5	· · 50.1 50.1	322°18.1 337°20.4	· · 45.1 45.0	Atria	107°09.3	-69°04.3
17	349°27.6	78°03.2	41.7	70°49.6	03.3	235°29.3	50.1	352°22.8	44.9	Sabik	102°02.2	-15°45.4
18	4°30.1	93°02.3	\$23°41.8	85°50.0	S24°03.1	250°32.1	N21°50.3	7°25.1	S03°44.9	Shaula	96°09.7	-37°07.3
19	19°32.6	108°01.3	41.9	100°50.4	03.0	265°34.9	50.3	22°27.5	44.8	Rasalhague	95°58.2 90°42.4	12°32.4 51°29.0
20	34°35.0	123°00.3	41.9	115°50.8	02.9	280°37.7	50.4	37°29.8	44.8	Eltanin Kaus Aust.	90 42.4 83°31.9	-34°22.3
21	49°37.5	$137^{\circ}59.3$	• • 42.0	130°51.1	• • 02.8	295°40.5	• • 50.4	52°32.2	• • 44.7	Vega	80°33.1	38°48.4
22	64°40.0	152°58.4	42.0	145°51.5	02.7	310°43.2	50.5	67°34.6	44.7	Nunki	75°47.1	-26°15.9
23	79°42.4	167°57.4	42.1	160°51.9	02.6	325°46.0	50.5	82°36.9	44.6	Altair	61°59.5	8°56.2
Mer.p	ass. 17:42	$\nu$ -1.0′ d0.	1′ m-3.90	$\nu$ 0.4′ d-0	.1′ m1.17	$\nu 2.8' \ d0.$	1' m-2.66	$\nu 2.4' \ d-0$	.1'  m0.99	Peacock	53°05.0	-56°39.2
										Deneb	49°25.7	45°22.5
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°38.2	9°59.7
0	94°44.9	182°56.4	S23°42.2	175°52.3	S24°02.5	340°48.8	N21°50.6	97°39.3	S03°44.5	Al Na'ir	27°32.2	-46°50.3
1	109°47.4	197°55.4	42.2	190°52.7	02.4	355°51.6	50.6	112°41.6	44.5	Fomalhaut	15°13.8	-29°29.2
2	124°49.8	212°54.5	42.3	205°53.1	02.3	10°54.4	50.7	127°44.0	44.4	Scheat	13°44.5 13°29.2	28°13.6
3	139°52.3	227°53.5	• • 42.3	220°53.4	02.2	25° 57.2	50.8	142°46.3	• • 44.4	Markab	15 29.2	15°20.8
4	154°54.8	242°52.5	42.4	235°53.8	02.1	41°00.0	50.8	157°48.7	44.3	Dec 24 Wed	SHA	Mer.pass
5	$169^{\circ}57.2$	$257^{\circ}51.5$	42.4	250°54.2	02.0	$56^{\circ}02.8$	50.9	172°51.0	44.3	Venus	90°56.4	11:46
6	184°59.7	272°50.6	S23°42.5	265°54.6	S24°01.9	71°05.6	N21°50.9	187°53.4	S03°44.2	Mars	82°47.4	12:17
7	200°02.1	287°49.6	42.5	280°55.0	01.8	86°08.4	51.0	202°55.8	44.2	Jupiter	245°48.4	01:25
8	215°04.6	302°48.6	42.6	295°55.3	01.7	101°11.2	51.0	217°58.1	44.1	Saturn	2°59.4	17:34
9 10	230°07.1 245°09.5	317°47.6 332°46.7	· · 42.6 42.7	310°55.7 325°56.1	· · 01.5 01.4	116° 14.0 131° 16.7	· · 51.1 51.1	233°00.5 248°02.8	· · 44.0 44.0	Dec 25 Thu	SHA	Mer.pass
11	260°12.0	347°45.7	42.7	340°56.5	01.4	146° 19.5	51.1	263°05.2	43.9	Venus	89°34.0	11:47
12	275°14.5	2°44.7	\$23°42.8	355°56.9	524°01.2	161°22.3	N21°51.3	278°07.5	S03°43.9	Mars	81°57.4	12:17
13	290°16.9	17°43.8	42.8	10°57.2	01.1	176°25.1	51.3	293°09.9	43.8		245°56.1	01:21
14	$305^{\circ}19.4$	32°42.8	42.9	$25^{\circ}57.6$	01.0	$191^{\circ}27.9$	51.4	$308^{\circ}12.2$	43.8	Saturn	2°56.9	17:30
15	320°21.9	47°41.8	• • 42.9	40°58.0	• • 00.9	206°30.7	•• 51.4	323°14.6	• • 43.7	Dec 26 Fri	SHA	Mer.pass
16	335°24.3	62°40.8	42.9	55°58.4	8.00	221°33.5	51.5	338°16.9	43.6	Venus	$88^{\circ}11.5$	11:49
17	350°26.8	77°39.9	43.0	70°58.8	00.7	236°36.3	51.5	353°19.3	43.6	Mars	81°07.4	12:16
18	5°29.3 20°31.7	92°38.9 107°37.9	\$23°43.0	85°59.1	\$24°00.6	251°39.1	N21°51.6	8°21.6 23°24.0	\$03°43.5		246°03.9	01:17
19 20	20°31.7 35°34.2	107°37.9 122°36.9	43.0 43.1	100°59.5 115°59.9	00.5 00.4	266°41.9 281°44.7	51.7 51.7	23°24.0 38°26.4	43.5 43.4	Saturn	2°54.4	17:27
21	50°36.6	137°36.0	43.1	131°00.3	00.4	201 44.7 296°47.5	• • 51.8	50° 20.4 53° 28.7	• • 43.4	Horizont	al parallax	
22	65°39.1	152°35.0	43.1	146°00.7	00.1	311°50.3	51.8	68°31.1	43.3		Venus:	0.1
23	80°41.6	167°34.0	43.2	$161^{\circ}01.0$	0.00	$326^{\circ}53.1$	51.9	83°33.4	43.2		Mars:	0.1
Mern	ass. 17:38	$\nu$ -1 0' d0	1′ m-3.90	ν0 4' d-0	.1′ m1.16	ν2 8' dΩ	1′ m-2.66	ν2 4' d-0	.1′ m0.99			
	27.00		0.50									

