
The Nautical Almanac 2025



TheNauticalAlmanac.com

The Nautical Almanac

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Acknowledgment and Credits

Dr. Enno Rodegerdts

The Nautical Almanac *Daily Pages* and Sun Almanacs found herein and on our site were created or derived from PyAlmanac written by the great Norwegian sailor Enno Rodegerdts. PyAlmanac uses PyEphem to generate the almanacs and LaTeX provides the final formatting. Visit Dr. Rodegerdts site and learn of his voyages at <https://sv-inua.net/>

Without his work TheNauticalAlmanac.com wouldn't exist.

Andrew Bauer

Mr. Bauer has taken the initial work of Dr. Rodegerdts and improved it to the excellence now found in the following Daily Pages. Attending foremost to the accuracy of data and then formatting Mr. Bauer modified PyAlmanac to provide a clear arrangement of figures needed for celestial navigation. To that end his work was determined, tireless and efficient. In our mutual writing across many lines of longitude he has always been pleasant, friendly and most affable.

As he has said, *"The art of celestial navigation should be promoted, not discouraged, even in the modern day"*.

To both of these men we all owe a large debt of gratitude and thanks

Disclaimer and Warning

Prior to use verify the accuracy of The Nautical Almanac or data you download from our site. They SHOULD NOT and MUST NOT be relied upon for celestial navigation work of any sorts or any purpose whatsoever. You use them at your own risk or peril.

Errors & Corrections

Contact us if you find any significant errors and describe the correction that should be made.



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2025

January

M	Tu	W	Th	F	Sa	Su
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

February

M	Tu	W	Th	F	Sa	Su
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

March

M	Tu	W	Th	F	Sa	Su
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

April

M	Tu	W	Th	F	Sa	Su
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

May

M	Tu	W	Th	F	Sa	Su
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

June

M	Tu	W	Th	F	Sa	Su
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

July

M	Tu	W	Th	F	Sa	Su
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

August

M	Tu	W	Th	F	Sa	Su
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

September

M	Tu	W	Th	F	Sa	Su
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

October

M	Tu	W	Th	F	Sa	Su
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

November

M	Tu	W	Th	F	Sa	Su
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

December

M	Tu	W	Th	F	Sa	Su
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

2025

Day of Week, Week Number, Day of Year, Remaining Days of Year

Day of Month	1		Days remaining	Week number
	January			
	Day of Week	Day of Year		
1	Wed	1	365	1
2	Thu	2	364	
3	Fri	3	363	
4	Sat	4	362	
5	Sun	5	361	2
6	Mon	6	360	
7	Tue	7	359	
8	Wed	8	358	
9	Thu	9	357	
10	Fri	10	356	
11	Sat	11	355	
12	Sun	12	354	3
13	Mon	13	353	
14	Tue	14	352	
15	Wed	15	351	
16	Thu	16	350	
17	Fri	17	349	
18	Sat	18	348	
19	Sun	19	347	4
20	Mon	20	346	
21	Tue	21	345	
22	Wed	22	344	
23	Thu	23	343	
24	Fri	24	342	
25	Sat	25	341	
26	Sun	26	340	5
27	Mon	27	339	
28	Tue	28	338	
29	Wed	29	337	
30	Thu	30	336	
31	Fri	31	335	

Day of Month	2		Days remaining	Week number
	February			
	Day of Week	Day of Year		
1	Sat	32	334	5
2	Sun	33	333	6
3	Mon	34	332	
4	Tue	35	331	
5	Wed	36	330	
6	Thu	37	329	
7	Fri	38	328	
8	Sat	39	327	
9	Sun	40	326	7
10	Mon	41	325	
11	Tue	42	324	
12	Wed	43	323	
13	Thu	44	322	
14	Fri	45	321	
15	Sat	46	320	
16	Sun	47	319	8
17	Mon	48	318	
18	Tue	49	317	
19	Wed	50	316	
20	Thu	51	315	
21	Fri	52	314	
22	Sat	53	313	
23	Sun	54	312	9
24	Mon	55	311	
25	Tue	56	310	
26	Wed	57	309	
27	Thu	58	308	
28	Fri	59	307	

Day of Month	3		Days remaining	Week number
	March			
	Day of Week	Day of Year		
1	Sat	60	306	9
2	Sun	61	305	10
3	Mon	62	304	
4	Tue	63	303	
5	Wed	64	302	
6	Thu	65	301	
7	Fri	66	300	
8	Sat	67	299	
9	Sun	68	298	11
10	Mon	69	297	
11	Tue	70	296	
12	Wed	71	295	
13	Thu	72	294	
14	Fri	73	293	
15	Sat	74	292	
16	Sun	75	291	12
17	Mon	76	290	
18	Tue	77	289	
19	Wed	78	288	
20	Thu	79	287	
21	Fri	80	286	
22	Sat	81	285	
23	Sun	82	284	13
24	Mon	83	283	
25	Tue	84	282	
26	Wed	85	281	
27	Thu	86	280	
28	Fri	87	279	
29	Sat	88	278	
30	Sun	89	277	14
31	Mon	90	276	

Day of Month	4		Days remaining	Week number
	April			
	Day of Week	Day of Year		
1	Tue	91	275	14
2	Wed	92	274	
3	Thu	93	273	
4	Fri	94	272	
5	Sat	95	271	
6	Sun	96	270	15
7	Mon	97	269	
8	Tue	98	268	
9	Wed	99	267	
10	Thu	100	266	
11	Fri	101	265	
12	Sat	102	264	
13	Sun	103	263	16
14	Mon	104	262	
15	Tue	105	261	
16	Wed	106	260	
17	Thu	107	259	
18	Fri	108	258	
19	Sat	109	257	
20	Sun	110	256	17
21	Mon	111	255	
22	Tue	112	254	
23	Wed	113	253	
24	Thu	114	252	
25	Fri	115	251	
26	Sat	116	250	
27	Sun	117	249	18
28	Mon	118	248	
29	Tue	119	247	
30	Wed	120	246	

Day of Month	5		Days remaining	Week number
	May			
	Day of Week	Day of Year		
1	Thu	121	245	18
2	Fri	122	244	
3	Sat	123	243	
4	Sun	124	242	19
5	Mon	125	241	
6	Tue	126	240	
7	Wed	127	239	
8	Thu	128	238	
9	Fri	129	237	
10	Sat	130	236	
11	Sun	131	235	20
12	Mon	132	234	
13	Tue	133	233	
14	Wed	134	232	
15	Thu	135	231	
16	Fri	136	230	
17	Sat	137	229	
18	Sun	138	228	21
19	Mon	139	227	
20	Tue	140	226	
21	Wed	141	225	
22	Thu	142	224	
23	Fri	143	223	
24	Sat	144	222	
25	Sun	145	221	22
26	Mon	146	220	
27	Tue	147	219	
28	Wed	148	218	
29	Thu	149	217	
30	Fri	150	216	
31	Sat	151	215	

Day of Month	6		Days remaining	Week number
	June			
	Day of Week	Day of Year		
1	Sun	152	214	23
2	Mon	153	213	
3	Tue	154	212	
4	Wed	155	211	
5	Thu	156	210	
6	Fri	157	209	
7	Sat	158	208	
8	Sun	159	207	24
9	Mon	160	206	
10	Tue	161	205	
11	Wed	162	204	
12	Thu	163	203	
13	Fri	164	202	
14	Sat	165	201	
15	Sun	166	200	25
16	Mon	167	199	
17	Tue	168	198	
18	Wed	169	197	
19	Thu	170	196	
20	Fri	171	195	
21	Sat	172	194	
22	Sun	173	193	26
23	Mon	174	192	
24	Tue	175	191	
25	Wed	176	190	
26	Thu	177	189	
27	Fri	178	188	
28	Sat	179	187	
29	Sun	180	186	27
30	Mon	181	185	

Day of Week, Week Number, Day of Year, Remaining Days of Year

Day of Month	7		Days remaining	Week number
	July			
	Day of Week	Day of Year		
1	Tue	182	184	27
2	Wed	183	183	
3	Thu	184	182	
4	Fri	185	181	
5	Sat	186	180	
6	Sun	187	179	28
7	Mon	188	178	
8	Tue	189	177	
9	Wed	190	176	
10	Thu	191	175	
11	Fri	192	174	
12	Sat	193	173	
13	Sun	194	172	29
14	Mon	195	171	
15	Tue	196	170	
16	Wed	197	169	
17	Thu	198	168	
18	Fri	199	167	
19	Sat	200	166	
20	Sun	201	165	30
21	Mon	202	164	
22	Tue	203	163	
23	Wed	204	162	
24	Thu	205	161	
25	Fri	206	160	
26	Sat	207	159	
27	Sun	208	158	31
28	Mon	209	157	
29	Tue	210	156	
30	Wed	211	155	
31	Thu	212	154	

Day of Month	8		Days remaining	Week number
	August			
	Day of Week	Day of Year		
1	Fri	213	153	31
2	Sat	214	152	
3	Sun	215	151	32
4	Mon	216	150	
5	Tue	217	149	
6	Wed	218	148	
7	Thu	219	147	
8	Fri	220	146	
9	Sat	221	145	
10	Sun	222	144	33
11	Mon	223	143	
12	Tue	224	142	
13	Wed	225	141	
14	Thu	226	140	
15	Fri	227	139	
16	Sat	228	138	
17	Sun	229	137	34
18	Mon	230	136	
19	Tue	231	135	
20	Wed	232	134	
21	Thu	233	133	
22	Fri	234	132	
23	Sat	235	131	
24	Sun	236	130	35
25	Mon	237	129	
26	Tue	238	128	
27	Wed	239	127	
28	Thu	240	126	
29	Fri	241	125	
30	Sat	242	124	
31	Sun	243	123	36

Day of Month	9		Days remaining	Week number
	September			
	Day of Week	Day of Year		
1	Mon	244	122	36
2	Tue	245	121	
3	Wed	246	120	
4	Thu	247	119	
5	Fri	248	118	
6	Sat	249	117	
7	Sun	250	116	37
8	Mon	251	115	
9	Tue	252	114	
10	Wed	253	113	
11	Thu	254	112	
12	Fri	255	111	
13	Sat	256	110	
14	Sun	257	109	38
15	Mon	258	108	
16	Tue	259	107	
17	Wed	260	106	
18	Thu	261	105	
19	Fri	262	104	
20	Sat	263	103	
21	Sun	264	102	39
22	Mon	265	101	
23	Tue	266	100	
24	Wed	267	99	
25	Thu	268	98	
26	Fri	269	97	
27	Sat	270	96	
28	Sun	271	95	40
29	Mon	272	94	
30	Tue	273	93	

Day of Month	10		Days remaining	Week number
	October			
	Day of Week	Day of Year		
1	Wed	274	92	40
2	Thu	275	91	
3	Fri	276	90	
4	Sat	277	89	
5	Sun	278	88	41
6	Mon	279	87	
7	Tue	280	86	
8	Wed	281	85	
9	Thu	282	84	
10	Fri	283	83	
11	Sat	284	82	
12	Sun	285	81	42

Useful Information

Time Signals- by telephone

WWV 303-499-7111 **WWVH** 808-335-4363

CHU English: 613-745-1576 (CHU provides only Eastern time announcements)
French: 613-745-9426

Time signals- by Radio

WWV (Fort Collins, Colorado)	2.5, 5, 10, 15, 20 MHz (male voice)
WWVH (Kauai, Hawaii)	2.5, 5, 10, 15 MHz (female voice)
CHU (Ottawa, Canada)	3330, 7850, and 14,670 kHz (USB)

Bowditch *2017- The American Practical Navigator*

https://TheNauticalAlmanac.com/2017_Bowditch-_American_Practical_Navigator.html

Organized in a convenient and useful manner. Download the Chapters, Parts or Tables you want or the entire work.

The Terrestrial Almanac Annual calendar and day planner for the entire year.

<https://TheNauticalAlmanac.com/TerrestrialAlmanac.html>

Pub. No. 249 Download individual Latitudes or Volumes

<https://TheNauticalAlmanac.com/Pub.No.249.html>

Pub. No. 229 Download individual Volumes covering a range of Latitudes

<https://TheNauticalAlmanac.com/Pub.No.229.html>

Sight Reduction Forms & Methods

<https://www.TheNauticalAlmanac.com/Methods.html>

Celestial Navigation

useful Formulas

About Calculators

The Casio *fx-300ES Plus* is an inexpensive calculator at about 11 USD. It features *natural input* so you enter a formula just as it would be written on paper. Entering degrees, minutes and seconds is very simple. The Casio *fx-300ES Plus* has 9 memory locations and you can review many of the previous entries you make using a special key on the calculator.

Determine Hc using a calculator

The formula

$$Hc = \text{asin}[\sin(\text{Declination}) * \sin(\text{Latitude}) + \cos(\text{Latitude}) * \cos(\text{Declination}) * \cos(\text{LHA})]$$

As it would be entered into the Casio calculator Note- Sin^{-1} is the arc-sin key

$$\text{Sin}^{-1}(\text{Sin}(\text{Ap Latitude}) \times \text{Sin}(\text{Declination}) + \text{Cos}(\text{Ap Latitude}) \times \text{Cos}(\text{Declination}) \times \text{Cos}(\text{LHA}))$$

Declination is the declination of the Celestial body you're observing. When the heavenly body's declination is *Contrary name* to your Ap Latitude enter a negative sign before it.

Latitude is the Latitude where you are, think you are or where you would like to determine Hc for. Typically, you'll be using an *Assumed position Latitude* or *Ap Latitude* as it's called.

In Western Longitudes

LHA is the Local Hour Angle which is derived from subtracting your whole number value of Longitude (Assumed or otherwise) from the whole number value of **GHA** (Greenwich Hour Angle).

In Eastern Longitudes

LHA, in **Eastern Longitudes**, is determined by rounding up the GHA figure to the next highest whole degree figure then adding the DR. Longitude to GHA to obtain LHA. Only add the whole degree DR. Longitude figure to the rounded up whole degree GHA figure. If the resulting LHA figure is greater than 360° then subtract 360° from the figure to obtain the LHA.

Why would you want to determine Hc using a calculator?

It's faster than looking up in Pub. No. 249 and Pub. No. 229, highly accurate and you don't need a lot of printed out pages of Latitudes from Pub. No. 249 and Pub. No. 229. Pub. No. 249 Vol. 2 & 3 don't cover any declination greater than 29 degrees so you'd have to use Pub. No. 229 which is extremely large.

Celestial Navigation

Determine Z

$$Z = \text{acos}[(\sin(\text{Declination}) - \sin(\text{Ap Latitude}) \times \sin(\text{Hc})) \div (\cos(\text{Ap Latitude}) \times \cos(\text{Hc}))]$$

As it would be entered into the Casio calculator... Note- Cos^{-1} is the arc-cosine key

$$\text{Cos}^{-1}((\sin(\text{Declination}) - \sin(\text{AP Latitude}) \times \sin(\text{Hc})) \div (\cos(\text{AP Latitude}) \times \cos(\text{Hc}))$$

If the heavenly body's declination is *Contrary name* to the Ap Latitude enter a negative sign before it.

To obtain Zn see the rules below for Northern and Southern latitudes.

Determine Z independent of Hc

$$Z = \tan^{-1}\left(\frac{\sin \text{LHA}}{(\cos L \tan d) - (\sin L \cos \text{LHA})}\right)$$

"L" is latitude and "d" is declination. When the heavenly body's declination is *Contrary name* to your Ap Latitude enter a negative sign before it.

As it would be entered into the Casio calculator... Note- \tan^{-1} is the arc-tangent key

$$Z = \tan^{-1} ((\sin (\text{LHA}) \div (\cos(\text{AP latitude}) \times \tan(\text{declination}) - (\sin(\text{AP latitude}) \times \cos(\text{LHA})))$$

The sign convention used in the calculation of this azimuth formula is as follows:

from Bowditch Chapter 22 CALCULATIONS AND CONVERSIONS, page 331

- 1) If latitude and declination are of contrary name, declination is treated as a negative quantity;
- 2) If the local hour angle is greater than 180° , it is treated as a negative quantity. If the azimuth angle as calculated is negative, add 180° to obtain the desired value.

To obtain Zn apply the following rules

<u>In Northern Latitudes</u>	<u>In Southern Latitudes</u>
LHA greater than 180°Zn=Z	LHA greater than 180°Zn= $180^\circ - Z$
LHA less than 180°Zn= $360^\circ - Z$	LHA less than 180°Zn= $180^\circ + Z$

Determine Refraction $0.96 \div \tan$ of (Ha)

Gives good results down to about 8° from the horizon but not less.

Refraction (good overall formula from 90° to below 8° from the horizon)

$$R_0 = \cot \left(H_a + \frac{7.31}{H_a + 4.4} \right)$$

As it would be entered into the Casio calculator...

$$1 \div \tan((H_a + (7.31 \div (H_a + 4.4)))$$

Both refraction formulas use the standard pressure and temperature of;

1010 mb 10° C
29.83 in 53° F

Determine Dip using feet

0.97 x (Square Root of *He* (Height of Eye) in feet)

Determine Dip using meters

1.76 x (Square Root of *He* (Height of eye) in meters)

Rules to Calculate Latitude using the Sun- Noon-Sight

1- Latitude and declination *Same name* but latitude is greater than declination:

$$\text{Latitude} = (90^\circ - H_o) + \text{declination}$$

2- Latitude and declination *Same name* but declination greater than latitude:

$$\text{Latitude} = \text{Declination} - (90^\circ - H_o)$$

3- Latitude and declination *Contrary name*:

$$\text{Latitude} = (90^\circ - H_o) - \text{Declination}$$

To get AP longitude (needed for plotting the LOP)

In Western longitudes

Combine the DR Longitude figure with only the minutes (of arc) of the total GHA figure. The Ap λ figure will be used when plotting the LOP on the UPS.

In Eastern longitudes

In Eastern longitudes the Ap λ is determined as follows;

DR longitude + (0°60' *minus* GHA minutes of arc)

Example- E 075° + (0°60' - 0° 02')= 75° 58' Ap longitude



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Explanation of The Nautical Almanac Daily Pages

Refer to the next several pages

1	Date and Time based on GMT/UT
2	Mer. pass- meridian passage of Aries at the Prime Meridian- Greenwich- 0°. Time figure is GMT/UT.
3	GHA v correction and Declination d correction. The amount to correct v and d for is determined by the minutes and seconds of time of the planet observation and is found in the <i>Increments and Corrections</i> pages of The Nautical Almanac.
4	m- is the <i>magnitude</i> or brightness of the planet. A bright planet will have a <i>minus</i> sign beside the figure. A fainter planet will have no sign beside its magnitude figure.
5	Stars- SHA, Sidereal Hour Angle, and Declination. 59 stars are listed. Typically, only 57 stars are used for navigational purposes in both Northern and Southern Hemispheres.
6	Mer. pass- planet meridian passage time at the Prime Meridian- Greenwich- 0°. Time figure is GMT/UT.
7	SHA- planet SHA. Planet SHA is calculated by subtracting Aries GHA from planet GHA. If planet GHA figure is less than Aries GHA, add 360° to planet GHA and then subtract Aries GHA.
8	Horizontal parallax- for Venus and Mars.
9	SD- Semi-diameter of the Sun. One half of the angular width of the Sun as observed on earth.
10	d- the amount the declination of the Sun changes per hour.
11	The Moon's GHA v correction. The amount to correct the Moon's GHA using v is determined by the minutes and seconds of time of the Moon's observation and is found in the <i>Increments and Corrections</i> pages of The Nautical Almanac.
12	SD- Semi-diameter of the Moon. One half of the angular width of the Moon, as observed on earth.
13	The Moon's declination d correction. It's the amount of declination the Moon changes per hour. The amount to correct the Moon's declination using d is determined by the minutes and seconds of time of the Moon's observation and is found in the <i>Increments and Corrections</i> pages of The Nautical Almanac. The d correction is <i>algebraically</i> added. An easy way to determine whether to <i>add</i> or <i>subtract</i> the d correction found in the <i>Increments and Corrections</i> pages is by examining the Moon's declination trend in The Nautical Almanac. If the declination is increasing from the integral hour of the observation you made then add the d increment and increase the value of the declination. If the declination is decreasing from the integral hour of the observation you made then subtract the d increment and decrease the value of the declination. Make sure to put the N or S "back on" the corrected declination so you know which hemisphere the Moon's in.
14	HP- the angle between two lines, one from the center of the Moon to the center of the Earth, the other from the center of the Moon to the edge of the Earth. This angle is about 56', but it changes slightly from day to day as the distance to the Moon changes along its elliptical path around the Earth. <i>Source- starpath.com</i>
15	Sun- Eqn. of Time- In its simplicity the Equation of Time is the difference between clock time and time seen on a Sundial. That is comparing "clock time", as a mechanical measurement of time, and the Sundial being time determined by the position of the Sun at any given hour. The figures listed are for GMT/UT at 00 ^h and 12 ^h . If you look at Mer. Pass just to the right of the Eqn. of Time you'll find, approximately, when the Sun crosses The Prime Meridian (at Greenwich). The figures in the 12 ^h column indicate, approximately, how many minutes and seconds are subtracted, or added, to 12 to determine when Local Apparent Noon is at The Prime Meridian. You can calculate, approximately, when LAN is at your Longitude by adding, or subtracting the amount of time difference between you and Greenwich and the Equation of Time. An Equation of Time chart is provided in each almanac on TheNauticalAlmanac.com Example- May 30, 2016. Mer. Pass is at UT 11:58. 12^h is 02:25. This means <i>subtract</i> 2 minutes and 25 seconds from UT 12 to calculate when Meridian Passage is at Greenwich. So at W 075° meridian passage would occur at about- 12 hours + 5 hours <i>MINUS</i> 2 minutes and 25 seconds, or UT 16:57:35
16	Sun- Mer. Pass just to the right of the Eqn. of Time is the approximate GMT/UT when the Sun crosses The Prime Meridian (at Greenwich) for that specific date.

17	Moon- Mer. Pass- is the approximate GMT/UT when the Moon crosses The Prime Meridian (at Greenwich) or The International Date Line for that specific date. Upper means the GMT/UT when the Moon crosses The Prime Meridian (Greenwich) and Lower means the GMT/UT when the Moon crosses The International Date Line (180°).
18	Moon- Age- this is the number of days past a new Moon. Typically, there are 29 days in a lunar month. Moon- %- the amount of the Moon's illumination. 100% would be a full moon. 49% would be about ½ of the Moon is illuminated. A 3 day range percentage is provided but only one graphic for the phase.
19* <i>see notes at bottom</i>	(morning) Twilight- Naut.- the approximate GMT/UT when morning Nautical Twilight begins. Nautical twilight is the time when the center of the sun is 12° below the horizon and the horizon is visible enough to be used for marine sextant observations. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time.
19* <i>see notes at bottom</i>	(morning) Twilight- Civil- the approximate GMT/UT of morning civil twilight starts when the geometric center of the sun is 6° below the horizon. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time.
19* <i>see notes at bottom</i>	Sunrise- the approximate GMT/UT when the Sun is 0° 50' (semi-diameter plus refraction) below the horizon. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time.
19* <i>see notes at bottom</i>	(evening) Twilight- Naut.- the approximate GMT/UT of when evening Nautical Twilight ends. Nautical twilight is the time when the center of the sun is 12° below the horizon and the horizon is no longer visible enough to be used for sextant observations. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time.
19* <i>see notes at bottom</i>	(evening) Twilight- Civil- the approximate GMT/UT of evening civil twilight that ends when the geometric center of the sun is 6° below the horizon. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time.
19* <i>see notes at bottom</i>	Sunset- the approximate GMT/UT when the Sun is 0° 50' (semi-diameter plus refraction) below the horizon. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time.
20* <i>see notes at bottom</i>	Moonrise- the approximate GMT/UT when the Moon is about 0° 05' to 0° 10' below the horizon. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time under the specific day.
20* <i>see notes at bottom</i>	Moonset- the approximate GMT/UT when the Moon is about 0° 05' to 0° 10' below the horizon. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time under the specific day.

*** Note-**

means the Sun or Moon remains continuously above the horizon (in some cases twilight all night)

—:— can also mean twilight lasts all night

■ means the Sun or Moon remains continuously below the horizon.

—:— means Moon does not rise or set on that day but may have risen or set the previous day or following day.

*** Note-** Time of Sunrise, Sunset, Moonrise, Moonset and twilight is based on GMT/UT of the event at 0° (Greenwich). To determine the GMT/UT time at your Longitude add or subtract the time difference between your AP Longitude and Greenwich.

Sunrise, Sunset and twilight figures can be considered as approximate LMT (Local Mean Time) of the phenomena.

January 01, 02 ,03 (Fri., Sat., Sun.)

	Aries			Venus			Mars			Jupiter			Saturn			Stars	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	100°32.5	181°58.1	S23°38.5	318°04.0	N18°45.1	131°37.2	S13°36.5	275°29.9	N00°18.5	Alpheratz	357°46.2	29°09.0					
1	115°35.0	196°57.1	38.4	333°06.8	45.4	146°39.2	36.4	290°32.3	18.5	Ankaa	353°18.1	-42°15.2					
2	130°37.4	211°56.1	38.3	348°09.6	45.6	161°41.2	36.2	305°34.7	18.5	Schedar	349°43.6	56°35.9					
3	145°39.9	226°55.1	38.2	363°12.4	45.8	176°43.2	36.0	320°37.1	18.5	Diphda	348°58.3	-17°55.9					
4	160°42.4	241°54.2	38.1	378°15.2	46.0	191°45.1	35.8	335°39.5	18.5	Achernar	335°28.3	-57°11.3					
5	175°44.8	256°53.2	38.0	393°18.1	46.2	206°47.1	35.7	350°41.9	18.5	Hamal	328°03.5	23°30.8					
6	190°47.3	271°52.2	S23°37.9	408°20.9	N18°46.5	221°49.1	S13°35.5	5°44.3	N00°18.5	Polaris	318°47.1	89°18.8					
7	205°49.8	286°51.3	37.8	423°23.7	46.7	236°51.1	35.3	20°46.7	18.5	Akamar	315°19.9	-40°16.0					
8	220°52.2	301°50.3	37.7	438°26.5	46.9	251°53.0	35.1	35°49.2	18.5	Menkar	314°17.5	4°07.8					
9	235°54.7	316°49.3	37.6	453°29.4	47.1	266°55.0	35.0	50°51.6	18.4	Mirfak	308°43.7	49°54.0					
10	250°57.2	331°48.4	37.5	468°32.2	47.3	281°57.0	34.8	65°54.0	18.4	Aldebaran	290°52.0	16°31.9					
11	265°59.6	346°47.4	37.4	483°35.0	47.6	296°59.0	34.6	80°56.4	18.4	Rigel	281°14.1	-8°11.4					
12	281°02.1	361°46.4	S23°37.3	498°37.9	N18°47.8	312°00.9	S13°34.4	95°58.8	N00°18.4	Capella	280°37.8	46°00.6					
13	296°04.5	376°45.5	37.2	513°40.7	48.0	327°02.9	34.3	111°01.2	18.4	Bellatrix	278°34.4	6°21.5					
14	311°07.0	391°44.5	37.1	528°43.5	48.2	342°04.9	34.1	126°03.6	18.4	Elnath	278°15.5	28°37.0					
15	326°09.5	406°43.5	37.0	543°46.4	48.5	357°06.8	33.9	141°06.0	18.4	Anilam	275°48.6	-1°11.7					
16	341°11.9	421°42.6	36.9	558°49.2	48.7	372°08.8	33.7	156°08.4	18.4	Betelgeuse	271°03.7	7°24.5					
17	356°14.4	436°41.6	36.8	573°52.0	48.9	387°10.8	33.6	171°10.8	18.4	Canopus	263°56.7	-52°42.1					
18	11°16.9	91°40.6	S23°36.7	588°54.9	N18°49.1	402°12.8	S13°33.4	186°13.2	N00°18.3	Sirius	258°35.5	-16°43.6					
19	26°19.3	106°39.6	36.5	603°57.7	49.4	417°14.7	33.2	201°15.7	18.3	Adara	255°14.1	-28°59.2					
20	41°21.8	121°38.7	36.4	618°50.6	49.6	432°16.7	33.0	216°18.1	18.3	Procyon	245°01.9	5°12.0					
21	56°24.3	136°37.7	36.3	633°53.4	49.8	447°18.7	32.9	231°20.5	18.3	Pollux	243°30.3	28°00.0					
22	71°26.7	151°36.7	36.2	648°56.3	50.0	462°20.7	32.7	246°22.9	18.3	Avior	234°18.6	-59°32.4					
23	86°29.2	166°35.8	36.1	663°59.1	50.3	477°22.6	32.5	261°25.3	18.3	Suhail	222°54.0	-43°28.3					
	Mer.pass.:17:14	v-1.0 d0.1 m-3.8		v2.8 d0.2 m-0.7		v2.0 d0.2 m-2.0		v2.4 d-0.0 m0.9		Miaplacidus	221°39.7	-69°45.4					
										Alphard	217°58.3	-8°42.2					
										Regulus	207°45.9	11°54.9					
										Dubhe	193°54.2	61°41.4					
										Denebola	182°36.0	14°30.8					
										Gienah	175°54.9	-17°35.9					
										Acrux	173°12.3	-63°09.1					
										Gacrux	172°03.9	-57°10.0					
										Altho	166°22.8	55°53.9					
										Spica	158°34.0	-11°12.9					
										Alcaid	153°00.9	49°15.4					
										Hadar	148°51.9	-60°25.1					
										Menkent	148°10.8	-36°25.1					
										Arcturus	145°58.0	19°07.9					
										Rigel Kent.	139°55.6	-60°52.4					
										Zubenelg.	137°08.4	-16°05.0					
										Kochab	137°20.2	74°06.5					
										Alphecca	126°13.4	26°40.7					
										Antares	112°29.7	-26°27.2					
										Atria	107°34.4	-69°02.6					
										Sabik	102°15.8	-15°44.3					
										Shaula	96°25.8	-37°06.6					
										Rasalhague	96°09.1	12°33.1					
										Eltanin	90°47.8	51°29.2					
										Kaus Aust.	83°47.5	-34°22.8					
										Vega	80°41.1	38°47.5					
										Nunki	76°01.8	-26°17.1					
										Altair	62°11.1	8°53.7					
										Peacock	53°23.6	-56°42.2					
										Deneb	49°33.7	45°19.1					
										Enif	33°49.9	9°55.4					
										Alnair	27°47.1	-46°54.8					
										Fomalhaut	15°26.9	-29°34.2					
										Scheat	13°56.1	28°08.4					
										Markab	13°41.0	15°15.7					

Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	101°31.7	181°34.8	S23°36.0	319°12.0	N18°50.5	132°24.6	S13°32.3	276°27.7	N00°18.3
1	116°34.1	196°33.8	35.8	334°14.8	50.7	147°26.6	32.2	291°30.1	18.3
2	131°36.6	211°32.9	35.7	349°17.7	51.0	162°28.6	32.0	306°32.5	18.3
3	146°39.0	226°31.9	35.6	364°20.5	51.2	177°30.5	31.8	321°34.9	18.3
4	161°41.5	241°30.9	35.5	379°23.4	51.4	192°32.5	31.6	336°37.3	18.2
5	176°44.0	256°30.0	35.3	394°26.2	51.6	207°34.5	31.5	351°39.8	18.2
6	191°46.4	271°29.0	S23°35.2	409°29.1	N18°51.9	222°36.4	S13°31.3	6°42.2	N00°18.2
7	206°48.9	286°28.0	35.1	424°31.9	52.1	237°38.4	31.1	21°44.6	18.2
8	221°51.4	301°27.1	34.9	439°34.8	52.3	252°40.4	30.9	36°47.0	18.2
9	236°53.8	316°26.1	34.8	454°37.7	52.6	267°42.4	30.8	51°49.4	18.2
10	251°56.3	331°25.1	34.7	469°40.5	52.8	282°44.3	30.6	66°51.8	18.2
11	266°58.8	346°24.2	34.5	484°43.4	53.0	297°46.3	30.4	81°54.2	18.2
12	282°01.2	361°23.2	S23°34.4	499°46.3	N18°53.3	312°48.3	S13°30.2	96°56.6	N00°18.2
13	297°03.7	376°22.2	34.3	514°49.1	53.5	327°50.2	30.1	111°59.1	18.2
14	312°06.1	391°21.3	34.1	529°52.0	53.7	342°52.2	29.9	127°01.5	18.2
15	327°08.6	406°20.3	34.0	544°54.9	53.9	357°54.2	29.7	142°03.9	18.1
16	342°11.1	421°19.3	33.8	559°57.7	54.2	372°56.2	29.5	157°06.3	18.1
17	357°13.5	436°18.4	33.7	574°60.6	54.4	387°58.1	29.3	172°08.7	18.1
18	12°16.0	91°17.4	S23°33.6	589°63.4	N18°54.7	403°00.1	S13°29.2	187°11.1	N00°18.1
19	27°18.5	106°16.5	33.4	604°66.3	54.9	418°02.1	29.0	202°13.5	18.1
20	42°20.9	121°15.5	33.3	619°69.2	55.1	433°04.0	28.8	217°16.0	18.1
21	57°23.4	136°14.5	33.1	634°72.1	55.4	448°06.0	28.6	232°18.4	18.1
22	72°25.9	151°13.6	33.0	649°75.0	55.6	463°08.0	28.5	247°20.8	18.1
23	87°28.3	166°12.6	32.8	664°77.9	55.9	478°10.0	28.3	262°23.2	18.1
	Mer.pass.:17:11	v-1.0 d0.1 m-3.8		v2.9 d0.2 m-0.8		v2.0 d0.2 m-1.9		v2.4 d-0.0 m0.9	

Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	102°30.8	181°11.6	S23°32.7	320°20.8	N18°56.1	133°11.9	S13°28.1	277°25.6	N00°18.1
1	117°33.3	196°10.7	32.5	335°23.7	56.3	148°13.9	27.9	292°28.0	18.1
2	132°35.7	211°09.7	32.4	350°26.6	56.6	163°15.9	27.8	307°30.4	18.1
3	147°38.2	226°08.7	32.2	365°29.5	56.8	178°17.8	27.6	322°32.9	18.1
4	162°40.6	241°07.8	32.0	380°32.3	57.0	193°19.8	27.4	337°35.3	18.0
5	177°43.1	256°06.8	31.9	395°35.2	57.3	208°21.8	27.2	352°37.7	18.0
6	192°45.6	271°05.8	S23°31.7	410°38.1	N18°57.5	223°23.7	S13°27.0	7°40.1	N00°18.0
7	207°48.0	286°04.9	31.6	425°41.0	57.8	238°25.7	26.9	22°42.5	18.0
8	222°50.5	301°03.9	31.4	440°43.9	58.0	253°27.7	26.7	37°44.9	18.0
9	237°53.0	316°03.0	31.2	455°46.8	58.2	268°29.6	26.5	52°47.4	18.0
10	252°55.4	331°02.0	31.1	470°49.7	58.5	283°31.6	26.3	67°49.8	18.0
11	267°57.9	346°01.0	30.9	485°52.6	58.7	298°33.6	26.2	82°52.2	18.0
12	283°00.4	361°00.1	S23°30.7	490°55.5	N18°59.0	313°35.5	S13°26.0	97°54.6	N00°18.0
13	298°02.8	376°00.1	30.6	505°58.4	59.2	328°37.5	25.8	112°57.0	18.0
14	313°05.3	391°00.1	30.4	520°61.3	59.5	343°39.5	25.6	127°59.4	18.0
15	328°07.8	406°00.1	30.2	535°64.2	59.7	358°41.4	25.4	143°01.9	18.0
16	343°10.2	421°00.1	30.1	550°67.1	59.9	373°43.4	25.3	158°04.3	17.9
17	358°12.7	436°00.1	29.9	565°70.0	60.2	388°45.4	25.1	173°06.7	17.9
18	13°15.1	90°54.3	S23°29.7	580°72.9	N19°00.4	403°47.3	S13°24.9	188°09.9	N00°17.9
19	28°17								

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2010 January 01 to Jan. 03

h Sun							Moon							2010 January 01 to Jan. 03						
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight							
									Naut.	Civil			Civil	Naut.						
0	179°10.4	S23°01.6	356°04.6	3.1'	N23°30.0	-7.2'	61.0'	N 72°	08:23	10:40	■	■	13:29	15:45						
1	194°10.2	01.4	10°26.6	3.1'	23°22.7	-7.3'	61.0'	N 70°	08:04	09:48	■	■	14:20	16:04						
2	209°09.9	01.2	24°48.8	3.2'	23°15.3	-7.5'	61.0'	68°	07:49	09:16	■	■	14:52	16:19						
3	224°09.6	· · 01.0	39°11.0	3.2'	23°07.7	-7.7'	61.0'	66°	07:37	08:52	10:26	13:42	15:16	16:31						
4	239°09.3	00.8	53°33.3	3.3'	22°59.9	-7.9'	61.1'	64°	07:26	08:34	09:48	14:20	15:35	16:42						
5	254°09.0	00.6	67°55.6	3.4'	22°52.0	-8.0'	61.1'	62°	07:17	08:18	09:22	14:46	15:50	16:51						
6	269°08.7	S23°00.4	82°18.0	3.4'	N22°43.8	-8.2'	61.1'	60°	07:09	08:05	09:02	15:07	16:03	16:59						
7	284°08.4	00.2	96°40.5	3.5'	22°35.6	-8.4'	61.1'	N 58°	07:02	07:54	08:45	15:23	16:14	17:06						
8	299°08.1	23°00.0	111°03.1	3.6'	22°27.1	-8.5'	61.1'	56°	06:55	07:44	08:31	15:37	16:24	17:13						
9	314°07.8	22°59.8	125°25.7	3.7'	22°18.5	-8.7'	61.1'	54°	06:50	07:35	08:19	15:50	16:33	17:19						
10	329°07.5	59.6	139°48.4	3.7'	22°09.7	-8.9'	61.1'	52°	06:44	07:28	08:08	16:00	16:41	17:24						
11	344°07.2	59.4	154°11.2	3.8'	22°00.8	-9.0'	61.1'	50°	06:39	07:20	07:58	16:10	16:48	17:29						
12	359°06.9	S22°59.2	168°34.0	3.9'	N21°51.7	-9.2'	61.1'	45°	06:28	07:05	07:38	16:30	17:03	17:40						
13	14°06.6	59.0	182°57.0	4.0'	21°42.4	-9.3'	61.1'	N 40°	06:18	06:52	07:22	16:46	17:17	17:50						
14	29°06.3	58.8	197°20.0	4.1'	21°33.0	-9.5'	61.1'	35°	06:09	06:40	07:08	17:00	17:28	18:00						
15	44°06.0	· · 58.6	211°43.1	4.1'	21°23.4	-9.6'	61.1'	30°	06:00	06:30	06:56	17:12	17:38	18:08						
16	59°05.7	58.3	226°06.3	4.2'	21°13.7	-9.8'	61.1'	20°	05:44	06:11	06:35	17:33	17:57	18:24						
17	74°05.5	58.1	240°29.5	4.3'	21°03.8	-10.0'	61.1'	N 10°	05:28	05:55	06:17	17:51	18:13	18:40						
18	89°05.2	S22°57.9	254°52.9	4.4'	N20°53.8	-10.1'	61.1'	0°	05:12	05:38	06:00	18:08	18:30	18:56						
19	104°04.9	57.7	269°16.3	4.5'	20°43.6	-10.2'	61.1'	S 10°	04:53	05:20	05:43	18:25	18:48	19:15						
20	119°04.6	57.5	283°39.8	4.6'	20°33.3	-10.4'	61.1'	20°	04:31	05:00	05:25	18:43	19:08	19:37						
21	134°04.3	· · 57.3	298°03.5	4.7'	20°22.8	-10.5'	61.1'	30°	04:03	04:36	05:03	19:05	19:32	20:05						
22	149°04.0	57.1	312°27.2	4.8'	20°12.2	-10.7'	61.1'	35°	03:44	04:21	04:50	19:18	19:47	20:23						
23	164°03.7	56.8	326°51.0	4.8'	20°01.5	-10.8'	61.1'	40°	03:22	04:03	04:36	19:32	20:05	20:46						
	SD.=16.3	d=0.2			S.D.=16.6			45°	02:52	03:41	04:18	19:50	20:27	21:15						

Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise		Moonset			
									Fri	Sat	Sun	Fri	Sat	Sun
0	179°03.4	S22°56.6	341°14.9	4.9'	N19°50.6	-11.0'	61.1'	N 72°	□	15:25	18:36	□	12:34	11:20
1	194°03.1	56.4	355°38.8	5.0'	19°39.6	-11.1'	61.1'	N 70°	□	16:17	18:54	□	11:40	11:00
2	209°02.8	56.2	10°02.9	5.1'	19°28.4	-11.2'	61.1'	68°	13:46	16:49	19:08	12:05	11:07	10:44
3	224°02.5	· · 56.0	24°27.1	5.2'	19°17.1	-11.4'	61.1'	66°	14:49	17:12	19:19	11:00	10:42	10:31
4	239°02.2	55.7	38°51.4	5.3'	19°05.7	-11.5'	61.1'	64°	15:24	17:30	19:28	10:24	10:23	10:20
5	254°02.0	55.5	53°15.7	5.4'	18°54.2	-11.6'	61.1'	62°	15:49	17:45	19:36	09:58	10:07	10:10
6	269°01.7	S22°55.3	67°40.2	5.5'	N18°42.5	-11.7'	61.1'	60°	16:09	17:58	19:43	09:38	09:53	10:02
7	284°01.4	55.1	82°04.7	5.6'	18°30.7	-11.9'	61.1'	N 58°	16:25	18:08	19:49	09:21	09:42	09:55
8	299°01.1	54.8	96°29.4	5.7'	18°18.7	-12.0'	61.1'	56°	16:39	18:18	19:54	09:07	09:31	09:49
9	314°00.8	· · 54.6	110°54.1	5.8'	18°06.7	-12.1'	61.1'	54°	16:51	18:26	19:59	08:54	09:22	09:43
10	329°00.5	54.4	125°19.0	5.9'	17°54.5	-12.2'	61.1'	52°	17:01	18:33	20:03	08:43	09:14	09:38
11	344°00.2	54.2	139°43.9	6.0'	17°42.3	-12.3'	61.1'	50°	17:11	18:40	20:07	08:33	09:07	09:33
12	358°59.9	S22°53.9	154°08.9	6.1'	N17°29.9	-12.5'	61.1'	45°	17:30	18:54	20:15	08:13	08:51	09:23
13	13°59.6	53.7	168°34.1	6.2'	17°17.3	-12.6'	61.1'	N 40°	17:46	19:05	20:22	07:56	08:39	09:14
14	28°59.3	53.5	182°59.3	6.3'	17°04.7	-12.7'	61.0'	35°	17:59	19:15	20:28	07:41	08:28	09:07
15	43°59.1	· · 53.2	197°24.6	6.4'	16°52.0	-12.8'	61.0'	30°	18:11	19:23	20:33	07:29	08:18	09:00
16	58°58.8	53.0	211°50.1	6.5'	16°39.2	-12.9'	61.0'	20°	18:31	19:38	20:42	07:08	08:01	08:49
17	73°58.5	52.8	226°15.6	6.6'	16°26.2	-13.0'	61.0'	N 10°	18:48	19:51	20:50	06:49	07:46	08:39
18	88°58.2	S22°52.6	240°41.2	6.7'	N16°13.2	-13.1'	61.0'	0°	19:04	20:03	20:57	06:31	07:32	08:29
19	103°57.9	52.3	255°06.9	6.8'	16°00.0	-13.2'	61.0'	S 10°	19:20	20:14	21:05	06:14	07:18	08:19
20	118°57.6	52.1	269°32.7	6.9'	15°46.8	-13.3'	61.0'	20°	19:37	20:27	21:12	05:55	07:03	08:09
21	133°57.3	· · 51.9	283°58.7	7.0'	15°33.5	-13.4'	61.0'	30°	19:56	20:41	21:21	05:33	06:46	07:57
22	148°57.0	51.6	298°24.7	7.1'	15°20.0	-13.5'	61.0'	35°	20:07	20:50	21:26	05:20	06:35	07:50
23	163°56.7	51.4	312°50.8	7.2'	15°06.5	-13.6'	60.9'	40°	20:20	20:59	21:32	05:05	06:24	07:42
	SD.=16.3	d=0.2			S.D.=16.7			45°	20:35	21:10	21:38	04:47	06:10	07:33

Sun	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Mer. Pass	Moon		Age
									Eqn.of Time	12h	Mer. Pass	Upper	Lower	16-18
									00h	mm:ss	hh:mm	hh:mm	hh:mm	99-90%
0	178°56.5	S22°51.1	327°17.0	7.3'	N14°52.9	-13.7'	60.9'	1	03:18	03:32	12:04	00:16	12:48	99-90%
1	193°56.2	50.9	341°43.3	7.3'	14°39.2	-13.7'	60.9'	2	03:46	04:00	12:04	01:18	13:48	
2	208°55.9	50.7	356°09.7	7.4'	14°25.4	-13.8'	60.9'	3	04:14	04:28	12:04	02:16	14:43	
3	223°55.6	· · 50.4	10°36.2	7.5'	14°11.6	-13.9'	60.9'							
4	238°55.3	50.2	25°02.8	7.6'	13°57.6	-14.0'	60.9'							
5	253°55.0	49.9	39°29.4	7.7'	13°43.6	-14.1'	60.9'							
6	268°54.7	S22°49.7	53°56.2	7.8'	N13°29.5	-14.1'	60.8'							
7	283°54.4	49.5	68°23.1	7.9'	13°15.3	-14.2'	60.8'							
8	298°54.2	49.2	82°50.0	8.0'	13°01.1	-14.3'	60.8'							
9	313°53.9	· · 49.0	97°17.1	8.1'	12°46.7	-14.4'	60.8'							
10	328°53.6	48.7	111°44.2	8.2'	12°32.3	-14.4'	60.8'							
11	343°53.3	48.5	126°11.4	8.3'	12°17.9	-14.5'	60.7'							
12	358°53.0	S22°48.2	140°38.8	8.4'	N12°03.4	-14.6'	60.7'							
13	13°52.7	48.0	155°06.2	8.5'	11°48.8	-14.6'	60.7'							
14	28°52.4	47.7	169°33.7	8.5'	11°34.1	-14.7'	60.7'							
15	43°52.2	· · 47.5	184°01.2	8.6'	11°19.4	-14.7'	60.7'							
16	58°51.9	47.2	198°28.9	8.7'	11°04.7	-14.8'	60.6'							
17	73°51.6	47.0	212°56.7	8.8'	10°49.8	-14.8'	60.6'							
18	88°51.3	S22°46.7	227°24.5	8.9'	N10°35.0	-14.9'	60.6'							
19	103°51.0	46.5	241°52.4	9.0'	10°20.0	-14.9'	60.6'							
20	118°50.7	46.2	256°20.4	9.0'	10°05.1	-15.0'	60.6'							
21	133°50.4	· · 46.0	270°48.5	9.1'	09°50.1	-15.0'	60.5'							
22	148°50.2	45.7	285°16.7	9.2'	09°35.0	-15.1'	60.5'							
23	163°49.9	45.5	299°44.9	9.3'	09°19.9	-15.1'	60.5'							
	SD.=16.3	d=0.2			S.D.=16.6									

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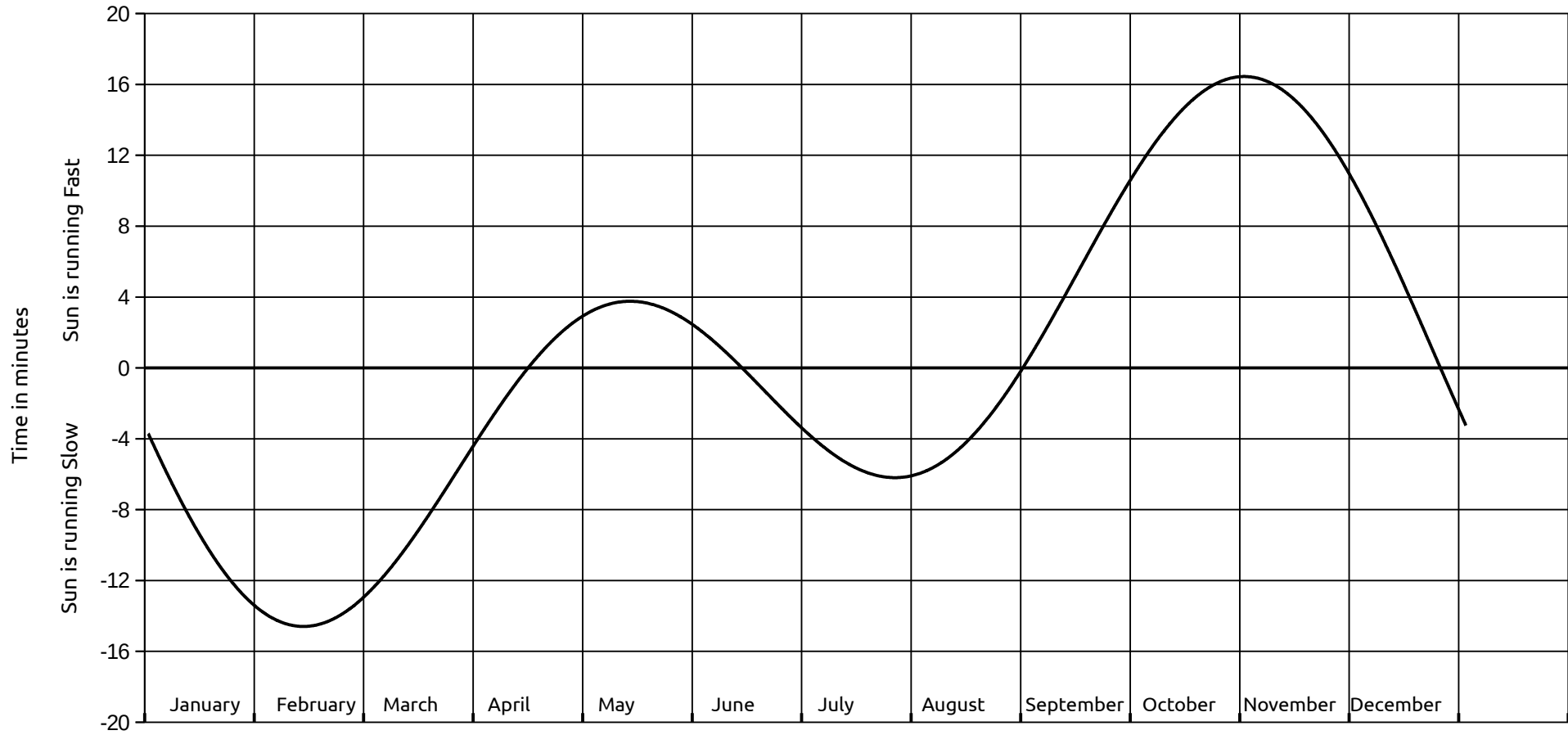
16

17

18

20

Equation of Time *for the Sun*

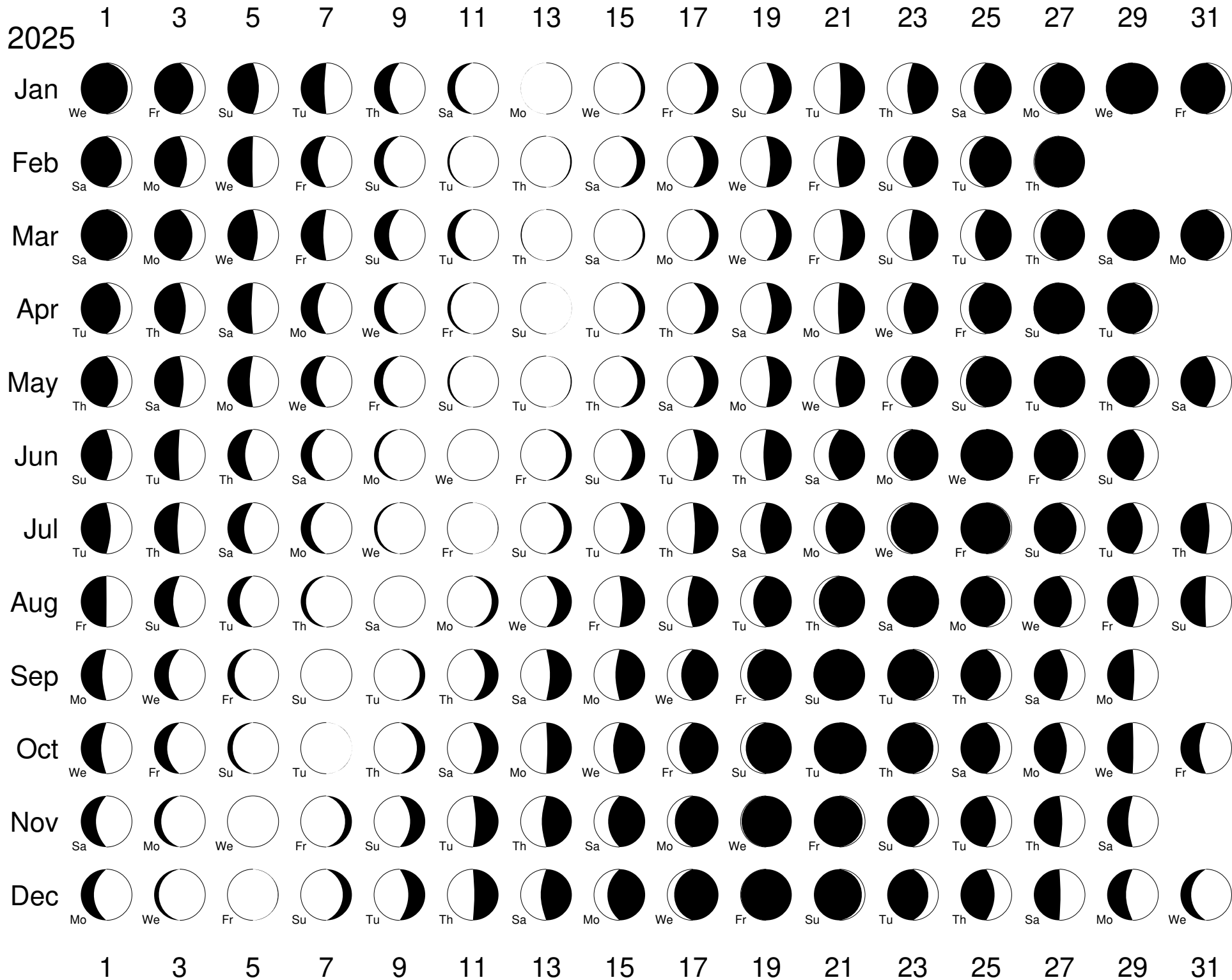


2025 Moon Phases

Date and Time (GMT/Universal Time)

New Moon	First Quarter	Full Moon	Last Quarter
--	January 06 23:56	January 13 22:27	January 21 20:31
January 29 12:36	February 05 08:02	February 12 13:53	February 20 17:32
February 28 00:45	March 06 16:31	March 14 06:55	March 22 11:29
March 29 10:58	April 05 02:15	April 13 00:22	April 21 01:35
April 27 19:31	May 04 13:52	May 12 16:56	May 20 11:59
May 27 03:02	June 03 03:41	June 11 07:44	June 18 19:19
June 25 10:31	July 02 19:30	July 10 20:37	July 18 00:38
July 24 19:11	August 01 12:41	August 09 07:55	August 16 05:12
August 23 06:06	August 31 06:25	September 07 18:09	September 14 10:33
September 21 19:54	September 29 23:54	October 07 03:47	October 13 18:13
October 21 12:25	October 29 16:21	November 05 13:19	November 12 05:28
November 20 06:47	November 28 06:59	December 04 23:14	December 11 20:52
December 20 01:43	December 27 19:10	--	--

Add or subtract your time difference from Greenwich to determine local time and date of Moon phase.



Conversion of Arc to Time

0° - 59°			60° - 119°			120° - 179°			180° - 239°			240° - 299°			300° - 360°			0' - 59'			0" - 59"	
°	h	m	°	h	m	°	h	m	°	h	m	°	h	m	°	h	m	'	m	s	"	s
0	0	00	60	4	00	120	8	00	180	12	00	240	16	00	300	20	00	0	0	00	0	0.00
1	0	04	61	4	04	121	8	04	181	12	04	241	16	04	301	20	04	1	0	04	1	0.07
2	0	08	62	4	08	122	8	08	182	12	08	242	16	08	302	20	08	2	0	08	2	0.13
3	0	12	63	4	12	123	8	12	183	12	12	243	16	12	303	20	12	3	0	12	3	0.20
4	0	16	64	4	16	124	8	16	184	12	16	244	16	16	304	20	16	4	0	16	4	0.27
5	0	20	65	4	20	125	8	20	185	12	20	245	16	20	305	20	20	5	0	20	5	0.33
6	0	24	66	4	24	126	8	24	186	12	24	246	16	24	306	20	24	6	0	24	6	0.40
7	0	28	67	4	28	127	8	28	187	12	28	247	16	28	307	20	28	7	0	28	7	0.47
8	0	32	68	4	32	128	8	32	188	12	32	248	16	32	308	20	32	8	0	32	8	0.53
9	0	36	69	4	36	129	8	36	189	12	36	249	16	36	309	20	36	9	0	36	9	0.60
10	0	40	70	4	40	130	8	40	190	12	40	250	16	40	310	20	40	10	0	40	10	0.67
11	0	44	71	4	44	131	8	44	191	12	44	251	16	44	311	20	44	11	0	44	11	0.73
12	0	48	72	4	48	132	8	48	192	12	48	252	16	48	312	20	48	12	0	48	12	0.80
13	0	52	73	4	52	133	8	52	193	12	52	253	16	52	313	20	52	13	0	52	13	0.87
14	0	56	74	4	56	134	8	56	194	12	56	254	16	56	314	20	56	14	0	56	14	0.93
15	1	00	75	5	00	135	9	00	195	13	00	255	17	00	315	21	00	15	1	00	15	1.00
16	1	04	76	5	04	136	9	04	196	13	04	256	17	04	316	21	04	16	1	04	16	1.07
17	1	08	77	5	08	137	9	08	197	13	08	257	17	08	317	21	08	17	1	08	17	1.13
18	1	12	78	5	12	138	9	12	198	13	12	258	17	12	318	21	12	18	1	12	18	1.20
19	1	16	79	5	16	139	9	16	199	13	16	259	17	16	319	21	16	19	1	16	19	1.27
20	1	20	80	5	20	140	9	20	200	13	20	260	17	20	320	21	20	20	1	20	20	1.33
21	1	24	81	5	24	141	9	24	201	13	24	261	17	24	321	21	24	21	1	24	21	1.40
22	1	28	82	5	28	142	9	28	202	13	28	262	17	28	322	21	28	22	1	28	22	1.47
23	1	32	83	5	32	143	9	32	203	13	32	263	17	32	323	21	32	23	1	32	23	1.53
24	1	36	84	5	36	144	9	36	204	13	36	264	17	36	324	21	36	24	1	36	24	1.60
25	1	40	85	5	40	145	9	40	205	13	40	265	17	40	325	21	40	25	1	40	25	1.67
26	1	44	86	5	44	146	9	44	206	13	44	266	17	44	326	21	44	26	1	44	26	1.73
27	1	48	87	5	48	147	9	48	207	13	48	267	17	48	327	21	48	27	1	48	27	1.80
28	1	52	88	5	52	148	9	52	208	13	52	268	17	52	328	21	52	28	1	52	28	1.87
29	1	56	89	5	56	149	9	56	209	13	56	269	17	56	329	21	56	29	1	56	29	1.93
30	2	00	90	6	00	150	10	00	210	14	00	270	18	00	330	22	00	30	2	00	30	2.00
31	2	04	91	6	04	151	10	04	211	14	04	271	18	04	331	22	04	31	2	04	31	2.07
32	2	08	92	6	08	152	10	08	212	14	08	272	18	08	332	22	08	32	2	08	32	2.13
33	2	12	93	6	12	153	10	12	213	14	12	273	18	12	333	22	12	33	2	12	33	2.20
34	2	16	94	6	16	154	10	16	214	14	16	274	18	16	334	22	16	34	2	16	34	2.27
35	2	20	95	6	20	155	10	20	215	14	20	275	18	20	335	22	20	35	2	20	35	2.33
36	2	24	96	6	24	156	10	24	216	14	24	276	18	24	336	22	24	36	2	24	36	2.40
37	2	28	97	6	28	157	10	28	217	14	28	277	18	28	337	22	28	37	2	28	37	2.47
38	2	32	98	6	32	158	10	32	218	14	32	278	18	32	338	22	32	38	2	32	38	2.53
39	2	36	99	6	36	159	10	36	219	14	36	279	18	36	339	22	36	39	2	36	39	2.60
40	2	40	100	6	40	160	10	40	220	14	40	280	18	40	340	22	40	40	2	40	40	2.67
41	2	44	101	6	44	161	10	44	221	14	44	281	18	44	341	22	44	41	2	44	41	2.73
42	2	48	102	6	48	162	10	48	222	14	48	282	18	48	342	22	48	42	2	48	42	2.80
43	2	52	103	6	52	163	10	52	223	14	52	283	18	52	343	22	52	43	2	52	43	2.87
44	2	56	104	6	56	164	10	56	224	14	56	284	18	56	344	22	56	44	2	56	44	2.93
45	3	00	105	7	00	165	11	00	225	15	00	285	19	00	345	23	00	45	3	00	45	3.00
46	3	04	106	7	04	166	11	04	226	15	04	286	19	04	346	23	04	46	3	04	46	3.07
47	3	08	107	7	08	167	11	08	227	15	08	287	19	08	347	23	08	47	3	08	47	3.13
48	3	12	108	7	12	168	11	12	228	15	12	288	19	12	348	23	12	48	3	12	48	3.20
49	3	16	109	7	16	169	11	16	229	15	16	289	19	16	349	23	16	49	3	16	49	3.27
50	3	20	110	7	20	170	11	20	230	15	20	290	19	20	350	23	20	50	3	20	50	3.33
51	3	24	111	7	24	171	11	24	231	15	24	291	19	24	351	23	24	51	3	24	51	3.40
52	3	28	112	7	28	172	11	28	232	15	28	292	19	28	352	23	28	52	3	28	52	3.47
53	3	32	113	7	32	173	11	32	233	15	32	293	19	32	353	23	32	53	3	32	53	3.53
54	3	36	114	7	36	174	11	36	234	15	36	294	19	36	354	23	36	54	3	36	54	3.60
55	3	40	115	7	40	175	11	40	235	15	40	295	19	40	355	23	40	55	3	40	55	3.67
56	3	44	116	7	44	176	11	44	236	15	44	296	19	44	356	23	44	56	3	44	56	3.73
57	3	48	117	7	48	177	11	48	237	15	48	297	19	48	357	23	48	57	3	48	57	3.80
58	3	52	118	7	52	178	11	52	238	15	52	298	19	52	358	23	52	58	3	52	58	3.87
59	3	56	119	7	56	179	11	56	239	15	56	299	19	56	359	23	56	59	3	56	59	3.93
60	4	00	120	8	00	180	12	00	240	16	00	300	20	00	360	24	00	60	4	00	60	4.00

h= hours of time m= minutes of time s = seconds of time ' = minutes of arc " = seconds of arc

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

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	100°54.0	130°30.3	S13°35.2	335°46.4	N23°32.7	29°01.0	N21°47.2	114°23.0	S07°55.0	Alpheratz	357°34.9	29°13.9
1	115°56.4	145°30.2	34.1	350°49.8	33.0	44°03.8	47.2	129°25.3	54.9	Ankaa	353°07.2	-42°10.4
2	130°58.9	160°30.2	33.0	5°53.1	33.3	59°06.5	47.2	144°27.6	54.8	Schedar	349°31.1	56°40.8
3	146°01.4	175°30.1	· · 31.9	20°56.4	· · 33.5	74°09.3	· · 47.2	159°29.9	· · 54.8	Diphda	348°47.2	-17°51.1
4	161°03.8	190°30.0	30.8	35°59.7	33.8	89°12.0	47.1	174°32.1	54.7	Achernar	335°20.0	-57°06.9
5	176°06.3	205°30.0	29.7	51°03.0	34.1	104°14.8	47.1	189°34.4	54.6	Hamal	327°51.1	23°35.0
6	191°08.8	220°29.9	S13°28.6	66°06.3	N23°34.4	119°17.5	N21°47.1	204°36.7	S07°54.5	Polaris	313°44.8	89°22.4
7	206°11.2	235°29.9	27.5	81°09.6	34.6	134°20.3	47.1	219°39.0	54.5	Akamar	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	265°29.7	· · 25.3	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	266°21.1	295°29.6	23.2	141°22.9	35.7	194°31.3	47.0	279°48.2	54.1	Rigel	281°03.6	-8°10.4
12	281°23.5	310°29.6	S13°22.1	156°26.3	N23°36.0	209°34.0	N21°46.9	294°50.5	S07°54.1	Capella	280°21.5	46°01.5
13	296°26.0	325°29.5	21.0	171°29.6	36.3	224°36.8	46.9	309°52.8	54.0	Bellatrix	278°22.6	6°22.3
14	311°28.5	340°29.5	19.9	186°32.9	36.6	239°39.5	46.9	324°55.0	53.9	Elnath	278°01.5	28°37.8
15	326°30.9	355°29.4	· · 18.8	201°36.2	· · 36.8	254°42.3	· · 46.9	339°57.3	· · 53.8	Alnilam	275°37.4	-1°11.2
16	341°33.4	10°29.4	17.7	216°39.6	37.1	269°45.0	46.9	354°59.6	53.7	Betelgeuse	270°51.8	7°24.7
17	356°35.9	25°29.3	16.6	231°42.9	37.4	284°47.8	46.8	10°01.9	53.7	Canopus	263°51.9	-52°42.5
18	11°38.3	40°29.3	S13°15.5	246°46.2	N23°37.7	299°50.5	N21°46.8	25°04.2	S07°53.6	Sirius	258°25.8	-16°44.8
19	26°40.8	55°29.2	14.4	261°49.6	37.9	314°53.2	46.8	40°06.5	53.5	Adara	255°05.5	-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°50.4	5°09.8
21	56°45.7	85°29.1	· · 12.2	291°56.2	· · 38.5	344°58.7	· · 46.7	70°11.1	· · 53.5	Pollux	243°16.8	27°57.9
22	71°48.2	100°29.1	11.1	306°59.6	38.8	0°01.5	46.7	85°13.3	53.3	Avior	234°14.2	-50°35.2
23	86°50.7	115°29.0	10.0	322°02.9	39.0	15°04.2	46.7	100°15.6	53.2	Suhail	222°45.9	-43°31.9
Mer.pass.:17:13		v-0.1 d1.1 m-4.2		v3.3 d0.3 m-1.1		v2.7 d-0.0 m-2.6		v2.3 d0.1 m1.1		Miaplacidus	221°37.6	-69°48.9
										Alphard	217°47.5	-8°46.0
										Regulus	207°34.2	11°50.6
										Dubhe	193°40.7	61°36.7
										Denebola	182°24.8	14°25.8
										Gienah	175°43.5	-17°40.8
										Acrux	173°00.1	-63°14.0
										Gacrux	171°51.7	-57°14.9
										Alioth	166°13.0	55°49.1
										Spica	158°22.4	-11°17.5
										Alkaid	152°52.1	49°11.0
										Hadar	148°36.3	-60°29.4
										Menkent	147°57.8	-36°29.4
										Arcturus	145°47.9	19°03.3
										Rigel Kent.	139°40.7	-60°56.1
										Kochab	137°20.4	74°02.8
										Zuben'ubi	136°56.2	-16°08.7
										Alphecca	126°04.0	26°37.7
										Antares	112°16.2	-26°29.2
										Atria	107°10.9	-69°04.2
										Sabik	102°03.1	-15°45.4
										Shaula	96°10.8	-37°07.3
										Rasalhague	95°58.9	12°32.5
										Eltanin	90°42.7	51°29.0
										Kaus Aust.	83°32.9	-34°22.4
										Vega	80°33.7	38°48.3
										Nunki	75°48.2	-26°16.0
										Altair	62°00.4	8°56.0
										Peacock	53°06.3	-56°39.4
										Deneb	49°26.2	45°22.2
										Enif	33°39.1	9°59.4
										Al Na'ir	27°33.2	-46°50.6
										Fomalhaut	15°14.8	-29°29.5
										Scheat	13°45.4	28°13.2
										Markab	13°30.1	15°20.4
										Jan 01 Wed	SHA	Mer.pass
										Venus	29°36.3	15:18
										Mars	234°52.5	01:37
										Jupiter	288°07.1	22:00
										Saturn	13°29.0	16:20
										Jan 02 Thu	SHA	Mer.pass
										Venus	28°35.9	15:18
										Mars	235°13.1	01:31
										Jupiter	288°13.8	21:56
										Saturn	13°24.8	16:16
										Jan 03 Fri	SHA	Mer.pass
										Venus	27°36.0	15:18
										Mars	235°34.4	01:26
										Jupiter	288°20.5	21:51
										Saturn	13°20.5	16:13
										Horizontal parallax		
										Venus:	0.2	
										Mars:	0.2	
Mer.pass.:17:05		v-0.0 d1.1 m-4.2		v3.4 d0.3 m-1.2		v2.7 d-0.0 m-2.6		v2.3 d0.1 m1.1				

Sun		Moon					
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°08.4	S22°59.9	164°13.1	7.1'	S25°51.6	7.1'	57.4'
1	194°08.1	59.7	178°39.2	7.1'	25°44.4	7.3'	57.5'
2	209°07.8	59.5	193°05.3	7.2'	25°37.0	7.4'	57.5'
3	224°07.5	59.3	207°31.5	7.2'	25°29.5	7.6'	57.5'
4	239°07.2	59.1	221°57.7	7.3'	25°21.9	7.7'	57.5'
5	254°06.9	58.8	236°24.0	7.3'	25°14.0	7.9'	57.5'
6	269°06.6	S22°58.6	250°50.4	7.4'	S25°06.0	8.1'	57.6'
7	284°06.3	58.4	265°16.8	7.4'	24°57.9	8.2'	57.6'
8	299°06.0	58.2	279°43.2	7.5'	24°49.6	8.4'	57.6'
9	314°05.7	58.0	294°09.8	7.5'	24°41.2	8.5'	57.6'
10	329°05.4	57.8	308°36.3	7.6'	24°32.6	8.7'	57.6'
11	344°05.1	57.6	323°03.0	7.7'	24°23.9	8.8'	57.7'
12	359°04.8	S22°57.4	337°29.6	7.7'	S24°15.0	8.9'	57.7'
13	14°04.5	57.1	351°56.4	7.8'	24°06.0	9.1'	57.7'
14	29°04.2	56.9	6°23.2	7.8'	23°56.8	9.2'	57.7'
15	44°03.9	56.7	20°50.1	7.9'	23°47.5	9.4'	57.7'
16	59°03.6	56.5	35°17.0	8.0'	23°38.1	9.5'	57.8'
17	74°03.3	56.3	49°44.0	8.0'	23°28.5	9.7'	57.8'
18	89°03.1	S22°56.0	64°11.1	8.1'	S23°18.8	9.8'	57.8'
19	104°02.8	55.8	78°38.2	8.2'	23°08.9	9.9'	57.8'
20	119°02.5	55.6	93°05.4	8.2'	22°58.9	10.1'	57.8'
21	134°02.2	55.4	107°32.7	8.3'	22°48.8	10.2'	57.9'
22	149°01.9	55.2	122°00.0	8.4'	22°38.5	10.3'	57.9'
23	164°01.6	54.9	136°27.4	8.4'	22°28.1	10.5'	57.9'
	SD.=16.3	d=0.2			S.D.=15.7		
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	179°01.3	S22°54.7	150°54.9	8.5'	S22°17.5	10.6'	57.9'
1	194°01.0	54.5	165°22.4	8.6'	22°06.9	10.7'	57.9'
2	209°00.7	54.2	179°50.0	8.6'	21°56.1	10.9'	58.0'
3	224°00.4	54.0	194°17.7	8.7'	21°45.1	11.0'	58.0'
4	239°00.1	53.8	208°45.4	8.8'	21°34.1	11.1'	58.0'
5	253°59.8	53.6	223°13.3	8.8'	21°22.9	11.2'	58.0'
6	268°59.5	S22°53.3	237°41.1	8.9'	S21°11.6	11.4'	58.0'
7	283°59.3	53.1	252°09.1	9.0'	21°00.1	11.5'	58.0'
8	298°59.0	52.9	266°37.1	9.1'	20°48.6	11.6'	58.1'
9	313°58.7	52.6	281°05.2	9.1'	20°36.9	11.7'	58.1'
10	328°58.4	52.4	295°33.4	9.2'	20°25.1	11.9'	58.1'
11	343°58.1	52.2	310°01.6	9.3'	20°13.2	12.0'	58.1'
12	358°57.8	S22°51.9	324°29.9	9.3'	S20°01.2	12.1'	58.1'
13	13°57.5	51.7	338°58.3	9.4'	19°49.0	12.2'	58.2'
14	28°57.2	51.5	353°26.7	9.5'	19°36.7	12.3'	58.2'
15	43°56.9	51.2	7°55.2	9.5'	19°24.4	12.4'	58.2'
16	58°56.6	51.0	22°23.8	9.6'	19°11.9	12.5'	58.2'
17	73°56.4	50.7	36°52.5	9.7'	18°59.3	12.7'	58.2'
18	88°56.1	S22°50.5	51°21.2	9.8'	S18°46.6	12.8'	58.2'
19	103°55.8	50.3	65°50.0	9.8'	18°33.8	12.9'	58.3'
20	118°55.5	50.0	80°18.8	9.9'	18°20.8	13.0'	58.3'
21	133°55.2	49.8	94°47.8	10.0'	18°07.8	13.1'	58.3'
22	148°54.9	49.5	109°16.8	10.0'	17°54.7	13.2'	58.3'
23	163°54.6	49.3	123°45.8	10.1'	17°41.5	13.3'	58.3'
	SD.=16.3	d=0.2			S.D.=15.8		
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178°54.3	S22°49.1	138°15.0	10.2'	S17°28.1	13.4'	58.3'
1	193°54.0	48.8	152°44.2	10.2'	17°14.7	13.5'	58.3'
2	208°53.8	48.6	167°13.4	10.3'	17°01.2	13.6'	58.4'
3	223°53.5	48.3	181°42.8	10.4'	16°47.6	13.7'	58.4'
4	238°53.2	48.1	196°12.2	10.4'	16°33.9	13.8'	58.4'
5	253°52.9	47.8	210°41.6	10.5'	16°20.1	13.9'	58.4'
6	268°52.6	S22°47.6	225°11.1	10.6'	S16°06.2	13.9'	58.4'
7	283°52.3	47.3	239°40.7	10.6'	15°52.2	14.0'	58.4'
8	298°52.0	47.1	254°10.4	10.7'	15°38.1	14.1'	58.4'
9	313°51.7	46.8	268°40.1	10.7'	15°23.9	14.2'	58.5'
10	328°51.5	46.6	283°09.9	10.8'	15°09.7	14.3'	58.5'
11	343°51.2	46.3	297°39.7	10.9'	14°55.3	14.4'	58.5'
12	358°50.9	S22°46.1	312°09.6	10.9'	S14°40.9	14.5'	58.5'
13	13°50.6	45.8	326°39.5	11.0'	14°26.4	14.5'	58.5'
14	28°50.3	45.6	341°09.6	11.0'	14°11.9	14.6'	58.5'
15	43°50.0	45.3	355°39.6	11.1'	13°57.2	14.7'	58.5'
16	58°49.7	45.0	10°09.8	11.2'	13°42.5	14.8'	58.6'
17	73°49.5	44.8	24°39.9	11.2'	13°27.7	14.8'	58.6'
18	88°49.2	S22°44.5	39°10.2	11.3'	S13°12.8	14.9'	58.6'
19	103°48.9	44.3	53°40.5	11.3'	12°57.8	15.0'	58.6'
20	118°48.6	44.0	68°10.8	11.4'	12°42.8	15.1'	58.6'
21	133°48.3	43.7	82°41.2	11.4'	12°27.7	15.1'	58.6'
22	148°48.0	43.5	97°11.7	11.5'	12°12.5	15.2'	58.6'
23	163°47.7	43.2	111°42.2	11.5'	11°57.3	15.3'	58.6'
	SD.=16.3	d=0.2			S.D.=15.9		

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

Lat.	Moonrise			Moonset		
	Wed	Thu	Fri	Wed	Thu	Fri
N 72°	■	■	12:47	■	■	18:17
N 70°	■	13:50	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	18:10	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
N 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
S 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
S 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
S 60°	03:31	05:19	07:05	22:56	22:58	22:58

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time	12 ^h		Upper	Lower	
1	03:27	03:41	12:04	13:33	01:06	
2	03:55	04:09	12:04	14:27	02:01	
3	04:23	04:37	12:05	15:18	02:53	

January 04, 05, 06 (Sat., Sun., Mon.)

Aries		Venus		Mars		Jupiter		Saturn		Stars				
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec			
0	103°51.4	130°28.1	S12°15.6	339°47.7	N23°52.6	32°18.3	N21°45.5	117°07.6	S07°49.2	Alpheratz	357°34.9	29°13.9		
1	118°53.9	145°28.1	14.5	354°51.1	52.8	47°21.1	45.5	132°09.8	49.2	Ankaa	353°07.2	-42°10.4		
2	133°56.3	160°28.1	13.7	9°54.5	53.1	62°23.8	45.5	147°12.1	49.1	Schedar	349°31.1	56°40.7		
3	148°58.8	175°28.1	· · 12.2	24°57.9	· · 53.4	77°26.5	· · 45.5	162°14.4	· · 49.0	Diphda	348°47.2	-17°51.1		
4	164°01.3	190°28.1	11.1	40°01.3	53.7	92°29.2	45.4	177°16.7	48.9	Achernar	335°20.1	-57°06.9		
5	179°03.7	205°28.1	10.0	55°04.7	54.0	107°32.0	45.4	192°19.0	48.8	Hamal	327°51.1	23°35.0		
6	194°06.2	220°28.1	S12°08.9	70°08.0	N23°54.2	122°34.7	N21°45.4	207°21.3	S07°48.7	Polaris	313°46.0	89°22.5		
7	209°08.6	235°28.2	07.7	85°11.4	54.5	137°37.4	45.4	222°23.5	48.7	Akamars	315°11.5	-40°12.4		
8	224°11.1	250°28.2	06.6	100°14.8	54.8	152°40.2	45.4	237°25.8	48.6	Menkar	314°06.0	4°11.3		
9	239°13.6	265°28.2	· · 05.5	115°18.2	· · 55.1	167°42.9	· · 45.3	252°28.1	· · 48.5	Mirfak	308°27.9	49°57.2		
10	254°16.0	280°28.2	04.4	130°21.6	55.3	182°45.6	45.3	267°30.4	48.4	Aldebaran	290°39.3	16°33.6		
11	269°18.5	295°28.2	03.3	145°25.0	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	S12°02.1	160°28.4	N23°55.9	212°51.1	N21°45.3	297°34.9	S07°48.2	Capella	280°21.5	46°01.5		
13	299°23.4	325°28.2	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°37.8		
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°51.9	-52°42.5		
18	14°35.8	40°28.3	S11°55.4	250°48.9	N23°57.5	303°07.4	N21°45.1	27°48.6	S07°47.8	Sirius	258°25.8	-16°44.8		
19	29°38.2	55°28.4	54.3	265°52.3	57.8	318°10.1	45.1	42°50.9	47.7	Adara	255°05.5	-29°00.4		
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°50.4	5°09.8		
21	59°43.1	85°28.4	· · 52.0	295°59.1	· · 58.4	348°15.6	· · 45.1	72°55.4	· · 47.5	Pollux	243°16.8	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°14.2	-50°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.pass.:17:01		v0.0 d1.1 m-4.2		v3.4 d0.3 m-1.2		v2.7 d-0.0 m-2.6		v2.3 d0.1 m1.1		Miaplacidus	221°37.5	-69°49.0		
											Alphard	217°47.5	-8°46.0	
											Regulus	207°34.2	11°50.6	
											Dubhe	193°40.6	61°36.7	
											Denebola	182°24.8	14°25.8	
											Gienah	175°43.5	-17°40.8	
											Acrux	173°00.1	-63°14.0	
											Gacrux	171°51.6	-57°14.9	
											Alioth	166°13.0	55°49.1	
											Spica	158°22.4	-11°17.5	
											Alkaid	152°52.1	49°11.0	
											Hadar	148°36.2	-60°29.4	
											Menkent	147°57.8	-36°29.4	
											Arcturus	145°47.9	19°03.3	
											Rigel Kent.	139°40.6	-60°56.1	
											Kochab	137°20.3	74°02.8	
											Zuben'ubi	136°56.2	-16°08.7	
											Alphecca	126°04.0	26°37.7	
											Antares	112°16.1	-26°29.2	
											Atria	107°10.9	-69°04.2	
											Sabik	102°03.1	-15°45.4	
											Shaula	96°10.8	-37°07.3	
											Rasalhague	95°58.9	12°32.4	
											Eltanin	90°42.7	51°29.0	
											Kaus Aust.	83°32.9	-34°22.4	
											Vega	80°33.7	38°48.3	
											Nunki	75°48.1	-26°16.0	
											Altair	62°00.4	8°56.0	
											Peacock	53°06.3	-56°39.4	
											Deneb	49°26.2	45°22.2	
											Enif	33°39.1	9°59.4	
											Al Na'ir	27°33.2	-46°50.6	
											Fomalhaut	15°14.8	-29°29.5	
											Scheat	13°45.4	28°13.2	
											Markab	13°30.1	15°20.4	
Mer.pass.:16:57		v0.0 d1.1 m-4.2		v3.4 d0.3 m-1.2		v2.7 d-0.0 m-2.6		v2.3 d0.1 m1.1		Jan 04 Sat		SHA	Mer.pass	
											Venus	26°36.7	15:18	
											Mars	235°56.3	01:21	
											Jupiter	288°26.9	21:47	
											Saturn	13°16.2	16:09	
Mer.pass.:16:53		v0.1 d1.1 m-4.2		v3.4 d0.3 m-1.2		v2.7 d-0.0 m-2.5		v2.3 d0.1 m1.1		Jan 05 Sun		SHA	Mer.pass	
											Venus	25°38.0	15:18	
											Mars	236°18.8	01:15	
											Jupiter	288°33.2	21:42	
											Saturn	13°11.7	16:05	
Mer.pass.:16:53		v0.1 d1.1 m-4.2		v3.4 d0.3 m-1.2		v2.7 d-0.0 m-2.5		v2.3 d0.1 m1.1		Jan 06 Mon		SHA	Mer.pass	
											Venus	24°39.8	15:18	
											Mars	236°41.8	01:10	
											Jupiter	288°39.4	21:38	
											Saturn	13°07.3	16:02	
											Horizontal parallax			
											Venus:		0.2	
											Mars:		0.2	

h Sun Moon

Sat	GHA	Dec	GHA	<i>ν</i>	Dec	d	HP
0	178°47.5	S22°43.0	126°12.7	11.6'	S11°42.0	15.3'	58.7'
1	193°47.2	42.7	140°43.3	11.6'	11°26.6	15.4'	58.7'
2	208°46.9	42.4	155°13.9	11.7'	11°11.2	15.5'	58.7'
3	223°46.6	.. 42.2	169°44.6	11.7'	10°55.7	15.5'	58.7'
4	238°46.3	41.9	184°15.4	11.8'	10°40.2	15.6'	58.7'
5	253°46.0	41.6	198°46.2	11.8'	10°24.6	15.6'	58.7'
6	268°45.8	S22°41.4	213°17.0	11.8'	S10°08.9	15.7'	58.7'
7	283°45.5	41.1	227°47.8	11.9'	09°53.2	15.7'	58.7'
8	298°45.2	40.8	242°18.8	11.9'	09°37.4	15.8'	58.7'
9	313°44.9	.. 40.6	256°49.7	12.0'	09°21.6	15.8'	58.8'
10	328°44.6	40.3	271°20.7	12.0'	09°05.7	15.9'	58.8'
11	343°44.3	40.0	285°51.7	12.0'	08°49.8	15.9'	58.8'
12	358°44.1	S22°39.7	300°22.8	12.1'	S08°33.8	16.0'	58.8'
13	13°43.8	39.5	314°53.9	12.1'	08°17.8	16.0'	58.8'
14	28°43.5	39.2	329°25.0	12.1'	08°01.7	16.1'	58.8'
15	43°43.2	.. 38.9	343°56.2	12.2'	07°45.6	16.1'	58.8'
16	58°42.9	38.6	358°27.3	12.2'	07°29.5	16.2'	58.8'
17	73°42.7	38.4	12°58.6	12.2'	07°13.3	16.2'	58.8'
18	88°42.4	S22°38.1	27°29.8	12.3'	S06°57.0	16.3'	58.9'
19	103°42.1	37.8	42°01.1	12.3'	06°40.8	16.3'	58.9'
20	118°41.8	37.5	56°32.4	12.3'	06°24.4	16.3'	58.9'
21	133°41.5	.. 37.2	71°03.7	12.3'	06°08.1	16.4'	58.9'
22	148°41.3	37.0	85°35.1	12.4'	05°51.7	16.4'	58.9'
23	163°41.0	36.7	100°06.5	12.4'	05°35.3	16.4'	58.9'
SD.=16.3		d=0.3	S.D.=16.0				

Sun	GHA	Dec	GHA	<i>ν</i>	Dec	d	HP
0	178°40.7	S22°36.4	114°37.9	12.4'	S05°18.9	16.5'	58.9'
1	193°40.4	36.1	129°09.3	12.4'	05°02.4	16.5'	58.9'
2	208°40.1	35.8	143°40.7	12.4'	04°45.9	16.5'	58.9'
3	223°39.9	.. 35.6	158°12.2	12.5'	04°29.4	16.5'	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°15.2	12.5'	03°56.2	16.6'	59.0'
6	268°39.0	S22°34.7	201°46.7	12.5'	S03°39.6	16.6'	59.0'
7	283°38.7	34.4	216°18.2	12.5'	03°23.0	16.6'	59.0'
8	298°38.5	34.1	230°49.7	12.5'	03°06.4	16.7'	59.0'
9	313°38.2	.. 33.8	245°21.3	12.5'	02°49.7	16.7'	59.0'
10	328°37.9	33.5	259°52.8	12.5'	02°33.0	16.7'	59.0'
11	343°37.6	33.3	274°24.3	12.6'	02°16.3	16.7'	59.0'
12	358°37.4	S22°33.0	288°55.9	12.6'	S01°59.6	16.7'	59.0'
13	13°37.1	32.7	303°27.5	12.6'	01°42.9	16.7'	59.0'
14	28°36.8	32.4	317°59.0	12.6'	01°26.1	16.7'	59.0'
15	43°36.5	.. 32.1	332°30.6	12.6'	01°09.4	16.8'	59.0'
16	58°36.2	31.8	347°02.2	12.6'	00°52.6	16.8'	59.0'
17	73°36.0	31.5	1°33.7	12.6'	00°35.9	16.8'	59.0'
18	88°35.7	S22°31.2	16°05.3	12.6'	S00°19.1	16.8'	59.0'
19	103°35.4	30.9	30°36.9	12.6'	S00°02.3	16.8'	59.1'
20	118°35.1	30.6	45°08.4	12.6'	N00°14.4	16.8'	59.1'
21	133°34.9	.. 30.3	59°40.0	12.5'	00°31.2	16.8'	59.1'
22	148°34.6	30.0	74°11.5	12.5'	00°48.0	16.8'	59.1'
23	163°34.3	29.7	88°43.0	12.5'	01°04.8	16.8'	59.1'
SD.=16.3		d=0.3	S.D.=16.1				

Mon	GHA	Dec	GHA	<i>ν</i>	Dec	d	HP
0	178°34.0	S22°29.4	103°14.5	12.5'	N01°21.6	16.8'	59.1'
1	193°33.8	29.1	117°46.0	12.5'	01°38.3	16.8'	59.1'
2	208°33.5	28.8	132°17.5	12.5'	01°55.1	16.8'	59.1'
3	223°33.2	.. 28.5	146°49.0	12.5'	02°11.9	16.8'	59.1'
4	238°32.9	28.2	161°20.5	12.5'	02°28.6	16.7'	59.1'
5	253°32.7	27.9	175°51.9	12.4'	02°45.4	16.7'	59.1'
6	268°32.4	S22°27.6	190°23.3	12.4'	N03°02.1	16.7'	59.1'
7	283°32.1	27.3	204°54.7	12.4'	03°18.8	16.7'	59.1'
8	298°31.9	27.0	219°26.1	12.4'	03°35.5	16.7'	59.1'
9	313°31.6	.. 26.7	233°57.5	12.3'	03°52.2	16.7'	59.1'
10	328°31.3	26.4	248°28.8	12.3'	04°08.9	16.7'	59.1'
11	343°31.0	26.1	263°00.1	12.3'	04°25.5	16.6'	59.1'
12	358°30.8	S22°25.7	277°31.4	12.3'	N04°42.2	16.6'	59.1'
13	13°30.5	25.4	292°02.7	12.2'	04°58.8	16.6'	59.2'
14	28°30.2	25.1	306°33.9	12.2'	05°15.4	16.6'	59.2'
15	43°29.9	.. 24.8	321°05.1	12.2'	05°32.0	16.6'	59.2'
16	58°29.7	24.5	335°36.2	12.1'	05°48.5	16.5'	59.2'
17	73°29.4	24.2	350°07.3	12.1'	06°05.0	16.5'	59.2'
18	88°29.1	S22°23.9	4°38.4	12.1'	N06°21.5	16.5'	59.2'
19	103°28.9	23.6	19°09.5	12.0'	06°38.0	16.4'	59.2'
20	118°28.6	23.2	33°40.5	12.0'	06°54.4	16.4'	59.2'
21	133°28.3	.. 22.9	48°11.4	11.9'	07°10.8	16.4'	59.2'
22	148°28.1	22.6	62°42.4	11.9'	07°27.2	16.3'	59.2'
23	163°27.8	22.3	77°13.2	11.9'	07°43.5	16.3'	59.2'
SD.=16.3		d=0.3	S.D.=16.1				

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

Lat.	Moonrise			Moonset		
	Sat	Sun	Mon	Sat	Sun	Mon
N 72°	11:51	11:12	10:35	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
S 10°	09:48	10:41	11:33	22:22	23:04	23:46
20°	09:41	10:39	11:37	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
S 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
S 60°	08:47	10:26	12:04	22:57	22:56	22:56

Day	Sun		Mer. Pass	Moon		Age 5-7 23-44%
	Eqn. of Time 00h mm:ss	12h mm:ss		Upper Mer. Pass. hh:mm	Lower Mer. Pass. hh:mm	
4	04:50	05:04	12:05	16:06	03:42	
5	05:17	05:31	12:06	16:54	04:30	
6	05:44	05:57	12:06	17:41	05:17	

January 07, 08, 09 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	106°48.8	130°30.9	S10°54.1	343°54.1	N24°12.3	35°34.1	N21°44.0	119°51.5	S07°43.2	Alpheratz	357°34.9	29°13.9
1	121°51.3	145°31.0	53.0	358°57.5	12.5	50°36.8	43.9	134°53.8	43.1	Ankaa	353°07.2	-42°10.4
2	136°53.7	160°31.1	51.8	14°01.0	12.8	65°39.6	43.9	149°56.0	43.0	Schedar	349°31.1	56°40.7
3	151°56.2	175°31.2	· · 50.7	29°04.4	· · 13.1	80°42.3	· · 43.9	164°58.3	· · 43.0	Diphda	348°47.2	-17°51.1
4	166°58.7	190°31.2	49.5	44°07.9	13.4	95°45.0	43.9	180°00.6	42.9	Achernar	335°20.1	-57°06.9
5	182°01.1	205°31.3	48.4	59°11.3	13.6	110°47.7	43.9	195°02.9	42.8	Hamal	327°51.1	23°35.0
6	197°03.6	220°31.4	S10°47.2	74°14.8	N24°13.9	125°50.4	N21°43.8	210°05.1	S07°42.7	Polaris	313°47.2	89°22.5
7	212°06.1	235°31.5	46.1	89°18.2	14.2	140°53.1	43.8	225°07.4	42.6	Akamars	315°11.5	-40°12.5
8	227°08.5	250°31.6	45.0	104°21.7	14.4	155°55.8	43.8	240°09.7	42.5	Menkar	314°06.0	4°11.3
9	242°11.0	265°31.7	· · 43.8	119°25.2	· · 14.7	170°58.5	· · 43.8	255°11.9	· · 42.4	Mirfak	308°28.0	49°57.2
10	257°13.5	280°31.7	42.7	134°28.6	15.0	186°01.2	43.8	270°14.2	42.4	Aldebaran	290°39.3	16°33.6
11	272°15.9	295°31.8	41.5	149°32.1	15.2	201°03.9	43.7	285°16.5	42.3	Rigel	281°03.6	-8°10.4
12	287°18.4	310°31.9	S10°40.4	164°35.5	N24°15.5	216°06.6	N21°43.7	300°18.8	S07°42.2	Capella	280°21.5	46°01.5
13	302°20.8	325°32.0	39.2	179°39.0	15.8	231°09.3	43.7	315°21.0	42.1	Bellatrix	278°22.6	6°22.3
14	317°23.3	340°32.1	38.1	194°42.5	16.1	246°12.0	43.7	330°23.3	42.0	Elnath	278°01.5	28°37.8
15	332°25.8	355°32.2	· · 36.9	209°45.9	· · 16.3	261°14.7	· · 43.7	345°25.6	· · 41.9	Alnilam	275°37.4	-1°11.2
16	347°28.2	10°32.3	35.8	224°49.4	16.6	276°17.4	43.6	0°27.8	41.8	Betelgeuse	270°51.8	7°24.7
17	2°30.7	25°32.4	34.6	239°52.9	16.9	291°20.1	43.6	15°30.1	41.7	Canopus	263°51.9	-52°42.6
18	17°33.2	40°32.5	S10°33.5	254°56.3	N24°17.1	306°22.8	N21°43.6	30°32.4	S07°41.7	Sirius	258°25.8	-16°44.9
19	32°35.6	55°32.5	32.3	269°59.8	17.4	321°25.6	43.6	45°34.7	41.6	Adara	255°05.5	-29°00.4
20	47°38.1	70°32.6	31.2	285°03.3	17.7	336°28.3	43.6	60°36.9	41.5	Procyon	244°50.4	5°09.8
21	62°40.6	85°32.7	· · 30.0	300°06.7	· · 17.9	351°31.0	· · 43.5	75°39.2	· · 41.4	Pollux	243°16.8	27°57.9
22	77°43.0	100°32.8	28.9	315°10.2	18.2	6°33.7	43.5	90°41.5	41.3	Avior	234°14.1	-50°35.2
23	92°45.5	115°32.9	27.7	330°13.7	18.5	21°36.4	43.5	105°43.7	41.2	Suhail	222°45.9	-43°31.9
Mer.pass.:16:49		v0.1 d1.1 m-4.2		v3.5 d0.3 m-1.2		v2.7 d-0.0 m-2.5		v2.3 d0.1 m1.1		Miaplacidus	221°37.5	-69°49.0
										Alphard	217°47.5	-8°46.0
										Regulus	207°34.2	11°50.6
										Dubhe	193°40.6	61°36.7
										Denebola	182°24.8	14°25.8
										Gienah	175°43.5	-17°40.8
										Acrux	173°00.0	-63°14.0
										Gacrux	171°51.6	-57°14.9
										Alioth	166°13.0	55°49.1
										Spica	158°22.3	-11°17.5
										Alkaid	152°52.1	49°11.0
										Hadar	148°36.2	-60°29.4
										Menkent	147°57.8	-36°29.4
										Arcturus	145°47.9	19°03.2
										Rigel Kent.	139°40.6	-60°56.1
										Kochab	137°20.3	74°02.8
										Zuben'ubi	136°56.2	-16°08.7
										Alphecca	126°04.0	26°37.7
										Antares	112°16.1	-26°29.2
										Atria	107°10.8	-69°04.2
										Sabik	102°03.1	-15°45.4
										Shaula	96°10.8	-37°07.3
										Rasalhague	95°58.9	12°32.4
										Eltanin	90°42.7	51°29.0
										Kaus Aust.	83°32.9	-34°22.4
										Vega	80°33.7	38°48.3
										Nunki	75°48.1	-26°16.0
										Altair	62°00.4	8°56.0
										Peacock	53°06.3	-56°39.4
										Deneb	49°26.3	45°22.2
										Enif	33°39.1	9°59.4
										Al Na'ir	27°33.3	-46°50.6
										Fomalhaut	15°14.8	-29°29.5
										Scheat	13°45.4	28°13.2
										Markab	13°30.1	15°20.4
										Jan 07 Tue	SHA	Mer.pass
										Venus	23°42.1	15:18
										Mars	237°05.3	01:04
										Jupiter	288°45.3	21:34
										Saturn	13°02.7	15:58
										Jan 08 Wed	SHA	Mer.pass
										Venus	22°45.1	15:18
										Mars	237°29.2	00:59
										Jupiter	288°51.1	21:30
										Saturn	12°58.1	15:55
										Jan 09 Thu	SHA	Mer.pass
										Venus	21°48.6	15:17
										Mars	237°53.5	00:53
										Jupiter	288°56.7	21:25
										Saturn	12°53.3	15:51
										Horizontal parallax		
										Venus:		0.2
										Mars:		0.2
Mer.pass.:16:42		v0.1 d1.2 m-4.2		v3.5 d0.3 m-1.2		v2.7 d-0.0 m-2.5		v2.3 d0.1 m1.1				