h	Su	n			Moon		
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°08.5	S23°25.0	132°57.5	12.8'	S17°50.3	-12.0'	55.8'
1 2	195°08.2 210°07.9	24.9 24.9	147°29.4 162°01.2	12.9' 12.9'	17°38.3 17°26.2	-12.1' -12.2'	55.8' 55.8'
3	210 07.9 225°07.6	24.8	176°33.1	13.0'	17° 20.2	-12.2	55.8'
4	240°07.3	24.8	191°05.1	13.0'	17°01.7	-12.4'	55.9'
5	255°07.0	24.7	205°37.1	13.1'	16°49.4	-12.4'	55.9'
6 7	270°06.7 285°06.4	\$23°24.7 24.6	220°09.2 234°41.3	13.1' 13.1'	\$16° 36.9 16° 24.4	-12.5' -12.6'	55.9' 55.9'
8	300°06.1	24.6	249°13.4	13.1	16° 24.4	-12.7'	55.9'
9	315°05.7	• • 24.5	263°45.6	13.2'	15°59.1	-12.8'	56.0'
10	330°05.4	24.5	278°17.8	13.3'	15°46.4	-12.8'	56.0'
11 12	345°05.1 0°04.8	24.4 \$23°24.3	292°50.1 307°22.4	13.3' 13.4'	15°33.5 \$15°20.6	-12.9' -13.0'	56.0' 56.0'
13	15° 04.5	24.3	321°54.8	13.4'	15°07.6	-13.1'	56.1
14	30°04.2	24.2	$336^{\circ}27.1$	13.4'	14°54.5	-13.1'	56.1'
15	45°03.9 60°03.6	• • 24.2	350°59.6	13.5'	14°41.4	-13.2'	56.1'
16 17	75°03.3	24.1 24.1	5°32.0 20°04.6	13.5' 13.5'	14°28.2 14°14.9	-13.3' -13.4'	56.1' 56.2'
18	90°03.0	S23°24.0	34°37.1	13.6'	S14°01.5	-13.4	56.2
19	105°02.6	23.9	49°09.7	13.6'	13°48.1	-13.5'	56.2'
20	120°02.3	23.9	63°42.3	13.6'	13°34.5	-13.6'	56.2'
21 22	135°02.0 150°01.7	· · 23.8 23.7	78°14.9 92°47.6	13.7' 13.7'	13°21.0 13°07.3	-13.7' -13.7'	56.2' 56.3'
23	165° 01.4	23.7	107°20.3	13.7'	12°53.6	-13.8'	56.3
	SD = 16.3'	d = -0.0'			D = 15.2'		
					15.2		
Thu	GHA	Dec	GHA	$\nu$	Dec	d	HP
0 1	180°01.1 195°00.8	\$23°23.6 23.5	121°53.1 136°25.8	13.8' 13.8'	\$12°39.8 12°26.0	-13.9' -13.9'	56.3' 56.3'
2	210°00.5	23.5	150° 58.7	13.8'	12° 12.0	-13.9 -14.0'	56.4'
3	225°00.2	• • 23.4	165°31.5	13.9'	11°58.1	-14.0'	56.4
4	239°59.8	23.3	180°04.3	13.9'	11°44.0	-14.1'	56.4'
5 6	254° 59.5 269° 59.2	23.3 \$23°23.2	194°37.2 209°10.1	13.9' 13.9'	11°29.9 \$11°15.7	-14.2' -14.2'	56.4' 56.5'
7	284° 58.9	23.1	209 10.1 223°43.1	14.0'	11°01.5	-14.2	56.5
8	299°58.6	23.1	238°16.0	14.0'	10°47.2	-14.3'	56.5'
9	314°58.3	• • 23.0	252°49.0	14.0'	10°32.9	-14.4'	56.5'
10 11	329°58.0 344°57.7	22.9 22.8	267°22.0 281°55.1	14.0' 14.0'	10°18.5 10°04.0	-14.5' -14.5'	56.6' 56.6'
12	359° 57.4	\$23°22.8	296°28.1	14.1'	S09°49.5	-14.6'	56.6'
13	14°57.1	22.7	$311^{\circ}01.2$	14.1'	09°34.9	-14.6'	56.6'
14	29°56.8	22.6	325°34.2	14.1'	09°20.3	-14.7'	56.7'
15 16	44° 56.4 59° 56.1	· · 22.5 22.4	340°07.3 354°40.5	14.1' 14.1'	09°05.6 08°50.9	-14.7' -14.8'	56.7' 56.7'
17	74°55.8	22.4	9°13.6	14.1'	08°36.1	-14.8'	56.8'
18	89° 55.5	\$23°22.3	23°46.7	14.2'	S08°21.3	-14.9'	56.8'
19	104° 55.2 119° 54.9	22.2 22.1	38°19.9 52°53.0	14.2'	08°06.4 07°51.5	-14.9'	56.8' 56.8'
20 21	134°54.6	22.0	67°26.2	14.2'	07°36.5	-15.0'	56.9'
22	149°54.3	22.0	81°59.4	14.2'	07°21.5	-15.1'	56.9'
23	164°54.0	21.9	96°32.6	14.2'	07°06.4	-15.1'	56.9'
	SD = 16.3'	d = -0.1'		SI	O = 15.4'		
Fri	GHA	Dos	GHA		Dos	- 4	НР
6 0	<b>GHA</b> 179°53.7	<b>Dec</b> \$23°21.8	111°05.8	u 14.2'	<b>Dec</b> \$06° 51.3	d -15.2'	56.9'
1	194°53.3	21.7	125°39.0	14.2'	$06^{\circ}36.2$	-15.2'	57.0'
2	209°53.0	21.6	140°12.2	14.2'	06°21.0	-15.2'	57.0'
3 4	224° 52.7 239° 52.4	· · 21.5 21.4	154°45.4 169°18.6	14.2' 14.2'	06°05.7 05°50.5	-15.3' -15.3'	57.0' 57.0'
5	254°52.1	21.3	183°51.8	14.2'	05°35.1	-15.4	57.1
6	269°51.8	\$23°21.3	198°25.0	14.2'	S05°19.8	-15.4'	57.1'
7	284°51.5 299°51.2	21.2 21.1	212°58.2 227°31.4	14.2' 14.2'	05°04.4 04°49.0	-15.4'	57.1' 57.2'
8 9	299°51.2 314°50.9	21.1	227°31.4 242°04.6	14.2'	04°49.0 04°33.5	-15.5' -15.5'	57.2'
10	329°50.6	20.9	256°37.8	14.2'	04°18.0	-15.5'	57.2'
11	344°50.3	20.8	271°11.0	14.2'	04°02.5	-15.6'	57.2'
12 13	359°50.0 14°49.6	\$23°20.7 20.6	285°44.1 300°17.3	14.2' 14.1'	\$03°46.9 03°31.3	-15.6' -15.6'	57.3' 57.3'
13 14	14°49.6 29°49.3	20.6	300°17.3 314°50.4	14.1' 14.1'	03° 31.3	-15.6 -15.7'	57.3'
15	44°49.0	20.4	$329^{\circ}23.6$	14.1'	03°00.0	-15.7'	57.4
16	59°48.7	20.3	343°56.7	14.1'	02°44.4	-15.7'	57.4
17 18	74° 48.4 89° 48.1	20.2 \$23°20.1	358°29.8 13°02.9	14.1' 14.1'	02°28.7 \$02°12.9	-15.7' -15.8'	57.4' 57.4'
18 19	89°48.1 104°47.8	20.0	13°02.9 27°36.0	14.1'	01°57.2	-15.8' -15.8'	57.4° 57.5'
20	119° 47.5	19.9	42°09.0	14.0'	01°41.4	-15.8'	57.5'
21	134°47.2	• • 19.8	56°42.1	14.0'	01°25.6	-15.8'	57.5'
22 23	149° 46.9 164° 46.6	19.7 19.6	71°15.1 85°48.1	14.0' 14.0'	01°09.7 00°53.9	-15.8' -15.9'	57.6' 57.6'
23						-10.9	31.0
	SD = 16.3'	d = -0.1'		51	D = 15.5'		

Lat.	Twi	light	Sunrise	Sunset	Twi	light
Lat.	Naut.	Civil	Junisc	Juliset	Civil	Naut.
N 72°	08:27	10:57			13:04	15:34
N 70°	08:07	09:55			14:05	15:53
68°	07:51	09:20			14:40	16:09
66°	07:38	08:55	10:35	13:25	15:05	16:22
64°	07:27	08:35	09:53	14:07	15:25	16:34
62°	07:17	08:19	09:25	14:35	15:41	16:43
60°	07:09	08:06	09:03	14:57	15:55	16:51
N 58°	07:01	07:54	08:46	15:14	16:06	16:59
56°	06:55	07:44	08:31	15:29	16:17	17:06
54°	06:49	07:35	08:19	15:42	16:26	17:12
52°	06:43	07:27	80:80	15:53	16:34	17:18
50°	06:38	07:19	07:58	16:03	16:41	17:23
45°	06:26	07:03	07:37	16:23	16:57	17:35
N 40°	06:15	06:50	07:20	16:40	17:11	17:45
35°	06:06	06:38	07:06	16:54	17:23	17:54
30°	05:57	06:27	06:54	17:07	17:33	18:03
20°	05:41	06:08	06:32	17:28	17:52	18:20
N 10° 0°	05:25	05:51	06:14	17:46	18:09	18:36
1	05:08	05:34	05:56	18:04	18:26	18:53
<b>S</b> 10°	04:49	05:16	05:39	18:21	18:45	19:12
20° 30°	04:26	04:55	05:20	18:40	19:05	19:34
30°	03:57 03:38	04:30 04:15	04:58 04:45	19:02 19:15	19:30 19:45	20:03 20:22
40°	03:36	03:57	04:45	19:15	20:03	20:22
45°	03:13	03:34	04:30	19:48	20:26	21:16
<b>S</b> 50°	01:59	03:05	03:49	20:11	20:56	22:01
52°	01:39	03.03	03:49	20:11	21:11	22:29
54°	00:45	02:32	03:26	20:34	21:28	23:14
56°	////	02:09	03:12	20:48	21:51	////
58°	////	01:40	02:55	21:05	22:20	7777
<b>S</b> 60°	////	00:49	02:35	21:25	23:10	////
				1		