January 10, 11, 12 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		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	S07°36.9	Alpheratz	357°34.9	29°13.9					
1	124°48.7	145°39.1	30.0	3°07.9	31.7	53°51.1	42.5	137°37.1	36.8	Ankaa	353°07.2	-42°10.4					
2	139°51.2	160°39.2	28.8	18°11.4	31.9	68°53.7	42.5	152°39.3	36.8	Schedar	349°31.2	56°40.7					
3	154°53.6	175°39.4	· · 27.6	33°14.9	· · 32.2	83°56.4	· · 42.5	167°41.6	· · 36.7	Diphda	348°47.2	-17°51.1					
4	169°56.1	190°39.5	26.5	48°18.4	32.4	98°59.1	42.5	182°43.9	36.6	Achernar	335°20.1	-57°06.9					
5	184°58.6	205°39.7	25.3	63°21.9	32.7	114°01.8	42.5	197°46.1	36.5	Hamal	327°51.1	23°35.0					
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	Polaris	313°48.1	89°22.5					
7	215°03.5	235°40.0	23.0	93°28.9	33.2	144°07.2	42.4	227°50.6	36.3	Akamar	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	34.3	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	N21°42.4	303°02.0	S07°35.9	Capella	280°21.5	46°01.5					
13	305°18.3	325°40.9	16.0	183°49.9	34.8	234°23.3	42.3	318°04.2	35.8	Bellatrix	278°22.6	6°22.3					
14	320°20.7	340°41.1	14.8	198°53.4	35.0	249°25.9	42.3	333°06.5	35.7	Elnath	278°01.5	28°37.8					
15	335°23.2	355°41.3	· · 13.7	213°56.9	· · 35.3	264°28.6	· · 42.3	348°08.8	· · 35.6	Alnilam	275°37.4	-1°11.2					
16	350°25.7	10°41.4	12.5	229°00.4	35.5	279°31.3	42.3	3°11.0	35.5	Betelgeuse	270°51.8	7°24.7					
17	5°28.1	25°41.6	11.4	244°04.0	35.8	294°34.0	42.3	18°13.3	35.4	Canopus	263°51.9	-52°42.6					
18	20°30.6	40°41.7	S09°10.2	259°07.5	N24°36.0	309°36.7	N21°42.2	33°15.5	S07°35.3	Sirius	258°25.8	-16°44.9					
19	35°33.0	55°41.9	09.0	274°11.0	36.3	324°39.3	42.2	48°17.8	35.2	Adara	255°05.5	-29°00.4					
20	50°35.5	70°42.1	07.9	289°14.5	36.6	339°42.0	42.2	63°20.1	35.1	Procyon	244°50.4	5°09.8					
21	65°38.0	85°42.2	· · 06.7	304°18.0	· · 36.8	354°44.7	· · 42.2	78°22.3	· · 35.1	Pollux	243°16.8	27°57.9					
22	80°40.4	100°42.4	05.5	319°21.5	37.1	9°47.4	42.2	93°24.6	35.0	Avior	234°14.1	-50°35.3					
23	95°42.9	115°42.6	04.4	334°25.0	37.3	24°50.1	42.2	108°26.8	34.9	Suhail	222°45.9	-43°31.9					
Mer.pass.:16:38		v0.1 d1.2 m-4.3		v3.5 d0.3 m-1.2		v2.7 d-0.0 m-2.5		v2.3 d0.1 m1.1		Miaplacidus		221°37.5	-69°49.0				
Alphard		217°47.5		-8°46.0		Regulus		207°34.1		11°50.6		Dubhe		193°40.6	61°36.7		
Denebola		182°24.7		14°25.8		Gienah		175°43.5		-17°40.8		Acrux		173°00.0	-63°14.0		
Gacrux		171°51.5		-57°15.0		Alioth		166°12.9		55°49.1		Spica		158°22.3	-11°17.5		
Alkaid		152°52.0		49°11.0		Hadar		148°36.2		-60°29.4		Menkent		147°57.7	-36°29.4		
Arcturus		145°47.8		19°03.2		Rigel Kent.		139°40.6		-60°56.1		Kochab		137°20.2	74°02.8		
Zuben'ubi		136°56.2		-16°08.7		Alphecca		126°04.0		26°37.6		Antares		112°16.1	-26°29.2		
Sabik		102°03.1		-15°45.4		Shaula		96°10.7		-37°07.3		Rasalhague		95°58.9	12°32.4		
Eltanin		90°42.7		51°28.9		Kaus Aust.		83°32.9		-34°22.3		Vega		80°33.7	38°48.2		
Nunki		75°48.1		-26°16.0		Altair		62°00.4		8°56.0		Peacock		53°06.3	-56°39.4		
Deneb		49°26.3		45°22.2		Enif		33°39.1		9°59.4		Al Na'ir		27°33.3	-46°50.6		
Fomalhaut		15°14.8		-29°29.5		Scheat		13°45.4		28°13.2		Markab		13°30.1	15°20.4		
Mer.pass.:16:34		v0.2 d1.2 m-4.3		v3.5 d0.3 m-1.2		v2.7 d-0.0 m-2.5		v2.3 d0.1 m1.1		Jan 10 Fri		SHA	Mer.pass				
Venus		20°52.7		15:17		Mars		238°18.2		00:48		Jupiter		289°02.1		21:21	
Saturn		12°48.6		15:47		Jan 11 Sat		SHA	Mer.pass	Venus		19°57.4		15:17			
Mars		238°43.1		00:42		Jupiter		289°07.4		21:17		Saturn		12°43.7		15:44	
Jan 12 Sun		SHA	Mer.pass	Venus		19°02.7		15:17		Mars		239°08.4		00:36			
Jupiter		289°12.4		21:12		Saturn		12°38.8		15:40		Horizontal parallax		Venus:		0.2	
Mars:		0.2		Mer.pass.:16:30		v0.2 d1.2 m-4.3		v3.5 d0.2 m-1.2		v2.7 d-0.0 m-2.5		v2.3 d0.1 m1.1					

h	Sun			Moon			
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178° 08.7	S21° 57.0	53° 39.3	6.2'	N24° 14.0	9.4'	59.1'
1	193° 08.5	56.6	68° 04.4	6.1'	24° 23.3	9.2'	59.0'
2	208° 08.2	56.3	82° 29.5	6.0'	24° 32.5	9.1'	59.0'
3	223° 08.0	· · 55.9	96° 54.4	5.9'	24° 41.5	8.9'	59.0'
4	238° 07.7	55.5	111° 19.3	5.9'	24° 50.3	8.8'	59.0'
5	253° 07.5	55.1	125° 44.2	5.8'	24° 59.0	8.6'	59.0'
6	268° 07.2	S21° 54.8	140° 08.9	5.7'	N25° 07.6	8.4'	59.0'
7	283° 07.0	54.4	154° 33.5	5.6'	25° 15.9	8.3'	59.0'
8	298° 06.7	54.0	168° 58.1	5.5'	25° 24.1	8.1'	59.0'
9	313° 06.5	· · 53.6	183° 22.6	5.5'	25° 32.1	8.0'	59.0'
10	328° 06.2	53.2	197° 47.1	5.4'	25° 40.0	7.8'	59.0'
11	343° 06.0	52.9	212° 11.4	5.3'	25° 47.7	7.6'	59.0'
12	358° 05.7	S21° 52.5	226° 35.7	5.2'	N25° 55.3	7.5'	59.0'
13	13° 05.5	52.1	240° 59.9	5.2'	26° 02.6	7.3'	58.9'
14	28° 05.2	51.7	255° 24.0	5.1'	26° 09.8	7.1'	58.9'
15	43° 05.0	· · 51.3	269° 48.1	5.0'	26° 16.8	6.9'	58.9'
16	58° 04.7	51.0	284° 12.1	5.0'	26° 23.7	6.8'	58.9'
17	73° 04.5	50.6	298° 36.1	4.9'	26° 30.4	6.6'	58.9'
18	88° 04.2	S21° 50.2	313° 00.0	4.9'	N26° 36.9	6.4'	58.9'
19	103° 04.0	49.8	327° 23.8	4.8'	26° 43.2	6.2'	58.9'
20	118° 03.7	49.4	341° 47.5	4.7'	26° 49.3	6.1'	58.9'
21	133° 03.5	· · 49.0	356° 11.2	4.7'	26° 55.3	5.9'	58.9'
22	148° 03.2	48.6	10° 34.9	4.6'	27° 01.1	5.7'	58.8'
23	163° 03.0	48.2	24° 58.5	4.6'	27° 06.7	5.5'	58.8'
SD.=16.3			d=0.4		S.D.=16.1		
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178° 02.7	S21° 47.8	39° 22.0	4.5'	N27° 12.2	5.3'	58.8'
1	193° 02.5	47.5	53° 45.5	4.5'	27° 17.4	5.2'	58.8'
2	208° 02.2	47.1	68° 09.0	4.4'	27° 22.5	5.0'	58.8'
3	223° 02.0	· · 46.7	82° 32.4	4.4'	27° 27.4	4.8'	58.8'
4	238° 01.8	46.3	96° 55.8	4.3'	27° 32.1	4.6'	58.8'
5	253° 01.5	45.9	111° 19.1	4.3'	27° 36.6	4.4'	58.8'
6	268° 01.3	S21° 45.5	125° 42.4	4.3'	N27° 40.9	4.2'	58.7'
7	283° 01.0	45.1	140° 05.6	4.2'	27° 45.0	4.1'	58.7'
8	298° 00.8	44.7	154° 28.8	4.2'	27° 49.0	3.9'	58.7'
9	313° 00.5	· · 44.3	168° 52.0	4.2'	27° 52.8	3.7'	58.7'
10	328° 00.3	43.9	183° 15.2	4.1'	27° 56.4	3.5'	58.7'
11	343° 00.0	43.5	197° 38.3	4.1'	27° 59.8	3.3'	58.7'
12	357° 59.8	S21° 43.1	212° 01.4	4.1'	N28° 03.0	3.1'	58.7'
13	12° 59.6	42.7	226° 24.5	4.1'	28° 06.0	2.9'	58.6'
14	27° 59.3	42.3	240° 47.6	4.1'	28° 08.8	2.7'	58.6'
15	42° 59.1	· · 41.9	255° 10.6	4.0'	28° 11.5	2.5'	58.6'
16	57° 58.8	41.5	269° 33.7	4.0'	28° 13.9	2.4'	58.6'
17	72° 58.6	41.1	283° 56.7	4.0'	28° 16.2	2.2'	58.6'
18	87° 58.4	S21° 40.7	298° 19.7	4.0'	N28° 18.2	2.0'	58.6'
19	102° 58.1	40.3	312° 42.8	4.0'	28° 20.1	1.8'	58.5'
20	117° 57.9	39.9	327° 05.8	4.0'	28° 21.8	1.6'	58.5'
21	132° 57.6	· · 39.5	341° 28.8	4.0'	28° 23.3	1.4'	58.5'
22	147° 57.4	39.1	355° 51.8	4.0'	28° 24.6	1.2'	58.5'
23	162° 57.2	38.7	10° 14.8	4.0'	28° 25.7	1.0'	58.5'
SD.=16.3			d=0.4		S.D.=16.0		
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	177° 56.9	S21° 38.2	24° 37.8	4.0'	N28° 26.7	0.8'	58.5'
1	192° 56.7	37.8	39° 00.9	4.0'	28° 27.4	0.6'	58.4'
2	207° 56.4	37.4	53° 23.9	4.1'	28° 27.9	0.5'	58.4'
3	222° 56.2	· · 37.0	67° 47.0	4.1'	28° 28.3	0.3'	58.4'
4	237° 56.0	36.6	82° 10.1	4.1'	28° 28.5	0.1'	58.4'
5	252° 55.7	36.2	96° 33.2	4.1'	28° 28.5	-0.1'	58.4'
6	267° 55.5	S21° 35.8	110° 56.3	4.1'	N28° 28.2	-0.3'	58.4'
7	282° 55.2	35.4	125° 19.5	4.2'	28° 27.8	-0.5'	58.3'
8	297° 55.0	35.0	139° 42.7	4.2'	28° 27.3	-0.7'	58.3'
9	312° 54.8	· · 34.5	154° 05.9	4.2'	28° 26.5	-0.9'	58.3'
10	327° 54.5	34.1	168° 29.1	4.3'	28° 25.5	-1.1'	58.3'
11	342° 54.3	33.7	182° 52.4	4.3'	28° 24.4	-1.2'	58.3'
12	357° 54.1	S21° 33.3	197° 15.7	4.3'	N28° 23.0	-1.4'	58.2'
13	12° 53.8	32.9	211° 39.1	4.4'	28° 21.5	-1.6'	58.2'
14	27° 53.6	32.5	226° 02.5	4.4'	28° 19.8	-1.8'	58.2'
15	42° 53.3	· · 32.0	240° 26.0	4.5'	28° 17.9	-2.0'	58.2'
16	57° 53.1	31.6	254° 49.5	4.5'	28° 15.8	-2.2'	58.2'
17	72° 52.9	31.2	269° 13.0	4.6'	28° 13.6	-2.3'	58.1'
18	87° 52.6	S21° 30.8	283° 36.6	4.6'	N28° 11.1	-2.5'	58.1'
19	102° 52.4	30.4	298° 00.3	4.7'	28° 08.5	-2.7'	58.1'
20	117° 52.2	29.9	312° 24.0	4.8'	28° 05.7	-2.9'	58.1'
21	132° 51.9	· · 29.5	326° 47.8	4.8'	28° 02.7	-3.1'	58.1'
22	147° 51.7	29.1	341° 11.7	4.9'	27° 59.6	-3.2'	58.0'
23	162° 51.5	28.7	355° 35.6	4.9'	27° 56.2	-3.4'	58.0'
SD.=16.3			d=0.4		S.D.=15.9		

Lat.	Twilight		Sunrise	Sunset	Twilight	
	Naut.	Civil			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	15:06	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	16:03	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°	04:59	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	03:35	20:40	21:37	23:33
58°	□	02:14	03:20	20:55	22:00	□
S 60°	□	01:42	03:03	21:12	22:31	□

Lat.	Moonrise			Moonset		
	Fri	Sat	Sun	Fri	Sat	Sun
N 72°	□	□	□	□	□	□
N 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
N 40°	13:21	14:12	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	04:44	05:48
20°	14:19	15:16	16:17	03:11	04:16	05:19
N 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
S 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
S 60°	19:17	20:55	21:46	23:07	23:38	-:-

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time	12 ^h		Mer. Pass.	Lower	
10	07:25	07:37	12:08	21:16	08:46	
11	07:49	08:01	12:08	22:17	09:46	
12	08:12	08:24	12:08	23:18	10:48	

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

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	112°43.7	130°52.2	S08°07.0	352°17.5	N24°49.6	42°00.9	N21°41.4	125°17.5	S07°30.4	Alpheratz	357°34.9	29°13.9
1	127°46.1	145°52.4	05.9	7°21.0	49.8	57°03.6	41.3	140°19.8	30.3	Ankaa	353°07.2	-42°10.4
2	142°48.6	160°52.7	04.7	22°24.5	50.0	72°06.3	41.3	155°22.0	30.2	Schedar	349°31.2	56°40.7
3	157°51.0	175°52.9	· · 03.5	37°28.0	· · 50.3	87°08.9	· · 41.3	170°24.3	· · 30.1	Diphda	348°47.2	-17°51.1
4	172°53.5	190°53.1	02.3	52°31.6	50.5	102°11.6	41.3	185°26.5	30.1	Achernar	335°20.1	-57°06.9
5	187°56.0	205°53.3	01.2	67°35.1	50.8	117°14.2	41.3	200°28.8	30.0	Hamal	327°51.1	23°35.0
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	Polaris	313°49.1	89°22.5
7	218°00.9	235°53.8	07°58.8	97°42.2	51.3	147°19.6	41.2	230°33.3	29.8	Akamars	315°11.6	-40°12.5
8	233°03.4	250°54.0	57.6	112°45.7	51.5	162°22.2	41.2	245°35.6	29.7	Menkar	314°06.0	4°11.3
9	248°05.8	265°54.2	· · 56.5	127°49.2	· · 51.7	177°24.9	· · 41.2	260°37.8	· · 29.6	Mirfak	308°28.0	49°57.2
10	263°08.3	280°54.5	55.3	142°52.7	52.0	192°27.5	41.2	275°40.1	29.5	Aldebaran	290°39.3	16°33.6
11	278°10.8	295°54.7	54.1	157°56.3	52.2	207°30.2	41.2	290°42.3	29.4	Rigel	281°03.6	-8°10.4
12	293°13.2	310°54.9	S07°52.9	172°59.8	N24°52.5	222°32.9	N21°41.2	305°44.6	S07°29.3	Capella	280°21.5	46°01.5
13	308°15.7	325°55.2	51.8	188°03.3	52.7	237°35.5	41.2	320°46.8	29.2	Bellatrix	278°22.6	6°22.3
14	323°18.2	340°55.4	50.6	203°06.9	52.9	252°38.2	41.1	335°49.1	29.1	Elnath	278°01.5	28°37.8
15	338°20.6	355°55.7	· · 49.4	218°10.4	· · 53.2	267°40.8	· · 41.1	350°51.3	· · 29.0	Alnilam	275°37.4	-1°11.2
16	353°23.1	10°55.9	48.2	233°13.9	53.4	282°43.5	41.1	5°53.6	28.9	Betelgeuse	270°51.7	7°24.7
17	8°25.5	25°56.1	47.1	248°17.5	53.7	297°46.1	41.1	20°55.9	28.9	Canopus	263°51.9	-52°42.6
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	Sirius	258°25.8	-16°44.9
19	38°30.5	55°56.6	44.7	278°24.5	54.1	327°51.5	41.1	51°00.4	28.7	Adara	255°05.5	-29°00.4
20	53°32.9	70°56.9	43.5	293°28.1	54.4	342°54.1	41.1	66°02.6	28.6	Procyon	244°50.4	5°09.8
21	68°35.4	85°57.1	· · 42.4	308°31.6	· · 54.6	357°56.8	· · 41.0	81°04.9	· · 28.5	Pollux	243°16.8	27°57.9
22	83°37.9	100°57.3	41.2	323°35.1	54.9	12°59.4	41.0	96°07.1	28.4	Avior	234°14.1	-50°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	Suhail	222°45.9	-43°31.9
Mer.pass.:16:26		v0.2 d1.2 m-4.3		v3.5 d0.2 m-1.3		v2.7 d-0.0 m-2.5		v2.3 d0.1 m1.1		Miaplacidus	221°37.5	-69°49.0
										Alphard	217°47.4	-8°46.0
										Regulus	207°34.1	11°50.6
										Dubhe	193°40.5	61°36.7
										Denebola	182°24.7	14°25.8
										Gienah	175°43.4	-17°40.8
										Acrux	172°59.9	-63°14.0
										Gacrux	171°51.5	-57°15.0
										Alioth	166°12.9	55°49.1
										Spica	158°22.3	-11°17.5
										Alkaid	152°52.0	49°11.0
										Hadar	148°36.1	-60°29.4
										Menkent	147°57.7	-36°29.4
										Arcturus	145°47.8	19°03.2
										Rigel Kent.	139°40.5	-60°56.1
										Kochab	137°20.2	74°02.8
										Zuben'ubi	136°56.1	-16°08.7
										Alphecca	126°03.9	26°37.6
										Antares	112°16.1	-26°29.2
										Atria	107°10.7	-69°04.2
										Sabik	102°03.0	-15°45.4
										Shaula	96°10.7	-37°07.3
										Rasalhague	95°58.8	12°32.4
										Eltanin	90°42.7	51°28.9
										Kaus Aust.	83°32.8	-34°22.3
										Vega	80°33.7	38°48.2
										Nunki	75°48.1	-26°16.0
										Altair	62°00.3	8°55.9
										Peacock	53°06.2	-56°39.4
										Deneb	49°26.3	45°22.2
										Enif	37°39.1	9°59.4
										Al Na'ir	27°33.3	-46°50.6
										Fomalhaut	15°14.8	-29°29.5
										Scheat	13°45.4	28°13.2
										Markab	13°30.1	15°20.4
										Jan 13 Mon	SHA	Mer.pass
										Venus	18°08.6	15:16
										Mars	239°33.8	00:31
										Jupiter	289°17.3	21:08
										Saturn	12°33.9	15:36
										Jan 14 Tue	SHA	Mer.pass
										Venus	17°15.0	15:16
										Mars	239°59.4	00:25
										Jupiter	289°21.9	21:04
										Saturn	12°28.8	15:33
										Jan 15 Wed	SHA	Mer.pass
										Venus	16°22.2	15:15
										Mars	240°25.1	00:19
										Jupiter	289°26.4	21:00
										Saturn	12°23.7	15:29
										Horizontal parallax		
										Venus:		0.2
										Mars:		0.2
Mer.pass.:16:18		v0.3 d1.2 m-4.3		v3.5 d0.2 m-1.3		v2.6 d-0.0 m-2.5		v2.3 d0.1 m1.1				

January 16, 17, 18 (Thu., Fri., Sat.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Thu	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec	
0	115°41.1	131°11.0	S06°42.2	356°31.9	N25°06.4	45°11.8	N21°40.3	127°59.7	S07°23.7				Alpheratz	357°34.9	29°13.9		
1	130°43.5	146°11.3	41.1	11°35.4	06.6	60°14.4	40.3	143°01.9	23.6				Ankaa	353°07.2	-42°10.4		
2	145°46.0	161°11.6	39.9	26°39.0	06.9	75°17.0	40.3	158°04.2	23.5				Schedar	349°31.2	56°40.7		
3	160°48.5	176°11.9	· · 38.7	41°42.5	· · 07.1	90°19.7	· · 40.3	173°06.4	· · 23.4				Diphda	348°47.2	-17°51.1		
4	175°50.9	191°12.2	37.5	56°46.1	07.3	105°22.3	40.3	188°08.7	23.3				Achernar	335°20.1	-57°06.9		
5	190°53.4	206°12.5	36.3	71°49.6	07.5	120°24.9	40.3	203°10.9	23.2				Hamal	327°51.1	23°35.0		
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				Polaris	313°50.5	89°22.5		
7	220°58.3	236°13.1	34.0	101°56.7	08.0	150°30.2	40.3	233°15.4	23.0				Akamar	315°11.6	-40°12.5		
8	236°00.8	251°13.4	32.8	117°00.2	08.2	165°32.9	40.2	248°17.7	22.9				Menkar	314°06.0	4°11.3		
9	251°03.3	266°13.7	· · 31.6	132°03.7	· · 08.4	180°35.5	· · 40.2	263°19.9	· · 22.8				Mirfak	308°28.0	49°57.2		
10	266°05.7	281°14.0	30.4	147°07.3	08.6	195°38.1	40.2	278°22.2	22.7				Aldebaran	290°39.3	16°33.6		
11	281°08.2	296°14.3	29.3	162°10.8	08.8	210°40.8	40.2	293°24.4	22.6				Rigel	281°03.6	-8°10.4		
12	296°10.6	311°14.6	S06°28.1	177°14.4	N25°09.1	225°43.4	N21°40.2	308°26.6	S07°22.5				Capella	280°21.5	46°01.6		
13	311°13.1	326°14.9	26.9	192°17.9	09.3	240°46.0	40.2	323°28.9	22.5				Bellatrix	278°22.6	6°22.3		
14	326°15.6	341°15.2	25.7	207°21.4	09.5	255°48.7	40.2	338°31.1	22.4				Elnath	278°01.5	28°37.8		
15	341°18.0	356°15.6	· · 24.5	222°25.0	· · 09.7	270°51.3	· · 40.2	353°33.4	· · 22.3				Alnilam	275°37.4	-1°11.2		
16	356°20.5	11°15.9	23.3	237°28.5	09.9	285°53.9	40.1	8°35.6	22.2				Betelgeuse	270°51.7	7°24.7		
17	11°23.0	26°16.2	22.2	252°32.0	10.2	300°56.6	40.1	23°37.9	22.1				Canopus	263°51.9	-52°42.6		
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				Sirius	258°25.8	-16°44.9		
19	41°27.9	56°16.8	19.8	282°39.1	10.6	331°01.8	40.1	53°42.4	21.9				Adara	255°05.5	-29°00.4		
20	56°30.4	71°17.2	18.6	297°42.7	10.8	346°04.5	40.1	68°44.6	21.8				Procyon	244°50.4	5°09.8		
21	71°32.8	86°17.5	· · 17.4	312°46.2	· · 11.0	1°07.1	· · 40.1	83°46.9	· · 21.7				Pollux	243°16.8	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°14.1	-50°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.:16:14			v0.3 d1.2 m-4.3			v3.5 d0.2 m-1.2			v2.6 d-0.0 m-2.5			v2.2 d0.1 m1.1			Alphard	217°47.4	-8°46.1
															Regulus	207°34.1	11°50.6
															Dubhe	193°40.5	61°36.7
															Denebola	182°24.7	14°25.8
															Gienah	175°43.4	-17°40.8
															Acrux	172°59.9	-63°14.0
															Gacrux	171°51.5	-57°15.0
															Alioth	166°12.8	55°49.1
															Spica	158°22.2	-11°17.5
															Alkaid	152°52.0	49°11.0
															Hadar	148°36.1	-60°29.4
															Menkent	147°57.7	-36°29.5
															Arcturus	145°47.8	19°03.2
															Rigel Kent.	139°40.5	-60°56.1
															Kochab	137°20.1	74°02.8
															Zuben'ubi	136°56.1	-16°08.7
															Alphecca	126°03.9	26°37.6
															Antares	112°16.0	-26°29.2
															Atria	107°10.7	-69°04.1
															Sabik	102°03.0	-15°45.4
															Shaula	96°10.7	-37°07.3
															Rasalhague	95°58.8	12°32.4
															Eltanin	90°42.6	51°28.9
															Kaus Aust.	83°32.8	-34°22.3
															Vega	80°33.6	38°48.2
															Nunki	75°48.1	-26°16.0
															Altair	62°00.3	8°55.9
															Peacock	53°06.2	-56°39.3
															Deneb	49°26.3	45°22.2
															Enif	33°39.1	9°59.3
															Al Na'ir	27°33.3	-46°50.5
															Fomalhaut	15°14.8	-29°29.5
															Scheat	13°45.5	28°13.2
															Markab	13°30.1	15°20.4
															Jan 16 Thu	SHA	Mer.pass
															Venus	15°29.9	15:15
															Mars	240°50.8	00:14
															Jupiter	289°30.7	20:56
															Saturn	12°18.6	15:26
															Jan 17 Fri	SHA	Mer.pass
															Venus	14°38.2	15:14
															Mars	241°16.6	00:08
															Jupiter	289°34.8	20:51
															Saturn	12°13.4	15:22
															Jan 18 Sat	SHA	Mer.pass
															Venus	13°47.2	15:14
															Mars	241°42.3	00:03
															Jupiter	289°38.6	20:47
															Saturn	12°08.1	15:19
															Horizontal parallax		
															Venus:	0.2	
															Mars:	0.2	
Mer.pass.:16:06			v0.4 d1.2 m-4.3			v3.5 d0.2 m-1.2			v2.6 d-0.0 m-2.5			v2.2 d0.1 m1.1					

Sun				Moon										
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight	
									Naut.	Civil			Civil	Naut.
0	177°35.2	S20°55.7	331°06.9	12.5'	N17°25.3	-12.5'	56.2'							
1	192°35.0	55.2	345°38.4	12.6'	17°12.8	-12.5'	56.2'	N 72°	07:55	09:42	■	■	14:39	16:26
2	207°34.8	54.8	0°10.1	12.7'	17°00.2	-12.6'	56.2'	N 70°	07:41	09:11	11:37	12:45	15:10	16:40
3	222°34.5	54.3	14°41.9	12.8'	16°47.5	-12.7'	56.1'	68°	07:30	08:48	10:22	13:59	15:33	16:51
4	237°34.3	53.8	29°13.8	12.9'	16°34.8	-12.7'	56.1'	66°	07:20	08:30	09:46	14:35	15:51	17:01
5	252°34.1	53.3	43°45.7	13.0'	16°22.1	-12.8'	56.1'	64°	07:12	08:15	09:20	15:01	16:06	17:09
6	267°33.9	S20°52.9	58°17.8	13.1'	N16°09.2	-12.9'	56.1'	62°	07:05	08:03	09:00	15:21	16:18	17:16
7	282°33.7	52.4	72°50.0	13.2'	15°56.3	-12.9'	56.0'	60°	06:58	07:52	08:44	15:37	16:29	17:23
8	297°33.5	51.9	87°22.2	13.3'	15°43.4	-13.0'	56.0'	N 58°	06:53	07:43	08:30	15:51	16:38	17:28
9	312°33.3	51.4	101°54.6	13.4'	15°30.4	-13.0'	56.0'	56°	06:47	07:34	08:18	16:02	16:46	17:33
10	327°33.1	50.9	116°27.0	13.5'	15°17.3	-13.1'	55.9'	54°	06:43	07:27	08:08	16:13	16:54	17:38
11	342°32.9	50.4	130°59.6	13.6'	15°04.2	-13.1'	55.9'	52°	06:38	07:20	07:59	16:22	17:00	17:43
12	357°32.6	S20°50.0	145°32.2	13.7'	N14°51.0	-13.2'	55.9'	50°	06:34	07:14	07:51	16:30	17:07	17:47
13	12°32.4	49.5	160°04.9	13.8'	14°37.8	-13.2'	55.9'	45°	06:25	07:01	07:33	16:47	17:20	17:56
14	27°32.2	49.0	174°37.7	13.9'	14°24.5	-13.3'	55.8'	N 40°	06:16	06:49	07:19	17:02	17:31	18:04
15	42°32.0	48.5	189°10.6	13.9'	14°11.2	-13.3'	55.8'	35°	06:08	06:39	07:07	17:14	17:41	18:12
16	57°31.8	48.0	203°43.6	14.0'	13°57.9	-13.4'	55.8'	30°	06:01	06:30	06:56	17:24	17:50	18:19
17	72°31.6	47.5	218°16.7	14.1'	13°44.4	-13.4'	55.8'	20°	05:47	06:14	06:38	17:43	18:06	18:33
18	87°31.4	S20°47.0	232°49.9	14.2'	N13°31.0	-13.5'	55.7'	N 10°	05:33	05:59	06:22	17:59	18:21	18:47
19	102°31.2	46.5	247°23.1	14.3'	13°17.5	-13.5'	55.7'	0°	05:19	05:44	06:07	18:14	18:36	19:02
20	117°31.0	46.1	261°56.4	14.4'	13°03.9	-13.6'	55.7'	S 10°	05:02	05:29	05:51	18:29	18:52	19:18
21	132°30.8	45.6	276°29.8	14.4'	12°50.4	-13.6'	55.7'	20°	04:42	05:11	05:35	18:45	19:09	19:38
22	147°30.6	45.1	291°03.3	14.5'	12°36.7	-13.6'	55.7'	30°	04:17	04:49	05:15	19:05	19:31	20:03
23	162°30.4	44.6	305°36.9	14.6'	12°23.1	-13.7'	55.6'	35°	04:00	04:36	05:04	19:16	19:44	20:19
	SD.=16.3	d=0.5			S.D.=15.3			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
								S 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	03:57	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	□
								S 60°	□	02:04	03:17	21:02	22:13	□
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset		
									Thu	Fri	Sat	Thu	Fri	Sat
0	177°30.2	S20°44.1	320°10.5	14.7'	N12°09.4	-13.7'	55.6'	N 72°	17:15	19:38	21:40	11:54	11:02	10:26
1	192°30.0	43.6	334°44.2	14.8'	11°55.6	-13.8'	55.6'	N 70°	17:44	19:49	21:42	11:24	10:48	10:21
2	207°29.8	43.1	349°18.0	14.8'	11°41.9	-13.8'	55.6'	68°	18:04	19:59	21:43	11:02	10:37	10:17
3	222°29.5	42.6	3°51.9	14.9'	11°28.0	-13.8'	55.5'	66°	18:21	20:06	21:45	10:44	10:27	10:13
4	237°29.3	42.1	18°25.8	15.0'	11°14.2	-13.9'	55.5'	64°	18:34	20:13	21:46	10:29	10:19	10:10
5	252°29.1	41.6	32°59.9	15.1'	11°00.3	-13.9'	55.5'	62°	18:45	20:18	21:46	10:17	10:12	10:07
6	267°28.9	S20°41.1	47°33.9	15.1'	N10°46.4	-13.9'	55.5'	60°	18:54	20:23	21:47	10:06	10:06	10:05
7	282°28.7	40.6	62°08.1	15.2'	10°32.5	-14.0'	55.4'	N 58°	19:03	20:27	21:48	09:57	10:00	10:02
8	297°28.5	40.1	76°42.3	15.3'	10°18.5	-14.0'	55.4'	56°	19:10	20:31	21:48	09:49	09:55	10:00
9	312°28.3	39.6	91°16.6	15.3'	10°04.5	-14.0'	55.4'	54°	19:16	20:34	21:49	09:42	09:51	09:59
10	327°28.1	39.1	105°51.0	15.4'	09°50.5	-14.0'	55.4'	52°	19:22	20:37	21:50	09:35	09:47	09:57
11	342°27.9	38.6	120°25.4	15.5'	09°36.4	-14.1'	55.3'	50°	19:27	20:40	21:50	09:29	09:44	09:56
12	357°27.7	S20°38.1	134°59.9	15.5'	N09°22.4	-14.1'	55.3'	45°	19:38	20:46	21:51	09:16	09:36	09:52
13	12°27.5	37.6	149°34.4	15.6'	09°08.3	-14.1'	55.3'	N 40°	19:47	20:51	21:52	09:06	09:29	09:50
14	27°27.3	37.1	164°09.0	15.6'	08°54.1	-14.1'	55.3'	35°	19:55	20:55	21:53	08:57	09:23	09:47
15	42°27.1	36.6	178°43.7	15.7'	08°40.0	-14.2'	55.3'	30°	20:02	20:59	21:53	08:48	09:18	09:45
16	57°26.9	36.1	193°18.5	15.8'	08°25.8	-14.2'	55.2'	20°	20:14	21:05	21:54	08:34	09:09	09:42
17	72°26.7	35.6	207°53.2	15.8'	08°11.7	-14.2'	55.2'	N 10°	20:24	21:11	21:55	08:22	09:02	09:39
18	87°26.5	S20°35.1	222°28.1	15.9'	N07°57.5	-14.2'	55.2'	0°	20:34	21:16	21:56	08:10	08:54	09:35
19	102°26.3	34.6	237°03.0	15.9'	07°43.2	-14.2'	55.2'	S 10°	20:43	21:21	21:57	07:59	08:47	09:32
20	117°26.1	34.1	251°38.0	16.0'	07°29.0	-14.2'	55.2'	20°	20:53	21:27	21:58	07:46	08:39	09:29
21	132°25.9	33.6	266°13.0	16.0'	07°14.7	-14.3'	55.1'	30°	21:05	21:33	21:59	07:31	08:30	09:25
22	147°25.7	33.1	280°48.0	16.1'	07°00.5	-14.3'	55.1'	35°	21:11	21:37	22:00	07:23	08:24	09:23
23	162°25.5	32.6	295°23.1	16.1'	06°46.2	-14.3'	55.1'	40°	21:19	21:41	22:01	07:13	08:18	09:20
	SD.=16.3	d=0.5			S.D.=15.2			45°	21:28	21:45	22:01	07:02	08:11	09:18
								S 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
								S 60°	22:01	22:03	22:05	06:16	07:44	09:06
									22:08	22:07	22:05	06:06	07:38	09:04
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Mer.	Moon		Age
									Eqn. of Time	Mer. Pass	Upper Mer. Pass.	Lower Mer. Pass.	17-19	
									00 ^h	12 ^h	hh:mm	hh:mm	hh:mm	93-80%
									mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	
0	177°25.3	S20°32.1	309°58.3	16.2'	N06°31.9	-14.3'	55.1'	16	09:39	09:50	12:10	01:59	14:22	
1	192°25.1	31.5	324°33.5	16.2'	06°17.6	-14.3'	55.0'	17	09:59	10:09	12:10	02:44	15:05	
2	207°24.9	31.0	339°08.8	16.3'	06°03.2	-14.3'	55.0'	18	10:19	10:28	12:10	03:26	15:46	
3	222°24.7	30.5	353°44.1	16.3'	05°48.9	-14.3'	55.0'							
4	237°24.5	30.0	8°19.4	16.4'	05°34.5	-14.4'	55.0'							
5	252°24.3	29.5	22°54.8	16.4'	05°20.2	-14.4'	55.0'							
6	267°24.1	S20°29.0	37°30.3	16.5'	N05°05.8	-14.4'	55.0'							
7	282°23.9	28.5	52°05.8	16.5'	04°51.5	-14.4'	54.9'							
8	297°23.7	28.0	66°41.3	16.5'	04°37.1	-14.4'	54.9'							
9	312°23.5	27.4	81°16.8	16.6'	04°22.7	-14.4'	54.9'							
10	327°23.4	26.9	95°52.4	16.6'	04°08.3	-14.4'	54.9'							
11	342°23.2	26.4	110°28.1	16.7'	03°53.9	-14.4'	54.9'							
12	357°23.0	S20°25.9	125°03.7	16.7'	N03°39.5	-14.4'	54.8'							
13	12°22.8	25.4	139°39.4	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'	54.8'							
15	42°22.4	24.3	168°50.9	16.8'	02°56.3	-14.4'	54.8'							
16	57°22.2	23.8	183°26.7	16.8'	02°41.9	-14.4'	54.8'							
17	72°22.0	23.3	198°02.6	16.8'	02°27.5	-14.4'	54.8'							
18	87°21.8	S20°22.8	212°38.4	16.9'	N02°13.1	-14.4'	54.7'							
19	102°21.6	22.2	227°14.3	16.9'	01°58.7	-14.4'	54.7'							

January 19, 20, 21 (Sun., Mon., Tue.)

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°34.9	29°13.8
1	133°41.0	146°35.7	15.9	15°49.9	21.8	63°23.4	39.5	145°43.5	16.6	Ankaa	353°07.2	-42°10.4
2	148°43.4	161°36.1	14.8	30°53.5	22.0	78°26.0	39.5	160°45.8	16.5	Schedar	349°31.2	56°40.7
3	163°45.9	176°36.5	· · 13.6	45°57.0	· · 22.2	93°28.6	· · 39.5	175°48.0	· · 16.5	Diphda	348°47.2	-17°51.1
4	178°48.3	191°36.9	12.4	61°00.5	22.4	108°31.2	39.5	190°50.3	16.4	Achernar	335°20.2	-57°06.9
5	193°50.8	206°37.3	11.2	76°04.0	22.6	123°33.9	39.5	205°52.5	16.3	Hamal	327°51.2	23°35.0
6	208°53.3	221°37.6	S05°10.0	91°07.6	N25°22.8	138°36.5	N21°39.5	220°54.7	S07°16.2	Polaris	313°52.0	89°22.5
7	223°55.7	236°38.0	08.8	106°11.1	23.0	153°39.1	39.5	235°57.0	16.1	Akamars	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°39.4	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	S07°15.6	Capella	280°21.5	46°01.6
13	314°10.5	326°40.4	01.8	196°32.3	24.2	243°54.7	39.4	326°10.4	15.5	Bellatrix	278°22.6	6°22.3
14	329°13.0	341°40.8	05°00.6	211°35.8	24.4	258°57.3	39.4	341°12.7	15.4	Elnath	278°01.5	28°37.8
15	344°15.5	356°41.2	04°59.4	226°39.3	· · 24.6	274°00.0	· · 39.4	356°14.9	· · 15.3	Alnilam	275°37.4	-1°11.2
16	359°17.9	11°41.6	58.2	241°42.8	24.8	289°02.6	39.4	11°17.1	15.2	Betelgeuse	270°51.8	7°24.7
17	14°20.4	26°42.0	57.0	256°46.3	25.0	304°05.2	39.4	26°19.4	15.1	Canopus	263°51.9	-52°42.6
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	Sirius	258°25.8	-16°44.9
19	44°25.3	56°42.8	54.7	286°53.4	25.4	334°10.4	39.4	56°23.8	14.9	Adara	255°05.5	-29°00.4
20	59°27.8	71°43.2	53.5	301°56.9	25.6	349°13.0	39.4	71°26.1	14.8	Procyon	244°50.4	5°09.7
21	74°30.2	86°43.6	· · 52.3	317°00.4	· · 25.8	4°15.6	· · 39.3	86°28.3	· · 14.7	Pollux	243°16.8	27°57.9
22	89°32.7	101°44.0	51.1	332°04.0	25.9	19°18.2	39.3	101°30.6	14.6	Avior	234°14.1	-50°35.3
23	104°35.2	116°44.4	49.9	347°07.5	26.1	34°20.8	39.3	116°32.8	14.5	Suhail	222°45.9	-43°32.0
Mer.pass.:16:02		v0.4 d1.2 m-4.3		v3.5 d0.2 m-1.2		v2.6 d-0.0 m-2.5		v2.2 d0.1 m1.1		Miaplacidus	221°37.4	-69°49.1
										Alphard	217°47.4	-8°46.1
										Regulus	207°34.1	11°50.6
										Dubhe	193°40.4	61°36.7
										Denebola	182°24.7	14°25.8
										Gienah	175°43.4	-17°40.8
										Acrux	172°59.8	-63°14.0
										Gacrux	171°51.4	-57°15.0
										Alioth	166°12.8	55°49.1
										Spica	158°22.2	-11°17.5
										Alkaid	152°51.9	49°11.0
										Hadar	148°36.0	-60°29.4
										Menkent	147°57.6	-36°29.5
										Arcturus	145°47.8	19°03.2
										Rigel Kent.	139°40.4	-60°56.1
										Kochab	137°20.0	74°02.8
										Zuben'ubi	136°56.1	-16°08.7
										Alphecca	126°03.9	26°37.6
										Antares	112°16.0	-26°29.2
										Atria	107°10.6	-69°04.1
										Sabik	102°03.0	-15°45.4
										Shaula	96°10.7	-37°07.2
										Rasalhague	95°58.8	12°32.4
										Eltanin	90°42.6	51°28.9
										Kaus Aust.	83°32.8	-34°22.3
										Vega	80°33.6	38°48.2
										Nunki	75°48.1	-26°16.0
										Altair	62°00.3	8°55.9
										Peacock	53°06.2	-56°39.3
										Deneb	49°26.3	45°22.1
										Enif	33°39.1	9°59.3
										Al Na'ir	27°33.3	-46°50.5
										Fomalhaut	15°14.8	-29°29.5
										Scheat	13°45.5	28°13.2
										Markab	13°30.1	15°20.4
										Jan 19 Sun	SHA	Mer.pass
										Venus	12°56.9	15:13
										Mars	242°07.9	23:51
										Jupiter	289°42.3	20:43
										Saturn	12°02.8	15:15
										Jan 20 Mon	SHA	Mer.pass
										Venus	12°07.2	15:13
										Mars	242°33.4	23:46
										Jupiter	289°45.8	20:39
										Saturn	11°57.4	15:11
										Jan 21 Tue	SHA	Mer.pass
										Venus	11°18.1	15:12
										Mars	242°58.6	23:40
										Jupiter	289°49.0	20:35
										Saturn	11°52.0	15:08
										Horizontal parallax		
										Venus:		0.2
										Mars:		0.2
Mer.pass.:15:54		v0.4 d1.2 m-4.3		v3.5 d0.2 m-1.2		v2.6 d-0.0 m-2.5		v2.2 d0.1 m1.1				

January 25, 26, 27 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars								
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec								
0	124°33.3	132°42.2	S02°27.5	9°10.0	N25°46.5	54°33.3	N21°38.6	136°03.0	S07°02.3			Alpheratz	357°34.9	29°13.8									
1	139°35.8	147°42.8	26.3	24°13.4	46.7	69°35.8	38.6	151°05.2	02.2			Ankaa	353°07.3	-42°10.4									
2	154°38.3	162°43.3	25.1	39°16.9	46.8	84°38.4	38.6	166°07.5	02.1			Schedar	349°31.3	56°40.7									
3	169°40.7	177°43.9	· · 23.9	54°20.3	· · 46.9	99°40.9	· · 38.6	181°09.7	· · 02.0			Diphda	348°47.3	-17°51.1									
4	184°43.2	192°44.4	22.8	69°23.8	47.1	114°43.5	38.6	196°11.9	01.8			Achernar	335°20.2	-57°06.9									
5	199°45.6	207°45.0	21.6	84°27.2	47.2	129°46.1	38.6	211°14.1	01.7			Hamal	327°51.2	23°35.0									
6	214°48.1	222°45.5	S02°20.4	99°30.7	N25°47.4	144°48.6	N21°38.6	226°16.4	S07°01.6			Polaris	313°54.4	89°22.5									
7	229°50.6	237°46.1	19.3	114°34.1	47.5	159°51.2	38.6	241°18.6	01.5			Akamars	315°11.6	-40°12.5									
8	244°53.0	252°46.7	18.1	129°37.6	47.7	174°53.7	38.6	256°20.8	01.4			Menkar	314°06.0	4°11.3									
9	259°55.5	267°47.2	· · 16.9	144°41.0	· · 47.8	189°56.3	· · 38.6	271°23.1	· · 01.3			Mirfak	308°28.0	49°57.2									
10	274°58.0	282°47.8	15.8	159°44.5	47.9	204°58.9	38.6	286°25.3	01.2			Aldebaran	290°39.4	16°33.6									
11	290°00.4	297°48.4	14.6	174°47.9	48.1	220°01.4	38.6	301°27.5	01.1			Rigel	281°03.6	-8°10.4									
12	305°02.9	312°48.9	S02°13.4	189°51.4	N25°48.2	235°04.0	N21°38.6	316°29.7	S07°01.0			Capella	280°21.5	46°01.6									
13	320°05.4	327°49.5	12.3	204°54.8	48.4	250°06.5	38.6	331°32.0	00.9			Bellatrix	278°22.6	6°22.3									
14	335°07.8	342°50.1	11.1	219°58.3	48.5	265°09.1	38.6	346°34.2	00.8			Elnath	278°01.5	28°37.8									
15	350°10.3	357°50.6	· · 09.9	235°01.7	· · 48.6	280°11.6	· · 38.6	1°36.4	· · 00.7			Alnilam	275°37.4	-1°11.2									
16	5°12.7	12°51.2	08.8	250°05.1	48.8	295°14.2	38.6	16°38.6	00.6			Betelgeuse	270°51.8	7°24.7									
17	20°15.2	27°51.8	07.6	265°08.6	48.9	310°16.7	38.6	31°40.9	00.5			Canopus	263°51.9	-52°42.6									
18	35°17.7	42°52.4	S02°06.4	280°12.0	N25°49.0	325°19.3	N21°38.6	46°43.1	S07°00.4			Sirius	258°25.8	-16°44.9									
19	50°20.1	57°52.9	05.2	295°15.5	49.2	340°21.8	38.6	61°45.3	00.3			Adara	255°05.5	-29°00.4									
20	65°22.6	72°53.5	04.1	310°18.9	49.3	355°24.4	38.6	76°47.5	00.2			Procyon	244°50.4	5°09.7									
21	80°25.1	87°54.1	· · 02.9	325°22.3	· · 49.5	10°27.0	· · 38.6	91°49.8	· · 00.1			Pollux	243°16.8	27°57.9									
22	95°27.5	102°54.7	01.7	340°25.8	49.6	25°29.5	38.6	106°52.0	07°00.0			Avior	234°14.1	-50°35.4									
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			Suhail	222°45.8	-43°32.0									
Mer.pass.:15:39			v0.6 d1.2 m-4.4			v3.5 d0.1 m-1.2			v2.6 d-0.0 m-2.4			v2.2 d0.1 m1.1			Miaplacidus			221°37.4	-69°49.1				
															Alphard			217°47.4	-8°46.1				
															Regulus			207°34.0	11°50.6				
															Dubhe			193°40.4	61°36.7				
															Denebola			182°24.6	14°25.8				
															Gienah			175°43.3	-17°40.9				
															Acrux			172°59.8	-63°14.1				
															Gacrux			171°51.4	-57°15.0				
															Alioth			166°12.7	55°49.1				
															Spica			158°22.2	-11°17.5				
															Alkaid			152°51.9	49°11.0				
															Hadar			148°35.9	-60°29.4				
															Menkent			147°57.6	-36°29.5				
															Arcturus			145°47.7	19°03.2				
															Rigel Kent.			139°40.3	-60°56.1				
															Kochab			137°19.9	74°02.7				
															Zuben'ubi			136°56.0	-16°08.8				
															Alphecca			126°03.8	26°37.6				
															Antares			112°16.0	-26°29.2				
															Atria			107°10.5	-69°04.1				
															Sabik			102°03.0	-15°45.4				
															Shaula			96°10.6	-37°07.2				
															Rasalhague			95°58.8	12°32.4				
															Eltanin			90°42.6	51°28.9				
															Kaus Aust.			83°32.8	-34°22.3				
															Vega			80°33.6	38°48.2				
															Nunki			75°48.0	-26°16.0				
															Altair			62°00.3	8°55.9				
															Peacock			53°06.2	-56°39.3				
															Deneb			49°26.2	45°22.1				
															Enif			33°39.1	9°59.3				
															Al Na'ir			27°33.3	-46°50.5				
															Fomalhaut			15°14.8	-29°29.5				
															Scheat			13°45.5	28°13.1				
															Markab			13°30.1	15°20.4				
															Jan 25 Sat			SHA	Mer.pass				
															Venus			8°08.9	15:09				
															Mars			244°36.7	23:18				
															Jupiter			289°59.9	20:18				
															Saturn			11°29.7	14:54				
															Jan 26 Sun			SHA	Mer.pass				
															Venus			7°23.4	15:08				
															Mars			245°00.2	23:13				
															Jupiter			290°02.1	20:14				
															Saturn			11°24.0	14:50				
															Jan 27 Mon			SHA	Mer.pass				
															Venus			6°38.6	15:07				
															Mars			245°23.2	23:07				
															Jupiter			290°04.1	20:10				
															Saturn			11°18.2	14:46				
															Horizontal parallax								
															Venus:			0.3					
															Mars:			0.2					
Mer.pass.:15:31			v0.6 d1.2 m-4.4			v3.4 d0.1 m-1.1			v2.5 d-0.0 m-2.4			v2.2 d0.1 m1.1											

January 28, 29, 30 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°34.9	29°13.8
1	142°33.2	148°26.0	02.5	28°19.8	56.0	72°39.2	38.5	153°45.4	54.6	Ankaa	353°07.3	-42°10.4
2	157°35.7	163°26.7	01.4	43°23.2	56.1	87°41.7	38.5	168°47.6	54.5	Schedar	349°31.3	56°40.7
3	172°38.1	178°27.3	01°00.2	58°26.6	56.3	102°44.2	38.5	183°49.8	54.4	Diphda	348°47.3	-17°51.1
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	Achernar	335°20.2	-57°06.8
5	202°43.1	208°28.7	57.9	88°33.4	56.5	132°49.3	38.5	213°54.3	54.2	Hamal	327°51.2	23°35.0
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	Polaris	313°55.7	89°22.5
7	232°48.0	238°30.0	55.6	118°40.1	56.7	162°54.3	38.5	243°58.7	54.0	Akamar	315°11.6	-40°12.5
8	247°50.5	253°30.6	54.5	133°43.5	56.8	177°56.9	38.5	259°00.9	53.9	Menkar	314°06.0	4°11.3
9	262°52.9	268°31.3	53.3	148°46.9	56.9	192°59.4	38.5	274°03.2	53.8	Mirfak	308°28.0	49°57.2
10	277°55.4	283°32.0	52.2	163°50.3	57.0	208°01.9	38.5	289°05.4	53.7	Aldebaran	290°39.4	16°33.6
11	292°57.9	298°32.6	51.0	178°53.6	57.2	223°04.5	38.5	304°07.6	53.6	Rigel	281°03.6	-8°10.4
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	Capella	280°21.5	46°01.6
13	323°02.8	328°33.9	48.7	209°00.4	57.4	253°09.5	38.5	334°12.0	53.4	Bellatrix	278°22.6	6°22.3
14	338°05.2	343°34.6	47.6	224°03.8	57.5	268°12.0	38.5	349°14.3	53.3	Elnath	278°01.5	28°37.8
15	353°07.7	358°35.3	46.4	239°07.2	57.6	283°14.6	38.5	4°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°17.1	38.5	19°18.7	53.0	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°42.9	284°17.3	N25°57.9	328°22.2	N21°38.5	49°23.1	S06°52.8	Sirius	258°25.8	-16°44.9
19	53°17.6	58°38.0	41.8	299°20.6	58.0	343°24.7	38.5	64°25.4	52.7	Adara	255°05.5	-29°00.5
20	68°20.0	73°38.6	40.6	314°24.0	58.1	358°27.2	38.5	79°27.6	52.6	Procyon	244°50.4	5°09.7
21	83°22.5	88°39.3	39.5	329°27.4	58.3	373°29.7	38.5	94°29.8	52.5	Pollux	243°16.7	27°57.9
22	98°25.0	103°40.0	38.3	344°30.7	58.4	388°32.3	38.5	109°32.0	52.4	Avior	234°14.1	-50°35.4
23	113°27.4	118°40.7	37.2	359°34.1	58.5	403°34.8	38.5	124°34.2	52.3	Suhail	222°45.8	-43°32.0
Mer.pass.:15:27		v0.6 d1.2 m-4.4		v3.4 d0.1 m-1.1		v2.5 d0.0 m-2.4		v2.2 d0.1 m1.1		Miaplacidus	221°37.4	-69°49.1
										Alphard	217°47.4	-8°46.1
										Regulus	207°34.0	11°50.6
										Dubhe	193°40.3	61°36.7
										Denebola	182°24.6	14°25.8
										Gienah	175°43.3	-17°40.9
										Acrux	172°59.7	-63°14.1
										Gacrux	171°51.3	-57°15.0
										Alioth	166°12.7	55°49.1
										Spica	158°22.1	-11°17.6
										Alkaid	152°51.8	49°11.0
										Hadar	148°35.9	-60°29.4
										Menkent	147°57.5	-36°29.5
										Arcturus	145°47.7	19°03.2
										Rigel Kent.	139°40.3	-60°56.1
										Kochab	137°19.9	74°02.7
										Zuben'ubi	136°56.0	-16°08.8
										Alphecca	126°03.8	26°37.6
										Antares	112°15.9	-26°29.2
										Atria	107°10.5	-69°04.1
										Sabik	102°02.9	-15°45.4
										Shaula	96°10.6	-37°07.2
										Rasalhague	95°58.8	12°32.4
										Eltanin	90°42.6	51°28.9
										Kaus Aust.	83°32.8	-34°22.3
										Vega	80°33.6	38°48.2
										Nunki	75°48.0	-26°16.0
										Altair	62°00.3	8°55.9
										Peacock	53°06.2	-56°39.3
										Deneb	49°26.2	45°22.1
										Enif	33°39.1	9°59.3
										Al Na'ir	27°33.3	-46°50.5
										Fomalhaut	15°14.8	-29°29.5
										Scheat	13°45.5	28°13.1
										Markab	13°30.1	15°20.4
										Jan 28 Tue	SHA	Mer.pass
										Venus	5°54.7	15:06
										Mars	245°45.7	23:02
										Jupiter	290°05.9	20:06
										Saturn	11°12.4	14:43
										Jan 29 Wed	SHA	Mer.pass
										Venus	5°11.5	15:05
										Mars	246°07.6	22:56
										Jupiter	290°07.4	20:02
										Saturn	11°06.6	14:39
										Jan 30 Thu	SHA	Mer.pass
										Venus	4°29.1	15:03
										Mars	246°28.9	22:51
										Jupiter	290°08.7	19:58
										Saturn	11°00.7	14:36
										Horizontal parallax		
										Venus:		0.3
										Mars:		0.2
Mer.pass.:15:19		v0.7 d1.1 m-4.4		v3.3 d0.1 m-1.1		v2.5 d0.0 m-2.4		v2.2 d0.1 m1.1				

h		Sun		Moon										
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight	
									Naut.	Civil			Civil	Naut.
0	176°47.0	S18°11.3	196°17.0	6.4'	S26°50.9	5.9'	57.6'							
1	191°46.9	10.6	210°42.4	6.4'	26°44.9	6.1'	57.6'	N 72°	07:19	08:51	10:52	13:35	15:37	17:09
2	206°46.8	09.9	225°07.8	6.4'	26°38.8	6.2'	57.6'	N 70°	07:10	08:30	10:01	14:27	15:57	17:18
3	221°46.7	· · 09.3	239°33.2	6.4'	26°32.5	6.4'	57.7'	68°	07:02	08:14	09:29	14:58	16:13	17:25
4	236°46.6	08.6	253°58.6	6.5'	26°26.0	6.6'	57.7'	66°	06:56	08:01	09:06	15:21	16:27	17:31
5	251°46.4	07.9	268°24.1	6.5'	26°19.4	6.7'	57.7'	64°	06:50	07:50	08:48	15:40	16:38	17:37
6	266°46.3	S18°07.3	282°49.6	6.5'	S26°12.6	6.9'	57.7'	62°	06:45	07:40	08:33	15:54	16:47	17:42
7	281°46.2	06.6	297°15.2	6.6'	26°05.6	7.1'	57.8'	60°	06:41	07:32	08:20	16:07	16:55	17:46
8	296°46.1	06.0	311°40.8	6.6'	25°58.5	7.2'	57.8'	N 58°	06:37	07:25	08:09	16:18	17:02	17:50
9	311°46.0	· · 05.3	326°06.4	6.6'	25°51.2	7.4'	57.8'	56°	06:33	07:18	08:00	16:27	17:09	17:54
10	326°45.9	04.6	340°32.0	6.7'	25°43.7	7.5'	57.9'	54°	06:30	07:12	07:52	16:35	17:14	17:57
11	341°45.8	04.0	354°57.7	6.7'	25°36.1	7.7'	57.9'	52°	06:26	07:07	07:44	16:43	17:20	18:01
12	356°45.6	S18°03.3	9°23.5	6.8'	S25°28.3	7.9'	57.9'	50°	06:23	07:02	07:37	16:49	17:25	18:04
13	11°45.5	02.6	23°49.2	6.8'	25°20.3	8.0'	58.0'	45°	06:16	06:51	07:23	17:04	17:35	18:11
14	26°45.4	02.0	38°15.1	6.8'	25°12.2	8.2'	58.0'	N 40°	06:10	06:42	07:11	17:16	17:44	18:17
15	41°45.3	· · 01.3	52°40.9	6.9'	25°04.0	8.3'	58.0'	35°	06:04	06:34	07:01	17:26	17:53	18:23
16	56°45.2	00.6	67°06.8	6.9'	24°55.6	8.5'	58.0'	30°	05:58	06:27	06:52	17:35	18:00	18:29
17	71°45.1	18°00.0	81°32.8	7.0'	24°47.0	8.7'	58.1'	20°	05:47	06:13	06:36	17:50	18:13	18:40
18	86°45.0	S17°59.3	95°58.8	7.0'	S24°38.2	8.8'	58.1'	N 10°	05:35	06:01	06:23	18:04	18:26	18:51
19	101°44.8	58.6	110°24.9	7.1'	24°29.3	9.0'	58.1'	0°	05:23	05:48	06:10	18:17	18:38	19:04
20	116°44.7	57.9	124°51.0	7.1'	24°20.3	9.1'	58.2'	S 10°	05:08	05:34	05:56	18:30	18:52	19:18
21	131°44.6	· · 57.3	139°17.1	7.2'	24°11.1	9.3'	58.2'	20°	04:51	05:19	05:42	18:44	19:07	19:35
22	146°44.5	56.6	153°43.4	7.2'	24°01.7	9.4'	58.2'	30°	04:29	05:00	05:26	19:00	19:26	19:57
23	161°44.4	55.9	168°09.6	7.3'	23°52.2	9.6'	58.2'	35°	04:15	04:49	05:17	19:09	19:37	20:10
	SD.=16.2	d=0.7			S.D.=15.7			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
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise		Moonset			
									Tue	Wed	Thu	Tue	Wed	Thu
0	176°44.3	S17°55.3	182°35.9	7.3'	S23°42.6	9.7'	58.3'	N 72°	██	██	11:35	██	██	15:12
1	191°44.2	54.6	197°02.3	7.4'	23°32.8	9.9'	58.3'	N 70°	██	██	10:50	██	██	15:55
2	206°44.1	53.9	211°28.8	7.5'	23°22.8	10.0'	58.3'	68°	██	11:42	10:20	██	13:10	16:23
3	221°44.0	· · 53.2	225°55.2	7.5'	23°12.7	10.2'	58.3'	66°	██	10:34	09:58	██	14:17	16:44
4	236°43.8	52.6	240°21.8	7.6'	23°02.5	10.3'	58.4'	64°	10:46	09:58	09:40	12:06	14:52	17:01
5	251°43.7	51.9	254°48.4	7.6'	22°52.1	10.5'	58.4'	62°	09:41	09:31	09:25	13:11	15:17	17:15
6	266°43.6	S17°51.2	269°15.1	7.7'	S22°41.6	10.6'	58.4'	60°	09:06	09:11	09:12	13:45	15:37	17:26
7	281°43.5	50.5	283°41.8	7.8'	22°30.9	10.7'	58.4'	N 58°	08:40	08:54	09:01	14:11	15:53	17:36
8	296°43.4	49.9	298°08.6	7.8'	22°20.1	10.9'	58.5'	56°	08:20	08:39	08:51	14:30	16:07	17:45
9	311°43.3	· · 49.2	312°35.4	7.9'	22°09.1	11.0'	58.5'	54°	08:03	08:27	08:43	14:47	16:19	17:52
10	326°43.2	48.5	327°02.3	7.9'	21°58.0	11.2'	58.5'	52°	07:49	08:16	08:35	15:01	16:29	17:59
11	341°43.1	47.8	341°29.3	8.0'	21°46.8	11.3'	58.5'	50°	07:36	08:06	08:28	15:13	16:38	18:05
12	356°43.0	S17°47.1	355°56.4	8.1'	S21°35.4	11.4'	58.6'	45°	07:09	07:45	08:13	15:39	16:58	18:18
13	11°42.9	46.5	10°23.5	8.1'	21°23.9	11.6'	58.6'	N 40°	06:49	07:28	08:01	15:59	17:13	18:29
14	26°42.8	45.8	24°50.6	8.2'	21°12.3	11.7'	58.6'	35°	06:31	07:14	07:50	16:16	17:27	18:38
15	41°42.7	· · 45.1	39°17.9	8.3'	21°00.5	11.8'	58.6'	30°	06:16	07:01	07:41	16:30	17:38	18:46
16	56°42.6	44.4	53°45.1	8.3'	20°48.6	12.0'	58.7'	20°	05:50	06:40	07:25	16:54	17:57	19:00
17	71°42.5	43.7	68°12.5	8.4'	20°36.6	12.1'	58.7'	N 10°	05:28	06:21	07:11	17:15	18:14	19:11
18	86°42.3	S17°43.1	82°39.9	8.5'	S20°24.4	12.2'	58.7'	0°	05:07	06:04	06:58	17:35	18:30	19:22
19	101°42.2	42.4	97°07.4	8.5'	20°12.2	12.3'	58.7'	S 10°	04:46	05:46	06:44	17:54	18:45	19:33
20	116°42.1	41.7	111°35.0	8.6'	19°59.8	12.5'	58.8'	20°	04:24	05:27	06:30	18:14	19:02	19:45
21	131°42.0	· · 41.0	126°02.6	8.7'	19°47.2	12.6'	58.8'	30°	03:58	05:05	06:14	18:38	19:20	19:58
22	146°41.9	40.3	140°30.3	8.7'	19°34.6	12.7'	58.8'	35°	03:43	04:52	06:04	18:52	19:31	20:05
23	161°41.8	39.6	154°58.0	8.8'	19°21.8	12.8'	58.8'	40°	03:25	04:38	05:53	19:08	19:44	20:14
	SD.=16.2	d=0.7			S.D.=15.9			45°	03:03	04:20	05:40	19:26	19:58	20:24
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Sun		Moon		Age	
									Eqn.of Time	Mer.	Mer.Pass.			
									00 ^h	12 ^h	Upper	Lower	29-1	
									mm:ss	mm:ss	hh:mm	hh:mm	1-1%	
0	176°41.7	S17°38.9	169°25.8	8.8'	S19°08.9	13.0'	58.9'	28	12:52	12:58	12:13	11:21	23:49	
1	191°41.6	38.3	183°53.7	8.9'	18°55.9	13.1'	58.9'	29	13:03	13:08	12:13	12:17	--	
2	206°41.5	37.6	198°21.7	9.0'	18°42.8	13.2'	58.9'	30	13:13	13:18	12:13	13:10	00:44	
3	221°41.4	· · 36.9	212°49.7	9.0'	18°29.5	13.3'	58.9'							
4	236°41.3	36.2	227°17.8	9.1'	18°16.2	13.4'	58.9'							
5	251°41.2	35.5	241°45.9	9.2'	18°02.7	13.5'	59.0'							
6	266°41.1	S17°34.8	256°14.1	9.2'	S17°49.1	13.6'	59.0'							
7	281°41.0	34.1	270°42.4	9.3'	17°35.4	13.7'	59.0'							
8	296°40.9	33.4	285°10.7	9.4'	17°21.7	13.8'	59.0'							
9	311°40.8	· · 32.7	299°39.1	9.4'	17°07.8	13.9'	59.0'							
10	326°40.7	32.1	314°07.6	9.5'	16°53.8	14.1'	59.1'							
11	341°40.6	31.4	328°36.1	9.6'	16°39.7	14.2'	59.1'							
12	356°40.5	S17°30.7	343°04.7	9.6'	S16°25.4	14.3'	59.1'							
13	11°40.4	30.0	357°33.4	9.7'	16°11.1	14.4'	59.1'							
14	26°40.3	29.3	12°02.1	9.7'	15°56.7	14.4'	59.1'							
15	41°40.2	· · 28.6	26°30.9	9.8'	15°42.2	14.5'	59.1'							
16	56°40.1	27.9	40°59.7	9.9'	15°27.7	14.6'	59.2'							
17	71°40.0	27.2	55°28.6	9.9'	15°13.0	14.7'	59.2'							
18	86°39.9	S17°26.5	69°57.6	10.0'	S14°58.2	14.8'	59.2'							
19	101°39.9	25.8	84°26.6	10.1'	14°43.3	14.9'	59.2'							
20	116°39.8	25.1	98°55.7	10.1'	14°28.4	15.0'	59.2'							
21	131°39.7	· · 24.4	113°24.8	10.2'	14°13.3	15.1'	59.2'							
22	146°39.6	23.7	127°54.0	10.2'	13°58.2	15.2'	59.3'							
23	161°39.5	23.0	142°23.3	10.3'	13°43.0	15.2'	59.3'							
	SD.=16.2	d=0.7			S.D.=16.1									

January 31, 01, 02 (Fri., Sat., Sun.)

Aries			Venus			Mars			Jupiter			Saturn			Stars																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
Fri	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
0	130°28.2	134°15.8	N00°18.7	17°17.7	N26°03.3	60°38.0	N21°38.7	141°22.9	S06°47.1	Alpheratz	357°35.0	29°13.8	1	145°30.6	149°16.5	19.9	32°21.0	03.3	75°40.5	38.7	156°25.1	46.9	Ankaa	353°07.3	-42°10.4	2	160°33.1	164°17.3	21.0	47°24.3	03.4	90°43.0	38.7	171°27.3	46.8	Schedar	349°31.3	56°40.7	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	348°47.3	-17°51.1	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	-57°06.8	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	23°35.0	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	313°57.3	89°22.5	7	235°45.4	239°21.1	26.7	122°40.9	03.9	165°55.5	38.7	246°38.4	46.3	Akamar	315°11.7	-40°12.5	8	250°47.9	254°21.8	27.8	137°44.2	03.9	180°58.1	38.7	261°40.6	46.2	Menkar	314°06.0	4°11.3	9	265°50.3	269°22.6	· · 28.9	152°47.5	· · 04.0	196°00.6	· · 38.7	276°42.8	· · 46.1	Mirfak	308°28.1	49°57.2	10	280°52.8	284°23.4	30.1	167°50.8	04.1	211°03.1	38.7	291°45.1	46.0	Aldebaran	290°39.4	16°33.6	11	295°55.3	299°24.2	31.2	182°54.0	04.2	226°05.6	38.7	306°47.3	45.9	Rigel	281°03.6	-8°10.4	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	Capella	280°21.5	46°01.6	13	326°00.2	329°25.7	33.4	213°00.6	04.4	256°10.6	38.7	336°51.7	45.7	Bellatrix	278°22.6	6°22.3	14	341°02.7	344°26.5	34.6	228°03.9	04.4	271°13.1	38.7	351°53.9	45.5	Elnath	278°01.5	28°37.8	15	356°05.1	359°27.2	· · 35.7	243°07.2	· · 04.5	286°15.6	· · 38.7	6°56.1	· · 45.4	Alnilam	275°37.4	-1°11.2	16	11°07.6	14°28.0	36.8	258°10.5	04.6	301°18.1	38.7	21°58.3	45.3	Betelgeuse	270°51.8	7°24.7	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	-52°42.7	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°25.8	-16°44.9	19	56°15.0	59°30.4	40.2	303°20.4	04.9	346°25.6	38.7	67°05.0	45.0	Adara	255°05.5	-20°00.5	20	71°17.4	74°31.1	41.3	318°23.7	04.9	1°28.1	38.7	82°07.2	44.9	Procyon	244°50.3	5°09.7	21	86°19.9	89°31.9	· · 42.5	333°27.0	· · 05.0	16°30.6	· · 38.7	97°09.4	· · 44.8	Pollux	243°16.7	27°57.9	22	101°22.4	104°32.7	43.6	348°30.2	05.1	31°33.1	38.8	112°11.6	44.7	Avior	234°14.1	-50°35.4	23	116°24.8	119°33.5	44.7	3°33.5	05.2	46°35.5	38.8	127°13.8	44.6	Suhail	222°45.8	-43°32.0	Mer.pass.:15:15			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Miaplacidus			221°37.4	-69°49.1	Mer.pass.:15:11			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Alphard			217°47.4	-8°46.1	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Regulus			207°34.0	11°50.6	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Dubhe			193°40.3	61°36.7	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Denebola			182°24.6	14°25.8	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Gienah			175°43.3	-17°40.9	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Acrux			172°59.7	-63°14.1	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Gacrux			171°51.3	-57°15.0	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Alioth			166°12.7	55°49.1	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Spica			158°22.1	-11°17.6	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Alkaid			152°51.8	49°10.9	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Hadar			148°35.9	-60°29.4	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Menkent			147°57.5	-36°29.5	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Arcturus			145°47.7	19°03.2	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Rigel Kent.			139°40.2	-60°56.1	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Kochab			137°19.8	74°02.7	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Zuben'ubi			136°56.0	-16°08.8	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Alphecca			126°03.8	26°37.6	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Antares			112°15.9	-26°29.2	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Atria			107°10.4	-69°04.1	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Sabik			102°02.9	-15°45.4	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Shaula			96°10.6	-37°07.2	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Rasalhague			95°58.7	12°32.4	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Eltanin			90°42.5	51°28.8	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Kaus Aust.			83°32.7	-34°22.3	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Vega			80°33.6	38°48.1	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Nunki			75°48.0	-26°16.0	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Altair			62°00.3	8°55.9	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Peacock			53°06.2	-56°39.3	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Deneb			49°26.2	45°22.1	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Enif			33°39.1	9°59.3	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Al Na'ir			27°33.3	-46°50.5	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Fomalhaut			15°14.8	-29°29.5	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Scheat			13°45.5	28°13.1	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Markab			13°30.1	15°20.4	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Jan 31 Fri			SHA	Mer.pass	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Venus			3°47.6	15:02	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Mars			246°49.5	22:46	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Jupiter			290°09.9	19:54	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Saturn			10°54.7	14:32	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Feb 01 Sat			SHA	Mer.pass	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Venus			3°07.0	15:01	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Mars			247°09.5	22:41	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Jupiter			290°10.7	19:50	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Saturn			10°48.8	14:29	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Feb 02 Sun			SHA	Mer.pass	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Venus			2°27.3	15:00	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Mars			247°28.8	22:35	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Jupiter			290°11.4	19:46	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Saturn			10°42.7	14:25	Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Horizontal parallax					Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Venus:			0.3		Mer.pass.:15:07			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Mars:			0.2	
Mer.pass.:15:15			v0.8 d1.1 m-4.4			v3.3 d0.1 m-1.0			v2.5 d0.0 m-2.4			v2.2 d0.1 m1.1			Miaplacidus			221°37.4	-69°49.1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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February 03, 04, 05 (Mon., Tue., Wed.)

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°12.9	N26°08.6	63°37.4	N21°39.1	144°02.2	S06°39.2	Alpheratz	357°35.0	29°13.8
1	148°28.0	150°14.9	40.5	36°16.1	08.7	78°39.9	39.1	159°04.5	39.1	Ankaa	353°07.3	-42°10.4
2	163°30.5	165°15.8	41.6	51°19.3	08.7	93°42.4	39.1	174°06.7	39.0	Schedar	349°31.3	56°40.7
3	178°33.0	180°16.6	· · 42.7	66°22.5	· · 08.8	108°44.9	· · 39.1	189°08.9	· · 38.9	Diphda	348°47.3	-17°51.1
4	193°35.4	195°17.5	43.8	81°25.7	08.8	123°47.3	39.1	204°11.1	38.8	Achernar	335°20.3	-57°06.8
5	208°37.9	210°18.4	44.9	96°28.9	08.9	138°49.8	39.1	219°13.3	38.7	Hamal	327°51.2	23°34.9
6	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	Polaris	313°58.8	89°22.5
7	238°42.8	240°20.1	47.1	126°35.4	09.0	168°54.8	39.1	249°17.7	38.4	Akamars	315°11.7	-40°12.5
8	253°45.3	255°21.0	48.2	141°38.6	09.1	183°57.3	39.1	264°19.9	38.3	Menkar	314°06.0	4°11.3
9	268°47.8	270°21.9	· · 49.3	156°41.8	· · 09.1	198°59.7	· · 39.1	279°22.1	· · 38.2	Mirfak	308°28.1	49°57.2
10	283°50.2	285°22.8	50.4	171°45.0	09.2	214°02.2	39.1	294°24.3	38.1	Aldebaran	290°39.4	16°33.6
11	298°52.7	300°23.7	51.5	186°48.2	09.2	229°04.7	39.1	309°26.6	38.0	Rigel	281°03.6	-8°10.4
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	Capella	280°21.5	46°01.6
13	328°57.6	330°25.5	53.7	216°54.6	09.4	259°09.6	39.1	339°31.0	37.8	Bellatrix	278°22.6	6°22.3
14	344°00.1	345°26.3	54.8	231°57.8	09.4	274°12.1	39.2	354°33.2	37.7	Elnath	278°01.5	28°37.8
15	359°02.5	0°27.2	· · 55.9	247°01.0	· · 09.5	289°14.6	· · 39.2	9°35.4	· · 37.6	Alnilam	275°37.4	-1°11.2
16	14°05.0	15°28.1	57.0	262°04.2	09.5	304°17.0	39.2	24°37.6	37.5	Betelgeuse	270°51.8	7°24.7
17	29°07.5	30°29.0	58.1	277°07.4	09.6	319°19.5	39.2	39°39.8	37.3	Canopus	263°51.9	-52°42.7
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	Sirius	258°25.8	-16°44.9
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	Adara	255°05.5	-29°00.5
20	74°14.9	75°31.7	01.4	322°17.0	09.7	4°26.9	39.2	84°46.4	37.0	Procyon	244°50.4	5°09.7
21	89°17.3	90°32.6	· · 02.5	337°20.2	· · 09.8	19°29.4	· · 39.2	99°48.7	· · 36.9	Pollux	243°16.7	27°57.9
22	104°19.8	105°33.5	03.6	352°23.4	09.8	34°31.9	39.2	114°50.9	36.8	Avior	234°14.1	-50°35.4
23	119°22.3	120°34.4	04.7	7°26.5	09.9	49°34.3	39.2	129°53.1	36.7	Suhail	222°45.8	-43°32.0
Mer.pass.:15:03		v0.9 d1.1 m-4.4		v3.2 d0.1 m-1.0		v2.5 d0.0 m-2.4		v2.2 d0.1 m1.1		Miaplacidus	221°37.4	-69°49.2
										Alphard	217°47.4	-8°46.1
										Regulus	207°34.0	11°50.6
										Dubhe	193°40.3	61°36.7
										Denebola	182°24.6	14°25.8
										Gienah	175°43.3	-17°40.9
										Acrux	172°59.7	-63°14.1
										Gacrux	171°51.3	-57°15.1
										Alioth	166°12.6	55°49.1
										Spica	158°22.1	-11°17.6
										Alkaid	152°51.8	49°10.9
										Hadar	148°35.8	-60°29.4
										Menkent	147°57.5	-36°29.5
										Arcturus	145°47.6	19°03.2
										Rigel Kent.	139°40.2	-60°56.1
										Kochab	137°19.7	74°02.7
										Zuben'ubi	136°56.0	-16°08.8
										Alphecca	126°03.8	26°37.6
										Antares	112°15.9	-26°29.2
										Atria	107°10.4	-69°04.1
										Sabik	102°02.9	-15°45.4
										Shaula	96°10.5	-37°07.2
										Rasalhague	95°58.7	12°32.3
										Eltanin	90°42.5	51°28.8
										Kaus Aust.	83°32.7	-34°22.3
										Vega	80°33.6	38°48.1
										Nunki	75°48.0	-26°16.0
										Altair	62°00.3	8°55.9
										Peacock	53°06.2	-56°39.3
										Deneb	49°26.2	45°22.1
										Enif	33°39.1	9°59.3
										Al Na'ir	27°33.3	-46°50.5
										Fomalhaut	15°14.8	-29°29.5
										Scheat	13°45.5	28°13.1
										Markab	13°30.1	15°20.4
										Feb 03 Mon	SHA	Mer.pass
										Venus	1°48.5	14:58
										Mars	247°47.3	22:30
										Jupiter	290°11.9	19:42
										Saturn	10°36.7	14:22
										Feb 04 Tue	SHA	Mer.pass
										Venus	1°10.6	14:57
										Mars	248°05.0	22:25
										Jupiter	290°12.1	19:38
										Saturn	10°30.6	14:18
										Feb 05 Wed	SHA	Mer.pass
										Venus	0°33.8	14:55
										Mars	248°22.0	22:20
										Jupiter	290°12.1	19:34
										Saturn	10°24.4	14:15
										Horizontal parallax		
										Venus:		0.3
										Mars:		0.2
Mer.pass.:14:55		v1.0 d1.1 m-4.4		v3.2 d0.0 m-0.9		v2.5 d0.0 m-2.4		v2.2 d0.1 m1.2				

h		Sun							Moon						
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight		
								Naut.	Civil				Civil	Naut.	
0	176°29.6	S15°36.3	83°44.1	7.1'	N23°32.1	10.0'	58.8'	N 72°	06:46	08:10	09:41	14:48	16:20	17:44	
1	191°29.6	35.6	98°10.2	7.0'	23°42.1	9.9'	58.8'	N 70°	06:41	07:56	09:12	15:17	16:34	17:49	
2	206°29.6	34.8	112°36.1	6.9'	23°51.9	9.8'	58.8'	68°	06:37	07:44	08:51	15:39	16:45	17:53	
3	221°29.5	· · 34.0	127°02.0	6.8'	24°01.6	9.6'	58.8'	66°	06:33	07:35	08:34	15:56	16:55	17:57	
4	236°29.5	33.3	141°27.8	6.8'	24°11.1	9.5'	58.7'	64°	06:29	07:26	08:20	16:09	17:03	18:00	
5	251°29.4	32.5	155°53.5	6.7'	24°20.5	9.3'	58.7'	62°	06:26	07:19	08:08	16:21	17:10	18:03	
6	266°29.4	S15°31.7	170°19.2	6.6'	N24°29.7	9.1'	58.7'	60°	06:23	07:13	07:59	16:31	17:16	18:06	
7	281°29.4	30.9	184°44.8	6.6'	24°38.8	9.0'	58.7'	N 58°	06:21	07:07	07:50	16:39	17:22	18:09	
8	296°29.3	30.2	199°10.3	6.5'	24°47.7	8.8'	58.7'	56°	06:18	07:02	07:42	16:47	17:27	18:11	
9	311°29.3	· · 29.4	213°35.7	6.4'	24°56.5	8.7'	58.7'	54°	06:16	06:58	07:36	16:53	17:31	18:13	
10	326°29.2	28.6	228°01.1	6.3'	25°05.1	8.5'	58.7'	52°	06:14	06:54	07:30	16:59	17:35	18:15	
11	341°29.2	27.8	242°26.4	6.3'	25°13.5	8.4'	58.6'	50°	06:12	06:50	07:24	17:05	17:39	18:17	
12	356°29.2	S15°27.1	256°51.7	6.2'	N25°21.8	8.2'	58.6'	45°	06:07	06:41	07:12	17:17	17:47	18:22	
13	11°29.1	26.3	271°16.9	6.1'	25°30.0	8.0'	58.6'	N 40°	06:02	06:34	07:02	17:27	17:55	18:27	
14	26°29.1	25.5	285°42.0	6.1'	25°37.9	7.9'	58.6'	35°	05:57	06:27	06:54	17:35	18:01	18:31	
15	41°29.1	· · 24.7	300°07.0	6.0'	25°45.7	7.7'	58.6'	30°	05:53	06:21	06:46	17:42	18:07	18:36	
16	56°29.0	23.9	314°32.0	6.0'	25°53.4	7.6'	58.6'	20°	05:44	06:10	06:33	17:55	18:18	18:44	
17	71°29.0	23.2	328°57.0	5.9'	26°00.8	7.4'	58.5'	N 10°	05:35	06:00	06:22	18:07	18:28	18:54	
18	86°28.9	S15°22.4	343°21.8	5.8'	N26°08.1	7.2'	58.5'	0°	05:24	05:49	06:11	18:18	18:39	19:04	
19	101°28.9	21.6	357°46.6	5.8'	26°15.3	7.1'	58.5'	S 10°	05:12	05:38	06:00	18:29	18:50	19:16	
20	116°28.9	20.8	12°11.4	5.7'	26°22.2	6.9'	58.5'	20°	04:57	05:25	05:48	18:40	19:03	19:30	
21	131°28.8	· · 20.1	26°36.1	5.7'	26°29.1	6.7'	58.5'	30°	04:38	05:09	05:34	18:54	19:19	19:49	
22	146°28.8	19.3	41°00.7	5.6'	26°35.7	6.5'	58.5'	35°	04:26	04:59	05:26	19:02	19:29	20:01	
23	161°28.8	18.5	55°25.3	5.6'	26°42.2	6.4'	58.4'	40°	04:11	04:47	05:17	19:11	19:40	20:16	
	SD.=16.2	d=0.8			S.D.=16.0			45°	03:53	04:33	05:06	19:22	19:54	20:34	
								S 50°	03:29	04:16	04:53	19:35	20:11	20:58	
								52°	03:17	04:08	04:46	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	
								S 60°	01:55	03:20	04:14	20:13	21:06	22:28	
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset			
									Thu	Fri	Sat	Thu	Fri	Sat	
0	176°28.7	S15°17.7	69°49.9	5.5'	N26°48.4	6.2'	58.4'	N 72°	☐	☐	☐	☐	☐	☐	
1	191°28.7	16.9	84°14.4	5.5'	26°54.6	6.0'	58.4'	N 70°	☐	☐	☐	☐	☐	☐	
2	206°28.7	16.1	98°38.8	5.4'	27°00.5	5.9'	58.4'	68°	☐	☐	☐	☐	☐	☐	
3	221°28.6	· · 15.4	113°03.2	5.4'	27°06.3	5.7'	58.4'	66°	☐	☐	☐	☐	☐	☐	
4	236°28.6	14.6	127°27.6	5.3'	27°11.9	5.5'	58.4'	64°	08:02	☐	☐	05:05	☐	☐	
5	251°28.6	13.8	141°51.9	5.3'	27°17.3	5.3'	58.3'	62°	08:44	08:30	☐	04:24	06:41	☐	
6	266°28.5	S15°13.0	156°16.2	5.3'	N27°22.6	5.2'	58.3'	60°	09:13	09:25	10:02	03:56	05:46	07:15	
7	281°28.5	12.2	170°40.4	5.2'	27°27.6	5.0'	58.3'	N 58°	09:35	09:58	10:43	03:35	05:14	06:34	
8	296°28.5	11.4	185°04.6	5.2'	27°32.5	4.8'	58.3'	56°	09:54	10:22	11:11	03:17	04:50	06:06	
9	311°28.5	· · 10.7	199°28.7	5.1'	27°37.3	4.6'	58.3'	54°	10:09	10:42	11:33	03:02	04:30	05:45	
10	326°28.4	09.9	213°52.9	5.1'	27°41.8	4.5'	58.3'	52°	10:22	10:59	11:51	02:49	04:14	05:27	
11	341°28.4	09.1	228°17.0	5.1'	27°46.2	4.3'	58.2'	50°	10:34	11:13	12:06	02:38	04:00	05:11	
12	356°28.4	S15°08.3	242°41.0	5.0'	N27°50.4	4.1'	58.2'	45°	10:59	11:42	12:37	02:14	03:31	04:40	
13	11°28.3	07.5	257°05.1	5.0'	27°54.4	3.9'	58.2'	N 40°	11:19	12:05	13:01	01:56	03:09	04:16	
14	26°28.3	06.7	271°29.1	5.0'	27°58.2	3.7'	58.2'	35°	11:35	12:24	13:21	01:40	02:51	03:56	
15	41°28.3	· · 05.9	285°53.0	5.0'	28°01.8	3.6'	58.2'	30°	11:49	12:40	13:38	01:27	02:35	03:39	
16	56°28.3	05.1	300°17.0	5.0'	28°05.3	3.4'	58.2'	20°	12:14	13:08	14:07	01:04	02:08	03:11	
17	71°28.2	04.4	314°41.0	4.9'	28°08.6	3.2'	58.1'	N 10°	12:35	13:32	14:32	00:44	01:45	02:46	
18	86°28.2	S15°03.6	329°04.9	4.9'	N28°11.7	3.0'	58.1'	0°	12:55	13:54	14:55	00:25	01:23	02:23	
19	101°28.2	02.8	343°28.8	4.9'	28°14.6	2.8'	58.1'	S 10°	13:15	14:17	15:18	00:07	01:02	02:00	
20	116°28.1	02.0	357°52.7	4.9'	28°17.3	2.6'	58.1'	20°	13:37	14:41	15:42	--	00:39	01:36	
21	131°28.1	· · 01.2	12°16.6	4.9'	28°19.9	2.5'	58.1'	30°	14:02	15:09	16:11	--	00:12	01:07	
22	146°28.1	15°00.4	26°40.4	4.9'	28°22.3	2.3'	58.0'	35°	14:17	15:26	16:28	23:57	--	00:50	
23	161°28.1	14°59.6	41°04.3	4.9'	28°24.4	2.1'	58.0'	40°	14:35	15:46	16:48	23:39	--	00:30	
	SD.=16.2	d=0.8			S.D.=15.9			45°	14:56	16:09	17:12	23:17	--	00:06	
								S 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	
								S 60°	16:57	18:42	19:49	21:13	21:32	22:31	
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Mer.	Moon		Age	
									Eqn.of Time	12 ^h	Pass	Upper	Lower	8-10	
									00 ^h	mm:ss	hh:mm	hh:mm	hh:mm	63-82%	
0	176°28.0	S14°58.8	55°28.2	4.9'	N28°26.4	1.9'	58.0'	6	14:01	14:03	12:14	19:09	06:40		
1	191°28.0	58.0	69°52.0	4.9'	28°28.3	1.7'	58.0'	7	14:05	14:07	12:14	20:09	07:39		
2	206°28.0	57.2	84°15.9	4.9'	28°29.9	1.6'	58.0'	8	14:08	14:09	12:14	21:09	08:39		
3	221°28.0	· · 56.4	98°39.8	4.9'	28°31.4	1.4'	58.0'								
4	236°27.9	55.6	113°03.6	4.9'	28°32.6	1.2'	57.9'								
5	251°27.9	54.9	127°27.5	4.9'	28°33.7	1.0'	57.9'								
6	266°27.9	S14°54.1	141°51.4	4.9'	N28°34.7	0.8'	57.9'								
7	281°27.9	53.3	156°15.3	4.9'	28°35.4	0.6'	57.9'								
8	296°27.9	52.5	170°39.2	4.9'	28°35.9	0.5'	57.9'								
9	311°27.8	· · 51.7	185°03.1	4.9'	28°36.3	0.3'	57.8'								
10	326°27.8	50.9	199°27.1	5.0'	28°36.5	0.1'	57.8'								
11	341°27.8	50.1	213°51.0	5.0'	28°36.5	-0.1'	57.8'								
12	356°27.8	S14°49.3	228°15.0	5.0'	N28°36.3	-0.3'	57.8'								
13	11°27.8	48.5	242°39.0	5.0'	28°35.9	-0.5'	57.8'								
14	26°27.7	47.7	257°03.1	5.1'	28°35.4	-0.6'	57.8'								
15	41°27.7	· · 46.9	271°27.1	5.1'	28°34.7	-0.8'	57.7'								
16	56°27.7	46.1	285°51.2	5.1'	28°33.8	-1.0'	57.7'								
17	71°27.7	45.3	300°15.4	5.1'	28°32.7	-1.2'	57.7'								
18	86°27.7	S14°44.5	314°39.5	5.2'	N28°31.4	-1.3'	57.7'								
19	101°27.6	43.7	329°03.7	5.2'	28°30.0	-1.5'	57.7'								
20	116°27.6	42.9	343°28.0	5.3'	28°28.4	-1.7'	57.6'								
21	131°27.6	· · 42.1	357°52.3	5.3'	28°26.6	-1.9'	57.6'								
22	146°27.6	41.3	12°16.6	5.4'	28°24.6	-2.1'	57.6'								
23	161°27.6	40.5	26°41.0	5.4'	28°22.5	-2.2'	57.6'								
	SD.=16.2	d=0.8			S.D.=15.										

February 09, 10, 11 (Sun., Mon., Tue.)

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°35.0	29°13.8
1	154°22.9	152°38.8	14.1	43°45.0	13.7	84°32.8	40.6	164°22.1	23.0	Ankaa	353°07.3	-42°10.4
2	169°25.3	167°39.9	15.2	58°48.0	13.8	99°35.2	40.6	179°24.3	22.9	Schedar	349°31.3	56°40.7
3	184°27.8	182°41.1	•• 16.2	73°51.0	•• 13.8	114°37.6	•• 40.6	194°26.5	•• 22.8	Diphda	348°47.3	-17°51.1
4	199°30.3	197°42.2	17.2	88°54.0	13.8	129°40.1	40.6	209°28.7	22.7	Achernar	335°20.3	-57°06.8
5	214°32.7	212°43.4	18.2	103°57.0	13.8	144°42.5	40.7	224°30.9	22.6	Hamal	327°51.2	23°34.9
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	Polaris	314°01.2	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	Akamar	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°11.3
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	317°51.4	N04°25.3	209°18.0	N26°13.9	249°59.4	N21°40.8	329°46.3	S06°21.8	Capella	280°21.5	46°01.6
13	334°52.4	332°52.6	26.4	224°21.0	13.9	265°01.9	40.8	344°48.5	21.7	Bellatrix	278°22.6	6°22.3
14	349°54.9	347°53.8	27.4	239°24.0	13.9	280°04.3	40.8	359°50.7	21.5	Elnath	278°01.6	28°37.8
15	4°57.4	2°54.9	•• 28.4	254°27.0	•• 13.9	295°06.7	•• 40.8	14°52.9	•• 21.4	Anilam	275°37.4	-1°11.2
16	19°59.8	17°56.1	29.4	269°30.0	13.9	310°09.1	40.8	29°55.1	21.3	Betelgeuse	270°51.8	7°24.7
17	35°02.3	32°57.3	30.4	284°33.0	13.9	325°11.5	40.8	44°57.3	21.2	Canopus	263°52.0	-52°42.7
18	50°04.8	47°58.5	N04°31.4	299°36.0	N26°13.9	340°13.9	N21°40.8	59°59.5	S06°21.1	Sirius	258°25.8	-16°45.0
19	65°07.2	62°59.6	32.4	314°38.9	13.9	355°16.4	40.9	75°01.7	21.0	Adara	255°05.5	-29°00.5
20	80°09.7	78°00.8	33.4	329°41.9	13.9	10°18.8	40.9	90°03.9	20.9	Procyon	244°50.3	5°09.7
21	95°12.2	93°02.0	•• 34.5	344°44.9	•• 13.9	25°21.2	•• 40.9	105°06.1	•• 20.8	Pollux	243°16.7	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	-50°35.4
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.pass.:14:40		v1.1 d1.0 m-4.4		v3.0 d0.0 m-0.8		v2.4 d0.0 m-2.3		v2.2 d0.1 m1.2		Miaplacidus	221°37.4	-69°49.2
										Alphard	217°47.3	-8°46.1
										Regulus	207°34.0	11°50.6
										Dubhe	193°40.2	61°36.7
										Denebola	182°24.5	14°25.7
										Gienah	175°43.2	-17°40.9
										Acrux	172°59.6	-63°14.1
										Gacrux	171°51.2	-57°15.1
										Alioth	166°12.6	55°49.1
										Spica	158°22.1	-11°17.6
										Alkaid	152°51.7	49°10.9
										Hadar	148°35.7	-60°29.4
										Menkent	147°57.4	-36°29.5
										Arcturus	145°47.6	19°03.2
										Rigel Kent.	139°40.1	-60°56.1
										Kochab	137°19.6	74°02.7
										Zuben'ubi	136°55.9	-16°08.8
										Alphecca	126°03.7	26°37.5
										Antares	112°15.8	-26°29.2
										Atria	107°10.3	-69°04.1
										Sabik	102°02.8	-15°45.4
										Shaula	96°10.5	-37°07.2
										Rasalhague	95°58.7	12°32.3
										Eltanin	90°42.5	51°28.8
										Kaus Aust.	83°32.7	-34°22.3
										Vega	80°33.5	38°48.1
										Nunki	75°47.9	-26°16.0
										Altair	62°00.3	8°55.9
										Peacock	53°06.1	-56°39.2
										Deneb	49°26.2	45°22.0
										Enif	33°39.0	9°59.3
										Al Na'ir	27°33.3	-46°50.5
										Fomalhaut	15°14.8	-29°29.5
										Scheat	13°45.5	28°13.1
										Markab	13°30.1	15°20.4
										Feb 09 Sun	SHA	Mer.pass
										Venus	358°17.2	14:48
										Mars	249°21.5	22:01
										Jupiter	290°10.0	19:19
										Saturn	9°59.5	14:01
										Feb 10 Mon	SHA	Mer.pass
										Venus	357°46.0	14:46
										Mars	249°34.3	21:56
										Jupiter	290°08.9	19:15
										Saturn	9°53.1	13:57
										Feb 11 Tue	SHA	Mer.pass
										Venus	357°16.0	14:44
										Mars	249°46.2	21:51
										Jupiter	290°07.6	19:11
										Saturn	9°46.8	13:54
										Horizontal parallax		
										Venus:		0.3
										Mars:		0.2
Mer.pass.:14:32		v1.2 d1.0 m-4.4		v2.9 d-0.0 m-0.8		v2.4 d0.0 m-2.3		v2.2 d0.1 m1.2				

February 12, 13, 14 (Wed., Thu., Fri.)