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

		Sun			Moon	
Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age
_ u,	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	4-6
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	14-31%
24	00:34	00:19	12:00	15:37	03:14	
25	00:04	00:11	12:00	16:22	04:00	
26	00:25	00:40	12:01	17:06	04:44	

# December 27, 28, 29 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	95° 44.0	182°33.0	\$23°43.2	176°01.4	S23°59.9	341°55.9	N21°51.9	98°35.8	503°43.2		SHA	Dec
1	110°46.5	197°32.1	43.2	191°01.4	59.8	356° 58.7	52.0	113°38.1	43.1	Alpheratz	357°34.0	29°14.2
2	125°49.0	212°31.1	43.3	206°02.2	59.7	12°01.4	52.0	128°40.5	43.1	Ankaa	353°06.3	-42°10.1
3	140°51.4	227°30.1	43.3	221°02.6	• • 59.6	27°04.2	• • 52.1	143°42.8	• • 43.0	Schedar	349°30.1	56°41.1
4	155°53.9	242°29.1	43.3	236°02.9	59.5	42°07.0	52.2	158°45.2	43.0	Diphda	348°46.5	-17°50.7
5	170°56.4	257°28.2	43.3	251°03.3	59.4	57°09.8	52.2	173°47.5	42.9	Achernar	335°19.4	-57°06.5
6	185°58.8	272°27.2	S23°43.3	266°03.7	S23°59.3	72° 12.6	N21°52.3	188°49.9	S03°42.8	Hamal	327°50.1	23°35.3
7	201°01.3	287°26.2	43.4	281°04.1	59.1	87° 15.4	52.3	203°52.2	42.8	Polaris	313°16.6	89°22.7
8	216°03.7	302°25.2	43.4	296°04.5	59.0	102°18.2	52.4	218°54.6	42.7	Acamar	315°10.9	-40°12.2 4°11.5
9	231°06.2	317°24.3	• • 43.4	311°04.8	• • 58.9	117°21.0	• • 52.4	233°56.9	• • 42.7	Menkar Mirfak	314°05.1 308°26.7	4 11.5 49°57.4
10	246°08.7	332°23.3	43.4	326°05.2	58.8	132°23.8	52.5	248°59.3	42.6	Aldebaran	290°38.4	16°33.7
11	261°11.1	347°22.3	43.4	341°05.6	58.7	147°26.6	52.6	264°01.6	42.5	Rigel	281°02.8	-8°10.3
12	276° 13.6	2°21.3	S23°43.4	356°06.0	S23°58.6	162°29.4	N21°52.6	279°04.0	S03°42.5	Capella	280°20.2	46°01.5
13	291°16.1	17°20.4	43.5	11°06.4	58.4	177°32.2	52.7	294°06.3	42.4	Bellatrix	278°21.7	6°22.4
14	306° 18.5	32°19.4	43.5	26°06.7	58.3	192°35.0	52.7	309°08.7	42.4	Elnath	278°00.5	28°37.8
15	321°21.0	47°18.4	• • 43.5	41°07.1	• • 58.2	207° 37.8 222° 40.6	• • 52.8	324°11.0	• • 42.3	Alnilam	275°36.6	-1°11.1
16 17	336°23.5 351°25.9	62°17.4 77°16.5	43.5 43.5	56°07.5 71°07.9	58.1 58.0	222 40.6 237°43.4	52.8 52.9	339°13.4 354°15.7	42.2 42.2	Betelgeuse	$270^{\circ}50.9$	7°24.7
18	6°28.4	92°15.5	\$23°43.5	86°08.3	50.0 \$23°57.8	252° 46.2	N21°53.0	9°18.1	\$03°42.1	Canopus	$263^{\circ}51.5$	-52°42.5
19	21°30.9	107°14.5	43.5	101°08.6	57.7	267°49.0	53.0	24°20.4	42.1	Sirius	258° 25.2	-16°45.1
20	36°33.3	122°13.5	43.5	116°09.0	57.6	282°51.8	53.1	39°22.8	42.0	Adhara	255°04.8	-29°00.4
21	51°35.8	137°12.6	43.5	131°09.4	• • 57.5	297°54.6	53.1	54°25.1	• • 42.0	Procyon	244°49.7	5°09.5
22	66°38.2	152°11.6	43.5	146°09.8	57.4	312°57.4	53.2	69°27.5	41.9	Pollux	243°16.0	27°57.7
23	81°40.7	167°10.6	43.5	161°10.1	57.2	328°00.2	53.2	84°29.8	41.8	Avior	234°13.8	-59°35.4
		-								Suhail	222°45.4	-43°32.1
ivier.p	ass. 17:34	$\nu$ -1.0′ $d0$	.0′ m-3.90	$\nu$ 0.4 d-0	.1′ m1.15	ν2.8′ d0.	1′ m-2.66	ν2.4 d-0	.1′ m1.00	Miaplacidus Alphard	221°37.4 217°46.7	-69°49.2 -8°46.3
										Regulus	207°33.4	11°50.3
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Dubhe	193°39.8	61°36.3
0	96°43.2	182°09.7	\$23°43.5	176°10.5	\$23°57.1	343°03.0	N21°53.3	99°32.2	503°41.8	Denebola	182°24.1	14°25.5
1	111°45.6	197°08.7	43.5	191°10.9	57.0	358°05.8	53.3	114°34.5	41.7	Gienah	175°42.8	-17°41.1
2	126°48.1	212°07.7	43.5	206°11.3	56.9	13°08.6	53.4	129°36.9	41.7	Acrux	$172^{\circ}59.2$	-63°14.3
3	141°50.6	227°06.7	• • 43.5	221°11.7	• • 56.7	28° 11.4	53.5	144°39.2	• • 41.6	Gacrux	$171^{\circ}50.8$	-57°15.3
4	156°53.0 171°55.5	242°05.8	43.5	236°12.0 251°12.4	56.6	43°14.2	53.5	159°41.6 174°43.9	41.5	Alioth	$166^{\circ}12.3$	55°48.8
5 6	171 55.5 186° 58.0	257°04.8 272°03.8	43.5 \$23°43.5	266°12.8	56.5 \$23°56.4	58° 17.0 73° 19.8	53.6 N21°53.6	174 43.9 189°46.2	41.5 \$03°41.4	Spica	158°21.6	-11°17.8
7	202° 00.4	272 03.8 287°02.8	43.5	281°13.2	56.2	88°22.6	53.7	204°48.6	41.4	Alkaid	152°51.6	49°10.7
8	202 00.4 217°02.9	302°01.9	43.4	296°13.6	56.1	103°25.4	53.7	219°50.9	41.4	Hadar	148°35.2	-60°29.7
9	232°05.4	317°00.9	43.4	311°13.9	• • 56.0	118°28.2	• • 53.8	234°53.3	• • 41.2	Menkent	147°56.9	-36°29.7
10	247°07.8	331°59.9	43.4	326°14.3	55.9	133°31.0	53.9	249°55.6	41.2	Arcturus	145°47.3	19°02.7
11	262°10.3	346°58.9	43.4	341°14.7	55.7	148°33.8	53.9	264°58.0	41.1	Rigil Kent. Kochab	139°39.6 137°20.5	-60°56.3 74°02.6
12	277°12.7	1°58.0	\$23°43.4	356°15.1	S23°55.6	163°36.6	N21°54.0	280°00.3	S03°41.1	Zuben'ubi	136°55.3	-16°09.0
13	292° 15.2	16°57.0	43.4	$11^{\circ}15.5$	55.5	178°39.4	54.0	295°02.7	41.0	Alphecca	126°03.3	26°37.5
14	$307^{\circ}17.7$	31°56.0	43.3	26°15.8	55.4	193°42.2	54.1	310°05.0	40.9	Antares	112° 15.2	-26°29.3
15	322°20.1	46°55.0	• • 43.3	41°16.2	• • 55.2	208° 45.0	•• 54.1	325°07.4	• • 40.9	Atria	107°09.2	-69°04.3
16	337°22.6	61°54.1	43.3	56°16.6	55.1	223°47.8	54.2	340°09.7	40.8	Sabik	102°02.2	-15°45.4
17	352°25.1	76°53.1	43.3	71°17.0	55.0	238°50.6	54.3	355°12.1	40.8	Shaula	96°09.7	-37°07.3
18	7°27.5	91°52.1	523°43.2	86°17.4	\$23°54.8	253°53.4	N21°54.3	10°14.4	S03°40.7	Rasalhague	$95^{\circ}58.1$	12°32.4
19	22°30.0 37°32.5	106°51.1 121°50.2	43.2	101°17.7 116°18.1	54.7	268° 56.2 283° 59.0	54.4	25°16.7 40°19.1	40.6	Eltanin	90°42.4	51°29.0
20 21	57 32.5 52°34.9	121 50.2 136°49.2	43.2 • • 43.2	131° 18.5	54.6 •• 54.4	203 59.0 299°01.8	54.4 •• 54.5	55°21.4	40.6 •• 40.5	Kaus Aust.	83°31.9	-34°22.3
22	67°37.4	151°48.2	43.2	146°18.9	54.3	314°04.6	54.5	70°23.8	40.5	Vega	80°33.1	38°48.4
23	82°39.8	166°47.2	43.1	161°19.3	54.2	329°07.4	54.6	85°26.1	40.4	Nunki	75°47.1	-26°15.9
						_				Altair	61°59.5 53°05.0	8°56.2 -56°39.2
ivier.p	ass. 17:30	$\nu$ -1.0 d-0	0.0′ m-3.90	$\nu_{0.4}$ a-0	.1′ m1.15	$\nu$ 2.8° $a$ 0.	1′ m-2.66	$\nu$ 2.3 a-0	.1′ m1.00	Peacock Deneb	49° 25.7	-50 39.2 45°22.5
										Enif	33°38.2	9°59.7
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.2	-46°50.3
0	97°42.3	181°46.3	\$23°43.1	176°19.6	\$23°54.0	344°10.2	N21°54.7	100°28.5	503°40.3	Fomalhaut	15°13.8	-29°29.2
1	112°44.8	196°45.3	43.0	191°20.0	53.9	359°13.0	54.7	115°30.8	40.3	Scheat	13°44.6	28°13.6
2	127°47.2	211°44.3	43.0	206°20.4	53.8	14° 15.8	54.8	130°33.2	40.2	Markab	$13^{\circ}29.2$	15°20.8
3	142° 49.7 157° 52.2	226°43.4 241°42.4	• • 43.0	221°20.8	53.6	29° 18.6	• • 54.8	145°35.5	40.2	Dec 27 Sat	SHA	Mor noss
4			42.9 42.0	236°21.2 251°21.5	53.5	44°21.4 59°24.2	54.9 54.0	160°37.8 175°40.2	40.1	Venus	<b>SHA</b> 86°49.0	Mer.pass 11:51
5 6	172°54.6 187°57.1	256°41.4 271°40.4	42.9 \$23°42.8	251°21.5 266°21.9	53.4 \$23°53.2	59°24.2 74°27.0	54.9 N21°55.0	175°40.2 190°42.5	40.0 \$03°40.0	Venus	80° 17.4	12:16
7	202° 59.6	286°39.5	42.8	281°22.3	53.1	89°29.8	55.0	205°44.9	39.9	Jupiter	246°11.8	01:12
8	202 39.0 218°02.0	301°38.5	42.8	201 22.3 296°22.7	53.1	104°32.6	55.0	200°47.2	39.8	Saturn	2°51.7	17:23
9	233°04.5	316°37.5	42.7	311°23.1	• • 52.8	119°35.4	55.2	235°49.6	• • 39.8			
10	248°07.0	331°36.5	42.7	326°23.4	52.7	134°38.2	55.2	250°51.9	39.7	Dec 28 Sun	SHA	Mer.pass
11	263°09.4	346°35.6	42.6	341°23.8	52.5	149°41.0	55.3	265°54.2	39.7	Venus	85°26.5	11:52
12	278°11.9	1°34.6	\$23°42.6	356°24.2	S23°52.4	164°43.8	N21°55.3	280°56.6	S03°39.6	Mars	79°27.4 246°19.8	12:15
13	293°14.3	16°33.6	42.5	$11^{\circ}24.6$	52.3	179°46.6	55.4	295°58.9	39.5	Jupiter Saturn	246° 19.8 2° 49.0	01:08 17:19
14	308° 16.8	31°32.6	42.5	26°24.9	52.1	194° 49.4	55.4	311°01.3	39.5			11.19
15	323°19.3	46°31.7	• • 42.4	41°25.3	• • 52.0	209°52.2	• • 55.5	326°03.6	• • 39.4	Dec 29 Mon	SHA	Mer.pass
16	338°21.7	61°30.7	42.4	56°25.7	51.8	224°55.0	55.6	341°06.0	39.4	Venus	84°04.0	11:54
17	353°24.2	76°29.7	42.3	71°26.1	51.7	239°57.8	55.6	356°08.3	39.3	Mars	78°37.3	12:14
18	8°26.7	91°28.8	\$23°42.3	86°26.5	\$23°51.6	255°00.7	N21°55.7	11°10.6	\$03°39.2	Jupiter	246°27.9	01:03
19	23°29.1 38°31.6	106°27.8 121°26.8	42.2 42.1	101°26.8 116°27.2	51.4 51.3	270°03.5 285°06.3	55.7 55.8	26°13.0 41°15.3	39.2 39.1	Saturn	2°46.2	17:15
20 21	53° 34.1	121 26.8 136° 25.8	· · 42.1	116°27.2 131°27.6	51.3	285°06.3 300°09.1	55.8	41 15.3 56° 17.7	39.1 · · 39.0	Horizont	al parallax	
22	68° 36.5	150°24.9	42.1	146°28.0	51.0	315°11.9	55.9	71°20.0	39.0		Venus:	0.1
23	83°39.0	166°23.9	42.0	161°28.4	50.8	330° 14.7	56.0	86°22.4	38.9		Mars:	0.1
			0.0′ m-3.90		.1′ m1.14		1′ m-2.67		.1′ m1.00		-	
ivier.p	ass. 17:26	ν-1.0 a-0	.0 111-3.90	νυ.4 α-0	.1111.14	ν2.0° α0.	1 111-2.07	ν2.3 α-0	.1111.00			