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°35.0	29°13.8				
1	157°20.3	154°06.4	25.9	47°18.0	13.8	87°26.3	41.7	167°00.4	14.8	Ankaa	353°07.3	-42°10.4				
2	172°22.8	169°07.7	26.9	62°20.9	13.8	102°28.7	41.8	182°02.6	14.7	Schedar	349°31.4	56°40.7				
3	187°25.2	184°09.0	· · 27.9	77°23.8	· · 13.8	117°31.1	· · 41.8	197°04.8	· · 14.6	Diphda	348°47.3	-17°51.1				
4	202°27.7	199°10.3	28.8	92°26.7	13.8	132°33.5	41.8	212°07.0	14.5	Achernar	335°20.3	-57°06.8				
5	217°30.2	214°11.6	29.8	107°29.6	13.8	147°35.9	41.8	227°09.2	14.3	Hamal	327°51.2	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°02.8	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	Akamars	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°11.3				
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	292°42.5	289°18.1	34.6	182°44.1	13.7	222°47.9	41.9	302°20.2	13.8	Aldebaran	290°39.4	16°33.6				
11	307°44.9	304°19.5	35.6	197°47.0	13.7	237°50.3	41.9	317°22.4	13.7	Rigel	281°03.6	-8°10.5				
12	322°47.4	319°20.8	N05°36.5	212°49.8	N26°13.7	252°52.7	N21°41.9	332°24.6	S06°13.5	Capella	280°21.5	46°01.6				
13	337°49.9	334°22.1	37.5	227°52.7	13.7	267°55.1	41.9	347°26.8	13.4	Bellatrix	278°22.6	6°22.3				
14	352°52.3	349°23.4	38.5	242°55.6	13.7	282°57.5	42.0	2°29.0	13.3	Elnath	278°01.6	28°37.8				
15	7°54.8	4°24.8	· · 39.4	257°58.5	· · 13.7	297°59.8	· · 42.0	17°31.2	· · 13.2	Alnilam	275°37.5	-1°11.2				
16	22°57.3	19°26.1	40.4	273°01.4	13.6	313°02.2	42.0	32°33.4	13.1	Betelgeuse	270°51.8	7°24.7				
17	37°59.7	34°27.4	41.3	288°04.3	13.6	328°04.6	42.0	47°35.6	13.0	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°12.8	Sirius	258°25.8	-16°45.0				
19	68°04.7	64°30.1	43.2	318°10.0	13.6	358°09.4	42.1	77°40.0	12.7	Adara	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°50.3	5°09.7				
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°16.7	27°57.9				
22	113°12.0	109°34.1	46.1	3°18.6	13.6	43°16.6	42.1	122°46.5	12.4	Avior	234°14.1	-50°35.5				
23	128°14.5	124°35.5	47.1	18°21.5	13.5	58°19.0	42.1	137°48.7	12.3	Suhail	222°45.8	-43°32.1				
Mer.pass.:14:28											v1.3 d1.0 m-4.4	v2.9 d-0.0 m-0.7	v2.4 d0.0 m-2.3	v2.2 d0.1 m1.2		
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec					
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	Alphard	217°47.3	-8°46.1				
1	158°19.4	154°38.2	49.0	48°27.3	13.5	88°23.7	42.2	167°53.1	12.0	Regulus	207°34.0	11°50.6				
2	173°21.9	169°39.5	49.9	63°30.1	13.5	103°26.1	42.2	182°55.3	11.9	Dubhe	193°40.2	61°36.8				
3	188°24.4	184°40.9	· · 50.8	78°33.0	· · 13.5	118°28.5	· · 42.2	197°57.5	· · 11.8	Denebola	182°24.5	14°25.7				
4	203°26.8	199°42.2	51.8	93°35.9	13.5	133°30.9	42.2	212°59.7	11.7	Gienah	175°43.2	-17°40.9				
5	218°29.3	214°43.6	52.7	108°38.7	13.4	148°33.3	42.2	228°01.9	11.6	Acrux	172°59.6	-63°14.2				
6	233°31.8	229°45.0	N05°53.7	123°41.6	N26°13.4	163°35.7	N21°42.3	243°04.1	S06°11.5	Gacrux	171°51.2	-57°15.1				
7	248°34.2	244°46.3	54.6	138°44.4	13.4	178°38.1	42.3	258°06.3	11.4	Alioth	166°12.5	55°49.1				
8	263°36.7	259°47.7	55.6	153°47.3	13.4	193°40.5	42.3	273°08.5	11.2	Spica	158°22.0	-11°17.6				
9	278°39.1	274°49.1	· · 56.5	168°50.2	· · 13.4	208°42.8	· · 42.3	288°10.7	· · 11.1	Alkaid	152°51.7	49°10.9				
10	293°41.6	289°50.5	57.5	183°53.0	13.4	223°45.2	42.3	303°12.9	11.0	Hadar	148°35.7	-60°29.5				
11	308°44.1	304°51.8	58.4	198°55.9	13.3	238°47.6	42.4	318°15.1	10.9	Menkent	147°57.4	-36°29.5				
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	Arcturus	145°47.6	19°03.1				
13	338°49.0	334°54.6	06°00.3	229°01.6	13.3	268°52.4	42.4	348°19.5	10.7	Rigel Kent.	139°40.1	-60°56.1				
14	353°51.5	349°56.0	01.2	244°04.4	13.3	283°54.8	42.4	3°21.7	10.5	Kochab	137°19.5	74°02.7				
15	8°53.9	4°57.4	· · 02.2	259°07.3	· · 13.3	298°57.1	· · 42.4	18°23.9	· · 10.4	Zuben'ubi	136°55.9	-16°08.8				
16	23°56.4	19°58.8	03.1	274°10.1	13.2	313°59.5	42.4	33°26.1	10.3	Alphecca	126°03.7	26°37.5				
17	38°58.9	35°00.1	04.0	289°13.0	13.2	329°01.9	42.5	48°28.3	10.2	Antares	112°15.8	-26°29.2				
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	Atria	107°10.2	-69°04.1				
19	69°03.8	65°02.9	05.9	319°18.6	13.2	359°06.7	42.5	78°32.7	10.0	Sabik	102°02.8	-15°45.4				
20	84°06.3	80°04.3	06.8	334°21.5	13.2	14°09.1	42.5	93°34.9	09.8	Shaula	96°10.5	-37°07.2				
21	99°08.7	95°05.7	· · 07.8	349°24.3	· · 13.1	29°11.4	· · 42.5	108°37.0	· · 09.7	Rasalhague	95°58.7	12°32.3				
22	114°11.2	110°07.1	08.7	4°27.2	13.1	44°13.8	42.6	123°39.2	09.6	Eltanin	90°42.4	51°28.8				
23	129°13.6	125°08.5	09.6	19°30.0	13.1	59°16.2	42.6	138°41.4	09.5	Kaus Aust.	83°32.6	-34°22.3				
Mer.pass.:14:24											v1.4 d0.9 m-4.5	v2.9 d-0.0 m-0.7	v2.4 d0.0 m-2.3	v2.2 d0.1 m1.2		
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec					
0	144°16.1	140°09.9	N06°10.6	34°32.8	N26°13.1	74°18.6	N21°42.6	153°43.6	S06°09.4	Venus	356°47.2	14:42				
1	159°18.6	155°11.4	11.5	49°35.7	13.1	89°21.0	42.6	168°45.8	09.3	Mars	249°57.2	21:47				
2	174°21.0	170°12.8	12.4	64°38.5	13.0	104°23.3	42.6	183°48.0	09.2	Jupiter	290°06.1	19:07				
3	189°23.5	185°14.2	· · 13.3	79°41.3	· · 13.0	119°25.7	· · 42.7	198°50.2	· · 09.0	Saturn	9°40.4	13:50				
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						
5	219°28.4	215°17.0	15.2	109°47.0	13.0	149°30.5	42.7	228°54.6	08.8	SHA	Mer.pass					
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	Venus	356°47.2	14:42				
7	249°33.4	245°19.9	17.0	139°52.6	12.9	179°35.2	42.7	258°59.0	08.6	Mars	249°57.2	21:47				
8	264°35.8	260°21.3	18.0	154°55.4	12.9	194°37.6	42.8	274°01.2	08.5	Jupiter	290°06.1	19:07				
9	279°38.3	275°22.7	· · 18.9	169°58.3	· · 12.9	209°40.0	· · 42.8	289°03.4	· · 08.3	Saturn	9°40.4	13:50				
10	294°40.8	290°24.2	19.8	185°01.1	12.8	224°42.4	42.8	304°05.6	08.2	Feb 13 Thu						
11	309°43.2	305°25.6	20.7	200°03.9	12.8	239°44.7	42.8	319°07.8	08.1	SHA	Mer.pass					
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	Venus	356°19.9	14:40				
13	339°48.1	335°28.5	22.5	230°09.5	12.8	269°49.5	42.9	349°12.2	07.9	Mars	250°07.4	21:42				
14	354°50.6	350°29.9	23.5	245°12.3	12.7	284°51.9	42.9	4°14.4	07.8	Jupiter	290°04.4	19:04				
15	9°53.1	5°31.4	· · 24.4	260°15.2	· · 12.7	299°54.2	· · 42.9	19°16.5	· · 07.6	Saturn	9°34.0	13:47				
16	24°55.5	20°32.8	25.3	275°18.0	12.7	314°56.6	42.9	34°18.7	07.5	Feb 14 Fri						
17	39°58.0	35°34.3	26.2	290°20.8	12.7	329°59.0	42.9	49°20.9	07.4	SHA	Mer.pass					
18	55°00.5	50°35.7	N06°27.1	305°23.6	N26°12.6	345°01.3	N21°43.0	64°23.1	S06°07.3	Venus	355°53.8	14:38				
19	70°02.9	65°37.2	28.0	320°26.4	12.6	0°03.7	43.0	79°25.3	07.2	Mars	250°16.7	21:38				
20	85°05.4	80°38.6	28.9	335°29.2	12.6	15°06.1	43.0	94°27.5	07.1	Jupiter	290°02.5	19:00				
21	100°07.9	95°40.1	· · 29.9	350°32.0	· · 12.6	30°08.5	· · 43.0	109°29.7	· · 07.0	Saturn	9°27.5	13:43				
22	115°10.3	110°41.6	30.8	5°34.8	12.5	45°10.8	43.0	124°31.9	06.8	Horizontal parallax						
23	130°12.8	125°43.0	31.7	20°37.6	12.5	60°13.2	43.1	139°34.1	06.7	Venus:	0.3					
Mer.pass.:14:20											v1.4 d0.9 m-4.5	v2.8 d-0.0 m-0.7	v2.4 d0.0 m-2.3	v2.2 d0.1 m1.2	Mars:	0.2

h		Sun						Moon						
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight	
									Naut.	Civil			Civil	Naut.
0	176°27.2	S13°40.8	2°01.6	12.0'	N19°04.1	-11.9'	56.1'	N 72°	06:22	07:43	09:04	15:26	16:47	18:08
1	191°27.3	40.0	16°32.6	12.1'	18°52.2	-12.0'	56.1'	N 70°	06:19	07:32	08:42	15:48	16:58	18:11
2	206°27.3	39.2	31°03.8	12.2'	18°40.2	-12.0'	56.1'	68°	06:17	07:23	08:25	16:04	17:07	18:13
3	221°27.3	38.3	45°35.0	12.3'	18°28.1	-12.1'	56.1'	66°	06:15	07:16	08:12	16:18	17:14	18:15
4	236°27.3	37.5	60°06.3	12.4'	18°15.9	-12.2'	56.0'	64°	06:13	07:09	08:01	16:29	17:20	18:16
5	251°27.3	36.7	74°37.8	12.5'	18°03.7	-12.3'	56.0'	62°	06:11	07:04	07:51	16:38	17:26	18:18
6	266°27.3	S13°35.8	89°09.3	12.6'	N17°51.4	-12.3'	56.0'	60°	06:10	06:59	07:43	16:46	17:31	18:20
7	281°27.3	35.0	103°40.9	12.7'	17°39.1	-12.4'	56.0'	N 58°	06:08	06:54	07:36	16:54	17:35	18:21
8	296°27.3	34.2	118°12.6	12.8'	17°26.6	-12.5'	56.0'	56°	06:07	06:50	07:29	17:00	17:39	18:23
9	311°27.3	33.3	132°44.4	12.8'	17°14.1	-12.5'	55.9'	54°	06:05	06:47	07:24	17:06	17:42	18:24
10	326°27.3	32.5	147°16.3	12.9'	17°01.5	-12.6'	55.9'	52°	06:04	06:43	07:18	17:11	17:46	18:25
11	341°27.4	31.7	161°48.3	13.0'	16°48.9	-12.7'	55.9'	50°	06:02	06:40	07:14	17:15	17:49	18:27
12	356°27.4	S13°30.8	176°20.3	13.1'	N16°36.2	-12.7'	55.9'	45°	05:59	06:33	07:04	17:25	17:56	18:30
13	11°27.4	30.0	190°52.5	13.2'	16°23.4	-12.8'	55.9'	N 40°	05:56	06:27	06:55	17:34	18:02	18:33
14	26°27.4	29.1	205°24.8	13.3'	16°10.6	-12.9'	55.8'	35°	05:52	06:22	06:48	17:41	18:07	18:37
15	41°27.4	28.3	219°57.1	13.4'	15°57.7	-12.9'	55.8'	30°	05:49	06:17	06:41	17:47	18:12	18:40
16	56°27.4	27.5	234°29.5	13.5'	15°44.7	-13.0'	55.8'	20°	05:42	06:08	06:30	17:58	18:21	18:47
17	71°27.4	26.6	249°02.0	13.6'	15°31.7	-13.0'	55.8'	N 10°	05:34	05:59	06:20	18:08	18:30	18:55
18	86°27.4	S13°25.8	263°34.6	13.6'	N15°18.6	-13.1'	55.8'	0°	05:25	05:50	06:11	18:18	18:39	19:03
19	101°27.5	25.0	278°07.3	13.7'	15°05.5	-13.2'	55.7'	S 10°	05:14	05:40	06:01	18:27	18:49	19:14
20	116°27.5	24.1	292°40.0	13.8'	14°52.3	-13.2'	55.7'	20°	05:01	05:28	05:51	18:37	19:00	19:27
21	131°27.5	23.3	307°12.9	13.9'	14°39.0	-13.3'	55.7'	30°	04:44	05:14	05:39	18:49	19:14	19:44
22	146°27.5	22.4	321°45.8	14.0'	14°25.7	-13.3'	55.7'	35°	04:33	05:05	05:32	18:56	19:22	19:54
23	161°27.5	21.6	336°18.8	14.0'	14°12.4	-13.4'	55.7'	40°	04:20	04:55	05:24	19:04	19:32	20:07
	SD.=16.2	d=0.8			S.D.=15.3			45°	04:04	04:43	05:15	19:13	19:44	20:23
								S 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
								S 60°	02:27	03:40	04:30	19:56	20:46	21:58
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset		
									Wed	Thu	Fri	Wed	Thu	Fri
0	176°27.5	S13°20.8	350°51.9	14.1'	N13°59.0	-13.4'	55.6'	N 72°	14:10	16:55	19:03	10:44	09:32	08:51
1	191°27.5	19.9	5°25.1	14.2'	13°45.5	-13.5'	55.6'	N 70°	14:55	17:12	19:09	09:58	09:13	08:43
2	206°27.6	19.1	19°58.3	14.3'	13°32.0	-13.5'	55.6'	68°	15:24	17:25	19:13	09:27	08:57	08:36
3	221°27.6	18.2	34°31.6	14.4'	13°18.5	-13.6'	55.6'	66°	15:45	17:36	19:17	09:04	08:45	08:30
4	236°27.6	17.4	49°05.0	14.4'	13°04.9	-13.6'	55.6'	64°	16:02	17:45	19:20	08:46	08:34	08:25
5	251°27.6	16.5	63°38.5	14.5'	12°51.3	-13.7'	55.5'	62°	16:16	17:52	19:23	08:31	08:25	08:20
6	266°27.6	S13°15.7	78°12.0	14.6'	N12°37.6	-13.7'	55.5'	60°	16:28	17:59	19:25	08:18	08:18	08:16
7	281°27.6	14.9	92°45.6	14.6'	12°23.9	-13.7'	55.5'	N 58°	16:38	18:05	19:27	08:07	08:11	08:13
8	296°27.7	14.0	107°19.3	14.7'	12°10.1	-13.8'	55.5'	56°	16:47	18:10	19:29	07:57	08:05	08:10
9	311°27.7	13.2	121°53.1	14.8'	11°56.3	-13.8'	55.5'	54°	16:54	18:14	19:31	07:49	07:59	08:07
10	326°27.7	12.3	136°26.9	14.9'	11°42.5	-13.9'	55.4'	52°	17:01	18:18	19:32	07:41	07:54	08:05
11	341°27.7	11.5	151°00.8	14.9'	11°28.6	-13.9'	55.4'	50°	17:08	18:22	19:33	07:34	07:49	08:02
12	356°27.7	S13°10.6	165°34.7	15.0'	N11°14.7	-13.9'	55.4'	45°	17:21	18:30	19:36	07:19	07:40	07:57
13	11°27.8	09.8	180°08.8	15.1'	11°00.8	-14.0'	55.4'	N 40°	17:32	18:37	19:39	07:07	07:31	07:53
14	26°27.8	08.9	194°42.9	15.1'	10°46.8	-14.0'	55.4'	35°	17:41	18:42	19:41	06:56	07:24	07:49
15	41°27.8	08.1	209°17.0	15.2'	10°32.8	-14.0'	55.4'	30°	17:49	18:47	19:43	06:47	07:18	07:46
16	56°27.8	07.3	223°51.2	15.3'	10°18.7	-14.1'	55.3'	20°	18:03	18:56	19:46	06:31	07:07	07:40
17	71°27.8	06.4	238°25.5	15.3'	10°04.6	-14.1'	55.3'	N 10°	18:16	19:03	19:49	06:16	06:57	07:35
18	86°27.9	S13°05.6	252°59.9	15.4'	N09°50.5	-14.1'	55.3'	0°	18:27	19:10	19:51	06:03	06:48	07:30
19	101°27.9	04.7	267°34.3	15.4'	09°36.4	-14.1'	55.3'	S 10°	18:38	19:17	19:54	05:50	06:39	07:25
20	116°27.9	03.9	282°08.7	15.5'	09°22.2	-14.2'	55.3'	20°	18:50	19:25	19:57	05:35	06:29	07:20
21	131°27.9	03.0	296°43.3	15.6'	09°08.0	-14.2'	55.2'	30°	19:04	19:33	20:00	05:18	06:18	07:14
22	146°27.9	02.2	311°17.8	15.6'	08°53.8	-14.2'	55.2'	35°	19:12	19:38	20:02	05:08	06:11	07:11
23	161°28.0	01.3	325°52.5	15.7'	08°39.6	-14.3'	55.2'	40°	19:21	19:44	20:04	04:57	06:03	07:07
	SD.=16.2	d=0.8			S.D.=15.2			45°	19:31	19:50	20:06	04:44	05:55	07:02
								S 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
								S 60°	20:20	20:19	20:17	03:38	05:12	06:41
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun			Moon		Age
									Eqn. of Time	Mer. Pass	Mer. Pass.	Upper	Lower	14-16
									00 ^h	12 ^h	Pass	hh:mm	hh:mm	100-96%
									mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	
0	176°28.0	S13°00.5	340°27.2	15.7'	N08°25.3	-14.3'	55.2'	12	14:11	14:11	12:14	--	12:15	
1	191°28.0	12°59.6	355°01.9	15.8'	08°11.0	-14.3'	55.2'	13	14:10	14:09	12:14	00:38	12:59	
2	206°28.0	58.8	9°36.7	15.8'	07°56.7	-14.3'	55.1'	14	14:08	14:07	12:14	01:20	13:41	
3	221°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'	55.1'							
5	251°28.1	56.2	53°21.4	16.0'	07°13.7	-14.4'	55.1'							
6	266°28.1	S12°55.4	67°56.4	16.0'	N06°59.3	-14.4'	55.1'							
7	281°28.2	54.5	82°31.5	16.1'	06°44.9	-14.4'	55.1'							
8	296°28.2	53.7	97°06.5	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	326°28.2	51.9	126°16.9	16.2'	06°01.6	-14.5'	55.0'							
11	341°28.3	51.1	140°52.1	16.2'	05°47.1	-14.5'	55.0'							
12	356°28.3	S12°50.2	155°27.4	16.3'	N05°32.7	-14.5'	55.0'							
13	11°28.3	49.4	170°02.7	16.3'	05°18.2	-14.5'	55.0'							
14	26°28.4	48.5	184°38.0	16.4'	05°03.7	-14.5'	54.9'							
15	41°28.4	47.7	199°13.4	16.4'	04°49.2	-14.5'	54.9'							
16	56°28.4	46.8	213°48.8	16.4'	04°34.7	-14.5'	54.9'							
17	71°28.4	46.0	228°24.3	16.5'	04°20.2	-14.5'	54.9'							
18	86°28.5	S12°45.1	242°59.8	16.5'	N04°05.7	-14.5'	54.9'							
19	101°28.5	44.2	257°35.3	16.5'	03°51.1	-14.5'	54.9'							
20	116°28.5	43.4	272°10.9	16.6'	03°36.6	-14.5'	54.8'							
21	131°28.6	42.5	286°46.4	16.6'	03°22.1	-14.5'</								

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

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Sat	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	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	154°36.3	S06°06.6	154°36.3	S06°06.6	154°36.3	S06°06.6	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	169°38.5	06.5	169°38.5	06.5	169°38.5	06.5	169°38.5	06.5
2	175°20.2	170°47.4	34.4	65°46.0	12.4	105°20.3	43.1	184°40.7	06.4	184°40.7	06.4	184°40.7	06.4	184°40.7	06.4	184°40.7	06.4
3	190°22.6	185°48.9	· · 35.3	80°48.8	· · 12.4	120°22.7	· · 43.1	199°42.9	· · 06.3	199°42.9	· · 06.3	199°42.9	· · 06.3	199°42.9	· · 06.3	199°42.9	· · 06.3
4	205°25.1	200°50.4	36.2	95°51.6	12.4	135°25.1	43.2	214°45.1	06.1	214°45.1	06.1	214°45.1	06.1	214°45.1	06.1	214°45.1	06.1
5	220°27.6	215°51.9	37.1	110°54.4	12.3	150°27.4	43.2	229°47.3	06.0	229°47.3	06.0	229°47.3	06.0	229°47.3	06.0	229°47.3	06.0
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	244°49.5	S06°05.9	244°49.5	S06°05.9	244°49.5	S06°05.9	244°49.5	S06°05.9
7	250°32.5	245°54.8	38.9	140°59.9	12.3	180°32.2	43.2	259°51.6	05.8	259°51.6	05.8	259°51.6	05.8	259°51.6	05.8	259°51.6	05.8
8	265°35.0	260°56.3	39.8	156°02.7	12.3	195°34.5	43.2	274°53.8	05.7	274°53.8	05.7	274°53.8	05.7	274°53.8	05.7	274°53.8	05.7
9	280°37.4	275°57.8	· · 40.7	171°05.5	· · 12.2	210°36.9	· · 43.3	289°56.0	· · 05.6	289°56.0	· · 05.6	289°56.0	· · 05.6	289°56.0	· · 05.6	289°56.0	· · 05.6
10	295°39.9	290°59.3	41.6	186°08.3	12.2	225°39.3	43.3	304°58.2	05.4	304°58.2	05.4	304°58.2	05.4	304°58.2	05.4	304°58.2	05.4
11	310°42.4	306°00.8	42.5	201°11.1	12.2	240°41.6	43.3	320°00.4	05.3	320°00.4	05.3	320°00.4	05.3	320°00.4	05.3	320°00.4	05.3
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	335°02.6	S06°05.2	335°02.6	S06°05.2	335°02.6	S06°05.2	335°02.6	S06°05.2
13	340°47.3	336°03.8	44.3	231°16.6	12.1	270°46.4	43.4	350°04.8	05.1	350°04.8	05.1	350°04.8	05.1	350°04.8	05.1	350°04.8	05.1
14	355°49.7	351°05.3	45.2	246°19.4	12.1	285°48.7	43.4	5°07.0	05.0	5°07.0	05.0	5°07.0	05.0	5°07.0	05.0	5°07.0	05.0
15	10°52.2	6°06.8	· · 46.1	261°22.2	· · 12.0	300°51.1	· · 43.4	20°09.2	· · 04.9	20°09.2	· · 04.9	20°09.2	· · 04.9	20°09.2	· · 04.9	20°09.2	· · 04.9
16	25°54.7	21°08.3	46.9	276°25.0	12.0	315°53.5	43.4	35°11.4	04.7	35°11.4	04.7	35°11.4	04.7	35°11.4	04.7	35°11.4	04.7
17	40°57.1	36°09.9	47.8	291°27.7	12.0	330°55.8	43.4	50°13.6	04.6	50°13.6	04.6	50°13.6	04.6	50°13.6	04.6	50°13.6	04.6
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	65°15.8	S06°04.5	65°15.8	S06°04.5	65°15.8	S06°04.5	65°15.8	S06°04.5
19	71°02.1	66°12.9	49.6	321°33.3	11.9	1°00.6	43.5	80°18.0	04.4	80°18.0	04.4	80°18.0	04.4	80°18.0	04.4	80°18.0	04.4
20	86°04.5	81°14.4	50.5	336°36.0	11.9	16°02.9	43.5	95°20.2	04.3	95°20.2	04.3	95°20.2	04.3	95°20.2	04.3	95°20.2	04.3
21	101°07.0	96°15.9	· · 51.4	351°38.8	· · 11.8	31°05.3	· · 43.5	110°22.4	· · 04.2	110°22.4	· · 04.2	110°22.4	· · 04.2	110°22.4	· · 04.2	110°22.4	· · 04.2
22	116°09.5	111°17.5	52.3	6°41.6	11.8	46°07.7	43.5	125°24.5	04.0	125°24.5	04.0	125°24.5	04.0	125°24.5	04.0	125°24.5	04.0
23	131°11.9	126°19.0	53.2	21°44.3	11.8	61°10.0	43.6	140°26.7	03.9	140°26.7	03.9	140°26.7	03.9	140°26.7	03.9	140°26.7	03.9
Mer.pass.:14:16			v1.5 d0.9 m-4.5			v2.8 d-0.0 m-0.7			v2.4 d0.0 m-2.3			v2.2 d0.1 m1.2					
Sun	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec	
0	146°14.4	141°20.5	N06°54.0	36°47.1	N26°11.7	76°12.4	N21°43.6	155°28.9	S06°03.8	155°28.9	S06°03.8	155°28.9	S06°03.8	155°28.9	S06°03.8	155°28.9	S06°03.8
1	161°16.8	156°22.1	54.9	51°49.8	11.7	91°14.7	43.6	170°31.1	03.7	170°31.1	03.7	170°31.1	03.7	170°31.1	03.7	170°31.1	03.7
2	176°19.3	171°23.6	55.8	66°52.6	11.7	106°17.1	43.6	185°33.3	03.6	185°33.3	03.6	185°33.3	03.6	185°33.3	03.6	185°33.3	03.6
3	191°21.8	186°25.1	· · 56.7	81°55.4	· · 11.6	121°19.5	· · 43.7	200°35.5	· · 03.5	200°35.5	· · 03.5	200°35.5	· · 03.5	200°35.5	· · 03.5	200°35.5	· · 03.5
4	206°24.2	201°26.7	57.6	96°58.1	11.6	136°21.8	43.7	215°37.7	03.3	215°37.7	03.3	215°37.7	03.3	215°37.7	03.3	215°37.7	03.3
5	221°26.7	216°28.2	58.4	112°00.9	11.6	151°24.2	43.7	230°39.9	03.2	230°39.9	03.2	230°39.9	03.2	230°39.9	03.2	230°39.9	03.2
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	245°42.1	S06°03.1	245°42.1	S06°03.1	245°42.1	S06°03.1	245°42.1	S06°03.1
7	251°31.6	246°31.3	07°00.2	142°06.4	11.5	181°28.9	43.7	260°44.3	03.0	260°44.3	03.0	260°44.3	03.0	260°44.3	03.0	260°44.3	03.0
8	266°34.1	261°32.9	01.1	157°09.1	11.5	196°31.3	· · 43.8	275°46.5	02.9	275°46.5	02.9	275°46.5	02.9	275°46.5	02.9	275°46.5	02.9
9	281°36.6	276°34.4	· · 01.9	172°11.9	· · 11.4	211°33.6	· · 43.8	290°48.7	· · 02.8	290°48.7	· · 02.8	290°48.7	· · 02.8	290°48.7	· · 02.8	290°48.7	· · 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	305°50.9	02.6	305°50.9	02.6	305°50.9	02.6	305°50.9	02.6
11	311°41.5	306°37.5	03.7	202°17.4	11.4	241°38.3	43.8	320°53.0	02.5	320°53.0	02.5	320°53.0	02.5	320°53.0	02.5	320°53.0	02.5
12	326°44.0	321°39.1	N07°04.6	217°20.1	N26°11.3	256°40.7	N21°43.9	335°55.2	S06°02.4	335°55.2	S06°02.4	335°55.2	S06°02.4	335°55.2	S06°02.4	335°55.2	S06°02.4
13	341°46.4	336°40.7	05.4	232°22.8	11.3	271°43.1	43.9	350°57.4	02.3	350°57.4	02.3	350°57.4	02.3	350°57.4	02.3	350°57.4	02.3
14	356°48.9	351°42.2	06.3	247°25.6	11.2	286°45.4	43.9	5°59.6	02.2	5°59.6	02.2	5°59.6	02.2	5°59.6	02.2	5°59.6	02.2
15	11°51.3	6°43.8	· · 07.2	262°28.3	· · 11.2	301°47.8	· · 43.9	21°01.8	· · 02.1	21°01.8	· · 02.1	21°01.8	· · 02.1	21°01.8	· · 02.1	21°01.8	· · 02.1
16	26°53.8	21°45.4	08.0	277°31.1	11.2	316°50.1	43.9	36°04.0	01.9	36°04.0	01.9	36°04.0	01.9	36°04.0	01.9	36°04.0	01.9
17	41°56.3	36°47.0	08.9	292°33.8	11.1	331°52.5	44.0	51°06.2	01.8	51°06.2	01.8	51°06.2	01.8	51°06.2	01.8	51°06.2	01.8
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	66°08.4	S06°01.7	66°08.4	S06°01.7	66°08.4	S06°01.7	66°08.4	S06°01.7
19	72°01.2	66°50.1	10.6	322°39.3	11.1	1°57.2	44.0	81°10.6	01.6	81°10.6	01.6	81°10.6	01.6	81°10.6	01.6	81°10.6	01.6
20	87°03.7	81°51.7	11.5	337°42.0	11.0	16°59.5	44.0	96°12.8	01.5	96°12.8	01.5	96°12.8	01.5	96°12.8	01.5	96°12.8	01.5
21	102°06.1	96°53.3	· · 12.3	352°44.7	· · 11.0	32°01.9	· · 44.1	111°15.0	· · 01.4	111°15.0	· · 01.4	111°15.0	· · 01.4	111°15.0	· · 01.4	111°15.0	· · 01.4
22	117°08.6	111°54.9	13.2	7°47.5	10.9	47°04.3	44.1	126°17.2	01.2	126°17.2	01.2	126°17.2	01.2	126°17.2	01.2	126°17.2	01.2
23	132°11.1	126°56.5	14.1	22°50.2	10.9	62°06.6	44.1	141°19.3	01.1	141°19.3	01.1	141°19.3	01.1	141°19.3	01.1	141°19.3	01.1
Mer.pass.:14:12			v1.5 d0.9 m-4.5			v2.8 d-0.0 m-0.6			v2.4 d0.0 m-2.3			v2.2 d0.1 m1.2					
Mon	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec	
0	147°13.5	141°58.1	N07°14.9	37°52.9	N26°10.9	77°09.0	N21°44.1	156°21.5	S06°01.0	156°21.5	S06°01.0	156°21.5	S06°01.0	156°21.5	S06°01.0	156°21.5	S06°01.0
1	162°16.0	156°59.7	15.8	52°55.6	10.8	92°11.3	44.1	171°23.7	00.9	171°23.7	00.9	171°23.7	00.9	171°23.7	00.9	171°23.7	00.9
2	177°18.4	172°01.3	16.6	67°58.4	10.8	107°13.7	44.2	186°25.9	00.8	186°25.9	00.8	186°25.9	00.8	186°25.9	00.8	186°25.9	00.8
3	192°20.9	187°02.9	· · 17.5	83°01.1	· · 10.7	122°16.0	· · 44.2	201°28.1	· · 00.7	201°28.1	· · 00.7	201°28.1	· · 00.7	201°28.1	· · 00.7	201°28.1	· · 00.7
4	207°23.4	202°04.5	18.3	98°03.8	10.7	137°18.4	44.2	216°30.3	00.5	216°30.3	00.5	216°30.3	00.5	216°30.3	00.5	216°30.3	00.5
5	222°25.8	217°06.1	19.2	113°06.5	10.7	152°20.7	44.2	231°32.5	00.4	231°32.5	00.4	231°32.5	00.4	231°32.5	00.4	231°32.5	00.4
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	246°34.7	S06°00.3	246°34.7	S06°00.3	246°34.7	S06°00.3	246°34.7	S06°00.3
7	252°30.8	247°09.3	20.9	143°11.9	10.6	182°25.4	44.3	261°36.9	00.2	261°36.9							

Sun								Moon							
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight		
								Naut.	Civil				Civil	Naut.	
0	176°28.6	S12°40.0	330°33.4	16.7'	N02°38.4	-14.5'	54.8'								
1	191°28.7	39.1	345°09.1	16.7'	02°23.9	-14.5'	54.8'	N 72°	06:09	07:29	08:46	15:43	17:01	18:21	
2	206°28.7	38.2	359°44.8	16.7'	02°09.3	-14.5'	54.7'	N 70°	06:08	07:20	08:28	16:02	17:10	18:22	
3	221°28.7	· · 37.4	14°20.6	16.8'	01°54.8	-14.5'	54.7'	68°	06:07	07:12	08:13	16:17	17:17	18:23	
4	236°28.8	36.5	28°56.4	16.8'	01°40.3	-14.5'	54.7'	66°	06:06	07:06	08:01	16:29	17:24	18:24	
5	251°28.8	35.7	43°32.2	16.8'	01°25.7	-14.5'	54.7'	64°	06:05	07:00	07:51	16:38	17:29	18:25	
6	266°28.8	S12°34.8	58°08.0	16.8'	N01°11.2	-14.5'	54.7'	62°	06:04	06:55	07:42	16:47	17:34	18:26	
7	281°28.9	33.9	72°43.9	16.9'	00°56.7	-14.5'	54.7'	60°	06:03	06:51	07:35	16:54	17:38	18:27	
8	296°28.9	33.1	87°19.8	16.9'	00°42.1	-14.5'	54.7'	N 58°	06:02	06:47	07:28	17:01	17:42	18:28	
9	311°28.9	· · 32.2	101°55.7	16.9'	00°27.6	-14.5'	54.6'	56°	06:01	06:44	07:22	17:06	17:45	18:29	
10	326°29.0	31.4	116°31.6	16.9'	N00°13.1	-14.5'	54.6'	54°	05:59	06:41	07:17	17:12	17:48	18:30	
11	341°29.0	30.5	131°07.5	16.9'	S00°01.4	-14.5'	54.6'	52°	05:58	06:38	07:13	17:16	17:51	18:30	
12	356°29.0	S12°29.6	145°43.4	16.9'	S00°15.9	-14.5'	54.6'	50°	05:57	06:35	07:08	17:20	17:54	18:31	
13	11°29.1	28.8	160°19.4	17.0'	00°30.4	-14.5'	54.6'	45°	05:55	06:29	06:59	17:30	18:00	18:34	
14	26°29.1	27.9	174°55.4	17.0'	00°44.9	-14.5'	54.6'	N 40°	05:52	06:24	06:51	17:37	18:05	18:37	
15	41°29.1	· · 27.0	189°31.3	17.0'	00°59.3	-14.5'	54.6'	35°	05:49	06:19	06:45	17:44	18:10	18:39	
16	56°29.2	26.2	204°07.3	17.0'	01°13.8	-14.4'	54.6'	30°	05:46	06:14	06:39	17:50	18:14	18:42	
17	71°29.2	25.3	218°43.3	17.0'	01°28.2	-14.4'	54.5'	20°	05:40	06:06	06:28	18:00	18:22	18:48	
18	86°29.2	S12°24.4	233°19.3	17.0'	S01°42.7	-14.4'	54.5'	N 10°	05:33	05:58	06:19	18:09	18:30	18:55	
19	101°29.3	23.6	247°55.4	17.0'	01°57.1	-14.4'	54.5'	0°	05:25	05:49	06:11	18:17	18:39	19:03	
20	116°29.3	22.7	262°31.4	17.0'	02°11.5	-14.4'	54.5'	S 10°	05:15	05:40	06:02	18:26	18:48	19:13	
21	131°29.4	· · 21.9	277°07.4	17.0'	02°25.9	-14.4'	54.5'	20°	05:03	05:30	05:52	18:35	18:58	19:25	
22	146°29.4	21.0	291°43.4	17.0'	02°40.2	-14.4'	54.5'	30°	04:47	05:16	05:41	18:46	19:11	19:40	
23	161°29.4	20.1	306°19.5	17.0'	02°54.6	-14.3'	54.5'	35°	04:37	05:08	05:35	18:53	19:19	19:50	
	SD.=16.2	d=0.9			S.D.=14.9			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	
								S 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	
								S 60°	02:41	03:49	04:38	19:48	20:36	21:44	
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset			
									Sat	Sun	Mon	Sat	Sun	Mon	
0	176°29.5	S12°19.3	320°55.5	17.0'	S03°08.9	-14.3'	54.5'	N 72°	21:03	23:05	--	08:18	07:45	07:08	
1	191°29.5	18.4	335°31.6	17.0'	03°23.2	-14.3'	54.4'	N 70°	20:59	22:51	--	08:17	07:52	07:24	
2	206°29.6	17.5	350°07.6	17.0'	03°37.5	-14.3'	54.4'	68°	20:56	22:40	--	08:16	07:58	07:37	
3	221°29.6	· · 16.6	4°43.7	17.0'	03°51.8	-14.3'	54.4'	66°	20:54	22:31	--	08:16	08:02	07:48	
4	236°29.6	15.8	19°19.7	17.0'	04°06.1	-14.2'	54.4'	64°	20:52	22:23	23:58	08:15	08:06	07:57	
5	251°29.7	14.9	33°55.7	17.0'	04°20.3	-14.2'	54.4'	62°	20:50	22:17	23:46	08:15	08:10	08:05	
6	266°29.7	S12°14.0	48°31.8	17.0'	S04°34.5	-14.2'	54.4'	60°	20:48	22:12	23:36	08:15	08:13	08:12	
7	281°29.7	13.2	63°07.8	17.0'	04°48.7	-14.2'	54.4'	N 58°	20:47	22:07	23:27	08:14	08:16	08:18	
8	296°29.8	12.3	77°43.8	17.0'	05°02.9	-14.2'	54.4'	56°	20:46	22:02	23:20	08:14	08:18	08:23	
9	311°29.8	· · 11.4	92°19.8	17.0'	05°17.0	-14.1'	54.4'	54°	20:45	21:58	23:13	08:14	08:21	08:28	
10	326°29.9	10.6	106°55.9	17.0'	05°31.1	-14.1'	54.3'	52°	20:44	21:55	23:07	08:14	08:23	08:32	
11	341°29.9	09.7	121°31.9	17.0'	05°45.2	-14.1'	54.3'	50°	20:43	21:52	23:01	08:14	08:25	08:36	
12	356°30.0	S12°08.8	136°07.8	17.0'	S05°59.3	-14.1'	54.3'	45°	20:41	21:45	22:50	08:13	08:29	08:45	
13	11°30.0	08.0	150°43.8	17.0'	06°13.4	-14.0'	54.3'	N 40°	20:39	21:39	22:40	08:13	08:32	08:52	
14	26°30.0	07.1	165°19.8	17.0'	06°27.4	-14.0'	54.3'	35°	20:38	21:34	22:32	08:12	08:35	08:58	
15	41°30.1	· · 06.2	179°55.7	16.9'	06°41.4	-14.0'	54.3'	30°	20:37	21:30	22:24	08:12	08:38	09:04	
16	56°30.1	05.3	194°31.7	16.9'	06°55.3	-13.9'	54.3'	20°	20:35	21:23	22:12	08:12	08:42	09:13	
17	71°30.2	04.5	209°07.6	16.9'	07°09.2	-13.9'	54.3'	N 10°	20:33	21:17	22:01	08:11	08:46	09:22	
18	86°30.2	S12°03.6	223°43.5	16.9'	S07°23.1	-13.9'	54.3'	0°	20:31	21:11	21:51	08:11	08:50	09:30	
19	101°30.3	02.7	238°19.4	16.9'	07°37.0	-13.8'	54.3'	S 10°	20:29	21:05	21:41	08:10	08:54	09:38	
20	116°30.3	01.8	252°55.3	16.9'	07°50.8	-13.8'	54.3'	20°	20:28	20:58	21:30	08:10	08:58	09:46	
21	131°30.3	· · 01.0	267°31.1	16.8'	08°04.6	-13.8'	54.3'	30°	20:26	20:51	21:18	08:09	09:03	09:56	
22	146°30.4	12°00.1	282°06.9	16.8'	08°18.4	-13.7'	54.3'	35°	20:25	20:47	21:11	08:09	09:05	10:02	
23	161°30.4	11°59.2	296°42.7	16.8'	08°32.1	-13.7'	54.2'	40°	20:23	20:43	21:04	08:08	09:08	10:08	
	SD.=16.2	d=0.9			S.D.=14.9			45°	20:22	20:38	20:54	08:08	09:12	10:16	
								S 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	
								S 60°	20:15	20:14	20:12	08:05	09:28	10:52	
Mon	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Mer.	Moon		Age	
									Eqn.of Time	Mer.	Upper	Lower			
									00 ^h	Pass	hh:mm	hh:mm	17-19		
									mm:ss	hh:mm	hh:mm	hh:mm	92-79%		
0	176°30.5	S11°58.3	311°18.5	16.8'	S08°45.8	-13.7'	54.2'	15	14:05	14:04	12:14	02:01	14:21		
1	191°30.5	57.5	325°54.3	16.7'	08°59.5	-13.6'	54.2'	16	14:02	14:00	12:14	02:41	15:00		
2	206°30.6	56.6	340°30.0	16.7'	09°13.1	-13.6'	54.2'	17	13:58	13:56	12:14	03:20	15:40		
3	221°30.6	· · 55.7	355°05.7	16.7'	09°26.7	-13.6'	54.2'								
4	236°30.7	54.8	9°41.4	16.7'	09°40.3	-13.5'	54.2'								
5	251°30.7	54.0	24°17.1	16.6'	09°53.8	-13.5'	54.2'								
6	266°30.8	S11°53.1	38°52.7	16.6'	S10°07.2	-13.5'	54.2'								
7	281°30.8	52.2	53°28.3	16.6'	10°20.7	-13.4'	54.2'								
8	296°30.8	51.3	68°03.8	16.5'	10°34.1	-13.4'	54.2'								
9	311°30.9	· · 50.5	82°39.4	16.5'	10°47.4	-13.3'	54.2'								
10	326°30.9	49.6	97°14.9	16.5'	11°00.7	-13.3'	54.2'								
11	341°31.0	48.7	111°50.3	16.4'	11°14.0	-13.2'	54.2'								
12	356°31.0	S11°47.8	126°25.7	16.4'	S11°27.2	-13.2'	54.2'								
13	11°31.1	46.9	141°01.1	16.4'	11°40.4	-13.2'	54.2'								
14	26°31.1	46.1	155°36.5	16.3'	11°53.5	-13.1'	54.2'								
15	41°31.2	· · 45.2	170°11.8	16.3'	12°06.6	-13.1'	54.2'								
16	56°31.2	44.3	184°47.1	16.3'	12°19.7	-13.0'	54.2'								
17	71°31.3	43.4	199°22.3	16.2'	12°32.7	-13.0'	54.2'								
18	86°31.3	S11°42.5	213°57.5	16.2'	S12°45.6	-12.9'	54.2'								
19	101°31.4	41.7	228°32.7	16.1'	12°58.5	-12.9'	54.2'								
20	116°31.4	40.8	243°07.8	16.1'	13°11.4	-12.8'	54.2'								
21	131°31.5	· · 39.9	257°42.8	16.0'	13°24.2	-12.8'	54.2								

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

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°35.0	29°13.8
1	163°15.1	157°38.9	36.0	54°00.6	09.8	93°07.7	44.7	172°16.3	58.1	Ankaa	353°07.3	-42°10.4
2	178°17.6	172°40.5	36.8	69°03.2	09.8	108°10.0	44.7	187°18.5	58.0	Schedar	349°31.4	56°40.7
3	193°20.1	187°42.2	· · 37.7	84°05.9	· · 09.7	123°12.4	· · 44.7	202°20.7	· · 57.8	Diphda	348°47.3	-17°51.1
4	208°22.5	202°43.9	38.5	99°08.6	09.7	138°14.7	44.8	217°22.9	57.7	Achernar	335°20.4	-57°06.8
5	223°25.0	217°45.6	39.3	114°11.3	09.6	153°17.1	44.8	232°25.1	57.6	Hamal	327°51.3	23°34.9
6	238°27.4	232°47.2	N07°40.2	129°14.0	N26°09.6	168°19.4	N21°44.8	247°27.3	S05°57.5	Polaris	314°05.8	89°22.5
7	253°29.9	247°48.9	41.0	144°16.7	09.5	183°21.8	44.8	262°29.5	57.4	Akamar	315°11.8	-40°12.5
8	268°32.4	262°50.6	41.8	159°19.3	09.5	198°24.1	44.9	277°31.6	57.3	Menkar	314°06.1	4°11.3
9	283°34.8	277°52.3	· · 42.6	174°22.0	· · 09.4	213°26.4	· · 44.9	292°33.8	· · 57.1	Mirfak	308°28.2	49°57.2
10	298°37.3	292°54.0	43.4	189°24.7	09.4	228°28.8	44.9	307°36.0	57.0	Aldebaran	290°39.4	16°33.6
11	313°39.8	307°55.7	44.3	204°27.4	09.3	243°31.1	44.9	322°38.2	56.9	Rigel	281°03.6	-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	S05°56.8	Capella	280°21.6	46°01.6
13	343°44.7	337°59.1	45.9	234°32.7	09.3	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°38.1	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°24.6
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°53.5	S05°56.1	Sirius	258°25.8	-16°45.0
19	73°59.5	68°09.3	50.8	324°48.7	09.0	3°49.8	45.1	82°55.7	56.0	Adara	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	55.8	Procyon	244°50.4	5°09.7
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°16.8	27°57.9
22	119°06.9	113°14.5	53.2	9°56.7	08.8	48°56.9	45.2	128°02.3	55.6	Avior	234°14.2	-50°35.5
23	134°09.3	128°16.2	54.0	24°59.3	08.8	63°59.2	45.2	143°04.5	55.5	Suhail	222°45.8	-43°32.1
Mer.pass.:14:04		v1.7 d0.8 m-4.4		v2.7 d-0.0 m-0.6		v2.3 d0.0 m-2.2		v2.2 d0.1 m1.2		Miaplacidus	221°37.4	-69°49.2
										Alphard	217°47.3	-8°46.2
										Regulus	207°34.0	11°50.5
										Dubhe	193°40.2	61°36.8
										Denebola	182°24.5	14°25.7
										Gienah	175°43.2	-17°41.0
										Acrux	172°59.5	-63°14.2
										Gacrux	171°51.1	-57°15.1
										Alioth	166°12.5	55°49.1
										Spica	158°22.0	-11°17.6
										Alkaid	152°51.6	49°10.9
										Hadar	148°35.6	-60°29.5
										Menkent	147°57.4	-36°29.6
										Arcturus	145°47.5	19°03.1
										Rigel Kent.	139°40.0	-60°56.2
										Kochab	137°19.4	74°02.7
										Zuben'ubi	136°55.8	-16°08.8
										Alphecca	126°03.6	26°37.5
										Antares	112°15.8	-26°29.2
										Atria	107°10.1	-69°04.1
										Sabik	102°02.8	-15°45.4
										Shaula	96°10.4	-37°07.2
										Rasalhague	95°58.6	12°32.3
										Eltanin	90°42.4	51°28.8
										Kaus Aust.	83°32.6	-34°22.3
										Vega	80°33.5	38°48.1
										Nunki	75°47.9	-26°15.9
										Altair	62°00.2	8°55.9
										Peacock	53°06.1	-56°39.2
										Deneb	49°26.2	45°22.0
										Enif	33°39.0	9°59.3
										Al Na'ir	27°33.2	-46°50.4
										Fomalhaut	15°14.8	-29°29.5
										Scheat	13°45.5	28°13.1
										Markab	13°30.1	15°20.3
										Feb 18 Tue	SHA	Mer.pass
										Venus	354°24.5	14:28
										Mars	250°45.2	21:20
										Jupiter	289°52.7	18:45
										Saturn	9°01.5	13:29
										Feb 19 Wed	SHA	Mer.pass
										Venus	354°06.2	14:25
										Mars	250°50.2	21:16
										Jupiter	289°49.7	18:41
										Saturn	8°54.9	13:26
										Feb 20 Thu	SHA	Mer.pass
										Venus	353°49.5	14:22
										Mars	250°54.3	21:12
										Jupiter	289°46.6	18:37
										Saturn	8°48.3	13:22
										Horizontal parallax		
										Venus:	0.4	
										Mars:	0.2	
Mer.pass.:13:56		v1.8 d0.8 m-4.4		v2.6 d-0.1 m-0.5		v2.3 d0.0 m-2.2		v2.2 d0.1 m1.2				

February 21, 22, 23 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°35.0	29°13.8					
1	166°12.5	159°46.5	32.7	57°10.2	06.0	95°55.6	46.5	174°53.9	49.6	Ankaa	353°07.3	-42°10.4					
2	181°15.0	174°48.3	33.4	72°12.8	05.9	110°57.9	46.5	189°56.1	49.5	Schedar	349°31.4	56°40.6					
3	196°17.5	189°50.2	· · 34.2	87°15.3	· · 05.9	126°00.2	· · 46.6	204°58.3	· · 49.4	Diphda	348°47.3	-17°51.1					
4	211°19.9	204°52.1	34.9	102°17.9	05.8	141°02.5	46.6	220°00.5	49.2	Achernar	335°20.4	-57°06.8					
5	226°22.4	219°54.0	35.6	117°20.5	05.8	156°04.9	46.6	235°02.7	49.1	Hamal	327°51.3	23°34.9					
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	S05°49.0	Polaris	314°07.0	89°22.5					
7	256°27.3	249°57.8	37.1	147°25.6	05.6	186°09.5	46.7	265°07.0	48.9	Akamar	315°11.8	-40°12.5					
8	271°29.8	264°59.7	37.8	162°28.2	05.6	201°11.8	46.7	280°09.2	48.8	Menkar	314°06.1	4°11.3					
9	286°32.3	280°01.6	· · 38.6	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°39.5	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°01.6					
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	43.7	282°48.7	05.1	321°30.3	46.9	40°26.7	47.8	Betelgeuse	270°51.8	7°24.6					
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°42.8					
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°25.8	-16°45.0					
19	76°56.9	70°20.8	45.8	327°56.4	04.9	6°37.3	47.0	85°33.3	47.5	Adara	255°05.5	-20°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°50.4	5°09.7					
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°16.8	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	-50°35.5					
23	137°06.8	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					
Mer.pass.:13:53		v1.9 d0.7 m-4.4		v2.6 d-0.1 m-0.5		v2.3 d0.0 m-2.2		v2.2 d0.1 m1.2		Miaplacidus		221°37.4	-69°49.3				
Alphard		217°47.3		-8°46.2		Regulus		207°34.0		11°50.5		Dubhe		193°40.2		61°36.8	
Denebola		182°24.5		14°25.7		Gienah		175°43.2		-17°41.0		Acrux		172°59.5		-63°14.2	
Gacrux		171°51.1		-57°15.2		Alioth		166°12.5		55°49.1		Spica		158°22.0		-11°17.6	
Alkaid		152°51.6		49°11.0		Hadar		148°35.6		-60°29.5		Menkent		147°57.3		-36°29.6	
Arcturus		145°47.5		19°03.1		Rigel Kent.		139°40.0		-60°56.2		Kochab		137°19.4		74°02.7	
Zuben'ubi		136°55.8		-16°08.8		Alphecca		126°03.6		26°37.5		Antares		112°15.7		-26°29.2	
Atria		107°10.0		-69°04.1		Sabik		102°02.8		-15°45.4		Shaula		96°10.4		-37°07.2	
Rasalhague		95°58.6		12°32.3		Eltanin		90°42.4		51°28.8		Kaus Aust.		83°32.6		-34°22.3	
Vega		80°33.4		38°48.1		Nunki		75°47.9		-26°15.9		Altair		62°00.2		8°55.9	
Peacock		53°06.0		-56°39.2		Deneb		49°26.2		45°22.0		Enif		33°39.0		9°59.3	
Al Na'ir		27°33.2		-46°50.4		Fomalhaut		15°14.8		-29°29.5		Scheat		13°45.5		28°13.1	
Markab		13°30.1		15°20.3		Feb 21 Fri		SHA		Mer.pass		Venus		353°34.5		14:19	
						Mars		250°57.5		21:08		Jupiter		289°43.2		18:34	
						Saturn		8°41.7		13:19		Feb 22 Sat		SHA		Mer.pass	
						Venus		353°21.3		14:16		Mars		250°59.9		21:04	
						Jupiter		289°39.6		18:30		Saturn		8°35.0		13:15	
						Feb 23 Sun		SHA		Mer.pass		Venus		353°10.0		14:13	
						Mars		251°01.5		21:00		Jupiter		289°35.9		18:26	
						Saturn		8°28.3		13:12		Horizontal parallax		Venus:		0.4	
												Mars:				0.2	
Mer.pass.:13:45		v2.0 d0.7 m-4.4		v2.5 d-0.1 m-0.4		v2.3 d0.0 m-2.2		v2.2 d0.1 m1.2									

h		Sun						Moon						
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight	
									Naut.	Civil			Civil	Naut.
0	176°36.2	S10°32.9	268°26.5	10.6'	S26°01.3	-6.6'	54.9'	N 72°	05:42	07:00	08:13	16:16	17:28	18:47
1	191°36.2	32.0	282°56.0	10.5'	26°07.8	-6.4'	54.9'	N 70°	05:44	06:54	07:59	16:29	17:34	18:45
2	206°36.3	31.1	297°25.5	10.4'	26°14.2	-6.3'	54.9'	68°	05:45	06:49	07:48	16:41	17:39	18:44
3	221°36.4	30.2	311°54.8	10.3'	26°20.4	-6.2'	54.9'	66°	05:46	06:45	07:38	16:50	17:43	18:43
4	236°36.5	29.2	326°24.1	10.2'	26°26.6	-6.1'	55.0'	64°	05:47	06:42	07:31	16:57	17:47	18:42
5	251°36.5	28.3	340°53.3	10.1'	26°32.6	-6.0'	55.0'	62°	05:47	06:38	07:24	17:04	17:50	18:41
6	266°36.6	S10°27.4	355°22.4	10.1'	S26°38.5	-5.8'	55.0'	60°	05:47	06:35	07:18	17:10	17:53	18:41
7	281°36.7	26.5	9°51.4	10.0'	26°44.2	-5.7'	55.0'	N 58°	05:47	06:33	07:13	17:15	17:55	18:41
8	296°36.8	25.6	24°20.3	9.9'	26°49.9	-5.6'	55.1'	56°	05:47	06:30	07:08	17:20	17:57	18:41
9	311°36.8	24.7	38°49.2	9.8'	26°55.4	-5.4'	55.1'	54°	05:47	06:28	07:04	17:24	18:00	18:41
10	326°36.9	23.8	53°18.0	9.7'	27°00.8	-5.3'	55.1'	52°	05:47	06:26	07:00	17:27	18:02	18:41
11	341°37.0	22.9	67°46.6	9.6'	27°06.0	-5.2'	55.1'	50°	05:47	06:24	06:57	17:31	18:03	18:41
12	356°37.1	S10°22.0	82°15.2	9.6'	S27°11.1	-5.1'	55.1'	45°	05:46	06:20	06:50	17:38	18:08	18:42
13	11°37.1	21.1	96°43.8	9.5'	27°16.1	-4.9'	55.2'	N 40°	05:44	06:16	06:43	17:44	18:12	18:43
14	26°37.2	20.2	111°12.2	9.4'	27°21.0	-4.8'	55.2'	35°	05:43	06:12	06:38	17:49	18:15	18:44
15	41°37.3	19.3	125°40.6	9.3'	27°25.7	-4.7'	55.2'	30°	05:41	06:09	06:33	17:54	18:18	18:46
16	56°37.4	18.4	140°08.8	9.2'	27°30.3	-4.5'	55.2'	20°	05:37	06:02	06:25	18:02	18:25	18:50
17	71°37.4	17.4	154°37.0	9.2'	27°34.8	-4.4'	55.3'	N 10°	05:31	05:56	06:17	18:10	18:31	18:56
18	86°37.5	S10°16.5	169°05.2	9.1'	S27°39.1	-4.2'	55.3'	0°	05:25	05:49	06:10	18:17	18:38	19:02
19	101°37.6	15.6	183°33.2	9.0'	27°43.2	-4.1'	55.3'	S 10°	05:17	05:41	06:03	18:24	18:45	19:10
20	116°37.7	14.7	198°01.2	8.9'	27°47.3	-4.0'	55.3'	20°	05:06	05:32	05:55	18:32	18:54	19:20
21	131°37.8	13.8	212°29.1	8.9'	27°51.2	-3.8'	55.4'	30°	04:52	05:21	05:46	18:40	19:05	19:34
22	146°37.8	12.9	226°56.9	8.8'	27°55.0	-3.7'	55.4'	35°	04:43	05:14	05:41	18:46	19:12	19:43
23	161°37.9	12.0	241°24.6	8.7'	27°58.6	-3.6'	55.4'	40°	04:33	05:06	05:35	18:52	19:20	19:53
	SD.=16.2	d=0.9			S.D.=15.0			45°	04:19	04:57	05:28	18:58	19:29	20:06
								S 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
								S 60°	03:05	04:08	04:54	19:31	20:17	21:19
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise		Moonset			
									Fri	Sat	Sun	Fri	Sat	Sun
0	176°38.0	S10°11.1	255°52.3	8.6'	S28°02.1	-3.4'	55.5'	N 72°	██	██	██	██	██	██
1	191°38.1	10.2	270°19.9	8.6'	28°05.4	-3.3'	55.5'	N 70°	██	██	██	██	██	██
2	206°38.1	09.2	284°47.4	8.5'	28°08.6	-3.1'	55.5'	68°	██	██	██	██	██	██
3	221°38.2	08.3	299°14.9	8.4'	28°11.6	-3.0'	55.5'	66°	██	██	██	██	██	██
4	236°38.3	07.4	313°42.3	8.4'	28°14.5	-2.8'	55.6'	64°	██	██	██	██	██	██
5	251°38.4	06.5	328°09.6	8.3'	28°17.3	-2.7'	55.6'	62°	04:59	██	██	07:32	██	██
6	266°38.5	S10°05.6	342°36.8	8.2'	S28°19.9	-2.5'	55.6'	60°	04:15	05:48	06:51	08:16	08:34	09:27
7	281°38.5	04.7	357°04.0	8.2'	28°22.4	-2.4'	55.7'	N 58°	03:46	05:07	06:08	08:46	09:14	10:09
8	296°38.6	03.8	11°31.1	8.1'	28°24.7	-2.2'	55.7'	56°	03:24	04:40	05:40	09:08	09:42	10:38
9	311°38.7	02.9	25°58.2	8.0'	28°26.8	-2.1'	55.7'	54°	03:05	04:18	05:18	09:27	10:04	11:00
10	326°38.8	01.9	40°25.2	8.0'	28°28.8	-1.9'	55.7'	52°	02:50	04:00	04:59	09:43	10:22	11:18
11	341°38.9	01.0	54°52.1	7.9'	28°30.7	-1.8'	55.8'	50°	02:37	03:45	04:44	09:56	10:37	11:34
12	356°39.0	S10°00.1	69°19.0	7.8'	S28°32.4	-1.6'	55.8'	45°	02:10	03:14	04:12	10:24	11:08	12:05
13	11°39.0	09°59.2	83°45.8	7.8'	28°34.0	-1.5'	55.8'	N 40°	01:48	02:50	03:48	10:46	11:32	12:29
14	26°39.1	58.3	98°12.6	7.7'	28°35.4	-1.3'	55.9'	35°	01:30	02:31	03:28	11:04	11:52	12:49
15	41°39.2	57.4	112°39.3	7.7'	28°36.6	-1.2'	55.9'	30°	01:15	02:14	03:11	11:20	12:09	13:06
16	56°39.3	56.4	127°05.9	7.6'	28°37.7	-1.0'	55.9'	20°	00:49	01:46	02:42	11:47	12:38	13:34
17	71°39.4	55.5	141°32.5	7.6'	28°38.6	-0.9'	56.0'	N 10°	00:27	01:22	02:17	12:10	13:02	13:59
18	86°39.5	S09°54.6	155°59.0	7.5'	S28°39.4	-0.7'	56.0'	0°	00:07	00:59	01:54	12:32	13:25	14:22
19	101°39.5	53.7	170°25.5	7.5'	28°40.0	-0.5'	56.0'	S 10°	--	00:37	01:31	12:53	13:48	14:44
20	116°39.6	52.8	184°52.0	7.4'	28°40.5	-0.4'	56.0'	20°	--	00:13	01:07	13:16	14:13	15:08
21	131°39.7	51.9	199°18.4	7.4'	28°40.8	-0.2'	56.1'	30°	23:45	--	00:38	13:43	14:41	15:37
22	146°39.8	50.9	213°44.7	7.3'	28°40.9	-0.1'	56.1'	35°	23:29	--	00:21	14:00	14:58	15:53
23	161°39.9	50.0	228°11.0	7.3'	28°40.9	0.1'	56.1'	40°	23:09	--	00:01	14:18	15:18	16:13
	SD.=16.2	d=0.9			S.D.=15.1			45°	22:46	23:37	--	14:41	15:42	16:36
								S 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
								S 60°	20:27	21:00	22:17	16:58	18:19	19:01
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Mer.	Moon		Age
									Eqn. of Time	12 ^h	Pass	Upper Mer.Pass.	Lower	23-25
									00 ^h	mm:ss	hh:mm	hh:mm	hh:mm	43-24%
0	176°40.0	S09°49.1	242°37.3	7.2'	S28°40.7	0.3'	56.2'	21	13:35	13:32	12:14	06:19	18:45	
1	191°40.0	48.2	257°03.5	7.2'	28°40.4	0.4'	56.2'	22	13:28	13:24	12:13	07:12	19:40	
2	206°40.1	47.3	271°29.7	7.2'	28°39.9	0.6'	56.2'	23	13:20	13:16	12:13	08:08	20:36	
3	221°40.2	46.4	285°55.8	7.1'	28°39.2	0.7'	56.3'							
4	236°40.3	45.4	300°21.9	7.1'	28°38.4	0.9'	56.3'							
5	251°40.4	44.5	314°48.0	7.1'	28°37.4	1.1'	56.3'							
6	266°40.5	S09°43.6	329°14.0	7.0'	S28°36.3	1.2'	56.4'							
7	281°40.6	42.7	343°40.0	7.0'	28°35.0	1.4'	56.4'							
8	296°40.7	41.8	358°06.0	7.0'	28°33.5	1.6'	56.4'							
9	311°40.7	40.8	12°31.9	6.9'	28°31.8	1.7'	56.5'							
10	326°40.8	39.9	26°57.9	6.9'	28°30.0	1.9'	56.5'							
11	341°40.9	39.0	41°23.7	6.9'	28°28.0	2.1'	56.5'							
12	356°41.0	S09°38.1	55°49.6	6.9'	S28°25.9	2.2'	56.6'							
13	11°41.1	37.2	70°15.5	6.8'	28°23.6	2.4'	56.6'							
14	26°41.2	36.2	84°41.3	6.8'	28°21.1	2.6'	56.6'							
15	41°41.3	35.3	99°07.1	6.8'	28°18.5	2.7'	56.7'							
16	56°41.4	34.4	113°32.9	6.8'	28°15.7	2.9'	56.7'							
17	71°41.5	33.5	127°58.7	6.8'	28°12.7	3.1'	56.8'							
18	86°41.5	S09°32.5	142°24.4	6.8'	S28°09.6	3.2'	56.8'							
19	101°41.6	31.6	156°50.2	6.7'	28°06.2	3.4'	56.8'							
20	116°41.7	30.7	171°15.9	6.7'	28°02.8	3.6'	56.9'							
21	131°41.8	29.8	185°41.7	6.7'	27°59.1	3.7'	56.9'							
22	146°41.9	28.9	200°07.4	6.7'	27°55.3	3.9'	56.9'							
23	161°42.0	27.9	214°33.1	6.7'	27°51.3	4.1'	57.0'							
	SD.=16.2	d=0.9			S.D.=15.3									

February 24, 25, 26 (Mon., Tue., Wed.)


Aries		Venus		Mars		Jupiter		Saturn		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°29.1	S05°41.2	Alpheratz	357°35.0	29°13.8
1	169°10.0	162°10.2	22.5	60°12.2	01.2	98°41.7	48.5	177°31.3	41.0	Ankaa	353°07.3	-42°10.3
2	184°12.4	177°12.3	23.1	75°14.7	01.1	113°44.0	48.6	192°33.5	40.9	Schedar	349°31.4	56°40.6
3	199°14.9	192°14.4	· · 23.7	90°17.1	· · 01.0	128°46.3	· · 48.6	207°35.7	· · 40.8	Diphda	348°47.3	-17°51.1
4	214°17.4	207°16.6	24.4	105°19.6	00.9	143°48.6	48.6	222°37.9	40.7	Achernar	335°20.4	-57°06.8
5	229°19.8	222°18.7	25.0	120°22.1	00.9	158°50.8	48.6	237°40.1	40.6	Hamal	327°51.3	23°34.9
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	Polaris	314°08.3	89°22.5
7	259°24.7	252°23.0	26.3	150°27.0	00.7	188°55.4	48.7	267°44.4	40.3	Akamar	315°11.8	-40°12.5
8	274°27.2	267°25.1	26.9	165°29.5	00.6	203°57.7	48.7	282°46.6	40.2	Menkar	314°06.1	4°11.3
9	289°29.7	282°27.2	· · 27.5	180°32.0	· · 00.6	219°00.0	· · 48.8	297°48.8	· · 40.1	Mirfak	308°28.2	49°57.2
10	304°32.1	297°29.4	28.2	195°34.4	00.5	234°02.3	48.8	312°51.0	40.0	Aldebaran	290°39.5	16°33.6
11	319°34.6	312°31.5	28.8	210°36.9	00.4	249°04.6	48.8	327°53.2	39.8	Rigel	281°03.7	-8°10.5
12	334°37.1	327°33.7	N09°29.4	225°39.4	N26°00.3	264°06.9	N21°48.9	342°55.4	S05°39.7	Capella	280°21.6	46°01.6
13	349°39.5	342°35.8	30.0	240°41.8	00.3	279°09.2	48.9	357°57.6	39.6	Bellatrix	278°22.6	6°22.3
14	4°42.0	357°38.0	30.6	255°44.3	00.2	294°11.5	48.9	12°59.7	39.5	Elnath	278°01.6	28°37.8
15	19°44.5	12°40.1	· · 31.3	270°46.7	· · 00.1	309°13.8	· · 48.9	28°01.9	· · 39.4	Alnilam	275°37.5	-1°11.2
16	34°46.9	27°42.3	31.9	285°49.2	00.0	324°16.0	49.0	43°04.1	39.2	Betelgeuse	270°51.8	7°24.6
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	Canopus	263°52.1	-52°42.8
18	64°51.9	57°46.7	N09°33.1	315°54.1	N25°59.9	354°20.6	N21°49.0	73°08.5	S05°39.0	Sirius	258°25.8	-16°45.0
19	79°54.3	72°48.8	33.7	330°56.5	59.8	9°22.9	49.1	88°10.7	38.9	Adara	255°05.5	-20°00.5
20	94°56.8	87°51.0	34.3	345°59.0	59.7	24°25.2	49.1	103°12.8	38.8	Procyon	244°50.4	5°09.7
21	109°59.2	102°53.2	· · 34.9	1°01.4	· · 59.7	39°27.5	· · 49.1	118°15.0	· · 38.6	Pollux	243°16.8	27°57.9
22	125°01.7	117°55.4	35.5	16°03.9	59.6	54°29.8	49.2	133°17.2	38.5	Avior	234°14.2	-50°35.5
23	140°04.2	132°57.6	36.1	31°06.3	59.5	69°32.1	49.2	148°19.4	38.4	Suhail	222°45.8	-43°32.2
Mer.pass.:13:41		v2.1 d0.6 m-4.4		v2.5 d-0.1 m-0.4		v2.3 d0.0 m-2.2		v2.2 d0.1 m1.2		Miaplacidus	221°37.5	-69°49.3
										Alphard	217°47.3	-8°46.2
										Regulus	207°33.9	11°50.5
										Dubhe	193°40.1	61°36.8
										Denebola	182°24.4	14°25.7
										Gienah	175°43.2	-17°41.0
										Acrux	172°59.4	-63°14.2
										Gacrux	171°51.1	-57°15.2
										Alioth	166°12.4	55°49.1
										Spica	158°22.0	-11°17.6
										Alkaid	152°51.6	49°11.0
										Hadar	148°35.5	-60°29.5
										Menkent	147°57.3	-36°29.6
										Arcturus	145°47.5	19°03.1
										Rigel Kent.	139°39.9	-60°56.2
										Kochab	137°19.3	74°02.7
										Zuben'ubi	136°55.8	-16°08.8
										Alphecca	126°03.6	26°37.5
										Antares	112°15.7	-26°29.3
										Atria	107°10.0	-69°04.1
										Sabik	102°02.7	-15°45.4
										Shaula	96°10.3	-37°07.2
										Rasalhague	95°58.6	12°32.3
										Eltanin	90°42.3	51°28.8
										Kaus Aust.	83°32.5	-34°22.3
										Vega	80°33.4	38°48.1
										Nunki	75°47.8	-26°15.9
										Altair	62°00.2	8°55.9
										Peacock	53°06.0	-56°39.2
										Deneb	49°26.2	45°22.0
										Enif	33°39.0	9°59.3
										Al Na'ir	27°33.2	-46°50.4
										Fomalhaut	15°14.8	-29°29.5
										Scheat	13°45.5	28°13.1
										Markab	13°30.1	15°20.3
										Feb 24 Mon	SHA	Mer.pass
										Venus	353°00.6	14:09
										Mars	251°02.2	20:56
										Jupiter	289°31.9	18:23
										Saturn	8°21.7	13:08
										Feb 25 Tue	SHA	Mer.pass
										Venus	352°53.1	14:06
										Mars	251°02.1	20:52
										Jupiter	289°27.7	18:19
										Saturn	8°14.9	13:05
										Feb 26 Wed	SHA	Mer.pass
										Venus	352°47.6	14:02
										Mars	251°01.3	20:48
										Jupiter	289°23.4	18:15
										Saturn	8°08.2	13:01
										Horizontal parallax		
										Venus:		0.4
										Mars:		0.2
Mer.pass.:13:33		v2.3 d0.6 m-4.4		v2.4 d-0.1 m-0.3		v2.3 d0.0 m-2.2		v2.2 d0.1 m1.2				

February 27, 28, 01 (Thu., Fri., Sat.)

Aries			Venus			Mars			Jupiter			Saturn			Stars				
Thu	GHA	GHA Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	SHA	Dec			
0	157°04.9	149°49.1 N10°03.8	48°04.5	N25°55.5	86°23.7	N21°50.7	165°06.4	S05°32.5	Alpheratz	357°35.0	29°13.8								
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°07.3	-42°10.3								
2	187°09.8	179°53.8 04.8	78°09.2	55.3	116°28.2	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°47.3	-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	Achernar	335°20.4	-57°06.8								
5	232°17.2	225°01.0 06.3	123°16.3	55.0	161°35.1	50.9	240°17.3	31.9	Hamal	327°51.3	23°34.9								
6	247°19.7	240°03.4 N10°06.9	138°18.7	N25°55.0	176°37.3	N21°50.9	255°19.5	S05°31.8	Polaris	314°09.8	89°22.5								
7	262°22.2	255°05.7 07.4	153°21.1	54.9	191°39.6	50.9	270°21.7	31.7	Akamar	315°11.8	-40°12.5								
8	277°24.6	270°08.1 07.9	168°23.4	54.8	206°41.9	51.0	285°23.9	31.6	Menkar	314°06.1	4°11.3								
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°01.6								
13	352°36.9	345°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	Elnath	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°39.1	·· 30.7	Alnilam	275°37.5	-1°11.2								
16	37°44.3	30°27.4 11.9	288°42.3	54.1	327°00.0	51.2	45°41.3	30.6	Betelgeuse	270°51.8	7°24.6								
17	52°46.8	45°29.8 12.4	303°44.7	54.0	342°02.2	51.3	60°43.5	30.5	Canopus	263°52.1	-52°42.8								
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	Sirius	258°25.8	-16°45.0								
19	82°51.7	75°34.7 13.3	333°49.4	53.8	12°06.8	51.3	90°47.9	30.3	Adara	255°05.5	-29°00.6								
20	97°54.2	90°37.1 13.8	348°51.7	53.7	27°09.0	51.4	105°50.1	30.1	Procyon	244°50.4	5°09.7								
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°16.8	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	-50°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								
Mer.pass.:13:29			v2.4 d0.5 m-4.4			v2.4 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Miaaplacidus			221°37.5	-69°49.3
Mer.pass.:13:25			v2.5 d0.5 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Alphard			217°47.3	-8°46.2
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Regulus			207°33.9	11°50.5
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Dubhe			193°40.1	61°36.8
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Denebola			182°24.4	14°25.7
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Gienah			175°43.1	-17°41.0
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Acrux			172°59.4	-63°14.2
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Gacrux			171°51.1	-57°15.2
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Alioth			166°12.4	55°49.1
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Spica			158°21.9	-11°17.6
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Alkaid			152°51.5	49°11.0
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Hadar			148°35.5	-60°29.5
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Menkent			147°57.3	-36°29.6
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Arcturus			145°47.5	19°03.1
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Rigel Kent.			139°39.9	-60°56.2
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Kochab			137°19.2	74°02.7
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Zuben'ubi			136°55.8	-16°08.8
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Alphecca			126°03.6	26°37.5
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Antares			112°15.7	-26°29.3
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Atria			107°09.9	-69°04.1
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Sabik			102°02.7	-15°45.4
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Shaula			96°10.3	-37°07.2
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Rasalhague			95°58.5	12°32.3
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Eltanin			90°42.3	51°28.7
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Kaus Aust.			83°32.5	-34°22.3
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Vega			80°33.4	38°48.0
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Nunki			75°47.8	-26°15.9
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Altair			62°00.2	8°55.8
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Peacock			53°06.0	-56°39.2
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Deneb			49°26.1	45°22.0
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Enif			33°39.0	9°59.3
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Al Na'ir			27°33.2	-46°50.4
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Fomalhaut			15°14.8	-29°29.4
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Scheat			13°45.5	28°13.1
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Markab			13°30.1	15°20.3
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Feb 27 Thu			SHA	Mer.pass
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Venus			352°44.2	13:59
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Mars			250°59.6	20:44
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Jupiter			289°18.8	18:12
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Saturn			8°01.5	12:58
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Feb 28 Fri			SHA	Mer.pass
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Venus			352°42.8	13:55
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Mars			250°57.1	20:41
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Jupiter			289°14.0	18:08
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Saturn			7°54.7	12:54
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Mar 01 Sat			SHA	Mer.pass
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Venus			352°43.6	13:51
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Mars			250°53.8	20:37
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Jupiter			289°09.1	18:04
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Saturn			7°48.0	12:51
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Horizontal parallax				
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Venus:			0.4	
Mer.pass.:13:21			v2.5 d0.4 m-4.4			v2.3 d-0.1 m-0.3			v2.3 d0.0 m-2.2			v2.2 d0.1 m1.2			Mars:			0.2	

March 02, 03, 04 (Sun., Mon., Tue.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	160°02.3	152°48.8	N10°36.5	50°52.1	N25°48.8	89°06.3	N21°53.1	167°43.5	S05°23.9	Alpheratz	357°35.0	29°13.7	
1	175°04.8	167°51.5	36.9	65°54.4	48.7	104°08.5	53.1	182°45.7	23.8	Ankaa	353°07.4	-42°10.3	
2	190°07.3	182°54.1	37.3	80°56.7	48.6	119°10.8	53.2	197°47.9	23.7	Schedar	349°31.4	56°40.6	
3	205°09.7	197°56.7	· · 37.6	95°58.9	· · 48.5	134°13.0	· · 53.2	212°50.1	· · 23.5	Diphda	348°47.3	-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	243°04.7	N10°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	53.4	272°58.8	23.1	Akamars	315°11.8	-40°12.5	
8	280°22.0	273°10.0	39.5	171°10.3	48.0	209°24.2	53.4	288°01.0	22.9	Menkar	314°06.1	4°11.2	
9	295°24.5	288°12.7	· · 39.9	186°12.6	· · 47.9	224°26.5	· · 53.4	303°03.2	· · 22.8	Mirfak	308°28.2	49°57.2	
10	310°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°17.1	47.7	254°31.0	53.5	333°07.5	22.6	Rigel	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	Capella	280°21.6	46°01.6	
13	355°34.4	348°23.3	41.3	246°21.6	47.5	284°35.5	53.6	3°11.9	22.3	Bellatrix	278°22.7	6°22.3	
14	10°36.8	3°26.0	41.7	261°23.9	47.4	299°37.7	53.6	18°14.1	22.2	Elnath	278°01.6	28°37.8	
15	25°39.3	18°28.7	· · 42.0	276°26.2	· · 47.3	314°39.9	· · 53.6	33°16.2	· · 22.1	Alnilam	275°37.5	-1°11.2	
16	40°41.7	33°31.4	42.4	291°28.4	47.2	329°42.2	53.7	48°18.4	22.0	Betelgeuse	270°51.8	7°24.6	
17	55°44.2	48°34.1	42.7	306°30.7	47.1	344°44.4	53.7	63°20.6	21.9	Canopus	263°52.1	-52°42.8	
18	70°46.7	63°36.8	N10°43.1	321°32.9	N25°47.0	359°46.7	N21°53.7	78°22.8	S05°21.7	Sirius	258°25.9	-16°45.0	
19	85°49.1	78°39.5	43.4	336°35.2	46.9	14°48.9	53.8	93°25.0	21.6	Adara	255°05.6	-29°00.6	
20	100°51.6	93°42.2	43.8	351°37.5	46.8	29°51.1	53.8	108°27.2	21.5	Procyon	244°50.4	5°09.7	
21	115°54.1	108°44.9	· · 44.1	6°39.7	· · 46.7	44°53.4	· · 53.8	123°29.3	· · 21.4	Pollux	243°16.8	27°57.9	
22	130°56.5	123°47.6	44.5	21°42.0	46.6	59°55.6	53.9	138°31.5	21.2	Avior	234°14.2	-50°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.pass.:13:17		v2.6 d0.4 m-4.3		v2.3 d-0.1 m-0.2		v2.2 d0.0 m-2.2		v2.2 d0.1 m1.2		Miaplacidus		221°37.5	-69°49.3
										Alphard		217°47.3	-8°46.2
										Regulus		207°33.9	11°50.5
										Dubhe		193°40.1	61°36.8
										Denebola		182°24.4	14°25.7
										Gienah		175°43.1	-17°41.0
										Acrux		172°59.4	-63°14.2
										Gacrux		171°51.0	-57°15.2
										Alioth		166°12.4	55°49.1
										Spica		158°21.9	-11°17.7
										Alkaid		152°51.5	49°11.0
										Hadar		148°35.5	-60°29.5
										Menkent		147°57.3	-36°29.6
										Arcturus		145°47.4	19°03.1
										Rigel Kent.		139°39.8	-60°56.2
										Kochab		137°19.2	74°02.7
										Zuben'ubi		136°55.7	-17°08.9
										Alphecca		126°03.5	26°37.5
										Antares		112°15.7	-26°29.3
										Atria		107°09.9	-69°04.1
										Sabik		102°02.7	-15°45.4
										Shaula		96°10.3	-37°07.2
										Rasalhague		95°58.5	12°32.3
										Eltanin		90°42.3	51°28.7
										Kaus Aust.		83°32.5	-34°22.3
										Vega		80°33.4	38°48.0
										Nunki		75°47.8	-26°15.9
										Altair		62°00.1	8°55.8
										Peacock		53°06.0	-56°39.2
										Deneb		49°26.1	45°22.0
										Enif		33°39.0	9°59.3
										Al Na'ir		27°33.2	-46°50.4
										Fomalhaut		15°14.8	-29°29.4
										Scheat		13°45.5	28°13.0
										Markab		13°30.1	15°20.3
										Mar 02 Sun		SHA	Mer.pass
										Venus		352°46.5	13:46
										Mars		250°49.8	20:33
										Jupiter		289°04.0	18:01
										Saturn		7°41.2	12:47
										Mar 03 Mon		SHA	Mer.pass
										Venus		352°51.6	13:42
										Mars		250°45.0	20:30
										Jupiter		288°58.6	17:57
										Saturn		7°34.4	12:44
										Mar 04 Tue		SHA	Mer.pass
										Venus		352°58.9	13:37
										Mars		250°39.5	20:26
										Jupiter		288°53.1	17:54
										Saturn		7°27.6	12:40
										Horizontal parallax			
										Venus:		0.5	
										Mars:		0.2	
Mer.pass.:13:09		v2.8 d0.3 m-4.3		v2.2 d-0.1 m-0.2		v2.2 d0.0 m-2.1		v2.2 d0.1 m1.2					

h		Sun						Moon						
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight	
									Naut.	Civil			Civil	Naut.
0	177°07.3	S06°02.4	114°00.3	6.7'	N22°36.5	11.2'	59.5'	N 72°	04:43	06:02	07:09	17:15	18:23	19:42
1	192°07.4	01.4	128°26.0	6.6'	22°47.6	11.0'	59.5'	N 70°	04:51	06:02	07:03	17:21	18:22	19:34
2	207°07.6	06°00.5	142°51.6	6.6'	22°58.6	10.9'	59.5'	68°	04:58	06:02	06:58	17:26	18:22	19:27
3	222°07.7	05°59.5	157°17.1	6.5'	23°09.3	10.7'	59.5'	66°	05:03	06:02	06:53	17:31	18:22	19:22
4	237°07.9	58.5	171°42.6	6.4'	23°20.0	10.5'	59.4'	64°	05:07	06:02	06:49	17:34	18:22	19:17
5	252°08.0	57.6	186°08.0	6.4'	23°30.4	10.4'	59.4'	62°	05:11	06:02	06:46	17:38	18:22	19:13
6	267°08.1	S05°56.6	200°33.3	6.3'	N23°40.7	10.2'	59.4'	60°	05:14	06:02	06:43	17:40	18:22	19:10
7	282°08.3	55.6	214°58.6	6.2'	23°50.9	10.1'	59.4'	N 58°	05:16	06:01	06:41	17:43	18:22	19:08
8	297°08.4	54.7	229°23.8	6.2'	24°00.9	9.9'	59.3'	56°	05:18	06:01	06:38	17:45	18:22	19:05
9	312°08.6	· · 53.7	243°49.0	6.1'	24°10.7	9.8'	59.3'	54°	05:20	06:01	06:36	17:47	18:22	19:03
10	327°08.7	52.7	258°14.0	6.1'	24°20.4	9.6'	59.3'	52°	05:22	06:01	06:34	17:49	18:23	19:02
11	342°08.9	51.7	272°39.1	6.0'	24°29.9	9.4'	59.3'	50°	05:23	06:00	06:33	17:51	18:23	19:00
12	357°09.0	S05°50.8	287°04.0	5.9'	N24°39.3	9.3'	59.2'	45°	05:26	05:59	06:29	17:54	18:24	18:58
13	12°09.1	49.8	301°28.9	5.9'	24°48.5	9.1'	59.2'	N 40°	05:27	05:59	06:26	17:57	18:24	18:56
14	27°09.3	48.8	315°53.8	5.8'	24°57.5	8.9'	59.2'	35°	05:28	05:57	06:23	18:00	18:25	18:55
15	42°09.4	· · 47.9	330°18.6	5.8'	25°06.4	8.8'	59.2'	30°	05:29	05:56	06:20	18:03	18:26	18:54
16	57°09.6	46.9	344°43.3	5.7'	25°15.1	8.6'	59.1'	20°	05:28	05:54	06:16	18:07	18:29	18:54
17	72°09.7	45.9	359°08.0	5.7'	25°23.6	8.4'	59.1'	N 10°	05:26	05:51	06:12	18:11	18:32	18:56
18	87°09.9	S05°45.0	13°32.6	5.6'	N25°31.9	8.3'	59.1'	0°	05:23	05:47	06:08	18:14	18:35	18:59
19	102°10.0	44.0	27°57.2	5.5'	25°40.1	8.1'	59.1'	S 10°	05:18	05:43	06:04	18:18	18:39	19:04
20	117°10.1	43.0	42°21.7	5.5'	25°48.1	7.9'	59.0'	20°	05:11	05:37	06:00	18:22	18:45	19:10
21	132°10.3	· · 42.1	56°46.2	5.4'	25°56.0	7.8'	59.0'	30°	05:02	05:30	05:54	18:27	18:51	19:20
22	147°10.4	41.1	71°10.6	5.4'	26°03.7	7.6'	59.0'	35°	04:56	05:26	05:52	18:30	18:56	19:26
23	162°10.6	40.1	85°35.0	5.4'	26°11.2	7.4'	58.9'	40°	04:48	05:21	05:48	18:34	19:01	19:33
	SD.=16.1	d=1.0			S.D.=16.2			45°	04:39	05:14	05:44	18:37	19:07	19:43
								S 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
								S 60°	03:47	04:42	05:26	18:55	19:38	20:33
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset		
									Wed	Thu	Fri	Wed	Thu	Fri
0	177°10.7	S05°39.2	99°59.3	5.3'	N26°18.5	7.2'	58.9'	N 72°	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	192°10.9	38.2	114°23.6	5.3'	26°25.6	7.1'	58.9'	N 70°	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	207°11.0	37.2	128°47.8	5.2'	26°32.6	6.9'	58.9'	68°	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	222°11.2	· · 36.2	143°12.0	5.2'	26°39.4	6.7'	58.8'	66°	05:29	<input type="checkbox"/>	<input type="checkbox"/>	03:24	<input type="checkbox"/>	<input type="checkbox"/>
4	237°11.3	35.3	157°36.2	5.1'	26°46.0	6.5'	58.8'	64°	06:24	<input type="checkbox"/>	<input type="checkbox"/>	02:30	<input type="checkbox"/>	<input type="checkbox"/>
5	252°11.4	34.3	172°00.3	5.1'	26°52.5	6.4'	58.8'	62°	06:58	06:45	<input type="checkbox"/>	01:58	04:13	<input type="checkbox"/>
6	267°11.6	S05°33.3	186°24.4	5.1'	N26°58.7	6.2'	58.8'	60°	07:22	07:30	07:57	01:34	03:28	05:08
7	282°11.7	32.4	200°48.5	5.0'	27°04.8	6.0'	58.7'	N 58°	07:42	08:00	08:37	01:15	02:59	04:28
8	297°11.9	31.4	215°12.5	5.0'	27°10.7	5.8'	58.7'	56°	07:59	08:23	09:05	00:59	02:36	04:00
9	312°12.0	· · 30.4	229°36.5	5.0'	27°16.4	5.6'	58.7'	54°	08:13	08:42	09:27	00:45	02:18	03:38
10	327°12.2	29.5	244°00.5	5.0'	27°22.0	5.5'	58.6'	52°	08:25	08:58	09:45	00:34	02:03	03:20
11	342°12.3	28.5	258°24.4	4.9'	27°27.3	5.3'	58.6'	50°	08:36	09:12	10:00	00:23	01:49	03:05
12	357°12.5	S05°27.5	272°48.3	4.9'	N27°32.5	5.1'	58.6'	45°	08:59	09:40	10:32	00:01	01:22	02:34
13	12°12.6	26.5	287°12.2	4.9'	27°37.5	4.9'	58.6'	N 40°	09:18	10:02	10:56	--	01:00	02:10
14	27°12.8	25.6	301°36.1	4.9'	27°42.3	4.7'	58.5'	35°	09:33	10:21	11:16	--	00:42	01:50
15	42°12.9	· · 24.6	315°59.9	4.8'	27°47.0	4.5'	58.5'	30°	09:47	10:36	11:33	--	00:27	01:34
16	57°13.1	23.6	330°23.8	4.8'	27°51.4	4.4'	58.5'	20°	10:10	11:04	12:01	--	00:01	01:05
17	72°13.2	22.7	344°47.6	4.8'	27°55.7	4.2'	58.5'	N 10°	10:31	11:27	12:26	23:38	--	00:41
18	87°13.4	S05°21.7	359°11.4	4.8'	N27°59.8	4.0'	58.4'	0°	10:50	11:49	12:49	23:18	--	00:18
19	102°13.5	20.7	13°35.2	4.8'	28°03.7	3.8'	58.4'	S 10°	11:09	12:11	13:12	22:57	23:55	--
20	117°13.6	19.7	27°59.0	4.8'	28°07.4	3.6'	58.4'	20°	11:30	12:35	13:37	22:35	23:31	--
21	132°13.8	· · 18.8	42°22.7	4.8'	28°10.9	3.4'	58.3'	30°	11:54	13:02	14:06	22:09	23:02	--
22	147°13.9	17.8	56°46.5	4.8'	28°14.3	3.3'	58.3'	35°	12:08	13:19	14:23	21:54	22:45	23:44
23	162°14.1	16.8	71°10.3	4.8'	28°17.4	3.1'	58.3'	40°	12:25	13:38	14:44	21:37	22:26	23:24
	SD.=16.1	d=1.0			S.D.=16.1			45°	12:44	14:01	15:08	21:16	22:02	23:00
								S 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
								S 60°	14:36	16:29	17:51	19:21	19:33	20:17
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Mer.	Moon		Age
									Eqn.of Time	Mer.	Upper	Lower		
									00 ^h	Pass	hh:mm	hh:mm	5-7	
									mm:ss	hh:mm	hh:mm	hh:mm	37-59%	
0	177°14.2	S05°15.8	85°34.0	4.8'	N28°20.4	2.9'	58.3'	5	11:31	11:24	12:11	17:04	04:34	
1	192°14.4	14.9	99°57.8	4.8'	28°23.2	2.7'	58.2'	6	11:17	11:10	12:11	18:03	05:33	
2	207°14.5	13.9	114°21.6	4.8'	28°25.8	2.5'	58.2'	7	11:03	10:56	12:11	19:04	06:34	
3	222°14.7	· · 12.9	128°45.3	4.8'	28°28.2	2.3'	58.2'							
4	237°14.8	12.0	143°09.1	4.8'	28°30.5	2.1'	58.2'							
5	252°15.0	11.0	157°32.9	4.8'	28°32.5	2.0'	58.1'							
6	267°15.1	S05°10.0	171°56.7	4.8'	N28°34.4	1.8'	58.1'							
7	282°15.3	09.0	186°20.5	4.8'	28°36.1	1.6'	58.1'							
8	297°15.4	08.1	200°44.4	4.8'	28°37.6	1.4'	58.0'							
9	312°15.6	· · 07.1	215°08.2	4.9'	28°38.9	1.2'	58.0'							
10	327°15.7	06.1	229°32.1	4.9'	28°40.0	1.0'	58.0'							
11	342°15.9	05.1	243°56.0	4.9'	28°41.0	0.9'	58.0'							
12	357°16.0	S05°04.2	258°19.9	4.9'	N28°41.7	0.7'	57.9'							
13	12°16.2	03.2	272°43.8	5.0'	28°42.3	0.5'	57.9'							
14	27°16.3	02.2	287°07.8	5.0'	28°42.7	0.3'	57.9'							
15	42°16.5	· · 01.2	301°31.8	5.0'	28°43.0	0.1'	57.9'							
16	57°16.6	05°00.3	315°55.8	5.1'	28°43.0	-0.1'	57.8'							
17	72°16.8	04°59.3	330°19.9	5.1'	28°42.9	-0.2'	57.8'							
18	87°17.0	S04°58.3	344°44.0	5.1'	N28°42.5	-0.4'	57.8'							
19	102°17.1	57.3	359°08.1	5.2'	28°42.0	-0.6'	57.8'							
20	117°17.3	56.4	13°32.3	5.2'	28°41.3	-0.8'	57.7'							
21	132°17.4	· · 55.4	27°56.6	5.3'	28°40.5	-0.9'	57.7'							
22	147°17.6	54.4	42°20.8	5.3'	28°39.5	-1.1'	57.7'							
23														