h	Su	n			Moon		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	179°46.3	S23°19.5	100°21.0	13.9'	S00°38.0	-15.9'	57.6'
1	194°45.9	19.4	114°54.0	13.9'	00°22.1	-15.9'	57.6'
2	209°45.6 224°45.3	19.3 •• 19.2	129°26.9 143°59.7	13.9' 13.8'	\$00°06.2 N00°09.7	-15.9' 15.9'	57.7' 57.7'
3 4	239°45.0	19.2	143 59.7 158°32.6	13.8'	00°25.6	16.0'	57.7'
5	254°44.7	19.0	173°05.4	13.8'	00°23.6	16.0'	57.8
6	269°44.4	S23°18.8	187°38.2	13.7'	N00°57.5	16.0'	57.8'
7	284°44.1	18.7	202°10.9	13.7'	01°13.5	16.0'	57.8'
8	299°43.8	18.6	216°43.7	13.7'	01°29.5	16.0'	57.9'
9 10	314°43.5 329°43.2	· · 18.5	231°16.3 245°49.0	13.6' 13.6'	01°45.5 02°01.5	16.0'	57.9' 57.9'
11	329 43.2 344°42.9	18.4	245 49.0 260°21.6	13.6'	02 01.5 02°17.5	16.0' 16.0'	57.9' 57.9'
12	359°42.6	\$23°18.2	274°54.1	13.5'	N02°33.5	16.0'	58.0'
13	14°42.3	18.1	289°26.6	13.5'	02°49.6	16.0'	58.0'
14	29°42.0	17.9	303°59.1	13.4'	03°05.6	16.0'	58.0'
15	44°41.7	• • 17.8	318°31.5	13.4'	03°21.6	16.0'	58.1'
16 17	59°41.3 74°41.0	17.7 17.6	333°03.9 347°36.2	13.3' 13.3'	03°37.6 03°53.7	16.0' 16.0'	58.1' 58.1'
18	89°40.7	\$23°17.5	2°08.5	13.2'	N04°09.7	16.0'	58.2'
19	104°40.4	17.3	16°40.7	13.2'	04°25.7	16.0'	58.2'
20	119°40.1	17.2	31°12.9	13.1'	04°41.8	16.0'	58.2'
21	134°39.8	•• 17.1	45°45.0	13.1'	04°57.8	16.0'	58.2'
22	149°39.5	17.0	60°17.1	13.0'	05°13.8	16.0'	58.3'
23	164°39.2	16.9	74°49.1	12.9'	05°29.8	16.0'	58.3'
	SD = 16.3'	d = -0.1'		SI	D = 15.7'		
Sun	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°38.9	\$23°16.7	89°21.0	12.9'	N05°45.8	16.0'	58.3'
1 2	194°38.6 209°38.3	16.6 16.5	103°52.9 118°24.7	12.8' 12.8'	06°01.8 06°17.7	16.0' 16.0'	58.4' 58.4'
3	209 36.3 224°38.0	. 16.4	110 24.7 132°56.5	12.7'	06°17.7	15.9'	58.4'
4	239°37.7	16.2	147°28.1	12.6'	06°49.6	15.9'	58.5'
5	254°37.4	16.1	161°59.8	12.6'	07°05.6	15.9'	58.5'
6	269°37.1	S23°16.0	176°31.3	12.5'	N07°21.5	15.9'	58.5'
7	284°36.8 299°36.5	15.8	191°02.8 205°34.2	12.4'	07°37.4 07°53.2	15.9'	58.6'
8 9	299°36.5 314°36.2	15.7 •• 15.6	205°34.2 220°05.6	12.3' 12.3'	07°53.2 08°09.1	15.9' 15.8'	58.6' 58.6'
10	329°35.8	15.4	234°36.8	12.2'	08°24.9	15.8'	58.6'
11	344°35.5	15.3	249°08.0	12.1'	08°40.7	15.8'	58.7'
12	359°35.2	S23°15.2	263°39.1	12.0'	N08°56.5	15.8'	58.7'
13	14°34.9	15.0	278°10.2	12.0'	09°12.3	15.7'	58.7'
14 15	29°34.6 44°34.3	14.9 •• 14.8	292°41.1 307°12.0	11.9' 11.8'	09°28.0 09°43.7	15.7' 15.7'	58.8' 58.8'
16	59°34.0	14.6	301° 12.0	11.7'	09°59.3	15.6'	58.8'
17	74°33.7	14.5	336°13.5	11.6'	10°15.0	15.6'	58.9'
18	89°33.4	S23°14.4	350°44.1	11.5'	N10°30.5	15.6'	58.9'
19	104°33.1	14.2	5°14.7	11.4'	10°46.1	15.5'	58.9'
20	119°32.8	14.1	19°45.1	11.4'	11°01.6	15.5'	58.9'
21 22	134°32.5 149°32.2	· · 13.9 13.8	34°15.5 48°45.7	11.3' 11.2'	11°17.1 11°32.5	15.4' 15.4'	59.0' 59.0'
23	164°31.9	13.6	63°15.9	11.1'	11°47.9	15.4	59.0'
	SD = 16.3'	d = -0.1'		SI	D = 15.9'		
N4	CUA	D	CHA		D		
Mon 0	<b>GHA</b> 179°31.6	<b>Dec</b> \$23°13.5	<b>GHA</b> 77°46.0	u 11.0'	<b>Dec</b> N12°03.3	d 15.3'	<b>HP</b> 59.1'
1	194°31.3	13.4	92°16.0	10.9'	12°18.6	15.2'	59.1'
2	209°31.0	13.2	106°45.8	10.8'	$12^{\circ}33.8$	15.2'	59.1'
3	224°30.7	• • 13.1	121°15.6	10.7'	12°49.0	15.1'	59.2'
4 5	239°30.4 254°30.1	12.9 12.8	135°45.3 150°14.9	10.6' 10.5'	13°04.2 13°19.2	15.1' 15.0'	59.2' 59.2'
6	269°29.8	523°12.6	150 14.9 164°44.4	10.5	N13°34.3	15.0'	59.2'
7	284°29.5	12.5	179°13.8	10.3'	13°49.3	14.9	59.3
8	299°29.2	12.3	193°43.0	10.2'	14°04.2	14.9'	59.3'
9	314°28.9	• • 12.2	208°12.2	10.1'	14°19.1	14.8'	59.3'
10	329°28.6 344°28.3	12.0	222°41.3 237°10.2	10.0' 9.8'	14°33.9 14°48.6	14.7'	59.4'
11 12	344°28.3 359°28.0	11.9 \$23°11.7	237°10.2 251°39.1	9.8'	14°48.6 N15°03.3	14.7' 14.6'	59.4' 59.4'
13	14°27.7	11.6	266° 07.8	9.6'	15°17.9	14.5	59.4'
14	29°27.4	11.4	280°36.4	9.5'	15°32.4	14.5'	59.5'
15	44°27.1	•• 11.2	295°04.9	9.4'	15°46.8	14.4'	59.5'
16	59°26.8	11.1	309°33.3	9.3'	16°01.2	14.3'	59.5'
17	74°26.4 89°26.1	10.9 \$23°10.8	324°01.6	9.2' 9.0'	16°15.5 N16°29.8	14.2'	59.5'
18 19	89°26.1 104°25.8	\$23°10.8 10.6	338°29.8 352°57.8	9.0′ 8.9′	N16°29.8 16°43.9	14.2' 14.1'	59.6' 59.6'
20	119°25.5	10.6	7°25.8	8.8'	16° 58.0	14.1	59.6'
21	134°25.2	10.3	21°53.6	8.7'	17°12.0	13.9'	59.7'
22	149°24.9	10.1	36°21.3	8.6'	17°25.9	13.8'	59.7'
23	164°24.6	10.0	50°48.8	8.4'	17°39.7	13.7'	59.7'
	SD = 16.3'	d = -0.1'		SI	0 = 16.1'		

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

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

		Sun			Moon	
Day	Eqn.of	f 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	41-63%
27	00:55	01:10	12:01	17:51	05:29	
28	01:24	01:39	12:02	18:38	06:14	
29	01:54	02:08	12:02	19:29	07:03	

## December 30, 31, 01 UT (Tue., Wed., Thu.)

h	Aries	Vei	nus	М	ars	Jup	oiter	Sat	urn		Stars	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
											ЗПА	Dec
0	98°41.5	181°22.9	S23°41.9	176°28.7	S23°50.7	345°17.5	$N21^{\circ}56.0$	101°24.7	S03°38.9	Alpheratz	357°34.0	29°14.2
1	113°43.9	196°22.0	41.8	191°29.1	50.6	0°20.3	56.1	116°27.0	38.8	Ankaa	353°06.4	-42°10.1
2	128°46.4	$211^{\circ}21.0$	41.8	206°29.5	50.4	15°23.1	56.1	131°29.4	38.7	Schedar	349°30.1	56°41.1
3	143°48.8	226°20.0	• • 41.7	221°29.9	• • 50.3	30°25.9	• • 56.2	146°31.7	• • 38.7	l .		
4	158°51.3	241°19.0	41.6	236°30.3	50.1	45°28.7	56.2	161°34.1	38.6	Diphda	348°46.5	-17°50.7
5	173°53.8	256°18.1	41.6	251°30.6	50.0	60°31.5	56.3	176°36.4	38.5	Achernar	335°19.4	-57°06.5
6	188°56.2	271°17.1	\$23°41.5	266°31.0	S23°49.8	75°34.3	N21°56.4	191°38.7	S03°38.5	Hamal	327°50.1	23°35.3
7	203°58.7	286°16.1	41.4	281°31.4	49.7	90°37.1	56.4	206°41.1	38.4	Polaris	313°17.4	89°22.7
8	219°01.2	301°15.1		296°31.8	49.5	105°39.9	56.5	221°43.4		Acamar	$315^{\circ}10.9$	-40°12.2
			41.3						38.4	Menkar	$314^{\circ}05.1$	$4^{\circ}11.5$
9	234°03.6	316°14.2	• • 41.3	311°32.2	• • 49.4	120°42.7	• • 56.5	236°45.8	• • 38.3	Mirfak	308° 26.7	49°57.4
10	249°06.1	331°13.2	41.2	326° 32.5	49.2	135°45.5	56.6	251°48.1	38.2	Aldebaran	290°38.4	16°33.7
11	264°08.6	346°12.2	41.1	341°32.9	49.1	150°48.3	56.6	266°50.4	38.2	Rigel	281°02.8	-8°10.3
12	$279^{\circ}11.0$	$1^{\circ}11.3$	S23°41.0	356°33.3	523°48.9	165°51.2	N21°56.7	281°52.8	S03°38.1			46°01.5
13	294°13.5	$16^{\circ}10.3$	41.0	11°33.7	48.8	180°54.0	56.8	296°55.1	38.0	Capella	280°20.2	
14	309°16.0	31°09.3	40.9	$26^{\circ}34.1$	48.6	195°56.8	56.8	311°57.4	38.0	Bellatrix	278°21.7	6°22.4
15	324°18.4	46°08.3	• • 40.8	41°34.4	• • 48.5	210°59.6	• • 56.9	326°59.8	• • 37.9	Elnath	278°00.5	28°37.8
16	339°20.9	61°07.4	40.7	56°34.8	48.3	226°02.4	56.9	342°02.1	37.8	Alnilam	275°36.6	-1°11.1
17	354°23.3	76°06.4	40.6	71°35.2	48.2	241°05.2	57.0	357°04.5	37.8	Betelgeuse	270°50.9	7°24.7
										Canopus	263°51.5	-52°42.5
18	9°25.8	91°05.4	\$23°40.5	86°35.6	\$23°48.0	256°08.0	N21°57.0	12°06.8	S03°37.7	Sirius	258°25.2	-16°45.1
19	24°28.3	106°04.5	40.4	101°35.9	47.9	271°10.8	57.1	27°09.1	37.7	Adhara	255°04.8	-29°00.4
20	39°30.7	121°03.5	40.4	116°36.3	47.7	286°13.6	57.2	42°11.5	37.6	Procyon	244°49.7	5°09.5
21	54°33.2	136°02.5	• • 40.3	131°36.7	• • 47.5	301°16.4	• • 57.2	57°13.8	• • 37.5	Pollux	243°16.0	27°57.7
22	69°35.7	151°01.5	40.2	146°37.1	47.4	$316^{\circ}19.2$	57.3	72°16.2	37.5	!	245 10.0 234°13.8	
23	84°38.1	166°00.6	40.1	161°37.5	47.2	331°22.0	57.3	87°18.5	37.4	Avior		-59°35.4
										Suhail	222°45.4	-43°32.1
Mer.p	ass. 17:22	$\nu$ -1.0′ d-0	.1' m-3.90	$\nu$ 0.4′ d-0	.1' m $1.14$	$\nu 2.8' \ d0.$	1'  m-2.67	$\nu$ 2.3′ d-0	.1'  m1.00	Miaplacidus	221°37.4	-69°49.2
										Alphard	217°46.7	-8°46.3
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°33.4	$11^{\circ}50.3$
										Dubhe	193°39.7	61°36.3
0	99°40.6	180°59.6	\$23°40.0	176°37.8	S23°47.1	346°24.8	N21°57.4	102°20.8	S03°37.3	Denebola	$182^{\circ}24.1$	14°25.5
1	114°43.1	195°58.6	39.9	191°38.2	46.9	1°27.7	57.4	117°23.2	37.3	Gienah	175°42.7	$-17^{\circ}41.1$
2	129°45.5	210°57.7	39.8	206°38.6	46.8	16°30.5	57.5	132°25.5	37.2	Acrux	172°59.2	-63°14.3
3	144°48.0	225°56.7	• • 39.7	221°39.0	• • 46.6	31°33.3	• • 57.6	147°27.8	• • 37.1	<b>I</b>	171°50.7	-57°15.3
4	159°50.4	240°55.7	39.6	236°39.4	46.5	46°36.1	57.6	162°30.2	37.1	Alioth	166°12.3	55°48.8
5	174°52.9	255°54.8	39.5	251°39.7	46.3	61°38.9	57.7	177°32.5	37.0		158° 21.5	-11°17.8
6	189°55.4	270°53.8	S23°39.4	266°40.1	523°46.1	76°41.7	N21°57.7	192°34.8	S03°37.0	Spica		
7	204°57.8	285°52.8	39.3	281°40.5	46.0	91°44.5	57.8	207°37.2	36.9	Alkaid	152°51.5	49°10.7
8	220°00.3	300°51.8	39.2	296° 40.9	45.8	106°47.3	57.8	222°39.5	36.8	Hadar	148°35.1	-60°29.7
9	235°02.8	315°50.9	39.1	311°41.3	• • 45.7	121°50.1	• • 57.9	237°41.9	36.8	Menkent	147°56.8	-36°29.7