March 11, 12, 13 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		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°51.8	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°02.0	208°55.2	· · 06.1	103°41.9	· · 23.7	142°10.6	· · 01.4	220°41.0	· · 57.5	Diphda	348°47.3	-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	Achernar	335°20.5	-57°06.7
5	244°06.9	239°02.1	05.8	133°46.0	23.4	172°15.0	01.4	250°45.3	57.2	Hamal	327°51.3	23°34.9
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	Polaris	314°14.8	89°22.5
7	274°11.8	269°08.9	05.5	163°50.0	23.1	202°19.4	01.5	280°49.7	57.0	Akamars	315°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°15.9	· · 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°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	Rigel	281°03.7	-8°10.5
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	Capella	280°21.7	46°01.6
13	4°26.6	359°29.7	04.6	254°02.1	22.2	292°32.4	01.8	11°02.7	56.3	Bellatrix	278°22.7	6°22.3
14	19°29.1	14°33.2	04.4	269°04.1	22.3	307°34.6	01.8	26°04.9	56.2	Elnath	278°01.7	28°37.8
15	34°31.5	29°36.6	· · 04.2	284°06.1	· · 22.1	322°36.8	· · 01.9	41°07.1	· · 56.0	Alnilam	275°37.6	-1°11.1
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°10.1	21.8	352°41.1	01.9	71°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	Sirius	258°25.9	-16°45.0
19	94°41.4	89°50.5	03.5	344°14.1	21.5	22°45.5	02.0	101°15.8	55.5	Adara	255°05.6	-29°00.6
20	109°43.9	104°54.0	03.4	359°16.1	21.4	37°47.6	02.1	116°18.0	55.4	Procyon	244°50.4	5°09.7
21	124°46.3	119°57.5	· · 03.2	14°18.1	· · 21.3	52°49.8	· · 02.1	131°20.2	· · 55.3	Pollux	243°16.8	27°57.9
22	139°48.8	135°01.0	03.0	29°20.1	21.1	67°52.0	02.1	146°22.4	55.2	Avior	234°14.3	-50°35.6
23	154°51.3	150°04.5	02.8	44°22.1	21.0	82°54.1	02.2	161°24.5	55.1	Suhail	222°45.9	-43°32.2
Mer.pass.:12:42		v3.4 d-0.1 m-4.1		v2.0 d-0.1 m-0.0		v2.2 d0.0 m-2.1		v2.2 d0.1 m1.2		Miaplacidus	221°37.6	-69°49.4
										Alphard	217°47.3	-8°46.2
										Regulus	207°33.9	11°50.5
										Dubhe	193°40.1	61°36.9
										Denebola	182°24.4	14°25.7
										Gienah	175°43.1	-17°41.0
										Acrux	172°59.3	-63°14.3
										Gacrux	171°51.0	-57°15.3
										Alioth	166°12.3	55°49.2
										Spica	158°21.9	-11°17.7
										Alkaid	152°51.5	49°11.0
										Hadar	148°35.4	-60°29.6
										Menkent	147°57.2	-36°29.6
										Arcturus	145°47.4	19°03.1
										Rigel Kent.	139°39.7	-60°56.2
										Kochab	137°19.0	74°02.8
										Zuben'ubi	136°55.7	-16°08.9
										Alphecca	126°03.5	26°37.5
										Antares	112°15.6	-26°29.3
										Atria	107°09.7	-69°04.1
										Sabik	102°02.6	-15°45.4
										Shaula	96°10.2	-37°07.2
										Rasalhague	95°58.5	12°32.3
										Eltanin	90°42.2	51°28.7
										Kaus Aust.	83°32.4	-34°22.3
										Vega	80°33.3	38°48.0
										Nunki	75°47.7	-26°15.9
										Altair	62°00.1	8°55.8
										Peacock	53°05.9	-56°39.1
										Deneb	49°26.1	45°21.9
										Enif	33°39.0	9°59.3
										Al Na'ir	27°33.2	-46°50.3
										Fomalhaut	15°14.8	-29°29.4
										Scheat	13°45.5	28°13.0
										Markab	13°30.1	15°20.3
										Mar 11 Tue	SHA	Mer.pass
										Venus	354°50.3	13:02
										Mars	249°41.3	20:03
										Jupiter	288°09.5	17:29
										Saturn	6°39.8	12:16
										Mar 12 Wed	SHA	Mer.pass
										Venus	355°14.3	12:56
										Mars	249°30.4	20:00
										Jupiter	288°02.6	17:26
										Saturn	6°33.0	12:12
										Mar 13 Thu	SHA	Mer.pass
										Venus	355°40.0	12:51
										Mars	249°18.9	19:57
										Jupiter	287°55.5	17:22
										Saturn	6°26.2	12:09
										Horizontal parallax		
										Venus:	0.5	
										Mars:	0.2	
Mer.pass.:12:34		v3.6 d-0.3 m-4.1		v2.0 d-0.1 m0.0		v2.2 d0.0 m-2.1		v2.2 d0.1 m1.2				

March 14, 15, 16 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°35.0	29°13.7	
1	186°54.5	183°02.9	50.1	76°00.7	14.2	114°42.4	04.3	193°13.5	49.0	Ankaa	353°07.4	-42°10.3	
2	201°56.9	198°06.5	49.7	91°02.6	14.0	129°44.6	04.3	208°15.7	48.9	Schedar	349°31.5	56°40.6	
3	216°59.4	213°10.2	· · 49.4	106°04.6	· · 13.9	144°46.7	· · 04.3	223°17.8	· · 48.8	Diphda	348°47.3	-17°51.0	
4	232°01.8	228°13.8	49.1	121°06.5	13.7	159°48.9	04.4	238°20.0	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°16.2	89°22.5	
7	277°09.2	273°24.8	48.1	166°12.3	13.3	204°55.4	04.5	283°26.6	48.3	Akamar	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°01.6	
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°10.4	04.8	28°41.8	47.5	Elnath	278°01.7	28°37.8	
15	37°29.0	33°54.0	· · 45.3	286°27.8	· · 12.2	325°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	258°25.9	-16°45.0	
19	97°38.8	94°08.7	43.9	346°35.6	11.6	25°21.2	05.0	103°52.7	46.9	Adara	255°05.6	-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	Procyon	244°50.4	5°09.7	
21	127°43.7	124°16.1	· · 43.1	16°39.4	· · 11.3	55°25.5	· · 05.1	133°57.1	· · 46.6	Pollux	243°16.8	27°58.0	
22	142°46.2	139°19.8	42.8	31°41.3	11.2	70°27.7	05.2	148°59.3	46.5	Avior	234°14.3	-50°35.6	
23	157°48.7	154°23.5	42.4	46°43.3	11.0	85°29.8	05.2	164°01.4	46.4	Suhail	222°45.9	-43°32.2	
Mer.pass.:12:30		v3.6 d-0.3 m-4.0		v1.9 d-0.1 m0.1		v2.2 d0.0 m-2.1		v2.2 d0.1 m1.2		Miacplacidus		221°37.6	-69°49.4
										Alphard		217°47.3	-8°46.2
										Regulus		207°33.9	11°50.5
										Dubhe		193°40.1	61°36.9
										Denebola		182°24.4	14°25.7
										Gienah		175°43.1	-17°41.0
										Acrux		172°59.3	-63°14.3
										Gacrux		171°51.0	-57°15.3
										Alioth		166°12.3	55°49.2
										Spica		158°21.9	-11°17.7
										Alkaid		152°51.4	49°11.0
										Hadar		148°35.4	-60°29.6
										Menkent		147°57.2	-36°29.6
										Arcturus		145°47.4	19°03.1
										Rigel Kent.		139°39.7	-60°56.2
										Kochab		137°19.0	74°02.8
										Zuben'ubi		136°55.7	-16°08.9
										Alphecca		126°03.5	26°37.5
										Antares		112°15.6	-26°29.3
										Atria		107°09.6	-69°04.1
										Sabik		102°02.6	-15°45.4
										Shaula		96°10.2	-37°07.2
										Rasalhague		95°58.4	12°32.3
										Eltanin		90°42.2	51°28.7
										Kaus Aust.		83°32.4	-34°22.3
										Vega		80°33.3	38°48.0
										Nunki		75°47.7	-26°15.9
										Altair		62°00.1	8°55.8
										Peacock		53°05.8	-56°39.1
										Deneb		49°26.1	45°21.9
										Enif		33°39.0	9°59.3
										Al Na'ir		27°33.1	-46°50.3
										Fomalhaut		15°14.7	-29°29.4
										Scheat		13°45.5	28°13.0
										Markab		13°30.1	15°20.3
										Mar 14 Fri		SHA	Mer.pass
										Venus		356°07.3	12:45
										Mars		249°06.7	19:54
										Jupiter		287°48.3	17:19
										Saturn		6°19.3	12:05
										Mar 15 Sat		SHA	Mer.pass
										Venus		356°36.0	12:39
										Mars		248°54.1	19:50
										Jupiter		287°40.8	17:15
										Saturn		6°12.5	12:02
										Mar 16 Sun		SHA	Mer.pass
										Venus		357°06.0	12:33
										Mars		248°40.8	19:47
										Jupiter		287°33.3	17:12
										Saturn		6°05.7	11:59
										Horizontal parallax			
										Venus:		0.5	
										Mars:		0.1	
Mer.pass.:12:22		v3.7 d-0.4 m-4.0		v1.9 d-0.1 m0.1		v2.1 d0.0 m-2.1		v2.2 d0.1 m1.2					

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

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	177°46.8	177°01.7	N09°39.0	65°29.3	N24°52.6	104°48.2	N22°10.5	183°25.2	S04°31.9	Alpheratz	357°35.0	29°13.7
1	192°49.3	192°05.6	38.4	80°31.1	52.4	119°50.3	10.5	198°27.3	31.8	Ankaa	353°07.4	-42°10.2
2	207°51.7	207°09.4	37.7	95°32.9	52.3	134°52.4	10.6	213°29.5	31.7	Schedar	349°31.5	56°40.5
3	222°54.2	222°13.3	· · 37.1	110°34.7	· · 52.1	149°54.5	· · 10.6	228°31.7	· · 31.5	Diphda	348°47.3	-17°51.0
4	237°56.7	237°17.1	36.4	125°36.5	51.9	164°56.7	10.6	243°33.9	31.4	Achernar	335°20.6	-57°06.7
5	252°59.1	252°21.0	35.7	140°38.3	51.8	179°58.8	10.7	258°36.1	31.3	Hamal	327°51.3	23°34.9
6	268°01.6	267°24.8	N09°35.1	155°40.1	N24°51.6	195°00.9	N22°10.7	273°38.2	S04°31.2	Polaris	314°18.2	89°22.5
7	283°04.1	282°28.7	34.4	170°41.9	51.5	210°03.0	10.8	288°40.4	31.1	Akamars	315°11.9	-40°12.4
8	298°06.5	297°32.5	33.7	185°43.8	51.3	225°05.1	10.8	303°42.6	30.9	Menkar	314°06.2	4°11.2
9	313°09.0	312°36.4	· · 33.0	200°45.6	· · 51.1	240°07.2	· · 10.9	318°44.8	· · 30.8	Mirfak	308°28.3	49°57.2
10	328°11.5	327°40.3	32.4	215°47.4	51.0	255°09.4	10.9	333°47.0	30.7	Aldebaran	290°39.6	16°33.6
11	343°13.9	342°44.1	31.7	230°49.2	50.8	270°11.5	11.0	348°49.1	30.6	Rigel	281°03.8	-8°10.5
12	358°16.4	357°48.0	N09°31.0	245°51.0	N24°50.7	285°13.6	N22°11.0	3°51.3	S04°30.5	Capella	280°21.8	46°01.6
13	13°18.8	12°51.8	30.3	260°52.8	50.5	300°15.7	11.0	18°53.5	30.3	Bellatrix	278°22.7	6°22.3
14	28°21.3	27°55.7	29.6	275°54.6	50.3	315°17.8	11.1	33°55.7	30.2	Elnath	278°01.7	28°37.8
15	43°23.8	42°59.5	· · 28.9	290°56.4	· · 50.2	330°19.9	· · 11.1	48°57.9	· · 30.1	Alnilam	275°37.6	-1°11.3
16	58°26.2	58°03.4	28.3	305°58.2	50.0	345°22.1	11.2	64°00.0	30.0	Betelgeuse	270°51.9	7°24.6
17	73°28.7	73°07.2	27.6	321°00.0	49.8	0°24.2	11.2	79°02.2	29.9	Canopus	263°52.3	-52°42.8
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	Sirius	258°25.9	-16°45.0
19	103°33.6	103°14.9	26.2	351°03.6	49.5	30°28.4	11.3	109°06.6	29.6	Adara	255°05.6	-29°00.6
20	118°36.1	118°18.8	25.5	6°05.4	49.3	45°30.5	11.4	124°08.8	29.5	Procyon	244°50.4	5°09.7
21	133°38.6	133°22.7	· · 24.8	21°07.2	· · 49.2	60°32.6	· · 11.4	139°11.0	· · 29.4	Pollux	243°16.8	27°58.0
22	148°41.0	148°26.5	24.1	36°09.0	49.0	75°34.7	11.4	154°13.1	29.3	Avior	234°14.4	-50°35.6
23	163°43.5	163°30.4	23.4	51°10.8	48.9	90°36.9	11.5	169°15.3	29.1	Suhail	222°45.9	-43°32.3
Mer.pass.:12:06		v3.9 d-0.7 m-3.8		v1.8 d-0.2 m0.2		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Miaplacidus	221°37.7	-69°49.4
										Alphard	217°47.3	-8°46.2
										Regulus	207°33.9	11°50.5
										Dubhe	193°40.1	61°36.9
										Denebola	182°24.4	14°25.7
										Gienah	175°43.1	-17°41.0
										Acrux	172°59.3	-63°14.4
										Gacrux	171°51.0	-57°15.3
										Alioth	166°12.3	55°49.2
										Spica	158°21.8	-11°17.7
										Alkaid	152°51.4	49°11.0
										Hadar	148°35.3	-60°29.6
										Menkent	147°57.1	-36°29.7
										Arcturus	145°47.3	19°03.1
										Rigel Kent.	139°39.6	-60°56.3
										Kochab	137°18.9	74°02.8
										Zuben'ubi	136°55.6	-16°08.9
										Alphecca	126°03.4	26°37.5
										Antares	112°15.5	-26°29.3
										Atria	107°09.5	-69°04.1
										Sabik	102°02.5	-15°45.4
										Shaula	96°10.1	-37°07.2
										Rasalhague	95°58.4	12°32.3
										Eltanin	90°42.1	51°28.7
										Kaus Aust.	83°32.3	-34°22.3
										Vega	80°33.2	38°48.0
										Nunki	75°47.7	-26°15.9
										Altair	62°00.0	8°55.8
										Peacock	53°05.8	-56°39.1
										Deneb	49°26.0	45°21.9
										Enif	33°38.9	9°59.3
										Al Na'ir	27°33.1	-46°50.3
										Fomalhaut	15°14.7	-29°29.4
										Scheat	13°45.5	28°13.0
										Markab	13°30.1	15°20.3
										Mar 20 Thu	SHA	Mer.pass
										Venus	359°14.9	12:09
										Mars	247°42.5	19:36
										Jupiter	287°01.4	16:58
										Saturn	5°38.4	11:45
										Mar 21 Fri	SHA	Mer.pass
										Venus	359°48.3	12:03
										Mars	247°26.6	19:33
										Jupiter	286°53.0	16:55
										Saturn	5°31.5	11:41
										Mar 22 Sat	SHA	Mer.pass
										Venus	0°21.6	11:56
										Mars	247°10.2	19:30
										Jupiter	286°44.5	16:52
										Saturn	5°24.7	11:38
										Horizontal parallax		
										Venus:		0.5
										Mars:		0.1
Mer.pass.:11:59		v3.9 d-0.7 m-3.8		v1.8 d-0.2 m0.2		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2				

h		Sun			Moon									
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight	
									Naut.	Civil			Civil	Naut.
0	178°07.4	S00°08.9	299°05.2	11.5'	S25°12.5	-7.3'	54.4'							
1	193°07.6	07.9	313°35.7	11.4'	25°19.8	-7.2'	54.4'	N 72°	03:13	04:44	05:52	18:25	19:34	21:06
2	208°07.7	06.9	328°06.1	11.4'	25°27.0	-7.1'	54.4'	N 70°	03:33	04:52	05:54	18:23	19:25	20:45
3	223°07.9	06.0	342°36.4	11.3'	25°34.0	-7.0'	54.4'	68°	03:49	04:59	05:55	18:21	19:18	20:29
4	238°08.1	05.0	357°06.7	11.2'	25°41.0	-6.9'	54.4'	66°	04:01	05:05	05:56	18:20	19:12	20:16
5	253°08.3	04.0	11°36.8	11.1'	25°47.8	-6.8'	54.5'	64°	04:11	05:09	05:57	18:19	19:07	20:06
6	268°08.5	S00°03.0	26°06.9	11.1'	S25°54.5	-6.7'	54.5'	62°	04:19	05:13	05:57	18:18	19:03	19:57
7	283°08.7	02.0	40°37.0	11.0'	26°01.1	-6.5'	54.5'	60°	04:26	05:17	05:58	18:17	18:59	19:50
8	298°08.9	01.0	55°06.9	10.9'	26°07.6	-6.4'	54.5'	N 58°	04:33	05:19	05:59	18:17	18:56	19:43
9	313°09.0	S00°00.0	69°36.8	10.8'	26°13.9	-6.3'	54.5'	56°	04:38	05:22	05:59	18:16	18:53	19:38
10	328°09.2	N00°01.0	84°06.6	10.8'	26°20.2	-6.2'	54.5'	54°	04:42	05:24	06:00	18:16	18:51	19:33
11	343°09.4	01.9	98°36.3	10.7'	26°26.3	-6.1'	54.6'	52°	04:46	05:26	06:00	18:15	18:49	19:29
12	358°09.6	N00°02.9	113°06.0	10.6'	S26°32.3	-5.9'	54.6'	50°	04:50	05:28	06:00	18:15	18:47	19:25
13	13°09.8	03.9	127°35.5	10.5'	26°38.2	-5.8'	54.6'	45°	04:57	05:32	06:01	18:14	18:43	19:18
14	28°10.0	04.9	142°05.0	10.5'	26°43.9	-5.7'	54.6'	N 40°	05:03	05:35	06:02	18:13	18:40	19:12
15	43°10.1	05.9	156°34.5	10.4'	26°49.5	-5.6'	54.6'	35°	05:07	05:37	06:02	18:13	18:38	19:07
16	58°10.3	06.9	171°03.8	10.3'	26°55.1	-5.4'	54.6'	30°	05:11	05:39	06:02	18:12	18:36	19:04
17	73°10.5	07.9	185°33.1	10.2'	27°00.4	-5.3'	54.7'	20°	05:16	05:41	06:03	18:11	18:33	18:59
18	88°10.7	N00°08.9	200°02.3	10.2'	S27°05.7	-5.2'	54.7'	N 10°	05:18	05:43	06:04	18:11	18:32	18:56
19	103°10.9	09.8	214°31.4	10.1'	27°10.8	-5.1'	54.7'	0°	05:19	05:43	06:04	18:10	18:31	18:55
20	118°11.1	10.8	229°00.5	10.0'	27°15.8	-4.9'	54.7'	S 10°	05:19	05:43	06:04	18:10	18:31	18:55
21	133°11.3	11.8	243°29.5	10.0'	27°20.7	-4.8'	54.7'	20°	05:17	05:42	06:04	18:10	18:32	18:57
22	148°11.5	12.8	257°58.4	9.9'	27°25.4	-4.7'	54.8'	30°	05:12	05:40	06:04	18:10	18:33	19:01
23	163°11.6	13.8	272°27.3	9.8'	27°30.0	-4.5'	54.8'	35°	05:09	05:39	06:04	18:10	18:35	19:04
	SD.=16.1	d=1.0			S.D.=14.8			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
								S 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
								S 60°	04:31	05:21	06:03	18:10	18:51	19:41
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset		
									Thu	Fri	Sat	Thu	Fri	Sat
0	178°11.8	N00°14.8	286°56.1	9.8'	S27°34.5	-4.4'	54.8'	N 72°	██	██	██	██	██	██
1	193°12.0	15.8	301°24.8	9.7'	27°38.8	-4.3'	54.8'	N 70°	██	██	██	██	██	██
2	208°12.2	16.8	315°53.4	9.6'	27°43.0	-4.1'	54.8'	68°	██	██	██	██	██	██
3	223°12.4	17.7	330°22.0	9.6'	27°47.1	-4.0'	54.9'	66°	██	██	██	██	██	██
4	238°12.6	18.7	344°50.5	9.5'	27°51.0	-3.9'	54.9'	64°	03:35	██	██	04:39	██	██
5	253°12.8	19.7	359°19.0	9.4'	27°54.8	-3.7'	54.9'	62°	02:25	██	██	05:49	██	██
6	268°12.9	N00°20.7	13°47.4	9.4'	S27°58.5	-3.6'	54.9'	60°	01:50	03:26	04:43	06:25	06:35	07:09
7	283°13.1	21.7	28°15.7	9.3'	28°02.0	-3.5'	54.9'	N 58°	01:25	02:49	03:59	06:51	07:12	07:54
8	298°13.3	22.7	42°44.0	9.2'	28°05.4	-3.3'	55.0'	56°	01:05	02:23	03:30	07:11	07:38	08:23
9	313°13.5	23.7	57°12.2	9.2'	28°08.6	-3.2'	55.0'	54°	00:49	02:03	03:07	07:28	07:59	08:46
10	328°13.7	24.7	71°40.3	9.1'	28°11.8	-3.0'	55.0'	52°	00:34	01:46	02:49	07:43	08:16	09:04
11	343°13.9	25.6	86°08.4	9.1'	28°14.7	-2.9'	55.0'	50°	00:22	01:31	02:33	07:56	08:31	09:20
12	358°14.1	N00°26.6	100°36.4	9.0'	S28°17.6	-2.8'	55.0'	45°	--	01:01	02:01	08:22	09:01	09:51
13	13°14.2	27.6	115°04.4	8.9'	28°20.2	-2.6'	55.1'	N 40°	--	00:38	01:37	08:43	09:25	10:16
14	28°14.4	28.6	129°32.3	8.9'	28°22.8	-2.5'	55.1'	35°	--	00:19	01:17	09:00	09:44	10:36
15	43°14.6	29.6	144°00.1	8.8'	28°25.2	-2.3'	55.1'	30°	--	00:03	01:00	09:15	10:01	10:53
16	58°14.8	30.6	158°27.9	8.8'	28°27.4	-2.2'	55.1'	20°	23:36	--	00:31	09:41	10:29	11:22
17	73°15.0	31.6	172°55.7	8.7'	28°29.5	-2.0'	55.2'	N 10°	23:12	--	00:06	10:03	10:53	11:47
18	88°15.2	N00°32.6	187°23.4	8.7'	S28°31.5	-1.9'	55.2'	0°	22:50	23:43	--	10:24	11:16	12:10
19	103°15.4	33.5	201°51.0	8.6'	28°33.3	-1.7'	55.2'	S 10°	22:29	23:20	--	10:45	11:38	12:33
20	118°15.5	34.5	216°18.6	8.6'	28°35.0	-1.6'	55.2'	20°	22:05	22:56	23:51	11:07	12:02	12:57
21	133°15.7	35.5	230°46.2	8.5'	28°36.5	-1.5'	55.3'	30°	21:38	22:27	23:23	11:33	12:31	13:26
22	148°15.9	36.5	245°13.7	8.5'	28°37.9	-1.3'	55.3'	35°	21:22	22:10	23:06	11:48	12:47	13:43
23	163°16.1	37.5	259°41.1	8.4'	28°39.1	-1.2'	55.3'	40°	21:04	21:50	22:46	12:06	13:07	14:03
	SD.=16.1	d=1.0			S.D.=14.9			45°	20:42	21:26	22:23	12:28	13:31	14:27
								S 50°	20:14	20:56	21:52	12:55	14:01	14:58
								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	16:21
								S 60°	18:32	18:53	19:49	14:35	16:03	17:01
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Mer.	Moon		Age
									Eqn. of Time	Pass	Upper Mer. Pass.	Lower Mer. Pass.	20-22	
									00 ^h	12 ^h	hh:mm	hh:mm	69-50%	
									mm:ss	mm:ss	hh:mm	hh:mm		
0	178°16.3	N00°38.5	274°08.5	8.4'	S28°40.2	-1.0'	55.3'	20	07:30	07:22	12:07	04:12	16:37	
1	193°16.5	39.5	288°35.9	8.3'	28°41.1	-0.9'	55.4'	21	07:13	07:04	12:07	05:03	17:29	
2	208°16.7	40.5	303°03.2	8.3'	28°41.9	-0.7'	55.4'	22	06:55	06:46	12:07	05:56	18:24	
3	223°16.9	41.4	317°30.5	8.3'	28°42.5	-0.6'	55.4'							
4	238°17.0	42.4	331°57.7	8.2'	28°43.0	-0.4'	55.5'							
5	253°17.2	43.4	346°24.9	8.2'	28°43.3	-0.2'	55.5'							
6	268°17.4	N00°44.4	0°52.1	8.1'	S28°43.5	-0.1'	55.5'							
7	283°17.6	45.4	15°19.2	8.1'	28°43.5	0.1'	55.5'							
8	298°17.8	46.4	29°46.3	8.1'	28°43.4	0.2'	55.6'							
9	313°18.0	47.4	44°13.3	8.0'	28°43.1	0.4'	55.6'							
10	328°18.2	48.3	58°40.3	8.0'	28°42.7	0.5'	55.6'							
11	343°18.4	49.3	73°07.3	8.0'	28°42.1	0.7'	55.7'							
12	358°18.5	N00°50.3	87°34.3	7.9'	S28°41.3	0.8'	55.7'							
13	13°18.7	51.3	102°01.2	7.9'	28°40.4	1.0'	55.7'							
14	28°18.9	52.3	116°28.1	7.9'	28°39.3	1.1'	55.7'							
15	43°19.1	53.3	130°55.0	7.9'	28°38.1	1.3'	55.8'							
16	58°19.3	54.3	145°21.9	7.8'	28°36.7	1.5'	55.8'							
17	73°19.5	55.2	159°48.7	7.8'	28°35.2	1.6'	55.8'							
18	88°19.7	N00°56.2	174°15.5	7.8'	S28°33.5	1.8'	55.9'							
19	103°19.9	57.2	188°42.3	7.8'	28°31.7	1.9'	55.9'							
20	118°20.0	58.2	203°09.1	7.8'	28°29.7	2.1'	55.9'							
21	133°20.2	00°59.2	217°35.8	7.7'	28°27.5	2.2'	56.0'							
22	148°20.4	01°00.2	232°02.6	7.7'	28°25.2	2.4'	56.0'							
23	163°20.6	01.2	246°29.3	7.7'										

March 23, 24, 25 (Sun., Mon., Tue.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	180°44.2	181°39.0	N08°46.9	67°37.6	N24°40.6	107°20.1	N22°13.7	186°02.2	S04°23.3	Alpheratz	357°35.0	29°13.7	
1	195°46.7	196°42.9	46.1	82°39.4	40.5	122°22.2	13.7	201°04.4	23.2	Ankaa	353°07.4	-42°10.2	
2	210°49.2	211°46.7	45.3	97°41.1	40.3	137°24.3	13.8	216°06.5	23.1	Schedar	349°31.5	56°40.5	
3	225°51.6	226°50.5	· · 44.5	112°42.9	· · 40.1	152°26.4	· · 13.8	231°08.7	· · 23.0	Diphda	348°47.3	-17°51.0	
4	240°54.1	241°54.4	43.7	127°44.6	39.9	167°28.5	13.9	246°10.9	22.8	Achernar	335°20.6	-57°06.7	
5	255°56.6	256°58.2	42.9	142°46.4	39.8	182°30.6	13.9	261°13.1	22.7	Hamal	327°51.3	23°34.9	
6	270°59.0	272°02.0	N08°42.2	157°48.1	N24°39.6	197°32.7	N22°14.0	276°15.3	S04°22.6	Polaris	314°19.1	89°22.4	
7	286°01.5	287°05.9	41.4	172°49.9	39.4	212°34.8	14.0	291°17.4	22.5	Akamars	315°11.9	-40°12.4	
8	301°03.9	302°09.7	40.6	187°51.6	39.3	227°36.9	14.1	306°19.6	22.4	Menkar	314°06.2	4°11.2	
9	316°06.4	317°13.5	· · 39.8	202°53.4	· · 39.1	242°39.0	· · 14.1	321°21.8	· · 22.2	Mirfak	308°28.4	49°57.2	
10	331°08.9	332°17.4	39.0	217°55.1	38.9	257°41.1	14.2	336°24.0	22.1	Aldebaran	290°39.6	16°33.6	
11	346°11.3	347°21.2	38.2	232°56.9	38.7	272°43.2	14.2	351°26.2	22.0	Rigel	281°03.8	-8°10.5	
12	1°13.8	2°25.0	N08°37.4	247°58.6	N24°38.6	287°45.3	N22°14.2	6°28.3	S04°21.9	Capella	280°21.8	46°01.6	
13	16°16.3	17°28.8	36.6	263°00.4	38.4	302°47.4	14.3	21°30.5	21.8	Bellatrix	278°22.8	6°22.3	
14	31°17.7	32°32.7	35.8	278°02.1	38.2	317°49.5	14.3	36°32.7	21.7	Elnath	278°01.7	28°37.8	
15	46°21.2	47°36.5	· · 35.0	293°03.8	· · 38.0	332°51.6	· · 14.4	51°34.9	· · 21.5	Alnilam	275°37.6	-1°11.3	
16	61°23.7	62°40.3	34.2	308°05.6	37.9	347°53.6	14.4	66°37.1	21.4	Betelgeuse	270°51.9	7°24.6	
17	76°26.1	77°44.1	33.4	323°07.3	37.7	2°55.7	14.5	81°39.3	21.3	Canopus	263°52.3	-52°42.8	
18	91°28.6	92°48.0	N08°32.6	338°09.1	N24°37.5	17°57.8	N22°14.5	96°41.4	S04°21.2	Sirius	258°25.9	-16°45.0	
19	106°31.1	107°51.8	31.7	353°10.8	37.3	32°59.9	14.6	111°43.6	21.1	Adara	255°05.7	-29°00.6	
20	121°33.5	122°55.6	30.9	8°12.5	37.2	48°02.0	14.6	126°45.8	20.9	Procyon	244°50.4	5°09.7	
21	136°36.0	137°59.4	· · 30.1	23°14.3	· · 37.0	63°04.1	· · 14.7	141°48.0	· · 20.8	Pollux	243°16.8	27°58.0	
22	151°38.4	153°03.2	29.3	38°16.0	36.8	78°06.2	14.7	156°50.2	20.7	Avior	234°14.4	-59°35.6	
23	166°40.9	168°07.0	28.5	53°17.7	36.7	93°08.3	14.8	171°52.3	20.6	Suhail	222°45.9	-43°32.3	
Mer.pass.:11:55		v3.8 d-0.8 m-3.8		v1.8 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Miaplacidus		221°37.7	-69°49.4
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Alphard		217°47.3	-8°46.2
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Regulus		207°33.9	11°50.5
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Dubhe		193°40.1	61°36.9
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Denebola		182°24.4	14°25.7
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Gienah		175°43.1	-17°41.1
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Acrux		172°59.3	-63°14.4
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Gacrux		171°50.9	-57°15.3
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Alioth		166°12.3	55°49.2
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Spica		158°21.8	-11°17.7
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Alkaid		152°51.4	49°11.0
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Hadar		148°35.3	-60°29.6
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Menkent		147°57.1	-36°29.7
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Arcturus		145°47.3	19°03.1
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Rigel Kent.		139°39.6	-60°56.3
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Kochab		137°18.8	74°02.8
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Zuben'ubi		136°55.6	-16°08.9
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Alphecca		126°03.4	26°37.5
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Antares		112°15.5	-26°29.3
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Atria		107°09.4	-69°04.1
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Sabik		102°02.5	-15°45.4
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Shaula		96°10.1	-37°07.2
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Rasalhague		95°58.4	12°32.3
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Eltanin		90°42.1	51°28.7
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Kaus Aust.		83°32.3	-34°22.3
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Vega		80°33.2	38°48.0
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Nunki		75°47.6	-26°15.9
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Altair		62°00.0	8°55.8
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Peacock		53°05.7	-56°39.1
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Deneb		49°26.0	45°21.9
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Enif		33°38.9	9°59.3
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Al Na'ir		27°33.1	-46°50.3
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Fomalhaut		15°14.7	-29°29.4
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Scheat		13°45.4	28°13.0
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Markab		13°30.1	15°20.3
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Mar 23 Sun		SHA	Mer.pass
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Venus		0°54.8	11:50
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Mars		246°53.4	19:27
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Jupiter		286°35.8	16:48
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Saturn		5°17.9	11:34
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Mar 24 Mon		SHA	Mer.pass
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Venus		1°27.5	11:44
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Mars		246°36.1	19:24
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Jupiter		286°27.0	16:45
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Saturn		5°11.2	11:31
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Mar 25 Tue		SHA	Mer.pass
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Venus		1°59.5	11:38
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Mars		246°18.4	19:22
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Jupiter		286°18.1	16:42
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Saturn		5°04.4	11:27
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Horizontal parallax			
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Venus:		0.5	
Mer.pass.:11:51		v3.8 d-0.8 m-3.8		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Mars:		0.1	

March 26, 27, 28 (Wed., Thu., Fri.)


Aries		Venus		Mars		Jupiter		Saturn		Stars			
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	183°41.7	186°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°41.4	14.7	Ankaa	353°07.4	-42°10.2	
2	213°46.6	216°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°47.3	-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°01.0	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°20.2	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	Akamars	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	13.8	Menkar	314°06.2	4°11.3	
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	334°06.3	336°49.6	38.6	219°58.7	26.1	260°11.4	17.5	339°01.1	13.6	Aldebaran	290°39.6	16°33.6	
11	349°08.8	351°53.4	37.7	235°00.4	25.9	275°13.5	17.5	354°03.3	13.5	Rigel	281°03.8	-8°10.5	
12	4°11.2	6°57.1	N07°36.8	250°02.1	N24°25.7	290°15.6	N22°17.6	9°05.5	S04°13.4	Capella	280°21.8	46°01.6	
13	19°13.7	22°00.8	36.0	265°03.8	25.3	305°17.7	17.6	24°07.6	13.3	Bellatrix	278°22.8	6°22.3	
14	34°16.1	37°04.5	35.1	280°05.5	25.5	320°19.8	17.6	39°09.8	13.1	Elnath	278°01.7	28°37.8	
15	49°18.6	52°08.2	· · 34.2	295°07.2	· · 25.2	335°21.8	· · 17.7	54°12.0	· · 13.0	Alnilam	275°37.6	-1°11.2	
16	64°21.1	67°11.9	33.3	310°08.9	25.0	350°23.9	17.7	69°14.2	12.9	Betelgeuse	270°51.9	7°24.6	
17	79°23.5	82°15.6	32.5	325°10.6	24.8	5°26.0	17.8	84°16.4	12.8	Canopus	263°52.3	-52°42.8	
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	Sirius	258°26.0	-16°45.0	
19	109°28.5	112°23.0	30.7	355°13.9	24.4	35°30.2	17.9	114°20.7	12.6	Adara	255°05.7	-29°00.6	
20	124°30.9	127°26.7	29.8	10°15.6	24.2	50°32.2	17.9	129°22.9	12.4	Procyon	244°50.5	5°09.7	
21	139°33.4	142°30.4	· · 28.9	25°17.3	· · 24.1	65°34.3	· · 18.0	144°25.1	· · 12.3	Pollux	243°16.9	27°58.0	
22	154°35.9	157°34.1	28.1	40°19.0	23.9	80°36.4	18.0	159°27.3	12.2	Avior	234°14.4	-59°35.6	
23	169°38.3	172°37.8	27.2	55°20.6	23.7	95°38.5	18.1	174°29.5	12.1	Suhail	222°45.9	-43°32.3	
Mer.pass.:11:43		v3.7 d-0.9 m-3.9		v1.7 d-0.2 m0.3		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2		Miaplacidus		221°37.7	-69°49.4
										Alphard		217°47.4	-8°46.2
										Regulus		207°33.9	11°50.5
										Dubhe		193°40.1	61°36.9
										Denebola		182°24.4	14°25.7
										Gienah		175°43.1	-17°41.1
										Acrux		172°59.3	-63°14.4
										Gacrux		171°50.9	-57°15.3
										Alioth		166°12.3	55°49.2
										Spica		158°21.8	-11°17.7
										Alkaid		152°51.4	49°11.0
										Hadar		148°35.2	-60°29.6
										Menkent		147°57.1	-36°29.7
										Arcturus		145°47.3	19°03.1
										Rigel Kent.		139°39.6	-60°56.3
										Kochab		137°18.8	74°02.8
										Zuben'ubi		136°55.6	-16°08.9
										Alphecca		126°03.4	26°37.5
										Antares		112°15.5	-26°29.3
										Atria		107°09.4	-69°04.1
										Sabik		102°02.5	-15°45.4
										Shaula		96°10.1	-37°07.3
										Rasalhague		95°58.3	12°32.3
										Eltanin		90°42.0	51°28.7
										Kaus Aust.		83°32.3	-34°22.3
										Vega		80°33.2	38°48.0
										Nunki		75°47.6	-26°15.9
										Altair		62°00.0	8°55.8
										Peacock		53°05.7	-56°39.1
										Deneb		49°26.0	45°21.9
										Enif		33°38.9	9°59.3
										Al Na'ir		27°33.1	-46°50.3
										Fomalhaut		15°14.7	-29°29.4
										Scheat		13°45.4	28°13.0
										Markab		13°30.1	15°20.3
										Mar 26 Wed		SHA	Mer.pass
										Venus		2°30.7	11:32
										Mars		246°00.2	19:19
										Jupiter		286°09.0	16:38
										Saturn		4°57.6	11:24
										Mar 27 Thu		SHA	Mer.pass
										Venus		3°00.7	11:26
										Mars		245°41.5	19:16
										Jupiter		285°59.8	16:35
										Saturn		4°50.9	11:20
										Mar 28 Fri		SHA	Mer.pass
										Venus		3°29.5	11:21
										Mars		245°22.5	19:14
										Jupiter		285°50.4	16:32
										Saturn		4°44.1	11:17
										Horizontal parallax			
										Venus:		0.5	
										Mars:		0.1	
Mer.pass.:11:35		v3.6 d-0.9 m-4.0		v1.7 d-0.2 m0.4		v2.1 d0.0 m-2.0		v2.2 d0.1 m1.2					

March 29, 30, 31 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec					
0	186°39.1	190°36.0	N06°43.5	71°42.1	N24°14.4	112°19.9	N22°20.3	191°16.5	S04°06.3					Alpheratz	357°35.0	29°13.7				
1	201°41.5	205°39.6	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°20.8	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°47.3	-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°51.4	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°21.2	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					Akamars	315°11.9	-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°11.3				
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°32.7	252°01.8	N24°12.1	292°44.7	N22°20.9	11°42.7	S04°04.9					Capella	280°21.8	46°01.6				
13	22°11.1	26°22.2	31.8	267°03.4	11.9	307°46.8	20.9	26°44.9	04.8					Bellatrix	278°22.8	6°22.3				
14	37°13.6	41°25.7	31.0	282°05.0	11.7	322°48.8	21.0	41°47.1	04.7					Elnath	278°01.8	28°37.8				
15	52°16.0	56°29.3	· · 30.1	297°06.7	· · 11.5	337°50.9	· · 21.0	56°49.2	· · 04.6					Alnilam	275°37.6	-1°11.2				
16	67°18.5	71°32.8	29.2	312°08.3	11.3	352°52.9	21.1	71°51.4	04.5					Betelgeuse	270°52.0	7°24.6				
17	82°21.0	86°36.3	28.3	327°09.9	11.1	7°55.0	21.1	86°53.6	04.4					Canopus	263°52.4	-52°42.8				
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	S04°04.2					Sirius	258°26.0	-16°45.0				
19	112°25.9	116°43.3	26.5	357°13.2	10.7	37°59.1	21.2	116°58.0	04.1					Adara	255°05.7	-29°00.6				
20	127°28.3	131°46.9	25.6	12°14.8	10.5	53°01.2	21.3	132°00.2	04.0					Procyon	244°50.5	5°09.7				
21	142°30.8	146°50.4	· · 24.7	27°16.5	· · 10.3	68°03.2	· · 21.3	147°02.4	· · 03.9					Pollux	243°16.9	27°58.0				
22	157°33.3	161°53.9	23.8	42°18.1	10.1	83°05.3	21.4	162°04.5	03.8					Avior	234°14.4	-50°35.7				
23	172°35.7	176°57.4	22.9	57°19.7	09.9	98°07.4	21.4	177°06.7	03.7					Suhail	222°45.9	-43°32.3				
Mer.pass.:11:31			v3.6 d-0.9 m-4.0			v1.6 d-0.2 m0.4			v2.1 d0.0 m-2.0			v2.2 d0.1 m1.2			Miaplacidus			221°37.8	-69°49.5	
															Alphard			217°47.4	-8°46.2	
															Regulus			207°34.0	11°50.6	
															Dubhe			193°40.1	61°36.9	
															Denebola			182°24.4	14°25.8	
															Gienah			175°43.1	-17°41.1	
															Acrux			172°59.3	-63°14.4	
															Gacrux			171°50.9	-57°15.4	
															Alioth			166°12.3	55°49.2	
															Spica			158°21.8	-11°17.7	
															Alkaid			152°51.4	49°11.0	
															Hadar			148°35.2	-60°29.7	
															Menkent			147°57.1	-36°29.7	
															Arcturus			145°47.3	19°03.1	
															Rigel Kent.			139°39.6	-60°56.3	
															Kochab			137°18.7	74°02.8	
															Zuben'ubi			136°55.6	-16°08.9	
															Alphecca			126°03.4	26°37.5	
															Antares			112°15.4	-26°29.3	
															Atria			107°09.3	-69°04.2	
															Sabik			102°02.5	-15°45.4	
															Shaula			96°10.0	-37°07.3	
															Rasalhague			95°58.3	12°32.3	
															Eltanin			90°42.0	51°28.7	
															Kaus Aust.			83°32.2	-34°22.3	
															Vega			80°33.1	38°48.0	
															Nunki			75°47.6	-26°15.9	
															Altair			62°00.0	8°55.8	
															Peacock			53°05.7	-56°39.1	
															Deneb			49°25.9	45°21.9	
															Enif			33°38.9	9°59.3	
															Al Na'ir			27°33.1	-46°50.3	
															Fomalhaut			15°14.7	-29°29.4	
															Scheat			13°45.4	28°13.0	
															Markab			13°30.1	15°20.3	
															Mar 29 Sat			SHA	Mer.pass	
															Venus			3°56.9	11:15	
															Mars			245°03.0	19:11	
															Jupiter			285°40.9	16:28	
															Saturn			4°37.4	11:13	
															Mar 30 Sun			SHA	Mer.pass	
															Venus			4°22.7	11:09	
															Mars			244°43.2	19:09	
															Jupiter			285°31.2	16:25	
															Saturn			4°30.7	11:10	
															Mar 31 Mon			SHA	Mer.pass	
															Venus			4°46.7	11:04	
															Mars			244°22.9	19:06	
															Jupiter			285°21.4	16:22	
															Saturn			4°24.0	11:06	
															Horizontal parallax					
															Venus:			0.5		
															Mars:			0.1		
Mer.pass.:11:23			v3.4 d-0.9 m-4.1			v1.6 d-0.2 m0.4			v2.1 d0.0 m-2.0			v2.2 d0.1 m1.2								

April 01, 02, 03 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		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	114°48.0	N22°23.7	193°53.8	S03°58.0	Alpheratz	357°35.0	29°13.7
1	204°38.9	209°48.8	38.2	88°40.3	23°59.9	129°50.0	23.7	208°56.0	57.9	Ankaa	353°07.4	-42°10.2
2	219°41.4	224°52.1	37.4	103°41.9	59.7	144°52.1	23.8	223°58.2	57.7	Schedar	349°31.5	56°40.5
3	234°43.9	239°55.4	· · 36.5	118°43.5	· · 59.5	159°54.1	· · 23.8	239°00.4	· · 57.6	Diphda	348°47.3	-17°51.0
4	249°46.3	254°58.8	35.6	133°45.1	59.3	174°56.2	23.9	254°02.6	57.5	Achernar	335°20.6	-57°06.6
5	264°48.8	270°02.1	34.7	148°46.7	59.1	189°58.2	23.9	269°04.8	57.4	Hamal	327°51.4	23°34.9
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	S03°57.3	Polaris	314°21.8	89°22.4
7	294°53.7	300°08.8	32.9	178°49.9	58.6	220°02.3	24.0	299°09.1	57.2	Akamar	315°12.0	-40°12.4
8	309°56.2	315°12.1	32.1	193°51.5	58.4	235°04.4	24.1	314°11.3	57.1	Menkar	314°06.2	4°11.2
9	324°58.7	330°15.4	· · 31.2	208°53.1	· · 58.2	250°06.4	· · 24.1	329°13.5	· · 56.9	Mirfak	308°28.4	49°57.1
10	340°01.1	345°18.7	30.3	223°54.7	58.0	265°08.5	24.2	344°15.7	56.8	Aldebaran	290°39.6	16°33.6
11	355°03.6	0°22.0	29.4	238°56.3	57.8	280°10.5	24.2	359°17.9	56.7	Rigel	281°03.8	-8°10.5
12	10°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	Capella	280°21.8	46°01.6
13	25°08.5	30°28.7	27.7	268°59.4	57.4	310°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°16.6	24.4	44°24.5	56.4	Elnath	278°01.8	28°37.8
15	55°13.4	60°35.3	· · 25.9	299°02.6	· · 57.0	340°18.7	· · 24.4	59°26.6	· · 56.2	Alnilam	275°37.6	-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°26.0	-16°45.0
19	115°23.3	120°48.4	22.4	359°08.9	56.2	40°26.9	24.6	119°35.4	55.8	Adara	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°50.5	5°09.7
21	145°28.2	150°55.0	· · 20.7	29°12.1	· · 55.7	70°31.0	· · 24.7	149°39.8	· · 55.6	Pollux	243°16.9	27°58.0
22	160°30.7	165°58.2	19.8	44°13.7	55.5	85°33.0	24.7	164°42.0	55.4	Avior	234°14.5	-59°35.7
23	175°33.2	181°01.5	18.9	59°15.3	55.3	100°35.0	24.8	179°44.1	55.3	Suhail	222°45.9	-43°32.3
Mer.pass.:11:19		v3.3 d-0.9 m-4.1		v1.6 d-0.2 m0.5		v2.0 d0.0 m-2.0		v2.2 d0.1 m1.2		Miaplacidus	221°37.8	-69°49.5
										Alphard	217°47.4	-8°46.2
										Regulus	207°34.0	11°50.6
										Dubhe	193°40.1	61°37.0
										Denebola	182°24.4	14°25.8
										Gienah	175°43.1	-17°41.1
										Acrux	172°59.3	-63°14.4
										Gacrux	171°50.9	-57°15.4
										Alioth	166°12.3	55°49.3
										Spica	158°21.8	-11°17.7
										Alkaid	152°51.4	49°11.1
										Hadar	148°35.2	-60°29.7
										Menkent	147°57.1	-36°29.7
										Arcturus	145°47.3	19°03.1
										Rigel Kent.	139°39.5	-60°56.3
										Kochab	137°18.7	74°02.8
										Zuben'ubi	136°55.6	-16°08.9
										Alphecca	126°03.3	26°37.5
										Antares	112°15.4	-26°29.3
										Atria	107°09.3	-69°04.2
										Sabik	102°02.4	-15°45.4
										Shaula	96°10.0	-37°07.3
										Rasalhague	95°58.3	12°32.3
										Eltanin	90°42.0	51°28.7
										Kaus Aust.	83°32.2	-34°22.3
										Vega	80°33.1	38°48.0
										Nunki	75°47.6	-26°15.9
										Altair	61°59.9	8°55.8
										Peacock	53°05.7	-56°39.1
										Deneb	49°25.9	45°21.9
										Enif	33°38.9	9°59.3
										Al Na'ir	27°33.0	-46°50.2
										Fomalhaut	15°14.7	-29°29.3
										Scheat	13°45.4	28°13.0
										Markab	13°30.0	15°20.3
										Apr 01 Tue	SHA	Mer.pass
										Venus	5°08.9	10:59
										Mars	244°02.3	19:03
										Jupiter	285°11.5	16:19
										Saturn	4°17.4	11:03
										Apr 02 Wed	SHA	Mer.pass
										Venus	5°29.2	10:53
										Mars	243°41.2	19:01
										Jupiter	285°01.5	16:15
										Saturn	4°10.7	10:59
										Apr 03 Thu	SHA	Mer.pass
										Venus	5°47.3	10:48
										Mars	243°19.9	18:58
										Jupiter	284°51.3	16:12
										Saturn	4°04.1	10:56
										Horizontal parallax		
										Venus:		0.5
										Mars:		0.1
Mer.pass.:11:11		v3.2 d-0.9 m-4.2		v1.6 d-0.2 m0.5		v2.0 d0.0 m-2.0		v2.2 d0.1 m1.2				

h		Sun		Moon										
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight	
									Naut.	Civil			Civil	Naut.
0	179°01.3	N04°33.3	145°53.9	6.0'	N20°54.0	12.8'	60.7'	N 72°	01:22	03:34	04:50	19:20	20:38	23:00
1	194°01.4	34.2	160°18.9	5.9'	21°06.8	12.7'	60.7'	N 70°	02:11	03:51	04:58	19:12	20:20	22:03
2	209°01.6	35.2	174°43.7	5.8'	21°19.4	12.5'	60.7'	68°	02:41	04:04	05:04	19:05	20:06	21:31
3	224°01.8	36.2	189°08.5	5.7'	21°31.9	12.4'	60.7'	66°	03:03	04:15	05:10	18:59	19:54	21:08
4	239°02.0	37.1	203°33.2	5.7'	21°44.2	12.2'	60.7'	64°	03:20	04:24	05:14	18:55	19:45	20:50
5	254°02.2	38.1	217°57.8	5.6'	21°56.4	12.1'	60.6'	62°	03:34	04:32	05:18	18:50	19:37	20:36
6	269°02.4	N04°39.0	232°22.4	5.5'	N22°08.4	11.9'	60.6'	60°	03:45	04:39	05:22	18:47	19:30	20:24
7	284°02.6	40.0	246°46.9	5.4'	22°20.2	11.8'	60.6'	N 58°	03:55	04:44	05:25	18:44	19:24	20:14
8	299°02.7	41.0	261°11.3	5.4'	22°31.9	11.6'	60.6'	56°	04:03	04:49	05:28	18:41	19:19	20:06
9	314°02.9	41.9	275°35.6	5.3'	22°43.5	11.5'	60.5'	54°	04:10	04:54	05:30	18:38	19:14	19:59
10	329°03.1	42.9	289°59.8	5.2'	22°54.9	11.3'	60.5'	52°	04:16	04:58	05:32	18:36	19:10	19:52
11	344°03.3	43.9	304°24.0	5.1'	23°06.1	11.1'	60.5'	50°	04:22	05:01	05:34	18:34	19:07	19:46
12	359°03.5	N04°44.8	318°48.1	5.1'	N23°17.1	11.0'	60.5'	45°	04:34	05:09	05:39	18:29	18:59	19:34
13	14°03.7	45.8	333°12.2	5.0'	23°28.0	10.8'	60.4'	N 40°	04:43	05:15	05:42	18:25	18:53	19:25
14	29°03.8	46.8	347°36.2	4.9'	23°38.7	10.6'	60.4'	35°	04:50	05:20	05:45	18:22	18:48	19:18
15	44°04.0	47.7	2°00.1	4.9'	23°49.3	10.5'	60.4'	30°	04:56	05:24	05:48	18:19	18:43	19:12
16	59°04.2	48.7	16°23.9	4.8'	23°59.6	10.3'	60.3'	20°	05:05	05:31	05:53	18:15	18:37	19:03
17	74°04.4	49.6	30°47.7	4.7'	24°09.9	10.1'	60.3'	N 10°	05:11	05:36	05:57	18:10	18:32	18:56
18	89°04.6	N04°50.6	45°11.4	4.7'	N24°19.9	9.9'	60.3'	0°	05:15	05:39	06:00	18:07	18:27	18:52
19	104°04.8	51.6	59°35.1	4.6'	24°29.7	9.8'	60.3'	S 10°	05:18	05:43	06:04	18:03	18:24	18:49
20	119°04.9	52.5	73°58.6	4.6'	24°39.4	9.6'	60.2'	20°	05:20	05:45	06:07	17:59	18:21	18:47
21	134°05.1	53.5	88°22.2	4.5'	24°48.9	9.4'	60.2'	30°	05:20	05:47	06:11	17:55	18:19	18:47
22	149°05.3	54.5	102°45.6	4.4'	24°58.3	9.2'	60.2'	35°	05:19	05:48	06:14	17:53	18:18	18:47
23	164°05.5	55.4	117°09.1	4.4'	25°07.4	9.1'	60.1'	40°	05:18	05:49	06:16	17:50	18:17	18:48
	SD.=16.0	d=1.0			S.D.=16.6			45°	05:16	05:50	06:19	17:47	18:16	18:50
								S 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
								S 60°	05:02	05:50	06:32	17:34	18:15	19:03
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset		
									Tue	Wed	Thu	Tue	Wed	Thu
0	179°05.7	N04°56.4	131°32.4	4.3'	N25°16.4	8.9'	60.1'	N 72°	☐	☐	☐	☐	☐	☐
1	194°05.9	57.3	145°55.7	4.3'	25°25.2	8.7'	60.1'	N 70°	☐	☐	☐	☐	☐	☐
2	209°06.1	58.3	160°19.0	4.2'	25°33.8	8.5'	60.1'	68°	03:19	☐	☐	01:05	☐	☐
3	224°06.2	04°59.3	174°42.2	4.2'	25°42.2	8.3'	60.0'	66°	04:15	☐	☐	00:10	☐	☐
4	239°06.4	05°00.2	189°05.3	4.1'	25°50.4	8.1'	60.0'	64°	04:48	04:02	☐	--	02:31	☐
5	254°06.6	01.2	203°28.4	4.1'	25°58.5	8.0'	60.0'	62°	05:13	05:04	☐	--	01:29	☐
6	269°06.8	N05°02.1	217°51.5	4.0'	N26°06.3	7.8'	59.9'	60°	05:33	05:39	05:57	--	00:55	02:47
7	284°07.0	03.1	232°14.5	4.0'	26°14.0	7.6'	59.9'	N 58°	05:50	06:04	06:34	--	00:30	02:11
8	299°07.2	04.1	246°37.5	4.0'	26°21.5	7.4'	59.9'	56°	06:04	06:24	07:00	--	00:10	01:44
9	314°07.3	05.0	261°00.4	3.9'	26°28.8	7.2'	59.8'	54°	06:16	06:41	07:21	23:54	--	01:23
10	329°07.5	06.0	275°23.3	3.9'	26°35.9	7.0'	59.8'	52°	06:27	06:56	07:39	23:40	--	01:06
11	344°07.7	06.9	289°46.2	3.8'	26°42.8	6.8'	59.8'	50°	06:36	07:09	07:54	23:28	--	00:51
12	359°07.9	N05°07.9	304°09.0	3.8'	N26°49.5	6.6'	59.7'	45°	06:57	07:35	08:24	23:02	--	00:21
13	14°08.1	08.9	318°31.8	3.8'	26°56.1	6.4'	59.7'	N 40°	07:14	07:56	08:48	22:42	23:58	--
14	29°08.3	09.8	332°54.6	3.8'	27°02.4	6.2'	59.7'	35°	07:28	08:14	09:08	22:25	23:38	--
15	44°08.4	10.8	347°17.3	3.7'	27°08.6	6.1'	59.6'	30°	07:40	08:29	09:25	22:11	23:22	--
16	59°08.6	11.7	1°40.1	3.7'	27°14.5	5.9'	59.6'	20°	08:01	08:55	09:53	21:47	22:54	23:58
17	74°08.8	12.7	16°02.8	3.7'	27°20.3	5.7'	59.6'	N 10°	08:20	09:17	10:18	21:26	22:30	23:33
18	89°09.0	N05°13.7	30°25.4	3.7'	N27°25.9	5.5'	59.5'	0°	08:37	09:38	10:41	21:06	22:08	23:10
19	104°09.2	14.6	44°48.1	3.6'	27°31.2	5.3'	59.5'	S 10°	08:55	09:59	11:03	20:47	21:46	22:47
20	119°09.3	15.6	59°10.7	3.6'	27°36.4	5.1'	59.5'	20°	09:14	10:22	11:28	20:26	21:22	22:22
21	134°09.5	16.5	73°33.4	3.6'	27°41.4	4.9'	59.4'	30°	09:36	10:49	11:57	20:02	20:54	21:53
22	149°09.7	17.5	87°56.0	3.6'	27°46.2	4.7'	59.4'	35°	09:49	11:05	12:14	19:48	20:38	21:36
23	164°09.9	18.5	102°18.6	3.6'	27°50.8	4.5'	59.4'	40°	10:04	11:23	12:34	19:32	20:19	21:16
	SD.=16.0	d=1.0			S.D.=16.4			45°	10:22	11:45	12:59	19:12	19:56	20:51
								S 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
								S 60°	12:00	14:00	15:41	17:31	17:39	18:09
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Mer.	Moon		Age
									Eqn.of Time	Mer.	Mer.Pass.	Upper	Lower	3-5
									00 ^h	Pass	Upper	Lower	13-33%	
									mm:ss	hh:mm	hh:mm	hh:mm		
0	179°10.1	N05°19.4	116°41.2	3.6'	N27°55.2	4.3'	59.3'	1	03:55	03:46	12:04	14:52	02:22	
1	194°10.3	20.4	131°03.8	3.6'	27°59.4	4.1'	59.3'	2	03:37	03:28	12:03	15:53	03:22	
2	209°10.4	21.3	145°26.4	3.6'	28°03.4	3.9'	59.3'	3	03:20	03:11	12:03	16:55	04:24	
3	224°10.6	22.3	159°49.0	3.6'	28°07.2	3.7'	59.2'							
4	239°10.8	23.2	174°11.6	3.6'	28°10.8	3.5'	59.2'							
5	254°11.0	24.2	188°34.2	3.6'	28°14.2	3.3'	59.2'							
6	269°11.2	N05°25.2	202°56.8	3.6'	N28°17.4	3.1'	59.1'							
7	284°11.4	26.1	217°19.4	3.6'	28°20.4	2.9'	59.1'							
8	299°11.5	27.1	231°42.0	3.6'	28°23.2	2.7'	59.1'							
9	314°11.7	28.0	246°04.7	3.7'	28°25.8	2.5'	59.0'							
10	329°11.9	29.0	260°27.4	3.7'	28°28.3	2.3'	59.0'							
11	344°12.1	29.9	274°50.0	3.7'	28°30.5	2.1'	59.0'							
12	359°12.3	N05°30.9	289°12.8	3.7'	N28°32.5	1.9'	58.9'							
13	14°12.4	31.8	303°35.5	3.8'	28°34.4	1.7'	58.9'							
14	29°12.6	32.8	317°58.3	3.8'	28°36.0	1.5'	58.8'							
15	44°12.8	33.8	332°21.1	3.8'	28°37.5	1.4'	58.8'							
16	59°13.0	34.7	346°43.9	3.8'	28°38.7	1.2'	58.8'							
17	74°13.2	35.7	1°06.8	3.9'	28°39.8	1.0'	58.7'							
18	89°13.4	N05°36.6	15°29.7	3.9'	N28°40.7	0.8'	58.7'							
19	104°13.5	37.6	29°52.6	4.0'	28°41.3	0.6'	58.7'							
20	119°13.7	38.5	44°15.6	4.0'	28°41.8	0.4'	58.6'							
21	134°13.9	39.5	58°38.6	4.1'	28°42.1	0.2'	58.6'							
22	149°14.1	40.4	73°01.7	4.1'	28°42.2	0.0'	58.6'							
23	164°14.3	41.4	87°24.8	4.2'	28°42.1	-0.2'	58.5'							

April 04, 05, 06 (Fri., Sat., Sun.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Fri	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	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	Alpheratz	357°35.0	29°13.7					
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°07.3	-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°47.3	-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°34.9					
6	282°48.7	288°55.7	N04°32.2	165°41.3	N23°43.6	207°27.1	N22°27.3	286°44.5	S03°49.0	Polaris	314°22.3	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	Akamar	315°12.0	-40°12.4					
8	312°53.6	319°01.9	30.6	195°44.4	43.2	237°31.1	27.4	316°48.9	48.8	Menkar	314°06.2	4°11.3					
9	327°56.1	334°04.9	· · 29.7	210°46.0	· · 43.0	252°33.2	· · 27.5	331°51.1	· · 48.7	Mirfak	308°28.4	49°57.1					
10	342°58.5	349°08.0	28.9	225°47.5	42.7	267°35.2	27.5	346°53.3	48.6	Aldebaran	290°39.6	16°33.6					
11	358°01.0	4°11.0	28.1	240°49.1	42.5	282°37.2	27.6	1°55.5	48.5	Rigel	281°03.8	-8°10.5					
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	Capella	280°21.8	46°01.6					
13	28°05.9	34°17.1	26.5	270°52.2	42.1	312°41.3	27.7	31°59.8	48.2	Bellatrix	278°22.8	6°22.3					
14	43°08.4	49°20.1	25.6	285°53.7	41.9	327°43.3	27.7	47°02.0	48.1	Elnath	278°01.8	28°37.8					
15	58°10.9	64°23.2	· · 24.8	300°55.2	· · 41.6	342°45.4	· · 27.8	62°04.2	· · 48.0	Alnilam	275°37.7	-1°11.2					
16	73°13.3	79°26.2	24.0	315°56.8	41.4	357°47.4	27.8	77°06.4	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°32.3	N04°22.4	345°59.9	N23°41.0	27°51.4	N22°27.9	107°10.8	S03°47.7	Sirius	258°26.0	-16°45.0					
19	118°20.7	124°35.3	21.6	1°01.4	40.8	42°53.5	28.0	122°13.0	47.5	Adara	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°50.5	5°09.7					
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	243°16.9	27°58.0					
22	163°28.1	169°44.3	19.1	46°06.0	40.1	87°59.6	28.1	167°19.6	47.2	Avior	234°14.5	-50°35.7					
23	178°30.6	184°47.3	18.3	61°07.6	39.9	103°01.6	28.1	182°21.7	47.1	Suhail	222°46.0	-43°32.3					
Mer.pass.:11:07			v3.1 d-0.8 m-4.2			v1.6 d-0.2 m0.5			v2.0 d0.0 m-1.9			v2.2 d0.1 m1.2					
Mer.pass.:11:03			v3.0 d-0.8 m-4.2			v1.5 d-0.2 m0.5			v2.0 d0.0 m-1.9			v2.2 d0.1 m1.2					
Mer.pass.:11:00			v2.9 d-0.8 m-4.3			v1.5 d-0.2 m0.5			v2.0 d0.0 m-1.9			v2.2 d0.1 m1.2					

Sat	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec				
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°25.8		
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°43.0	-17°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	Acrux	172°59.3	-63°14.4		
3	238°40.4	244°59.3	· · 15.1	121°13.7	· · 39.0	163°09.7	· · 28.3	242°30.5	· · 46.6	Gacrux	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°13.7	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	Alkaid	152°51.3	49°11.1		
7	298°50.3	305°11.2	11.9	181°19.9	38.1	223°17.8	28.5	302°39.3	46.2	Hadar	148°35.2	-60°29.7		
8	313°52.7	320°14.1	11.1	196°21.4	37.9	238°19.8	28.6	317°41.5	46.1	Menkent	147°57.1	-36°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	Arcturus	145°47.3	19°03.2		
10	343°57.7	350°20.1	09.5	226°24.5	37.5	268°23.9	28.7	347°45.8	45.8	Rigel Kent.	139°39.5	-60°56.3		
11	359°00.1	5°23.0	08.7	241°26.0	37.2	283°25.9	28.7	2°48.0	45.7	Kochab	137°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°31.9	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°33.6	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°38.0	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	S03°44.9	Rasalhague	95°58.3	12°32.3		
19	119°19.9	125°46.5	02.4	1°38.2	35.5	43°42.1	29.1	123°05.6	44.8	Eltanin	90°41.9	51°28.7		
20	134°22.3	140°49.4	01.7	16°39.8	35.2	58°44.1	29.1	138°07.7	44.7	Kaus Aust.	83°32.2	-34°22.3		
21	149°24.8	155°52.3	· · 00.9	31°41.3	· · 35.0	73°46.1	· · 29.2	153°09.9	· · 44.6	Vega	80°33.1	38°48.0		
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	Nunki	75°47.5	-26°15.9		
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	Altair	61°59.9	8°55.8		
Mer.pass.:11:03			v3.0 d-0.8 m-4.2			v1.5 d-0.2 m0.5			v2.0 d0.0 m-1.9			v2.2 d0.1 m1.2		


Sun	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec				
0	194°32.2	201°01.1	N03°58.5	76°45.9	N23°34.3	118°52.2	N22°29.3	198°16.5	S03°44.3	Alphard	217°47.4	-8°46.2		
1	209°34.6	216°04.0	57.8	91°47.4	34.1	133°54.2	29.4	213°18.7	44.1	Regulus	207°34.0	11°50.6		
2	224°37.1	231°06.9	57.0	106°48.9	33.9	148°56.3	29.4	228°20.9	44.0	Dubhe	193°40.1	61°37.0		
3	239°39.6	246°09.8	· · 56.2	121°50.4	· · 33.7	163°58.3	· · 29.4	243°23.1	· · 43.9	Denebola	182°24.4	14°25.8		
4	254°42.0	261°12.6	55.5	136°52.0	33.4	179°00.3	29.5	258°25.3	43.8	Gienah	175°43.0	-17°41.1		
5	269°44.5	276°15.5	54.7	151°53.5	33.2	194°02.3	29.5	273°27.5	43.7	Acrux	172°59.3	-63°14.4		
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	Gacrux	171°50.9	-57°15.4		
7	299°49.4	306°21.3	53.1	181°56.5	32.8	224°06.4	29.6	303°31.9	43.5	Alioth	166°12.2	55°49.3		
8	314°51.9	321°24.2	52.4	196°58.0	32.5	239°08.4	29.7	318°34.0	43.4	Spica	158°21.8	-11°17.7		
9	329°54.4	336°27.0	· · 51.6	211°59.6	· · 32.3	254°10.4	· · 29.7	333°36.2	· · 43.2	Alkaid	152°51.3	49°11.1		
10	344°56.8	351°29.9	50.8	227°01.1	32.1	269°12.4	29.8	348°38.4	43.1	Hadar	148°35.2	-60°29.7		
11	359°59.3	6°32.8	50.1	242°02.6	31.9	284°14.4	29.8	3°40.6	43.0	Menkent	147°57.1	-36°29.7		
12	15°01.7	21°35.6	N03°49.3	257°04.1	N23°31.6	299°16.5	N22°29.9	18°42.8	S03°42.9	Arcturus	145°47.3	19°03.2		
13	30°04.2	36°38.5	48.6	272°05.6	31.4	314°18.5	29.9	33°45.0	42.8	Rigel Kent.	139°39.5	-60°56.3		
14	45°06.7	51°41.3	47.8	287°07.1	31.2	329°20.5	30.0	48°47.2	42.7	Kochab	137°18.7	74°02.8		
15	60°09.1	66°44.2	· · 47.0	302°08.7	· · 31.0	344°22.5	· · 30.0	63°49.4	· · 42.6	Zuben'ubi	136°55.5	-16°08.9		
16	75°11.6	81°47.0	46.3	317°10.2	30.7	359°24.5	30.1	78°51.6	42.4	Alphecca	126°03.3	26°37.5		
17	90°14.1	96°49.8	45.5	332°11.7	30.5	14°26.6	30.1	93°53.8	42.3	Antares	112°15.4	-26°29.3		
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	Atria	107°09.2	-69°04.2		
19	120°19.0	126°55.5	44.0	2°14.7	30.0	44°30.5	30.2	123°58.2	42.1	Sabik	102°02.4	-15°45.4		
20	135°21.5	141°58.3	43.3	17°16.2	29.8	59°32.6	30.2	139°00.3	42.0	Shaula	96°10.0	-37°07.3		
21	150°23.9	157°01.1	· · 42.5	32°17.8	· · 29.6	74°34.6	· · 30.3	154°02.5	· · 41.9	Rasalhague	95°58.3	12°32.3		
22	165°26.4	172°04.0	41.8	47°19.3	29.4	89°36.7	30.3	169°04.7	41.8	Eltanin	90°41.9	51°28.7		
23	180°28.9	187°06.8	41.0	62°20.8	29.1	104°38.7	30.4	184°06.9	41.7	Kaus Aust.	83°32.2	-34°22.3		
Mer.pass.:11:00			v2.9 d-0.8 m-4.3			v1.5 d-0.2 m0.5			v2.0 d0.0 m-1.9			v2.2 d0.1 m1.2		

Apr 04 Fri	SHA	Mer.pass
Venus	6°03.4	10:43
Mars	242°58.1	18:56
Jupiter	284°41.0	16:09
Saturn	3°57.5	10:52

Apr 05 Sat	SHA	Mer.pass
Venus	6°17.3	10:39
Mars	242°36.1	18:53
Jupiter	284°30.6	16:06
Saturn	3°50.9	10:49

Apr 06 Sun	SHA	Mer.pass
Venus	6°28.9	10:34
Mars	242°13.7	18:51
Jupiter	284°20.0	16:02
Saturn	3°44.3	10:45

Horizontal parallax		
Venus:	0.5	
Mars:	0.1	

h		Sun			Moon									
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight	
									Naut.	Civil			Civil	Naut.
0	179° 14.4	N05° 42.3	101° 48.0	4.2'	N28° 41.9	-0.4'	58.5'	N 72°	☐	03:14	04:34	19:35	20:56	☐
1	194° 14.6	43.3	116° 11.2	4.3'	28° 41.4	-0.6'	58.5'	N 70°	01:43	03:34	04:43	19:25	20:35	22:31
2	209° 14.8	44.3	130° 34.5	4.3'	28° 40.7	-0.7'	58.4'	68°	02:21	03:50	04:51	19:16	20:18	21:50
3	224° 15.0	45.2	144° 57.9	4.4'	28° 39.9	-0.9'	58.4'	66°	02:47	04:03	04:58	19:09	20:05	21:23
4	239° 15.2	46.2	159° 21.3	4.4'	28° 38.9	-1.1'	58.3'	64°	03:06	04:13	05:04	19:03	19:55	21:03
5	254° 15.3	47.1	173° 44.7	4.5'	28° 37.7	-1.3'	58.3'	62°	03:21	04:22	05:08	18:58	19:46	20:47
6	269° 15.5	N05° 48.1	188° 08.3	4.6'	N28° 36.3	-1.5'	58.3'	60°	03:34	04:29	05:13	18:54	19:38	20:34
7	284° 15.7	49.0	202° 31.9	4.6'	28° 34.7	-1.7'	58.2'	N 58°	03:45	04:36	05:16	18:50	19:31	20:23
8	299° 15.9	50.0	216° 55.6	4.7'	28° 32.9	-1.8'	58.2'	56°	03:54	04:41	05:20	18:47	19:25	20:13
9	314° 16.1	50.9	231° 19.3	4.8'	28° 31.0	-2.0'	58.2'	54°	04:02	04:46	05:23	18:44	19:20	20:05
10	329° 16.3	51.9	245° 43.1	4.9'	28° 28.9	-2.2'	58.1'	52°	04:09	04:51	05:25	18:41	19:16	19:58
11	344° 16.4	52.8	260° 07.0	4.9'	28° 26.6	-2.4'	58.1'	50°	04:15	04:55	05:28	18:38	19:12	19:52
12	359° 16.6	N05° 53.8	274° 31.0	5.0'	N28° 24.1	-2.6'	58.1'	45°	04:27	05:03	05:33	18:33	19:03	19:39
13	14° 16.8	54.7	288° 55.0	5.1'	28° 21.4	-2.7'	58.0'	N 40°	04:37	05:10	05:37	18:28	18:56	19:29
14	29° 17.0	55.7	303° 19.1	5.2'	28° 18.6	-2.9'	58.0'	35°	04:45	05:16	05:41	18:25	18:50	19:21
15	44° 17.2	56.6	317° 43.4	5.3'	28° 15.6	-3.1'	58.0'	30°	04:52	05:20	05:44	18:21	18:45	19:14
16	59° 17.3	57.6	332° 07.6	5.3'	28° 12.4	-3.3'	57.9'	20°	05:02	05:28	05:50	18:15	18:38	19:04
17	74° 17.5	58.5	346° 32.0	5.4'	28° 09.1	-3.4'	57.9'	N 10°	05:09	05:34	05:55	18:10	18:32	18:56
18	89° 17.7	N05° 59.5	0° 56.5	5.5'	N28° 05.6	-3.6'	57.9'	0°	05:14	05:39	05:59	18:06	18:27	18:51
19	104° 17.9	06° 00.4	15° 21.0	5.6'	28° 01.9	-3.8'	57.8'	S 10°	05:18	05:43	06:04	18:01	18:23	18:47
20	119° 18.1	01.4	29° 45.7	5.7'	27° 58.0	-3.9'	57.8'	20°	05:20	05:46	06:08	17:57	18:19	18:44
21	134° 18.2	02.3	44° 10.4	5.8'	27° 54.0	-4.1'	57.7'	30°	05:21	05:49	06:13	17:52	18:16	18:43
22	149° 18.4	03.3	58° 35.3	5.9'	27° 49.8	-4.3'	57.7'	35°	05:21	05:51	06:16	17:49	18:14	18:43
23	164° 18.6	04.2	73° 00.2	6.0'	27° 45.4	-4.4'	57.7'	40°	05:21	05:52	06:19	17:45	18:13	18:44
	SD.=16.0	d=1.0			S.D.=16.0			45°	05:19	05:53	06:23	17:42	18:11	18:45
								S 50°	05:17	05:55	06:27	17:37	18:10	18:47
								52°	05:16	05:55	06:29	17:35	18:09	18:48
								54°	05:15	05:56	06:31	17:33	18:08	18:49
								56°	05:13	05:56	06:34	17:31	18:08	18:51
								58°	05:11	05:57	06:36	17:28	18:07	18:52
								S 60°	05:09	05:57	06:39	17:25	18:06	18:54
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise		Moonset			
									Fri	Sat	Sun	Fri	Sat	Sun
0	179° 18.8	N06° 05.2	87° 25.2	6.1'	N27° 40.9	-4.6'	57.6'	N 72°	☐	☐	☐	☐	☐	☐
1	194° 18.9	06.1	101° 50.3	6.2'	27° 36.2	-4.8'	57.6'	N 70°	☐	☐	☐	☐	☐	☐
2	209° 19.1	07.1	116° 15.5	6.3'	27° 31.4	-4.9'	57.6'	68°	☐	☐	☐	☐	☐	☐
3	224° 19.3	08.0	130° 40.9	6.4'	27° 26.4	-5.1'	57.5'	66°	☐	☐	07:42	☐	☐	07:11
4	239° 19.5	09.0	145° 06.3	6.5'	27° 21.2	-5.2'	57.5'	64°	☐	☐	09:07	☐	☐	05:45
5	254° 19.7	09.9	159° 31.8	6.6'	27° 15.9	-5.4'	57.5'	62°	☐	07:38	09:44	☐	05:20	05:07
6	269° 19.8	N06° 10.9	173° 57.4	6.7'	N27° 10.5	-5.5'	57.4'	60°	06:50	08:25	10:10	04:03	04:32	04:41
7	284° 20.0	11.8	188° 23.1	6.8'	27° 04.8	-5.7'	57.4'	N 58°	07:31	08:56	10:30	03:23	04:01	04:20
8	299° 20.2	12.8	202° 49.0	6.9'	26° 59.1	-5.9'	57.4'	56°	07:59	09:19	10:47	02:55	03:38	04:02
9	314° 20.4	13.7	217° 14.9	7.0'	26° 53.1	-6.0'	57.3'	54°	08:21	09:37	11:01	02:33	03:19	03:47
10	329° 20.6	14.7	231° 41.0	7.1'	26° 47.1	-6.1'	57.3'	52°	08:39	09:53	11:14	02:15	03:03	03:34
11	344° 20.7	15.6	246° 07.1	7.2'	26° 40.8	-6.3'	57.3'	50°	08:54	10:07	11:25	01:59	02:49	03:23
12	359° 20.9	N06° 16.6	260° 33.4	7.3'	N26° 34.5	-6.4'	57.2'	45°	09:25	10:35	11:47	01:28	02:20	02:59
13	14° 21.1	17.5	274° 59.7	7.4'	26° 28.0	-6.6'	57.2'	N 40°	09:49	10:56	12:05	01:04	01:58	02:40
14	29° 21.3	18.5	289° 26.2	7.5'	26° 21.3	-6.7'	57.2'	35°	10:09	11:14	12:21	00:44	01:39	02:24
15	44° 21.5	19.4	303° 52.8	7.6'	26° 14.5	-6.9'	57.1'	30°	10:26	11:30	12:34	00:27	01:23	02:10
16	59° 21.6	20.3	318° 19.5	7.8'	26° 07.6	-7.0'	57.1'	20°	10:55	11:56	12:56	--	00:56	01:46
17	74° 21.8	21.3	332° 46.3	7.9'	26° 00.5	-7.1'	57.1'	N 10°	11:19	12:19	13:15	--	00:32	01:26
18	89° 22.0	N06° 22.2	347° 13.3	8.0'	N25° 53.3	-7.3'	57.0'	0°	11:42	12:40	13:33	--	00:10	01:06
19	104° 22.2	23.2	1° 40.3	8.1'	25° 45.9	-7.4'	57.0'	S 10°	12:05	13:01	13:51	23:48	--	00:46
20	119° 22.3	24.1	16° 07.4	8.2'	25° 38.4	-7.6'	57.0'	20°	12:29	13:23	14:10	23:24	--	00:25
21	134° 22.5	25.1	30° 34.7	8.3'	25° 30.8	-7.7'	56.9'	30°	12:58	13:49	14:32	22:56	--	00:01
22	149° 22.7	26.0	45° 02.1	8.4'	25° 23.1	-7.8'	56.9'	35°	13:15	14:04	14:45	22:40	23:46	--
23	164° 22.9	27.0	59° 29.6	8.5'	25° 15.2	-7.9'	56.9'	40°	13:34	14:22	14:59	22:21	23:29	--
	SD.=16.0	d=0.9			S.D.=15.7			45°	13:58	14:43	15:17	21:57	23:09	--
								S 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
								S 60°	16:28	16:42	16:45	19:28	21:14	22:58
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun Eqn. of Time		Mer. Pass	Moon Mer. Pass.		Age
									00 ^h	12 ^h	hh:mm	Upper	Lower	6-8
									mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	44-65%
0	179° 23.1	N06° 27.9	73° 57.2	8.7'	N25° 07.2	-8.1'	56.9'	4	03:02	02:54	12:03	17:56	05:26	
1	194° 23.2	28.9	88° 24.9	8.8'	24° 59.0	-8.2'	56.8'	5	02:45	02:36	12:03	18:53	06:25	
2	209° 23.4	29.8	102° 52.7	8.9'	24° 50.8	-8.3'	56.8'	6	02:28	02:19	12:02	19:45	07:20	
3	224° 23.6	30.7	117° 20.7	9.0'	24° 42.4	-8.4'	56.8'							
4	239° 23.8	31.7	131° 48.7	9.1'	24° 33.9	-8.6'	56.7'							
5	254° 23.9	32.6	146° 16.9	9.2'	24° 25.3	-8.7'	56.7'							
6	269° 24.1	N06° 33.6	160° 45.2	9.3'	N24° 16.5	-8.8'	56.7'							
7	284° 24.3	34.5	175° 13.6	9.5'	24° 07.7	-8.9'	56.6'							
8	299° 24.5	35.5	189° 42.1	9.6'	23° 58.7	-9.0'	56.6'							
9	314° 24.6	36.4	204° 10.7	9.7'	23° 49.6	-9.1'	56.6'							
10	329° 24.8	37.4	218° 39.5	9.8'	23° 40.4	-9.3'	56.5'							
11	344° 25.0	38.3	233° 08.3	9.9'	23° 31.1	-9.4'	56.5'							
12	359° 25.2	N06° 39.2	247° 37.3	10.0'	N23° 21.6	-9.5'	56.5'							
13	14° 25.4	40.2	262° 06.4	10.1'	23° 12.1	-9.6'	56.5'							
14	29° 25.5	41.1	276° 35.6	10.3'	23° 02.5	-9.7'	56.4'							
15	44° 25.7	42.1	291° 04.9	10.4'	22° 52.7	-9.8'	56.4'							
16	59° 25.9	43.0	305° 34.3	10.5'	22° 42.9	-9.9'	56.4'							
17	74° 26.1	43.9	320° 03.9	10.6'	22° 32.9	-10.0'	56.3'							
18	89° 26.2	N06° 44.9	334° 33.5	10.7'	N22° 22.8	-10.1'	56.3'							
19	104° 26.4	45.8	349° 03.3	10.8'	22° 12.7	-10.2'	56.3'							
20	119° 26.6	46.8	3° 33.1	10.9'	22° 02.4	-10.3'	56.3'							
21	134° 26.8	47.7	18° 03.1	11.0'	21° 52.1	-10.4'	56.2'							
22	149° 26.9	48.6	32° 33.2	11.1'	21° 41.6	-10.5'	56.2'							

April 07, 08, 09 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	195°31.3	202°09.6	N03°40.3	77°22.3	N23°28.9	119°40.7	N22°30.4	199°09.1	S03°41.5	Alpheratz	357°35.0	29°13.7
1	210°33.8	217°12.4	39.5	92°23.8	28.7	134°42.7	30.5	214°11.3	41.4	Ankaa	353°07.3	-42°10.2
2	225°36.2	232°15.2	38.8	107°25.3	28.4	149°44.7	30.5	229°13.5	41.3	Schedar	349°31.4	56°40.5
3	240°38.7	247°18.0	· · 38.1	122°26.8	· · 28.2	164°46.7	· · 30.6	244°15.7	· · 41.2	Diphda	348°47.3	-17°51.0
4	255°41.2	262°20.8	37.3	137°28.3	28.0	179°48.8	30.6	259°17.9	41.1	Achernar	335°20.6	-57°06.6
5	270°43.6	277°23.6	36.6	152°29.8	27.8	194°50.8	30.7	274°20.1	41.0	Hamal	327°51.3	23°34.9
6	285°46.1	292°26.4	N03°35.8	167°31.3	N23°27.5	209°52.8	N22°30.7	289°22.3	S03°40.9	Polaris	314°23.1	89°22.4
7	300°48.6	307°29.1	35.1	182°32.9	27.3	224°54.8	30.8	304°24.5	40.8	Akamar	315°12.0	-40°12.3
8	315°51.0	322°31.9	34.4	197°34.4	27.1	239°56.8	30.8	319°26.7	40.6	Menkar	314°06.2	4°11.3
9	330°53.5	337°34.7	· · 33.6	212°35.9	· · 26.8	254°58.8	· · 30.8	334°28.8	· · 40.5	Mirfak	308°28.4	49°57.1
10	345°56.0	352°37.5	32.9	227°37.4	26.6	270°00.9	30.9	349°31.0	40.4	Aldebaran	290°39.6	16°33.6
11	0°58.4	7°40.2	32.2	242°38.9	26.4	285°02.9	30.9	4°33.2	40.3	Rigel	281°03.8	-8°10.5
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	S03°40.2	Capella	280°21.8	46°01.6
13	31°03.3	37°45.7	30.7	272°41.9	25.9	315°06.9	31.0	34°37.6	40.1	Bellatrix	278°22.8	6°22.3
14	46°05.8	52°48.5	30.0	287°43.4	25.7	330°08.9	31.1	49°39.8	40.0	Elnath	278°01.8	28°37.8
15	61°08.3	67°51.2	· · 29.3	302°44.9	· · 25.5	345°10.9	· · 31.1	64°42.0	· · 39.9	Alnilam	275°37.7	-1°11.2
16	76°10.7	82°54.0	28.5	317°46.4	25.2	0°12.9	31.2	79°44.2	39.8	Betelgeuse	270°52.0	7°24.6
17	91°13.2	97°56.7	27.8	332°47.9	25.0	15°15.0	31.2	94°46.4	39.6	Canopus	263°52.4	-52°42.8
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	Sirius	258°26.0	-16°45.0
19	121°18.1	128°02.2	26.4	2°50.9	24.5	45°19.0	31.3	124°50.8	39.4	Adara	255°05.7	-29°00.6
20	136°20.6	143°04.9	25.7	17°52.4	24.3	60°21.0	31.4	139°53.0	39.3	Procyon	244°50.5	5°09.7
21	151°23.1	158°07.7	· · 24.9	32°53.9	· · 24.1	75°23.0	· · 31.4	154°55.2	· · 39.2	Pollux	243°16.9	27°58.0
22	166°25.5	173°10.4	24.2	47°55.4	23.8	90°25.0	31.4	169°57.4	39.1	Avior	234°14.5	-50°35.7
23	181°28.0	188°13.1	23.5	62°56.9	23.6	105°27.0	31.5	184°59.6	39.0	Suhail	222°46.0	-43°32.3
Mer.pass.:10:56		v2.8 d-0.7 m-4.3		v1.5 d-0.2 m0.6		v2.0 d0.0 m-1.9		v2.2 d0.1 m1.2		Miaplacidus	221°37.9	-69°49.5
										Alphard	217°47.4	-8°46.2
										Regulus	207°34.0	11°50.6
										Dubhe	193°40.1	61°37.0
										Denebola	182°24.4	14°25.8
										Gienah	175°43.0	-17°41.1
										Acrux	172°59.3	-63°14.5
										Gacrux	171°50.9	-57°15.4
										Alioth	166°12.2	55°49.3
										Spica	158°21.8	-11°17.7
										Alkaid	152°51.3	49°11.1
										Hadar	148°35.2	-60°29.7
										Menkent	147°57.0	-36°29.7
										Arcturus	145°47.2	19°03.2
										Rigel Kent.	139°39.5	-60°56.4
										Kochab	137°18.7	74°02.9
										Zuben'ubi	136°55.5	-16°08.9
										Alphecca	126°03.3	26°37.5
										Antares	112°15.4	-26°29.3
										Atria	107°09.1	-69°04.2
										Sabik	102°02.4	-15°45.4
										Shaula	96°09.9	-37°07.3
										Rasalhague	95°58.3	12°32.3
										Eltanin	90°41.9	51°28.7
										Kaus Aust.	83°32.2	-34°22.3
										Vega	80°33.1	38°48.0
										Nunki	75°47.5	-26°15.9
										Altair	61°59.9	8°55.8
										Peacock	53°05.6	-56°39.0
										Deneb	49°25.9	45°21.9
										Enif	33°38.8	9°59.3
										Al Na'ir	27°33.0	-46°50.2
										Fomalhaut	15°14.6	-29°29.3
										Scheat	13°45.4	28°13.0
										Markab	13°30.0	15°20.3
										Apr 07 Mon	SHA	Mer.pass
										Venus	6°38.3	10:29
										Mars	241°51.0	18:49
										Jupiter	284°09.4	15:59
										Saturn	3°37.8	10:42
										Apr 08 Tue	SHA	Mer.pass
										Venus	6°45.4	10:25
										Mars	241°28.0	18:46
										Jupiter	283°58.6	15:56
										Saturn	3°31.3	10:38
										Apr 09 Wed	SHA	Mer.pass
										Venus	6°50.2	10:21
										Mars	241°04.6	18:44
										Jupiter	283°47.7	15:53
										Saturn	3°24.8	10:35
										Horizontal parallax		
										Venus:		0.5
										Mars:		0.1
Mer.pass.:10:48		v2.6 d-0.7 m-4.3		v1.5 d-0.2 m0.6		v2.0 d0.0 m-1.9		v2.2 d0.1 m1.2				

April 10, 11, 12 (Thu., Fri., Sat.)

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°34.9	29°13.7	
1	213°31.2	220°24.0	49.8	94°11.2	11.8	137°07.4	33.8	216°49.3	33.4	Ankaa	353°07.3	-42°10.1	
2	228°33.7	235°26.5	49.1	109°12.7	11.5	152°09.4	33.9	231°51.5	33.3	Schedar	349°31.4	56°40.5	
3	243°36.1	250°29.0	· · 48.5	124°14.2	· · 11.3	167°11.4	· · 33.9	246°53.7	· · 33.2	Diphda	348°47.3	-17°51.0	
4	258°38.6	265°31.5	47.9	139°15.7	11.1	182°13.4	33.9	261°55.9	33.1	Achernar	335°20.6	-57°06.6	
5	273°41.0	280°34.0	47.2	154°17.1	10.8	197°15.4	34.0	276°58.1	33.0	Hamal	327°51.4	23°34.9	
6	288°43.5	295°36.5	N02°46.6	169°18.6	N23°10.6	212°17.4	N22°34.0	292°00.3	S03°32.8	Polaris	314°23.9	89°22.4	
7	303°46.0	310°39.0	46.0	184°20.1	10.3	227°19.5	34.1	307°02.5	32.7	Akamar	315°12.0	-40°12.3	
8	318°48.4	325°41.5	45.3	199°21.5	10.1	242°21.5	34.1	322°04.7	32.6	Menkar	314°06.2	4°11.3	
9	333°50.9	340°44.0	· · 44.7	214°23.0	· · 09.9	257°23.5	· · 34.2	337°06.8	· · 32.5	Mirfak	308°28.4	49°57.1	
10	348°53.4	355°46.5	44.1	229°24.5	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	244°26.0	09.4	287°27.5	34.3	7°11.2	32.3	Rigel	281°03.8	-8°10.5	
12	18°58.3	25°51.4	N02°42.9	259°27.4	N23°09.1	302°29.5	N22°34.3	22°13.4	S03°32.2	Capella	280°21.9	46°01.6	
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	· · 34.5	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°24.6	
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°26.0	-16°45.0	
19	124°15.5	131°08.7	38.6	4°37.7	07.4	47°43.5	34.6	127°28.8	31.4	Adara	255°05.7	-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°50.5	5°09.7	
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°16.9	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	-50°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.pass.:10:44		v2.5 d-0.6 m-4.3		v1.5 d-0.2 m0.6		v2.0 d0.0 m-1.9		v2.2 d0.1 m1.2		Miaplacidus		221°37.9	-69°49.5
										Alphard		217°47.4	-8°46.2
										Regulus		207°34.0	11°50.6
										Dubhe		193°40.1	61°37.0
										Denebola		182°24.4	14°25.8
										Gienah		175°43.0	-17°41.1
										Acrux		172°59.3	-63°14.5
										Gacrux		171°50.9	-57°15.4
										Alioth		166°12.2	55°49.3
										Spica		158°21.8	-11°17.7
										Alkaid		152°51.3	49°11.1
										Hadar		148°35.1	-60°29.7
										Menkent		147°57.0	-36°29.7
										Arcturus		145°47.2	19°03.2
										Rigel Kent.		139°39.5	-60°56.4
										Kochab		137°18.6	74°02.9
										Zuben'ubi		136°55.5	-16°08.9
										Alphecca		126°03.3	26°37.6
										Antares		112°15.3	-26°29.3
										Atria		107°09.1	-69°04.2
										Sabik		102°02.4	-15°45.5
										Shaula		96°09.9	-37°07.3
										Rasalhague		95°58.2	12°32.3
										Eltanin		90°41.9	51°28.7
										Kaus Aust.		83°32.1	-34°22.3
										Vega		80°33.0	38°48.0
										Nunki		75°47.5	-26°15.9
										Altair		61°59.9	8°55.8
										Peacock		53°05.5	-56°39.0
										Deneb		49°25.8	45°21.9
										Enif		33°38.8	9°59.3
										Al Na'ir		27°33.0	-46°50.2
										Fomalhaut		15°14.6	-29°29.3
										Scheat		13°45.4	28°13.0
										Markab		13°30.0	15°20.3
										Apr 10 Thu		SHA	Mer.pass
										Venus		6°52.7	10:17
										Mars		240°41.0	18:42
										Jupiter		283°36.7	15:50
										Saturn		3°18.4	10:31
										Apr 11 Fri		SHA	Mer.pass
										Venus		6°53.0	10:13
										Mars		240°17.1	18:39
										Jupiter		283°25.6	15:46
										Saturn		3°11.9	10:28
										Apr 12 Sat		SHA	Mer.pass
										Venus		6°51.0	10:09
										Mars		239°53.0	18:37
										Jupiter		283°14.4	15:43
										Saturn		3°05.5	10:24
										Horizontal parallax			
										Venus:		0.4	
										Mars:		0.1	
Mer.pass.:10:36		v2.3 d-0.6 m-4.4		v1.5 d-0.2 m0.7		v2.0 d0.0 m-1.9		v2.2 d0.1 m1.2					

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

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	Alpheratz	357°34.9	29°13.7
1	216°28.6	223°15.3	08.3	95°56.1	54.0	130°31.2	37.1	219°27.5	25.5	Ankaa	353°07.3	-42°10.1
2	231°31.1	238°17.5	07.8	110°57.6	53.8	154°33.2	37.1	234°29.7	25.4	Schedar	349°31.4	56°40.4
3	246°33.5	253°19.8	· · 07.3	125°59.0	· · 53.5	169°35.1	· · 37.2	249°31.9	· · 25.3	Diphda	348°47.3	-17°51.0
4	261°36.0	268°22.0	06.7	141°00.5	53.3	184°37.1	37.2	264°34.1	25.2	Achernar	335°20.6	-57°06.5
5	276°38.5	283°24.2	06.2	156°01.9	53.0	199°39.1	37.3	279°36.3	25.1	Hamal	327°51.4	23°34.9
6	291°40.9	298°26.4	N02°05.7	171°03.3	N22°52.7	214°41.1	N22°37.3	294°38.5	S03°25.0	Polaris	314°24.4	89°22.4
7	306°43.4	313°28.7	05.2	186°04.8	52.5	229°43.1	37.4	309°40.7	24.8	Akamar	315°12.0	-40°12.3
8	321°45.9	328°30.9	04.7	201°06.2	52.2	244°45.1	37.4	324°42.9	24.7	Menkar	314°06.2	4°11.3
9	336°48.3	343°33.1	· · 04.2	216°07.7	· · 52.0	259°47.1	· · 37.5	339°45.1	· · 24.6	Mirfak	308°28.4	49°57.1
10	351°50.8	358°35.3	03.7	231°09.1	51.7	274°49.1	37.5	354°47.3	24.5	Aldebaran	290°39.6	16°33.6
11	6°53.2	13°37.5	03.2	246°10.5	51.5	289°51.1	37.6	9°49.5	24.4	Rigel	281°03.9	-8°10.5
12	21°55.7	28°39.7	N02°02.7	261°12.0	N22°51.2	304°53.0	N22°37.6	24°51.7	S03°24.3	Capella	280°21.9	46°01.6
13	36°58.2	43°41.9	02.2	276°13.4	51.0	319°55.0	37.6	39°53.9	24.2	Bellatrix	278°22.8	6°22.3
14	52°00.6	58°44.1	01.7	291°14.8	50.7	334°57.0	37.7	54°56.1	24.1	Elnath	278°01.8	28°37.8
15	67°03.1	73°46.3	· · 01.2	306°16.3	· · 50.5	349°59.0	· · 37.7	69°58.3	· · 24.0	Alnilam	275°37.7	-1°11.2
16	82°05.6	88°48.5	00.8	321°17.7	50.2	5°01.0	37.8	85°00.5	23.9	Betelgeuse	270°52.0	7°24.6
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	Canopus	263°52.5	-52°42.8
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	Sirius	258°26.0	-16°45.0
19	127°13.0	133°55.0	59.3	6°22.0	49.4	50°07.0	37.9	130°07.1	23.5	Adara	255°05.8	-29°00.6
20	142°15.4	148°57.2	58.8	21°23.4	49.2	65°08.9	38.0	145°09.3	23.4	Procyon	244°50.5	5°09.7
21	157°17.9	163°59.4	· · 58.3	36°24.9	· · 48.9	80°10.9	· · 38.0	160°11.5	· · 23.3	Pollux	243°16.9	27°58.0
22	172°20.3	179°01.5	57.9	51°26.3	48.7	95°12.9	38.0	175°13.7	23.2	Avior	234°14.6	-50°35.7
23	187°22.8	194°03.7	57.4	66°27.7	48.4	110°14.9	38.1	190°15.9	23.1	Suhail	222°46.0	-43°32.3
Mer.pass.:10:32		v2.2 d-0.5 m-4.4		v1.4 d-0.3 m0.7		v2.0 d0.0 m-1.9		v2.2 d0.1 m1.2		Miaplacidus	221°38.0	-69°49.5
										Alphard	217°47.4	-8°46.2
										Regulus	207°34.0	11°50.6
										Dubhe	193°40.2	61°37.0
										Denebola	182°24.4	14°25.8
										Gienah	175°43.1	-17°41.1
										Acrux	172°59.3	-63°14.5
										Gacrux	171°50.9	-57°15.4
										Alioth	166°12.2	55°49.3
										Spica	158°21.8	-11°17.7
										Alkaid	152°51.3	49°11.1
										Hadar	148°35.1	-60°29.7
										Menkent	147°57.0	-36°29.7
										Arcturus	145°47.2	19°03.2
										Rigel Kent.	139°39.4	-60°56.4
										Kochab	137°18.6	74°02.9
										Zuben'ubi	136°55.5	-16°08.9
										Alphecca	126°03.3	26°37.6
										Antares	112°15.3	-26°29.3
										Atria	107°09.1	-69°04.2
										Sabik	102°02.4	-15°45.4
										Shaula	96°09.9	-37°07.3
										Rasalhague	95°58.2	12°32.3
										Eltanin	90°41.9	51°28.7
										Kaus Aust.	83°32.1	-34°22.3
										Vega	80°33.0	38°48.0
										Nunki	75°47.5	-26°15.9
										Altair	61°59.9	8°55.8
										Peacock	53°05.5	-56°39.0
										Deneb	49°25.8	45°21.9
										Enif	33°38.8	9°59.3
										Al Na'ir	27°32.9	-46°50.2
										Fomalhaut	15°14.6	-29°29.3
										Scheat	13°45.3	28°13.0
										Markab	13°30.0	15°20.3
										Apr 13 Sun	SHA	Mer.pass
										Venus	6°46.9	10:06
										Mars	239°28.6	18:35
										Jupiter	283°03.0	15:40
										Saturn	2°59.2	10:21
										Apr 14 Mon	SHA	Mer.pass
										Venus	6°40.6	10:02
										Mars	239°03.9	18:32
										Jupiter	282°51.6	15:37
										Saturn	2°52.8	10:17
										Apr 15 Tue	SHA	Mer.pass
										Venus	6°32.1	09:59
										Mars	238°39.0	18:30
										Jupiter	282°40.1	15:34
										Saturn	2°46.5	10:14
										Horizontal parallax		
										Venus:		0.4
										Mars:		0.1
Mer.pass.:10:24		v2.1 d-0.4 m-4.4		v1.4 d-0.3 m0.7		v2.0 d0.0 m-1.9		v2.2 d0.1 m1.2				

April 16, 17, 18 (Wed., Thu., Fri.)