										Arcturus	145°47.3	$19^{\circ}02.7$
10	250°05.2	330°49.9	39.0	326°41.6	45.5	136°52.9	58.0	252°44.2	36.7	Rigil Kent.	139°39.5	-60°56.3
11	265°07.7	345°48.9	38.9	341°42.0	45.3	151°55.7	58.0	267°46.5	36.6	Kochab	137°20.5	74°02.6
12	280°10.2	0°48.0	S23°38.8	356° 42.4	S23°45.2	166°58.6	N21°58.1	282°48.9	S03°36.6	Zuben'ubi	136°55.3	-16°09.0
13	295°12.6	15°47.0	38.6	11°42.8	45.0	182°01.4	58.1	297°51.2	36.5	Alphecca	126°03.3	26°37.5
14	310°15.1	30°46.0	38.5	26°43.2	44.9	197°04.2	58.2	312°53.5	36.4	Antares	112°15.2	-26°29.3
15	325°17.6	45°45.1	• • 38.4	41°43.5	• • 44.7	212°07.0	• • 58.2	327°55.9	• • 36.4	Atria	107°09.2	-69°04.3
16	340°20.0	60°44.1	38.3	56°43.9	44.5	227°09.8	58.3	342°58.2	36.3	Sabik	102°02.2	-15°45.4
17	355°22.5	75°43.1	38.2	71°44.3	44.4	242°12.6	58.3	358°00.5	36.2	Shaula	96°09.7	-37°07.3
18	10°24.9	90°42.2	S23°38.1	86°44.7	S23°44.2	257°15.4	N21°58.4	13°02.9	S03°36.2	Rasalhague	95°58.1	12°32.4
19	25°27.4	105°41.2	38.0	101°45.1	44.0	272°18.2	58.5	28°05.2	36.1	_		
20	40°29.9	120°40.2	37.8	116°45.4	43.9	287°21.0	58.5	43°07.5	36.0	Eltanin	90°42.3	51°29.0
21	55°32.3	135°39.2	37.7	131°45.8	• • 43.7	302°23.8	• • 58.6	58°09.9	36.0	Kaus Aust.	83°31.9	-34°22.3
22	70°34.8	150°38.3	37.6	146°46.2	43.5	317°26.7	58.6	73°12.2	35.9	Vega	80°33.1	38°48.4
								88°14.5		Nunki	$75^{\circ}47.1$	-26°15.9
23	85°37.3	165°37.3	37.5	161°46.6	43.4	332°29.5	58.7	88 14.5	35.8	Altair	$61^{\circ}59.5$	8°56.2
Mer.p	ass. 17:18	$\nu$ -1.0' d-0	.1′ m-3.90	$\nu$ 0.4′ d-0	.2′ m1.13	$\nu 2.8' \ d0.$	.1′ m-2.67	$\nu 2.3' \ d-0$	.1′ m1.00	Peacock	53°05.0	-56°39.2
										Deneb	49°25.7	45°22.5
										Enif	33°38.2	9°59.7
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Al Na'ir	27°32.2	-46°50.3
0	100°39.7	180°36.3	523°37.3	176°47.0	S23°43.2	347°32.3	N21°58.7	103°16.9	S03°35.8	Fomalhaut	15°13.8	-29°29.2
1	115°42.2	195°35.4	37.2	191°47.3	43.0	2°35.1	58.8	118°19.2	35.7	Scheat	13°44.6	28°13.6
2	130°44.7	210°34.4	37.1	206° 47.7	42.9	17°37.9	58.9	133°21.5	35.7	Markab	13° 29.2	15°20.8
3	145°47.1	225°33.4	• • 37.0	221°48.1	• • 42.7	32°40.7	• • 58.9	148°23.9	• • 35.6	ividikdD	10 29.2	10 20.0
4	160°49.6	240°32.5	36.8	236°48.5	42.5	47°43.5	59.0	163°26.2	35.5	Dec 30 Tue	SHA	Mer.pass
5	175°52.1	255°31.5	36.7	251°48.9	42.4	62°46.3	59.0	178°28.5	35.5	Venus	82°41.5	11:55
6	175 52.1 190°54.5	270°30.5	\$23°36.6	266° 49.2	\$23°42.2	77°49.1	N21°59.1	176 20.5 193°30.9	503°35.4	Mars	77°47.3	12:14
										Jupiter	246° 36.0	00:59
7	205°57.0	285°29.6	36.4	281°49.6	42.0	92°52.0	59.1	208°33.2	35.3			
8	220°59.4	300°28.6	36.3	296°50.0	41.8	107°54.8	59.2	223°35.5	35.3	Saturn	2°43.2	17:12
9	236°01.9	315°27.6	36.2	311°50.4	• • 41.7	122°57.6	• • 59.3	238°37.9	• • 35.2	Dec 31 Wed	SHA	Mer.pass
10	251°04.4	330°26.7	36.0	326°50.8	41.5	138°00.4	59.3	253°40.2	35.1	Venus	81° 19.0	11:57
11	266°06.8	345°25.7	35.9	341°51.1	41.3	153°03.2	59.4	268°42.5	35.1	Mars	76° 57.3	12:13
12	281°09.3	0°24.7	S23°35.7	356° 51.5	S23°41.2	168°06.0	N21°59.4	283°44.9	S03°35.0	Jupiter		00:54
13	$296^{\circ}11.8$	15°23.8	35.6	11°51.9	41.0	183°08.8	59.5	298°47.2	34.9	Saturn	2 <sup>40</sup> 44.3	
14	$311^{\circ}14.2$	30°22.8	35.5	26°52.3	40.8	$198^{\circ}11.6$	59.5	313°49.5	34.9	Saturn	∠ <del>4</del> 0.2	17:08
15	$326^{\circ}16.7$	45°21.8	• • 35.3	41°52.7	• • 40.6	213°14.4	• • 59.6	328°51.9	• • 34.8	Jan 01 Thu	SHA	Mer.pass
16	341°19.2	60°20.9	35.2	56°53.0	40.5	228°17.3	59.7	343°54.2	34.7	Venus	79°56.6	11:58
17	356°21.6	75°19.9	35.0	71°53.4	40.3	243°20.1	59.7	358°56.5	34.7	Mars	76°07.2	12:13
18	11°24.1	90°18.9	\$23°34.9	86°53.8	S23°40.1	258°22.9	N21°59.8	13°58.9	S03°34.6	Jupiter		00:50
19	26°26.6	105°18.0	34.7	101°54.2	39.9	273°25.7	59.8	29°01.2	34.5	Saturn	2°37.1	
20	41°29.0	120° 17.0	34.6	116° 54.6	39.8	288°28.5	59.9	44°03.5	34.5	Saturn	2 31.1	17:04
	56°31.5	120 17.0 135°16.0	• • 34.4	131° 54.0	39.6	303°31.3	59.9 21°59.9	59°05.8	• • 34.4	Horizont	al parallax	
21	50°31.5 71°33.9										Venus:	0.1
22		150°15.1	34.3	146°55.3	39.4	318°34.1	22°00.0	74°08.2	34.3		Mars:	0.1
23	86°36.4	165°14.1	34.1	161°55.7	39.2	333°37.0	00.1	89°10.5	34.3			V.1
Mer.p	ass. 17:15	$\nu$ -1.0′ d-0	.1′ m-3.90	$\nu$ 0.4′ d-0	.2′ m1.12	$\nu 2.8' \ d0.$	1' m-2.67	$\nu$ 2.3′ d-0	.1' m $1.01$			