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°34.9	29°13.7
1	219°26.0	225°47.2	35.8	97°38.7	35.3	141°54.0	40.3	222°06.0	17.7	Ankaa	353°07.3	-42°10.1
2	234°28.5	240°49.2	35.7	112°40.2	35.1	156°55.9	40.4	237°08.2	17.6	Schedar	349°31.4	56°40.4
3	249°30.9	255°51.1	· · 35.0	127°41.6	· · 34.8	171°57.9	· · 40.4	252°10.4	· · 17.5	Diphda	348°47.3	-17°51.0
4	264°33.4	270°53.1	34.6	142°43.0	34.5	186°59.9	40.5	267°12.6	17.4	Achernar	335°20.6	-57°06.5
5	279°35.9	285°55.1	34.2	157°44.4	34.3	202°01.9	40.5	282°14.8	17.3	Hamal	327°51.3	23°34.9
6	294°38.3	300°57.1	N01°33.8	172°45.8	N22°34.0	217°03.8	N22°40.6	297°17.0	S03°17.2	Polaris	314°24.7	89°22.3
7	309°40.8	315°59.0	33.5	187°47.2	33.8	232°05.8	40.6	312°19.2	17.1	Akamars	315°12.0	-40°12.3
8	324°43.3	331°01.0	33.1	202°48.6	33.5	247°07.8	40.6	327°21.4	17.0	Menkar	314°06.2	4°11.3
9	339°45.7	346°02.9	· · 32.7	217°50.0	· · 33.2	262°09.8	· · 40.7	342°23.6	· · 16.9	Mirfak	308°28.4	49°57.1
10	354°48.2	1°04.9	32.3	232°51.4	32.9	277°11.7	40.7	357°25.8	16.8	Aldebaran	290°39.6	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	Rigel	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	Capella	280°21.9	46°01.6
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°22.8	6°22.3
14	54°58.1	61°12.7	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°58.4	· · 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°24.6
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°26.1	-16°45.0
19	130°10.4	136°22.3	29.1	8°04.1	30.5	52°29.5	41.1	132°45.7	15.8	Adara	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°50.5	5°09.7
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°17.0	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	-50°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.pass.:10:20		v2.0 d-0.4 m-4.4		v1.4 d-0.3 m0.7		v2.0 d0.0 m-1.9		v2.2 d0.1 m1.2		Miaplacidus	221°38.0	-69°49.5
										Alphard	217°47.4	-8°46.2
										Regulus	207°34.0	11°50.6
										Dubhe	193°40.2	61°37.0
										Denebola	182°24.4	14°25.8
										Gienah	175°43.1	-17°41.1
										Acrux	172°59.3	-63°14.5
										Gacrux	171°50.9	-57°15.4
										Alioth	166°12.2	55°49.3
										Spica	158°21.8	-11°17.7
										Alkaid	152°51.3	49°11.1
										Hadar	148°35.1	-60°29.7
										Menkent	147°57.0	-36°29.8
										Arcturus	145°47.2	19°03.2
										Rigel Kent.	139°39.4	-60°56.4
										Kochab	137°18.6	74°02.9
										Zuben'ubi	136°55.5	-16°08.9
										Alphecca	126°03.3	26°37.6
										Antares	112°15.3	-26°29.3
										Atria	107°09.0	-69°04.2
										Sabik	102°02.3	-15°45.4
										Shaula	96°09.9	-37°07.3
										Rasalhague	95°58.2	12°32.3
										Eltanin	90°41.8	51°28.8
										Kaus Aust.	83°32.1	-34°22.3
										Vega	80°33.0	38°48.0
										Nunki	75°47.4	-26°15.9
										Altair	61°59.8	8°55.9
										Peacock	53°05.5	-56°39.0
										Deneb	49°25.8	45°21.9
										Enif	33°38.8	9°59.3
										Al Na'ir	27°32.9	-46°50.2
										Fomalhaut	15°14.6	-29°29.3
										Scheat	13°45.3	28°13.0
										Markab	13°30.0	15°20.3
										Apr 16 Wed	SHA	Mer.pass
										Venus	6°21.7	09:56
										Mars	238°13.8	18:28
										Jupiter	282°28.4	15:30
										Saturn	2°40.3	10:10
										Apr 17 Thu	SHA	Mer.pass
										Venus	6°09.2	09:53
										Mars	237°48.4	18:26
										Jupiter	282°16.7	15:27
										Saturn	2°34.0	10:07
										Apr 18 Fri	SHA	Mer.pass
										Venus	5°54.7	09:50
										Mars	237°22.7	18:23
										Jupiter	282°04.8	15:24
										Saturn	2°27.8	10:03
										Horizontal parallax		
										Venus:		0.4
										Mars:		0.1
Mer.pass.:10:12		v1.8 d-0.3 m-4.4		v1.4 d-0.3 m0.8		v2.0 d0.0 m-1.9		v2.2 d0.1 m1.2				

h		Sun		Moon				Twilight						
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
0	180°02.6	N10°08.1	329°01.8	12.0'	S24°20.3	-8.0'	54.2'	N 72°	☐	01:35	03:26	20:37	22:35	☐
1	195°02.7	09.0	343°32.8	12.0'	24°28.2	-7.9'	54.2'	N 70°	☐	02:19	03:45	20:17	21:46	☐
2	210°02.8	09.8	358°03.7	11.9'	24°36.0	-7.8'	54.2'	68°	☐	02:47	04:00	20:02	21:16	☐
3	225°03.0	· · 10.7	12°34.6	11.8'	24°43.7	-7.7'	54.2'	66°	01:22	03:09	04:11	19:50	20:54	22:46
4	240°03.1	11.6	27°05.4	11.7'	24°51.3	-7.6'	54.2'	64°	02:01	03:25	04:21	19:40	20:37	22:03
5	255°03.3	12.5	41°36.1	11.7'	24°58.8	-7.4'	54.2'	62°	02:27	03:39	04:30	19:31	20:23	21:36
6	270°03.4	N10°13.4	56°06.7	11.6'	S25°06.2	-7.3'	54.2'	60°	02:47	03:50	04:37	19:24	20:11	21:15
7	285°03.6	14.3	70°37.3	11.5'	25°13.5	-7.2'	54.2'	N 58°	03:03	04:00	04:43	19:17	20:01	20:59
8	300°03.7	15.2	85°07.7	11.4'	25°20.7	-7.1'	54.2'	56°	03:16	04:08	04:49	19:11	19:52	20:45
9	315°03.9	· · 16.0	99°38.2	11.4'	25°27.7	-7.0'	54.3'	54°	03:28	04:16	04:54	19:06	19:45	20:33
10	330°04.0	16.9	114°08.5	11.3'	25°34.7	-6.9'	54.3'	52°	03:37	04:22	04:59	19:01	19:38	20:23
11	345°04.2	17.8	128°38.8	11.2'	25°41.5	-6.8'	54.3'	50°	03:46	04:28	05:03	18:57	19:32	20:15
12	0°04.3	N10°18.7	143°09.0	11.2'	S25°48.2	-6.6'	54.3'	45°	04:03	04:41	05:12	18:48	19:19	19:57
13	15°04.5	19.6	157°39.1	11.1'	25°54.8	-6.5'	54.3'	N 40°	04:17	04:51	05:19	18:41	19:09	19:43
14	30°04.6	20.5	172°09.2	11.0'	26°01.3	-6.4'	54.3'	35°	04:28	04:59	05:25	18:34	19:00	19:32
15	45°04.8	· · 21.3	186°39.1	11.0'	26°07.6	-6.3'	54.3'	30°	04:37	05:06	05:31	18:29	18:53	19:22
16	60°04.9	22.2	201°09.1	10.9'	26°13.9	-6.2'	54.3'	20°	04:51	05:18	05:40	18:19	18:41	19:08
17	75°05.0	23.1	215°38.9	10.8'	26°20.0	-6.1'	54.3'	N 10°	05:02	05:27	05:49	18:11	18:32	18:57
18	90°05.2	N10°24.0	230°08.7	10.7'	S26°26.0	-5.9'	54.4'	0°	05:11	05:35	05:56	18:03	18:24	18:48
19	105°05.3	24.9	244°38.4	10.7'	26°31.8	-5.8'	54.4'	S 10°	05:18	05:42	06:04	17:55	18:17	18:41
20	120°05.5	25.7	259°08.1	10.6'	26°37.6	-5.7'	54.4'	20°	05:23	05:49	06:12	17:47	18:10	18:35
21	135°05.6	· · 26.6	273°37.6	10.5'	26°43.2	-5.6'	54.4'	30°	05:28	05:56	06:20	17:38	18:02	18:30
22	150°05.8	27.5	288°07.2	10.5'	26°48.7	-5.4'	54.4'	35°	05:30	06:00	06:25	17:33	17:59	18:28
23	165°05.9	28.4	302°36.6	10.4'	26°54.1	-5.3'	54.4'	40°	05:32	06:04	06:31	17:27	17:55	18:26
SD.=15.9		d=0.9	S.D.=14.8											
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Wed	Thu	Fri	Wed	Thu	Fri
0	180°06.1	N10°29.3	317°06.0	10.4'	S26°59.3	-5.2'	54.4'	N 72°	■	■	■	■	■	■
1	195°06.2	30.1	331°35.3	10.3'	27°04.4	-5.1'	54.4'	N 70°	■	■	■	■	■	■
2	210°06.3	31.0	346°04.6	10.2'	27°09.4	-4.9'	54.5'	68°	■	■	■	■	■	■
3	225°06.5	· · 31.9	0°33.8	10.2'	27°14.3	-4.8'	54.5'	66°	■	■	■	■	■	■
4	240°06.6	32.8	15°02.9	10.1'	27°19.0	-4.7'	54.5'	64°	00:42	■	■	03:23	■	■
5	255°06.8	33.7	29°32.0	10.0'	27°23.6	-4.5'	54.5'	62°	--	01:58	■	04:07	03:51	■
6	270°06.9	N10°34.5	44°01.0	10.0'	S27°28.1	-4.4'	54.5'	60°	--	01:05	02:30	04:37	04:44	05:08
7	285°07.1	35.4	58°29.9	9.9'	27°32.4	-4.3'	54.5'	N 58°	--	00:33	01:48	05:00	05:17	05:50
8	300°07.2	36.3	72°58.8	9.9'	27°36.6	-4.1'	54.5'	56°	--	00:09	01:20	05:18	05:41	06:18
9	315°07.4	· · 37.2	87°27.7	9.8'	27°40.7	-4.0'	54.6'	54°	23:50	--	00:58	05:34	06:00	06:41
10	330°07.5	38.0	101°56.4	9.7'	27°44.7	-3.9'	54.6'	52°	23:34	--	00:40	05:47	06:17	06:59
11	345°07.6	38.9	116°25.2	9.7'	27°48.5	-3.7'	54.6'	50°	23:20	--	00:24	05:59	06:31	07:14
12	0°07.8	N10°39.8	130°53.8	9.6'	S27°52.1	-3.6'	54.6'	45°	22:52	23:53	--	06:24	07:00	07:45
13	15°07.9	40.7	145°22.4	9.6'	27°55.7	-3.5'	54.6'	N 40°	22:30	23:29	--	06:43	07:22	08:10
14	30°08.1	41.5	159°51.0	9.5'	27°59.1	-3.3'	54.6'	35°	22:11	23:09	--	07:00	07:41	08:30
15	45°08.2	· · 42.4	174°19.5	9.5'	28°02.3	-3.2'	54.7'	30°	21:56	22:53	23:47	07:14	07:57	08:47
16	60°08.3	43.3	188°48.0	9.4'	28°05.5	-3.1'	54.7'	20°	21:29	22:24	23:18	07:39	08:25	09:15
17	75°08.5	44.2	203°16.4	9.4'	28°08.4	-2.9'	54.7'	N 10°	21:07	22:00	22:54	08:00	08:48	09:40
18	90°08.6	N10°45.0	217°44.7	9.3'	S28°11.3	-2.8'	54.7'	0°	20:45	21:37	22:31	08:20	09:10	10:03
19	105°08.8	45.9	232°13.0	9.3'	28°14.0	-2.6'	54.7'	S 10°	20:24	21:15	22:08	08:40	09:32	10:26
20	120°08.9	46.8	246°41.3	9.2'	28°16.6	-2.5'	54.7'	20°	20:02	20:50	21:43	09:01	09:56	10:50
21	135°09.0	· · 47.7	261°09.5	9.2'	28°19.0	-2.4'	54.8'	30°	19:36	20:22	21:15	09:26	10:23	11:19
22	150°09.2	48.5	275°37.7	9.1'	28°21.3	-2.2'	54.8'	35°	19:21	20:05	20:58	09:40	10:40	11:36
23	165°09.3	49.4	290°05.8	9.1'	28°23.4	-2.1'	54.8'	40°	19:03	19:46	20:38	09:57	10:59	11:56
SD.=15.9		d=0.9	S.D.=14.8											
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Sunrise	Mer.	Upper Mer.Pass.	Lower Mer.Pass.	Age	
0	180°09.5	N10°50.3	304°33.9	9.1'	S28°25.4	-1.9'	54.8'	50°	18:42	19:23	20:14	10:18	11:22	12:20
1	195°09.6	51.1	319°01.9	9.0'	28°27.3	-1.8'	54.8'	S 50°	18:15	18:53	19:43	10:44	11:51	12:51
2	210°09.7	52.0	333°29.9	9.0'	28°29.0	-1.6'	54.8'	52°	18:02	18:38	19:28	10:56	12:06	13:06
3	225°09.9	· · 52.9	347°57.9	8.9'	28°30.6	-1.5'	54.9'	54°	17:47	18:21	19:10	11:11	12:23	13:24
4	240°10.0	53.8	2°25.8	8.9'	28°32.0	-1.4'	54.9'	56°	17:30	18:00	18:48	11:28	12:44	13:46
5	255°10.2	54.6	16°53.7	8.9'	28°33.3	-1.2'	54.9'	58°	17:09	17:34	18:20	11:48	13:10	14:14
6	270°10.3	N10°55.5	31°21.6	8.8'	S28°34.4	-1.1'	54.9'	S 60°	16:43	16:58	17:39	12:14	13:46	14:55
7	285°10.4	56.4	45°49.4	8.8'	28°35.4	-0.9'	54.9'							
8	300°10.6	57.2	60°17.2	8.8'	28°36.2	-0.8'	55.0'							
9	315°10.7	· · 58.1	74°44.9	8.7'	28°36.9	-0.6'	55.0'							
10	330°10.9	59.0	89°12.7	8.7'	28°37.5	-0.5'	55.0'							
11	345°11.0	10°59.8	103°40.4	8.7'	28°37.9	-0.3'	55.0'							
12	0°11.1	N11°00.7	118°08.0	8.7'	S28°38.1	-0.2'	55.0'							
13	15°11.3	01.6	132°35.7	8.6'	28°38.2	-0.0'	55.1'							
14	30°11.4	02.5	147°03.3	8.6'	28°38.2	0.1'	55.1'							
15	45°11.6	· · 03.3	161°30.9	8.6'	28°38.0	0.3'	55.1'							
16	60°11.7	04.2	175°58.4	8.6'	28°37.6	0.4'	55.1'							
17	75°11.8	05.1	190°26.0	8.5'	28°37.1	0.6'	55.2'							
18	90°12.0	N11°05.9	204°53.5	8.5'	S28°36.5	0.7'	55.2'							
19	105°12.1	06.8	219°21.0	8.5'	28°35.7	0.9'	55.2'							
20	120°12.2	07.7	233°48.5	8.5'	28°34.8	1.0'	55.2'							
21	135°12.4	· · 08.5	248°16.0	8.5'	28°33.7	1.2'	55.2'							
22	150°12.5	09.4	262°43.5	8.5'	28°32.4	1.3'	55.3'							
23	165°12.6	10.3	277°10.9	8.4'	28°31.0	1.5'	55.3'							
SD.=15.9		d=0.9	S.D.=15.0											
Day	Sun		Mer.		Moon		Age							
	Eqn. of Time	12h	Pass	Upper	Lower	18-20								
	00h	mm:ss	hh:mm	hh:mm	hh:mm	89-75%								
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm									
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 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars		
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	207°21.0	212°59.3	N01°12.7	84°17.8	N22°16.0	129°13.9	N22°43.5	209°42.6	S03°10.2					Alpheratz	357°34.9	29°13.7	
1	222°23.4	228°01.1	12.4	99°19.2	15.8	144°15.8	43.5	224°44.8	10.1					Ankaa	353°07.3	-42°10.1	
2	237°25.9	243°02.8	12.2	114°20.6	15.5	159°17.8	43.5	239°47.0	10.0					Schedar	349°31.4	56°40.4	
3	252°28.4	258°04.5	•• 11.9	129°22.0	•• 15.2	174°19.8	•• 43.6	254°49.2	•• 09.9					Diphda	348°47.3	-17°50.9	
4	267°30.8	273°06.3	11.6	144°23.4	14.9	189°21.7	43.6	269°51.4	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°34.9	
6	297°35.8	303°09.7	N01°11.1	174°26.1	N22°14.4	219°25.6	N22°43.7	299°55.8	S03°09.6					Polaris	314°24.9	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					Akamars	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°11.3	
9	342°43.2	348°14.9	•• 10.4	219°30.3	•• 13.5	264°31.5	•• 43.9	345°02.5	•• 09.3					Mirfak	308°28.4	49°57.1	
10	357°45.6	3°16.6	10.1	234°31.6	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°01.6	
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°22.8	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	08.8					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°24.6	
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°26.1	-16°45.0	
19	133°07.8	138°31.9	08.0	9°44.0	10.7	54°51.2	44.3	135°24.6	08.2					Adara	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°50.6	5°09.7	
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°17.0	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	-50°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°46.0	-43°32.3	
Mer.pass.:10:08			v1.7 d-0.3 m-4.5	v1.4 d-0.3 m0.8	v2.0 d0.0 m-1.9	v2.2 d0.1 m1.2											
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec				
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	S03°07.7					Alphard	217°47.4	-8°46.2	
1	223°22.6	228°42.0	06.6	99°52.3	09.0	145°02.9	44.5	225°37.8	07.6					Regulus	207°34.0	11°50.6	
2	238°25.0	243°43.6	06.4	114°53.7	08.8	160°04.9	44.6	240°40.0	07.5					Dubhe	193°40.2	61°37.0	
3	253°27.5	258°45.3	•• 06.2	129°55.0	•• 08.5	175°06.8	•• 44.6	255°42.2	•• 07.4					Denebola	182°24.4	14°25.8	
4	268°30.0	273°46.9	06.0	144°56.4	08.2	190°08.8	44.7	270°44.4	07.3					Gienah	175°43.0	-17°41.1	
5	283°32.4	288°48.6	05.8	159°57.8	07.9	205°10.8	44.7	285°46.7	07.2					Acrux	172°59.3	-63°14.5	
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					Gacrux	171°50.9	-57°15.5	
7	313°37.4	318°51.9	05.4	190°00.5	07.3	235°14.7	44.8	315°51.1	07.0					Alioth	166°12.2	55°49.3	
8	328°39.8	333°53.6	05.1	205°01.9	07.1	250°16.6	44.8	330°53.3	06.9					Spica	158°21.8	-11°17.7	
9	343°42.3	348°55.2	•• 04.9	220°03.3	•• 06.8	265°18.6	•• 44.9	345°55.5	•• 06.8					Alkaid	152°51.3	49°11.1	
10	358°44.8	3°56.8	04.7	235°04.6	06.5	280°20.6	44.9	0°57.7	06.7					Hadar	148°35.1	-60°29.8	
11	13°47.2	18°58.5	04.5	250°06.0	06.2	295°22.5	45.0	15°59.9	06.6					Menkent	147°57.0	-36°29.8	
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					Arcturus	145°47.2	19°03.2	
13	43°52.1	49°01.7	04.1	280°08.7	05.6	325°26.4	45.1	46°04.3	06.4					Rigel Kent.	139°39.4	-60°56.4	
14	58°54.6	64°03.4	03.9	295°10.1	05.3	340°28.4	45.1	61°06.5	06.3					Kochab	137°18.6	74°02.9	
15	73°57.1	79°05.0	•• 03.7	310°11.5	•• 05.1	355°30.4	•• 45.1	76°08.8	•• 06.2					Zuben'ubi	136°55.5	-16°08.9	
16	88°59.5	94°06.6	03.5	325°12.8	04.8	10°32.3	45.2	91°11.0	06.1					Alphecca	126°03.2	26°37.6	
17	104°02.0	109°08.2	03.3	340°14.2	04.5	25°34.3	45.2	106°13.2	06.0					Antares	112°15.3	-26°29.3	
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					Atria	107°09.0	-69°04.2	
19	134°06.9	139°11.5	03.0	10°16.9	03.9	55°38.2	45.3	136°17.6	05.7					Sabik	102°02.3	-15°45.4	
20	149°09.4	154°13.1	02.8	25°18.3	03.6	70°40.1	45.4	151°19.8	05.6					Shaula	96°09.8	-37°07.3	
21	164°11.9	169°14.7	•• 02.6	40°19.7	•• 03.3	85°42.1	•• 45.4	166°22.0	•• 05.5					Rasalhague	95°58.2	12°32.3	
22	179°14.3	184°16.3	02.4	55°21.0	03.1	100°44.1	45.4	181°24.2	05.4					Eltanin	90°41.8	51°28.8	
23	194°16.8	199°17.9	02.2	70°22.4	02.8	115°46.0	45.5	196°26.4	05.3					Kaus Aust.	83°32.0	-34°22.3	
Mer.pass.:10:05			v1.7 d-0.2 m-4.5	v1.4 d-0.3 m0.8	v2.0 d0.0 m-1.9	v2.2 d0.1 m1.2											
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec				
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					Apr 19 Sat	SHA	Mer.pass	
1	224°21.7	229°21.1	01.9	100°25.1	02.2	145°49.9	45.6	226°30.9	05.1					Venus	5°38.4	09:47	
2	239°24.2	244°22.7	01.7	115°26.5	01.9	160°51.9	45.6	241°33.1	05.0					Mars	236°56.9	18:21	
3	254°26.6	259°24.3	•• 01.5	130°27.9	•• 01.6	175°53.8	•• 45.7	256°35.3	•• 04.9					Jupiter	281°52.9	15:21	
4	269°29.1	274°25.9	01.3	145°29.2	01.3	190°55.8	45.7	271°37.5	04.8					Saturn	2°21.6	10:00	
5	284°31.6	289°27.4	01.2	160°30.6	01.1	205°57.8	45.7	286°39.7	04.7								
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					Apr 20 Sun	SHA	Mer.pass	
7	314°36.5	319°30.6	00.8	190°33.3	00.5	236°01.7	45.8	316°44.1	04.5					Venus	5°20.2	09:44	
8	329°39.0	334°32.2	00.6	205°34.7	22°00.2	251°03.6	45.9	331°46.3	04.4					Mars	236°30.8	18:19	
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					Jupiter	281°40.9	15:18	
10	359°43.9	4°35.3	00.3	235°37.4	59.6	281°07.5	46.0	1°50.8	04.2					Saturn	2°15.5	09:56	
11	14°46.4	19°36.9	00.2	250°38.7	59.3	296°09.5	46.0	16°53.0	04.1								
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	S03°04.0					Apr 21 Mon	SHA	Mer.pass	
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					Venus	5°00.2	09:42	
14	59°53.8	64°41.6	59.7	295°42.8	58.5	341°15.4	46.1	61°59.6	03.8					Mars	236°04.5	18:17	
15	74°56.2	79°43.1	•• 59.5	310°44.2	•• 58.2	356°17.3	•• 46.2	77°01.8	•• 03.7					Jupiter	281°28.7	15:15	
16	89°58.7	94°44.7	59.4	325°45.5	57.9	11°19.3	46.2	92°04.0	03.6					Saturn	2°09.4	09:53	
17	105°01.1	109°46.2	59.2	340°46.9	57.6	26°21.2	46.3	107°06.2	03.5								
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					Horizontal parallax			
19	135°06.1	139°49.3	58.9	10°49.6	57.0	56°25.1	46.3	137°10.7	03.3					Venus:		0.4	
20	150°08.5	154°50.9	58.8	25°51.0	56.7	71°27.1	46.4	152°12.9	03.2					Mars:		0.1	
21	165°11.0	169°52.4	•• 58.6	40°52.3	•• 56.4	86°29.0	•• 46.4	167°15.1	•• 03.1								
22	180°13.5	184°53.9	58.5	55°53.7	56.1	101°31.0	46.5	182°17.3	03.0								
23	195°15.9	199°55.5	58.3	70°55.0	55.8	116°32.9	46.5	197°19.5	02.9								
Mer.pass.:10:01			v1.6 d-0.2 m-4.5	v1.4 d-0.3 m0.8	v2.0 d0.0 m-1.9	v2.2 d0.1 m1.2											

April 22, 23, 24 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		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°13.7
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°26.2	02.6	Schedar	349°31.4	56°40.4
3	255°25.8	260°01.6	· · 57.8	131°00.5	· · 54.7	176°40.7	· · 46.7	257°28.4	· · 02.5	Diphda	348°47.3	-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°34.9
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°25.2	89°22.3
7	315°35.6	320°07.6	57.2	191°05.9	53.5	236°48.6	46.8	317°37.2	02.0	Akamars	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°09.9	52.6	281°54.4	47.0	2°43.9	01.7	Aldebaran	290°39.7	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°01.6
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°24.6
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°26.1	-16°45.0
19	136°05.2	140°25.5	55.8	11°22.1	50.0	57°12.0	47.4	138°03.8	00.8	Adara	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°50.6	5°09.7
21	166°10.1	170°28.5	· · 55.6	41°24.8	· · 49.4	87°15.9	· · 47.4	168°08.2	· · 00.6	Pollux	243°17.0	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	-50°35.7
23	196°15.1	200°31.4	55.4	71°27.5	48.8	117°19.8	47.5	198°12.6	00.4	Suhail	222°46.1	-43°32.3
Mer.pass.:09:57		v1.5 d-0.1 m-4.5		v1.4 d-0.3 m0.8		v2.0 d0.0 m-1.9		v2.2 d0.1 m1.2		Miaplacidus	221°38.1	-69°49.5
										Alphard	217°47.4	-8°46.2
										Regulus	207°34.0	11°50.6
										Dubhe	193°40.2	61°37.0
										Denebola	182°24.4	14°25.8
										Gienah	175°43.0	-17°41.1
										Acrux	172°59.3	-63°14.5
										Gacrux	171°50.9	-57°15.5
										Alioth	166°12.2	55°49.3
										Spica	158°21.8	-11°17.7
										Alkaid	152°51.3	49°11.1
										Hadar	148°35.1	-60°29.8
										Menkent	147°57.0	-36°29.8
										Arcturus	145°47.2	19°03.2
										Rigel Kent.	139°39.4	-60°56.4
										Kochab	137°18.6	74°02.9
										Zuben'ubi	136°55.5	-16°08.9
										Alphecca	126°03.2	26°37.6
										Antares	112°15.3	-26°29.3
										Atria	107°08.9	-69°04.2
										Sabik	102°02.3	-15°45.4
										Shaula	96°09.8	-37°07.3
										Rasalhague	95°58.1	12°32.3
										Eltanin	90°41.8	51°28.8
										Kaus Aust.	83°32.0	-34°22.3
										Vega	80°32.9	38°48.0
										Nunki	75°47.4	-26°15.9
										Altair	61°59.8	8°55.9
										Peacock	53°05.4	-56°39.0
										Deneb	49°25.7	45°21.9
										Enif	33°38.7	9°59.3
										Al Na'ir	27°32.9	-46°50.2
										Fomalhaut	15°14.6	-29°29.3
										Scheat	13°45.3	28°13.0
										Markab	13°29.9	15°20.3
										Apr 22 Tue	SHA	Mer.pass
										Venus	4°38.6	09:39
										Mars	235°38.0	18:15
										Jupiter	281°16.5	15:12
										Saturn	2°03.3	09:49
										Apr 23 Wed	SHA	Mer.pass
										Venus	4°15.3	09:37
										Mars	235°11.3	18:12
										Jupiter	281°04.2	15:09
										Saturn	1°57.3	09:46
										Apr 24 Thu	SHA	Mer.pass
										Venus	3°50.5	09:35
										Mars	234°44.4	18:10
										Jupiter	280°51.8	15:05
										Saturn	1°51.3	09:42
										Horizontal parallax		
										Venus:	0.4	
										Mars:	0.1	
Mer.pass.:09:49		v1.4 d-0.1 m-4.5		v1.3 d-0.3 m0.8		v1.9 d0.0 m-1.9		v2.2 d0.1 m1.2				

April 25, 26, 27 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars												
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec											
0	213°15.8	216°39.9	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°13.7										
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°31.4	56°40.4										
3	258°23.2	261°43.9	· · 52.2	132°37.1	· · 33.2	179°00.9	· · 49.7	260°07.9	· · 55.2	Diphda	348°47.3	-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°41.1	N21°32.3	224°06.7	N22°49.8	305°14.5	S02°54.9	Polaris	314°25.6	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	Akamars	315°12.0	-40°12.3										
8	333°35.5	336°50.5	52.2	207°43.8	31.7	254°10.6	49.9	335°18.9	54.7	Menkar	314°06.2	4°11.3										
9	348°38.0	351°51.8	· · 52.1	222°45.1	· · 31.4	269°12.6	· · 49.9	350°21.2	· · 54.6	Mirfak	308°28.4	49°57.1										
10	3°40.4	6°53.1	52.1	237°46.5	31.1	284°14.5	50.0	5°23.4	54.5	Aldebaran	290°39.7	16°33.6										
11	18°42.9	21°54.5	52.1	252°47.8	30.8	299°16.4	50.0	20°25.6	54.4	Rigel	281°03.9	-8°10.4										
12	33°45.4	36°55.8	N00°52.1	267°49.1	N21°30.5	314°18.4	N22°50.0	35°27.8	S02°54.3	Capella	280°21.9	46°01.6										
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°37.8										
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°01.0	52.1	327°54.4	29.2	14°26.1	50.2	95°36.7	53.9	Betelgeuse	270°52.0	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	Canopus	263°52.6	-52°42.8										
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	Sirius	258°26.1	-16°45.0										
19	139°02.6	142°04.8	52.1	12°58.4	28.3	59°32.0	50.3	140°43.3	53.6	Adara	255°05.8	-29°00.6										
20	154°05.1	157°06.1	52.1	27°59.7	28.0	74°33.9	50.4	155°45.6	53.5	Procyon	244°50.6	5°09.7										
21	169°07.6	172°07.4	· · 52.1	43°01.1	· · 27.7	89°35.8	· · 50.4	170°47.8	· · 53.4	Pollux	243°17.0	27°58.0										
22	184°10.0	187°08.7	52.1	58°02.4	27.4	104°37.8	50.4	185°50.0	53.3	Avior	234°14.7	-50°35.7										
23	199°12.5	202°10.0	52.1	73°03.7	27.1	119°39.7	50.5	200°52.2	53.2	Suhail	222°46.1	-43°32.3										
Mer.pass.:09:45		v1.3 d-0.0 m-4.5		v1.3 d-0.3 m0.9		v1.9 d0.0 m-1.9		v2.2 d0.1 m1.2		Miaplacidus	221°38.1	-69°49.5										
Sat		GHA		GHA		GHA		GHA		Alphard	217°47.4	-8°46.2										
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		Dubhe	193°40.2	61°37.0
1		229°17.4		232°12.5		52.2		103°06.4		26.5		149°43.6		50.6		230°56.7		53.0		Denebola	182°24.4	14°25.8
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		· · 50.7		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	171°50.9	-57°15.5
5		289°27.3		292°17.6		52.2		163°11.6		25.2		209°51.3		50.7		291°05.5		52.6		Alioth	166°12.2	55°49.4
6		304°29.7		307°18.9		N00°52.3		178°13.0		N21°24.9		224°53.3		N22°50.8		306°07.8		S02°52.5		Spica	158°21.8	-11°17.7
7		319°32.2		322°20.1		52.3		193°14.3		24.6		239°55.2		50.8		321°10.0		52.4		Alkaid	152°51.3	49°11.2
8		334°34.7		337°21.4		52.3		208°15.6		24.3		254°57.2		50.9		336°12.2		52.3		Hadars	148°35.1	-60°29.8
9		349°37.1		352°22.6		· · 52.3		223°16.9		· · 24.0		269°59.1		· · 50.9		351°14.4		· · 52.2		Menkent	147°57.0	-36°29.8
10		4°39.6		7°23.9		52.4		238°18.3		23.7		285°01.0		50.9		6°16.6		52.1		Arcturus	145°47.2	19°03.2
11		19°42.0		22°25.1		52.4		253°19.6		23.4		300°03.0		51.0		21°18.9		52.0		Rigel Kent.	139°39.4	-60°56.4
12		34°44.5		37°26.4		N00°52.4		268°20.9		N21°23.0		315°04.9		N22°51.0		36°21.1		S02°51.9		Kochab	137°18.5	74°03.0
13		49°47.0		52°27.6		52.4		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°15.2	-26°29.3
16		94°54.4		97°31.4		52.6		328°26.2		21.8		15°12.6		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		127°33.8		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		51.2		Rasalhague	95°58.1	12°32.3
20		155°04.2		157°36.3		52.7		28°31.5		20.5		75°20.4		51.3		156°38.8		51.1		Eltanin	90°41.8	51°28.8
21		170°06.7		172°37.5		· · 52.8		43°32.8		· · 20.2		90°22.3		· · 51.4		171°41.1		· · 51.0		Kaus Aust.	83°32.0	-34°22.3
22		185°09.2		187°38.7		52.8		58°34.1		19.9		105°24.3		51.4		186°43.3		50.9		Vega	80°32.9	38°48.1
23		200°11.6		202°40.0		52.8		73°35.4		19.6		120°26.2		51.5		201°45.5		50.8		Nunki	75°47.3	-26°15.9
Mer.pass.:09:41		v1.3 d0.0 m-4.5		v1.3 d-0.3 m0.9		v1.9 d0.0 m-1.9		v2.2 d0.1 m1.2		Altair	61°59.8	8°55.9										
Sun		GHA		GHA		GHA		GHA		Peacock	53°05.3	-56°39.0										
0		215°14.1		217°41.2		N00°52.9		88°36.7		N21°19.3		135°28.1		N22°51.5		216°47.7		S02°50.7		Deneb	49°25.7	45°21.9
1		230°16.5		232°42.4		52.9		103°38.0		19.0		150°30.1		51.5		231°49.9		50.6		Enif	33°38.7	9°59.3
2		245°19.0		247°43.6		53.0		118°39.4		18.7		165°32.0		51.6		246°52.2		50.5		Al Na'ir	27°32.8	-46°50.1
3		260°21.5		262°44.8		· · 53.0		133°40.7		· · 18.4		180°33.9		· · 51.6		261°54.4		· · 50.4		Fomalhaut	15°14.5	-29°29.2
4		275°23.9		277°46.0		53.1		148°42.0		18.0		195°35.9		51.7		276°56.6		50.3		Scheat	13°45.3	28°13.0
5		290°26.4		292°47.3		53.1		163°43.3		17.7		210°37.8		51.7		291°58.8		50.2		Markab	13°29.9	15°20.3
6		305°28.9		307°48.5		N00°53.2		178°44.6		N21°17.4		225°39.7		N22°51.7		307°01.1		S02°50.2		Apr 25 Fri	SHA	Mer.pass
7		320°31.3		322°49.7		53.3		193°45.9		17.1		240°41.7		51.8		322°03.3		50.1		Venus	3°24.1	09:32
8		335°33.8		337°50.9		53.3		208°47.2		16.8		255°43.6		51.8		337°05.5		50.0		Mars	234°17.3	18:08
9		350°36.3		352°52.1		· · 53.4		223°48.6		· · 16.5		270°45.5		· · 51.9		352°07.7		· · 49.9		Jupiter	280°39.3	15:02
10		5°38.7		7°53.3		53.4		238°49.9		16.2		285°47.5		51.9		7°09.9		49.8		Saturn	1°45.4	09:38
11		20°41.2		22°54.5		53.5		253°51.2		15.8		300°49.4		51.9		22°12.2		49.7		Apr 26 Sat	SHA	Mer.pass
12		35°43.6		37°55.7		N00°53.6		268°52.5		N21°15.5		315°51.3		N22°52.0		37°14.4		S02°49.6		Venus	2°56.3	09:30
13		50°46.1		52°56.8		53.6		283°53.8		15.2		330°53.3		52.0		52°16.6		49.5		Mars	233°50.1	18:06
14		65°48.6		67°58.0		53.7		298°55.1		14.9		345°55.2		52.0		67°18.8		49.4		Jupiter	280°26.7	14:59
15		80°51.0		82°59.2		· · 53.8		313°56.4		· · 14.6		0°57.1		· · 52.1		82°21.1		· · 49.3		Saturn	1°39.5	09:35
16		95°53.5		98°00.4		53.8		328°57.8		14.3		15°59.1		52.1		97°23.3		49.2		Apr 27 Sun	SHA	Mer.pass
17		110°56.0		113°01.6		53.9		343°59.1		13.9		31°01.0		52.2		112°25.5		49.1		Venus	2°27.1	09:28
18		125°58.4		128°02.8		N00°54.0		359°00.4		N21°13.6		46°02.9		N22°52.2		127°27.7		S02°49.0		Mars	233°22.6	18:04
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	280°14.0	14:56
20		156°03.4		158°05.1		54.1		29°03.0		13.0		76°06.8		52.3		157°32.2		48.8		Saturn	1°33.6	09:31
21		171°05.8		173°06.3		· · 54.2		44°04.3		· · 12.4		91°08.7		· · 52.3		172°34.4		· · 48.7		Horizontal parallax		
22		18																				

h		Sun				Moon				Twilight						
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.		
0	180°30.3	N13°12.1	217°22.0	11.2'	S01°55.1	17.6'	60.3'	N 72°	☐	☐	02:29	21:32	☐	☐		
1	195°30.4	12.9	231°52.2	11.2'	01°37.6	17.6'	60.3'	N 70°	☐	00:48	02:58	21:01	23:28	☐		
2	210°30.5	13.8	246°22.3	11.1'	01°20.0	17.6'	60.3'	68°	☐	01:50	03:19	20:39	22:12	☐		
3	225°30.6	14.6	260°52.5	11.1'	01°02.3	17.6'	60.4'	66°	☐	02:23	03:36	20:22	21:37	☐		
4	240°30.7	15.4	275°22.6	11.1'	00°44.7	17.7'	60.4'	64°	00:42	02:47	03:50	20:08	21:12	23:32		
5	255°30.8	16.2	289°52.6	11.1'	00°27.0	17.7'	60.4'	62°	01:37	03:06	04:01	19:56	20:53	22:25		
6	270°30.9	N13°17.0	304°22.7	11.0'	S00°09.3	17.7'	60.5'	60°	02:07	03:21	04:11	19:46	20:37	21:52		
7	285°31.0	17.8	318°52.7	11.0'	N00°08.4	17.7'	60.5'	N 58°	02:29	03:33	04:20	19:37	20:24	21:29		
8	300°31.1	18.6	333°22.6	11.0'	00°26.1	17.7'	60.5'	56°	02:47	03:44	04:27	19:30	20:13	21:11		
9	315°31.2	19.5	347°52.6	10.9'	00°43.9	17.8'	60.6'	54°	03:01	03:54	04:34	19:23	20:03	20:56		
10	330°31.3	20.3	2°22.5	10.9'	01°01.6	17.8'	60.6'	52°	03:14	04:02	04:40	19:17	19:55	20:44		
11	345°31.4	21.1	16°52.3	10.8'	01°19.4	17.8'	60.6'	50°	03:24	04:09	04:45	19:11	19:47	20:33		
12	0°31.5	N13°21.9	31°22.1	10.8'	N01°37.2	17.8'	60.6'	45°	03:46	04:25	04:57	18:59	19:31	20:11		
13	15°31.6	22.7	45°51.9	10.8'	01°55.0	17.8'	60.7'	N 40°	04:03	04:38	05:06	18:50	19:19	19:54		
14	30°31.7	23.5	60°21.6	10.7'	02°12.8	17.8'	60.7'	35°	04:16	04:48	05:15	18:41	19:08	19:40		
15	45°31.8	24.3	74°51.3	10.7'	02°30.6	17.8'	60.7'	30°	04:27	04:57	05:22	18:34	18:59	19:29		
16	60°31.9	25.1	89°21.0	10.6'	02°48.4	17.8'	60.7'	20°	04:44	05:11	05:34	18:22	18:45	19:12		
17	75°32.0	25.9	103°50.6	10.6'	03°06.2	17.8'	60.8'	N 10°	04:58	05:23	05:45	18:11	18:33	18:58		
18	90°32.1	N13°26.7	118°20.1	10.5'	N03°24.0	17.8'	60.8'	0°	05:08	05:33	05:54	18:01	18:22	18:47		
19	105°32.3	27.5	132°49.6	10.5'	03°41.8	17.8'	60.8'	S 10°	05:18	05:43	06:04	17:51	18:13	18:38		
20	120°32.4	28.4	147°19.1	10.4'	03°59.6	17.8'	60.8'	20°	05:26	05:52	06:14	17:41	18:03	18:30		
21	135°32.5	29.2	161°48.5	10.4'	04°17.4	17.8'	60.9'	30°	05:33	06:01	06:26	17:29	17:54	18:22		
22	150°32.6	30.0	176°17.8	10.3'	04°35.1	17.8'	60.9'	35°	05:37	06:07	06:33	17:22	17:48	18:18		
23	165°32.7	30.8	190°47.1	10.3'	04°52.9	17.8'	60.9'	40°	05:40	06:12	06:40	17:15	17:43	18:15		
	SD.=15.9	d=0.8			S.D.=16.4			45°	05:44	06:18	06:49	17:06	17:36	18:11		
								S 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		
								S 60°	05:56	06:45	07:30	16:25	17:09	17:59		
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset				
0	180°32.8	N13°31.6	205°16.3	10.2'	N05°10.6	17.7'	60.9'	N 72°	03:50	03:11	02:21	16:39	19:21	--		
1	195°32.9	32.4	219°45.5	10.1'	05°28.4	17.7'	61.0'	N 70°	03:49	03:19	02:42	16:35	19:02	22:06		
2	210°33.0	33.2	234°14.6	10.1'	05°46.1	17.7'	61.0'	68°	03:48	03:26	03:00	16:31	18:47	21:24		
3	225°33.1	34.0	248°43.7	10.0'	06°03.8	17.7'	61.0'	66°	03:47	03:31	03:13	16:28	18:35	20:56		
4	240°33.2	34.8	263°12.7	10.0'	06°21.5	17.7'	61.0'	64°	03:46	03:36	03:25	16:26	18:26	20:35		
5	255°33.3	35.6	277°41.6	9.9'	06°39.1	17.6'	61.0'	62°	03:46	03:40	03:35	16:24	18:17	20:18		
6	270°33.4	N13°36.4	292°10.5	9.8'	N06°56.8	17.6'	61.1'	60°	03:45	03:44	03:44	16:22	18:10	20:04		
7	285°33.5	37.2	306°39.3	9.8'	07°14.4	17.6'	61.1'	N 58°	03:44	03:47	03:51	16:21	18:04	19:53		
8	300°33.6	38.0	321°08.0	9.7'	07°31.9	17.6'	61.1'	56°	03:44	03:50	03:58	16:19	17:58	19:42		
9	315°33.7	38.8	335°36.7	9.6'	07°49.5	17.5'	61.1'	54°	03:44	03:53	04:04	16:18	17:54	19:33		
10	330°33.8	39.6	350°05.3	9.6'	08°07.0	17.5'	61.1'	52°	03:43	03:55	04:09	16:17	17:49	19:25		
11	345°33.9	40.4	4°33.9	9.5'	08°24.5	17.5'	61.2'	50°	03:43	03:58	04:14	16:16	17:45	19:18		
12	0°34.0	N13°41.2	19°02.3	9.4'	N08°41.9	17.4'	61.2'	45°	03:42	04:03	04:25	16:14	17:37	19:03		
13	15°34.1	42.0	33°30.7	9.4'	08°59.3	17.4'	61.2'	N 40°	03:42	04:07	04:34	16:12	17:30	18:50		
14	30°34.2	42.8	47°59.0	9.3'	09°16.6	17.3'	61.2'	35°	03:41	04:10	04:42	16:10	17:23	18:40		
15	45°34.3	43.6	62°27.3	9.2'	09°33.9	17.3'	61.2'	30°	03:41	04:14	04:49	16:09	17:18	18:31		
16	60°34.4	44.4	76°55.4	9.1'	09°51.2	17.2'	61.2'	20°	03:40	04:19	05:01	16:06	17:09	18:15		
17	75°34.4	45.2	91°23.5	9.1'	10°08.4	17.2'	61.2'	N 10°	03:39	04:24	05:12	16:04	17:01	18:01		
18	90°34.5	N13°46.0	105°51.5	9.0'	N10°25.5	17.1'	61.3'	0°	03:38	04:29	05:22	16:02	16:53	17:48		
19	105°34.6	46.8	120°19.5	8.9'	10°42.6	17.1'	61.3'	S 10°	03:38	04:34	05:32	16:00	16:46	17:36		
20	120°34.7	47.6	134°47.3	8.8'	10°59.7	17.0'	61.3'	20°	03:37	04:39	05:43	15:58	16:38	17:22		
21	135°34.8	48.4	149°15.1	8.7'	11°16.7	17.0'	61.3'	30°	03:36	04:45	05:56	15:55	16:29	17:07		
22	150°34.9	49.2	163°42.8	8.6'	11°33.6	16.9'	61.3'	35°	03:36	04:48	06:03	15:54	16:24	16:58		
23	165°35.0	50.0	178°10.4	8.6'	11°50.5	16.8'	61.3'	40°	03:36	04:52	06:12	15:52	16:18	16:48		
	SD.=15.9	d=0.8			S.D.=16.6			45°	03:35	04:57	06:22	15:50	16:11	16:36		
								S 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		
								S 60°	03:33	05:19	07:10	15:42	15:41	15:40		
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun Eqn.of Time		Mer.	Moon Mer.Pass.		Age		
0	180°35.1	N13°50.8	192°37.9	8.5'	N12°07.2	16.8'	61.3'	25	00 ^h	12 ^h	Pass	Upper	Lower	27-29		
1	195°35.2	51.6	207°05.4	8.4'	12°24.0	16.7'	61.3'	26	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	8-0%		
2	210°35.3	52.4	221°32.7	8.3'	12°40.6	16.6'	61.3'	27								
3	225°35.4	53.2	236°00.0	8.2'	12°57.2	16.5'	61.3'									
4	240°35.5	54.0	250°27.2	8.1'	13°13.7	16.5'	61.4'									
5	255°35.6	54.8	264°54.3	8.0'	13°30.2	16.4'	61.4'									
6	270°35.7	N13°55.6	279°21.3	8.0'	N13°46.5	16.3'	61.4'									
7	285°35.8	56.4	293°48.2	7.9'	14°02.8	16.2'	61.4'									
8	300°35.9	57.2	308°15.0	7.8'	14°19.0	16.1'	61.4'									
9	315°36.0	58.0	322°41.7	7.7'	14°35.1	16.1'	61.4'									
10	330°36.1	58.7	337°08.3	7.6'	14°51.1	16.0'	61.4'									
11	345°36.2	59.5	351°34.9	7.5'	15°07.0	15.9'	61.4'									
12	0°36.3	N14°00.3	6°01.3	7.4'	N15°22.8	15.8'	61.4'									
13	15°36.4	01.1	20°27.7	7.3'	15°38.6	15.7'	61.4'									
14	30°36.4	01.9	34°53.9	7.2'	15°54.2	15.6'	61.4'									
15	45°36.5	02.7	49°20.1	7.1'	16°09.7	15.5'	61.4'									
16	60°36.6	03.5	63°46.2	7.0'	16°25.2	15.4'	61.4'									
17	75°36.7	04.3	78°12.1	6.9'	16°40.5	15.3'	61.4'									
18	90°36.8	N14°05.1	92°38.0	6.8'	N16°55.7	15.2'	61.4'									
19	105°36.9	05.9	107°03.8	6.7'	17°10.8	15.1'	61.4'									
20	120°37.0	06.6	121°29.4	6.6'	17°25.8	14.9'	61.4'									
21	135°37.1	07.4	135°55.0	6.5'	17°40.7	14.8'	61.4'									
22	150°37.2	08.2	150°20.5	6.4'	17°55.5	14.7'	61.4'									
23	165°37.3	09.0	164°45.9	6.3'	18°10.1	14.6'	61.4'									
	SD.=15.9	d=0.8			S.D.=16.7											

April 28, 29, 30 (Mon., Tue., Wed.)


Aries		Venus		Mars		Jupiter		Saturn		Stars		
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	216°13.2	218°09.8	N00°54.5	89°08.2	N21°11.7	136°14.5	N22°52.4	217°41.1	S02°48.4	Alpheratz	357°34.9	29°13.7
1	231°15.7	233°11.0	54.6	104°09.5	11.4	151°16.5	52.5	232°43.3	48.3	Ankaa	353°07.3	-42°10.1
2	246°18.1	248°12.1	54.6	119°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°12.2	· · 10.8	181°20.3	· · 52.6	262°47.7	· · 48.1	Diphda	348°47.3	-17°50.9
4	276°23.1	278°14.4	54.8	149°13.5	10.5	196°22.2	52.6	277°49.9	48.0	Achernar	335°20.6	-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°16.1	N21°09.8	226°26.1	N22°52.7	307°54.4	S02°47.8	Polaris	314°25.5	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	Akamar	315°12.0	-40°12.3
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°26.5	07.3	346°41.5	53.0	68°12.2	47.0	Elnath	278°01.9	28°37.8
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°42.8
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°26.1	-16°45.0
19	142°00.0	143°31.5	56.3	14°33.1	05.7	61°51.2	53.2	143°23.3	46.6	Adara	255°05.8	-29°00.6
20	157°02.5	158°32.7	56.4	29°34.4	05.3	76°55.1	53.2	158°25.5	46.5	Procyon	244°50.6	5°09.7
21	172°05.0	173°33.8	· · 56.5	44°35.7	· · 05.0	91°53.0	· · 53.3	173°27.8	· · 46.4	Pollux	243°17.0	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	-50°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
Mer.pass.:09:33		v1.2 d0.1 m-4.5		v1.3 d-0.3 m0.9		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Miaplacidus	221°38.2	-69°49.5
										Alphard	217°47.5	-8°46.2
										Regulus	207°34.0	11°50.6
										Dubhe	193°40.3	61°37.1
										Denebola	182°24.4	14°25.8
										Gienah	175°43.1	-17°41.1
										Acrux	172°59.3	-63°14.6
										Gacrux	171°50.9	-57°15.5
										Alioth	166°12.3	55°49.4
										Spica	158°21.7	-11°17.7
										Alkaid	152°51.3	49°11.2
										Hadar	148°35.1	-60°29.8
										Menkent	147°57.0	-36°29.8
										Arcturus	145°47.2	19°03.2
										Rigel Kent.	139°39.4	-60°56.5
										Kochab	137°18.5	74°03.0
										Zuben'ubi	136°55.4	-16°08.9
										Alphecca	126°03.2	26°37.6
										Antares	112°15.2	-26°29.3
										Atria	107°08.8	-69°04.2
										Sabik	102°02.3	-15°45.4
										Shaula	96°09.8	-37°07.3
										Rasalhague	95°58.1	12°32.3
										Eltanin	90°41.7	51°28.8
										Kaus Aust.	83°32.0	-34°22.3
										Vega	80°32.9	38°48.1
										Nunki	75°47.3	-26°15.9
										Altair	61°59.7	8°55.9
										Peacock	53°05.3	-56°39.0
										Deneb	49°25.7	45°21.9
										Enif	33°38.7	9°59.3
										Al Na'ir	27°32.8	-46°50.1
										Fomalhaut	15°14.5	-29°29.2
										Scheat	13°45.3	28°13.0
										Markab	13°29.9	15°20.3
										Apr 28 Mon	SHA	Mer.pass
										Venus	1°56.6	09:27
										Mars	232°55.0	18:02
										Jupiter	280°01.3	14:53
										Saturn	1°27.8	09:28
										Apr 29 Tue	SHA	Mer.pass
										Venus	1°24.8	09:25
										Mars	232°27.2	18:00
										Jupiter	279°48.5	14:50
										Saturn	1°22.1	09:24
										Apr 30 Wed	SHA	Mer.pass
										Venus	0°51.7	09:23
										Mars	231°59.3	17:58
										Jupiter	279°35.6	14:47
										Saturn	1°16.4	09:21
										Horizontal parallax		
										Venus:	0.3	
										Mars:	0.1	
Mer.pass.:09:25		v1.1 d0.2 m-4.5		v1.3 d-0.3 m0.9		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2				

May 01, 02, 03 (Thu., Fri., Sat.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	219°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°13.7	
1	234°13.1	234°29.2	04.2	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°47.2	-17°50.9	
4	279°20.5	279°32.2	04.8	150°46.9	47.0	198°40.9	55.4	280°30.2	41.1	Achernar	335°20.6	-57°06.4	
5	294°23.0	294°33.2	05.0	165°48.2	46.7	213°42.8	55.4	295°32.5	41.0	Hamal	327°51.3	23°34.8	
6	309°25.4	309°34.3	N01°05.2	180°49.5	N20°46.4	228°44.7	N22°55.4	310°34.7	S02°40.9	Polaris	314°25.3	89°22.3	
7	324°27.9	324°35.3	05.4	195°50.8	46.0	243°46.7	55.5	325°36.9	40.8	Akamars	315°12.0	-40°12.2	
8	339°30.4	339°36.3	05.6	210°52.1	45.7	258°48.6	55.5	340°39.2	40.7	Menkar	314°06.2	4°11.3	
9	354°32.8	354°37.3	· · 05.8	225°53.4	· · 45.4	273°50.5	· · 55.6	355°41.4	· · 40.7	Mirfak	308°28.4	49°57.0	
10	9°35.3	9°38.3	06.0	240°54.7	45.0	288°52.4	55.6	10°43.6	40.6	Aldebaran	290°39.7	16°33.6	
11	24°37.7	24°39.3	06.1	255°56.0	44.7	303°54.3	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°57.2	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	69°45.1	69°42.2	06.7	300°59.8	43.7	349°00.1	55.7	70°52.5	40.2	Elnath	278°01.9	28°37.8	
15	84°47.6	84°43.2	· · 06.9	316°01.1	· · 43.4	4°02.0	· · 55.8	85°54.8	· · 40.1	Alnilam	275°37.7	-1°11.2	
16	99°50.1	99°44.2	07.1	331°02.4	43.0	19°03.9	55.8	100°57.0	40.0	Betelgeuse	270°52.1	7°24.7	
17	114°52.5	114°45.2	07.3	346°03.7	42.7	34°05.9	55.9	115°59.2	39.9	Canopus	263°52.6	-52°42.8	
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	Sirius	258°26.1	-16°45.0	
19	144°57.5	144°47.1	07.8	16°06.2	42.0	64°09.7	55.9	146°03.7	39.7	Adara	255°05.8	-29°00.6	
20	159°59.9	159°48.1	08.0	31°07.5	41.7	79°11.6	56.0	161°05.9	39.6	Procyon	244°50.6	5°09.7	
21	175°02.4	174°49.1	· · 08.2	46°08.8	· · 41.4	94°13.5	· · 56.0	176°08.1	· · 39.5	Pollux	243°17.0	27°58.0	
22	190°04.9	189°50.1	08.4	61°10.1	41.0	109°15.5	56.0	191°10.4	39.4	Avior	234°14.8	-57°35.7	
23	205°07.3	204°51.1	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.pass.:09:21		v1.0 d0.2 m-4.5		v1.3 d-0.3 m0.9		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Miaplacidus		221°38.2	-69°49.5
Mer.pass.:09:17		v1.0 d0.2 m-4.5		v1.3 d-0.3 m0.9		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Alphard		217°47.5	-8°46.2
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Regulus		207°34.0	11°50.6
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Dubhe		193°40.3	61°37.1
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Denebola		182°24.4	14°25.8
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Gienah		175°43.1	-17°41.1
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Acrux		172°59.3	-63°14.6
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Gacrux		171°50.9	-57°15.5
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Alioth		166°12.3	55°49.4
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Spica		158°21.7	-11°17.7
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Alkaid		152°51.3	49°11.2
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Hadar		148°35.1	-60°29.8
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Menkent		147°57.0	-36°29.8
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Arcturus		145°47.2	19°03.2
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Rigel Kent.		139°39.3	-60°56.5
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Kochab		137°18.5	74°03.0
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Zuben'ubi		136°55.4	-16°08.9
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Alphecca		126°03.2	26°37.6
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Antares		112°15.2	-26°29.3
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Atria		107°08.8	-69°04.2
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Sabik		102°02.2	-15°45.4
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Shaula		96°09.7	-37°07.3
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Rasalhague		95°58.1	12°32.3
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Eltanin		90°41.7	51°28.8
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Kaus Aust.		83°31.9	-34°22.3
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Vega		80°32.9	38°48.1
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Nunki		75°47.3	-26°15.9
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Altair		61°59.7	8°55.9
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Peacock		53°05.3	-56°39.0
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Deneb		49°25.6	45°21.9
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Enif		33°38.7	9°59.3
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Al Na'ir		27°32.8	-46°50.1
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Fomalhaut		15°14.5	-29°29.2
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Scheat		13°45.2	28°13.0
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Markab		13°29.9	15°20.3
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		May 01 Thu		SHA	Mer.pass
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Venus		0°17.6	09:21
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Mars		231°31.2	17:56
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Jupiter		279°22.6	14:44
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Saturn		1°10.7	09:17
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		May 02 Fri		SHA	Mer.pass
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Venus		359°42.2	09:20
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Mars		231°02.9	17:54
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Jupiter		279°09.5	14:41
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Saturn		1°05.1	09:14
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		May 03 Sat		SHA	Mer.pass
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Venus		359°05.9	09:18
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Mars		230°34.5	17:52
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Jupiter		278°56.4	14:38
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Saturn		0°59.5	09:10
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Horizontal parallax			
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Venus:		0.3	
Mer.pass.:09:13		v0.9 d0.2 m-4.5		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Mars:		0.1	

May 04, 05, 06 (Sun., Mon., Tue.)

Aries		Venus		Mars		Jupiter		Saturn		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°13.7
1	237°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°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°39.2	· · 21.3	137°17.8	· · 23.0	185°57.0	· · 58.0	268°08.7	· · 34.5	Diphda	348°47.2	-17°50.9
4	282°17.9	280°40.0	21.6	152°19.1	22.6	200°58.9	58.0	283°11.0	34.5	Achernar	335°20.5	-57°06.4
5	297°20.4	295°40.9	21.9	167°20.3	22.3	216°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°21.6	N20°21.9	231°02.7	N22°58.1	313°15.4	S02°34.3	Polaris	314°25.2	89°22.3
7	327°25.3	325°42.7	22.4	197°22.9	21.6	246°04.6	58.1	328°17.7	34.2	Akamar	315°12.0	-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°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°31.7	19.2	351°18.0	58.4	73°33.3	33.5	Elnath	278°01.9	28°37.8
15	87°45.0	85°49.6	· · 24.7	317°33.0	· · 18.8	6°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°35.5	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°25.6	N22°58.5	133°42.3	S02°33.2	Sirius	258°26.1	-16°45.0
19	147°54.9	145°53.0	25.9	17°38.1	17.4	66°27.6	58.5	148°44.5	33.1	Adara	255°05.9	-29°00.6
20	162°57.3	160°53.9	26.2	32°39.4	17.1	81°29.5	58.6	163°46.7	33.0	Procyon	244°50.6	5°09.7
21	177°59.8	175°54.7	· · 26.5	47°40.6	· · 16.7	96°31.4	· · 58.6	178°49.0	· · 32.9	Pollux	243°17.0	27°58.0
22	193°02.3	190°55.6	26.8	62°41.9	16.4	111°33.3	58.6	193°51.2	32.8	Avior	234°14.8	-50°35.7
23	208°04.7	205°56.4	27.1	77°43.1	16.0	126°35.2	58.7	208°53.4	32.7	Suhail	222°46.1	-43°32.3
Mer.pass.:09:09		v0.9 d0.3 m-4.4		v1.3 d-0.3 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2		Miaplacidus	221°38.3	-69°49.6
										Alphard	217°47.5	-8°46.2
										Regulus	207°34.0	11°50.6
										Dubhe	193°40.3	61°37.1
										Denebola	182°24.4	14°25.8
										Gienah	175°43.1	-17°41.1
										Acrux	172°59.3	-63°14.6
										Gacrux	171°50.9	-57°15.5
										Alioth	166°12.3	55°49.4
										Spica	158°21.7	-11°17.7
										Alkaid	152°51.3	49°11.2
										Hadar	148°35.0	-60°29.8
										Menkent	147°57.0	-36°29.8
										Arcturus	145°47.2	19°03.2
										Rigel Kent.	139°39.3	-60°56.5
										Kochab	137°18.5	74°03.0
										Zuben'ubi	136°55.4	-16°08.9
										Alphecca	126°03.2	26°37.6
										Antares	112°15.2	-26°29.3
										Atria	107°08.7	-69°04.3
										Sabik	102°02.2	-15°45.4
										Shaula	96°09.7	-37°07.3
										Rasalhague	95°58.1	12°32.3
										Eltanin	90°41.7	51°28.8
										Kaus Aust.	83°31.9	-34°22.3
										Vega	80°32.8	38°48.1
										Nunki	75°47.3	-26°15.9
										Altair	61°59.7	8°55.9
										Peacock	53°05.2	-56°39.0
										Deneb	49°25.6	45°21.9
										Enif	33°38.6	9°59.3
										Al Na'ir	27°32.7	-46°50.1
										Fomalhaut	15°14.5	-29°29.2
										Scheat	13°45.2	28°13.0
										Markab	13°29.8	15°20.3
										May 04 Sun	SHA	Mer.pass
										Venus	358°28.4	09:17
										Mars	230°05.9	17:50
										Jupiter	278°43.2	14:35
										Saturn	0°54.0	09:07
										May 05 Mon	SHA	Mer.pass
										Venus	357°50.0	09:16
										Mars	229°37.2	17:48
										Jupiter	278°29.9	14:32
										Saturn	0°48.5	09:03
										May 06 Tue	SHA	Mer.pass
										Venus	357°10.7	09:14
										Mars	229°08.4	17:46
										Jupiter	278°16.6	14:29
										Saturn	0°43.1	08:59
										Horizontal parallax		
										Venus:	0.3	
										Mars:	0.1	
Mer.pass.:09:02		v0.8 d0.3 m-4.4		v1.3 d-0.4 m1.0		v1.9 d0.0 m-1.8		v2.2 d0.1 m1.2				

h		Sun				Moon									
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight		
									Naut.	Civil			Civil	Naut.	
0	180°51.6	N16°49.6	58°59.7	16.4'	N07°05.9	-14.1'	54.9'				00:17	--			
1	195°51.7	50.2	73°35.1	16.4'	06°51.8	-14.2'	54.9'	N 72°							
2	210°51.7	50.9	88°10.5	16.5'	06°37.6	-14.2'	54.9'	N 70°			01:45	22:14			
3	225°51.8	51.6	102°46.0	16.5'	06°23.4	-14.2'	54.8'	68°			02:23	21:34			
4	240°51.8	52.3	117°21.5	16.6'	06°09.2	-14.2'	54.8'	66°			01:01	02:49	21:07	23:01	
5	255°51.8	53.0	131°57.1	16.6'	05°55.0	-14.2'	54.8'	64°			01:49	03:09	20:46	22:08	
6	270°51.9	N16°53.7	146°32.7	16.6'	N05°40.8	-14.2'	54.8'	62°			02:19	03:25	20:29	21:37	
7	285°51.9	54.4	161°08.4	16.7'	05°26.6	-14.2'	54.8'	60°	00:54	02:41	03:39	20:16	21:14	23:07	
8	300°52.0	55.1	175°44.1	16.7'	05°12.3	-14.2'	54.7'	N 58°	01:38	02:59	03:51	20:04	20:56	22:19	
9	315°52.0	55.7	190°19.8	16.7'	04°58.1	-14.3'	54.7'	56°	02:05	03:14	04:01	19:54	20:41	21:50	
10	330°52.0	56.4	204°55.5	16.8'	04°43.8	-14.3'	54.7'	54°	02:26	03:26	04:09	19:45	20:28	21:29	
11	345°52.1	57.1	219°31.3	16.8'	04°29.5	-14.3'	54.7'	52°	02:43	03:37	04:17	19:37	20:17	21:12	
12	0°52.1	N16°57.8	234°07.2	16.8'	N04°15.2	-14.3'	54.7'	50°	02:57	03:46	04:24	19:30	20:08	20:58	
13	15°52.2	58.5	248°43.0	16.9'	04°00.9	-14.3'	54.7'	45°	03:24	04:06	04:39	19:14	19:48	20:30	
14	30°52.2	59.2	263°18.9	16.9'	03°46.7	-14.3'	54.6'	N 40°	03:45	04:22	04:52	19:02	19:32	20:09	
15	45°52.2	16°59.8	277°54.8	16.9'	03°32.4	-14.3'	54.6'	35°	04:01	04:35	05:02	18:51	19:19	19:52	
16	60°52.3	17°00.5	292°30.8	17.0'	03°18.0	-14.3'	54.6'	30°	04:15	04:46	05:11	18:42	19:08	19:39	
17	75°52.3	01.2	307°06.7	17.0'	03°03.7	-14.3'	54.6'	20°	04:36	05:04	05:27	18:26	18:50	19:17	
18	90°52.3	N17°01.9	321°42.7	17.0'	N02°49.4	-14.3'	54.6'	N 10°	04:53	05:18	05:40	18:13	18:35	19:01	
19	105°52.4	02.6	336°18.7	17.0'	02°35.1	-14.3'	54.6'	0°	05:06	05:31	05:53	18:00	18:22	18:47	
20	120°52.4	03.3	350°54.8	17.1'	02°20.8	-14.3'	54.5'	S 10°	05:18	05:44	06:05	17:47	18:09	18:35	
21	135°52.4	03.9	5°30.8	17.1'	02°06.5	-14.3'	54.5'	20°	05:29	05:56	06:19	17:34	17:57	18:24	
22	150°52.5	04.6	20°06.9	17.1'	01°52.2	-14.3'	54.5'	30°	05:40	06:08	06:34	17:19	17:44	18:13	
23	165°52.5	05.3	34°43.0	17.1'	01°37.8	-14.3'	54.5'	35°	05:45	06:15	06:42	17:10	17:37	18:07	
	SD.=15.9	d=0.7			S.D.=15.0			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	
0	180°52.6	N17°06.0	49°19.1	17.1'	N01°23.5	-14.3'	54.5'	S 50°	06:03	06:42	07:17	16:35	17:10	17:49	
1	195°52.6	06.6	63°55.3	17.1'	01°09.2	-14.3'	54.5'	52°	06:06	06:47	07:24	16:29	17:05	17:46	
2	210°52.6	07.3	78°31.4	17.2'	00°54.9	-14.3'	54.4'	54°	06:09	06:52	07:31	16:22	17:00	17:43	
3	225°52.7	08.0	93°07.6	17.2'	00°40.6	-14.3'	54.4'	56°	06:12	06:57	07:39	16:14	16:55	17:40	
4	240°52.7	08.7	107°43.8	17.2'	00°26.3	-14.3'	54.4'	58°	06:16	07:04	07:48	16:05	16:49	17:36	
5	255°52.7	09.3	122°20.0	17.2'	N00°12.0	-14.3'	54.4'	S 60°	06:19	07:10	07:58	15:54	16:42	17:33	
6	270°52.8	N17°10.0	136°56.2	17.2'	S00°02.3	-14.3'	54.4'								
7	285°52.8	10.7	151°32.4	17.2'	00°16.6	-14.3'	54.4'	Lat.	Moonrise			Moonset			
8	300°52.8	11.4	166°08.6	17.2'	00°30.9	-14.3'	54.4'	Wed	Thu	Fri	Wed	Thu	Fri		
9	315°52.9	12.0	180°44.9	17.2'	00°45.2	-14.3'	54.4'	N 72°	13:39	15:37	17:38	03:28	02:55	02:23	
10	330°52.9	12.7	195°21.1	17.2'	00°59.4	-14.3'	54.3'	N 70°	13:45	15:34	17:24	03:19	02:54	02:29	
11	345°52.9	13.4	209°57.4	17.2'	01°13.7	-14.3'	54.3'	68°	13:49	15:31	17:14	03:12	02:53	02:35	
12	0°53.0	N17°14.1	224°33.6	17.3'	S01°27.9	-14.2'	54.3'	66°	13:53	15:29	17:05	03:06	02:53	02:40	
13	15°53.0	14.7	239°09.9	17.3'	01°42.2	-14.2'	54.3'	64°	13:56	15:27	16:58	03:01	02:52	02:43	
14	30°53.0	15.4	253°46.1	17.3'	01°56.4	-14.2'	54.3'	62°	13:59	15:25	16:51	02:57	02:52	02:47	
15	45°53.1	16.1	268°22.4	17.3'	02°10.6	-14.2'	54.3'	60°	14:01	15:24	16:46	02:53	02:51	02:50	
16	60°53.1	16.7	282°58.6	17.3'	02°24.8	-14.2'	54.3'	N 58°	14:03	15:22	16:41	02:49	02:51	02:53	
17	75°53.1	17.4	297°34.9	17.3'	02°39.0	-14.2'	54.3'	56°	14:05	15:21	16:37	02:46	02:51	02:55	
18	90°53.1	N17°18.1	312°11.2	17.3'	S02°53.2	-14.2'	54.3'	54°	14:07	15:20	16:33	02:44	02:51	02:57	
19	105°53.2	18.8	326°47.4	17.3'	03°07.3	-14.2'	54.2'	52°	14:08	15:19	16:30	02:41	02:50	02:59	
20	120°53.2	19.4	341°23.7	17.2'	03°21.5	-14.1'	54.2'	50°	14:10	15:18	16:27	02:39	02:50	03:01	
21	135°53.2	20.1	355°59.9	17.2'	03°35.6	-14.1'	54.2'	45°	14:13	15:16	16:20	02:34	02:50	03:05	
22	150°53.3	20.8	10°36.1	17.2'	03°49.7	-14.1'	54.2'	N 40°	14:15	15:15	16:14	02:30	02:49	03:08	
23	165°53.3	21.4	25°12.4	17.2'	04°03.8	-14.1'	54.2'	35°	14:17	15:14	16:10	02:26	02:49	03:11	
	SD.=15.8	d=0.7			S.D.=14.9			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	
0	180°53.3	N17°22.1	39°48.6	17.2'	S04°17.9	-14.1'	54.2'	N 10°	14:25	15:09	15:52	02:12	02:47	03:22	
1	195°53.4	22.8	54°24.8	17.2'	04°32.0	-14.0'	54.2'	0°	14:28	15:07	15:46	02:07	02:47	03:26	
2	210°53.4	23.4	69°01.0	17.2'	04°46.0	-14.0'	54.2'	S 10°	14:31	15:05	15:40	02:02	02:46	03:30	
3	225°53.4	24.1	83°37.2	17.2'	05°00.0	-14.0'	54.2'	20°	14:33	15:04	15:34	01:57	02:46	03:34	
4	240°53.4	24.7	98°13.4	17.2'	05°14.0	-14.0'	54.2'	30°	14:37	15:02	15:27	01:51	02:45	03:38	
5	255°53.5	25.4	112°49.5	17.2'	05°28.0	-14.0'	54.1'	35°	14:38	15:01	15:24	01:48	02:45	03:41	
6	270°53.5	N17°26.1	127°25.7	17.1'	S05°41.9	-13.9'	54.1'	40°	14:40	15:00	15:19	01:44	02:44	03:44	
7	285°53.5	26.7	142°01.8	17.1'	05°55.9	-13.9'	54.1'	45°	14:43	14:58	15:14	01:39	02:44	03:47	
8	300°53.6	27.4	156°37.9	17.1'	06°09.8	-13.9'	54.1'	S 50°	14:46	14:57	15:08	01:34	02:43	03:51	
9	315°53.6	28.1	171°14.0	17.1'	06°23.7	-13.9'	54.1'	52°	14:47	14:56	15:05	01:31	02:43	03:53	
10	330°53.6	28.7	185°50.1	17.1'	06°37.5	-13.8'	54.1'	54°	14:48	14:55	15:02	01:28	02:42	03:55	
11	345°53.6	29.4	200°26.2	17.0'	06°51.3	-13.8'	54.1'	56°	14:50	14:54	14:59	01:25	02:42	03:58	
12	0°53.7	N17°30.0	215°02.2	17.0'	S07°05.1	-13.8'	54.1'	58°	14:52	14:53	14:55	01:22	02:42	04:00	
13	15°53.7	30.7	229°38.2	17.0'	07°18.9	-13.8'	54.1'	S 60°	14:54	14:52	14:51	01:18	02:41	04:03	
14	30°53.7	31.4	244°14.2	17.0'	07°32.7	-13.7'	54.1'								
15	45°53.7	32.0	258°50.2	17.0'	07°46.4	-13.7'	54.1'	Day	Sun		Mer.	Moon		Age	
16	60°53.8	32.7	273°26.1	16.9'	08°00.1	-13.7'	54.1'		Eqn. of Time	Pass	Upper Mer.Pass.	Lower	10-12		
17	75°53.8	33.3	288°02.0	16.9'	08°13.7	-13.6'	54.1'		00 ^h	hh:mm	hh:mm	hh:mm	78-91%		
18	90°53.8	N17°34.0	302°37.9	16.9'	S08°27.4	-13.6'	54.1'		mm:ss	mm:ss					
19	105°53.8	34.6	317°13.8	16.8'	08°41.0	-13.6'	54.1'	7	03:27	03:28	11:57	20:37	08:18		
20	120°53.9	35.3	331°49.6	16.8'	08°54.5	-13.5'	54.0'	8	03:30	03:32	11:56	21:16	08:57		
21	135°53.9	36.0	346°25.4	16.8'	09°08.1	-13.5'	54.0'	9	03:33	03:35	11:56	21:56	09:36		
22	150°53.9	36.6	1°01.2	16.8'	09°21.6	-13.5'	54.0'								
23	165°53.9	37.3	15°36.9	16.7'	09°35.0	-13.4'	54.0'								
	SD.=15.8	d=0.7			S.D.=14.8										

May 13, 14, 15 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	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°34.8	29°13.7	
1	246°02.8	238°12.5	45.2	111°44.8	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	45.6	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°47.2	-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°12.6	298°14.8	47.1	171°49.8	03.3	222°51.2	05.1	306°18.2	15.7	Hamal	327°51.3	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	Polaris	314°24.6	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	Akamar	315°12.0	-40°12.2	
8	351°20.0	343°16.5	48.6	216°53.4	02.2	267°56.8	05.2	351°25.0	15.5	Menkar	314°06.2	4°11.3	
9	6°22.5	358°17.0	· · 49.1	231°54.7	· · 01.8	282°58.7	· · 05.2	6°27.2	· · 15.4	Mirfak	308°28.4	49°57.0	
10	21°24.9	13°17.6	49.7	246°55.9	01.4	298°00.6	05.2	21°29.5	15.3	Aldebaran	290°39.7	16°33.6	
11	36°27.4	28°18.2	50.2	261°57.1	01.0	313°02.5	05.2	36°31.8	15.2	Rigel	281°03.9	-8°10.4	
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	Capella	280°22.0	46°01.5	
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°37.8	
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	Canopus	263°52.7	-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°47.6	S02°14.7	Sirius	258°26.2	-16°45.0	
19	156°47.1	148°22.6	54.2	22°06.9	57.9	73°17.6	05.5	156°49.8	14.6	Adara	255°05.9	-29°00.5	
20	171°49.6	163°23.1	54.7	37°08.1	57.5	88°19.5	05.5	171°52.1	14.5	Procyon	244°50.6	5°09.7	
21	186°52.1	178°23.7	· · 55.2	52°09.4	· · 57.1	103°21.4	· · 05.5	186°54.3	· · 14.4	Pollux	243°17.1	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	-50°35.7	
23	216°57.0	208°24.8	56.3	82°11.8	56.4	133°25.1	05.6	216°58.8	14.3	Suhail	222°46.2	-43°32.3	
Mer.pass.:08:34		v0.6 d0.5 m-4.4		v1.2 d-0.4 m1.1		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.2		Miaaplacidus		221°38.4	-69°49.6
										Alphard		217°47.5	-8°46.2
										Regulus		207°34.1	11°50.6
										Dubhe		193°40.4	61°37.1
										Denebola		182°24.4	14°25.8
										Gienah		175°43.1	-17°41.1
										Acrux		172°59.4	-63°14.6
										Gacrux		171°51.0	-57°15.6
										Alioth		166°12.3	55°49.4
										Spica		158°21.7	-11°17.7
										Alkaid		152°51.3	49°11.2
										Hadar		148°35.0	-60°29.9
										Menkent		147°57.0	-36°29.8
										Arcturus		145°47.2	19°03.2
										Rigel Kent.		139°39.3	-60°56.5
										Kochab		137°18.6	74°03.0
										Zuben'ubi		136°55.4	-16°08.9
										Alphecca		126°03.2	26°37.7
										Antares		112°15.1	-26°29.3
										Atria		107°08.6	-69°04.3
										Sabik		102°02.2	-15°45.4
										Shaula		96°09.7	-37°07.3
										Rasalhague		95°58.0	12°32.4
										Eltanin		90°41.6	51°28.9
										Kaus Aust.		83°31.8	-34°22.3
										Vega		80°32.8	38°48.1
										Nunki		75°47.2	-26°15.9
										Altair		61°59.6	8°55.9
										Peacock		53°05.1	-56°39.0
										Deneb		49°25.5	45°21.9
										Enif		33°38.6	9°59.3
										Al Na'ir		27°32.7	-46°50.1
										Fomalhaut		15°14.4	-29°29.2
										Scheat		13°45.1	28°13.0
										Markab		13°29.8	15°20.3
										May 13 Tue		SHA	Mer.pass
										Venus		352°11.6	09:07
										Mars		225°43.3	17:32
										Jupiter		276°41.4	14:07
										Saturn		0°06.6	08:34
										May 14 Wed		SHA	Mer.pass
										Venus		351°25.9	09:06
										Mars		225°13.6	17:30
										Jupiter		276°27.6	14:04
										Saturn		0°01.7	08:31
										May 15 Thu		SHA	Mer.pass
										Venus		350°39.5	09:05
										Mars		224°43.8	17:28
										Jupiter		276°13.7	14:01
										Saturn		359°56.7	08:27
										Horizontal parallax			
										Venus:		0.3	
										Mars:		0.1	
Mer.pass.:08:26		v0.5 d0.5 m-4.4		v1.2 d-0.4 m1.1		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.2					

May 16, 17, 18 (Fri., Sat., Sun.)

Aries			Venus			Mars			Jupiter			Saturn			Stars					
Fri	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	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	233°49.6	S02°10.4	233°49.6	S02°10.4	233°49.6	S02°10.4	233°49.6	S02°10.4			
1	249°00.2	238°50.6	23.0	113°12.8	36.7	164°59.4	07.0	248°51.9	10.3	248°51.9	10.3	248°51.9	10.3	248°51.9	10.3	248°51.9	10.3			
2	264°02.7	253°51.1	23.6	128°15.3	36.3	180°01.3	07.0	263°54.1	10.2	263°54.1	10.2	263°54.1	10.2	263°54.1	10.2	263°54.1	10.2			
3	279°05.1	268°51.6	· · 24.2	143°15.2	· · 35.9	195°03.1	· · 07.0	278°56.4	· · 10.2	278°56.4	· · 10.2	278°56.4	· · 10.2	278°56.4	· · 10.2	278°56.4	· · 10.2			
4	294°07.6	283°52.1	24.7	158°16.4	35.5	210°05.0	07.1	293°58.6	10.1	293°58.6	10.1	293°58.6	10.1	293°58.6	10.1	293°58.6	10.1			
5	309°10.0	298°52.6	25.3	173°17.7	35.1	225°06.9	07.1	309°00.9	10.0	309°00.9	10.0	309°00.9	10.0	309°00.9	10.0	309°00.9	10.0			
6	324°12.5	313°53.1	N03°25.8	188°18.9	N18°34.7	240°08.8	N23°07.1	324°03.2	S02°09.9	324°03.2	S02°09.9	324°03.2	S02°09.9	324°03.2	S02°09.9	324°03.2	S02°09.9			
7	339°15.0	328°53.6	26.4	203°20.1	34.3	255°10.7	07.1	339°05.4	09.9	339°05.4	09.9	339°05.4	09.9	339°05.4	09.9	339°05.4	09.9			
8	354°17.4	343°54.0	27.0	218°21.3	33.9	270°12.6	07.2	354°07.7	09.8	354°07.7	09.8	354°07.7	09.8	354°07.7	09.8	354°07.7	09.8			
9	9°19.9	358°54.5	· · 27.5	233°22.5	· · 33.5	285°14.4	· · 07.2	9°10.0	· · 09.7	9°10.0	· · 09.7	9°10.0	· · 09.7	9°10.0	· · 09.7	9°10.0	· · 09.7			
10	24°22.4	13°55.0	28.1	248°23.7	33.1	300°16.3	07.2	24°12.2	09.6	24°12.2	09.6	24°12.2	09.6	24°12.2	09.6	24°12.2	09.6			
11	39°24.8	28°55.5	28.6	263°24.9	32.7	315°18.2	07.2	39°14.5	09.5	39°14.5	09.5	39°14.5	09.5	39°14.5	09.5	39°14.5	09.5			
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	54°16.8	S02°09.5	54°16.8	S02°09.5	54°16.8	S02°09.5	54°16.8	S02°09.5			
13	69°29.8	58°56.4	29.8	293°27.4	31.9	345°22.0	07.3	69°19.0	09.4	69°19.0	09.4	69°19.0	09.4	69°19.0	09.4	69°19.0	09.4			
14	84°32.2	73°56.9	30.3	308°28.6	31.5	0°23.8	07.3	84°21.3	09.3	84°21.3	09.3	84°21.3	09.3	84°21.3	09.3	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°23.6	· · 09.2	99°23.6	· · 09.2	99°23.6	· · 09.2	99°23.6	· · 09.2	99°23.6	· · 09.2			
16	114°37.2	103°57.9	31.5	338°31.0	30.7	30°27.6	07.4	114°25.8	09.2	114°25.8	09.2	114°25.8	09.2	114°25.8	09.2	114°25.8	09.2			
17	129°39.6	118°58.3	32.0	353°32.2	30.3	45°29.5	07.4	129°28.1	09.1	129°28.1	09.1	129°28.1	09.1	129°28.1	09.1	129°28.1	09.1			
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	144°30.3	S02°09.0	144°30.3	S02°09.0	144°30.3	S02°09.0	144°30.3	S02°09.0			
19	159°44.5	148°59.3	33.2	23°34.7	29.5	75°33.2	07.5	159°32.6	08.9	159°32.6	08.9	159°32.6	08.9	159°32.6	08.9	159°32.6	08.9			
20	174°47.0	163°59.8	33.7	38°35.9	29.1	90°35.1	07.5	174°34.9	08.9	174°34.9	08.9	174°34.9	08.9	174°34.9	08.9	174°34.9	08.9			
21	189°49.5	179°00.2	· · 34.3	53°37.1	· · 28.7	105°37.0	· · 07.5	189°37.1	· · 08.8	189°37.1	· · 08.8	189°37.1	· · 08.8	189°37.1	· · 08.8	189°37.1	· · 08.8			
22	204°51.9	194°00.7	34.9	68°38.3	28.3	120°38.9	07.5	204°39.4	08.7	204°39.4	08.7	204°39.4	08.7	204°39.4	08.7	204°39.4	08.7			
23	219°54.4	209°01.2	35.4	83°39.5	27.9	135°40.8	07.6	219°41.7	08.6	219°41.7	08.6	219°41.7	08.6	219°41.7	08.6	219°41.7	08.6			
Mer.pass.:08:22			v0.5 d0.6 m-4.4			v1.2 d-0.4 m1.1			v1.9 d0.0 m-1.8			v2.3 d0.1 m1.2								
Sat			GHA			Dec			GHA			Dec			GHA			Dec		
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	234°43.9	S02°08.5	234°43.9	S02°08.5	234°43.9	S02°08.5	234°43.9	S02°08.5			
1	249°59.3	239°02.1	36.6	113°41.9	27.1	165°44.5	07.6	249°46.2	08.5	249°46.2	08.5	249°46.2	08.5	249°46.2	08.5	249°46.2	08.5			
2	265°01.8	254°02.5	37.2	128°43.1	26.7	180°46.4	07.6	264°48.5	08.4	264°48.5	08.4	264°48.5	08.4	264°48.5	08.4	264°48.5	08.4			
3	280°04.3	269°03.0	· · 37.7	143°44.4	· · 26.3	195°48.3	· · 07.7	279°50.7	· · 08.3	279°50.7	· · 08.3	279°50.7	· · 08.3	279°50.7	· · 08.3	279°50.7	· · 08.3			
4	295°06.7	284°03.5	38.3	158°45.6	25.9	210°50.2	07.7	294°53.0	08.2	294°53.0	08.2	294°53.0	08.2	294°53.0	08.2	294°53.0	08.2			
5	310°09.2	299°03.9	38.9	173°46.8	25.5	225°52.0	07.7	309°55.3	08.2	309°55.3	08.2	309°55.3	08.2	309°55.3	08.2	309°55.3	08.2			
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	324°57.5	S02°08.1	324°57.5	S02°08.1	324°57.5	S02°08.1	324°57.5	S02°08.1			
7	340°14.1	329°04.8	40.0	203°49.2	24.7	255°55.8	07.8	339°59.8	08.0	339°59.8	08.0	339°59.8	08.0	339°59.8	08.0	339°59.8	08.0			
8	355°16.6	344°05.3	40.6	218°50.4	24.3	270°57.7	07.8	355°02.1	07.9	355°02.1	07.9	355°02.1	07.9	355°02.1	07.9	355°02.1	07.9			
9	10°19.0	359°05.8	· · 41.2	233°51.6	· · 23.9	285°59.6	· · 07.8	10°04.3	· · 07.9	10°04.3	· · 07.9	10°04.3	· · 07.9	10°04.3	· · 07.9	10°04.3	· · 07.9			
10	25°21.5	14°06.2	41.8	248°52.8	23.5	301°01.4	07.8	25°06.6	07.8	25°06.6	07.8	25°06.6	07.8	25°06.6	07.8	25°06.6	07.8			
11	40°24.0	29°06.7	42.4	263°54.0	23.1	316°03.3	07.9	40°08.9	07.7	40°08.9	07.7	40°08.9	07.7	40°08.9	07.7	40°08.9	07.7			
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	S02°07.6	55°11.1	S02°07.6	55°11.1	S02°07.6	55°11.1	S02°07.6	55°11.1	S02°07.6			
13	70°28.9	59°07.6	43.5	293°56.5	22.3	346°07.1	07.9	70°13.4	07.5	70°13.4	07.5	70°13.4	07.5	70°13.4	07.5	70°13.4	07.5			
14	85°31.4	74°08.0	44.1	308°57.7	21.9	1°09.0	07.9	85°15.7	07.5	85°15.7	07.5	85°15.7	07.5	85°15.7	07.5	85°15.7	07.5			
15	100°33.8	89°08.5	· · 44.7	323°58.9	· · 21.5	16°10.8	· · 08.0	100°17.9	· · 07.4	100°17.9	· · 07.4	100°17.9	· · 07.4	100°17.9	· · 07.4	100°17.9	· · 07.4			
16	115°36.3	104°08.9	45.3	339°00.1	21.1	31°12.7	08.0	115°20.2	07.3	115°20.2	07.3	115°20.2	07.3	115°20.2	07.3	115°20.2	07.3			
17	130°38.8	119°09.4	45.9	354°01.3	20.6	46°14.6	08.0	130°22.5	07.2	130°22.5	07.2	130°22.5	07.2	130°22.5	07.2	130°22.5	07.2			
18	145°41.2	134°09.8	N03°46.4	9°02.5	N18°20.2	61°16.5	N23°08.1	145°24.7	S02°07.2	145°24.7	S02°07.2	145°24.7	S02°07.2	145°24.7	S02°07.2	145°24.7	S02°07.2			
19	160°43.7	149°10.3	47.0	24°03.7	19.8	76°18.4	08.1	160°27.0	07.1	160°27.0	07.1	160°27.0	07.1	160°27.0	07.1	160°27.0	07.1			
20	175°46.2	164°10.7	47.6	39°04.9	19.4	91°20.2	08.1	175°29.3	07.0	175°29.3	07.0	175°29.3	07.0	175°29.3	07.0	175°29.3	07.0			
21	190°48.6	179°11.2	· · 48.2	54°06.1	· · 19.0	106°22.1	· · 08.1	190°31.5	· · 06.9	190°31.5	· · 06.9	190°31.5	· · 06.9	190°31.5	· · 06.9	190°31.5	· · 06.9			
22	205°51.1	194°11.6	48.8	69°07.3	18.6	121°24.0	08.2	205°33.8	06.9	205°33.8	06.9	205°33.8	06.9	205°33.8	06.9	205°33.8	06.9			
23	220°53.5	209°12.0	49.4	84°08.6	18.2	136°25.9	08.2	220°36.1	06.8	220°36.1	06.8	220°36.1	06.8	220°36.1	06.8	220°36.1	06.8			
Mer.pass.:08:18			v0.5 d0.6 m-4.4			v1.2 d-0.4 m1.1			v1.9 d0.0 m-1.8			v2.3 d0.1 m1.1								
Sun			GHA			Dec			GHA			Dec			GHA			Dec		
0	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	235°38.3	S02°06.7	235°38.3	S02°06.7	235°38.3	S02°06.7	235°38.3	S02°06.7			
1	250°58.5	239°12.9	50.6	114°11.0	17.4	166°29.6	08.2	250°40.6	06.6	250°40.6	06.6	250°40.6	06.6	250°40.6	06.6	250°40.6	06.6			
2	266°00.9	254°13.4	51.1	129°12.2	17.0	181°31.5	08.3	265°42.9	06.6	265°42.9	06.6	265°42.9	06.6	265°42.9	06.6	265°42.9	06.6			
3	281°03.4	269°13.8	· · 51.7	144°13.4	· · 16.6	196°33.4	· · 08.3	280°45.1	· · 06.5	280°45.1	· · 06.5	280°45.1	· · 06.5	280°45.1	· · 06.5	280°45.1	· · 06.5			
4	296°05.9	284°14.2	52.3	159°14.6	16.2	211°35.3	08.3	295°47.4	06.4	295°47.4	06.4	295°47.4	06.4	295°47.4	06.4	295°47.4	06.4			
5	311°08.3	299°14.7	52.9	174°15.8	15.8	226°37.1	08.3	310°49.7	06.3	310°49.7	06.3	310°49.7	06.3	310°49.7	06.3	310°49.7	06.3			
6	326°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	325°51.9	S02°06.3	325°51.9	S02°06.3	325°51.9	S02°06.3	325°51.9	S02°06.3			
7	341°13.3	329°15.5	54.1	204°18.2	15.0	256°40.9	08.4	340°54.2	06.2	340°54.2	06.2	340°54.2	06.2	340°54.2	06.2	340°54.2	06.2			
8	356°15.7	344°16.0	54.7	219°19.4	14.6	271°42.8	08.4	355°56.5	06.1	355°56.5	06.1	355°56.5	06.1	355°56.5						

May 19, 20, 21 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	236°55.1	224°22.8	N04°04.3	99°38.7	N18°08.0	152°12.8	N23°08.8	236°32.8	S02°04.9	Alpheratz	357°34.7	29°13.7	
1	251°57.6	239°23.2	04.9	114°39.9	07.6	167°14.7	08.8	251°35.1	04.8	Ankaa	353°07.1	-42°09.9	
2	267°00.1	254°23.6	05.5	129°41.1	07.2	182°16.5	08.9	266°37.3	04.8	Schedar	349°31.1	56°40.4	
3	282°02.5	269°24.0	· · 06.1	144°42.3	· · 06.8	197°18.4	· · 08.9	281°39.6	· · 04.7	Diphda	348°47.1	-17°50.8	
4	297°05.0	284°24.4	06.7	159°43.5	06.4	212°20.3	08.9	296°41.9	04.6	Achernar	335°20.5	-57°06.3	
5	312°07.5	299°24.8	07.4	174°44.7	05.9	227°22.2	08.9	311°44.2	04.5	Hamal	327°51.2	23°34.9	
6	327°09.9	314°25.2	N04°08.0	189°46.0	N18°05.5	242°24.1	N23°08.9	326°46.4	S02°04.5	Polaris	314°23.6	89°22.2	
7	342°12.4	329°25.6	08.6	204°47.2	05.1	257°25.9	09.0	341°48.7	04.4	Akamar	315°12.0	-40°12.1	
8	357°14.9	344°26.1	09.2	219°48.4	04.7	272°27.8	09.0	356°51.0	04.3	Menkar	314°06.2	4°11.3	
9	12°17.3	359°26.5	· · 09.8	234°49.6	· · 04.3	287°29.7	· · 09.0	11°53.2	· · 04.2	Mirfak	308°28.4	49°57.0	
10	27°19.8	14°26.9	10.4	249°50.8	03.9	302°31.6	09.0	26°55.5	04.2	Aldebaran	290°39.7	16°33.6	
11	42°22.3	29°27.3	11.0	264°52.0	03.5	317°33.4	09.1	41°57.8	04.1	Rigel	281°03.9	-8°10.4	
12	57°24.7	44°27.7	N04°11.6	279°53.2	N18°03.1	332°35.3	N23°09.1	57°00.1	S02°04.0	Capella	280°21.9	46°01.5	
13	72°27.2	59°28.1	12.3	294°54.4	02.7	347°37.2	09.1	72°02.3	04.0	Bellatrix	278°22.9	6°22.3	
14	87°29.6	74°28.5	12.9	309°55.6	02.2	2°39.1	09.1	87°04.6	03.9	Elnath	278°01.9	28°37.7	
15	102°32.1	89°28.9	· · 13.5	324°56.8	· · 01.8	17°40.9	· · 09.2	102°06.9	· · 03.8	Alnilam	275°37.8	-1°11.2	
16	117°34.6	104°29.3	14.1	339°58.0	01.4	32°42.8	09.2	117°09.1	03.7	Betelgeuse	270°52.1	7°24.7	
17	132°37.0	119°29.7	14.7	354°59.2	01.0	47°44.7	09.2	132°11.4	03.7	Canopus	263°52.7	-52°42.7	
18	147°39.5	134°30.1	N04°15.3	10°00.4	N18°00.6	62°46.6	N23°09.2	147°13.7	S02°03.6	Sirius	258°26.2	-16°45.0	
19	162°42.0	149°30.5	16.0	25°01.6	18°00.2	77°48.4	09.3	162°16.0	03.5	Adara	255°05.9	-29°00.5	
20	177°44.4	164°30.9	16.6	40°02.8	17°59.8	92°50.3	09.3	177°18.2	03.4	Procyon	244°50.6	5°09.7	
21	192°46.9	179°31.3	· · 17.2	55°04.0	· · 59.3	107°52.2	· · 09.3	192°20.5	· · 03.4	Pollux	243°17.1	27°58.0	
22	207°49.4	194°31.7	17.8	70°05.2	58.9	122°54.0	09.3	207°22.8	03.3	Avior	234°14.9	-50°35.7	
23	222°51.8	209°32.1	18.4	85°06.4	58.5	137°55.9	09.4	222°25.1	03.2	Suhail	222°46.2	-43°32.3	
Mer.pass.:08:10		v0.4 d0.6 m-4.3		v1.2 d-0.4 m1.1		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Miaaplacidus		221°38.5	-69°49.6
										Alphard		217°47.5	-8°46.2
										Regulus		207°34.1	11°50.6
										Dubhe		193°40.4	61°37.1
										Denebola		182°24.4	14°25.8
										Gienah		175°43.1	-17°41.1
										Acrux		172°59.4	-63°14.7
										Gacrux		171°51.0	-57°15.6
										Alioth		166°12.3	55°49.5
										Spica		158°21.7	-11°17.7
										Alkaid		152°51.3	49°11.3
										Hadar		148°35.0	-60°29.9
										Menkent		147°56.9	-36°29.9
										Arcturus		145°47.2	19°03.3
										Rigel Kent.		139°39.3	-60°56.6
										Kochab		137°18.6	74°03.1
										Zuben'ubi		136°55.4	-70°08.9
										Alphecca		126°03.1	26°37.7
										Antares		112°15.1	-26°29.3
										Atria		107°08.5	-69°04.3
										Sabik		102°02.1	-15°45.4
										Shaula		96°09.6	-37°07.3
										Rasalhague		95°58.0	12°32.4
										Eltanin		90°41.6	51°28.9
										Kaus Aust.		83°31.8	-34°22.3
										Vega		80°32.7	38°48.1
										Nunki		75°47.1	-26°15.9
										Altair		61°59.6	8°55.9
										Peacock		53°05.0	-56°39.0
										Deneb		49°25.5	45°21.9
										Enif		33°38.5	9°59.3
										Al Na'ir		27°32.6	-46°50.1
										Fomalhaut		15°14.4	-29°29.2
										Scheat		13°45.1	28°13.0
										Markab		13°29.7	15°20.4
										May 19 Mon		SHA	Mer.pass
										Venus		347°27.6	09:02
										Mars		222°43.6	17:20
										Jupiter		275°17.6	13:49
										Saturn		359°37.7	08:13
										May 20 Tue		SHA	Mer.pass
										Venus		346°38.2	09:02
										Mars		222°13.3	17:18
										Jupiter		275°03.5	13:46
										Saturn		359°33.0	08:09
										May 21 Wed		SHA	Mer.pass
										Venus		345°48.2	09:01
										Mars		221°43.0	17:16
										Jupiter		274°49.3	13:43
										Saturn		359°28.5	08:05
										Horizontal parallax			
										Venus:		0.2	
										Mars:		0.1	
Mer.pass.:08:03		v0.4 d0.6 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1					

May 22, 23, 24 (Thu., Fri., Sat.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	239°52.6	224°50.3	N04°49.6	101°05.1	N17°38.0	156°27.7	N23°10.5	239°16.6	S01°59.7	Alpheratz	357°34.7	29°13.7	
1	254°55.0	239°50.6	50.2	116°06.3	37.6	169°29.5	10.5	254°18.9	59.6	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°40.4	
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°47.1	-17°50.8	
4	300°02.4	284°51.7	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°34.9	
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	S01°59.3	Polaris	314°23.3	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	Akamar	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°28.2	49°57.0	
10	30°17.2	14°53.7	56.1	251°17.0	33.7	304°46.4	10.7	29°39.4	59.0	Aldebaran	290°39.7	16°33.6	
11	45°19.7	29°54.1	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	Capella	280°21.9	46°01.5	
13	75°24.6	59°54.7	58.1	296°20.6	32.5	349°52.0	10.8	74°46.2	58.8	Bellatrix	278°22.9	6°22.3	
14	90°27.1	74°55.1	58.8	311°21.8	32.0	4°53.8	10.8	89°48.5	58.7	Elnath	278°01.9	28°37.7	
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	Alnilam	275°37.8	-1°11.2	
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	Betelgeuse	270°52.1	7°24.7	
17	135°34.5	119°56.1	00.7	356°25.4	30.8	49°59.5	10.8	134°55.3	58.5	Canopus	263°52.7	-52°42.7	
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	S01°58.4	Sirius	258°26.2	-16°45.0	
19	165°39.4	149°56.7	02.1	26°27.8	29.9	80°03.2	10.9	164°59.9	58.4	Adara	255°05.9	-29°00.5	
20	180°41.8	164°57.1	02.7	41°29.0	29.5	95°05.1	10.9	180°02.2	58.3	Procyon	244°50.7	5°09.7	
21	195°44.3	179°57.4	· · 03.4	56°30.2	· · 29.0	110°06.9	· · 10.9	195°04.5	· · 58.2	Pollux	243°17.1	27°58.0	
22	210°46.8	194°57.7	04.0	71°31.4	28.6	125°08.8	11.0	210°06.7	58.2	Avior	234°15.0	-50°35.7	
23	225°49.2	209°58.1	04.7	86°32.6	28.2	140°10.7	11.0	225°09.0	58.1	Suhail	222°46.2	-43°32.3	
Mer.pass.:07:59		v0.3 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Miaplacidus	221°38.5	-69°49.6	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
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	S01°58.0	Alphard	217°47.5	-8°46.2	
1	255°54.2	239°58.7	06.0	116°34.9	27.3	170°14.4	11.0	255°13.6	58.0	Regulus	207°34.1	11°50.6	
2	270°56.6	254°59.0	06.7	131°36.1	26.9	185°16.3	11.0	270°15.9	57.9	Dubhe	193°40.4	61°37.1	
3	285°59.1	269°59.4	· · 07.4	146°37.3	· · 26.5	200°18.1	· · 11.1	285°18.1	· · 57.8	Denebola	182°24.4	14°25.8	
4	301°01.6	284°59.7	08.0	161°38.5	26.0	215°20.0	11.1	300°20.4	57.7	Gienah	175°43.1	-17°41.1	
5	316°04.0	300°00.0	08.7	176°39.7	25.6	230°01.9	11.1	315°22.7	57.7	AcruX	172°59.4	-63°14.7	
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	S01°57.6	Gacrux	171°51.0	-57°15.6	
7	346°08.9	330°00.7	10.0	206°42.1	24.8	260°25.6	11.1	345°27.3	57.5	Alioth	166°12.3	55°49.5	
8	1°11.4	345°01.0	10.7	221°43.3	24.3	275°27.5	11.2	0°29.6	57.5	Spica	158°21.7	-11°17.7	
9	16°13.9	0°01.3	· · 11.4	236°44.5	· · 23.9	290°29.3	· · 11.2	15°31.8	· · 57.4	Alkaid	152°51.3	49°11.3	
10	31°16.3	15°01.6	12.0	251°45.7	23.5	305°31.2	11.2	30°34.1	57.3	Hadar	148°35.0	-60°29.9	
11	46°18.8	30°01.9	12.7	266°46.8	23.0	320°33.1	11.2	45°36.4	57.3	Menkent	147°56.9	-36°29.9	
12	61°21.3	45°02.3	N05°13.4	281°48.0	N17°22.6	335°34.9	N23°11.2	60°38.7	S01°57.2	Arcturus	145°47.2	19°03.3	
13	76°23.7	60°02.6	14.0	296°49.2	22.2	350°36.8	11.3	75°41.0	57.1	Rigil Kent.	139°39.3	-60°56.6	
14	91°26.2	75°02.9	14.7	311°50.4	21.8	5°38.7	11.3	90°43.2	57.1	Kochab	137°18.6	74°03.1	
15	106°28.7	90°03.2	· · 15.4	326°51.6	· · 21.3	20°40.6	· · 11.3	105°45.5	· · 57.0	Zuben'ubi	136°55.4	-16°08.9	
16	121°31.1	105°03.5	16.1	341°52.8	20.9	35°42.4	11.3	120°47.8	56.9	Alphecca	126°03.1	26°37.7	
17	136°33.6	120°03.8	16.7	356°54.0	20.5	50°44.3	11.3	135°50.1	56.9	Antares	112°15.1	-26°29.4	
18	151°36.1	135°04.2	N05°17.4	11°55.2	N17°20.0	65°46.2	N23°11.4	150°52.4	S01°56.8	Atria	107°08.5	-69°04.3	
19	166°38.5	150°04.5	18.1	26°56.4	19.6	80°48.0	11.4	165°54.7	56.7	Sabik	102°02.1	-15°45.4	
20	181°41.0	165°04.8	18.7	41°57.5	19.2	95°49.9	11.4	180°56.9	56.7	Shaula	96°09.6	-37°07.3	
21	196°43.4	180°05.1	· · 19.4	56°58.7	· · 18.7	110°51.8	· · 11.4	195°59.2	· · 56.6	Rasalhague	95°58.0	12°32.4	
22	211°45.9	195°05.4	20.1	71°59.9	18.3	125°53.6	11.5	211°01.5	56.5	Eltanin	90°41.6	51°28.9	
23	226°48.4	210°05.7	20.8	87°01.1	17.9	140°55.5	11.5	226°03.8	56.4	Kaus Aust.	83°31.8	-34°22.3	
Mer.pass.:07:55		v0.3 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Vega	80°32.7	38°48.2	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
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	S01°56.4	Nunki	75°47.1	-26°15.9	
1	256°53.3	240°06.3	22.1	117°03.5	17.0	170°59.2	11.5	256°08.4	56.3	Altair	61°59.6	8°55.9	
2	271°55.8	255°06.6	22.8	132°04.7	16.6	186°01.1	11.5	271°10.7	56.2	Peacock	53°05.0	-56°39.0	
3	286°58.2	270°06.9	· · 23.5	147°05.9	· · 16.1	201°03.0	· · 11.6	286°12.9	· · 56.2	Deneb	49°25.4	45°21.9	
4	302°00.7	285°07.2	24.2	162°07.1	15.7	216°04.8	11.6	301°15.2	56.1	Enif	33°38.5	9°59.3	
5	317°03.2	300°07.5	24.8	177°08.2	15.3	231°06.7	11.6	316°17.5	56.0	Al Na'ir	27°32.6	-46°50.1	
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	Fomalhaut	15°14.3	-29°29.1	
7	347°08.1	330°08.1	26.2	207°10.6	14.4	261°10.4	11.6	346°22.1	55.9	Scheat	13°45.1	28°13.0	
8	2°10.6	345°08.4	26.9	222°11.8	14.0	276°12.3	11.7	1°24.4	55.8	Markab	13°29.7	15°20.4	
9	17°13.0	0°08.7	· · 27.6	237°13.0	· · 13.5	291°14.2	· · 11.7	16°26.6	· · 55.8	May 22 Thu		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°57.7	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	221°12.5	17:14	
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°35.1	13:40	
13	77°22.9	60°09.9	30.3	297°17.7	11.8	351°21.6	11.8	76°35.8	55.5	Saturn	359°24.0	08:02	
14	92°25.3	75°10.2	31.0	312°18.9	11.4	6°23.5	11.8	91°38.1	55.4	May 23 Fri		SHA	Mer.pass
15	107°27.8	90°10.5	· · 31.6	327°20.1	· · 10.9	21°25.4	· · 11.8	106°40.4	· · 55.4	Venus	344°06.7	09:00	
16	122°30.3	105°10.8	32.3	342°21.3	10.5	36°27.2	11.8	121°42.6	55.3	Mars	220°42.0	17:12	
17	137°32.7	120°11.1	33.0	357°22.5	10.1	51°29.1	11.8	136°44.9	55.2	Jupiter	274°20.8	13:37	
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	S01°55.2	Saturn	359°19.6	07:58	
19	167°37.7	150°11.7	34.4	27°24.9	09.2	81°32.8	11.9	166°49.5	55.1	May 24 Sat		SHA	Mer.pass
20	182°40.1	165°12.0	35.1	42°26.0	08.8	96°34.7	11.9	181°51.8	55.0	Venus	343°15.2	08:59	
21	197°42.6	180°12.3	· · 35.8	57°27.2	· · 08.3	111°36.5	· · 11.9	196°54.1	· · 55.0	Mars	220°11.5	17:10	
22	212°45.0	195°12.6	36.4	72°28.4	07.9	126°38.4	11.9	211°56.4	54.9	Jupiter	274°06.5	13:34	
23	227°47.5	210°12.9	37.1	87°29.6	07.5	141°40.3	11.9	226°58.7	54.8	Saturn	359°15.2	07:54	
Mer.pass.:07:51		v0.3 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Horizontal parallax			
Venus: 0.2													
Mars: 0.1													

Sun								Moon							
h	Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight	
										Naut.	Civil			Civil	Naut.
0	180°	50.5	N20°	23.5	248°	36.2	12.4'	S04°	13.2	16.6'	59.1'				
1	195°	50.4		24.0	263°	07.6	12.4'	03°	56.6	16.7'	59.1'				
2	210°	50.4		24.5	277°	39.0	12.4'	03°	39.9	16.7'	59.1'				
3	225°	50.3	· ·	25.0	292°	10.3	12.4'	03°	23.2	16.7'	59.2'				
4	240°	50.3		25.5	306°	41.7	12.3'	03°	06.5	16.8'	59.2'				
5	255°	50.2		26.0	321°	13.0	12.3'	02°	49.7	16.8'	59.2'				
6	270°	50.2	N20°	26.5	335°	44.3	12.3'	S02°	32.8	16.8'	59.3'				
7	285°	50.1		27.0	350°	15.6	12.3'	02°	16.0	16.9'	59.3'				
8	300°	50.1		27.5	4°	46.8	12.2'	01°	59.1	16.9'	59.3'				
9	315°	50.0	· ·	28.0	19°	18.1	12.2'	01°	42.2	16.9'	59.4'				
10	330°	50.0		28.4	33°	49.3	12.2'	01°	25.3	17.0'	59.4'				
11	345°	49.9		28.9	48°	20.4	12.2'	01°	08.3	17.0'	59.4'				
12	0°	49.9	N20°	29.4	62°	51.6	12.1'	S00°	51.3	17.0'	59.5'				
13	15°	49.8		29.9	77°	22.7	12.1'	00°	34.3	17.0'	59.5'				
14	30°	49.8		30.4	91°	53.8	12.1'	00°	17.3	17.0'	59.5'				
15	45°	49.7	· ·	30.9	106°	24.8	12.0'	S00°	00.2	17.1'	59.6'				
16	60°	49.7		31.3	120°	55.9	12.0'	N00°	16.9	17.1'	59.6'				
17	75°	49.6		31.8	135°	26.8	12.0'	00°	33.9	17.1'	59.6'				
18	90°	49.6	N20°	32.3	149°	57.8	11.9'	N00°	51.0	17.1'	59.7'				
19	105°	49.5		32.8	164°	28.7	11.9'	01°	08.2	17.1'	59.7'				
20	120°	49.5		33.3	178°	59.6	11.8'	01°	25.3	17.1'	59.7'				
21	135°	49.4	· ·	33.8	193°	30.4	11.8'	01°	42.4	17.1'	59.7'				
22	150°	49.4		34.2	208°	01.1	11.8'	01°	59.6	17.2'	59.8'				
23	165°	49.3		34.7	222°	31.9	11.7'	02°	16.8	17.2'	59.8'				
	SD.=15.8	d=0.5						S.D.=16.1							
Fri	GHA	Dec	GHA	ν	Dec	d	HP								
0	180°	49.3	N20°	35.2	237°	02.6	11.7'	N02°	33.9	17.2'	59.8'				
1	195°	49.2		35.7	251°	33.2	11.6'	02°	51.1	17.2'	59.9'				
2	210°	49.2		36.1	266°	03.8	11.6'	03°	08.3	17.2'	59.9'				
3	225°	49.1	· ·	36.6	280°	34.3	11.5'	03°	25.4	17.2'	59.9'				
4	240°	49.0		37.1	295°	04.8	11.5'	03°	42.6	17.2'	60.0'				
5	255°	49.0		37.6	309°	35.2	11.4'	03°	59.8	17.2'	60.0'				
6	270°	48.9	N20°	38.0	324°	05.6	11.3'	N04°	17.0	17.2'	60.0'				
7	285°	48.9		38.5	338°	35.9	11.3'	04°	34.1	17.2'	60.0'				
8	300°	48.8		39.0	353°	06.2	11.2'	04°	51.3	17.2'	60.1'				
9	315°	48.8	· ·	39.5	7°	36.4	11.2'	05°	08.4	17.1'	60.1'				
10	330°	48.7		39.9	22°	06.6	11.1'	05°	25.6	17.1'	60.1'				
11	345°	48.7		40.4	36°	36.6	11.0'	05°	42.7	17.1'	60.1'				
12	0°	48.6	N20°	40.9	51°	06.6	11.0'	N05°	59.8	17.1'	60.2'				
13	15°	48.6		41.3	65°	36.6	10.9'	06°	16.9	17.1'	60.2'				
14	30°	48.5		41.8	80°	06.5	10.9'	06°	34.0	17.1'	60.2'				
15	45°	48.4	· ·	42.3	94°	36.3	10.8'	06°	51.0	17.0'	60.3'				
16	60°	48.4		42.7	109°	06.1	10.7'	07°	08.1	17.0'	60.3'				
17	75°	48.3		43.2	123°	35.7	10.6'	07°	25.1	17.0'	60.3'				
18	90°	48.3	N20°	43.7	138°	05.3	10.6'	N07°	42.1	17.0'	60.3'				
19	105°	48.2		44.2	152°	34.9	10.5'	07°	59.0	16.9'	60.4'				
20	120°	48.2		44.6	167°	04.3	10.4'	08°	16.0	16.9'	60.4'				
21	135°	48.1	· ·	45.1	181°	33.7	10.3'	08°	32.9	16.9'	60.4'				
22	150°	48.0		45.5	196°	03.0	10.3'	08°	49.8	16.9'	60.4'				
23	165°	48.0		46.0	210°	32.2	10.2'	09°	06.6	16.8'	60.4'				
	SD.=15.8	d=0.5						S.D.=16.3							
Sat	GHA	Dec	GHA	ν	Dec	d	HP								
0	180°	47.9	N20°	46.5	225°	01.4	10.1'	N09°	23.4	16.8'	60.5'				
1	195°	47.9		46.9	239°	30.4	10.0'	09°	40.2	16.7'	60.5'				
2	210°	47.8		47.4	253°	59.4	9.9'	09°	56.9	16.7'	60.5'				
3	225°	47.7	· ·	47.9	268°	28.3	9.9'	10°	13.6	16.7'	60.5'				
4	240°	47.7		48.3	282°	57.1	9.8'	10°	30.2	16.6'	60.6'				
5	255°	47.6		48.8	297°	25.9	9.7'	10°	46.8	16.6'	60.6'				
6	270°	47.6	N20°	49.2	311°	54.5	9.6'	N11°	03.3	16.5'	60.6'				
7	285°	47.5		49.7	326°	23.0	9.5'	11°	19.8	16.5'	60.6'				
8	300°	47.4		50.2	340°	51.5	9.4'	11°	36.2	16.4'	60.6'				
9	315°	47.4	· ·	50.6	355°	19.9	9.3'	11°	52.6	16.4'	60.7'				
10	330°	47.3		51.1	9°	48.1	9.2'	12°	08.9	16.3'	60.7'				
11	345°	47.3		51.5	24°	16.3	9.1'	12°	25.2	16.2'	60.7'				
12	0°	47.2	N20°	52.0	38°	44.4	9.0'	N12°	41.4	16.2'	60.7'				
13	15°	47.1		52.4	53°	12.4	8.9'	12°	57.5	16.1'	60.7'				
14	30°	47.1		52.9	67°	40.3	8.8'	13°	13.6	16.0'	60.8'				
15	45°	47.0	· ·	53.3	82°	08.1	8.7'	13°	29.6	16.0'	60.8'				
16	60°	47.0		53.8	96°	35.8	8.6'	13°	45.6	15.9'	60.8'				
17	75°	46.9		54.3	111°	03.4	8.5'	14°	01.4	15.8'	60.8'				
18	90°	46.8	N20°	54.7	125°	30.9	8.4'	N14°	17.2	15.8'	60.8'				
19	105°	46.8		55.2	139°	58.2	8.3'	14°	32.9	15.7'	60.8'				
20	120°	46.7		55.6	154°	25.5	8.2'	14°	48.5	15.6'	60.8'				
21	135°	46.6	· ·	56.1	168°	52.7	8.1'	15°	04.1	15.5'	60.9'				
22	150°	46.6		56.5	183°	19.8	8.0'	15°	19.6	15.4'	60.9'				
23	165°	46.5		57.0	197°	46.8	7.9'	15°	35.0	15.3'	60.9'				
	SD.=15.8	d=0.5						S.D.=16.5							

Lat.	Moonrise			Moonset		
	Thu	Fri	Sat	Thu	Fri	Sat
N 72°	02:16	01:39	00:58	13:46	16:13	19:10
N 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
N 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
N 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
S 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
S 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
S 60°	01:01	02:42	04:26	13:53	13:52	13:52

Day	Sun		Mer. Pass hh:mm	Moon		Age 25-27 28-10%
	Eqn. of Time 00 ^h mm:ss	12 ^h mm:ss		Mer. Pass. Upper hh:mm	Lower hh:mm	
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	03:09	11:57	09:19	21:46	

May 25, 26, 27 (Sun., Mon., Tue.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	242°50.0	225°13.2	N05°37.8	102°30.8	N17°07.0	156°42.1	N23°12.0	242°00.9	S01°54.8	Alpheratz	357°34.7	29°13.7	
1	257°52.4	240°13.4	38.5	117°32.0	06.6	171°44.0	12.0	257°03.2	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	270°14.0	· · 39.9	147°34.3	· · 05.7	201°47.7	· · 12.0	287°07.8	· · 54.6	Diphda	348°47.1	-17°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°51.2	23°34.9	
6	333°04.8	315°14.9	N05°41.9	192°37.9	N17°04.4	246°53.3	N23°12.1	332°14.7	S01°54.4	Polaris	314°22.5	89°22.1	
7	348°07.2	330°15.2	42.6	207°39.1	04.0	261°55.2	12.1	347°17.0	54.3	Akamar	315°11.9	-40°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	0°15.7	· · 44.0	237°41.4	· · 03.1	291°58.9	· · 12.1	17°21.5	· · 54.2	Mirfak	308°28.4	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	45°16.6	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°01.5	
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	90°17.4	· · 48.2	327°48.6	· · 00.5	22°10.1	· · 12.2	107°35.3	· · 53.8	Alnilam	275°37.8	-1°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°42.7	
18	153°34.3	135°18.2	N05°50.3	12°52.1	N16°59.1	67°15.7	N23°12.3	152°42.1	S01°53.6	Sirius	258°26.2	-16°45.0	
19	168°36.8	150°18.5	51.0	27°53.3	58.7	82°17.6	12.3	167°44.4	53.5	Adara	255°05.9	-29°00.5	
20	183°39.3	165°18.8	51.7	42°54.5	58.3	97°19.4	12.3	182°46.7	53.4	Procyon	244°50.7	5°09.7	
21	198°41.7	180°19.0	· · 52.4	57°55.6	· · 57.8	112°21.3	· · 12.4	197°49.0	· · 53.4	Pollux	243°17.1	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	-50°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.pass.:07:47		v0.3 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Miaplacidus	221°38.6	-69°49.6	
Mer.pass.:07:43		v0.3 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Alphard	217°47.5	-8°46.2	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Regulus	207°34.1	11°50.6	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Dubhe	193°40.5	61°37.1	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Denebola	182°24.4	14°25.8	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Gienah	175°43.1	-17°41.1	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Acrux	172°59.4	-63°14.7	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Gacrux	171°51.0	-57°15.6	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Alioth	166°12.4	55°49.5	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Spica	158°21.7	-11°17.7	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Alkaid	152°51.3	49°11.3	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Hadar	148°35.1	-60°29.9	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Menkent	147°56.9	-36°29.9	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Arcturus	145°47.2	19°03.3	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Rigel Kent.	139°39.3	-60°56.6	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Kochab	137°18.6	74°03.1	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Zuben'ubi	136°55.4	-16°08.9	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Alphecca	126°03.1	26°37.7	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Antares	112°15.1	-26°29.4	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Atria	107°08.5	-69°04.3	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Sabik	102°02.1	-15°45.4	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Shaula	96°09.6	-37°07.3	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Rasalhague	95°58.0	12°32.4	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Eltanin	90°41.5	51°28.9	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Kaus Aust.	83°31.8	-34°22.3	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Vega	80°32.7	38°48.2	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Nunki	75°47.1	-26°15.9	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Altair	61°59.5	8°56.0	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Peacock	53°04.9	-56°39.0	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Deneb	49°25.4	45°22.0	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Enif	33°38.5	9°59.4	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Al Na'ir	27°32.5	-46°50.0	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Fomalhaut	15°14.3	-29°29.1	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Scheat	13°45.0	28°13.0	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Markab	13°29.7	15°20.4	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		May 25 Sun		SHA	Mer.pass
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Venus	342°23.2	08:59	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Mars	219°40.8	17:09	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Jupiter	273°52.2	13:32	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Saturn	359°11.0	07:51	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		May 26 Mon		SHA	Mer.pass
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Venus	341°30.7	08:59	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Mars	219°10.1	17:07	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Jupiter	273°37.8	13:29	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Saturn	359°06.8	07:47	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		May 27 Tue		SHA	Mer.pass
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Venus	340°37.8	08:58	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Mars	218°39.3	17:05	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Jupiter	273°23.3	13:26	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Saturn	359°02.6	07:43	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Horizontal parallax			
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Venus:		0.2	
Mer.pass.:07:39		v0.2 d0.7 m-4.3		v1.2 d-0.4 m1.2		v1.9 d0.0 m-1.8		v2.3 d0.1 m1.1		Mars:		0.1	

May 31, 01, 02 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars			
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec			
0	248°44.8	225°46.6	N07°21.1	105°20.2	N16°02.3	161°10.1	N23°14.3	247°31.6	S01°45.8					Alpheratz	357°34.6	29°13.7		
1	263°47.3	240°46.8	21.8	120°21.4	01.9	176°11.9	14.4	262°33.9	45.7					Ankaa	353°07.0	-42°09.9		
2	278°49.8	255°47.0	22.6	135°22.6	01.4	191°13.8	14.4	277°36.2	45.6					Schedar	349°31.0	56°40.4		
3	293°52.2	270°47.1	· · 23.3	150°23.7	· · 01.0	206°15.6	· · 14.4	292°38.5	· · 45.6					Diphda	348°47.0	-17°50.8		
4	308°54.7	285°47.3	24.1	165°24.9	00.5	221°17.5	14.4	307°40.8	45.5					Achernar	335°20.4	-57°06.2		
5	323°57.1	300°47.5	24.8	180°26.1	16°00.0	236°19.3	14.4	322°43.1	45.5					Hamal	327°51.2	23°34.9		
6	338°59.6	315°47.7	N07°25.6	195°27.3	N15°59.6	251°21.2	N23°14.4	337°45.4	S01°45.4					Polaris	314°20.7	89°22.1		
7	354°02.1	330°47.8	26.3	210°28.4	59.1	266°23.1	14.4	352°47.7	45.4					Akamar	315°11.9	-40°12.1		
8	9°04.5	345°48.0	27.0	225°29.6	58.6	281°24.9	14.5	7°50.0	45.3					Menkar	314°06.1	4°11.3		
9	24°07.0	0°48.2	· · 27.8	240°30.8	· · 58.2	296°26.8	· · 14.5	22°52.3	· · 45.2					Mirfak	308°28.3	49°57.0		
10	39°09.5	15°48.4	28.5	255°31.9	57.7	311°28.6	14.5	37°54.6	45.2					Aldebaran	290°39.6	16°33.6		
11	54°11.9	30°48.5	29.3	270°33.1	57.3	326°30.5	14.5	52°56.9	45.1					Rigel	281°03.9	-8°10.4		
12	69°14.4	45°48.7	N07°30.0	285°34.3	N15°56.8	341°32.3	N23°14.5	67°59.2	S01°45.1					Capella	280°21.9	46°01.5		
13	84°16.9	60°48.9	30.8	300°35.4	56.3	356°34.2	14.5	83°01.5	45.0					Bellatrix	278°22.9	6°22.3		
14	99°19.3	75°49.1	31.5	315°36.6	55.9	11°36.0	14.5	98°03.8	45.0					Elnath	278°01.9	28°37.7		
15	114°21.8	90°49.2	· · 32.3	330°37.8	· · 55.4	26°37.9	· · 14.5	113°06.2	· · 44.9					Alnilam	275°37.7	-1°11.2		
16	129°24.2	105°49.4	33.0	345°38.9	54.9	41°39.8	14.6	128°08.5	44.8					Betelgeuse	270°52.1	7°24.7		
17	144°26.7	120°49.6	33.8	0°40.1	54.5	56°41.6	14.6	143°10.8	44.8					Canopus	263°52.8	-52°42.6		
18	159°29.2	135°49.7	N07°34.5	15°41.3	N15°54.0	71°43.5	N23°14.6	158°13.1	S01°44.7					Sirius	258°26.2	-16°44.9		
19	174°31.6	150°49.9	35.3	30°42.4	53.5	86°45.3	14.6	173°15.4	44.7					Adara	255°05.9	-20°00.5		
20	189°34.1	165°50.1	36.0	45°43.6	53.1	101°47.2	14.6	188°17.7	44.6					Procyon	244°50.7	5°09.7		
21	204°36.6	180°50.2	· · 36.7	60°44.8	· · 52.6	116°49.0	· · 14.6	203°20.0	· · 44.6					Pollux	243°17.1	27°58.0		
22	219°39.0	195°50.4	37.5	75°45.9	52.1	131°50.9	14.6	218°22.3	44.5					Avior	234°15.0	-50°35.7		
23	234°41.5	210°50.5	38.2	90°47.1	51.7	146°52.7	14.7	233°24.6	44.4					Suhail	222°46.3	-43°32.3		
Mer.pass.:07:23			v0.2 d0.7 m-4.2	v1.2 d-0.5 m1.3			v1.9 d0.0 m-1.8			v2.3 d0.1 m1.1			Miaplacidus			221°38.7	-69°49.5	
													Alphard			217°47.6	-8°46.2	
													Regulus			207°34.1	11°50.6	
													Dubhe			193°40.5	61°37.1	
													Denebola			182°24.4	14°25.8	
													Gienah			175°43.1	-17°41.1	
													Acrux			172°59.5	-63°14.7	
													Gacrux			171°51.0	-57°15.6	
													Alioth			166°12.4	55°49.5	
													Spica			158°21.7	-11°17.7	
													Alkaid			152°51.4	49°11.3	
													Hadar			148°35.0	-60°30.0	
													Menkent			147°56.9	-36°29.9	
													Arcturus			145°47.2	19°03.3	
													Rigel Kent.			139°39.3	-60°56.6	
													Kochab			137°18.7	74°03.1	
													Zuben'ubi			136°55.4	-16°09.0	
													Alphecca			126°03.1	26°37.7	
													Antares			112°15.1	-26°29.4	
													Atria			107°08.4	-69°04.4	
													Sabik			102°02.1	-15°45.4	
													Shaula			96°09.5	-37°07.3	
													Rasalhague			95°57.9	12°32.4	
													Eltanin			90°41.5	51°29.0	
													Kaus Aust.			83°31.7	-34°22.3	
													Vega			80°32.7	38°48.2	
													Nunki			75°47.1	-26°15.9	
													Altair			61°59.5	8°56.0	
													Peacock			53°04.9	-56°39.0	
													Deneb			49°25.4	45°22.0	
													Enif			33°38.4	9°59.4	
													Al Na'ir			27°32.4	-46°50.0	
													Fomalhaut			15°14.2	-29°29.1	
													Scheat			13°45.0	28°13.0	
													Markab			13°29.6	15°20.4	
													May 31 Sat			SHA	Mer.pass	
													Venus			337°01.8	08:57	
													Mars			216°35.4	16:57	
													Jupiter			272°25.2	13:14	
													Saturn			358°46.7	07:29	
													Jun 01 Sun			SHA	Mer.pass	
													Venus			336°06.7	08:57	
													Mars			216°04.3	16:55	
													Jupiter			272°10.6	13:11	
													Saturn			358°43.0	07:25	
													Jun 02 Mon			SHA	Mer.pass	
													Venus			335°11.3	08:56	
													Mars			215°33.1	16:54	
													Jupiter			271°56.0	13:08	
													Saturn			358°39.3	07:21	
													Horizontal parallax					
													Venus:			0.2		
													Mars:			0.1		
Mer.pass.:07:15			v0.1 d0.8 m-4.2	v1.2 d-0.5 m1.3			v1.9 d0.0 m-1.8			v2.3 d0.1 m1.1								

h		Sun				Moon									
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight		
									Naut.	Civil			Civil	Naut.	
0	180°28.1	N22°19.1	88°51.1	15.6'	N08°31.0	-14.2'	55.5'								
1	195°28.0	19.4	103°25.8	15.7'	08°16.8	-14.2'	55.5'	N 72°							
2	210°27.9	19.7	118°00.5	15.7'	08°02.6	-14.2'	55.5'	N 70°							
3	225°27.8	· · 20.0	132°35.2	15.8'	07°48.3	-14.3'	55.4'	68°							
4	240°27.7	20.3	147°10.0	15.8'	07°34.0	-14.3'	55.4'	66°			00:58	23:03			
5	255°27.6	20.6	161°44.9	15.9'	07°19.8	-14.3'	55.4'	64°			01:50	22:08			
6	270°27.4	N22°20.9	176°19.8	15.9'	N07°05.5	-14.3'	55.4'	62°			02:22	21:36			
7	285°27.3	21.2	190°54.8	16.0'	06°51.2	-14.3'	55.3'	60°		01:17	02:45	21:13	22:42		
8	300°27.2	21.5	205°29.8	16.1'	06°36.8	-14.3'	55.3'	N 58°		01:54	03:04	20:54	22:04		
9	315°27.1	· · 21.8	220°04.9	16.1'	06°22.5	-14.3'	55.3'	56°		02:20	03:19	20:39	21:38		
10	330°27.0	22.1	234°40.0	16.2'	06°08.2	-14.3'	55.3'	54°	01:10	02:40	03:32	20:25	21:18	22:49	
11	345°26.9	22.4	249°15.2	16.2'	05°53.8	-14.4'	55.2'	52°	01:45	02:57	03:44	20:14	21:01	22:13	
12	0°26.8	N22°22.7	263°50.4	16.3'	N05°39.5	-14.4'	55.2'	50°	02:09	03:11	03:54	20:03	20:47	21:49	
13	15°26.7	23.0	278°25.7	16.3'	05°25.1	-14.4'	55.2'	45°	02:50	03:38	04:15	19:42	20:19	21:07	
14	30°26.6	23.3	293°01.0	16.3'	05°10.7	-14.4'	55.2'	N 40°	03:19	04:00	04:32	19:25	19:57	20:38	
15	45°26.5	· · 23.6	307°36.4	16.4'	04°56.3	-14.4'	55.1'	35°	03:41	04:17	04:46	19:11	19:40	20:16	
16	60°26.4	23.9	322°11.8	16.4'	04°41.9	-14.4'	55.1'	30°	03:59	04:32	04:59	18:58	19:25	19:58	
17	75°26.3	24.2	336°47.2	16.5'	04°27.5	-14.4'	55.1'	20°	04:27	04:55	05:20	18:37	19:01	19:30	
18	90°26.2	N22°24.5	351°22.7	16.5'	N04°13.1	-14.4'	55.1'	N 10°	04:48	05:15	05:38	18:19	18:42	19:09	
19	105°26.1	24.8	5°58.3	16.5'	03°58.7	-14.4'	55.0'	0°	05:06	05:32	05:55	18:02	18:24	18:50	
20	120°26.0	25.1	20°33.8	16.6'	03°44.3	-14.4'	55.0'	S 10°	05:23	05:49	06:11	17:45	18:08	18:34	
21	135°25.9	· · 25.3	35°09.4	16.6'	03°29.9	-14.4'	55.0'	20°	05:38	06:05	06:29	17:28	17:51	18:19	
22	150°25.8	25.6	49°45.1	16.7'	03°15.5	-14.4'	55.0'	30°	05:54	06:23	06:49	17:07	17:33	18:03	
23	165°25.7	25.9	64°20.7	16.7'	03°01.1	-14.4'	55.0'	35°	06:02	06:33	07:01	16:55	17:23	17:55	
	SD.=15.8	d=0.3			S.D.=15.1			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	
0	180°25.5	N22°26.2	78°56.4	16.7'	N02°46.7	-14.4'	54.9'	S 50°	06:31	07:12	07:50	16:06	16:44	17:25	
1	195°25.4	26.5	93°32.2	16.8'	02°32.3	-14.4'	54.9'	52°	06:36	07:19	07:59	15:57	16:37	17:20	
2	210°25.3	26.8	108°07.9	16.8'	02°17.9	-14.4'	54.9'	54°	06:41	07:27	08:10	15:47	16:30	17:15	
3	225°25.2	· · 27.1	122°43.7	16.8'	02°03.5	-14.4'	54.9'	56°	06:47	07:35	08:22	15:35	16:21	17:09	
4	240°25.1	27.4	137°19.6	16.8'	01°49.1	-14.4'	54.8'	58°	06:53	07:45	08:35	15:21	16:11	17:03	
5	255°25.0	27.7	151°55.4	16.9'	01°34.7	-14.4'	54.8'	S 60°	07:00	07:56	08:51	15:05	16:01	16:56	
6	270°24.9	N22°27.9	166°31.3	16.9'	N01°20.3	-14.4'	54.8'								
7	285°24.8	28.2	181°07.2	16.9'	01°05.9	-14.4'	54.8'								
8	300°24.7	28.5	195°43.1	16.9'	00°51.5	-14.4'	54.8'								
9	315°24.6	· · 28.8	210°19.0	16.9'	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'	54.7'								
12	0°24.2	N22°29.7	254°07.0	17.0'	S00°06.0	-14.3'	54.7'								
13	15°24.1	29.9	268°43.0	17.0'	00°20.3	-14.3'	54.7'								
14	30°24.0	30.2	283°19.0	17.0'	00°34.6	-14.3'	54.7'								
15	45°23.9	· · 30.5	297°55.0	17.0'	00°48.9	-14.3'	54.6'								
16	60°23.8	30.8	312°31.1	17.1'	01°03.3	-14.3'	54.6'	N 58°	11:48	13:08	14:27	00:59	01:01	01:03	
17	75°23.7	31.1	327°07.2	17.1'	01°17.6	-14.3'	54.6'	56°	11:51	13:08	14:24	00:55	01:00	01:05	
18	90°23.6	N22°31.3	341°43.2	17.1'	S01°31.8	-14.3'	54.6'	54°	11:54	13:08	14:21	00:52	00:59	01:06	
19	105°23.5	31.6	356°19.3	17.1'	01°46.1	-14.3'	54.6'	52°	11:56	13:08	14:19	00:48	00:58	01:07	
20	120°23.4	31.9	10°55.4	17.1'	02°00.4	-14.2'	54.6'	50°	11:58	13:08	14:16	00:45	00:57	01:09	
21	135°23.3	· · 32.2	25°31.5	17.1'	02°14.6	-14.2'	54.5'	45°	12:03	13:07	14:11	00:39	00:55	01:11	
22	150°23.2	32.4	40°07.6	17.1'	02°28.8	-14.2'	54.5'	N 40°	12:06	13:07	14:07	00:33	00:54	01:13	
23	165°23.0	32.7	54°43.7	17.1'	02°43.0	-14.2'	54.5'	35°	12:10	13:07	14:03	00:29	00:52	01:15	
	SD.=15.8	d=0.3			S.D.=15.0			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	
0	180°22.9	N22°33.0	69°19.8	17.1'	S02°57.2	-14.2'	54.5'	N 10°	12:22	13:06	13:49	00:10	00:47	01:22	
1	195°22.8	33.3	83°55.9	17.1'	03°11.4	-14.2'	54.5'	0°	12:26	13:06	13:45	00:04	00:45	01:25	
2	210°22.7	33.5	98°32.1	17.1'	03°25.6	-14.1'	54.5'	S 10°	12:30	13:05	13:40	--	00:43	01:27	
3	225°22.6	· · 33.8	113°08.2	17.1'	03°39.7	-14.1'	54.4'	20°	12:34	13:05	13:36	--	00:41	01:29	
4	240°22.5	34.1	127°44.3	17.1'	03°53.8	-14.1'	54.4'	30°	12:39	13:05	13:30	--	00:39	01:32	
5	255°22.4	34.3	142°20.4	17.1'	04°07.9	-14.1'	54.4'	35°	12:42	13:05	13:27	--	00:37	01:34	
6	270°22.3	N22°34.6	156°56.5	17.1'	S04°22.0	-14.1'	54.4'	40°	12:45	13:05	13:24	--	00:36	01:36	
7	285°22.2	34.9	171°32.6	17.1'	04°36.1	-14.0'	54.4'	45°	12:49	13:04	13:20	--	00:34	01:38	
8	300°22.0	35.2	186°08.7	17.1'	04°50.1	-14.0'	54.4'	S 50°	12:53	13:04	13:15	--	00:32	01:41	
9	315°21.9	· · 35.4	200°44.8	17.1'	05°04.1	-14.0'	54.4'	52°	12:55	13:04	13:13	--	00:31	01:42	
10	330°21.8	35.7	215°20.8	17.1'	05°18.1	-14.0'	54.4'	54°	12:57	13:04	13:11	--	00:30	01:43	
11	345°21.7	36.0	229°56.9	17.1'	05°32.1	-14.0'	54.3'	56°	12:59	13:04	13:08	--	00:28	01:45	
12	0°21.6	N22°36.2	244°32.9	17.0'	S05°46.0	-13.9'	54.3'	58°	13:02	13:04	13:05	--	00:27	01:46	
13	15°21.5	36.5	259°09.0	17.0'	05°59.9	-13.9'	54.3'	S 60°	13:05	13:04	13:02	--	00:26	01:48	
14	30°21.4	36.7	273°45.0	17.0'	06°13.8	-13.9'	54.3'								
15	45°21.3	· · 37.0	288°21.0	17.0'	06°27.7	-13.8'	54.3'								
16	60°21.1	37.3	302°57.0	17.0'	06°41.5	-13.8'	54.3'								
17	75°21.0	37.5	317°33.0	17.0'	06°55.3	-13.8'	54.3'								
18	90°20.9	N22°37.8	332°09.0	17.0'	S07°09.1	-13.8'	54.3'								
19	105°20.8	38.1	346°44.9	16.9'	07°22.8	-13.7'	54.3'								
20	120°20.7	38.3	1°20.8	16.9'	07°36.5	-13.7'	54.2'								
21	135°20.6	· · 38.6	15°56.7	16.9'	07°50.2	-13.7'	54.2'								
22	150°20.5	38.8	30°32.6	16.9'	08°03.9	-13.6'	54.2'								
23	165°20.4	39.1	45°08.5	16.8'	08°17.5	-13.6'	54.2'								
	SD.=15.8	d=0.3			S.D.=14.9										

Lat.	Moonrise			Moonset		
	Tue	Wed	Thu	Tue	Thu	
N 72°	11:11	13:11	15:10	01:50	01:16	00:44
N 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
N 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
N 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
S 10°	12:30					

June 06, 07, 08 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
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	Alpheratz	357°34.6	29°13.7
1	269°42.1	241°05.3	11.3	123°08.7	53.6	180°38.8	15.9	268°07.2	37.9	Ankaa	353°07.0	-42°09.9
2	284°44.6	256°05.4	12.1	138°09.9	53.2	195°40.6	15.9	283°09.5	37.9	Schedar	349°30.9	56°40.3
3	299°47.0	271°05.5	· · 12.8	153°11.1	· · 52.7	210°42.5	· · 15.9	298°11.8	· · 37.8	Diphda	348°47.0	-17°50.7
4	314°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	-57°06.2
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	23°34.9
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°19.1	89°22.1
7	359°56.9	331°05.8	15.9	213°15.7	50.7	270°49.9	16.0	358°21.1	37.6	Akamars	315°11.9	-40°12.0
8	14°59.4	346°05.9	16.7	228°16.8	50.2	285°51.7	16.0	13°23.4	37.6	Menkar	314°06.1	4°11.4
9	30°01.8	1°06.0	· · 17.5	243°18.0	· · 49.8	300°53.6	· · 16.0	28°25.8	· · 37.5	Mirfak	308°28.3	49°57.0
10	45°04.3	16°06.0	18.3	258°19.1	49.3	315°55.4	16.0	43°28.1	37.5	Aldebaran	290°39.6	16°33.6
11	60°06.8	31°06.1	19.0	273°20.3	48.8	330°57.3	16.0	58°30.4	37.5	Rigel	281°03.9	-8°10.3
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	S01°37.4	Capella	280°21.9	46°01.5
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	6°22.4
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	28°37.7
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	-1°11.2
16	135°19.1	106°06.5	22.9	348°26.1	46.3	46°06.5	16.0	133°42.0	37.2	Betelgeuse	270°52.1	7°24.7
17	150°21.5	121°06.5	23.7	3°27.2	45.9	61°08.4	16.0	148°44.4	37.2	Canopus	263°52.8	-52°42.6
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	Sirius	258°26.2	-16°44.9
19	180°26.5	151°06.7	25.2	33°29.5	44.9	91°12.1	16.1	178°49.0	37.1	Adara	255°05.9	-20°00.5
20	195°28.9	166°06.8	26.0	48°30.7	44.4	106°13.9	16.1	193°51.3	37.0	Procyon	244°50.7	5°09.7
21	210°31.4	181°06.8	· · 26.8	63°31.8	· · 43.9	121°15.8	· · 16.1	208°53.7	· · 37.0	Pollux	243°17.1	27°58.0
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	-50°35.6
23	240°36.3	211°07.0	28.3	93°34.2	42.9	151°19.5	16.1	238°58.3	36.9	Suhail	222°46.3	-43°32.3
Mer.pass.:07:00		v0.1 d0.8 m-4.2		v1.2 d-0.5 m1.3		v1.9 d0.0 m-1.8		v2.3 d0.0 m1.1		Miaplacidus	221°38.7	-69°49.5
										Alphard	217°47.6	-8°46.2
										Regulus	207°34.1	11°50.6
										Dubhe	193°40.6	61°37.1
										Denebola	182°24.5	14°25.8
										Gienah	175°43.1	-17°41.1
										Acrux	172°59.5	-63°14.7
										Gacrux	171°51.1	-57°15.6
										Alioth	166°12.4	55°49.5
										Spica	158°21.8	-11°17.7
										Alkaid	152°51.4	49°11.3
										Hadar	148°35.1	-60°30.0
										Menkent	147°57.0	-36°29.9
										Arcturus	145°47.2	19°03.3
										Rigel Kent.	139°39.3	-60°56.6
										Kochab	137°18.7	74°03.2
										Zuben'ubi	136°55.4	-16°08.9
										Alphecca	126°03.1	26°37.8
										Antares	112°15.1	-26°29.4
										Atria	107°08.4	-69°04.4
										Sabik	102°02.0	-15°45.4
										Shaula	96°09.5	-37°07.3
										Rasalhague	95°57.9	12°32.4
										Eltanin	90°41.5	51°29.0
										Kaus Aust.	83°31.7	-34°22.3
										Vega	80°32.6	38°48.2
										Nunki	75°47.0	-26°15.9
										Altair	61°59.5	8°56.0
										Peacock	53°04.8	-56°39.0
										Deneb	49°25.3	45°22.0
										Enif	33°38.4	9°59.4
										Al Na'ir	27°32.4	-46°50.0
										Fomalhaut	15°14.2	-29°29.1
										Scheat	13°44.9	28°13.0
										Markab	13°29.6	15°20.4
										Jun 06 Fri	SHA	Mer.pass
										Venus	331°25.6	08:56
										Mars	213°27.9	16:46
										Jupiter	270°57.3	12:56
										Saturn	358°25.2	07:07
										Jun 07 Sat	SHA	Mer.pass
										Venus	330°28.2	08:55
										Mars	212°56.5	16:44
										Jupiter	270°42.5	12:53
										Saturn	358°21.9	07:03
										Jun 08 Sun	SHA	Mer.pass
										Venus	329°30.5	08:55
										Mars	212°25.1	16:43
										Jupiter	270°27.8	12:50
										Saturn	358°18.6	06:59
										Horizontal parallax		
										Venus:	0.2	
										Mars:	0.1	
Mer.pass.:06:52		v0.0 d0.8 m-4.2		v1.2 d-0.5 m1.3		v1.8 d0.0 m-1.8		v2.3 d0.0 m1.1				

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

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°34.5	29°13.7	
1	275°37.0	241°10.1	03.6	125°54.4	42.1	185°04.9	16.6	273°43.3	31.5	Ankaa	353°06.9	-42°09.8	
2	290°39.4	256°10.1	04.4	140°55.5	41.6	200°06.7	16.6	288°45.6	31.4	Schedar	349°30.9	56°40.4	
3	305°41.9	271°10.1	· · 05.2	155°56.7	· · 41.0	215°08.6	· · 16.6	303°47.9	· · 31.4	Diphda	348°47.0	-17°50.7	
4	320°44.3	286°10.1	05.9	170°57.8	40.5	230°10.4	16.6	318°50.3	31.3	Achernar	335°20.3	-57°06.2	
5	335°46.8	301°10.1	06.7	185°59.0	40.0	245°12.2	16.7	333°52.6	31.3	Hamal	327°51.1	23°34.9	
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	Polaris	314°16.7	89°22.1	
7	5°51.7	331°10.0	08.3	216°01.3	39.0	275°15.9	16.7	3°57.3	31.2	Akamar	315°11.8	-40°12.0	
8	20°54.2	346°10.0	09.1	231°02.4	38.5	290°17.8	16.7	18°59.7	31.2	Menkar	314°06.1	4°11.4	
9	35°56.7	1°10.0	· · 09.8	246°03.6	· · 38.0	305°19.6	· · 16.7	34°02.0	· · 31.1	Mirfak	308°28.2	49°56.9	
10	50°59.1	16°10.0	10.6	261°04.7	37.5	320°21.5	16.7	49°04.4	31.1	Aldebaran	290°39.6	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	Rigel	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	46°01.4	
13	96°06.5	61°09.9	13.0	306°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°09.9	13.8	321°09.3	35.4	20°28.9	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°26.2	-16°44.9	
19	186°21.3	151°09.8	17.7	36°15.0	32.9	95°38.1	16.7	184°25.5	30.7	Adara	255°05.9	-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°50.7	5°09.7	
21	216°26.2	181°09.7	· · 19.2	66°17.3	· · 31.9	125°41.8	· · 16.7	214°30.2	· · 30.7	Pollux	243°17.1	27°58.0	
22	231°28.7	196°09.7	20.0	81°18.4	31.4	140°43.6	16.7	229°32.5	30.6	Avior	234°15.1	-50°35.6	
23	246°31.2	211°09.7	20.8	96°19.6	30.8	155°45.5	16.7	244°34.9	30.6	Suhail	222°46.3	-43°32.3	
Mer.pass.:06:36		v-0.0 d0.8 m-4.2		v1.1 d-0.5 m1.4		v1.8 d0.0 m-1.8		v2.3 d0.0 m1.1		Miaplacidus		221°38.8	-69°49.5
										Alphard		217°47.6	-8°46.2
										Regulus		207°34.1	11°50.6
										Dubhe		193°40.6	61°37.1
										Denebola		182°24.5	14°25.9
										Gienah		175°43.1	-17°41.1
										Acrux		172°59.5	-63°14.7
										Gacrux		171°51.1	-57°15.6
										Alioth		166°12.5	55°49.5
										Spica		158°21.8	-11°17.7
										Alkaid		152°51.4	49°11.3
										Hadar		148°35.1	-60°30.0
										Menkent		147°57.0	-36°29.9
										Arcturus		145°47.2	19°03.3
										Rigel Kent.		139°39.3	-60°56.6
										Kochab		137°18.8	74°03.2
										Zuben'ubi		136°55.4	-16°08.9
										Alphecca		126°03.1	26°37.8
										Antares		112°15.0	-26°29.4
										Atria		107°08.4	-69°04.4
										Sabik		102°02.0	-15°45.4
										Shaula		96°09.5	-37°07.3
										Rasalhague		95°57.9	12°32.5
										Eltanin		90°41.5	51°29.0
										Kaus Aust.		83°31.6	-34°22.3
										Vega		80°32.6	38°48.3
										Nunki		75°47.0	-26°15.9
										Altair		61°59.4	8°56.0
										Peacock		53°04.7	-56°39.0
										Deneb		49°25.3	45°22.0
										Enif		33°38.3	9°59.4
										Al Na'ir		27°32.3	-46°50.0
										Fomalhaut		15°14.1	-29°29.1
										Scheat		13°44.9	28°13.1
										Markab		13°29.5	15°20.4
										Jun 12 Thu		SHA	Mer.pass
										Venus		325°35.6	08:55
										Mars		210°18.8	16:35
										Jupiter		269°28.5	12:38
										Saturn		358°06.4	06:44
										Jun 13 Fri		SHA	Mer.pass
										Venus		324°36.0	08:55
										Mars		209°47.1	16:33
										Jupiter		269°13.7	12:35
										Saturn		358°03.6	06:40
										Jun 14 Sat		SHA	Mer.pass
										Venus		323°36.0	08:55
										Mars		209°15.4	16:32
										Jupiter		268°58.8	12:32
										Saturn		358°00.8	06:37
										Horizontal parallax			
										Venus:		0.2	
										Mars:		0.1	
Mer.pass.:06:28		v-0.0 d0.8 m-4.2		v1.1 d-0.5 m1.4		v1.8 d0.0 m-1.8		v2.4 d0.0 m1.1					

Sun								Moon							
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight		
									Naut.	Civil			Civil	Naut.	
0	180°02.7	N23°09.1	351°41.6	8.4'	S28°24.1	0.0'	55.1'								
1	195°02.6	09.3	6°09.0	8.4'	28°24.0	0.2'	55.1'	N 72°							
2	210°02.5	09.5	20°36.3	8.3'	28°23.7	0.3'	55.1'	N 70°							
3	225°02.4	· · 09.6	35°03.7	8.3'	28°23.3	0.5'	55.2'	68°							
4	240°02.2	09.8	49°31.0	8.3'	28°22.7	0.6'	55.2'	66°							
5	255°02.1	09.9	63°58.3	8.3'	28°22.0	0.8'	55.2'	64°			01:35	22:26			
6	270°02.0	N23°10.1	78°25.6	8.3'	S28°21.1	0.9'	55.2'	62°			02:11	21:50			
7	285°01.8	10.2	92°52.9	8.3'	28°20.1	1.1'	55.2'	60°		00:56	02:37	21:24	23:06		
8	300°01.7	10.4	107°20.1	8.3'	28°18.9	1.3'	55.2'	N 58°		01:43	02:57	21:04	22:18		
9	315°01.6	· · 10.5	121°47.4	8.3'	28°17.6	1.4'	55.3'	56°		02:12	03:14	20:47	21:49		
10	330°01.5	10.7	136°14.7	8.3'	28°16.1	1.6'	55.3'	54°	00:51	02:34	03:28	20:33	21:27	23:11	
11	345°01.3	10.8	150°41.9	8.3'	28°14.5	1.7'	55.3'	52°	01:34	02:51	03:40	20:21	21:09	22:27	
12	0°01.2	N23°11.0	165°09.2	8.3'	S28°12.7	1.9'	55.3'	50°	02:01	03:06	03:50	20:10	20:54	21:59	
13	15°01.1	11.1	179°36.4	8.3'	28°10.8	2.0'	55.3'	45°	02:46	03:35	04:13	19:48	20:25	21:14	
14	30°00.9	11.3	194°03.7	8.3'	28°08.7	2.2'	55.4'	N 40°		03:16	03:58	04:31	19:30	20:03	20:44
15	45°00.8	· · 11.4	208°30.9	8.3'	28°06.5	2.3'	55.4'	35°		03:39	04:16	04:46	19:15	19:45	20:21
16	60°00.7	11.6	222°58.2	8.3'	28°04.1	2.5'	55.4'	30°		03:58	04:31	04:58	19:02	19:29	20:03
17	75°00.6	11.7	237°25.5	8.3'	28°01.5	2.6'	55.4'	20°		04:27	04:56	05:20	18:40	19:05	19:34
18	90°00.4	N23°11.8	251°52.7	8.3'	S27°58.8	2.8'	55.4'	N 10°		04:49	05:16	05:39	18:21	18:44	19:11
19	105°00.3	12.0	266°20.0	8.3'	27°56.0	2.9'	55.4'	0°	05:08	05:34	05:56	18:04	18:26	18:52	
20	120°00.2	12.1	280°47.3	8.3'	27°53.0	3.1'	55.5'	S 10°		05:25	05:51	06:14	17:46	18:09	18:36
21	135°00.0	· · 12.3	295°14.6	8.3'	27°49.8	3.2'	55.5'	20°		05:41	06:08	06:32	17:28	17:52	18:20
22	149°59.9	12.4	309°41.9	8.3'	27°46.5	3.4'	55.5'	30°		05:57	06:27	06:53	17:07	17:33	18:03
23	164°59.8	12.6	324°09.3	8.3'	27°43.1	3.5'	55.5'	35°		06:06	06:37	07:05	16:55	17:23	17:55
	SD.=15.8	d=0.2			S.D.=15.0			40°		06:15	06:49	07:20	16:41	17:11	17:45
								45°		06:25	07:02	07:36	16:24	16:58	17:35
								S 50°		06:37	07:18	07:57	16:03	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°		07:00	07:53	08:44	15:16	16:07	17:00
								S 60°		07:08	08:04	09:02	14:58	15:56	16:52

Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise		Moonset			
									Thu	Fri	Sat	Thu	Fri	Sat
0	179°59.6	N23°12.7	338°36.6	8.4'	S27°39.5	3.7'	55.5'	N 72°	■	■	■	■	■	■
1	194°59.5	12.8	353°04.0	8.4'	27°35.7	3.8'	55.6'	N 70°	■	■	■	■	■	■
2	209°59.4	13.0	7°31.4	8.4'	27°31.8	4.0'	55.6'	68°	■	■	■	■	■	■
3	224°59.3	· · 13.1	21°58.8	8.4'	27°27.8	4.1'	55.6'	66°	■	■	■	■	■	■
4	239°59.1	13.2	36°26.2	8.4'	27°23.6	4.3'	55.6'	64°	■	■	■	■	■	■
5	254°59.0	13.4	50°53.7	8.5'	27°19.3	4.4'	55.6'	62°	■	■	■	■	■	■
6	269°58.9	N23°13.5	65°21.1	8.5'	S27°14.8	4.6'	55.6'	60°	■	■	01:28	■	■	03:27
7	284°58.7	13.7	79°48.6	8.5'	27°10.1	4.7'	55.7'	N 58°	■	■	■	■	■	■
8	299°58.6	13.8	94°16.2	8.5'	27°05.3	4.9'	55.7'	56°	■	■	■	■	■	■
9	314°58.5	· · 13.9	108°43.7	8.6'	27°00.4	5.0'	55.7'	54°	■	■	■	■	■	■
10	329°58.3	14.1	123°11.3	8.6'	26°55.3	5.2'	55.7'	52°	■	■	■	■	■	■
11	344°58.2	14.2	137°38.9	8.6'	26°50.1	5.3'	55.7'	50°	■	■	■	■	■	■
12	359°58.1	N23°14.3	152°06.6	8.7'	S26°44.7	5.5'	55.8'	45°	■	■	■	■	■	■
13	14°58.0	14.4	166°34.2	8.7'	26°39.2	5.6'	55.8'	N 40°	■	■	■	■	■	■
14	29°57.8	14.6	181°02.0	8.7'	26°33.5	5.7'	55.8'	35°	■	■	■	■	■	■
15	44°57.7	· · 14.7	195°29.7	8.8'	26°27.7	5.9'	55.8'	30°	■	■	■	■	■	■
16	59°57.6	14.8	209°57.5	8.8'	26°21.7	6.0'	55.8'	20°	■	■	■	■	■	■
17	74°57.4	15.0	224°25.3	8.8'	26°15.6	6.2'	55.9'	N 10°	■	■	■	■	■	■
18	89°57.3	N23°15.1	238°53.2	8.9'	S26°09.4	6.3'	55.9'	0°	■	■	■	■	■	■
19	104°57.2	15.2	253°21.1	8.9'	26°03.0	6.5'	55.9'	S 10°	■	■	■	■	■	■
20	119°57.0	15.3	267°49.0	9.0'	25°56.5	6.6'	55.9'	20°	■	■	■	■	■	■
21	134°56.9	· · 15.5	282°17.0	9.0'	25°49.8	6.7'	55.9'	30°	■	■	■	■	■	■
22	149°56.8	15.6	296°45.1	9.1'	25°43.0	6.9'	56.0'	40°	■	■	■	■	■	■
23	164°56.6	15.7	311°13.1	9.1'	25°36.1	7.0'	56.0'	45°	■	■	■	■	■	■
	SD.=15.8	d=0.1			S.D.=15.2			S 50°	■	■	■	■	■	■
								52°	■	■	■	■	■	■
								54°	■	■	■	■	■	■
								56°	■	■	■	■	■	■
								58°	■	■	■	■	■	■
								S 60°	■	■	■	■	■	■

Sat	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Mer.	Moon		Age
									Eqn. of Time	12 ^h	Pass	Upper Mer. Pass.	Lower Mer. Pass.	16-18 98-90%
									00 ^h	mm:ss	hh:mm	hh:mm	hh:mm	
0	179°56.5	N23°15.8	325°41.3	9.1'	S25°29.0	7.2'	56.0'	12	00:11	00:05	12:00	00:34	13:02	
1	194°56.4	16.0	340°09.4	9.2'	25°21.8	7.3'	56.0'	13	00:01	00:08	12:00	01:29	13:56	
2	209°56.2	16.1	354°37.6	9.2'	25°14.4	7.4'	56.0'	14	00:14	00:20	12:00	02:22	14:48	
3	224°56.1	· · 16.2	9°05.9	9.3'	25°06.9	7.6'	56.1'							
4	239°56.0	16.3	23°34.2	9.3'	24°59.3	7.7'	56.1'							
5	254°55.8	16.4	38°02.5	9.4'	24°51.5	7.8'	56.1'							
6	269°55.7	N23°16.6	52°30.9	9.4'	S24°43.6	8.0'	56.1'							
7	284°55.6	16.7	66°59.4	9.5'	24°35.6	8.1'	56.1'							
8	299°55.4	16.8	81°27.9	9.5'	24°27.4	8.2'	56.2'							
9	314°55.3	· · 16.9	95°56.5	9.6'	24°19.1	8.4'	56.2'							
10	329°55.2	17.0	110°25.1	9.6'	24°10.6	8.5'	56.2'							
11	344°55.1	17.1	124°53.7	9.7'	24°02.1	8.6'	56.2'							
12	359°54.9	N23°17.3	139°22.4	9.7'	S23°53.4	8.8'	56.3'							
13	14°54.8	17.4	153°51.2	9.8'	23°44.6	8.9'	56.3'							
14	29°54.7	17.5	168°20.0	9.8'	23°35.6	9.0'	56.3'							
15	44°54.5	· · 17.6	182°48.9	9.9'	23°26.5	9.1'	56.3'							
16	59°54.4	17.7	197°17.8	10.0'	23°17.3	9.3'	56.3'							
17	74°54.3	17.8	211°46.8	10.0'	23°08.0	9.4'	56.4'							
18	89°54.1	N23°17.9	226°15.8	10.1'	S22°58.5	9.5'	56.4'							
19	104°54.0	18.0	240°44.9	10.1'	22°49.0	9.6'	56.4'							
20	119°53.9	18.1	255°14.1	10.2'	22°39.3	9.8'	56.4'							
21	134°53.7	· · 18.2	269°43.3	10.2'	22°29.4	9.9'	56.4'							
22	149°53.6	18.4	284°12.5	10.3'	22°19.5	10.0'	56.5'							
23	164°53.5	18.5	298°41.9	10.3'	22°09.4	10.1'	56.5'							
	SD.=15.7	d=0.1			S.D.=15.3									

June 15, 16, 17 (Sun., Mon., Tue.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	265°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	Alpheratz	357°34.5	29°13.7	
1	278°34.4	241°07.5	11°59.8	127°16.7	05.1	187°17.7	16.7	276°32.4	28.7	Ankaa	353°06.9	-42°09.8	
2	293°36.8	256°07.4	12°00.6	142°17.8	04.6	202°19.5	16.7	291°34.8	28.7	Schedar	349°30.8	56°40.4	
3	308°39.3	271°07.3	· · 01.4	157°19.0	· · 04.0	217°21.4	· · 16.7	306°37.1	· · 28.6	Diphda	348°46.9	-17°50.7	
4	323°41.8	286°07.3	02.2	172°20.1	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°15.7	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	Akamar	315°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°21.9	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°42.6	
18	174°16.3	136°06.4	N12°13.1	22°36.0	N12°56.2	82°49.1	N23°16.7	172°12.4	S01°28.1	Sirius	258°26.2	-16°44.9	
19	189°18.7	151°06.3	13.8	37°37.2	55.7	97°50.9	16.7	187°14.8	28.1	Adara	255°05.9	-29°00.4	
20	204°21.2	166°06.2	14.6	52°38.3	55.2	112°52.7	16.7	202°17.2	28.0	Procyon	244°50.7	5°09.7	
21	219°23.7	181°06.1	· · 15.4	67°39.5	· · 54.7	127°54.6	· · 16.7	217°19.5	· · 28.0	Pollux	243°17.1	27°58.0	
22	234°26.1	196°06.1	16.2	82°40.6	54.1	142°56.4	16.7	232°21.9	28.0	Avior	234°15.1	-50°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	222°46.3	-43°32.3	
Mer.pass.:06:24		v-0.1 d0.8 m-4.1		v1.1 d-0.5 m1.4		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.1		Miaplacidus	221°38.9	-69°49.5	
Mon		GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Alphard	217°47.6	-8°46.2
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	Regulus	207°34.2	11°50.6	
1	279°33.5	241°05.8	18.5	127°44.0	52.6	188°02.0	16.7	277°28.9	27.9	Dubhe	193°40.6	61°37.1	
2	294°36.0	256°05.8	19.3	142°45.2	52.0	203°03.8	16.6	292°31.3	27.8	Denebola	182°24.5	14°25.9	
3	309°38.4	271°05.7	· · 20.1	157°46.3	· · 51.5	218°05.6	· · 16.6	307°33.7	· · 27.8	Gienah	175°43.1	-17°41.1	
4	324°40.9	286°05.6	20.8	172°47.4	51.0	233°07.5	16.6	322°36.0	27.8	Acrux	172°59.6	-63°14.7	
5	339°43.4	301°05.5	21.6	187°48.6	50.5	248°09.3	16.6	337°38.4	27.7	Gacrux	171°51.1	-57°15.6	
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	Alioth	166°12.5	55°49.5	
7	9°48.3	331°05.4	23.2	217°50.9	49.4	278°13.0	16.6	7°43.1	27.7	Spica	158°21.8	-11°17.7	
8	24°50.8	346°05.3	23.9	232°52.0	48.9	293°14.9	16.6	22°45.5	27.6	Alkaid	152°51.4	49°11.4	
9	39°53.2	1°05.2	· · 24.7	247°53.1	· · 48.4	308°16.7	· · 16.6	37°47.8	· · 27.6	Hadar	148°35.1	-60°30.0	
10	54°55.7	16°05.1	25.5	262°54.3	47.9	323°18.6	16.6	52°50.2	27.6	Menkent	147°57.0	-36°29.9	
11	69°58.2	31°05.1	26.3	277°55.4	47.3	338°20.4	16.6	67°52.5	27.5	Arcturus	145°47.2	19°03.3	
12	85°00.6	46°05.0	N12°27.0	292°56.5	N12°46.8	353°22.2	N23°16.6	82°54.9	S01°27.5	Rigel Kent.	139°39.3	-60°56.7	
13	100°03.1	61°04.9	27.8	307°57.7	46.3	8°24.1	16.6	97°57.2	27.5	Kochab	137°18.8	74°03.2	
14	115°05.6	76°04.8	28.6	322°58.8	45.8	23°25.9	16.6	112°59.6	27.4	Zuben'ubi	136°55.4	-16°08.9	
15	130°08.0	91°04.7	· · 29.4	338°00.0	· · 45.2	38°27.8	· · 16.6	128°02.0	· · 27.4	Alphecca	126°03.1	26°37.8	
16	145°10.5	106°04.6	30.1	353°01.1	44.7	53°29.6	16.6	143°04.3	27.4	Antares	112°15.0	-26°29.4	
17	160°12.9	121°04.6	30.9	8°02.2	44.2	68°31.5	16.6	158°06.7	27.3	Atria	107°08.4	-69°04.4	
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	S01°27.3	Sabik	102°02.0	-15°45.4	
19	190°17.9	151°04.4	32.5	38°04.5	43.1	98°35.1	16.6	188°11.4	27.3	Shaula	96°09.5	-37°07.3	
20	205°20.8	166°04.3	33.2	53°05.6	42.6	113°37.0	16.6	203°13.8	27.2	Rasalhague	95°57.9	12°32.5	
21	220°22.8	181°04.2	· · 34.0	68°06.8	· · 42.1	128°38.8	· · 16.6	218°16.1	· · 27.2	Eltanin	90°41.5	51°29.0	
22	235°25.3	196°04.1	34.8	83°07.9	41.6	143°40.7	16.6	233°18.5	27.2	Kaus Aust.	83°31.6	-34°22.3	
23	250°27.7	211°04.0	35.6	98°09.1	41.0	158°42.5	16.6	248°20.9	27.1	Vega	80°32.6	38°48.3	
Mer.pass.:06:20		v-0.1 d0.8 m-4.1		v1.1 d-0.5 m1.4		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.1		Nunki	75°47.0	-26°15.9	
Tue		GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Altair	61°59.4	8°56.0
0	265°30.2	226°04.0	N12°36.3	113°10.2	N12°40.5	173°44.4	N23°16.6	263°23.2	S01°27.1	Peacock	53°04.7	-56°39.0	
1	280°32.7	241°03.9	37.1	128°11.3	40.0	188°46.2	16.6	278°25.6	27.1	Deneb	49°25.2	45°22.1	
2	295°35.1	256°03.8	37.9	143°12.5	39.5	203°48.1	16.6	293°27.9	27.0	Enif	33°38.3	9°59.4	
3	310°37.6	271°03.7	· · 38.6	158°13.6	· · 38.9	218°49.9	· · 16.6	308°30.3	· · 27.0	Al Na'ir	27°32.3	-46°50.0	
4	325°40.1	286°03.6	39.4	173°14.7	38.4	233°51.7	16.6	323°32.7	27.0	Fomalhaut	15°14.1	-29°29.1	
5	340°42.5	301°03.5	40.2	188°15.9	37.9	248°53.6	16.6	338°35.0	26.9	Markab	13°44.8	28°13.1	
6	355°45.0	316°03.4	N12°41.0	203°17.0	N12°37.4	263°55.4	N23°16.6	353°37.4	S01°26.9		13°29.5	15°20.4	
7	10°47.4	331°03.3	41.7	218°18.1	36.8	278°57.3	16.6	8°39.7	26.9	Jun 15 Sun	SHA	Mer.pass	
8	25°49.9	346°03.2	42.5	233°19.3	36.3	293°59.1	16.6	23°42.1	26.8	Venus	322°35.6	08:56	
9	40°52.4	1°03.1	· · 43.3	248°20.4	· · 35.8	309°01.0	· · 16.6	38°44.5	· · 26.8	Mars	208°43.6	16:30	
10	55°54.8	16°03.0	44.1	263°21.6	35.2	324°02.8	16.6	53°46.8	26.8	Jupiter	268°43.9	12:29	
11	70°57.3	31°02.9	44.8	278°22.7	34.7	339°04.6	16.6	68°49.2	26.7	Saturn	357°58.1	06:33	
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	Jun 16 Mon	SHA	Mer.pass	
13	101°02.2	61°02.7	46.4	308°25.0	33.7	9°08.3	16.6	98°53.9	26.7	Venus	321°34.9	08:56	
14	116°04.7	76°02.6	47.1	323°26.1	33.1	24°10.2	16.6	113°56.3	26.6	Mars	208°11.8	16:28	
15	131°07.2	91°02.5	· · 47.9	338°27.2	· · 32.6	39°12.0	· · 16.5	128°58.6	· · 26.6	Jupiter	268°29.1	12:26	
16	146°09.6	106°02.4	48.7	353°28.4	32.1	54°13.9	16.5	144°01.0	26.6	Saturn	357°55.5	06:29	
17	161°12.1	121°02.3	49.5	8°29.5	31.5	69°15.7	16.5	159°03.4	26.5	Jun 17 Tue	SHA	Mer.pass	
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	Venus	320°33.8	08:56	
19	191°17.0	151°02.1	51.0	38°31.8	30.5	99°19.4	16.5	189°08.1	26.5	Mars	207°40.0	16:26	
20	206°19.5	166°02.0	51.8	53°32.9	30.0	114°21.2	16.5	204°10.5	26.5	Jupiter	268°14.2	12:24	
21	221°21.9	181°01.9	· · 52.5	68°34.1	· · 29.4	129°23.1	· · 16.5	219°12.8	· · 26.4	Saturn	357°53.0	06:25	
22	236°24.4	196°01.8	53.3	83°35.2	28.9	144°24.9	16.5	234°15.2	26.4	Horizontal parallax			
23	251°26.9	211°01.7	54.1	98°36.3	28.4	159°26.8	16.5	249°17.6	26.4	Venus:		0.2	
Mer.pass.:06:16		v-0.1 d0.8 m-4.1		v1.1 d-0.5 m1.4		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.1		Mars:		0.1	

Sun								Moon							
h	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight		
Sun									Naut.	Civil			Civil	Naut.	
0	179°53.3	N23°18.6	313°11.2	10.4'	S21°59.3	10.2'	56.5'								
1	194°53.2	18.7	327°40.7	10.5'	21°49.0	10.4'	56.5'	N 72°							
2	209°53.1	18.8	342°10.1	10.5'	21°38.5	10.5'	56.6'	N 70°							
3	224°52.9	18.9	356°39.7	10.6'	21°28.0	10.6'	56.6'	68°							
4	239°52.8	19.0	11°09.3	10.6'	21°17.4	10.7'	56.6'	66°							
5	254°52.7	19.1	25°38.9	10.7'	21°06.6	10.8'	56.6'	64°			01:32	22:30			
6	269°52.5	N23°19.2	40°08.6	10.7'	S20°55.7	10.9'	56.6'	62°			02:10	21:52			
7	284°52.4	19.3	54°38.4	10.8'	20°44.7	11.0'	56.7'	60°		00:52	02:36	21:26	23:11		
8	299°52.3	19.4	69°08.2	10.9'	20°33.6	11.2'	56.7'	N 58°		01:41	02:56	21:06	22:21		
9	314°52.1	19.5	83°38.1	10.9'	20°22.4	11.3'	56.7'	56°		02:11	03:13	20:49	21:51		
10	329°52.0	19.6	98°08.0	11.0'	20°11.1	11.4'	56.7'	54°	00:47	02:33	03:27	20:35	21:29	23:15	
11	344°51.9	19.7	112°38.0	11.0'	19°59.7	11.5'	56.8'	52°	01:33	02:51	03:39	20:22	21:11	22:29	
12	359°51.7	N23°19.8	127°08.1	11.1'	S19°48.2	11.6'	56.8'	50°	02:00	03:06	03:50	20:11	20:56	22:02	
13	14°51.6	19.9	141°38.2	11.1'	19°36.5	11.7'	56.8'	45°	02:46	03:35	04:13	19:49	20:26	21:16	
14	29°51.5	20.0	156°08.3	11.2'	19°24.8	11.8'	56.8'	N 40°		03:16	03:58	04:31	19:31	20:04	
15	44°51.3	20.1	170°38.6	11.2'	19°12.9	11.9'	56.9'	35°		03:39	04:16	04:46	19:16	19:46	
16	59°51.2	20.2	185°08.8	11.3'	19°01.0	12.0'	56.9'	30°		03:58	04:31	04:59	19:03	19:30	
17	74°51.1	20.3	199°39.1	11.3'	18°48.9	12.1'	56.9'	20°		04:27	04:56	05:21	18:41	19:05	
18	89°50.9	N23°20.3	214°09.5	11.4'	S18°36.8	12.2'	56.9'	N 10°		04:49	05:16	05:40	18:22	18:45	
19	104°50.8	20.4	228°39.9	11.5'	18°24.5	12.3'	56.9'	0°	05:08	05:35	05:57	18:04	18:27	18:53	
20	119°50.7	20.5	243°10.4	11.5'	18°12.2	12.4'	57.0'	S 10°		05:25	05:52	06:15	17:47	18:10	
21	134°50.5	20.6	257°40.9	11.6'	17°59.7	12.5'	57.0'	20°		05:41	06:09	06:33	17:28	17:53	
22	149°50.4	20.7	272°11.5	11.6'	17°47.2	12.6'	57.0'	30°		05:58	06:28	06:54	17:07	17:34	
23	164°50.3	20.8	286°42.1	11.7'	17°34.6	12.7'	57.0'	35°		06:07	06:38	07:07	16:55	17:23	
	SD.=15.7	d=0.1			S.D.=15.4			40°		06:16	06:50	07:21	16:41	17:11	
								45°		06:26	07:04	07:37	16:24	16:58	
								S 50°		06:38	07:20	07:58	16:03	16:42	
								52°		06:43	07:27	08:08	15:53	16:34	
								54°		06:49	07:35	08:19	15:42	16:26	
								56°		06:55	07:44	08:32	15:30	16:17	
								58°		07:02	07:55	08:46	15:15	16:07	
								S 60°		07:09	08:06	09:04	14:58	15:55	


Mon	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Sun	Moonrise	Tue	Sun	Moonset	Tue
0	179°50.1	N23°20.9	301°12.8	11.7'	S17°21.8	12.8'	57.1'							
1	194°50.0	21.0	315°43.6	11.8'	17°09.0	12.9'	57.1'	N 72°	■	02:38	01:21	■	05:53	08:50
2	209°49.8	21.1	330°14.3	11.8'	16°56.1	13.0'	57.1'	N 70°	■	01:49	01:02	■	06:39	09:06
3	224°49.7	21.1	344°45.2	11.9'	16°43.1	13.1'	57.1'	68°	02:31	01:18	00:47	04:14	07:09	
4	239°49.6	21.2	359°16.1	11.9'	16°30.0	13.1'	57.2'	66°	01:27	00:54	00:35	05:16	07:31	
5	254°49.4	21.3	13°47.0	11.9'	16°16.8	13.2'	57.2'	64°	00:52	00:36	00:24	05:50	07:49	
6	269°49.3	N23°21.4	28°18.0	12.0'	S16°03.5	13.3'	57.2'	62°	00:26	00:21	00:15	06:15	08:03	
7	284°49.2	21.5	42°49.0	12.0'	15°50.1	13.4'	57.2'	60°	00:06	00:08	00:07	06:34	08:15	
8	299°49.0	21.6	57°20.0	12.1'	15°36.7	13.5'	57.3'	N 58°		23:56	00:01	06:50	08:25	
9	314°48.9	21.7	71°51.1	12.1'	15°23.1	13.6'	57.3'	56°		23:47	23:55	07:04	08:34	
10	329°48.8	21.7	86°22.3	12.2'	15°09.5	13.7'	57.3'	54°		23:38	23:49	07:16	08:42	
11	344°48.6	21.8	100°53.5	12.2'	14°55.8	13.7'	57.3'	52°		23:30	23:44	07:26	08:49	
12	359°48.5	N23°21.9	115°24.7	12.3'	S14°42.0	13.8'	57.4'	50°		23:23	23:40	07:35	08:55	
13	14°48.4	22.0	129°56.0	12.3'	14°28.2	13.9'	57.4'	45°		23:08	23:30	07:54	09:08	
14	29°48.2	22.0	144°27.3	12.3'	14°14.2	14.0'	57.4'	N 40°		22:55	23:22	08:10	09:19	
15	44°48.1	22.1	158°58.7	12.4'	14°00.2	14.1'	57.4'	35°		22:45	23:15	08:23	09:29	
16	59°48.0	22.2	173°30.1	12.4'	13°46.1	14.1'	57.4'	30°		22:35	23:08	08:34	09:37	
17	74°47.8	22.3	188°01.5	12.5'	13°31.9	14.2'	57.5'	20°		22:19	22:58	08:54	09:51	
18	89°47.7	N23°22.4	202°33.0	12.5'	S13°17.7	14.3'	57.5'	N 10°		22:05	22:48	09:10	10:03	
19	104°47.6	22.4	217°04.5	12.5'	13°03.3	14.4'	57.5'	0°	21:51	22:39	23:26	09:26	10:14	
20	119°47.4	22.5	231°36.1	12.6'	12°48.9	14.4'	57.5'	S 10°		21:38	22:30	23:21	09:41	
21	134°47.3	22.6	246°07.7	12.6'	12°34.5	14.5'	57.6'	20°		21:24	22:20	23:17	09:58	
22	149°47.2	22.7	260°39.3	12.6'	12°19.9	14.6'	57.6'	30°		21:07	22:09	23:11	10:16	
23	164°47.0	22.7	275°10.9	12.7'	12°05.3	14.6'	57.6'	35°		20:57	22:03	23:08	10:27	
	SD.=15.7	d=0.1			S.D.=15.6			40°		20:46	21:56	23:05	10:39	11:08
								45°		20:33	21:47	23:01	10:54	11:38
								S 50°		20:17	21:37	22:56	11:12	11:30
								52°		20:09	21:32	22:54	11:20	11:36
								54°		20:01	21:26	22:52	11:29	11:42
								56°		19:51	21:20	22:49	11:39	11:49
								58°		19:40	21:14	22:46	11:51	11:57
								S 60°		19:28	21:06	22:43	12:05	12:05

Day	Sun Eqn. of Time	Mer. Pass	Moon Mer. Pass.	Age
	00 ^h mm:ss	12 ^h mm:ss	Upper Mer. Pass. hh:mm	Lower Mer. Pass. hh:mm
15	00:27	00:33	12:01	03:14
16	00:40	00:46	12:01	04:03
17	00:52	00:59	12:01	04:50

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°46.9	N23°22.8	289°42.6	12.7'	S11°50.6	14.7'	57.6'
1	194°46.7	22.9	304°14.3	12.7'	11°35.9	14.8'	57.7'
2	209°46.6	22.9	318°46.1	12.8'	11°21.1	14.8'	57.7'
3	224°46.5	23.0	333°17.8	12.8'	11°06.2	14.9'	57.7'
4	239°46.3	23.1	347°49.6	12.8'	10°51.3	15.0'	57.7'
5	254°46.2	23.1	2°21.5	12.8'	10°36.3	15.0'	57.8'
6	269°46.1	N23°23.2	16°53.3	12.9'	S10°21.2	15.1'	57.8'
7	284°45.9	23.3	31°25.2	12.9'	10°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	314°45.7	23.4	60°29.0	12.9'	09°35.6	15.3'	57.9'
10	329°45.5	23.5	75°00.9	13.0'	09°20.3	15.3'	57.9'
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	15.4'	57.9'
13	14°45.1	23.7	118°36.9	13.0'	08°34.1	15.5'	58.0'
14	29°45.0	23.7	133°08.9	13.0'	08°18.6	15.5'	58.0'
15	44°44.8	23.8	147°40.9	13.0'	08°03.0	15.6'	58.0'
16	59°44.7	23.8	162°13.0	13.0'	07°47.4	15.6'	58.0'
17	74°44.6	23.9	176°45.0	13.1'	07°31.7	15.7'	58.1'
18	89°44.4	N23°24.0	191°17.1	13.1'	S07°16.0	15.7'	58.1'
19	104°44.3	24.0	205°49.1	13.1'	07°00.3	15.8'	58.1'
20	119°44.2	24.1	220°21.2	13.1'	06°44.4	15.8'	58.1'
21	134°44.0	24.1	234°53.3	13.1'	06°28.6	15.9'	58.2'
22	149°43.9	24.2	249°25.4	13.1'	06°12.7	15.9'	58.2'
23	164°43.8	24.2	263°57.5	13.1'	05°56.8	16.0'	58.2'
	SD.=15.7	d=0.1			S.D.=15.7		


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

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°34.5	29°13.7	
1	281°31.8	241°01.5	55.6	128°38.6	27.3	189°30.5	16.5	279°22.3	26.3	Ankaa	353°06.8	-42°09.8	
2	296°34.3	256°01.4	56.4	143°39.7	26.8	204°32.3	16.5	294°24.7	26.3	Schedar	349°30.8	56°40.4	
3	311°36.7	271°01.3	· · 57.2	158°40.9	· · 26.3	219°34.1	· · 16.5	309°27.0	· · 26.2	Diphda	348°46.9	-17°50.7	
4	326°39.2	286°01.2	57.9	173°42.0	25.7	234°36.0	16.5	324°29.4	26.2	Achernar	335°20.2	-57°06.2	
5	341°41.7	301°01.1	58.7	188°43.1	25.2	249°37.8	16.5	339°31.7	26.2	Hamal	327°51.0	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	Polaris	314°14.7	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	Akamar	315°11.8	-40°12.0	
8	26°49.0	346°00.8	01.0	233°46.5	23.6	294°43.4	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	300°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°39.6	16°33.6	
11	71°56.4	31°00.4	03.3	278°50.0	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°21.9	46°01.4	
13	102°01.4	61°00.2	04.8	308°52.2	20.9	9°52.6	16.5	99°50.7	25.9	Bellatrix	278°22.8	6°22.4	
14	117°03.8	76°00.1	05.6	323°53.4	20.4	24°54.4	16.5	114°53.0	25.9	Elnath	278°01.8	28°37.7	
15	132°06.3	91°00.0	· · 06.4	338°54.5	· · 19.9	39°56.3	· · 16.5	129°55.4	· · 25.9	Alnilam	275°37.7	-1°11.1	
16	147°08.8	105°59.9	07.1	353°55.6	19.4	54°58.1	16.4	144°57.8	25.8	Betelgeuse	270°52.0	7°24.7	
17	162°11.2	120°59.7	07.9	8°56.8	18.8	69°59.9	16.4	160°00.1	25.8	Canopus	263°52.8	-52°42.5	
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	Sirius	258°26.2	-16°44.9	
19	192°16.1	150°59.5	09.4	38°59.0	17.8	100°03.6	16.4	190°04.9	25.7	Adara	255°05.9	-29°00.4	
20	207°18.6	165°59.4	10.2	54°00.2	17.2	115°05.5	16.4	205°07.2	25.7	Procyon	244°50.7	5°09.7	
21	222°21.1	180°59.3	· · 11.0	69°01.3	· · 16.7	130°07.3	· · 16.4	220°09.6	· · 25.7	Pollux	243°17.1	27°58.0	
22	237°23.5	195°59.2	11.7	84°02.4	16.2	145°09.2	16.4	235°12.0	25.7	Avior	234°15.2	-50°35.6	
23	252°26.0	210°59.0	12.5	99°03.6	15.6	160°11.0	16.4	250°14.4	25.6	Suhail	222°46.4	-43°32.3	
Mer.pass.:06:13		v-0.1 d0.8 m-4.1		v1.1 d-0.5 m1.4		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.1		Miaplacidus	221°38.9	-69°49.5	
Thu		GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Alphard	217°47.6	-8°46.2
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	Regulus	207°34.2	11°50.6	
1	282°30.9	240°58.8	14.0	129°05.8	14.6	190°14.7	16.4	280°19.1	25.6	Dubhe	193°40.7	61°37.1	
2	297°33.4	255°58.7	14.8	144°07.0	14.0	205°16.5	16.4	295°21.5	25.5	Denebola	182°24.5	14°25.9	
3	312°35.9	270°58.6	· · 15.6	159°08.1	· · 13.5	220°18.4	· · 16.4	310°23.8	· · 25.5	Gienah	175°43.1	-17°41.1	
4	327°38.3	285°58.4	16.3	174°09.2	13.0	235°20.2	16.4	325°26.2	25.5	Acrux	172°59.6	-63°14.7	
5	342°40.8	300°58.3	17.1	189°10.4	12.4	250°22.1	16.4	340°28.6	25.5	Gacrux	171°51.2	-57°15.6	
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	Alioth	166°12.5	55°49.5	
7	12°45.7	330°58.1	18.6	219°12.6	11.4	280°25.7	16.4	10°33.3	25.4	Spica	158°21.8	-11°17.7	
8	27°48.2	345°57.9	19.4	234°13.8	10.8	295°27.6	16.4	25°35.7	25.4	Alkaid	152°51.4	49°11.4	
9	42°50.6	0°57.8	· · 20.2	249°14.9	· · 10.3	310°29.4	· · 16.4	40°38.0	· · 25.3	Hadar	148°35.1	-60°30.0	
10	57°53.1	15°57.7	20.9	264°16.0	09.8	325°31.3	16.4	55°40.4	25.3	Menkent	147°57.0	-36°29.9	
11	72°55.6	30°57.6	21.7	279°17.2	09.2	340°33.1	16.4	70°42.8	25.3	Arcturus	145°47.2	19°03.3	
12	87°58.0	45°57.4	N13°22.5	294°18.3	N12°08.7	355°35.0	N23°16.4	85°45.1	S01°25.3	Rigel Kent.	139°39.3	-60°56.7	
13	103°00.5	60°57.3	23.2	309°19.4	08.1	10°36.8	16.3	100°47.5	25.2	Kochab	137°18.9	74°03.2	
14	118°03.0	75°57.2	24.0	324°20.6	07.6	25°38.6	16.3	115°49.9	25.2	Zuben'ubi	136°55.4	-16°08.9	
15	133°05.4	90°57.0	· · 24.7	339°21.7	· · 07.1	40°40.5	· · 16.3	130°52.3	· · 25.2	Alphecca	126°03.1	26°37.8	
16	148°07.9	105°56.9	25.5	354°22.8	06.5	55°42.3	16.3	145°54.6	25.1	Antares	112°15.0	-26°29.4	
17	163°10.4	120°56.8	26.3	9°24.0	06.0	70°44.2	16.3	160°57.0	25.1	Atria	107°08.4	-69°04.5	
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	Sabik	102°02.0	-15°45.4	
19	193°15.3	150°56.5	27.8	39°26.2	04.9	100°47.9	16.3	191°01.7	25.1	Shaula	96°09.5	-37°07.3	
20	208°17.8	165°56.4	28.6	54°27.4	04.4	115°49.7	16.3	206°04.1	25.0	Rasalhague	95°57.9	12°32.5	
21	223°20.2	180°56.3	· · 29.3	69°28.5	· · 03.9	130°51.5	· · 16.3	221°06.5	· · 25.0	Eltanin	90°41.5	51°29.1	
22	238°22.7	195°56.1	30.1	84°29.6	03.3	145°53.4	16.3	236°08.9	25.0	Kaus Aust.	83°31.6	-34°22.3	
23	253°25.1	210°56.0	30.8	99°30.8	02.8	160°55.2	16.3	251°11.2	24.9	Vega	80°32.6	38°48.3	
Mer.pass.:06:09		v-0.1 d0.8 m-4.1		v1.1 d-0.5 m1.4		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.0		Nunki	75°46.9	-26°15.9	
Fri		GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Altair	61°59.4	8°56.0
0	268°27.6	225°55.9	N13°31.6	114°31.9	N12°02.3	175°57.1	N23°16.3	266°13.6	S01°24.9	Peacock	53°04.6	-56°39.0	
1	283°30.1	240°55.7	32.4	129°33.0	01.7	190°58.9	16.3	281°16.0	24.9	Deneb	49°25.2	45°22.1	
2	298°32.5	255°55.6	33.1	144°34.2	01.2	206°00.8	16.3	296°18.3	24.9	Enif	33°38.3	9°59.4	
3	313°35.0	270°55.4	· · 33.9	159°35.3	· · 00.6	221°02.6	· · 16.3	311°20.7	· · 24.8	Al Na'ir	27°32.3	-46°50.0	
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	Fomalhaut	15°14.1	-29°29.1	
5	343°39.9	300°55.2	35.4	189°37.6	11°59.6	251°06.3	16.3	341°25.5	24.8	Scheat	13°44.8	28°13.1	
6	358°42.4	315°55.0	N13°36.2	204°38.7	N11°59.0	266°08.1	N23°16.2	356°27.8	S01°24.7	Markab	13°29.5	15°20.4	
7	13°44.9	330°54.9	36.9	219°39.8	58.5	281°10.0	16.2	11°30.2	24.7	Jun 18 Wed		SHA	Mer.pass
8	28°47.3	345°54.8	37.7	234°40.9	58.0	296°11.8	16.2	26°32.6	24.7	Venus	319°32.3	08:56	
9	43°49.8	0°54.6	· · 38.4	249°42.1	· · 57.4	311°13.7	· · 16.2	41°35.0	· · 24.7	Mars	207°08.1	16:24	
10	58°52.2	15°54.5	39.2	264°43.2	56.9	326°15.5	16.2	56°37.3	24.6	Jupiter	267°59.3	12:21	
11	73°54.7	30°54.3	40.0	279°44.3	56.3	341°17.3	16.2	71°39.7	24.6	Saturn	357°50.6	06:22	
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	Jun 19 Thu		SHA	Mer.pass
13	103°59.6	60°54.0	41.5	309°46.6	55.3	11°21.0	16.2	101°44.4	24.6	Venus	318°30.4	08:56	
14	119°02.1	75°53.9	42.2	324°47.7	54.7	26°22.9	16.2	116°46.8	24.5	Mars	206°36.2	16:22	
15	134°04.6	90°53.8	· · 43.0	339°48.9	· · 54.2	41°24.7	· · 16.2	131°49.2	· · 24.5	Jupiter	267°44.4	12:18	
16	149°07.0	105°53.6	43.8	354°50.0	53.7	56°26.6	16.2	146°51.6	24.5	Saturn	357°48.2	06:18	
17	164°09.5	120°53.5	44.5	9°51.1	53.1	71°28.4	16.2	161°53.9	24.4	Jun 20 Fri		SHA	Mer.pass
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	Venus	317°28.2	08:56	
19	194°14.4	150°53.2	46.0	39°53.4	52.0	101°32.1	16.2	191°58.7	24.4	Mars	206°04.3	16:21	
20	209°16.9	165°53.0	46.8	54°54.5	51.5	116°33.9	16.2	207°01.1	24.4	Jupiter	267°29.5	12:15	
21	224°19.4	180°52.9	· · 47.5	69°55.7	· · 51.0	131°35.8	· · 16.1	222°03.4	· · 24.3	Saturn	357°46.0	06:14	
22	239°21.8	195°52.7	48.3	84°56.8	50.4	146°37.6	16.1	237°05.8	24.3	Horizontal parallax			
23	254°24.3	210°52.6	49.0	99°57.9	49.9	161°39.5	16.1	252°08.2	24.3	Venus:		0.2	
Mer.pass.:06:05		v-0.1 d0.8 m-4.1		v1.1 d-0.5 m1.4		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.0		Mars:		0.1	

h		Sun		Moon											
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight		
									Naut.	Civil			Civil	Naut.	
0	179°43.6	N23°24.3	278°29.6	13.1'	S05°40.8	16.0'	58.2'								
1	194°43.5	24.3	293°01.8	13.1'	05°24.8	16.0'	58.3'	N 72°							
2	209°43.4	24.4	307°33.9	13.1'	05°08.7	16.1'	58.3'	N 70°							
3	224°43.2	24.4	322°06.0	13.1'	04°52.6	16.1'	58.3'	68°							
4	239°43.1	24.5	336°38.1	13.1'	04°36.5	16.2'	58.3'	66°							
5	254°42.9	24.6	351°10.2	13.1'	04°20.3	16.2'	58.4'	64°			01:31	22:32			
6	269°42.8	N23°24.6	5°42.3	13.1'	S04°04.1	16.2'	58.4'	62°			02:09	21:54			
7	284°42.7	24.6	20°14.4	13.1'	03°47.9	16.2'	58.4'	60°		00:49	02:36	21:27	23:14		
8	299°42.5	24.7	34°46.5	13.1'	03°31.6	16.3'	58.4'	N 58°		01:40	02:56	21:07	22:23		
9	314°42.4	24.7	49°18.6	13.1'	03°15.3	16.3'	58.5'	56°		02:10	03:13	20:50	21:53		
10	329°42.3	24.8	63°50.7	13.1'	02°59.0	16.3'	58.5'	54°	00:45	02:33	03:27	20:36	21:30	23:18	
11	344°42.1	24.8	78°22.7	13.1'	02°42.6	16.4'	58.5'	52°	01:32	02:51	03:40	20:23	21:12	22:31	
12	359°42.0	N23°24.9	92°54.8	13.0'	S02°26.2	16.4'	58.5'	50°	02:00	03:06	03:50	20:12	20:57	22:03	
13	14°41.9	24.9	107°26.8	13.0'	02°09.8	16.4'	58.6'	45°	02:46	03:35	04:13	19:50	20:27	21:17	
14	29°41.7	25.0	121°58.9	13.0'	01°53.4	16.4'	58.6'	N 40°		03:16	03:58	04:31	19:32	20:05	20:47
15	44°41.6	25.0	136°30.9	13.0'	01°37.0	16.5'	58.6'	35°		03:40	04:16	04:46	19:17	19:47	20:23
16	59°41.4	25.1	151°02.9	13.0'	01°20.5	16.5'	58.6'	30°		03:58	04:32	04:59	19:04	19:31	20:05
17	74°41.3	25.1	165°34.8	13.0'	01°04.0	16.5'	58.7'	20°		04:27	04:57	05:21	18:42	19:06	19:36
18	89°41.2	N23°25.1	180°06.8	12.9'	S00°47.5	16.5'	58.7'	N 10°		04:50	05:17	05:40	18:23	18:46	19:13
19	104°41.0	25.2	194°38.7	12.9'	00°31.0	16.5'	58.7'	0°	05:09	05:35	05:58	18:05	18:28	18:54	
20	119°40.9	25.2	209°10.6	12.9'	S00°14.4	16.6'	58.7'	S 10°		05:26	05:52	06:15	17:48	18:10	18:37
21	134°40.8	25.3	223°42.5	12.9'	N00°02.1	16.6'	58.8'	20°		05:42	06:10	06:34	17:29	17:53	18:21
22	149°40.6	25.3	238°14.4	12.8'	00°18.7	16.6'	58.8'	30°		05:59	06:29	06:55	17:08	17:34	18:04
23	164°40.5	25.3	252°46.2	12.8'	00°35.3	16.6'	58.8'	35°		06:08	06:39	07:07	16:55	17:24	17:55
	SD.=15.7	d=0.1			S.D.=15.9			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
0	179°40.4	N23°25.4	267°18.0	12.8'	N00°51.9	16.6'	58.8'	S 50°		06:39	07:21	07:59	16:04	16:42	17:24
1	194°40.2	25.4	281°49.8	12.8'	01°08.5	16.6'	58.9'	52°		06:44	07:28	08:09	15:54	16:35	17:18
2	209°40.1	25.4	296°21.6	12.7'	01°25.1	16.6'	58.9'	54°		06:50	07:36	08:20	15:43	16:26	17:13
3	224°39.9	25.5	310°53.3	12.7'	01°41.7	16.6'	58.9'	56°		06:56	07:45	08:33	15:30	16:17	17:07
4	239°39.8	25.5	325°24.9	12.7'	01°58.4	16.6'	58.9'	58°		07:03	07:56	08:48	15:15	16:07	17:00
5	254°39.7	25.5	339°56.6	12.6'	02°15.0	16.6'	59.0'	S 60°		07:11	08:07	09:05	14:57	15:55	16:52
6	269°39.5	N23°25.6	354°28.2	12.6'	N02°31.6	16.6'	59.0'								
7	284°39.4	25.6	8°59.7	12.5'	02°48.3	16.6'	59.0'	Lat.	Moonrise		Moonset				
8	299°39.3	25.6	23°31.3	12.5'	03°04.9	16.6'	59.0'	Wed	Thu	Fri	Wed	Thu	Fri		
9	314°39.1	25.7	38°02.8	12.5'	03°21.6	16.6'	59.1'	N 72°	00:38	00:02	22:34	11:12	13:32	16:07	
10	329°39.0	25.7	52°34.2	12.4'	03°38.2	16.6'	59.1'	N 70°	00:31	00:03	22:59	11:16	13:25	15:45	
11	344°38.8	25.7	67°05.6	12.4'	03°54.8	16.6'	59.1'	68°	00:24	00:04	23:17	11:20	13:20	15:29	
12	359°38.7	N23°25.8	81°36.9	12.3'	N04°11.4	16.6'	59.1'	66°	00:19	00:04	23:33	11:22	13:16	15:15	
13	14°38.6	25.8	96°08.2	12.3'	04°28.1	16.6'	59.1'	64°	00:14	00:05	23:45	11:25	13:12	15:04	
14	29°38.4	25.8	110°39.5	12.2'	04°44.7	16.6'	59.2'	62°	00:10	00:05	00:01	11:27	13:09	14:55	
15	44°38.3	25.8	125°10.7	12.2'	05°01.3	16.6'	59.2'	60°	00:07	00:06	00:05	11:28	13:06	14:47	
16	59°38.2	25.9	139°41.8	12.1'	05°17.8	16.6'	59.2'	N 58°	00:04	00:06	00:09	11:30	13:03	14:40	
17	74°38.0	25.9	154°12.9	12.1'	05°34.4	16.6'	59.2'	56°	00:01	00:07	00:13	11:31	13:01	14:34	
18	89°37.9	N23°25.9	168°44.0	12.0'	N05°51.0	16.6'	59.3'	54°	--	00:07	00:16	11:32	12:59	14:29	
19	104°37.8	25.9	183°15.0	12.0'	06°07.5	16.5'	59.3'	52°	--	00:07	00:19	11:33	12:57	14:24	
20	119°37.6	26.0	197°45.9	11.9'	06°24.0	16.5'	59.3'	50°	--	00:08	00:22	11:34	12:56	14:20	
21	134°37.5	26.0	212°16.8	11.8'	06°40.5	16.5'	59.3'	45°	--	00:08	00:28	11:37	12:52	14:10	
22	149°37.3	26.0	226°47.6	11.8'	06°57.0	16.5'	59.4'	N 40°	--	00:09	00:33	11:38	12:49	14:02	
23	164°37.2	26.0	241°18.3	11.7'	07°13.5	16.5'	59.4'	35°	--	00:09	00:37	11:40	12:47	13:56	
	SD.=15.7	d=0.0			S.D.=16.1			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	
								S 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	
								S 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	
								S 60°	--	00:19	01:59	12:04	12:03	12:02	
								Day	Sun		Moon		Age		
									Eqn.of Time	Mer.	Mer.Pass.		22-24		
									00 ^h	Pass	Upper	Lower	54-31%		
									mm:ss	hh:mm	hh:mm	hh:mm			
								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 (Sat., Sun., Mon.)