h	Su	n			Moon		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179° 24.3	\$23°09.8	65°16.3	8.3'	N17°53.4	13.6'	59.7'
1	194°24.0	09.6	79°43.6	8.2'	18°07.0	13.5'	59.8'
2	209°23.7	09.5	94°10.8	8.1'	18°20.6	13.4'	59.8'
3	224°23.4	• • 09.3	108°37.8	7.9'	18°34.0	13.3'	59.8'
4	239°23.1	09.1	123°04.8	7.8'	18°47.3	13.2'	59.8'
5	254°22.8	09.0	137°31.6	7.7'	19°00.6	13.1'	59.9'
6	269°22.5	S23°08.8	151°58.3	7.6'	N19°13.7	13.0'	59.9'
7	284°22.2	08.6	166°24.9	7.4'	19°26.8 19°39.7	12.9'	59.9'
8	299°21.9 314°21.6	08.5 •• 08.3	180°51.3 195°17.6	7.3' 7.2'	19° 39.7 19° 52.5	12.8' 12.7'	59.9'
9 10	314 21.0 329°21.3	· · 08.3	195 17.6 209°43.8	7.2 7.1'	19 52.5 20°05.2	12.7	60.0' 60.0'
11	344°21.0	08.0	209 43.8 224°09.9	6.9'	20° 17.8	12.5'	60.0
12	359° 20.7	523°07.8	238°35.8	6.8'	N20°30.3	12.4	60.0
13	14°20.4	07.6	253°01.6	6.7'	20°42.6	12.2'	60.1
14	29°20.1	07.4	267°27.2	6.5'	20°54.9	12.1'	60.1'
15	44°19.8	07.3	281°52.8	6.4'	21°07.0	12.0'	60.1'
16	59° 19.5	07.1	296°18.2	6.3'	$21^{\circ}19.0$	11.9'	60.1'
17	74°19.2	06.9	310°43.4	6.1'	21°30.9	11.7'	60.1'
18	89° 18.9	\$23°06.7	325°08.6	6.0'	N21°42.6	11.6'	60.2'
19	104° 18.6	06.6	339°33.6	5.9'	21°54.2	11.5'	60.2'
20	119° 18.4	06.4	353°58.5	5.7'	22°05.7	11.3'	60.2'
21	134° 18.1	• • 06.2	8°23.2	5.6'	22°17.0	11.2'	60.2'
22	149° 17.8	06.0	22°47.8	5.5'	22°28.2	11.1'	60.3'
23	164°17.5	05.8	37°12.3	5.4'	22°39.3	10.9'	60.3'
	SD = 16.3'	d = -0.2'		SI	D = 16.3'		
Wed	GHA	Dec	GHA	$\nu$	Dec	d	HP
0	179°17.2	\$23°05.7	51°36.7	5.2'	$N22^{\circ}50.2$	10.8'	60.3'
1	194° 16.9	05.5	66°00.9	5.1'	23°01.0	10.6'	60.3'
2	209° 16.6	05.3	80°25.0	5.0'	23°11.6	10.5'	60.3'
3	224°16.3	• • 05.1	94°49.0	4.8'	23°22.1	10.3'	60.3'
4	239° 16.0	04.9	109°12.8	4.7'	23°32.4	10.2	60.4'
5	254° 15.7 269° 15.4	04.7 \$23°04.5	123°36.5 138°00.1	4.6'	23°42.6 N23°52.6	10.0'	60.4
6 7	284°15.4	04.4	150 00.1 152°23.6	4.5' 4.3'	24°02.5	9.9' 9.7'	60.4' 60.4'
8	299°14.8	04.4	166°46.9	4.3 4.2'	24 02.5 24°12.2	9.7 9.5'	60.4
9	314°14.5	• • 04.0	181°10.2	4.1'	24°12.2	9.3 9.4'	60.5
10	329°14.2	03.8	195°33.2	4.0'	24°31.1	9.2'	60.5
11	344°13.9	03.6	209°56.2	3.9'	24°40.4	9.1'	60.5
12	359°13.6	523°03.4	224°19.1	3.7'	N24°49.4	8.9'	60.5'
13	14°13.3	03.2	238°41.8	3.6'	24°58.3	8.7'	60.5'
14	29°13.0	03.0	253°04.4	3.5'	25°07.0	8.5'	60.5'
15	44° 12.7	• • 02.8	267°26.9	3.4'	25°15.5	8.4'	60.5'
16	59°12.4	02.6	281°49.3	3.3'	25°23.9	8.2'	60.6'
17 18	74° 12.1 89° 11.8	02.4 \$23°02.2	296°11.6 310°33.8	3.2' 3.1'	25°32.1 N25°40.1	8.0' 7.8'	60.6' 60.6'
19	104°11.5	02.0	324°55.8	3.1 2.9'	25°47.9	7.6'	60.6
20	119° 11.2	01.8	339°17.8	2.8'	25°55.5	7.5	60.6
21	134°10.9	01.6	353°39.6	2.7'	26°03.0	7.3	60.6'
22	149°10.6	01.4	8°01.3	2.6'	26°10.3	7.1'	60.6'
23	164°10.3	01.2	22°23.0	2.5'	26°17.3	6.9'	60.6'
	SD = 16.3'	d = -0.2'		SI	D = 16.4'		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	179° 10.1	\$23°01.0	36°44.5	2.4'	N26°24.2	6.7'	60.7'
1	194° 09.8	00.8	51°06.0	2.3'	26°30.9	6.5	60.7'
2	209°09.5	00.6	65°27.3	2.3'	26°37.4	6.3	60.7'
3	224°09.2	• • 00.4	79°48.6	2.2'	26°43.7	6.1'	60.7'
4	239°08.9	00.2	94°09.7	2.1'	26°49.8	5.9'	60.7'
5	254°08.6	23°00.0	108°30.8	2.0'	26°55.7	5.7'	60.7'
6	269°08.3	S22°59.8	122°51.8	1.9'	N27°01.5	5.5'	60.7'
7	284°08.0	59.6	137°12.7	1.8'	27°07.0	5.3'	60.7'
8 9	299° 07.7 314° 07.4	59.4 •• 59.2	151°33.5 165°54.3	1.8' 1.7'	27°12.3 27°17.4	5.1' 4.9'	60.7' 60.7'
10	314 07.4 329°07.1	59.2 59.0	105 54.3 180°14.9	1.6'	27 17.4 27°22.3	4.9 4.7'	60.7'
11	344°06.8	58.8	194°35.6	1.5'	27°27.0	4.7	60.7
12	359°06.5	S22°58.6	208°56.1	1.5'	N27°31.4	4.3'	60.7'
13	14°06.2	58.3	223°16.6	1.4'	27°35.7	4.1'	60.8'
14	29°05.9	58.1	237°37.0	1.4'	27°39.8	3.9'	60.8'
15	44°05.6	• • 57.9	251°57.3	1.3'	27°43.6	3.6'	60.8'
16	59°05.4	57.7	266°17.6	1.2'	27°47.3	3.4'	60.8'
17	74°05.1	57.5	280°37.9	1.2'	27°50.7	3.2'	60.8'
18	89°04.8	\$22°57.3	294°58.1	1.2'	N27°53.9	3.0'	60.8'
19	104°04.5	57.1	309°18.2	1.1'	27°56.9	2.8'	60.8'
20 21	119°04.2 134°03.9	56.8 • • 56.6	323°38.3 337°58.4	1.1' 1.0'	27°59.7 28°02.2	2.6' 2.3'	60.8' 60.8'
21	134°03.9 149°03.6	56.4	337°58.4 352°18.5	1.0'	28°02.2 28°04.6	2.3'	60.8'
23	164° 03.3	56.2	6°38.5	1.0'	28°06.7	2.1 1.9'	60.8
23		d = -0.2'	- 0 30.3			1.9	00.0
	SD = 16.3'	$a = -0.2^{\circ}$		51	D = 16.5'		