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°34.4	29°13.7
1	284°29.2	240°52.3	50.6	130°00.2	48.8	191°43.1	16.1	282°12.9	24.2	Ankaa	353°06.8	-42°09.8
2	299°31.7	255°52.1	51.3	145°01.3	48.3	206°45.0	16.1	297°15.3	24.2	Schedar	349°30.8	56°40.4
3	314°34.1	270°52.0	· · 52.1	160°02.4	· · 47.7	221°46.8	· · 16.1	312°17.7	· · 24.2	Diphda	348°46.9	-17°50.7
4	329°36.6	285°51.8	52.8	175°03.6	47.2	236°48.7	16.1	327°20.1	24.2	Achernar	335°20.2	-57°06.1
5	344°39.1	300°51.7	53.6	190°04.7	46.6	251°50.5	16.1	342°22.4	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°52.4	N23°16.1	357°24.8	S01°24.1	Polaris	314°13.4	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	Akamars	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°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°11.5	43.4	342°01.6	16.1	72°36.7	24.0	Rigel	281°03.8	-8°10.3
12	89°56.3	45°50.6	N13°58.9	295°12.6	N11°42.8	357°03.4	N23°16.0	87°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°05.3	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°07.1	16.0	117°43.8	23.9	Elnath	278°01.8	28°37.7
15	135°03.7	90°50.1	· · 01.1	340°16.0	· · 41.2	42°08.9	· · 16.0	132°46.2	· · 23.9	Alnilam	275°37.7	-1°11.1
16	150°06.2	105°49.9	01.9	355°17.1	40.7	57°10.8	16.0	147°48.6	23.8	Betelgeuse	270°52.0	7°24.7
17	165°08.6	120°49.8	02.6	10°18.3	40.1	72°12.6	16.0	162°51.0	23.8	Canopus	263°52.8	-52°42.5
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	Sirius	258°26.2	-16°44.9
19	195°13.6	150°49.5	04.1	40°20.5	39.1	102°16.3	16.0	192°55.7	23.8	Adara	255°05.9	-29°00.4
20	210°16.0	165°49.3	04.9	55°21.6	38.5	117°18.1	16.0	207°58.1	23.7	Procyon	244°50.7	5°09.8
21	225°18.5	180°49.1	· · 05.6	70°22.8	· · 38.0	132°20.0	· · 16.0	223°00.5	· · 23.7	Pollux	243°17.1	27°58.0
22	240°21.0	195°49.0	06.4	85°23.9	37.4	147°21.8	16.0	238°02.9	23.7	Avior	234°15.2	-50°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.pass.:06:01		v-0.2 d0.8 m-4.1		v1.1 d-0.5 m1.4		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.0		Miaplacidus	221°38.9	-69°49.5
										Alphard	217°47.6	-8°46.2
										Regulus	207°34.2	11°50.6
										Dubhe	193°40.7	61°37.1
										Denebola	182°24.5	14°25.9
										Gienah	175°43.2	-17°41.1
										Acrux	172°59.6	-63°14.7
										Gacrux	171°51.2	-57°15.6
										Alioth	166°12.5	55°49.5
										Spica	158°21.8	-11°17.7
										Alkaid	152°51.5	49°11.4
										Hadar	148°35.1	-60°30.0
										Menkent	147°57.0	-36°29.9
										Arcturus	145°47.2	19°03.3
										Rigel Kent.	139°39.4	-60°56.7
										Kochab	137°18.9	74°03.2
										Zuben'ubi	136°55.4	-16°08.9
										Alphecca	126°03.1	26°37.8
										Antares	112°15.0	-26°29.4
										Atria	107°08.4	-69°04.5
										Sabik	102°02.0	-15°45.4
										Shaula	96°09.4	-37°07.3
										Rasalhague	95°57.9	12°32.5
										Eltanin	90°41.4	51°29.1
										Kaus Aust.	83°31.6	-34°22.3
										Vega	80°32.6	38°48.3
										Nunki	75°46.9	-26°15.9
										Altair	61°59.4	8°56.0
										Peacock	53°04.6	-56°39.0
										Deneb	49°25.2	45°22.1
										Enif	33°38.3	9°59.5
										Al Na'ir	27°32.2	-46°50.0
										Fomalhaut	15°14.1	-29°29.0
										Scheat	13°44.8	28°13.1
										Markab	13°29.5	15°20.5
										Jun 21 Sat	SHA	Mer.pass
										Venus	316°25.7	08:57
										Mars	205°32.3	16:19
										Jupiter	267°14.6	12:12
										Saturn	357°43.8	06:10
										Jun 22 Sun	SHA	Mer.pass
										Venus	315°22.8	08:57
										Mars	205°00.3	16:17
										Jupiter	266°59.6	12:09
										Saturn	357°41.7	06:07
										Jun 23 Mon	SHA	Mer.pass
										Venus	314°19.5	08:57
										Mars	204°28.2	16:15
										Jupiter	266°44.7	12:06
										Saturn	357°39.7	06:03
										Horizontal parallax		
										Venus:		0.2
										Mars:		0.1
Mer.pass.:05:53		v-0.2 d0.7 m-4.1		v1.1 d-0.5 m1.4		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.0				

h		Sun						Moon						Twilight					
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight						
									Naut.	Civil			Civil	Naut.					
0	179°33.8	N23°26.3	243°42.9	9.7'	N13°53.0	15.3'	59.9'	N 72°	☐	☐	☐	☐	☐	☐					
1	194°33.6	26.3	258°11.5	9.6'	14°08.2	15.3'	59.9'	N 70°	☐	☐	☐	☐	☐	☐					
2	209°33.5	26.3	272°40.1	9.5'	14°23.5	15.2'	59.9'	68°	☐	☐	☐	☐	☐	☐					
3	224°33.4	•• 26.3	287°08.5	9.4'	14°38.6	15.1'	59.9'	66°	☐	☐	☐	☐	☐	☐					
4	239°33.2	26.3	301°36.9	9.3'	14°53.7	15.0'	59.9'	64°	☐	☐	☐	☐	☐	☐					
5	254°33.1	26.3	316°05.2	9.2'	15°08.7	15.0'	60.0'	62°	☐	☐	01:32	22:32	☐	☐					
6	269°33.0	N23°26.3	330°33.3	9.1'	N15°23.6	14.9'	60.0'	60°	☐	☐	02:10	21:54	☐	☐					
7	284°32.8	26.3	345°01.4	9.0'	15°38.5	14.8'	60.0'	58°	☐	00:50	02:36	21:28	23:14	☐					
8	299°32.7	26.3	359°29.3	8.9'	15°53.2	14.7'	60.0'	56°	☐	01:41	02:57	21:07	22:23	☐					
9	314°32.5	•• 26.3	13°57.2	8.8'	16°07.9	14.6'	60.0'	54°	☐	02:11	03:13	20:51	21:53	☐					
10	329°32.4	26.3	28°24.9	8.7'	16°22.5	14.6'	60.0'	52°	00:45	02:33	03:28	20:36	21:31	23:18					
11	344°32.3	26.3	42°52.6	8.6'	16°37.0	14.5'	60.1'	50°	01:33	02:51	03:40	20:24	21:13	22:31					
12	359°32.1	N23°26.3	57°20.1	8.5'	N16°51.4	14.4'	60.1'	48°	02:01	03:06	03:51	20:13	20:58	22:03					
13	14°32.0	26.3	71°47.5	8.4'	17°05.7	14.3'	60.1'	46°	02:46	03:36	04:14	19:51	20:28	21:18					
14	29°31.9	26.3	86°14.9	8.3'	17°20.0	14.2'	60.1'	N 40°	03:17	03:59	04:32	19:33	20:05	20:47					
15	44°31.7	•• 26.2	100°42.1	8.2'	17°34.1	14.1'	60.1'	35°	03:40	04:17	04:47	19:17	19:47	20:24					
16	59°31.6	26.2	115°09.2	8.0'	17°48.2	14.0'	60.1'	30°	03:59	04:32	05:00	19:04	19:32	20:05					
17	74°31.5	26.2	129°36.2	7.9'	18°02.1	13.9'	60.1'	20°	04:28	04:57	05:22	18:42	19:07	19:36					
18	89°31.3	N23°26.2	144°03.0	7.8'	N18°15.9	13.8'	60.1'	N 10°	04:51	05:18	05:41	18:23	18:46	19:14					
19	104°31.2	26.2	158°29.8	7.7'	18°29.7	13.7'	60.2'	0°	05:10	05:36	05:58	18:06	18:28	18:55					
20	119°31.0	26.2	172°56.5	7.6'	18°43.3	13.6'	60.2'	S 10°	05:27	05:53	06:16	17:48	18:11	18:37					
21	134°30.9	•• 26.2	187°23.0	7.5'	18°56.8	13.5'	60.2'	20°	05:43	06:10	06:34	17:30	17:54	18:21					
22	149°30.8	26.2	201°49.4	7.4'	19°10.2	13.4'	60.2'	30°	05:59	06:29	06:56	17:08	17:35	18:05					
23	164°30.6	26.2	216°15.7	7.3'	19°23.5	13.2'	60.2'	35°	06:08	06:40	07:08	16:56	17:24	17:56					
	SD.=15.7	d=0.0			S.D.=16.3			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					
Sun	GHA	Dec	GHA	ν	Dec	d	HP	S 50°	06:40	07:21	08:00	16:04	16:43	17:24					
0	179°30.5	N23°26.1	230°41.9	7.1'	N19°36.7	13.1'	60.2'	52°	06:45	07:29	08:10	15:54	16:35	17:19					
1	194°30.4	26.1	245°08.0	7.0'	19°49.8	13.0'	60.2'	54°	06:51	07:37	08:21	15:43	16:27	17:13					
2	209°30.2	26.1	259°34.0	6.9'	20°02.8	12.9'	60.2'	56°	06:57	07:46	08:34	15:30	16:18	17:07					
3	224°30.1	•• 26.1	273°59.9	6.8'	20°15.6	12.8'	60.2'	58°	07:04	07:56	08:48	15:16	16:08	17:00					
4	239°29.9	26.1	288°25.6	6.7'	20°28.3	12.6'	60.3'	S 60°	07:11	08:08	09:06	14:58	15:56	16:53					
5	254°29.8	26.1	302°51.2	6.6'	20°40.9	12.5'	60.3'												
6	269°29.7	N23°26.0	317°16.7	6.5'	N20°53.3	12.4'	60.3'	Lat.	Moonrise		Moonset								
7	284°29.5	26.0	331°42.1	6.3'	21°05.7	12.3'	60.3'	Sat	Sun	Mon	Sat	Sun	Mon						
8	299°29.4	26.0	346°07.4	6.2'	21°17.9	12.1'	60.3'	N 72°	☐	☐	☐	☐	☐	☐					
9	314°29.3	•• 26.0	0°32.6	6.1'	21°29.9	12.0'	60.3'	N 70°	21:49	☐	☐	18:46	☐	☐					
10	329°29.1	25.9	14°57.6	6.0'	21°41.9	11.9'	60.3'	68°	22:37	☐	☐	18:00	☐	☐					
11	344°29.0	25.9	29°22.6	5.9'	21°53.7	11.7'	60.3'	66°	23:08	22:04	☐	17:30	20:35	☐					
12	359°28.9	N23°25.9	43°47.4	5.8'	N22°05.3	11.6'	60.3'	64°	23:32	23:10	☐	17:08	19:31	☐					
13	14°28.7	25.9	58°12.1	5.7'	22°16.8	11.4'	60.3'	62°	23:51	23:45	23:37	16:50	18:56	21:16					
14	29°28.6	25.9	72°36.7	5.5'	22°28.2	11.3'	60.3'	60°	00:05	00:07	00:11	16:36	18:31	20:28					
15	44°28.4	•• 25.8	87°01.2	5.4'	22°39.4	11.2'	60.3'	N 58°	00:13	00:20	00:32	16:23	18:11	19:58					
16	59°28.3	25.8	101°25.5	5.3'	22°50.5	11.0'	60.3'	56°	00:21	00:31	00:49	16:13	17:55	19:35					
17	74°28.2	25.8	115°49.8	5.2'	23°01.5	10.9'	60.3'	54°	00:27	00:42	01:03	16:03	17:41	19:16					
18	89°28.0	N23°25.7	130°14.0	5.1'	N23°12.2	10.7'	60.4'	52°	00:33	00:51	01:16	15:55	17:29	19:00					
19	104°27.9	25.7	144°38.0	5.0'	23°22.9	10.5'	60.4'	50°	00:38	00:59	01:27	15:48	17:18	18:47					
20	119°27.8	25.7	159°01.9	4.9'	23°33.3	10.4'	60.4'	45°	00:50	01:16	01:51	15:32	16:56	18:19					
21	134°27.6	•• 25.7	173°25.7	4.8'	23°43.6	10.2'	60.4'	N 40°	00:59	01:31	02:10	15:19	16:38	17:57					
22	149°27.5	25.6	187°49.4	4.7'	23°53.8	10.1'	60.4'	35°	01:08	01:43	02:26	15:08	16:23	17:39					
23	164°27.4	25.6	202°13.0	4.6'	24°03.8	9.9'	60.4'	30°	01:15	01:54	02:39	14:58	16:10	17:23					
	SD.=15.7	d=0.0			S.D.=16.4			20°	01:28	02:12	03:03	14:42	15:48	16:57					
Mon	GHA	Dec	GHA	ν	Dec	d	HP	N 10°	01:39	02:29	03:24	14:28	15:29	16:34					
0	179°27.2	N23°25.6	216°36.5	4.4'	N24°13.6	9.7'	60.4'	0°	01:50	02:44	03:43	14:15	15:12	16:13					
1	194°27.1	25.5	230°59.9	4.3'	24°23.3	9.6'	60.4'	S 10°	02:00	03:00	04:03	14:02	14:54	15:52					
2	209°26.9	25.5	245°23.2	4.2'	24°32.8	9.4'	60.4'	20°	02:12	03:16	04:24	13:48	14:35	15:30					
3	224°26.8	•• 25.5	259°46.4	4.1'	24°42.1	9.2'	60.4'	30°	02:25	03:36	04:49	13:32	14:14	15:04					
4	239°26.7	25.4	274°09.5	4.0'	24°51.3	9.1'	60.4'	35°	02:33	03:47	05:03	13:23	14:01	14:48					
5	254°26.5	25.4	288°32.5	3.9'	25°00.3	8.9'	60.4'	40°	02:42	04:00	05:20	13:12	13:47	14:31					
6	269°26.4	N23°25.4	302°55.4	3.8'	N25°09.1	8.7'	60.4'	45°	02:53	04:16	05:40	13:00	13:30	14:09					
7	284°26.3	25.3	317°18.2	3.7'	25°17.7	8.5'	60.4'	S 50°	03:05	04:35	06:06	12:46	13:09	13:43					
8	299°26.1	25.3	331°40.9	3.7'	25°26.2	8.4'	60.4'	52°	03:11	04:44	06:19	12:39	12:59	13:30					
9	314°26.0	•• 25.2	346°03.5	3.6'	25°34.5	8.2'	60.4'	54°	03:18	04:55	06:33	12:31	12:48	13:15					
10	329°25.9	25.2	0°26.0	3.5'	25°42.6	8.0'	60.4'	56°	03:25	05:07	06:50	12:23	12:36	12:58					
11	344°25.7	25.2	14°48.4	3.4'	25°50.5	7.8'	60.4'	58°	03:34	05:20	07:10	12:13	12:21	12:37					
12	359°25.6	N23°25.1	29°10.8	3.3'	N25°58.2	7.6'	60.4'	S 60°	03:44	05:36	07:36	12:02	12:04	12:11					
13	14°25.5	25.1	43°33.0	3.2'	26°05.8	7.5'	60.4'												
14	29°25.3	25.0	57°55.2	3.1'	26°13.1	7.3'	60.4'	Day	Sun		Moon		Age						
15	44°25.2	•• 25.0	72°17.3	3.0'	26°20.3	7.1'	60.4'		Eqn.of Time	Mer.	Mer.Pass.		25-27						
16	59°25.0	25.0	86°39.3	3.0'	26°27.3	6.9'	60.3'	21	00 ^h	12 ^h	Pass	Upper	Lower	21-6%					
17	74°24.9	24.9	101°01.2	2.9'	26°34.1	6.7'	60.3'	22	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm						
18	89°24.8	N23°24.9	115°23.1	2.8'	N26°40.7	6.5'	60.3'	23											
19	104°24.6	24.8	129°44.9	2.8'	26°47.1	6.3'	60.3'		01:45	01:51	12:02	08:02	20:29						
20	119°24.5	24.8	144°06.6	2.7'	26°53.3	6.1'	60.3'		01:58	02:05	12:02	08:58	21:27						
21	134°24.4	•• 24.7	158°28.2	2.6'	26°59.3	5.9'	60.3'		02:11	02:18	12:02	09:58	22:30						
22	149°24.2	24.7	172°49.8	2.6'	27°05.1	5.7'	60.3'												
23	164°24.1	24.6	187°11.3	2.5'	27°10.7	5.5'	60.3'												
	SD.=15.7	d=0.0			S.D.=16.5														

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

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	272°24.2	225°40.0	N14°43.5	116°20.3	N11°10.1	178°54.0	N23°15.5	270°02.0	S01°22.5	Alpheratz	357°34.4	29°13.7
1	287°26.6	240°39.8	44.3	131°21.4	09.5	193°55.8	15.5	285°04.4	22.5	Ankaa	353°06.8	-42°09.8
2	302°29.1	255°39.6	45.0	146°22.5	09.0	208°57.6	15.5	300°06.8	22.5	Schedar	349°30.7	56°40.4
3	317°31.6	270°39.4	· · 45.7	161°23.7	· · 08.4	223°59.5	· · 15.5	315°09.2	· · 22.5	Diphda	348°46.9	-17°50.7
4	332°34.0	285°39.2	46.5	176°24.8	07.9	239°01.3	15.5	330°11.5	22.5	Achernar	335°20.1	-57°06.1
5	347°36.5	300°39.0	47.2	191°25.9	07.3	254°03.2	15.5	345°13.9	22.4	Hamal	327°51.0	23°34.9
6	2°39.0	315°38.8	N14°47.9	206°27.0	N11°06.8	269°05.0	N23°15.5	0°16.3	S01°22.4	Polaris	314°11.8	89°22.0
7	17°41.4	330°38.6	48.7	221°28.2	06.2	284°06.9	15.5	15°18.7	22.4	Akamar	315°11.8	-40°11.9
8	32°43.9	345°38.4	49.4	236°29.3	05.7	299°08.7	15.4	30°21.1	22.4	Menkar	314°06.0	4°11.4
9	47°46.3	0°38.2	· · 50.1	251°30.4	· · 05.1	314°10.5	· · 15.4	45°23.5	· · 22.3	Mirfak	308°28.1	49°56.9
10	62°48.8	15°38.0	50.9	266°31.5	04.6	329°12.4	15.4	60°25.9	22.3	Aldebaran	290°39.5	16°33.6
11	77°51.3	30°37.8	51.6	281°32.7	04.0	344°14.2	15.4	75°28.3	22.3	Rigel	281°03.8	-8°10.3
12	92°53.7	45°37.6	N14°52.3	296°33.8	N11°03.5	359°16.1	N23°15.4	90°30.7	S01°22.3	Capella	280°21.8	46°01.4
13	107°56.2	60°37.4	53.1	311°34.9	02.9	14°17.9	15.4	105°33.0	22.3	Bellatrix	278°22.8	6°22.4
14	122°58.7	75°37.2	53.8	326°36.0	02.4	29°19.8	15.4	120°35.4	22.2	Elnath	278°01.8	28°37.7
15	138°01.1	90°37.0	· · 54.5	341°37.2	· · 01.8	44°21.6	· · 15.4	135°37.8	· · 22.2	Alnilam	275°37.7	-1°11.1
16	153°03.6	105°36.8	55.3	356°38.3	01.3	59°23.4	15.4	150°40.2	22.2	Betelgeuse	270°52.0	7°24.7
17	168°06.1	120°36.6	56.0	11°39.4	00.7	74°25.3	15.3	165°42.6	22.2	Canopus	263°52.8	-52°42.5
18	183°08.5	135°36.4	N14°56.7	26°40.5	N11°00.2	89°27.1	N23°15.3	180°45.0	S01°22.2	Sirius	258°26.2	-16°44.9
19	198°11.0	150°36.2	57.5	41°41.7	10°59.6	104°29.0	15.3	195°47.4	22.1	Adara	255°05.9	-29°00.4
20	213°13.5	165°36.0	58.2	56°42.8	59.1	119°30.8	15.3	210°49.8	22.1	Procyon	244°50.7	5°09.8
21	228°15.9	180°35.8	· · 58.9	71°43.9	· · 58.5	134°32.7	· · 15.3	225°52.2	· · 22.1	Pollux	243°17.1	27°58.0
22	243°18.4	195°35.6	14°59.6	86°45.0	58.0	149°34.5	15.3	240°54.5	22.1	Avior	234°15.2	-50°35.6
23	258°20.8	210°35.4	15°00.4	101°46.2	57.4	164°36.3	15.3	255°56.9	22.1	Suhail	222°46.4	-43°32.3
Mer.pass.:05:49		v-0.2 d0.7 m-4.1		v1.1 d-0.6 m1.4		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.0		Miaplacidus	221°39.0	-69°49.5
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	273°23.3	225°35.2	N15°01.1	116°47.3	N10°56.8	179°38.2	N23°15.3	270°59.3	S01°22.0	Alphard	217°47.6	-8°46.2
1	288°25.8	240°34.9	01.8	131°48.4	56.3	194°40.0	15.3	286°01.7	22.0	Regulus	207°34.2	11°50.6
2	303°28.2	255°34.7	02.6	146°49.5	55.7	209°41.9	15.3	301°04.1	22.0	Dubhe	193°40.7	61°37.1
3	318°30.7	270°34.5	· · 03.3	161°50.7	· · 55.2	224°43.7	· · 15.2	316°06.5	· · 22.0	Denebola	182°24.5	14°25.9
4	333°33.2	285°34.3	04.0	176°51.8	54.6	239°45.6	15.2	331°08.9	22.0	Gienah	175°43.2	-17°41.1
5	348°35.6	300°34.1	04.7	191°52.9	54.1	254°47.4	15.2	346°11.3	21.9	Acrux	172°59.6	-63°14.7
6	3°38.1	315°33.9	N15°05.5	206°54.0	N10°53.5	269°49.2	N23°15.2	1°13.7	S01°21.9	Gacrux	171°51.2	-57°15.7
7	18°40.6	330°33.7	06.2	221°55.2	53.0	284°51.1	15.2	16°16.1	21.9	Alioth	166°12.5	55°49.5
8	33°43.0	345°33.5	06.9	236°56.3	52.4	299°52.9	15.2	31°18.5	21.9	Spica	158°21.8	-11°17.7
9	48°45.5	0°33.2	· · 07.6	251°57.4	· · 51.9	314°54.8	· · 15.2	46°20.8	· · 21.9	Alkaid	152°51.5	49°11.4
10	63°48.0	15°33.0	08.4	266°58.5	51.3	329°56.6	15.2	61°23.2	21.8	Hadar	148°35.2	-60°30.0
11	78°50.4	30°32.8	09.1	281°59.7	50.7	344°58.5	15.2	76°25.6	21.8	Menkent	147°57.0	-36°29.9
12	93°52.9	45°32.6	N15°09.8	297°00.8	N10°50.2	0°00.3	N23°15.1	91°28.0	S01°21.8	Arcturus	145°47.2	19°03.3
13	108°55.3	60°32.4	10.5	312°01.9	49.6	15°02.1	15.1	106°30.4	21.8	Rigel Kent.	139°39.4	-60°56.7
14	123°57.8	75°32.2	11.3	327°03.0	49.1	30°04.0	15.1	121°32.8	21.8	Kochab	137°19.0	74°03.2
15	139°00.3	90°31.9	· · 12.0	342°04.1	· · 48.5	45°05.8	· · 15.1	136°35.2	· · 21.8	Zuben'ubi	136°55.4	-16°08.9
16	154°02.7	105°31.7	12.7	357°05.3	48.0	60°07.7	15.1	151°37.6	21.7	Alphecca	126°03.1	26°37.8
17	169°05.2	120°31.5	13.4	12°06.4	47.4	75°09.5	15.1	166°40.0	21.7	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	181°42.4	S01°21.7	Atria	107°08.3	-69°04.5
19	199°10.1	150°31.1	14.9	42°08.6	46.3	105°13.2	15.1	196°44.8	21.7	Sabik	102°02.0	-15°45.4
20	214°12.6	165°30.8	15.6	57°09.8	45.7	120°15.0	15.0	211°47.2	21.7	Shaula	96°09.4	-37°07.3
21	229°15.1	180°30.6	· · 16.3	72°10.9	· · 45.2	135°16.9	· · 15.0	226°49.6	· · 21.6	Rasalhague	95°57.9	12°32.5
22	244°17.5	195°30.4	17.0	87°12.0	44.6	150°18.7	15.0	241°51.9	21.6	Eltanin	90°41.4	51°29.1
23	259°20.0	210°30.2	17.8	102°13.1	44.1	165°20.6	15.0	256°54.3	21.6	Kaus Aust.	83°31.6	-34°22.3
Mer.pass.:05:45		v-0.2 d0.7 m-4.1		v1.1 d-0.6 m1.4		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.0		Vega	80°32.6	38°48.3
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	274°22.5	225°30.0	N15°18.5	117°14.3	N10°43.5	180°22.4	N23°15.0	271°56.7	S01°21.6	Nunki	75°46.9	-26°15.9
1	289°24.9	240°29.7	19.2	132°15.4	43.0	195°24.3	15.0	286°59.1	21.6	Altair	61°59.3	8°56.1
2	304°27.4	255°29.5	19.9	147°16.5	42.4	210°26.1	15.0	302°01.5	21.5	Peacock	53°04.6	-56°39.0
3	319°29.8	270°29.3	· · 20.6	162°17.6	· · 41.9	225°27.9	· · 15.0	317°03.9	· · 21.5	Deneb	49°25.2	45°22.1
4	334°32.3	285°29.1	21.4	177°18.7	41.3	240°29.8	15.0	332°06.3	21.5	Enif	33°38.2	9°59.5
5	349°34.8	300°28.8	22.1	192°19.9	40.7	255°31.6	14.9	347°08.7	21.5	Al Na'ir	27°32.2	-46°50.0
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	Fomalhaut	15°14.0	-29°29.0
7	19°39.7	330°28.4	23.5	222°22.1	39.6	285°35.3	14.9	17°13.5	21.5	Markab	13°44.8	28°13.1
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	· · 24.9	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°57.0	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°42.2	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			
Mer.pass.:05:41		v-0.2 d0.7 m-4.1		v1.1 d-0.6 m1.4		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.0				
										Jun 24 Tue	SHA	Mer.pass
										Venus	313°15.8	08:57
										Mars	203°56.1	16:13
										Jupiter	266°29.8	12:03
										Saturn	357°37.8	05:59
										Jun 25 Wed	SHA	Mer.pass
										Venus	312°11.8	08:58
										Mars	203°24.0	16:12
										Jupiter	266°14.9	12:00
										Saturn	357°36.0	05:55
										Jun 26 Thu	SHA	Mer.pass
										Venus	311°07.5	08:58
										Mars	202°51.8	16:10
										Jupiter	266°00.0	11:57
										Saturn	357°34.3	05:51
										Horizontal parallax		
										Venus:	0.2	
										Mars:	0.1	

June 27, 28, 29 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	275°21.6	225°24.4	N15°35.7	117°41.2	N10°30.1	181°06.6	N23°14.7	272°54.2	S01°21.2	Alpheratz	357°34.4	29°13.8	
1	290°24.1	240°24.2	36.4	132°42.3	29.6	196°08.5	14.7	287°56.6	21.2	Ankaa	353°06.7	-42°09.8	
2	305°26.5	255°23.9	37.1	147°43.4	29.0	211°10.3	14.7	302°59.0	21.1	Schedar	349°30.7	56°40.4	
3	320°29.0	270°23.7	· · 37.8	162°44.5	· · 28.4	226°12.2	· · 14.7	318°01.4	· · 21.1	Diphda	348°46.8	-17°50.7	
4	335°31.4	285°23.4	38.5	177°45.7	27.9	241°14.0	14.7	333°03.8	21.1	Achernar	335°20.1	-57°06.1	
5	350°33.9	300°23.2	39.2	192°46.8	27.3	256°15.9	14.6	348°06.2	21.1	Hamal	327°50.9	23°34.9	
6	5°36.4	315°23.0	N15°39.9	207°47.9	N10°26.8	271°17.7	N23°14.6	3°08.6	S01°21.1	Polaris	314°10.4	89°22.0	
7	20°38.8	330°22.7	40.6	222°49.0	26.2	286°19.5	14.6	18°11.0	21.1	Akamar	315°11.7	-40°11.9	
8	35°41.3	345°22.5	41.3	237°50.2	25.6	301°21.4	14.6	33°13.4	21.0	Menkar	314°05.9	4°11.4	
9	50°43.8	0°22.2	· · 42.0	252°51.3	· · 25.1	316°23.2	· · 14.6	48°15.8	· · 21.0	Mirfak	308°28.1	49°56.9	
10	65°46.2	15°22.0	42.8	267°52.4	24.5	331°25.1	14.6	63°18.2	21.0	Aldebaran	290°39.5	16°33.6	
11	80°48.7	30°21.7	43.5	282°53.5	24.0	346°26.9	14.6	78°20.6	21.0	Rigel	281°03.8	-8°10.3	
12	95°51.2	45°21.5	N15°44.2	297°54.6	N10°23.4	1°28.8	N23°14.5	93°23.0	S01°21.0	Capella	280°21.8	46°01.4	
13	110°53.6	60°21.3	44.9	312°55.8	22.8	16°30.6	14.5	108°25.4	21.0	Bellatrix	278°22.8	6°22.4	
14	125°56.1	75°21.0	45.6	327°56.9	22.3	31°32.4	14.5	123°27.8	20.9	Elnath	278°01.8	28°37.7	
15	140°58.6	90°20.8	· · 46.3	342°58.0	· · 21.7	46°34.3	· · 14.5	138°30.2	· · 20.9	Alnilam	275°37.7	-1°11.1	
16	156°01.0	105°20.5	47.0	357°59.1	21.2	61°36.1	14.5	153°32.6	20.9	Betelgeuse	270°52.0	7°24.7	
17	171°03.5	120°20.3	47.7	13°00.2	20.6	76°38.0	14.5	168°35.0	20.9	Canopus	263°52.8	-52°42.5	
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	Sirius	258°26.2	-16°44.9	
19	201°08.4	150°19.8	49.1	43°02.5	19.5	106°41.7	14.5	198°39.8	20.9	Adara	255°05.9	-29°00.4	
20	216°10.9	165°19.5	49.8	58°03.6	18.9	121°43.5	14.4	213°42.2	20.9	Procyon	244°50.7	5°09.8	
21	231°13.3	180°19.3	· · 50.5	73°04.7	· · 18.3	136°45.3	· · 14.4	228°44.6	· · 20.8	Pollux	243°17.1	27°57.9	
22	246°15.8	195°19.0	51.2	88°05.8	17.8	151°47.2	14.4	243°47.0	20.8	Avior	234°15.2	-50°35.6	
23	261°18.3	210°18.8	51.9	103°07.0	17.2	166°49.0	14.4	258°49.4	20.8	Suhail	222°46.4	-43°32.3	
Mer.pass.:05:37		v-0.2 d0.7 m-4.1		v1.1 d-0.6 m1.5		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.0		Miaplacidus		221°39.0	-69°49.5
										Alphard		217°47.6	-8°46.2
										Regulus		207°34.2	11°50.6
										Dubhe		193°40.7	61°37.1
										Denebola		182°24.5	14°25.9
										Gienah		175°43.2	-17°41.1
										Acrux		172°59.7	-63°14.7
										Gacrux		171°51.2	-57°15.7
										Alioth		166°12.6	55°49.5
										Spica		158°21.8	-11°17.7
										Alkaid		152°51.5	49°11.4
										Hadar		148°35.2	-60°30.0
										Menkent		147°57.0	-36°29.9
										Arcturus		145°47.2	19°03.3
										Rigel Kent.		139°39.4	-60°56.7
										Kochab		137°19.0	74°03.2
										Zuben'ubi		136°55.4	-16°08.9
										Alphecca		126°03.1	26°37.8
										Antares		112°15.0	-26°29.4
										Atria		107°08.3	-69°04.5
										Sabik		102°02.0	-15°45.4
										Shaula		96°09.4	-37°07.3
										Rasalhague		95°57.9	12°32.5
										Eltanin		90°41.4	51°29.1
										Kaus Aust.		83°31.6	-34°22.3
										Vega		80°32.6	38°48.3
										Nunki		75°46.9	-26°15.9
										Altair		61°59.3	8°56.1
										Peacock		53°04.5	-56°39.0
										Deneb		49°25.1	45°22.1
										Enif		33°38.2	9°59.5
										Al Na'ir		27°32.2	-46°50.0
										Fomalhaut		15°14.0	-29°29.0
										Scheat		13°44.7	28°13.1
										Markab		13°29.4	15°20.5
										Jun 27 Fri		SHA	Mer.pass
										Venus		310°02.8	08:59
										Mars		202°19.6	16:08
										Jupiter		265°45.0	11:54
										Saturn		357°32.6	05:47
										Jun 28 Sat		SHA	Mer.pass
										Venus		308°57.8	08:59
										Mars		201°47.3	16:06
										Jupiter		265°30.1	11:51
										Saturn		357°31.1	05:44
										Jun 29 Sun		SHA	Mer.pass
										Venus		307°52.4	08:59
										Mars		201°15.1	16:04
										Jupiter		265°15.2	11:48
										Saturn		357°29.6	05:40
										Horizontal parallax			
										Venus:		0.2	
										Mars:		0.1	
Mer.pass.:05:29		v-0.3 d0.7 m-4.1		v1.1 d-0.6 m1.5		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.0					

June 30, 01, 02 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	278°19.0	225°05.7	N16°25.8	119°01.8	N09°49.5	183°19.4	N23°13.7	275°47.3	S01°20.2	Alpheratz	357°34.3	29°13.8	
1	293°21.5	240°05.4	26.5	134°02.9	48.9	198°21.2	13.7	290°49.7	20.2	Ankaa	353°06.7	-42°09.8	
2	308°23.9	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	323°26.4	270°04.8	· · 27.9	164°05.1	· · 47.8	228°24.9	· · 13.6	320°54.5	· · 20.1	Diphda	348°46.8	-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°20.1	-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°09.2	89°22.0	
7	23°36.3	330°03.7	30.6	224°09.6	45.5	288°32.3	13.6	21°04.1	20.1	Akamars	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°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°42.6	3°41.5	N23°13.5	96°16.2	S01°20.0	Capella	280°21.8	46°01.4	
13	113°51.0	60°02.0	34.6	314°16.3	42.1	18°43.4	13.5	111°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	13.5	126°21.0	20.0	Elnath	278°01.7	28°37.7	
15	143°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°01.1	36.7	359°19.6	40.4	63°48.9	13.4	156°25.8	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	-16°44.8	
19	204°05.8	150°00.2	38.7	44°23.0	38.7	108°54.4	13.4	201°33.1	20.0	Adara	255°05.9	-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	19.9	Procyon	244°50.7	5°09.8	
21	234°10.8	179°59.6	· · 40.0	74°25.2	· · 37.5	138°58.1	· · 13.3	231°37.9	· · 19.9	Pollux	243°17.1	27°57.9	
22	249°13.2	194°59.3	40.7	89°26.3	36.9	154°00.0	13.3	246°40.3	19.9	Avior	234°15.2	-50°35.5	
23	264°15.7	209°59.0	41.4	104°27.4	36.4	169°01.8	13.3	261°42.7	19.9	Suhail	222°46.4	-43°32.2	
Mer.pass.:05:25		v-0.3 d0.7 m-4.0		v1.1 d-0.6 m1.5		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.0		Miaplacidus	221°39.0	-69°49.5	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
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	Alphard	217°47.6	-8°46.2	
1	294°20.6	239°58.4	42.7	134°29.7	35.2	199°05.5	13.3	291°47.6	19.9	Regulus	207°34.2	11°50.6	
2	309°23.1	254°58.1	43.4	149°30.8	34.7	214°07.3	13.3	306°50.0	19.9	Dubhe	193°40.7	61°37.1	
3	324°25.5	269°57.8	· · 44.1	164°31.9	· · 34.1	229°09.2	· · 13.2	321°52.4	· · 19.9	Denebola	182°24.5	14°25.9	
4	339°28.0	284°57.5	44.7	179°33.0	33.5	244°11.0	13.2	336°54.8	19.9	Gienah	175°43.2	-17°41.1	
5	354°30.5	299°57.2	45.4	194°34.1	32.9	259°12.9	13.2	351°57.2	19.9	Acrux	172°59.7	-63°14.7	
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	Gacrux	171°51.2	-57°15.7	
7	24°35.4	329°56.6	46.7	224°36.4	31.8	289°16.6	13.2	22°02.0	19.8	Alioth	166°12.6	55°49.5	
8	39°37.9	344°56.3	47.4	239°37.5	31.2	304°18.4	13.1	37°04.5	19.8	Spica	158°21.8	-11°17.7	
9	54°40.3	359°56.0	· · 48.1	254°38.6	· · 30.6	319°20.2	· · 13.1	52°06.9	· · 19.8	Alkaid	152°51.5	49°11.4	
10	69°42.8	14°55.7	48.7	269°39.7	30.1	334°22.1	13.1	67°09.3	19.8	Hadar	148°35.2	-60°30.0	
11	84°45.3	29°55.4	49.4	284°40.8	29.5	349°23.9	13.1	82°11.7	19.8	Menkent	147°57.0	-36°29.9	
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	Arcturus	145°47.2	19°03.4	
13	114°50.2	59°54.8	50.7	314°43.0	28.3	19°27.6	13.1	112°16.5	19.8	Rigel Kent.	139°39.4	-60°56.7	
14	129°52.6	74°54.5	51.4	329°44.2	27.8	34°29.5	13.0	127°18.9	19.8	Kochab	137°19.1	74°03.2	
15	144°55.1	89°54.2	· · 52.1	344°45.3	· · 27.2	49°31.3	· · 13.0	142°21.4	· · 19.8	Zuben'ubi	136°55.4	-16°08.9	
16	159°57.6	104°53.9	52.7	359°46.4	26.6	64°33.2	13.0	157°23.8	19.8	Alphecca	126°03.1	26°37.8	
17	175°00.0	119°53.6	53.4	14°47.5	26.1	79°35.0	13.0	172°26.2	19.8	Antares	112°15.0	-26°29.4	
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	Atria	107°08.3	-69°04.5	
19	205°05.0	149°53.0	54.7	44°49.7	24.9	109°38.7	13.0	202°31.0	19.7	Sabik	102°02.0	-15°45.4	
20	220°07.4	164°52.7	55.4	59°50.8	24.3	124°40.5	12.9	217°33.4	19.7	Shaula	96°09.4	-37°07.4	
21	235°09.9	179°52.4	· · 56.0	74°52.0	· · 23.8	139°42.4	· · 12.9	232°35.9	· · 19.7	Rasalhague	95°57.9	12°32.5	
22	250°12.4	194°52.1	56.7	89°53.1	23.2	154°44.2	12.9	247°38.3	19.7	Eltanin	90°41.4	51°29.1	
23	265°14.8	209°51.8	57.3	104°54.2	22.6	169°46.1	12.9	262°40.7	19.7	Kaus Aust.	83°31.5	-34°22.3	
Mer.pass.:05:21		v-0.3 d0.7 m-4.0		v1.1 d-0.6 m1.5		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.0		Vega	80°32.5	38°48.4	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
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	Nunki	75°46.9	-26°15.9	
1	295°19.8	239°51.1	58.7	134°56.4	21.5	199°49.8	12.9	292°45.5	19.7	Altair	61°59.3	8°56.1	
2	310°22.2	254°50.8	16°59.3	149°57.5	20.9	214°51.6	12.8	307°47.9	19.7	Peacock	53°04.5	-56°39.0	
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	Deneb	49°25.1	45°22.1	
4	340°27.1	284°50.2	00.6	179°59.8	19.7	244°55.3	12.8	337°52.8	19.7	Enif	33°38.2	9°59.5	
5	355°29.6	299°49.9	01.3	195°00.9	19.2	259°57.1	12.8	352°55.2	19.7	Al Na'ir	27°32.1	-46°50.0	
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°19.6	Fomalhaut	15°14.0	-29°29.0	
7	25°34.5	329°49.3	02.6	225°03.1	18.0	290°00.8	12.7	23°00.0	19.6	Scheat	13°44.7	28°13.1	
8	40°37.0	344°48.9	03.3	240°04.2	17.4	305°02.7	12.7	38°02.4	19.6	Markab	13°29.4	15°20.5	
9	55°39.5	359°48.6	· · 03.9	255°05.3	· · 16.9	320°04.5	· · 12.7	53°04.9	· · 19.6	Jun 30 Mon		SHA	Mer.pass
10	70°41.9	14°48.3	04.6	270°06.4	16.3	335°06.4	12.7	68°07.3	19.6	Venus	306°46.7	09:00	
11	85°44.4	29°48.0	05.2	285°07.6	15.7	350°08.2	12.7	83°09.7	19.6	Mars	200°42.7	16:03	
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	Jupiter	265°00.4	11:45	
13	115°49.3	59°47.4	06.5	315°09.8	14.5	20°11.9	12.6	113°14.5	19.6	Saturn	357°28.3	05:36	
14	130°51.8	74°47.0	07.2	330°10.9	14.0	35°13.8	12.6	128°17.0	19.6	Jul 01 Tue		SHA	Mer.pass
15	145°54.2	89°46.7	· · 07.8	345°12.0	· · 13.4	50°15.6	· · 12.6	143°19.4	· · 19.6	Venus	305°40.6	09:00	
16	160°56.7	104°46.4	08.5	0°13.1	12.8	65°17.4	12.6	158°21.8	19.6	Mars	200°10.4	16:01	
17	175°59.2	119°46.1	09.1	15°14.2	12.2	80°19.3	12.6	173°24.2	19.6	Jupiter	264°45.5	11:42	
18	191°01.6	134°45.8	N17°09.8	30°15.3	N09°11.7	95°21.1	N23°12.5	188°26.6	S01°19.6	Saturn	357°27.0	05:32	
19	206°04.1	149°45.4	10.4	45°16.5	11.1	110°23.0	12.5	203°29.0	19.6	Jul 02 Wed		SHA	Mer.pass
20	221°06.6	164°45.1	11.1	60°17.6	10.5	125°24.8	12.5	218°31.5	19.5	Venus	304°34.2	09:01	
21	236°09.0	179°44.8	· · 11.7	75°18.7	· · 09.9	140°26.7	· · 12.5	233°33.9	· · 19.5	Mars	199°38.0	15:59	
22	251°11.5	194°44.5	12.4	90°19.8	09.4	155°28.5	12.5	248°36.3	19.5	Jupiter	264°30.6	11:39	
23	266°14.0	209°44.2	13.0	105°20.9	08.8	170°30.4	12.5	263°38.7	19.5	Saturn	357°25.8	05:28	
Mer.pass.:05:17		v-0.3 d0.7 m-4.0		v1.1 d-0.6 m1.5		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.0		Horizontal parallax			
Venus: 0.2													
Mars: 0.1													

July 03, 04, 05 (Thu., Fri., Sat.)

Aries		Venus		Mars		Jupiter		Saturn		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°41.1	S01°19.5	Alpheratz	357°34.3	29°13.8	
1	296°18.9	239°43.5	14.3	135°23.1	07.6	200°34.1	12.4	293°43.6	19.5	Ankaa	353°06.7	-42°09.8	
2	311°21.4	254°43.2	15.0	150°24.3	07.0	215°35.9	12.4	308°46.0	19.5	Schedar	349°30.6	56°40.4	
3	326°23.8	269°42.8	· · 15.6	165°25.4	· · 06.5	230°37.7	· · 12.4	323°48.4	· · 19.5	Diphda	348°46.8	-17°50.6	
4	341°26.3	284°42.5	16.3	180°26.5	05.9	245°39.6	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°07.8	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	Akamar	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°41.1	14°40.5	20.1	270°33.2	02.4	335°50.7	12.2	69°05.4	19.5	Aldebaran	290°39.5	16°33.6	
11	86°43.5	29°40.2	20.8	285°34.3	01.8	350°52.5	12.2	84°07.8	19.5	Rigel	281°03.8	-8°10.3	
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°19.4	Capella	280°21.8	46°01.4	
13	116°48.5	59°39.6	22.1	315°36.5	00.7	20°56.2	12.2	114°12.6	19.4	Bellatrix	278°22.8	6°22.4	
14	131°50.9	74°39.2	22.7	330°37.6	09°00.1	35°58.1	12.2	129°15.1	19.4	Elnath	278°01.7	28°37.7	
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	Alnilam	275°37.7	-1°11.1	
16	161°55.9	104°38.6	24.0	0°39.8	58.9	66°01.7	12.1	159°19.9	19.4	Betelgeuse	270°52.0	7°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°42.5	
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°26.1	-16°44.8	
19	207°03.2	149°37.5	25.9	45°43.2	57.2	111°07.3	12.1	204°27.2	19.4	Adara	255°05.9	-29°00.4	
20	222°05.7	164°37.2	26.5	60°44.3	56.6	126°09.1	12.1	219°29.6	19.4	Procyon	244°50.7	5°09.8	
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	243°17.1	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	Avior	234°15.2	-50°35.5	
23	267°13.1	209°36.2	28.4	105°47.6	54.9	171°14.7	12.0	264°36.9	19.4	Suhail	222°46.4	-43°32.2	
Mer.pass.:05:14		v-0.3 d0.6 m-4.0		v1.1 d-0.6 m1.5		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.0		Miaplacidus		221°39.0	-69°49.5
										Alphard		217°47.6	-8°46.2
										Regulus		207°34.2	11°50.6
										Dubhe		193°40.8	61°37.1
										Denebola		182°24.5	14°25.9
										Gienah		175°43.2	-17°41.1
										Acrux		172°59.7	-63°14.7
										Gacrux		171°51.3	-57°15.7
										Alioth		166°12.6	55°49.5
										Spica		158°21.8	-11°17.7
										Alkaid		152°51.5	49°11.4
										Hadar		148°35.2	-60°30.0
										Menkent		147°57.0	-36°29.9
										Arcturus		145°47.2	19°03.4
										Rigel Kent.		139°39.4	-60°56.7
										Kochab		137°19.1	74°03.3
										Zuben'ubi		136°55.4	-16°08.9
										Alphecca		126°03.2	26°37.8
										Antares		112°15.0	-26°29.4
										Atria		107°08.4	-69°04.5
										Sabik		102°02.0	-15°45.4
										Shaula		96°09.4	-37°07.4
										Rasalhague		95°57.9	12°32.5
										Eltanin		90°41.4	51°29.1
										Kaus Aust.		83°31.5	-34°22.3
										Vega		80°32.5	38°48.4
										Nunki		75°46.9	-26°15.9
										Altair		61°59.3	8°56.1
										Peacock		53°04.5	-56°39.0
										Deneb		49°25.1	45°22.2
										Enif		33°38.2	9°59.5
										Al Na'ir		27°32.1	-46°50.0
										Fomalhaut		15°13.9	-29°29.0
										Scheat		13°44.7	28°13.1
										Markab		13°29.4	15°20.5
										Jul 03 Thu		SHA	Mer.pass
										Venus		303°27.4	09:01
										Mars		199°05.6	15:57
										Jupiter		264°15.8	11:36
										Saturn		357°24.7	05:24
										Jul 04 Fri		SHA	Mer.pass
										Venus		302°20.3	09:02
										Mars		198°33.2	15:56
										Jupiter		264°00.9	11:33
										Saturn		357°23.7	05:21
										Jul 05 Sat		SHA	Mer.pass
										Venus		301°12.8	09:02
										Mars		198°00.7	15:54
										Jupiter		263°46.1	11:31
										Saturn		357°22.8	05:17
										Horizontal parallax			
										Venus:		0.2	
										Mars:		0.1	
Mer.pass.:05:06		v-0.4 d0.6 m-4.0		v1.1 d-0.6 m1.5		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.0					

July 06, 07, 08 (Sun., Mon., Tue.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	284°13.8	224°18.9	N17°58.9	121°42.0	N08°26.3	187°45.2	N23°11.0	281°35.8	S01°19.2	Alpheratz	357°34.3	29°13.8	
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	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°30.6	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°46.8	-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°50.9	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	S01°19.2	Polaris	314°06.2	89°22.0	
7	29°31.1	329°16.3	03.1	226°49.8	22.2	292°58.1	10.8	26°52.9	19.2	Akamar	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	Menkar	314°05.9	4°11.4	
9	59°36.0	359°15.6	· · 04.4	256°52.0	· · 21.0	323°01.8	· · 10.8	56°57.7	· · 19.2	Mirfak	308°28.0	49°56.9	
10	74°38.5	14°15.2	05.0	271°53.1	20.4	338°03.7	10.8	72°00.2	19.2	Aldebaran	290°39.5	16°33.7	
11	89°40.9	29°14.8	05.6	286°54.2	19.8	353°05.7	10.7	87°02.6	19.2	Rigel	281°03.8	-8°10.2	
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	Capella	280°21.7	46°01.4	
13	119°45.9	59°14.1	06.8	316°56.4	18.7	23°09.2	10.7	117°07.5	19.2	Bellatrix	278°22.7	6°22.4	
14	134°48.3	74°13.7	07.4	331°57.5	18.1	38°11.0	10.7	132°09.9	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°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°09.8	32°01.9	N08°15.7	98°18.4	N23°10.6	192°19.6	S01°19.2	Sirius	258°26.1	-16°44.8	
19	210°00.7	149°11.8	10.4	47°03.0	15.1	113°20.3	10.6	207°22.1	19.2	Adara	255°05.9	-29°00.3	
20	225°03.1	164°11.4	11.0	62°04.2	14.6	128°22.1	10.5	222°24.5	19.2	Procyon	244°50.6	5°09.8	
21	240°05.6	179°11.1	· · 11.6	77°05.3	· · 14.0	143°24.0	· · 10.5	237°26.9	· · 19.2	Pollux	243°17.1	27°57.9	
22	255°08.1	194°10.7	12.1	92°06.4	13.4	158°25.8	10.5	252°29.4	19.2	Avior	234°15.2	-50°35.5	
23	270°10.5	209°10.3	12.7	107°07.5	12.8	173°27.7	10.5	267°31.8	19.2	Suhail	222°46.4	-43°32.2	
Mer.pass.:05:02		v-0.4 d0.6 m-4.0		v1.1 d-0.6 m1.5		v1.8 d-0.0 m-1.8		v2.4 d0.0 m1.0		Miaplacidus		221°39.1	-69°49.4
										Alphard		217°47.6	-8°46.1
										Regulus		207°34.2	11°50.6
										Dubhe		193°40.8	61°37.1
										Denebola		182°24.6	14°25.9
										Gienah		175°43.2	-17°41.1
										Acrux		172°59.8	-63°14.7
										Gacrux		171°51.3	-57°15.6
										Alioth		166°12.6	55°49.5
										Spica		158°21.8	-11°17.7
										Alkaid		152°51.5	49°11.4
										Hadar		148°35.2	-60°30.0
										Menkent		147°57.0	-36°29.9
										Arcturus		145°47.3	19°03.4
										Rigel Kent.		139°39.4	-60°56.7
										Kochab		137°19.2	74°03.3
										Zuben'ubi		136°55.4	-16°08.9
										Alphecca		126°03.2	26°37.9
										Antares		112°15.0	-26°29.4
										Atria		107°08.4	-69°04.5
										Sabik		102°02.0	-15°45.4
										Shaula		96°09.4	-37°07.4
										Rasalhague		95°57.9	12°32.5
										Eltanin		90°41.4	51°29.2
										Kaus Aust.		83°31.5	-34°22.3
										Vega		80°32.5	38°48.4
										Nunki		75°46.9	-26°15.9
										Altair		61°59.3	8°56.1
										Peacock		53°04.5	-56°39.0
										Deneb		49°25.1	45°22.2
										Enif		33°38.2	9°59.5
										Al Na'ir		27°32.1	-46°50.0
										Fomalhaut		15°13.9	-29°29.0
										Scheat		13°44.7	28°13.2
										Markab		13°29.3	15°20.5
										Jul 06 Sun		SHA	Mer.pass
										Venus		300°05.1	09:03
										Mars		197°28.2	15:52
										Jupiter		263°31.3	11:28
										Saturn		357°22.0	05:13
										Jul 07 Mon		SHA	Mer.pass
										Venus		298°56.9	09:04
										Mars		196°55.6	15:50
										Jupiter		263°16.5	11:25
										Saturn		357°21.3	05:09
										Jul 08 Tue		SHA	Mer.pass
										Venus		297°48.5	09:04
										Mars		196°23.0	15:48
										Jupiter		263°01.8	11:22
										Saturn		357°20.6	05:05
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:04:54		v-0.4 d0.6 m-4.0		v1.1 d-0.6 m1.5		v1.8 d-0.0 m-1.8		v2.4 d-0.0 m1.0					

July 09, 10, 11 (Wed., Thu., Fri.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	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°34.3	29°13.8	
1	302°13.7	238°50.5	41.7	138°02.8	43.2	205°00.2	09.3	299°33.8	19.3	Ankaa	353°06.6	-42°09.7	
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°03.9	· · 09.3	329°38.7	· · 19.3	Diphda	348°46.7	-17°50.6	
4	347°21.1	283°49.3	43.4	183°06.1	41.4	250°05.7	09.2	344°41.1	19.3	Achernar	335°20.0	-57°06.1	
5	2°23.6	298°48.9	44.0	198°07.2	40.9	265°07.6	09.2	359°43.6	19.3	Hamal	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	Polaris	314°04.5	89°22.0	
7	32°28.5	328°48.1	45.1	228°09.4	39.7	295°11.3	09.2	29°48.5	19.3	Akamar	315°11.6	-40°11.9	
8	47°31.0	343°47.7	45.7	243°10.5	39.1	310°13.1	09.1	44°50.9	19.3	Menkar	314°05.9	4°11.5	
9	62°33.4	358°47.2	· · 46.2	258°11.6	· · 38.5	325°15.0	· · 09.1	59°53.4	· · 19.3	Mirfak	308°28.0	49°56.9	
10	77°35.9	13°46.8	46.8	273°12.7	37.9	340°16.8	09.1	74°55.8	19.3	Aldebaran	290°39.4	16°33.7	
11	92°38.4	28°46.4	47.3	288°13.8	37.3	355°18.7	09.1	89°58.2	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°01.4	
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	Betelgeuse	270°52.0	7°24.7	
17	182°53.2	118°43.9	50.7	18°20.4	33.7	85°29.8	08.9	180°12.9	19.4	Canopus	263°52.8	-52°42.4	
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	Sirius	258°26.1	-16°44.8	
19	212°58.1	148°43.1	51.8	48°22.6	32.5	115°33.5	08.9	210°17.8	19.4	Adara	255°05.9	-20°00.3	
20	228°00.5	163°42.7	52.3	63°23.7	31.9	130°35.3	08.8	225°20.3	19.4	Procyon	244°50.6	5°09.8	
21	243°03.0	178°42.2	· · 52.9	78°24.8	· · 31.3	145°37.2	· · 08.8	240°22.7	· · 19.4	Pollux	243°17.1	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	-50°35.5	
23	273°07.9	208°41.4	54.0	108°27.0	30.1	175°40.9	08.8	270°27.6	19.4	Suhail	222°46.4	-43°32.2	
Mer.pass.:04:50		v-0.4 d0.6 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.8		v2.4 d-0.0 m0.9		Miaplacidus		221°39.1	-69°49.4
										Alphard		217°47.6	-8°46.1
										Regulus		207°34.2	11°50.6
										Dubhe		193°40.8	61°37.1
										Denebola		182°24.6	14°25.9
										Gienah		175°43.2	-17°41.1
										Acrux		172°59.8	-63°14.7
										Gacrux		171°51.3	-57°15.6
										Alioth		166°12.7	55°49.5
										Spica		158°21.8	-11°17.7
										Alkaid		152°51.5	49°11.4
										Hadar		148°35.2	-60°30.0
										Menkent		147°57.0	-36°29.9
										Arcturus		145°47.3	19°03.4
										Rigel Kent.		139°39.4	-60°56.7
										Kochab		137°19.2	74°03.3
										Zuben'ubi		136°55.4	-10°08.9
										Alphecca		126°03.2	26°37.9
										Antares		112°15.0	-26°29.4
										Atria		107°08.4	-69°04.5
										Sabik		102°02.0	-15°45.4
										Shaula		96°09.4	-37°07.4
										Rasalhague		95°57.9	12°32.6
										Eltanin		90°41.5	51°29.2
										Kaus Aust.		83°31.5	-34°22.3
										Vega		80°32.5	38°48.4
										Nunki		75°46.9	-26°15.9
										Altair		61°59.3	8°56.1
										Peacock		53°04.5	-56°39.0
										Deneb		49°25.1	45°22.2
										Enif		33°38.1	9°59.5
										Al Na'ir		27°32.0	-46°50.0
										Fomalhaut		15°13.9	-29°29.0
										Scheat		13°44.6	28°13.2
										Markab		13°29.3	15°20.5
										Jul 09 Wed		SHA	Mer.pass
										Venus		296°39.7	09:05
										Mars		195°50.4	15:47
										Jupiter		262°47.0	11:19
										Saturn		357°20.1	05:01
										Jul 10 Thu		SHA	Mer.pass
										Venus		295°30.6	09:06
										Mars		195°17.7	15:45
										Jupiter		262°32.3	11:16
										Saturn		357°19.6	04:57
										Jul 11 Fri		SHA	Mer.pass
										Venus		294°21.1	09:06
										Mars		194°45.1	15:43
										Jupiter		262°17.6	11:13
										Saturn		357°19.3	04:53
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:04:42		v-0.4 d0.5 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9					

July 15, 16, 17 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	295°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	Alpheratz	357°34.2	29°13.8	
1	308°08.6	237°45.7	56.0	140°41.1	16.6	209°27.0	05.4	305°27.4	20.5	Ankaa	353°06.6	-42°09.7	
2	323°11.0	252°45.2	56.5	155°42.2	16.0	224°28.9	05.4	320°29.8	20.6	Schedar	349°30.4	56°40.4	
3	338°13.5	267°44.7	· · 56.9	170°43.3	· · 15.4	239°30.7	· · 05.3	335°32.3	· · 20.6	Diphda	348°46.7	-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°35.0	
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°01.7	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	Akamar	315°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°33.7	
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°21.7	46°01.4	
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°01.7	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°06.8	20.8	Canopus	263°52.7	-52°42.4	
18	203°50.5	132°37.3	N20°03.8	35°59.8	N06°06.3	104°58.6	N23°04.9	201°09.3	S01°20.8	Sirius	258°26.1	-16°44.8	
19	218°52.9	147°36.8	04.3	51°00.8	05.7	120°00.5	04.9	216°11.8	20.8	Adara	255°05.9	-20°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°50.6	5°09.8	
21	248°57.8	177°35.8	· · 05.2	81°03.0	· · 04.5	150°45.2	· · 04.8	246°16.7	· · 20.8	Pollux	243°17.0	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	-50°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.pass.:04:26		v-0.5 d0.5 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Miaplacidus		221°39.1	-69°49.4
Mer.pass.:04:22		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Alphard		217°47.6	-8°46.1
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Regulus		207°34.2	11°50.6
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Dubhe		193°40.8	61°37.0
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Denebola		182°24.6	14°25.9
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Gienah		175°43.2	-17°41.1
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Acrux		172°59.8	-63°14.7
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Gacrux		171°51.3	-57°15.6
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Alioth		166°12.7	55°49.5
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Spica		158°21.8	-11°17.7
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Alkaid		152°51.6	49°11.4
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Hadar		148°35.3	-60°30.0
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Menkent		147°57.1	-36°29.9
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Arcturus		145°47.3	19°03.4
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Rigel Kent.		139°39.5	-60°56.7
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Kochab		137°19.3	74°03.3
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Zuben'ubi		136°55.4	-16°08.9
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Alphecca		126°03.2	26°37.9
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Antares		112°15.0	-26°29.4
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Atria		107°08.4	-69°04.6
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Sabik		102°02.0	-15°45.4
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Shaula		96°09.4	-37°07.4
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Rasalhague		95°57.9	12°32.6
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Eltanin		90°41.5	51°29.2
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Kaus Aust.		83°31.5	-34°22.3
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Vega		80°32.5	38°48.4
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Nunki		75°46.8	-26°15.9
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Altair		61°59.3	8°56.1
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Peacock		53°04.4	-56°39.0
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Deneb		49°25.1	45°22.2
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Enif		33°38.1	9°59.5
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Al Na'ir		27°32.0	-46°50.0
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Fomalhaut		15°13.8	-29°29.0
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Scheat		13°44.6	28°13.2
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Markab		13°29.3	15°20.6
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Jul 15 Tue		SHA	Mer.pass
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Venus		289°40.1	09:09
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Mars		192°33.9	15:36
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Jupiter		261°19.1	11:01
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Saturn		357°18.8	04:38
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Jul 16 Wed		SHA	Mer.pass
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Venus		288°29.1	09:10
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Mars		192°01.1	15:34
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Jupiter		261°04.5	10:58
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Saturn		357°18.9	04:34
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Jul 17 Thu		SHA	Mer.pass
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Venus		287°17.8	09:11
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Mars		191°28.2	15:33
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Jupiter		260°50.0	10:55
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Saturn		357°19.1	04:30
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Horizontal parallax			
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Venus:		0.1	
Mer.pass.:04:18		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Mars:		0.1	

July 18, 19, 20 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	296°03.5	222°09.7	N20°27.1	126°58.7	N05°33.2	196°39.0	N23°03.2	293°22.9	S01°21.7	Alpheratz	357°34.2	29°13.8
1	311°06.0	237°09.1	27.5	141°59.8	32.6	211°40.8	03.2	308°25.4	21.7	Ankaa	353°06.5	-42°09.7
2	326°08.4	252°08.6	27.9	157°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°30.3	· · 21.7	Diphda	348°46.7	-17°50.6
4	356°13.4	282°07.5	28.7	187°03.1	30.8	256°46.4	03.1	353°32.8	· · 21.7	Achernar	335°19.8	-57°06.1
5	11°15.8	297°07.0	29.1	202°04.2	30.1	271°48.3	03.0	8°35.3	21.8	Hamal	327°50.8	23°35.0
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	314°00.1	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	Akamar	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	Menkar	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	Mirfak	308°27.9	49°56.9
10	86°28.2	12°04.4	31.1	277°09.6	27.1	346°57.6	02.9	83°47.7	21.9	Aldebaran	290°39.4	16°33.7
11	101°30.6	27°03.8	31.5	292°10.7	26.5	1°59.5	02.8	98°50.2	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°01.4
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	Elnath	278°01.6	28°37.7
15	161°40.5	87°01.7	· · 33.1	352°15.1	· · 24.0	62°06.9	· · 02.7	159°00.1	· · 22.0	Alnilam	275°37.6	-1°11.0
16	176°42.9	102°01.2	33.5	7°16.2	23.4	77°08.8	02.7	174°02.6	22.0	Betelgeuse	270°51.9	7°24.8
17	191°45.4	117°00.6	33.9	22°17.3	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°12.5	N23°02.6	204°07.5	S01°22.0	Sirius	258°26.1	-16°44.8
19	221°50.3	146°59.6	34.7	52°19.4	21.5	122°14.3	02.6	219°10.0	22.0	Adara	255°05.9	-20°00.3
20	236°52.8	161°59.0	35.1	67°20.5	20.9	137°16.2	02.5	234°12.5	22.1	Procyon	244°50.6	5°09.8
21	251°55.3	176°58.5	· · 35.5	82°21.6	· · 20.3	152°18.1	· · 02.5	249°15.0	· · 22.1	Pollux	243°17.0	27°57.9
22	266°57.7	191°58.0	35.9	97°22.7	19.7	167°19.9	02.5	264°17.5	22.1	Avior	234°15.2	-50°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
Mer.pass.:04:15		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.5		v1.9 d-0.0 m-1.7		v2.5 d-0.0 m0.9		Miaplacidus	221°39.2	-69°49.4
										Alphard	217°47.6	-8°46.1
										Regulus	207°34.2	11°50.6
										Dubhe	193°40.9	61°37.0
										Denebola	182°24.6	14°25.9
										Gienah	175°43.2	-17°41.1
										Acrux	172°59.9	-63°14.7
										Gacrux	171°51.4	-57°15.6
										Alioth	166°12.7	55°49.5
										Spica	158°21.9	-11°17.7
										Alkaid	152°51.6	49°11.4
										Hadar	148°35.3	-60°30.0
										Menkent	147°57.1	-36°29.9
										Arcturus	145°47.3	19°03.4
										Rigel Kent.	139°39.5	-60°56.7
										Kochab	137°19.4	74°03.3
										Zuben'ubi	136°55.4	-16°08.9
										Alphecca	126°03.2	26°37.9
										Antares	112°15.0	-26°29.4
										Atria	107°08.4	-69°04.6
										Sabik	102°02.0	-15°45.4
										Shaula	96°09.4	-37°07.4
										Rasalhague	95°57.9	12°32.6
										Eltanin	90°41.5	51°29.2
										Kaus Aust.	83°31.5	-34°22.3
										Vega	80°32.5	38°48.5
										Nunki	75°46.8	-26°15.9
										Altair	61°59.3	8°56.1
										Peacock	53°04.4	-56°39.1
										Deneb	49°25.1	45°22.2
										Enif	33°38.1	9°59.6
										Al Na'ir	27°32.0	-46°50.0
										Fomalhaut	15°13.8	-29°29.0
										Scheat	13°44.6	28°13.2
										Markab	13°29.3	15°20.6
										Jul 18 Fri	SHA	Mer.pass
										Venus	286°06.1	09:12
										Mars	190°55.2	15:31
										Jupiter	260°35.5	10:52
										Saturn	357°19.4	04:26
										Jul 19 Sat	SHA	Mer.pass
										Venus	284°54.2	09:13
										Mars	190°22.2	15:29
										Jupiter	260°21.0	10:49
										Saturn	357°19.8	04:22
										Jul 20 Sun	SHA	Mer.pass
										Venus	283°42.0	09:13
										Mars	189°49.2	15:27
										Jupiter	260°06.6	10:46
										Saturn	357°20.3	04:18
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:04:07		v-0.5 d0.4 m-4.0		v1.1 d-0.6 m1.6		v1.9 d-0.0 m-1.8		v2.5 d-0.0 m0.9				

July 21, 22, 23 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	290°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	Alpheratz	357°34.2	29°13.9	
1	314°03.4	236°30.0	54.7	143°18.1	48.1	213°54.9	00.7	311°24.3	23.2	Ankaa	353°06.5	-42°09.7	
2	329°05.9	251°29.4	55.1	158°19.2	47.5	228°56.8	00.7	326°26.7	23.2	Schedar	349°30.4	56°40.5	
3	344°08.3	266°28.8	· · 55.4	173°20.3	· · 46.9	243°58.7	· · 00.7	341°29.2	· · 23.2	Diphda	348°46.6	-17°50.6	
4	359°10.8	281°28.3	55.8	188°21.4	46.2	259°00.5	00.6	356°31.7	23.3	Achernar	335°19.8	-57°06.1	
5	14°13.3	296°27.7	56.1	203°22.4	45.6	274°02.4	00.6	11°34.2	23.3	Hamal	327°50.7	23°35.0	
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	Polaris	313°58.2	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	Akamar	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°33.7	
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	S01°23.5	Capella	280°21.6	46°01.4	
13	134°33.0	56°23.2	58.9	323°31.1	40.6	34°17.3	00.3	131°54.1	23.5	Bellatrix	278°22.7	6°22.4	
14	149°35.4	71°22.6	59.2	338°32.2	40.0	49°19.2	00.3	146°56.6	23.5	Elnath	278°01.6	28°37.7	
15	164°37.9	86°22.1	· · 59.5	353°33.3	· · 39.4	64°21.1	· · 00.2	161°59.1	· · 23.5	Alnilam	275°37.6	-1°11.0	
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	Betelgeuse	270°51.9	7°24.8	
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	Canopus	263°52.7	-52°42.4	
18	209°45.3	131°20.4	N21°00.6	38°36.5	N04°37.5	109°26.7	N23°00.1	207°06.6	S01°23.6	Sirius	258°26.1	-16°44.8	
19	224°47.8	146°19.8	00.9	53°37.6	36.9	124°28.5	00.1	222°09.1	23.6	Adara	255°05.9	-20°00.3	
20	239°50.2	161°19.2	01.2	68°38.7	36.3	139°30.4	00.1	237°11.6	23.6	Procyon	244°50.6	5°09.8	
21	254°52.7	176°18.7	· · 01.5	83°39.8	· · 35.7	154°32.3	· · 00.0	252°14.1	· · 23.7	Pollux	243°17.0	27°57.9	
22	269°55.1	191°18.1	01.9	98°40.9	35.0	169°34.1	00.0	267°16.6	23.7	Avior	234°15.2	-50°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.pass.:04:03		v-0.6 d0.3 m-4.0		v1.1 d-0.6 m1.6		v1.9 d-0.0 m-1.8		v2.5 d-0.0 m0.9		Miaplacidus		221°39.2	-69°49.4
										Alphard		217°47.6	-8°46.1
										Regulus		207°34.2	11°50.6
										Dubhe		193°40.9	61°37.0
										Denebola		182°24.6	14°25.9
										Gienah		175°43.2	-17°41.1
										Acrux		172°59.9	-63°14.7
										Gacrux		171°51.4	-57°15.6
										Alioth		166°12.7	55°49.5
										Spica		158°21.9	-11°17.7
										Alkaid		152°51.6	49°11.4
										Hadar		148°35.3	-60°30.0
										Menkent		147°57.1	-36°29.9
										Arcturus		145°47.3	19°03.4
										Rigel Kent.		139°39.5	-60°56.7
										Kochab		137°19.4	74°03.3
										Zuben'ubi		136°55.4	-16°08.9
										Alphecca		126°03.2	26°37.9
										Antares		112°15.0	-26°29.4
										Atria		107°08.4	-69°04.6
										Sabik		102°02.0	-15°45.4
										Shaula		96°09.4	-37°07.4
										Rasalhague		95°57.9	12°32.6
										Eltanin		90°41.5	51°29.2
										Kaus Aust.		83°31.5	-34°22.3
										Vega		80°32.5	38°48.5
										Nunki		75°46.8	-26°15.9
										Altair		61°59.2	8°56.2
										Peacock		53°04.4	-56°39.1
										Deneb		49°25.0	45°22.3
										Enif		33°38.1	9°59.6
										Al Na'ir		27°31.9	-46°50.0
										Fomalhaut		15°13.8	-29°29.0
										Scheat		13°44.6	28°13.2
										Markab		13°29.2	15°20.6
										Jul 21 Mon		SHA	Mer.pass
										Venus		282°29.6	09:14
										Mars		189°16.1	15:26
										Jupiter		259°52.1	10:43
										Saturn		357°20.8	04:14
										Jul 22 Tue		SHA	Mer.pass
										Venus		281°16.9	09:15
										Mars		188°43.0	15:24
										Jupiter		259°37.8	10:40
										Saturn		357°21.5	04:10
										Jul 23 Wed		SHA	Mer.pass
										Venus		280°03.9	09:16
										Mars		188°09.8	15:22
										Jupiter		259°23.4	10:37
										Saturn		357°22.2	04:06
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:03:55		v-0.6 d0.3 m-4.0		v1.1 d-0.6 m1.6		v1.9 d-0.0 m-1.8		v2.5 d-0.0 m0.9					

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

Aries		Venus		Mars		Jupiter		Saturn		Stars			
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°06.4	-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°46.6	-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°19.7	-57°06.0	
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°55.0	89°22.0	
7	50°13.0	325°01.2	37.1	235°59.9	14.0	308°35.5	55.1	47°39.5	27.4	Akamars	315°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	· · 12.7	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	12.1	353°41.1	55.0	92°47.1	27.5	Aldebaran	290°39.3	16°33.7	
11	110°22.9	24°58.7	37.9	296°04.2	11.5	8°43.0	55.0	107°49.6	27.6	Rigel	281°03.6	-8°10.2	
12	125°25.3	39°58.0	N21°38.2	311°05.2	N03°10.9	23°44.8	N22°54.9	122°52.1	S01°27.6	Capella	280°21.6	46°01.4	
13	140°27.8	54°57.4	38.4	326°06.3	10.2	38°46.7	54.9	137°54.6	27.6	Bellatrix	278°22.6	6°22.5	
14	155°30.3	69°56.8	38.6	341°07.4	09.6	53°48.6	54.9	152°57.1	27.7	Elnath	278°01.6	28°37.7	
15	170°32.7	84°56.2	· · 38.8	356°08.5	· · 09.0	68°50.5	· · 54.8	167°59.7	· · 27.7	Alnilam	275°37.5	-1°11.0	
16	185°35.2	99°55.6	39.0	11°09.5	08.3	83°52.3	54.8	183°02.2	27.7	Betelgeuse	270°51.9	7°24.8	
17	200°37.7	114°54.9	39.2	26°10.6	07.7	98°54.2	54.7	198°04.7	27.8	Canopus	263°52.7	-52°42.3	
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	Sirius	258°26.1	-16°44.7	
19	230°42.6	144°53.7	39.6	56°12.7	06.4	128°58.0	54.7	228°09.7	27.8	Adara	255°05.8	-29°00.3	
20	245°45.1	159°53.1	39.8	71°13.8	05.8	143°59.8	54.6	243°12.2	27.9	Procyon	244°50.6	5°09.8	
21	260°47.5	174°52.4	· · 40.0	86°14.9	· · 05.2	159°01.7	· · 54.6	258°14.8	· · 27.9	Pollux	243°17.0	27°57.9	
22	275°50.0	189°51.8	40.2	101°16.0	04.5	174°03.6	54.5	273°17.3	27.9	Avior	234°15.2	-50°35.4	
23	290°52.5	204°51.2	40.4	116°17.0	03.9	189°05.5	54.5	288°19.8	28.0	Suhail	222°46.4	-43°32.1	
Mer.pass.:03:39		v-0.6 d0.2 m-3.9		v1.1 d-0.6 m1.6		v1.9 d-0.0 m-1.8		v2.5 d-0.0 m0.9		Miaplacidus		221°39.2	-69°49.3
										Alphard		217°47.6	-8°46.1
										Regulus		207°34.2	11°50.6
										Dubhe		193°40.9	61°37.0
										Denebola		182°24.6	14°25.9
										Gienah		175°43.2	-17°41.1
										Acrux		172°59.9	-63°14.7
										Gacrux		171°51.4	-57°15.6
										Alioth		166°12.8	55°49.5
										Spica		158°21.9	-11°17.7
										Alkaid		152°51.7	49°11.4
										Hadar		148°35.4	-60°30.1
										Menkent		147°57.1	-36°29.9
										Arcturus		145°47.3	19°03.4
										Rigel Kent.		139°39.6	-60°56.7
										Kochab		137°19.5	74°03.3
										Zuben'ubi		136°55.4	-16°08.9
										Alphecca		126°03.2	26°37.9
										Antares		112°15.0	-26°29.4
										Atria		107°08.5	-69°04.6
										Sabik		102°02.0	-15°45.4
										Shaula		96°09.4	-37°07.4
										Rasalhague		95°57.9	12°32.6
										Eltanin		90°41.5	51°29.3
										Kaus Aust.		83°31.5	-34°22.4
										Vega		80°32.5	38°48.5
										Nunki		75°46.8	-26°15.9
										Altair		61°59.2	8°56.2
										Peacock		53°04.3	-56°39.1
										Deneb		49°25.0	45°22.3
										Enif		33°38.0	9°59.6
										Al Na'ir		27°31.9	-46°50.0
										Fomalhaut		15°13.8	-29°29.0
										Scheat		13°44.5	28°13.3
										Markab		13°29.2	15°20.6
										Jul 27 Sun		SHA	Mer.pass
										Venus		275°09.7	09:20
										Mars		185°56.6	15:15
										Jupiter		258°26.5	10:25
										Saturn		357°26.2	03:50
										Jul 28 Mon		SHA	Mer.pass
										Venus		273°55.6	09:21
										Mars		185°23.2	15:14
										Jupiter		258°12.4	10:22
										Saturn		357°27.4	03:46
										Jul 29 Tue		SHA	Mer.pass
										Venus		272°41.4	09:22
										Mars		184°49.7	15:12
										Jupiter		257°58.4	10:19
										Saturn		357°28.7	03:42
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:03:31		v-0.6 d0.2 m-3.9		v1.1 d-0.6 m1.6		v1.9 d-0.0 m-1.8		v2.5 d-0.0 m0.8					

Sun								Moon							
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight		
									Naut.	Civil			Civil	Naut.	
0	178°21.6	N19°11.8	150°41.0	13.4'	N12°19.0	-14.3'	56.8'								
1	193°21.6	11.3	165°13.4	13.5'	12°04.7	-14.3'	56.8'	N 72°							
2	208°21.6	10.7	179°45.9	13.5'	11°50.4	-14.4'	56.7'	N 70°			00:41	23:17			
3	223°21.6	10.1	194°18.5	13.6'	11°36.0	-14.4'	56.7'	68°			01:55	22:14			
4	238°21.6	09.6	208°51.1	13.7'	11°21.6	-14.4'	56.7'	66°			02:31	21:39			
5	253°21.6	09.0	223°23.9	13.8'	11°07.1	-14.5'	56.6'	64°		01:15	02:56	21:14	22:52		
6	268°21.6	N19°08.4	237°56.7	13.9'	N10°52.6	-14.5'	56.6'	62°		01:59	03:16	20:55	22:10		
7	283°21.6	07.9	252°29.6	14.0'	10°38.1	-14.5'	56.6'	60°		02:28	03:32	20:39	21:42		
8	298°21.6	07.3	267°02.6	14.0'	10°23.6	-14.6'	56.6'	N 58°	01:08	02:50	03:45	20:26	21:22	22:59	
9	313°21.6	06.7	281°35.7	14.1'	10°09.0	-14.6'	56.5'	56°	01:49	03:07	03:57	20:15	21:05	22:21	
10	328°21.6	06.1	296°08.9	14.2'	09°54.4	-14.6'	56.5'	54°	02:15	03:21	04:07	20:05	20:50	21:55	
11	343°21.7	05.6	310°42.1	14.3'	09°39.8	-14.6'	56.5'	52°	02:35	03:34	04:16	19:56	20:38	21:36	
12	358°21.7	N19°05.0	325°15.4	14.3'	N09°25.1	-14.7'	56.4'	50°	02:52	03:45	04:24	19:48	20:27	21:20	
13	13°21.7	04.4	339°48.8	14.4'	09°10.4	-14.7'	56.4'	45°	03:23	04:07	04:41	19:31	20:05	20:49	
14	28°21.7	03.9	354°22.2	14.5'	08°55.7	-14.7'	56.4'	N 40°	03:46	04:24	04:55	19:18	19:48	20:26	
15	43°21.7	03.3	8°55.7	14.6'	08°41.0	-14.7'	56.4'	35°	04:04	04:38	05:07	19:06	19:34	20:08	
16	58°21.7	02.7	23°29.3	14.6'	08°26.3	-14.8'	56.3'	30°	04:19	04:51	05:17	18:56	19:22	19:53	
17	73°21.7	02.1	38°03.0	14.7'	08°11.5	-14.8'	56.3'	20°	04:42	05:10	05:34	18:39	19:02	19:30	
18	88°21.7	N19°01.6	52°36.7	14.8'	N07°56.7	-14.8'	56.3'	N 10°	05:01	05:27	05:49	18:24	18:46	19:12	
19	103°21.7	01.0	67°10.5	14.8'	07°41.9	-14.8'	56.2'	0°	05:16	05:41	06:03	18:10	18:32	18:57	
20	118°21.7	19°00.4	81°44.3	14.9'	07°27.1	-14.8'	56.2'	S 10°	05:29	05:55	06:17	17:56	18:18	18:44	
21	133°21.8	18°59.8	96°18.2	14.9'	07°12.3	-14.8'	56.2'	20°	05:41	06:08	06:31	17:42	18:05	18:32	
22	148°21.8	59.2	110°52.2	15.0'	06°57.5	-14.8'	56.2'	30°	05:54	06:23	06:48	17:25	17:51	18:20	
23	163°21.8	58.7	125°26.2	15.1'	06°42.6	-14.9'	56.1'	35°	06:00	06:31	06:58	17:16	17:43	18:13	
	SD.=15.7	d=-0.6			S.D.=15.5			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	
								S 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	
								S 60°	06:42	07:34	08:23	15:50	16:40	17:32	

Mon	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise		Moonset			
									Sun	Mon	Tue	Sun	Mon	Tue
0	178°21.8	N18°58.1	140°00.3	15.1'	N06°27.8	-14.9'	56.1'	N 72°	05:44	07:59	10:03	22:03	21:29	20:56
1	193°21.8	57.5	154°34.5	15.2'	06°12.9	-14.9'	56.1'	N 70°	06:03	08:06	10:00	21:54	21:27	21:02
2	208°21.8	56.9	169°08.7	15.2'	05°58.0	-14.9'	56.0'	68°	06:17	08:11	09:57	21:46	21:26	21:08
3	223°21.8	56.3	183°43.0	15.3'	05°43.1	-14.9'	56.0'	66°	06:29	08:15	09:55	21:39	21:25	21:12
4	238°21.8	55.8	198°17.3	15.3'	05°28.2	-14.9'	56.0'	64°	06:39	08:19	09:54	21:34	21:25	21:16
5	253°21.9	55.2	212°51.7	15.4'	05°13.3	-14.9'	56.0'	62°	06:48	08:22	09:52	21:29	21:24	21:19
6	268°21.9	N18°54.6	227°26.1	15.5'	N04°58.4	-14.9'	55.9'	60°	06:55	08:25	09:51	21:24	21:23	21:22
7	283°21.9	54.0	242°00.6	15.5'	04°43.5	-14.9'	55.9'	N 58°	07:01	08:27	09:50	21:21	21:23	21:24
8	298°21.9	53.4	256°35.1	15.6'	04°28.6	-14.9'	55.9'	56°	07:07	08:29	09:49	21:17	21:22	21:27
9	313°21.9	52.8	271°09.7	15.6'	04°13.6	-14.9'	55.9'	54°	07:12	08:31	09:48	21:14	21:22	21:29
10	328°21.9	52.3	285°44.3	15.6'	03°58.7	-14.9'	55.8'	52°	07:16	08:33	09:47	21:11	21:21	21:31
11	343°21.9	51.7	300°19.0	15.7'	03°43.8	-14.9'	55.8'	50°	07:20	08:35	09:46	21:09	21:21	21:32
12	358°22.0	N18°51.1	314°53.7	15.7'	N03°28.9	-14.9'	55.8'	45°	07:29	08:38	09:45	21:03	21:20	21:36
13	13°22.0	50.5	329°28.4	15.8'	03°13.9	-14.9'	55.7'	N 40°	07:36	08:41	09:43	20:59	21:19	21:39
14	28°22.0	49.9	344°03.2	15.8'	02°59.0	-14.9'	55.7'	35°	07:42	08:43	09:42	20:54	21:19	21:42
15	43°22.0	49.3	358°38.1	15.9'	02°44.1	-14.9'	55.7'	30°	07:48	08:46	09:41	20:51	21:18	21:45
16	58°22.0	48.7	13°13.0	15.9'	02°29.2	-14.9'	55.7'	20°	07:57	08:49	09:40	20:44	21:17	21:49
17	73°22.0	48.2	27°47.9	15.9'	02°14.3	-14.9'	55.6'	N 10°	08:05	08:53	09:38	20:39	21:16	21:53
18	88°22.0	N18°47.6	42°22.8	16.0'	N01°59.4	-14.9'	55.6'	0°	08:13	08:56	09:37	20:34	21:15	21:56
19	103°22.1	47.0	56°57.8	16.0'	01°44.5	-14.9'	55.6'	S 10°	08:20	08:59	09:35	20:28	21:15	22:00
20	118°22.1	46.4	71°32.8	16.0'	01°29.6	-14.9'	55.6'	20°	08:28	09:02	09:34	20:22	21:14	22:03
21	133°22.1	45.8	86°07.9	16.1'	01°14.8	-14.9'	55.5'	30°	08:37	09:06	09:32	20:16	21:13	22:08
22	148°22.1	45.2	100°43.0	16.1'	00°59.9	-14.9'	55.5'	35°	08:43	09:08	09:31	20:12	21:12	22:10
23	163°22.1	44.6	115°18.1	16.1'	00°45.0	-14.8'	55.5'	40°	08:49	09:10	09:30	20:08	21:11	22:13
	SD.=15.8	d=-0.6			S.D.=15.3			45°	08:55	09:13	09:29	20:02	21:10	22:16
								S 50°	09:04	09:16	09:28	19:56	21:09	22:20
								52°	09:07	09:18	09:27	19:53	21:09	22:22
								54°	09:12	09:20	09:27	19:50	21:08	22:24
								56°	09:16	09:21	09:26	19:47	21:08	22:26
								58°	09:21	09:23	09:25	19:43	21:07	22:29
								S 60°	09:27	09:26	09:24	19:38	21:06	22:31

Day	Sun		Mer.	Moon		Age
	Eqn.of Time	12 ^h	Pass	Upper Mer.Pass.	Lower Mer.Pass.	3-5 8-23%
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	
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	

July 30, 31, 01 (Wed., Thu., Fri.)