Lat.	Twilight		Sunrise	Sunset	Twilight	
	Naut.	Civil	Junise	Juliset	Civil	Naut.
N 72°	08:25	10:45			13:21	15:42
<b>N</b> 70°	08:06	09:51			14:16	16:01
68°	07:50	09:18			14:49	16:16
66°	07:38	08:54	10:29	13:37	15:13	16:29
64°	07:27	08:35	09:50	14:16	15:32	16:40
62°	07:18	08:19	09:23	14:43	15:47	16:49
60°	07:09	08:06	09:03	15:04	16:01	16:57
<b>N</b> 58°	07:02	07:54	08:46	15:21	16:12	17:04
56°	06:56	07:44	08:31	15:35	16:22	17:11
54°	06:50	07:36	08:19	15:47	16:31	17:17
52°	06:44	07:28	80:80	15:58	16:39	17:22
50°	06:39	07:20	07:59	16:08	16:46	17:27
45°	06:27	07:05	07:38	16:28	17:02	17:39
<b>N</b> 40°	06:17	06:51	07:22	16:45	17:15	17:49
35°	06:08	06:40	07:08	16:58	17:27	17:58
30°	06:00	06:29	06:56	17:11	17:37	18:07
20°	05:43	06:11	06:35	17:31	17:55	18:23
<b>N</b> 10°	05:27	05:54	06:17	17:50	18:12	18:39
0°	05:11	05:37	05:59	18:07	18:29	18:55
<b>S</b> 10°	04:52	05:19	05:42	18:24	18:47	19:14
20°	04:30	04:59	05:23	18:43	19:07	19:36
30°	04:01	04:34	05:02	19:04	19:32	20:05
35°	03:43	04:19	04:49	19:17	19:47	20:23
40°	03:20	04:01	04:34	19:32	20:05	20:46
45°	02:50	03:39	04:16	19:50	20:27	21:16
<b>S</b> 50°	02:06	03:10	03:54	20:12	20:56	22:00
52°	01:39	02:55	03:44	20:22	21:10	22:26
54°	00:58	02:38	03:32	20:34	21:28	23:06
56°	////	02:16	03:18	20:48	21:49	////
58°	////	01:48	03:01	21:04	22:17	////
<b>S</b> 60°	////	01:03	02:42	21:24	23:01	////
	B.4			Manage		

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

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>	Pass	Upper	Lower	10-12
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	74-91%
30	02:23	02:37	12:03	20:25	07:56	
31	02:51	03:06	12:03	21:26	08:55	
01	03:20	03:34	12:04	22:32	09:59	