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°34.1	29°13.9	
1	322°55.7	234°19.5	49.1	147°10.5	32.1	220°39.4	52.5	320°25.8	29.8	Ankaa	353°06.4	-42°09.7	
2	337°58.1	249°18.8	49.3	162°11.5	31.5	235°41.3	52.4	335°28.3	29.8	Schedar	349°30.3	56°40.5	
3	353°00.6	264°18.2	· · 49.4	177°12.6	· · 30.8	250°43.2	· · 52.4	350°30.8	· · 29.8	Diphda	348°46.6	-17°50.6	
4	8°03.0	279°17.5	49.6	192°13.7	30.2	265°45.1	52.3	5°33.4	29.9	Achernar	335°19.7	-57°06.0	
5	23°05.5	294°16.9	49.7	207°14.7	29.6	280°47.0	52.3	20°35.9	29.9	Hamal	327°50.7	23°35.0	
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	Polaris	313°53.4	89°22.0	
7	53°10.4	324°15.6	50.0	237°16.9	28.3	310°50.7	52.2	50°40.9	30.0	Akamar	315°11.5	-40°11.8	
8	68°12.9	339°15.0	50.2	252°17.9	27.7	325°52.6	52.2	65°43.5	30.0	Menkar	314°05.7	4°11.5	
9	83°15.4	354°14.3	· · 50.3	267°19.0	· · 27.0	340°54.5	· · 52.1	80°46.0	· · 30.1	Mirfak	308°27.7	49°56.9	
10	98°17.8	9°13.7	50.5	282°20.1	26.4	355°56.4	52.1	95°48.5	30.1	Aldebaran	290°39.3	16°33.7	
11	113°20.3	24°13.0	50.6	297°21.1	25.7	10°58.2	52.0	110°51.0	30.2	Rigel	281°03.6	-8°10.2	
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	Capella	280°21.5	46°01.4	
13	143°25.2	54°11.7	50.9	327°23.3	24.5	41°02.0	52.0	140°56.1	30.2	Bellatrix	278°22.6	6°22.5	
14	158°27.7	69°11.1	51.0	342°24.3	23.8	56°03.9	51.9	155°58.6	30.3	Elnath	278°01.5	28°37.7	
15	173°30.2	84°10.5	· · 51.2	357°25.4	· · 23.2	71°05.8	· · 51.9	171°01.1	· · 30.3	Alnilam	275°37.5	-1°11.0	
16	188°32.6	99°09.8	51.3	12°26.5	22.6	86°07.7	51.8	186°03.7	30.3	Betelgeuse	270°51.8	7°24.8	
17	203°35.1	114°09.2	51.4	27°27.5	21.9	101°09.5	51.8	201°06.2	30.4	Canopus	263°52.7	-52°42.3	
18	218°37.5	129°08.5	N21°51.6	42°28.6	N02°21.3	116°11.4	N22°51.7	216°08.7	S01°30.4	Sirius	258°26.0	-16°44.7	
19	233°40.0	144°07.9	51.7	57°29.6	20.6	131°13.3	51.7	231°11.2	30.5	Adara	255°05.8	-20°00.2	
20	248°42.5	159°07.2	51.8	72°30.7	20.0	146°15.2	51.7	246°13.8	30.5	Procyon	244°50.6	5°09.8	
21	263°44.9	174°06.6	· · 52.0	87°31.8	· · 19.4	161°17.1	· · 51.6	261°16.3	· · 30.5	Pollux	243°17.0	27°57.9	
22	278°47.4	189°05.9	52.1	102°32.8	18.7	176°19.0	51.6	276°18.8	30.6	Avior	234°15.2	-50°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	Suhail	222°46.4	-43°32.1	
Mer.pass.:03:27		v-0.6 d0.2 m-3.9		v1.1 d-0.6 m1.6		v1.9 d-0.0 m-1.8		v2.5 d-0.0 m0.8		Miaplacidus		221°39.2	-69°49.3
										Alphard		217°47.6	-8°46.1
										Regulus		207°34.2	11°50.6
										Dubhe		193°40.9	61°37.0
										Denebola		182°24.6	14°25.9
										Gienah		175°43.3	-17°41.1
										Acrux		173°00.0	-63°14.7
										Gacrux		171°51.4	-57°15.6
										Alioth		166°12.8	55°49.5
										Spica		158°21.9	-11°17.7
										Alkaid		152°51.7	49°11.4
										Hadar		148°35.4	-60°30.0
										Menkent		147°57.1	-36°29.9
										Arcturus		145°47.3	19°03.4
										Rigel Kent.		139°39.6	-60°56.7
										Kochab		137°19.6	74°03.3
										Zuben'ubi		136°55.5	-16°08.9
										Alphecca		126°03.2	26°37.9
										Antares		112°15.1	-26°29.4
										Atria		107°08.5	-69°04.6
										Sabik		102°02.0	-15°45.4
										Shaula		96°09.4	-37°07.4
										Rasalhague		95°57.9	12°32.6
										Eltanin		90°41.5	51°29.3
										Kaus Aust.		83°31.5	-34°22.4
										Vega		80°32.6	38°48.5
										Nunki		75°46.8	-26°15.9
										Altair		61°59.2	8°56.2
										Peacock		53°04.3	-56°39.1
										Deneb		49°25.0	45°22.3
										Enif		33°38.0	9°59.6
										Al Na'ir		27°31.9	-46°50.0
										Fomalhaut		15°13.7	-29°29.0
										Scheat		13°44.5	28°13.3
										Markab		13°29.2	15°20.6
										Jul 30 Wed		SHA	Mer.pass
										Venus		271°26.9	09:23
										Mars		184°16.2	15:10
										Jupiter		257°44.4	10:16
										Saturn		357°30.1	03:38
										Jul 31 Thu		SHA	Mer.pass
										Venus		270°12.3	09:24
										Mars		183°42.6	15:09
										Jupiter		257°30.4	10:13
										Saturn		357°31.6	03:34
										Aug 01 Fri		SHA	Mer.pass
										Venus		268°57.5	09:25
										Mars		183°09.0	15:07
										Jupiter		257°16.5	10:10
										Saturn		357°33.1	03:30
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:03:20		v-0.7 d0.1 m-3.9		v1.1 d-0.6 m1.6		v1.9 d-0.0 m-1.8		v2.5 d-0.0 m0.8					

August 02, 03, 04 (Sat., Sun., Mon.)

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°34.1	29°13.9	
1	325°53.1	233°32.5	57.4	148°27.0	46.1	222°55.1	49.4	323°27.9	32.6	Ankaa	353°06.4	-42°09.7	
2	340°55.5	248°31.9	57.5	163°28.1	45.5	237°57.0	49.3	338°30.4	32.7	Schedar	349°30.2	56°40.5	
3	355°58.0	263°31.2	· · 57.6	178°29.1	· · 44.8	252°58.9	· · 49.3	353°33.0	· · 32.7	Diphda	348°46.5	-17°50.6	
4	11°00.5	278°30.5	57.7	193°30.2	44.2	268°00.8	49.2	8°35.5	32.8	Achernar	335°19.7	-57°06.0	
5	26°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°51.7	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	Akamars	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	· · 41.0	343°10.2	· · 49.0	83°48.2	· · 33.0	Mirfak	308°27.7	49°56.9	
10	101°15.2	8°26.6	58.1	283°36.6	40.3	358°12.1	49.0	98°50.7	33.0	Aldebaran	290°39.3	16°33.7	
11	116°17.7	23°25.9	58.2	298°37.6	39.7	13°14.0	48.9	113°53.3	33.1	Rigel	281°03.6	-8°10.2	
12	131°20.2	38°25.2	N21°58.3	313°38.7	N01°39.0	28°15.9	N22°48.9	128°55.8	S01°33.1	Capella	280°21.5	46°01.4	
13	146°22.6	53°24.6	58.3	328°39.7	38.4	43°17.8	48.8	143°58.3	33.1	Bellatrix	278°22.6	6°22.5	
14	161°25.1	68°23.9	58.4	343°40.8	37.8	58°19.7	48.8	159°00.9	33.2	Elnath	278°01.5	28°37.7	
15	176°27.6	83°23.3	· · 58.5	358°41.9	· · 37.1	73°21.6	· · 48.8	174°03.4	· · 33.2	Alnilam	275°37.5	-1°11.0	
16	191°30.0	98°22.6	58.5	13°42.9	36.5	88°23.4	48.7	189°05.9	33.3	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°26.0	-16°44.7	
19	236°37.4	143°20.6	58.7	58°46.1	34.6	133°29.1	48.6	234°13.6	33.4	Adara	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°50.6	5°09.8	
21	266°42.4	173°19.3	· · 58.8	88°48.2	· · 33.3	163°32.9	· · 48.5	264°18.6	· · 33.5	Pollux	243°17.0	27°57.9	
22	281°44.8	188°18.6	58.9	103°49.3	32.6	178°34.8	48.5	279°21.2	33.5	Avior	234°15.2	-50°35.4	
23	296°47.3	203°17.9	59.0	118°50.3	32.0	193°36.7	48.4	294°23.7	33.6	Suhail	222°46.4	-43°32.1	
Mer.pass.:03:16		v-0.7 d0.1 m-3.9		v1.1 d-0.6 m1.6		v1.9 d-0.0 m-1.8		v2.5 d-0.0 m0.8		Miaplacidus		221°39.2	-69°49.3
										Alphard		217°47.6	-8°46.1
										Regulus		207°34.2	11°50.6
										Dubhe		193°40.9	61°37.0
										Denebola		182°24.6	14°25.9
										Gienah		175°43.3	-17°41.1
										Acrux		173°00.0	-63°14.7
										Gacrux		171°51.5	-57°15.6
										Alioth		166°12.8	55°49.5
										Spica		158°21.9	-11°17.7
										Alkaid		152°51.7	49°11.4
										Hadar		148°35.4	-60°30.0
										Menkent		147°57.1	-36°29.9
										Arcturus		145°47.3	19°03.4
										Rigel Kent.		139°39.6	-60°56.7
										Kochab		137°19.7	74°03.3
										Zuben'ubi		136°55.5	-16°08.9
										Alphecca		126°03.3	26°37.9
										Antares		112°15.1	-26°29.4
										Atria		107°08.5	-69°04.6
										Sabik		102°02.0	-15°45.4
										Shaula		96°09.4	-37°07.4
										Rasalhague		95°57.9	12°32.6
										Eltanin		90°41.5	51°29.3
										Kaus Aust.		83°31.5	-34°22.4
										Vega		80°32.6	38°48.5
										Nunki		75°46.8	-26°15.9
										Altair		61°59.2	8°56.2
										Peacock		53°04.3	-56°39.1
										Deneb		49°25.0	45°22.3
										Enif		33°38.0	9°59.6
										Al Na'ir		27°31.9	-46°50.0
										Fomalhaut		15°13.7	-29°29.0
										Scheat		13°44.5	28°13.3
										Markab		13°29.2	15°20.6
										Aug 02 Sat		SHA	Mer.pass
										Venus		267°42.6	09:26
										Mars		182°35.4	15:05
										Jupiter		257°02.6	10:07
										Saturn		357°34.8	03:26
										Aug 03 Sun		SHA	Mer.pass
										Venus		266°27.5	09:27
										Mars		182°01.6	15:04
										Jupiter		256°48.8	10:04
										Saturn		357°36.5	03:22
										Aug 04 Mon		SHA	Mer.pass
										Venus		265°12.3	09:28
										Mars		181°27.9	15:02
										Jupiter		256°35.1	10:01
										Saturn		357°38.3	03:18
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:03:08		v-0.7 d0.0 m-3.9		v1.1 d-0.6 m1.6		v1.9 d-0.0 m-1.8		v2.5 d-0.0 m0.8					

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

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°34.0	29°13.9
1	328°50.5	232°44.3	00.6	149°43.1	00°59.8	225°11.3	46.2	326°30.8	35.8	Ankaa	353°06.4	-42°09.7
2	343°53.0	247°43.7	00.6	164°44.2	59.2	240°13.2	46.1	341°33.3	35.8	Schedar	349°30.2	56°40.5
3	358°55.4	262°43.0	· · 00.6	179°45.2	· · 58.5	255°15.1	· · 46.1	356°35.9	· · 35.9	Diphda	348°46.5	-17°50.6
4	13°57.9	277°42.3	00.6	194°46.3	57.9	270°17.0	46.0	11°38.4	35.9	Achernar	335°19.6	-57°06.0
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°49.8	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	Akamars	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°05.6	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°56.9
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°15.1	22°37.6	00.6	299°53.6	53.4	15°30.3	45.7	116°56.3	36.3	Rigel	281°03.6	-8°10.2
12	134°17.6	37°36.9	N22°00.6	314°54.7	N00°52.7	30°32.1	N22°45.7	131°58.8	S01°36.3	Capella	280°21.5	46°01.4
13	149°20.1	52°36.2	00.6	329°55.7	52.1	45°34.0	45.6	147°01.4	36.4	Bellatrix	278°22.6	6°22.5
14	164°22.5	67°35.5	00.6	344°56.8	51.4	60°35.9	45.6	162°03.9	36.4	Elnath	278°01.5	28°37.7
15	179°25.0	82°34.9	· · 00.6	359°57.8	· · 50.8	75°37.8	· · 45.5	177°06.4	· · 36.4	Alnilam	275°37.5	-1°11.0
16	194°27.5	97°34.2	00.6	14°58.9	50.1	90°39.7	45.5	192°09.0	36.5	Betelgeuse	270°51.8	7°24.8
17	209°29.9	112°33.5	00.6	29°59.9	49.5	105°41.6	45.4	207°11.5	36.5	Canopus	263°52.6	-52°42.3
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	Sirius	258°26.0	-16°44.7
19	239°34.8	142°32.1	00.6	60°02.0	48.2	135°45.4	45.3	237°16.6	36.6	Adara	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°50.5	5°09.8
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°17.0	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	-50°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
Mer.pass.:03:04		v-0.7 d0.0 m-3.9		v1.1 d-0.6 m1.6		v1.9 d-0.0 m-1.8		v2.5 d-0.0 m0.8		Miaplacidus	221°39.2	-69°49.3
										Alphard	217°47.6	-8°46.1
										Regulus	207°34.2	11°50.6
										Dubhe	193°40.9	61°37.0
										Denebola	182°24.6	14°25.9
										Gienah	175°43.3	-17°41.1
										Acrux	173°00.0	-63°14.7
										Gacrux	171°51.5	-57°15.6
										Alioth	166°12.8	55°49.5
										Spica	158°21.9	-11°17.7
										Alkaid	152°51.7	49°11.4
										Hadar	148°35.5	-60°30.0
										Menkent	147°57.1	-36°29.9
										Arcturus	145°47.4	19°03.4
										Rigel Kent.	139°39.7	-60°56.7
										Kochab	137°19.7	74°03.3
										Zuben'ubi	136°55.5	-16°08.9
										Alphecca	126°03.3	26°37.9
										Antares	112°15.1	-26°29.4
										Atria	107°08.5	-69°04.6
										Sabik	102°02.0	-15°45.4
										Shaula	96°09.4	-37°07.4
										Rasalhague	95°57.9	12°32.6
										Eltanin	90°41.6	51°29.3
										Kaus Aust.	83°31.5	-34°22.4
										Vega	80°32.6	38°48.5
										Nunki	75°46.8	-26°15.9
										Altair	61°59.2	8°56.2
										Peacock	53°04.3	-56°39.1
										Deneb	49°25.0	45°22.3
										Enif	33°38.0	9°59.6
										Al Na'ir	27°31.8	-46°50.0
										Fomalhaut	15°13.7	-29°29.0
										Scheat	13°44.5	28°13.3
										Markab	13°29.1	15°20.6
										Aug 05 Tue	SHA	Mer.pass
										Venus	263°57.0	09:29
										Mars	180°54.0	15:00
										Jupiter	256°21.4	09:58
										Saturn	357°40.2	03:14
										Aug 06 Wed	SHA	Mer.pass
										Venus	262°41.6	09:31
										Mars	180°20.1	14:58
										Jupiter	256°07.7	09:55
										Saturn	357°42.2	03:10
										Aug 07 Thu	SHA	Mer.pass
										Venus	261°26.1	09:32
										Mars	179°46.2	14:57
										Jupiter	255°54.2	09:52
										Saturn	357°44.3	03:05
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:02:56		v-0.7 d-0.0 m-3.9		v1.0 d-0.6 m1.6		v1.9 d-0.0 m-1.8		v2.6 d-0.0 m0.8				

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

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	316°45.4	216°55.9	N21°58.5	135°57.6	N00°14.0	212°26.1	N22°42.9	314°31.9	S01°39.2	Alpheratz	357°34.0	29°13.9	
1	331°47.9	231°55.2	58.5	150°58.7	13.3	227°28.0	42.8	329°34.4	39.3	Ankaa	353°06.3	-42°09.7	
2	346°50.4	246°54.5	58.4	165°59.7	12.7	242°29.9	42.8	344°37.0	39.3	Schedar	349°30.2	56°40.5	
3	1°52.8	261°53.8	· · 58.3	181°00.8	· · 12.0	257°31.8	· · 42.7	359°39.5	· · 39.4	Diphda	348°46.5	-17°50.6	
4	16°55.3	276°53.1	58.3	196°01.8	11.4	272°33.7	42.7	14°42.1	39.4	Achernar	335°19.6	-57°06.0	
5	31°57.8	291°52.5	58.2	211°02.9	10.7	287°35.6	42.6	29°44.7	39.5	Hamal	327°50.6	23°35.0	
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	Polaris	313°48.2	89°22.0	
7	62°02.7	321°51.1	58.0	241°05.0	09.4	317°39.4	42.5	59°49.8	39.6	Akamar	315°11.4	-40°11.8	
8	77°05.2	336°50.4	58.0	256°06.0	08.8	332°41.3	42.5	74°52.3	39.6	Menkar	314°05.6	4°11.5	
9	92°07.6	351°49.7	· · 57.9	271°07.0	· · 08.1	347°43.2	· · 42.4	89°54.9	· · 39.7	Mirfak	308°27.6	49°57.0	
10	107°10.1	6°49.0	57.8	286°08.1	07.5	2°45.1	42.4	104°57.4	39.7	Aldebaran	290°39.2	16°33.7	
11	122°12.6	21°48.3	57.7	301°09.1	06.8	17°47.0	42.3	120°00.0	39.8	Rigel	281°03.6	-8°10.1	
12	137°15.0	36°47.6	N21°57.7	316°10.2	N00°06.2	32°48.9	N22°42.3	135°02.6	S01°39.8	Capella	280°21.4	46°01.4	
13	152°17.5	51°47.0	57.6	331°11.2	05.5	47°50.8	42.2	150°05.1	39.9	Bellatrix	278°22.5	6°22.5	
14	167°19.9	66°46.3	57.5	346°12.3	04.9	62°52.7	42.2	165°07.7	39.9	Elnath	278°01.5	28°37.7	
15	182°22.4	81°45.6	· · 57.4	1°13.3	· · 04.2	77°54.7	· · 42.1	180°10.2	· · 40.0	Alnilam	275°37.4	-1°11.0	
16	197°24.9	96°44.9	57.3	16°14.4	03.6	92°56.6	42.1	195°12.8	40.0	Betelgeuse	270°51.8	7°24.8	
17	212°27.3	111°44.2	57.3	31°15.4	02.9	107°58.5	42.1	210°15.3	40.1	Canopus	263°52.6	-52°42.3	
18	227°29.8	126°43.5	N21°57.2	46°16.4	N00°02.3	123°00.4	N22°42.0	225°17.9	S01°40.1	Sirius	258°26.0	-16°44.7	
19	242°32.3	141°42.8	57.1	61°17.5	01.6	138°02.3	42.0	240°20.5	40.2	Adara	255°05.8	-29°00.2	
20	257°34.7	156°42.1	57.0	76°18.5	01.0	153°04.2	41.9	255°23.0	40.2	Procyon	244°50.5	5°09.8	
21	272°37.2	171°41.4	· · 56.9	91°19.6	N00°00.3	168°06.1	· · 41.9	270°25.6	· · 40.3	Pollux	243°16.9	27°57.9	
22	287°39.7	186°40.7	56.8	106°20.6	S00°00.3	183°08.0	41.8	285°28.1	40.3	Avior	234°15.2	-50°35.3	
23	302°42.1	201°40.1	56.7	121°21.7	01.0	198°09.9	41.8	300°30.7	40.4	Suhail	222°46.4	-43°32.1	
Mer.pass.:02:52		v-0.7 d-0.1 m-3.9		v1.0 d-0.6 m1.6		v1.9 d-0.0 m-1.8		v2.6 d-0.1 m0.8		Miacplacidus		221°39.2	-69°49.3
										Alphard		217°47.6	-8°46.1
										Regulus		207°34.2	11°50.6
										Dubhe		193°40.9	61°37.0
										Denebola		182°24.6	14°25.9
										Gienah		175°43.3	-17°41.1
										Acrux		173°00.0	-63°14.7
										Gacrux		171°51.5	-57°15.6
										Alioth		166°12.8	55°49.5
										Spica		158°21.9	-11°17.7
										Alkaid		152°51.7	49°11.4
										Hadar		148°35.5	-60°30.0
										Menkent		147°57.1	-36°29.9
										Arcturus		145°47.4	19°03.4
										Rigel Kent.		139°39.7	-60°56.7
										Kochab		137°19.8	74°03.3
										Zuben'ubi		136°55.5	-16°08.9
										Alphecca		126°03.3	26°37.9
										Antares		112°15.1	-26°29.4
										Atria		107°08.6	-69°04.6
										Sabik		102°02.0	-15°45.4
										Shaula		96°09.4	-37°07.4
										Rasalhague		95°57.9	12°32.6
										Eltanin		90°41.6	51°29.3
										Kaus Aust.		83°31.5	-34°22.4
										Vega		80°32.6	38°48.5
										Nunki		75°46.8	-26°15.9
										Altair		61°59.2	8°56.2
										Peacock		53°04.3	-56°39.1
										Deneb		49°25.0	45°22.4
										Enif		33°38.0	9°59.6
										Al Na'ir		27°31.8	-46°50.0
										Fomalhaut		15°13.7	-29°29.0
										Scheat		13°44.4	28°13.3
										Markab		13°29.1	15°20.7
										Aug 08 Fri		SHA	Mer.pass
										Venus		260°10.5	09:33
										Mars		179°12.2	14:55
										Jupiter		255°40.7	09:49
										Saturn		357°46.4	03:01
										Aug 09 Sat		SHA	Mer.pass
										Venus		258°54.8	09:34
										Mars		178°38.1	14:53
										Jupiter		255°27.2	09:46
										Saturn		357°48.7	02:57
										Aug 10 Sun		SHA	Mer.pass
										Venus		257°39.0	09:35
										Mars		178°04.0	14:52
										Jupiter		255°13.8	09:43
										Saturn		357°51.0	02:53
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:02:44		v-0.7 d-0.1 m-3.9		v1.0 d-0.6 m1.6		v1.9 d-0.0 m-1.8		v2.6 d-0.1 m0.8					

August 11, 12, 13 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		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	S00°32.8	214°43.4	N22°39.4	317°36.2	S01°43.0	Alpheratz	357°34.0	29°13.9	
1	334°45.3	231°05.4	51.0	152°13.7	33.4	229°45.3	39.3	332°38.8	43.0	Ankaa	353°06.3	-42°09.7	
2	349°47.8	246°04.7	50.8	167°14.8	34.1	244°47.2	39.3	347°41.4	43.1	Schedar	349°30.1	56°40.6	
3	4°50.3	261°04.0	· · 50.7	182°15.8	· · 34.7	259°49.1	· · 39.2	2°43.9	· · 43.1	Diphda	348°46.5	-17°50.6	
4	19°52.7	276°03.3	50.5	197°16.8	35.4	274°51.0	39.2	17°46.5	43.2	Achernar	335°19.5	-57°06.0	
5	34°55.2	291°02.6	50.4	212°17.9	36.0	289°52.9	39.2	32°49.1	43.2	Hamal	327°50.6	23°35.0	
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	Polaris	313°46.7	89°22.0	
7	65°00.1	321°01.3	50.1	242°19.9	37.3	319°56.7	39.1	62°54.2	43.3	Akamars	315°11.3	-40°11.8	
8	80°02.6	336°00.6	50.0	257°21.0	38.0	334°58.6	39.0	77°56.7	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	· · 43.4	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°04.4	43.6	Rigel	281°03.5	-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°01.4	
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	170°17.4	65°56.4	49.1	347°27.2	41.9	65°10.1	38.7	168°12.1	43.7	Elnath	278°01.4	28°37.7	
15	185°19.8	80°55.7	· · 48.9	2°28.2	· · 42.5	80°12.0	· · 38.7	183°14.7	· · 43.8	Alnilam	275°37.4	-1°11.0	
16	200°22.3	95°55.0	48.7	17°29.3	43.2	95°13.9	38.6	198°17.3	43.8	Betelgeuse	270°51.8	7°24.8	
17	215°24.8	110°54.3	48.6	32°30.3	43.8	110°15.9	38.6	213°19.9	43.9	Canopus	263°52.6	-52°42.3	
18	230°27.2	125°53.6	N21°48.4	47°31.4	S00°44.5	125°17.8	N22°38.5	228°22.4	S01°43.9	Sirius	258°26.0	-16°44.7	
19	245°29.7	140°52.9	48.3	62°32.4	45.1	140°19.7	38.5	243°25.0	44.0	Adara	255°05.8	-29°00.2	
20	260°32.1	155°52.2	48.1	77°33.4	45.8	155°21.6	38.4	258°27.6	44.0	Procyon	244°50.5	5°09.8	
21	275°34.6	170°51.5	· · 47.9	92°34.5	· · 46.4	170°23.5	· · 38.4	273°30.1	· · 44.1	Pollux	243°16.9	27°57.9	
22	290°37.1	185°50.8	47.8	107°35.5	47.1	185°25.4	38.3	288°32.7	44.2	Avior	234°15.2	-50°35.3	
23	305°39.5	200°50.1	47.6	122°36.5	47.7	200°27.3	38.3	303°35.3	44.2	Suhail	222°46.4	-43°32.1	
Mer.pass.:02:40		v-0.7 d-0.1 m-3.9		v1.0 d-0.6 m1.6		v1.9 d-0.0 m-1.8		v2.6 d-0.1 m0.8		Miaplacidus		221°39.2	-69°49.3
										Alphard		217°47.6	-8°46.1
										Regulus		207°34.2	11°50.6
										Dubhe		193°40.9	61°36.9
										Denebola		182°24.6	14°25.9
										Gienah		175°43.3	-17°41.1
										Acrux		173°00.1	-63°14.7
										Gacrux		171°51.5	-57°15.6
										Alioth		166°12.9	55°49.5
										Spica		158°21.9	-11°17.7
										Alkaid		152°51.7	49°11.4
										Hadar		148°35.5	-60°30.0
										Menkent		147°57.2	-36°29.9
										Arcturus		145°47.4	19°03.4
										Rigel Kent.		139°39.7	-60°56.7
										Kochab		137°19.8	74°03.3
										Zuben'ubi		136°55.5	-16°08.9
										Alphecca		126°03.3	26°37.9
										Antares		112°15.1	-26°29.4
										Atria		107°08.6	-69°04.6
										Sabik		102°02.0	-15°45.4
										Shaula		96°09.4	-37°07.4
										Rasalhague		95°57.9	12°32.6
										Eltanin		90°41.6	51°29.3
										Kaus Aust.		83°31.5	-34°22.4
										Vega		80°32.6	38°48.6
										Nunki		75°46.8	-26°15.9
										Altair		61°59.2	8°56.2
										Peacock		53°04.3	-56°39.1
										Deneb		49°25.0	45°22.4
										Enif		33°38.0	9°59.6
										Al Na'ir		27°31.8	-46°50.0
										Fomalhaut		15°13.7	-29°29.0
										Scheat		13°44.4	28°13.3
										Markab		13°29.1	15°20.7
										Aug 11 Mon		SHA	Mer.pass
										Venus		256°23.3	09:36
										Mars		177°29.8	14:50
										Jupiter		255°00.5	09:40
										Saturn		357°53.4	02:49
										Aug 12 Tue		SHA	Mer.pass
										Venus		255°07.4	09:37
										Mars		176°55.6	14:48
										Jupiter		254°47.2	09:37
										Saturn		357°55.8	02:45
										Aug 13 Wed		SHA	Mer.pass
										Venus		253°51.6	09:38
										Mars		176°21.3	14:47
										Jupiter		254°34.1	09:34
										Saturn		357°58.4	02:41
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:02:32		v-0.7 d-0.2 m-3.9		v1.0 d-0.7 m1.6		v1.9 d-0.0 m-1.8		v2.6 d-0.1 m0.8					

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

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	322°40.3	215°16.0	N21°38.3	138°27.1	S01°19.6	217°01.2	N22°35.8	320°41.3	S01°47.0	Alpheratz	357°34.0	29°14.0
1	337°42.7	230°15.3	38.1	153°28.2	20.3	232°03.1	35.8	335°43.8	47.0	Ankaa	353°06.3	-42°09.7
2	352°45.2	245°14.6	37.9	168°29.2	20.9	247°05.1	35.7	350°46.4	47.1	Schedar	349°30.1	56°40.6
3	7°47.7	260°13.9	· · 37.7	183°30.2	· · 21.6	262°07.0	· · 35.7	5°49.0	· · 47.2	Diphda	348°46.5	-17°50.5
4	22°50.1	275°13.2	37.4	198°31.3	22.2	277°08.9	35.6	20°51.6	47.2	Achernar	335°19.5	-57°06.0
5	37°52.6	290°12.5	37.2	213°32.3	22.9	292°10.8	35.6	35°54.1	47.3	Hamal	327°50.5	23°35.0
6	52°55.1	305°11.8	N21°37.0	228°33.3	S01°23.5	307°12.7	N22°35.5	50°56.7	S01°47.3	Polaris	313°45.1	89°22.0
7	67°57.5	320°11.1	36.8	243°34.4	24.2	322°14.7	35.5	65°59.3	47.4	Akamars	315°11.3	-40°11.8
8	83°00.0	335°10.4	36.6	258°35.4	24.8	337°16.6	35.4	81°01.9	47.4	Menkar	314°05.6	4°11.6
9	98°02.5	350°09.7	· · 36.3	273°36.4	· · 25.5	352°18.5	· · 35.4	96°04.4	· · 47.5	Mirfak	308°27.5	49°57.0
10	113°04.9	5°09.0	36.1	288°37.4	26.1	7°20.4	35.3	111°07.0	47.6	Aldebaran	290°39.2	16°33.7
11	128°07.4	20°08.3	35.9	303°38.5	26.8	22°22.3	35.3	126°09.6	47.6	Rigel	281°03.5	-8°10.1
12	143°09.8	35°07.6	N21°35.6	318°39.5	S01°27.4	37°24.3	N22°35.2	141°12.2	S01°47.7	Capella	280°21.4	46°01.4
13	158°12.3	50°06.9	35.4	333°40.5	28.1	52°26.2	35.2	156°14.7	47.7	Bellatrix	278°22.5	6°22.5
14	173°14.8	65°06.2	35.2	348°41.6	28.7	67°28.1	35.1	171°17.3	47.8	Elnath	278°01.4	28°37.7
15	188°17.2	80°05.5	· · 35.0	3°42.6	· · 29.4	82°30.0	· · 35.1	186°19.9	· · 47.9	Alnilam	275°37.4	-1°11.0
16	203°19.7	95°04.8	34.7	18°43.6	30.0	97°31.9	35.0	201°22.5	47.9	Betelgeuse	270°51.7	7°24.8
17	218°22.2	110°04.1	34.5	33°44.6	30.7	112°33.9	35.0	216°25.1	48.0	Canopus	263°52.6	-52°42.2
18	233°24.6	125°03.4	N21°34.3	48°45.7	S01°31.3	127°35.8	N22°34.9	231°27.6	S01°48.0	Sirius	258°26.0	-16°44.7
19	248°27.1	140°02.7	34.0	63°46.7	32.0	142°37.7	34.9	246°30.2	48.1	Adara	255°05.8	-20°00.2
20	263°29.6	155°02.0	33.8	78°47.7	32.6	157°39.6	34.8	261°32.8	48.1	Procyon	244°50.5	5°09.8
21	278°32.0	170°01.3	· · 33.6	93°48.8	· · 33.3	172°41.5	· · 34.8	276°35.4	· · 48.2	Pollux	243°16.9	27°57.9
22	293°34.5	185°00.6	33.3	108°49.8	34.0	187°43.5	34.7	291°37.9	48.3	Avior	234°15.2	-50°35.3
23	308°36.9	199°59.9	33.1	123°50.8	34.6	202°45.4	34.7	306°40.5	48.3	Suhail	222°46.4	-43°32.0
Mer.pass.:02:28		v-0.7 d-0.2 m-3.9		v1.0 d-0.7 m1.6		v1.9 d-0.1 m-1.8		v2.6 d-0.1 m0.8		Miaplacidus	221°39.2	-60°49.2
										Alphard	217°47.6	-8°46.1
										Regulus	207°34.2	11°50.6
										Dubhe	193°40.9	61°36.9
										Denebola	182°24.6	14°25.9
										Gienah	175°43.3	-17°41.0
										Acrux	173°00.1	-63°14.6
										Gacrux	171°51.5	-57°15.6
										Alioth	166°12.9	55°49.5
										Spica	158°21.9	-11°17.7
										Alkaid	152°51.8	49°11.4
										Hadar	148°35.5	-60°30.0
										Menkent	147°57.2	-36°29.9
										Arcturus	145°47.4	19°03.4
										Rigel Kent.	139°39.8	-60°56.7
										Kochab	137°19.9	74°03.3
										Zuben'ubi	136°55.5	-16°08.9
										Alphecca	126°03.3	26°37.9
										Antares	112°15.1	-26°29.4
										Atria	107°08.6	-69°04.6
										Sabik	102°02.0	-15°45.4
										Shaula	96°09.5	-37°07.4
										Rasalhague	95°57.9	12°32.6
										Eltanin	90°41.6	51°29.3
										Kaus Aust.	83°31.5	-34°22.4
										Vega	80°32.6	38°48.6
										Nunki	75°46.8	-26°15.9
										Altair	61°59.2	8°56.2
										Peacock	53°04.3	-56°39.1
										Deneb	49°25.0	45°22.4
										Enif	33°38.0	9°59.7
										Al Na'ir	27°31.8	-46°50.0
										Fomalhaut	15°13.7	-29°29.0
										Scheat	13°44.4	28°13.3
										Markab	13°29.1	15°20.7
										Aug 14 Thu	SHA	Mer.pass
										Venus	252°35.7	09:39
										Mars	175°46.9	14:45
										Jupiter	254°20.9	09:31
										Saturn	358°01.0	02:37
										Aug 15 Fri	SHA	Mer.pass
										Venus	251°19.8	09:40
										Mars	175°12.4	14:44
										Jupiter	254°07.9	09:28
										Saturn	358°03.7	02:33
										Aug 16 Sat	SHA	Mer.pass
										Venus	250°04.0	09:42
										Mars	174°37.9	14:42
										Jupiter	253°54.9	09:25
										Saturn	358°06.5	02:29
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:02:21		v-0.7 d-0.3 m-3.9		v1.0 d-0.7 m1.6		v1.9 d-0.1 m-1.8		v2.6 d-0.1 m0.8				

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

Aries		Venus		Mars		Jupiter		Saturn		Stars				
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec			
0	325°37.7	214°25.8	N21°20.1	139°41.0	S02°06.6	219°19.7	N22°32.1	323°47.0	S01°51.3	Alpheratz	357°34.0	29°14.0		
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°52.1	51.4	Schedar	349°30.1	56°40.6		
3	10°45.1	259°23.7	· · 19.2	184°44.1	· · 08.6	264°25.5	· · 32.0	8°54.7	· · 51.4	Diphda	348°46.4	-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°06.0		
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°35.1		
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°43.2	89°22.0		
7	70°54.9	319°20.9	18.0	244°48.1	11.2	324°33.2	31.8	69°05.1	51.7	Akamars	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°11.6		
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	280°21.3	46°01.4		
13	161°09.7	49°16.8	16.2	334°54.3	15.1	54°44.8	31.5	159°20.6	52.1	Bellatrix	278°22.5	6°22.5		
14	176°12.2	64°16.1	15.9	349°55.3	15.7	69°46.7	31.4	174°23.2	52.1	Elnath	278°01.4	28°37.7		
15	191°14.7	79°15.4	· · 15.6	4°56.3	· · 16.4	84°48.6	· · 31.4	189°25.8	· · 52.2	Alnilam	275°37.4	-1°11.0		
16	206°17.1	94°14.7	15.3	19°57.3	17.0	99°50.6	31.3	204°28.3	52.2	Betelgeuse	270°51.7	7°24.8		
17	221°19.6	109°14.0	15.0	34°58.3	17.7	114°52.5	31.3	219°30.9	52.3	Canopus	263°52.5	-52°42.2		
18	236°22.0	124°13.3	N21°14.7	49°59.4	S02°18.4	129°54.4	N22°31.2	234°33.5	S01°52.4	Sirius	258°25.9	-16°44.7		
19	251°24.5	139°12.6	14.4	65°00.4	19.0	144°56.4	31.2	249°36.1	52.4	Adara	255°05.7	-29°00.2		
20	266°27.0	154°11.9	14.1	80°01.4	19.7	159°58.3	31.1	264°38.7	52.5	Procyon	244°50.5	5°09.8		
21	281°29.4	169°11.2	· · 13.8	95°02.4	· · 20.3	175°00.2	· · 31.1	279°41.3	· · 52.6	Pollux	243°16.9	27°57.9		
22	296°31.9	184°10.5	13.4	110°03.4	21.0	190°02.1	31.0	294°43.9	52.6	Avior	234°15.2	-50°35.3		
23	311°34.4	199°09.8	13.1	125°04.4	21.6	205°04.1	31.0	309°46.4	52.7	Suhail	222°46.4	-43°32.0		
Mer.pass.:02:17		v-0.7 d-0.3 m-3.9		v1.0 d-0.7 m1.6		v1.9 d-0.1 m-1.8		v2.6 d-0.1 m0.8		Miaaplacidus		221°39.2	-69°49.2	
Mon		GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Alphard		217°47.6	-8°46.1
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	Regulus	207°34.2	11°50.6		
1	341°39.3	229°08.4	12.5	155°06.5	22.9	235°07.9	30.8	339°51.6	52.8	Dubhe	193°40.9	61°36.9		
2	356°41.8	244°07.7	12.2	170°07.5	23.6	250°09.9	30.8	354°54.2	52.9	Denebola	182°24.6	14°25.9		
3	11°44.2	259°07.1	· · 11.9	185°08.5	· · 24.2	265°11.8	· · 30.7	9°56.8	· · 52.9	Gienah	175°43.3	-17°41.0		
4	26°46.7	274°06.4	11.5	200°09.5	24.9	280°13.7	30.7	24°59.4	53.0	Acrux	173°00.1	-63°14.6		
5	41°49.2	289°05.7	11.2	215°10.5	25.5	295°15.7	30.6	40°02.0	53.1	Gacrux	171°51.5	-57°15.6		
6	56°51.6	304°05.0	N21°10.9	230°11.6	S02°26.2	310°17.6	N22°30.6	55°04.5	S01°53.1	Alioth	166°12.9	55°49.5		
7	71°54.1	319°04.3	10.6	245°12.6	26.8	325°19.5	30.5	70°07.1	53.2	Spica	158°21.9	-11°17.7		
8	86°56.5	334°03.6	10.3	260°13.6	27.5	340°21.5	30.5	85°09.7	53.2	Alkaid	152°51.8	49°11.4		
9	101°59.0	349°02.9	· · 09.9	275°14.6	· · 28.2	355°23.4	· · 30.4	100°12.3	· · 53.3	Hadar	148°35.6	-60°30.0		
10	117°01.5	4°02.2	09.6	290°15.6	28.8	10°25.3	30.4	115°14.9	53.4	Menkent	147°57.2	-36°29.9		
11	132°03.9	19°01.5	09.3	305°16.6	29.5	25°27.3	30.3	130°17.5	53.4	Arcturus	145°47.4	19°03.4		
12	147°06.4	34°00.8	N21°09.0	320°17.7	S02°30.1	40°29.2	N22°30.3	145°20.1	S01°53.5	Rigel Kent.	139°39.8	-60°56.7		
13	162°08.9	49°00.1	08.6	335°18.7	30.8	55°31.1	30.2	160°22.7	53.6	Kochab	137°20.0	74°03.3		
14	177°11.3	63°59.4	08.3	350°19.7	31.4	70°33.1	30.2	175°25.3	53.6	Zuben'ubi	136°55.5	-16°08.9		
15	192°13.8	78°58.7	· · 08.0	5°20.7	· · 32.1	85°35.0	· · 30.1	190°27.8	· · 53.7	Alphecca	126°03.3	26°37.9		
16	207°16.3	93°58.0	07.6	20°21.7	32.7	100°36.9	30.1	205°30.4	53.7	Antares	112°15.1	-26°29.4		
17	222°18.7	108°57.3	07.3	35°22.7	33.4	115°38.9	30.0	220°33.0	53.8	Atria	107°08.7	-69°04.6		
18	237°21.2	123°56.7	N21°07.0	50°23.8	S02°34.0	130°40.8	N22°30.0	235°35.6	S01°53.9	Sabik	102°02.1	-15°45.4		
19	252°23.7	138°56.0	06.6	65°24.8	34.7	145°42.7	29.9	250°38.2	53.9	Shaula	96°09.5	-37°07.4		
20	267°26.1	153°55.3	06.3	80°25.8	35.3	160°44.7	29.9	265°40.8	54.0	Rasalhague	95°57.9	12°32.6		
21	282°28.6	168°54.6	· · 06.0	95°26.8	· · 36.0	175°46.6	· · 29.8	280°43.4	· · 54.1	Eltanin	90°41.6	51°29.3		
22	297°31.0	183°53.9	05.6	110°27.8	36.7	190°48.5	29.8	295°46.0	54.1	Kaus Aust.	83°31.5	-34°22.4		
23	312°33.5	198°53.2	05.3	125°28.8	37.3	205°50.5	29.7	310°48.6	54.2	Vega	80°32.6	38°48.6		
Mer.pass.:02:13		v-0.7 d-0.3 m-3.9		v1.0 d-0.7 m1.6		v1.9 d-0.1 m-1.8		v2.6 d-0.1 m0.7		Nunki		75°46.8	-26°15.9	
Tue		GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Altair		61°59.2	8°56.2
0	327°36.0	213°52.5	N21°04.9	140°29.9	S02°38.0	220°52.4	N22°29.6	325°51.1	S01°54.3	Peacock	53°04.3	-56°39.1		
1	342°38.4	228°51.8	04.6	155°30.9	38.6	235°54.3	29.6	340°53.7	54.3	Deneb	49°25.0	45°22.4		
2	357°40.9	243°51.1	04.3	170°31.9	39.3	250°56.3	29.5	355°56.3	54.4	Enif	33°38.0	9°59.7		
3	12°43.4	258°50.4	· · 03.9	185°32.9	· · 39.9	265°58.2	· · 29.5	10°58.9	· · 54.4	Al Na'ir	27°31.8	-46°50.1		
4	27°45.8	273°49.7	03.6	200°33.9	40.6	281°00.1	29.4	26°01.5	54.5	Fomalhaut	15°13.6	-29°29.0		
5	42°48.3	288°49.0	03.2	215°34.9	41.2	296°02.1	29.4	41°04.1	54.6	Scheat	13°44.4	28°13.4		
6	57°50.8	303°48.3	N21°02.9	230°35.9	S02°41.9	311°04.0	N22°29.3	56°06.7	S01°54.6	Markab	13°29.1	15°20.7		
7	72°53.2	318°47.7	02.5	245°37.0	42.5	326°05.9	29.3	71°09.3	54.7	Aug 17 Sun			SHA	Mer.pass
8	87°55.7	333°47.0	02.2	260°38.0	43.2	341°07.9	29.2	86°11.9	54.8	Venus	248°48.1	09:43		
9	102°58.2	348°46.3	· · 01.8	275°39.0	· · 43.8	356°09.8	· · 29.2	101°14.5	· · 54.8	Mars	174°03.3	14:40		
10	118°00.6	3°45.6	01.5	290°40.0	44.5	11°11.7	29.1	116°17.0	54.9	Jupiter	253°42.0	09:21		
11	133°03.1	18°44.9	01.1	305°41.0	45.2	26°13.7	29.1	131°19.6	55.0	Saturn	358°09.3	02:24		
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	S01°55.0	Aug 18 Mon			SHA	Mer.pass
13	163°08.0	48°43.5	00.4	335°43.0	46.5	56°17.6	29.0	161°24.8	55.1	Venus	247°32.3	09:44		
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	Mars	173°28.6	14:39		
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	Jupiter	253°29.2	09:18		
16	208°15.4	93°41.4	59.4	20°46.1	48.4	101°23.4	28.8	206°32.6	55.3	Saturn	358°12.2	02:20		
17	223°17.9	108°40.7	59.0	35°47.1	49.1	116°25.3	28.8	221°35.2	55.3	Aug 19 Tue			SHA	Mer.pass
18	238°20.3	123°40.1	N20°58.6	50°48.1	S02°49.7	131°27.2	N22°28.7	236°37.8	S01°55.4	Venus	246°16.5	09:45		
19	253°22.8	138°39.4	58.3	65°49.1	50.4	146°29.2	28.6	251°40.4	55.5	Mars	172°53.9	14:37		
20	268°25.3	153°38.7	57.9	80°50.1	51.0	161°31.1	28.6	266°43.0	55.5	Jupiter	253°16.4	09:15		
21	283°27.7	168°38.0	· · 57.6	95°51.1	· · 51.7	176°33.0	· · 28.5	281°45.6	· · 55.6	Saturn	358°15.2	02:16		
22	298°30.2	183°37.3	57.2	110°52.1	52.4	191°35.0	28.5	296°48.1	55.7	Horizontal parallax				
23	313°32.6	198°36.6	56.8	125°53.2	53.0	206°36.9	28.4	311°50.7	55.7	Venus:		0.1		
Mer.pass.:02:09		v-0.7 d-0.3 m-3.9		v1.0 d-0.7 m1.6		v1.9 d-0.1 m-1.8		v2.6 d-0.1 m0.7		Mars:			0.1	

August 20, 21, 22 (Wed., Thu., Fri.)

Aries		Venus		Mars		Jupiter		Saturn		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	S02°53.7	221°38.9	N22°28.4	326°53.3	S01°55.8	Alpheratz	357°34.0	29°14.0	
1	343°37.6	228°35.2	56.1	155°55.2	54.3	236°40.8	28.3	341°55.9	55.8	Ankaa	353°06.3	-42°09.7	
2	358°40.0	243°34.5	55.7	170°56.2	55.0	251°42.7	28.3	356°58.5	55.9	Schedar	349°30.1	56°40.6	
3	13°42.5	258°33.8	· · 55.4	185°57.2	· · 55.6	266°44.7	· · 28.2	12°01.1	· · 56.0	Diphda	348°46.4	-17°50.5	
4	28°45.0	273°33.2	55.0	200°58.2	56.3	281°46.6	28.2	27°03.7	56.0	Achernar	335°19.5	-57°06.0	
5	43°47.4	288°32.5	54.6	215°59.2	56.9	296°48.5	28.1	42°06.3	56.1	Hamal	327°50.5	23°35.1	
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°41.4	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	Akamars	315°11.3	-40°11.8	
8	88°54.8	333°30.4	53.5	261°02.3	58.9	341°54.4	28.0	87°14.1	56.3	Menkar	314°05.5	4°11.6	
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	118°59.8	3°29.0	52.8	291°04.3	03°00.2	11°58.2	27.9	117°19.3	56.4	Aldebaran	290°39.1	16°33.7	
11	134°02.2	18°28.3	52.4	306°05.3	00.9	27°00.2	27.8	132°21.9	56.5	Rigel	281°03.5	-8°10.1	
12	149°04.7	33°27.6	N20°52.0	321°06.3	S03°01.5	42°02.1	N22°27.8	147°24.4	S01°56.6	Capella	280°21.3	46°01.4	
13	164°07.1	48°27.0	51.6	336°07.3	02.2	57°04.1	27.7	162°27.0	56.6	Bellatrix	278°22.4	6°22.5	
14	179°09.6	63°26.3	51.3	351°08.3	02.8	72°06.0	27.6	177°29.6	56.7	Elnath	278°01.4	28°37.7	
15	194°12.1	78°25.6	· · 50.9	6°09.3	· · 03.5	87°07.9	· · 27.6	192°32.2	· · 56.8	Alnilam	275°37.3	-1°11.0	
16	209°14.5	93°24.9	50.5	21°10.3	04.1	102°09.9	27.5	207°34.8	56.8	Betelgeuse	270°51.7	7°24.8	
17	224°17.0	108°24.2	50.1	36°11.3	04.8	117°11.8	27.5	222°37.4	56.9	Canopus	263°52.5	-52°42.2	
18	239°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°25.9	-16°44.7	
19	254°21.9	138°22.8	49.4	66°13.4	06.1	147°15.7	27.4	252°42.6	57.0	Adara	255°05.7	-20°00.2	
20	269°24.4	153°22.1	49.0	81°14.4	06.7	162°17.6	27.3	267°45.2	57.1	Procyon	244°50.5	5°09.8	
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°16.9	27°57.9	
22	299°29.3	183°20.8	48.2	111°16.4	08.1	192°21.5	27.2	297°50.4	57.2	Avior	234°15.2	-50°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.pass.:02:05		v-0.7 d-0.4 m-3.9		v1.0 d-0.7 m1.6		v1.9 d-0.1 m-1.8		v2.6 d-0.1 m0.7		Miaplacidus		221°39.2	-69°49.2
										Alphard		217°47.6	-8°46.1
										Regulus		207°34.2	11°50.6
										Dubhe		193°40.9	61°36.9
										Denebola		182°24.6	14°25.9
										Gienah		175°43.3	-17°41.0
										Acrux		173°00.1	-63°14.6
										Gacrux		171°51.5	-57°15.6
										Alioth		166°12.9	55°49.5
										Spica		158°21.9	-11°17.7
										Alkaid		152°51.8	49°11.4
										Hadar		148°35.6	-60°30.0
										Menkent		147°57.2	-36°29.9
										Arcturus		145°47.4	19°03.4
										Rigel Kent.		139°39.8	-60°56.7
										Kochab		137°20.0	74°03.2
										Zuben'ubi		136°55.5	-16°08.9
										Alphecca		126°03.3	26°37.9
										Antares		112°15.1	-26°29.4
										Atria		107°08.7	-69°04.7
										Sabik		102°02.1	-15°45.4
										Shaula		96°09.5	-37°07.4
										Rasalhague		95°57.9	12°32.6
										Eltanin		90°41.7	51°29.3
										Kaus Aust.		83°31.5	-34°22.4
										Vega		80°32.6	38°48.6
										Nunki		75°46.8	-26°15.9
										Altair		61°59.2	8°56.2
										Peacock		53°04.3	-56°39.2
										Deneb		49°25.0	45°22.4
										Enif		33°38.0	9°59.7
										Al Na'ir		27°31.8	-46°50.1
										Fomalhaut		15°13.6	-29°29.0
										Scheat		13°44.4	28°13.4
										Markab		13°29.1	15°20.7
										Aug 20 Wed		SHA	Mer.pass
										Venus		245°00.8	09:46
										Mars		172°19.1	14:35
										Jupiter		253°03.7	09:12
										Saturn		358°18.2	02:12
										Aug 21 Thu		SHA	Mer.pass
										Venus		243°45.1	09:47
										Mars		171°44.1	14:34
										Jupiter		252°51.1	09:09
										Saturn		358°21.3	02:08
										Aug 22 Fri		SHA	Mer.pass
										Venus		242°29.6	09:48
										Mars		171°09.2	14:32
										Jupiter		252°38.6	09:06
										Saturn		358°24.5	02:04
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:01:57		v-0.7 d-0.4 m-3.9		v1.0 d-0.7 m1.6		v1.9 d-0.1 m-1.8		v2.6 d-0.1 m0.7					

August 23, 24, 25 (Sat., Sun., Mon.)

Aries			Venus			Mars			Jupiter			Saturn			Stars						
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec						
0	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°06.2	-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			Diphda	348°46.4	-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	00.8			Achernar	335°19.4	-57°06.1							
5	46°44.9	287°43.2	25.4	217°11.6	44.0	299°08.5	24.3	45°13.3	00.9			Hamal	327°50.5	23°35.1							
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			Polaris	313°40.0	89°22.0							
7	76°49.8	317°41.8	24.5	247°13.6	45.3	329°12.4	24.2	75°18.5	01.0			Akamars	315°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°05.5	4°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°39.1	22.7	307°17.6	48.0	29°20.2	24.0	135°28.9	01.3			Rigel	281°03.5	-8°10.1							
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			Capella	280°21.3	46°01.4							
13	167°04.6	47°37.8	21.8	337°19.6	49.3	59°24.1	23.9	165°34.1	01.4			Bellatrix	278°22.4	6°22.5							
14	182°07.0	62°37.1	21.3	352°20.6	49.9	74°26.0	23.8	180°36.7	01.5			Elnath	278°01.3	28°37.7							
15	197°09.5	77°36.4	· · 20.9	7°21.6	· · 50.6	89°28.0	· · 23.8	195°39.3	· · 01.5			Alnilam	275°37.3	-1°11.0							
16	212°12.0	92°35.7	20.4	22°22.6	51.2	104°29.9	23.7	210°41.9	01.6			Betelgeuse	270°51.7	7°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°25.9	-16°44.7							
19	257°19.3	137°33.7	19.0	67°25.6	53.2	149°35.8	23.5	255°49.7	01.8			Adara	255°05.7	-20°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			Procyon	244°50.4	5°09.8							
21	287°24.3	167°32.4	· · 18.1	97°27.6	· · 54.5	179°39.7	· · 23.4	285°54.9	· · 02.0			Pollux	243°16.8	27°57.9							
22	302°26.7	182°31.7	17.7	112°28.6	55.2	194°41.6	23.4	300°57.5	02.0			Avior	234°15.1	-50°35.3							
23	317°29.2	197°31.0	17.2	127°29.6	55.8	209°43.6	23.3	316°00.1	02.1			Suhail	222°46.4	-43°32.0							
Mer.pass.:01:53			v-0.7 d-0.4 m-3.9			v1.0 d-0.7 m1.6			v1.9 d-0.1 m-1.8			v2.6 d-0.1 m0.7			Miaplacidus			221°39.2	-69°49.2		
															Alphard			217°47.5	-8°46.1		
															Regulus			207°34.2	11°50.6		
															Dubhe			193°40.9	61°36.9		
															Denebola			182°24.6	14°25.9		
															Gienah			175°43.3	-17°41.0		
															Acrux			173°00.1	-63°14.6		
															Gacrux			171°51.6	-57°15.5		
															Alioth			166°12.9	55°49.4		
															Spica			158°21.9	-11°17.7		
															Alkaid			152°51.8	49°11.3		
															Hadar			148°35.6	-60°30.0		
															Menkent			147°57.2	-36°29.9		
															Arcturus			145°47.4	19°03.4		
															Rigel Kent.			139°39.8	-60°56.7		
															Kochab			137°20.1	74°03.2		
															Zuben'ubi			136°55.5	-16°08.9		
															Alphecca			126°03.3	26°37.9		
															Antares			112°15.1	-26°29.4		
															Atria			107°08.7	-69°04.7		
															Sabik			102°02.1	-15°45.4		
															Shaula			96°09.5	-37°07.4		
															Rasalhague			95°57.9	12°32.6		
															Eltanin			90°41.7	51°29.3		
															Kaus Aust.			83°31.6	-34°22.4		
															Vega			80°32.6	38°48.6		
															Nunki			75°46.9	-26°15.9		
															Altair			61°59.2	8°56.2		
															Peacock			53°04.3	-56°39.2		
															Deneb			49°25.0	45°22.4		
															Enif			33°38.0	9°59.7		
															Al Na'ir			27°31.8	-46°50.1		
															Fomalhaut			15°13.6	-29°29.0		
															Scheat			13°44.4	28°13.4		
															Markab			13°29.1	15°20.7		
															Aug 23 Sat			SHA	Mer.pass		
															Venus			241°14.1	09:49		
															Mars			170°34.1	14:31		
															Jupiter			252°26.2	09:03		
															Saturn			358°27.7	02:00		
															Aug 24 Sun			SHA	Mer.pass		
															Venus			239°58.7	09:50		
															Mars			169°58.9	14:29		
															Jupiter			252°13.9	09:00		
															Saturn			358°31.1	01:55		
															Aug 25 Mon			SHA	Mer.pass		
															Venus			238°43.4	09:51		
															Mars			169°23.7	14:27		
															Jupiter			252°01.6	08:57		
															Saturn			358°34.4	01:51		
															Horizontal parallax						
															Venus:			0.1			
															Mars:			0.1			
Mer.pass.:01:45			v-0.7 d-0.5 m-3.9			v1.0 d-0.7 m1.6			v2.0 d-0.1 m-1.8			v2.6 d-0.1 m0.7									

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

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	334°29.9	211°58.1	N19°53.4	143°18.3	S04°27.9	226°19.4	N22°20.7	333°07.8	S02°05.5	Alpheratz	357°33.9	29°14.0	
1	349°32.4	226°57.5	52.9	158°19.3	28.5	241°21.4	20.6	348°10.4	05.6	Ankaa	353°06.2	-42°09.7	
2	4°34.9	241°56.8	52.4	173°20.3	29.2	256°23.3	20.6	3°13.0	05.6	Schedar	349°30.0	56°40.6	
3	19°37.3	256°56.2	· · 51.9	188°21.3	· · 29.8	271°25.3	· · 20.5	18°15.6	· · 05.7	Diphda	348°46.4	-17°50.5	
4	34°39.8	271°55.5	51.4	203°22.3	30.5	286°27.2	20.5	33°18.2	05.8	Achernar	335°19.4	-57°06.1	
5	49°42.3	286°54.8	50.9	218°23.3	31.1	301°29.2	20.4	48°20.8	05.8	Hamal	327°50.4	23°35.1	
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	Polaris	313°38.5	89°22.0	
7	79°47.2	316°53.5	49.8	248°25.3	32.4	331°33.1	20.3	78°26.0	06.0	Akamars	315°11.2	-40°11.8	
8	94°49.7	331°52.8	49.3	263°26.3	33.1	346°35.1	20.2	93°28.7	06.0	Menkar	314°05.5	4°11.6	
9	109°52.1	346°52.2	· · 48.8	278°27.3	· · 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°39.1	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°01.4	
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°48.8	46.2	353°32.2	37.0	76°46.8	19.9	183°44.3	06.5	Elnath	278°01.3	28°37.7	
15	200°06.9	76°48.2	· · 45.7	8°33.2	· · 37.7	91°48.8	· · 19.9	198°46.9	· · 06.5	Alnilam	275°37.3	-1°11.0	
16	215°09.4	91°47.5	45.1	23°34.2	38.3	106°50.8	19.8	213°49.5	06.6	Betelgeuse	270°51.7	7°24.8	
17	230°11.8	106°46.9	44.6	38°35.2	39.0	121°52.7	19.7	228°52.1	06.7	Canopus	263°52.5	-52°42.2	
18	245°14.3	121°46.2	N19°44.1	53°36.2	S04°39.6	136°54.7	N22°19.7	243°54.7	S02°06.7	Sirius	258°25.9	-16°44.7	
19	260°16.8	136°45.5	43.6	68°37.1	40.3	151°56.6	19.6	258°57.4	06.8	Adara	255°05.7	-29°00.2	
20	275°19.2	151°44.9	43.0	83°38.1	40.9	166°58.6	19.6	274°00.0	06.9	Procyon	244°50.4	5°09.8	
21	290°21.7	166°44.2	· · 42.5	98°39.1	· · 41.6	182°00.6	· · 19.5	289°02.6	· · 07.0	Pollux	243°16.8	27°57.9	
22	305°24.2	181°43.6	42.0	113°40.1	42.2	197°02.5	19.5	304°05.2	07.0	Avior	234°15.1	-50°35.3	
23	320°26.6	196°42.9	41.4	128°41.1	42.9	212°04.5	19.4	319°07.8	07.1	Suhail	222°46.4	-43°32.0	
Mer.pass.:01:41		v-0.7 d-0.5 m-3.9		v1.0 d-0.7 m1.6		v2.0 d-0.1 m-1.8		v2.6 d-0.1 m0.7		Miaplacidus		221°39.2	-69°49.2
										Alphard		217°47.5	-8°46.1
										Regulus		207°34.2	11°50.6
										Dubhe		193°40.9	61°36.9
										Denebola		182°24.6	14°25.9
										Gienah		175°43.3	-17°41.0
										Acrux		173°00.2	-63°14.6
										Gacrux		171°51.6	-57°15.5
										Alioth		166°12.9	55°49.4
										Spica		158°22.0	-11°17.7
										Alkaid		152°51.8	49°11.3
										Hadar		148°35.6	-60°30.0
										Menkent		147°57.2	-36°29.9
										Arcturus		145°47.4	19°03.4
										Rigel Kent.		139°39.9	-60°56.7
										Kochab		137°20.1	74°03.2
										Zuben 'ubi		136°55.6	-16°08.9
										Alphecca		126°03.4	26°37.9
										Antares		112°15.1	-26°29.4
										Atria		107°08.8	-69°04.7
										Sabik		102°02.1	-15°45.4
										Shaula		96°09.5	-37°07.4
										Rasalhague		95°58.0	12°32.7
										Eltanin		90°41.7	51°29.4
										Kaus Aust.		83°31.6	-34°22.4
										Vega		80°32.7	38°48.6
										Nunki		75°46.9	-26°15.9
										Altair		61°59.2	8°56.2
										Peacock		53°04.3	-56°39.2
										Deneb		49°25.0	45°22.5
										Enif		33°38.0	9°59.7
										Al Na'ir		27°31.8	-46°50.1
										Fomalhaut		15°13.6	-29°29.0
										Scheat		13°44.4	28°13.4
										Markab		13°29.1	15°20.7
										Aug 26 Tue		SHA	Mer.pass
										Venus		237°28.2	09:53
										Mars		168°48.4	14:26
										Jupiter		251°49.5	08:54
										Saturn		358°37.8	01:47
										Aug 27 Wed		SHA	Mer.pass
										Venus		236°13.2	09:54
										Mars		168°13.0	14:24
										Jupiter		251°37.4	08:50
										Saturn		358°41.3	01:43
										Aug 28 Thu		SHA	Mer.pass
										Venus		234°58.2	09:55
										Mars		167°37.5	14:23
										Jupiter		251°25.4	08:47
										Saturn		358°44.9	01:39
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:01:33		v-0.7 d-0.6 m-3.9		v1.0 d-0.7 m1.6		v2.0 d-0.1 m-1.8		v2.6 d-0.1 m0.7					

August 29, 30, 31 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	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°10.1	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	Schedar	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°23.6	· · 10.8	Diphda	348°46.4	-17°50.5	
4	37°37.2	271°08.2	11.9	204°33.2	17.5	288°48.7	16.5	36°26.3	10.9	Achernar	335°19.4	-57°06.1	
5	52°39.7	286°07.6	11.3	219°34.2	18.2	303°50.7	16.5	51°28.9	11.0	Hamal	327°50.4	23°35.1	
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°11.0	Polaris	313°36.9	89°22.0	
7	82°44.6	316°06.3	10.1	249°36.1	19.5	333°54.7	16.4	81°34.1	11.1	Akamar	315°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°40.1	22.1	34°02.5	16.1	141°44.6	11.4	Rigel	281°03.4	-8°10.1	
12	157°56.9	31°03.0	N19°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°01.4	
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	Elnath	278°01.3	28°37.7	
15	203°04.3	76°01.1	· · 05.4	9°44.0	· · 24.7	94°10.4	· · 15.9	201°55.0	· · 11.7	Alnilam	275°37.3	-1°11.0	
16	218°06.8	91°00.4	04.8	24°44.9	25.3	109°12.4	15.9	216°57.7	11.8	Betelgeuse	270°51.6	7°24.8	
17	233°09.2	105°59.8	04.2	39°45.9	26.0	124°14.4	15.8	232°00.3	11.8	Canopus	263°52.4	-52°42.2	
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	Sirius	258°25.9	-16°44.7	
19	263°14.2	135°58.5	03.0	69°47.9	27.3	154°18.3	15.7	262°05.5	12.0	Adara	255°05.7	-29°00.1	
20	278°16.6	150°57.9	02.4	84°48.8	27.9	169°20.3	15.6	277°08.1	12.1	Procyon	244°50.4	5°09.8	
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°16.8	27°57.9	
22	308°21.6	180°56.6	01.2	114°50.8	29.2	199°24.3	15.5	307°13.3	12.2	Avior	234°15.1	-50°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°46.3	-43°32.0	
Mer.pass.:01:29		v-0.6 d-0.6 m-3.9		v1.0 d-0.7 m1.6		v2.0 d-0.1 m-1.8		v2.6 d-0.1 m0.7		Miacplacidus		221°39.1	-69°49.2
										Alphard		217°47.5	-8°46.1
										Regulus		207°34.1	11°50.6
										Dubhe		193°40.9	61°36.8
										Denebola		182°24.6	14°25.9
										Gienah		175°43.3	-17°41.0
										Acrux		173°00.2	-63°14.6
										Gacrux		171°51.6	-57°15.5
										Alioth		166°13.0	55°49.4
										Spica		158°22.0	-11°17.7
										Alkaid		152°51.8	49°11.3
										Hadar		148°35.7	-60°30.0
										Menkent		147°57.2	-36°29.9
										Arcturus		145°47.4	19°03.4
										Rigel Kent.		139°39.9	-60°56.7
										Kochab		137°20.2	74°03.2
										Zuben'ubi		136°55.6	-16°08.9
										Alphecca		126°03.4	26°37.9
										Antares		112°15.2	-26°29.4
										Atria		107°08.8	-69°04.7
										Sabik		102°02.1	-15°45.4
										Shaula		96°09.5	-37°07.4
										Rasalhague		95°58.0	12°32.7
										Eltanin		90°41.7	51°29.4
										Kaus Aust.		83°31.6	-34°22.4
										Vega		80°32.7	38°48.6
										Nunki		75°46.9	-26°15.9
										Altair		61°59.3	8°56.3
										Peacock		53°04.3	-56°39.2
										Deneb		49°25.0	45°22.5
										Enif		33°38.0	9°59.7
										Al Na'ir		27°31.8	-46°50.1
										Fomalhaut		15°13.6	-29°29.0
										Scheat		13°44.4	28°13.4
										Markab		13°29.1	15°20.7
										Aug 29 Fri		SHA	Mer.pass
										Venus		233°43.4	09:56
										Mars		167°01.9	14:21
										Jupiter		251°13.5	08:44
										Saturn		358°48.5	01:35
										Aug 30 Sat		SHA	Mer.pass
										Venus		232°28.8	09:57
										Mars		166°26.3	14:20
										Jupiter		251°01.7	08:41
										Saturn		358°52.1	01:30
										Aug 31 Sun		SHA	Mer.pass
										Venus		231°14.3	09:58
										Mars		165°50.5	14:18
										Jupiter		250°50.0	08:38
										Saturn		358°55.8	01:26
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:01:22		v-0.6 d-0.6 m-3.9		v1.0 d-0.7 m1.6		v2.0 d-0.1 m-1.8		v2.6 d-0.1 m0.7					

h		Sun						Moon						
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight	
									Naut.	Civil			Civil	Naut.
0	179°44.5	N09°20.2	120°05.1	14.3'	S19°10.6	-10.9'	54.2'	N 72°	☐	02:18	03:53	20:05	21:37	☐
1	194°44.7	19.3	134°38.4	14.2'	19°21.6	-10.9'	54.2'	N 70°	☐	02:49	04:08	19:51	21:07	☐
2	209°44.9	18.4	149°11.6	14.2'	19°32.4	-10.8'	54.2'	68°	01:12	03:12	04:19	19:39	20:46	22:39
3	224°45.1	· · 17.5	163°44.7	14.1'	19°43.1	-10.7'	54.2'	66°	01:58	03:29	04:29	19:30	20:29	21:57
4	239°45.3	16.6	178°17.8	14.1'	19°53.8	-10.6'	54.2'	64°	02:27	03:44	04:38	19:22	20:15	21:30
5	254°45.5	15.7	192°50.9	14.0'	20°04.4	-10.5'	54.2'	62°	02:48	03:55	04:45	19:15	20:04	21:09
6	269°45.7	N09°14.8	207°23.9	13.9'	S20°14.8	-10.5'	54.2'	60°	03:05	04:05	04:51	19:09	19:54	20:53
7	284°45.9	14.0	221°56.8	13.9'	20°25.3	-10.4'	54.2'	N 58°	03:19	04:14	04:56	19:04	19:46	20:40
8	299°46.0	13.1	236°29.6	13.8'	20°35.6	-10.3'	54.2'	56°	03:31	04:21	05:01	18:59	19:39	20:29
9	314°46.2	· · 12.2	251°02.4	13.8'	20°45.8	-10.2'	54.2'	54°	03:41	04:27	05:05	18:55	19:32	20:19
10	329°46.4	11.3	265°35.1	13.7'	20°56.0	-10.1'	54.2'	52°	03:49	04:33	05:09	18:51	19:27	20:10
11	344°46.6	10.4	280°07.8	13.6'	21°06.0	-10.0'	54.2'	50°	03:57	04:38	05:12	18:48	19:22	20:03
12	359°46.8	N09°09.5	294°40.4	13.6'	S21°16.0	-9.9'	54.2'	45°	04:13	04:49	05:20	18:41	19:11	19:47
13	14°47.0	08.6	309°12.9	13.5'	21°25.9	-9.8'	54.2'	N 40°	04:25	04:58	05:26	18:34	19:02	19:35
14	29°47.2	07.7	323°45.4	13.4'	21°35.7	-9.8'	54.2'	35°	04:35	05:05	05:31	18:29	18:55	19:26
15	44°47.4	· · 06.8	338°17.8	13.4'	21°45.4	-9.7'	54.2'	30°	04:43	05:12	05:36	18:25	18:49	19:18
16	59°47.6	05.9	352°50.1	13.3'	21°55.0	-9.6'	54.2'	20°	04:55	05:22	05:44	18:17	18:39	19:05
17	74°47.8	05.0	7°22.4	13.2'	22°04.6	-9.5'	54.2'	N 10°	05:05	05:30	05:51	18:10	18:31	18:56
18	89°47.9	N09°04.1	21°54.6	13.2'	S22°14.0	-9.4'	54.2'	0°	05:12	05:36	05:57	18:04	18:25	18:49
19	104°48.1	03.2	36°26.8	13.1'	22°23.3	-9.3'	54.2'	S 10°	05:18	05:42	06:04	17:58	18:19	18:43
20	119°48.3	02.4	50°58.8	13.0'	22°32.6	-9.2'	54.2'	20°	05:22	05:48	06:10	17:51	18:14	18:39
21	134°48.5	· · 01.5	65°30.8	13.0'	22°41.7	-9.1'	54.2'	30°	05:26	05:53	06:17	17:44	18:08	18:36
22	149°48.7	09°00.6	80°02.8	12.9'	22°50.8	-9.0'	54.2'	35°	05:27	05:56	06:22	17:40	18:05	18:35
23	164°48.9	08°59.7	94°34.6	12.8'	22°59.7	-8.9'	54.2'	40°	05:28	05:59	06:26	17:35	18:03	18:34
	SD.=15.8	d=-0.9			S.D.=14.8			45°	05:28	06:02	06:32	17:30	18:00	18:34
								S 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
								S 60°	05:26	06:14	06:56	17:06	17:48	18:36
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset		
									Fri	Sat	Sun	Fri	Sat	Sun
0	179°49.1	N08°58.8	109°06.4	12.8'	S23°08.6	-8.8'	54.2'	N 72°	■	■	■	■	■	■
1	194°49.3	57.9	123°38.2	12.7'	23°17.4	-8.7'	54.2'	N 70°	■	■	■	■	■	■
2	209°49.5	57.0	138°09.8	12.6'	23°26.0	-8.6'	54.2'	68°	14:42	■	■	18:03	■	■
3	224°49.7	· · 56.1	152°41.4	12.6'	23°34.6	-8.5'	54.2'	64°	14:04	16:22	■	18:42	18:01	■
4	239°49.9	55.2	167°13.0	12.5'	23°43.0	-8.4'	54.2'	62°	13:37	15:24	17:33	19:10	19:01	18:36
5	254°50.1	54.3	181°44.4	12.4'	23°51.4	-8.3'	54.2'	60°	13:17	14:51	16:25	19:31	19:34	19:44
6	269°50.2	N08°53.4	196°15.8	12.3'	S23°59.7	-8.2'	54.2'	N 58°	13:00	14:26	15:50	19:49	19:59	20:19
7	284°50.4	52.5	210°47.1	12.3'	24°07.8	-8.1'	54.2'	56°	12:46	14:07	15:25	20:03	20:19	20:45
8	299°50.6	51.6	225°18.3	12.2'	24°15.9	-8.0'	54.2'	54°	12:33	13:51	15:05	20:16	20:36	21:05
9	314°50.8	· · 50.7	239°49.5	12.1'	24°23.8	-7.9'	54.2'	52°	12:23	13:37	14:48	20:27	20:50	21:22
10	329°51.0	49.8	254°20.6	12.1'	24°31.6	-7.8'	54.3'	50°	12:13	13:25	14:33	20:37	21:02	21:37
11	344°51.2	48.9	268°51.7	12.0'	24°39.4	-7.7'	54.3'	45°	11:53	13:00	14:04	20:58	21:28	22:06
12	359°51.4	N08°48.0	283°22.6	11.9'	S24°47.0	-7.6'	54.3'	N 40°	11:37	12:40	13:41	21:16	21:49	22:30
13	14°51.6	47.1	297°53.5	11.9'	24°54.5	-7.5'	54.3'	35°	11:24	12:23	13:23	21:30	22:06	22:49
14	29°51.8	46.2	312°24.3	11.8'	25°01.9	-7.3'	54.3'	30°	11:12	12:09	13:07	21:43	22:21	23:05
15	44°52.0	· · 45.3	326°55.1	11.7'	25°09.2	-7.2'	54.3'	20°	10:52	11:45	12:39	22:04	22:46	23:33
16	59°52.2	44.4	341°25.8	11.6'	25°16.4	-7.1'	54.3'	N 10°	10:35	11:24	12:16	22:23	23:08	23:57
17	74°52.4	43.5	355°56.4	11.6'	25°23.4	-7.0'	54.3'	0°	10:19	11:05	11:55	22:41	23:29	--
18	89°52.6	N08°42.6	10°26.9	11.5'	S25°30.4	-6.9'	54.3'	S 10°	10:03	10:46	11:33	22:58	23:49	--
19	104°52.8	41.7	24°57.4	11.4'	25°37.2	-6.8'	54.3'	20°	09:46	10:26	11:10	23:17	--	00:11
20	119°53.0	40.8	39°27.8	11.4'	25°44.0	-6.7'	54.3'	30°	09:26	10:02	10:43	23:39	--	00:37
21	134°53.1	· · 39.9	53°58.1	11.3'	25°50.6	-6.6'	54.3'	35°	09:15	09:48	10:28	23:52	--	00:52
22	149°53.3	39.0	68°28.4	11.2'	25°57.1	-6.4'	54.3'	40°	09:02	09:33	10:09	--	00:07	01:10
23	164°53.5	38.1	82°58.6	11.2'	26°03.5	-6.3'	54.3'	45°	08:47	09:14	09:48	--	00:25	01:31
	SD.=15.8	d=-0.9			S.D.=14.8			S 50°	08:29	08:50	09:20	--	00:48	01:58
								52°	08:20	08:39	09:06	--	00:58	02:11
								54°	08:10	08:27	08:51	--	01:11	02:27
								56°	07:59	08:12	08:32	00:03	01:24	02:44
								58°	07:47	07:55	08:10	00:15	01:41	03:06
								S 60°	07:33	07:35	07:41	00:29	02:01	03:35
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun Eqn. of Time		Mer. Pass	Moon Mer. Pass.		Age
									00 ^h	12 ^h	Pass	Upper	Lower	6-8
									mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	34-52%
0	179°53.7	N08°37.2	97°28.7	11.1'	S26°09.7	-6.2'	54.4'	29	01:02	00:53	12:01	16:30	04:07	☾
1	194°53.9	36.3	111°58.7	11.0'	26°15.9	-6.1'	54.4'	30	00:44	00:34	12:01	17:17	04:53	
2	209°54.1	35.4	126°28.7	11.0'	26°21.9	-6.0'	54.4'	31	00:25	00:16	12:00	18:07	05:42	
3	224°54.3	· · 34.5	140°58.7	10.9'	26°27.8	-5.8'	54.4'							
4	239°54.5	33.6	155°28.5	10.8'	26°33.6	-5.7'	54.4'							
5	254°54.7	32.7	169°58.3	10.8'	26°39.3	-5.6'	54.4'							
6	269°54.9	N08°31.8	184°28.0	10.7'	S26°44.8	-5.5'	54.4'							
7	284°55.1	30.9	198°57.7	10.6'	26°50.2	-5.4'	54.4'							
8	299°55.3	30.0	213°27.2	10.6'	26°55.5	-5.2'	54.4'							
9	314°55.5	· · 29.1	227°56.8	10.5'	27°00.7	-5.1'	54.5'							
10	329°55.7	28.2	242°26.2	10.4'	27°05.7	-5.0'	54.5'							
11	344°55.9	27.3	256°55.6	10.4'	27°10.6	-4.9'	54.5'							
12	359°56.1	N08°26.4	271°24.9	10.3'	S27°15.4	-4.7'	54.5'							
13	14°56.3	25.5	285°54.2	10.2'	27°20.1	-4.6'	54.5'							
14	29°56.5	24.6	300°23.4	10.2'	27°24.6	-4.5'	54.5'							
15	44°56.7	· · 23.7	314°52.5	10.1'	27°29.0	-4.3'	54.5'							
16	59°56.9	22.8	329°21.6	10.0'	27°33.3	-4.2'	54.5'							
17	74°57.1	21.9	343°50.6	10.0'	27°37.4	-4.1'	54.6'							
18	89°57.3	N08°21.0	358°19.6	9.9'	S27°41.4	-3.9'	54.6'							
19	104°57.5	20.1	12°48.5	9.9'	27°45.3	-3.8'	54.6'							
20	119°57.7	19.2	27°17.3	9.8'	27°49.1	-3.7'	54.6'							
21	134°57.9	· · 18.2	41°46.1	9.8'	27°52.7	-3.5'	54.6'							
22	149°58.1	17.3	56°14.8	9.7'	27°56.1	-3.4'	54.6'							
23	164°58.2	16.4	70°43.5	9.6'	27°59.5	-3.3'	54.7'							
	SD.=15.8	d=-0.9			S.D.=14.8									

September 01, 02, 03 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	340°24.8	210°24.7	N18°30.1	145°39.4	S06°01.8	231°03.2	N22°12.8	339°24.3	S02°15.9	Alpheratz	357°33.9	29°14.0	
1	355°27.2	225°24.1	29.4	160°40.4	02.5	246°05.2	12.7	354°26.9	16.0	Ankaa	353°06.2	-42°09.8	
2	10°29.7	240°23.5	28.8	175°41.4	03.1	261°07.2	12.7	9°29.5	16.0	Schedar	349°30.0	56°40.7	
3	25°32.2	255°22.9	· · 28.1	190°42.3	· · 03.8	276°09.1	· · 12.6	24°32.1	· · 16.1	Diphda	348°46.4	-17°50.5	
4	40°34.6	270°22.2	27.5	205°43.3	04.4	291°11.1	12.6	39°34.8	16.2	Achernar	335°19.3	-57°06.1	
5	55°37.1	285°21.6	26.8	220°44.3	05.1	306°13.1	12.5	54°37.4	16.3	Hamal	327°50.4	23°35.1	
6	70°39.6	300°21.0	N18°26.2	235°45.2	S06°05.7	321°15.1	N22°12.4	69°40.0	S02°16.3	Polaris	313°35.1	89°22.1	
7	85°42.0	315°20.3	25.5	250°46.2	06.4	336°17.1	12.4	84°42.6	16.4	Akamar	315°11.2	-40°11.8	
8	100°44.5	330°19.7	24.9	265°47.2	07.0	351°19.1	12.3	99°45.2	16.5	Menkar	314°05.4	4°11.6	
9	115°46.9	345°19.1	· · 24.2	280°48.1	· · 07.7	6°21.0	· · 12.3	114°47.9	· · 16.6	Mirfak	308°27.3	49°57.0	
10	130°49.4	0°18.5	23.6	295°49.1	08.3	21°23.0	12.2	129°50.5	16.6	Aldebaran	290°39.0	16°33.7	
11	145°51.9	15°17.8	22.9	310°50.1	09.0	36°25.0	12.2	144°53.1	16.7	Rigel	281°03.4	-8°10.1	
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	Capella	280°21.2	46°01.4	
13	175°56.8	45°16.6	21.6	340°52.0	10.3	66°29.0	12.1	174°58.4	16.9	Bellatrix	278°22.4	6°22.5	
14	190°59.3	60°16.0	20.9	355°53.0	10.9	81°31.0	12.0	190°01.0	16.9	Elnath	278°01.3	28°37.7	
15	206°01.7	75°15.3	· · 20.3	10°53.9	· · 11.6	96°33.0	· · 11.9	205°03.6	· · 17.0	Alnilam	275°37.3	-1°11.0	
16	221°04.2	90°14.7	19.6	25°54.9	12.2	111°34.9	11.9	220°06.2	17.1	Betelgeuse	270°51.6	7°24.8	
17	236°06.7	105°14.1	18.9	40°55.9	12.9	126°36.9	11.8	235°08.8	17.2	Canopus	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	Sirius	258°25.8	-16°44.7	
19	266°11.6	135°12.8	17.6	70°57.8	14.2	156°40.9	11.7	265°14.1	17.3	Adara	255°05.6	-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°50.4	5°09.8	
21	296°16.5	165°11.6	· · 16.3	100°59.7	· · 15.5	186°44.8	· · 11.6	295°19.3	· · 17.5	Pollux	243°16.8	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	-50°35.2	
23	326°21.4	195°10.3	15.0	131°01.7	16.8	216°48.8	11.5	325°24.6	17.6	Suhail	222°46.3	-43°32.0	
Mer.pass.:01:18		v-0.6 d-0.6 m-3.9		v1.0 d-0.7 m1.6		v2.0 d-0.1 m-1.8		v2.6 d-0.1 m0.7		Miaplacidus	221°39.1	-69°49.2	
										Alphard	217°47.5	-8°46.0	
										Regulus	207°34.1	11°50.6	
										Dubhe	193°40.9	61°36.8	
										Denebola	182°24.6	14°25.8	
										Gienah	175°43.3	-17°41.0	
										Acrux	173°00.2	-63°14.6	
										Gacrux	171°51.6	-57°15.5	
										Alioth	166°13.0	55°49.4	
										Spica	158°22.0	-11°17.7	
										Alkaid	152°51.9	49°11.3	
										Hadar	148°35.7	-60°30.0	
										Menkent	147°57.2	-36°29.9	
										Arcturus	145°47.4	19°03.4	
										Rigel Kent.	139°39.9	-60°56.7	
										Kochab	137°20.3	74°03.2	
										Zuben'ubi	136°55.6	-16°08.9	
										Alphecca	126°03.4	26°37.9	
										Antares	112°15.2	-26°29.4	
										Atria	107°08.9	-69°04.7	
										Sabik	102°02.1	-15°45.4	
										Shaula	96°09.5	-37°07.4	
										Rasalhague	95°58.0	12°32.7	
										Eltanin	90°41.7	51°29.4	
										Kaus Aust.	83°31.6	-34°22.4	
										Vega	80°32.7	38°48.6	
										Nunki	75°46.9	-26°15.9	
										Altair	61°59.3	8°56.3	
										Peacock	53°04.4	-56°39.2	
										Deneb	49°25.1	45°22.5	
										Enif	33°38.0	9°59.7	
										Al Na'ir	27°31.8	-46°50.1	
										Fomalhaut	15°13.6	-29°29.0	
										Scheat	13°44.4	28°13.4	
										Markab	13°29.0	15°20.7	
										Sep 01 Mon		SHA	Mer.pass
										Venus		230°00.0	09:59
										Mars		165°14.6	14:16
										Jupiter		250°38.4	08:35
										Saturn		358°59.5	01:22
										Sep 02 Tue		SHA	Mer.pass
										Venus		228°45.8	10:00
										Mars		164°38.7	14:15
										Jupiter		250°26.9	08:31
										Saturn		359°03.3	01:18
										Sep 03 Wed		SHA	Mer.pass
										Venus		227°31.8	10:01
										Mars		164°02.7	14:13
										Jupiter		250°15.5	08:28
										Saturn		359°07.1	01:14
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:01:10		v-0.6 d-0.7 m-3.9		v1.0 d-0.6 m1.6		v2.0 d-0.1 m-1.9		v2.6 d-0.1 m0.7					

September 04, 05, 06 (Thu., Fri., Sat.)

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°33.9	29°14.0					
1	358°24.7	224°39.5	40.5	161°49.7	49.2	248°28.4	08.8	357°35.8	21.4	Ankaa	353°06.2	-42°09.8					
2	13°27.1	239°38.9	39.8	176°50.6	49.8	263°30.4	08.7	12°38.4	21.5	Schedar	349°29.9	56°40.7					
3	28°29.6	254°38.3	· · 39.1	191°51.6	· · 50.5	278°32.4	· · 08.6	27°41.0	· · 21.5	Diphda	348°46.3	-17°50.5					
4	43°32.0	269°37.7	38.3	206°52.5	51.1	293°34.4	08.6	42°43.7	21.6	Achernar	335°19.3	-57°06.1					
5	58°34.5	284°37.1	37.6	221°53.5	51.8	308°36.4	08.5	57°46.3	21.7	Hamal	327°50.4	23°35.1					
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	S02°21.8	Polaris	313°33.6	89°22.1					
7	88°39.4	314°35.9	36.2	251°55.4	53.1	338°40.4	08.4	87°51.5	21.8	Akamar	315°11.1	-40°11.8					
8	103°41.9	329°35.3	35.5	266°56.4	53.7	353°42.4	08.4	102°54.2	21.9	Menkar	314°05.4	4°11.6					
9	118°44.4	344°34.7	· · 34.8	281°57.3	· · 54.4	8°44.4	· · 08.3	117°56.8	· · 22.0	Mirfak	308°27.3	49°57.0					
10	133°46.8	359°34.1	34.0	296°58.3	55.0	23°46.4	08.3	132°59.4	22.1	Aldebaran	290°39.0	16°33.7					
11	148°49.3	14°33.5	33.3	311°59.2	55.7	38°48.4	08.2	148°02.1	22.1	Rigel	281°03.4	-8°10.1					
12	163°51.8	29°32.8	N17°32.6	327°00.2	S06°56.3	53°50.4	N22°08.1	163°04.7	S02°22.2	Capella	280°21.1	46°01.4					
13	178°54.2	44°32.2	31.9	342°01.1	57.0	68°52.4	08.1	178°07.3	22.3	Bellatrix	278°22.3	6°22.5					
14	193°56.7	59°31.6	31.2	357°02.1	57.6	83°54.4	08.0	193°09.9	22.4	Elnath	278°01.2	28°37.7					
15	208°59.2	74°31.0	· · 30.4	12°03.0	· · 58.3	98°56.4	· · 08.0	208°12.6	· · 22.4	Alnilam	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	S07°00.2	144°02.4	N22°07.8	253°20.4	S02°22.7	Sirius	258°25.8	-16°44.7					
19	269°09.0	134°28.6	27.5	72°06.9	00.9	159°04.4	07.8	268°23.1	22.8	Adara	255°05.6	-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°50.4	5°09.8					
21	299°13.9	164°27.4	· · 26.1	102°08.8	· · 02.1	189°08.4	· · 07.6	298°28.3	· · 22.9	Pollux	243°16.8	27°57.9					
22	314°16.4	179°26.8	25.3	117°09.7	02.8	204°10.4	07.6	313°31.0	23.0	Avior	234°15.1	-50°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					
Mer.pass.:01:06		v-0.6 d-0.7 m-3.9		v1.0 d-0.6 m1.6		v2.0 d-0.1 m-1.9		v2.6 d-0.1 m0.7		Miacplacidus		221°39.1	-69°49.1				
Alphard		217°47.5		-8°46.0		Regulus		207°34.1		11°50.6		Dubhe		193°40.9	61°36.8		
Denebola		182°24.6		14°25.8		Gienah		175°43.3		-17°41.0		Acrux		173°00.2	-63°14.6		
Gacrux		171°51.6		-57°15.5		Alioth		166°13.0		55°49.4		Spica		158°22.0	-11°17.7		
Alkaid		152°51.9		49°11.3		Hadar		148°35.7		-60°30.0		Menkent		147°57.2	-36°29.8		
Arcturus		145°47.5		19°03.4		Rigil Kent.		139°39.9		-60°56.7		Kochab		137°20.3	74°03.2		
Zuben'ubi		136°55.6		-16°08.9		Alphecca		126°03.4		26°37.9		Antares		112°15.2	-26°29.4		
Atria		107°08.9		-69°04.7		Sabik		102°02.1		-15°45.4		Shaula		96°09.5	-37°07.4		
Rasalhague		95°58.0		12°32.7		Eltanin		90°41.8		51°29.4		Kaus Aust.		83°31.6	-34°22.4		
Vega		80°32.7		38°48.6		Nunki		75°46.9		-26°15.9		Altair		61°59.3	8°56.3		
Peacock		53°04.4		-56°39.2		Deneb		49°25.1		45°22.5		Enif		33°38.0	9°59.7		
Al Na'ir		27°31.8		-46°50.1		Fomalhaut		15°13.6		-29°29.0		Scheat		13°44.4	28°13.4		
Markab		13°29.0		15°20.7		Sep 04 Thu		SHA		Mer.pass		Venus		226°17.9	10:02		
Mars		163°26.5		14:12		Jupiter		250°04.2		08:25		Saturn		359°11.0	01:10		
Sep 05 Fri		SHA		Mer.pass		Venus		225°04.3		10:03		Mars		162°50.3	14:10		
Jupiter		249°53.0		08:22		Saturn		359°14.9		01:05		Sep 06 Sat		SHA		Mer.pass	
Venus		223°50.8		10:04		Mars		162°14.0		14:09		Jupiter		249°41.9		08:19	
Saturn		359°18.8		01:01		Horizontal parallax		Venus:		0.1		Mars:		0.1			
Mer.pass.:00:58		v-0.6 d-0.8 m-3.9		v0.9 d-0.6 m1.6		v2.0 d-0.1 m-1.9		v2.6 d-0.1 m0.7									


h		Sun		Moon										
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight	
									Naut.	Civil			Civil	Naut.
0	180° 13.1	N07° 09.7	46° 20.4	8.7'	S25° 27.9	7.6'	56.5'				04:22	19:32	20:53	
1	195° 13.3	08.8	60° 48.2	8.8'	25° 20.3	7.7'	56.5'	N 72°	☐	03:00				☐
2	210° 13.5	07.9	75° 15.9	8.8'	25° 12.5	7.8'	56.6'	N 70°	01:20	03:22	04:33	19:22	20:32	22:27
3	225° 13.7	· · 06.9	89° 43.7	8.8'	25° 04.6	8.0'	56.6'	68°	02:05	03:39	04:42	19:13	20:15	21:46
4	240° 13.9	06.0	104° 11.6	8.8'	24° 56.5	8.1'	56.6'	66°	02:34	03:52	04:49	19:06	20:02	21:19
5	255° 14.1	05.1	118° 39.4	8.9'	24° 48.3	8.3'	56.7'	64°	02:55	04:03	04:55	19:00	19:51	20:59
6	270° 14.3	N07° 04.2	133° 07.3	8.9'	S24° 40.0	8.4'	56.7'	62°	03:11	04:13	05:00	18:55	19:42	20:43
7	285° 14.5	03.2	147° 35.3	9.0'	24° 31.5	8.6'	56.7'	60°	03:25	04:21	05:05	18:51	19:35	20:30
8	300° 14.7	02.3	162° 03.3	9.0'	24° 22.9	8.7'	56.8'	N 58°	03:36	04:28	05:09	18:47	19:28	20:19
9	315° 14.9	· · 01.4	176° 31.3	9.0'	24° 14.1	8.8'	56.8'	56°	03:45	04:34	05:12	18:44	19:22	20:10
10	330° 15.1	07° 00.5	190° 59.3	9.1'	24° 05.2	9.0'	56.8'	54°	03:54	04:39	05:16	18:40	19:17	20:02
11	345° 15.3	06° 59.5	205° 27.4	9.1'	23° 56.2	9.1'	56.9'	52°	04:01	04:44	05:19	18:38	19:12	19:55
12	0° 15.6	N06° 58.6	219° 55.5	9.1'	S23° 47.0	9.3'	56.9'	50°	04:08	04:48	05:21	18:35	19:08	19:48
13	15° 15.8	57.7	234° 23.7	9.2'	23° 37.6	9.4'	56.9'	45°	04:21	04:57	05:27	18:29	18:59	19:35
14	30° 16.0	56.8	248° 51.9	9.2'	23° 28.2	9.5'	57.0'	N 40°	04:31	05:04	05:32	18:25	18:52	19:25
15	45° 16.2	· · 55.8	263° 20.1	9.3'	23° 18.6	9.7'	57.0'	35°	04:40	05:10	05:36	18:21	18:47	19:17
16	60° 16.4	54.9	277° 48.4	9.3'	23° 08.8	9.8'	57.0'	30°	04:47	05:15	05:39	18:18	18:42	19:10
17	75° 16.6	54.0	292° 16.7	9.3'	22° 59.0	9.9'	57.1'	20°	04:57	05:23	05:45	18:12	18:34	19:00
18	90° 16.8	N06° 53.1	306° 45.1	9.4'	S22° 49.0	10.1'	57.1'	N 10°	05:05	05:29	05:51	18:07	18:28	18:52
19	105° 17.0	52.1	321° 13.5	9.4'	22° 38.8	10.2'	57.1'	0°	05:10	05:35	05:55	18:02	18:23	18:47
20	120° 17.2	51.2	335° 41.9	9.5'	22° 28.6	10.3'	57.2'	S 10°	05:14	05:39	06:00	17:57	18:18	18:43
21	135° 17.4	· · 50.3	350° 10.4	9.5'	22° 18.2	10.5'	57.2'	20°	05:17	05:43	06:05	17:53	18:15	18:40
22	150° 17.6	49.4	4° 38.9	9.5'	22° 07.6	10.6'	57.2'	30°	05:19	05:46	06:10	17:47	18:11	18:39
23	165° 17.9	48.4	19° 07.5	9.6'	21° 57.0	10.7'	57.3'	35°	05:19	05:48	06:13	17:44	18:10	18:39
	SD.=15.9	d=-0.9			S.D.=15.4			40°	05:19	05:50	06:17	17:41	18:08	18:39
								45°	05:18	05:52	06:21	17:37	18:06	18:40
								S 50°	05:16	05:53	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
								S 60°	05:09	05:57	06:39	17:20	18:01	18:50
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset		
0	180° 18.1	N06° 47.5	33° 36.1	9.6'	S21° 46.2	10.9'	57.3'		Thu	Fri	Sat	Thu	Fri	Sat
1	195° 18.3	46.6	48° 04.7	9.7'	21° 35.3	11.0'	57.3'	N 72°	■	21:36	20:01	■	23:54	--
2	210° 18.5	45.7	62° 33.4	9.7'	21° 24.2	11.1'	57.4'	N 70°	■	20:34	19:40	■	--	00:53
3	225° 18.7	· · 44.7	77° 02.2	9.8'	21° 13.0	11.2'	57.4'	68°	■	19:59	19:24	■	--	01:27
4	240° 18.9	43.8	91° 31.0	9.8'	21° 01.7	11.4'	57.4'	66°	20:13	19:33	19:11	23:24	--	01:51
5	255° 19.1	42.9	105° 59.8	9.9'	20° 50.3	11.5'	57.5'	64°	19:32	19:13	19:00	--	00:04	02:10
6	270° 19.3	N06° 42.0	120° 28.7	9.9'	S20° 38.8	11.6'	57.5'	62°	19:04	18:57	18:51	--	00:31	02:25
7	285° 19.5	41.5	134° 57.6	9.9'	20° 27.1	11.7'	57.5'	60°	18:42	18:43	18:42	--	00:53	02:38
8	300° 19.7	40.1	149° 26.6	10.0'	20° 15.3	11.9'	57.6'	N 58°	18:24	18:31	18:35	--	01:10	02:49
9	315° 20.0	· · 39.2	163° 55.6	10.0'	20° 03.4	12.0'	57.6'	56°	18:09	18:21	18:29	--	01:24	02:58
10	330° 20.2	38.2	178° 24.6	10.1'	19° 51.3	12.1'	57.6'	54°	17:56	18:11	18:23	00:10	01:37	03:06
11	345° 20.4	37.3	192° 53.7	10.1'	19° 39.2	12.2'	57.7'	52°	17:44	18:03	18:18	00:25	01:48	03:14
12	0° 20.6	N06° 36.4	207° 22.8	10.2'	S19° 26.9	12.3'	57.7'	50°	17:34	17:56	18:13	00:37	01:57	03:20
13	15° 20.8	35.5	221° 52.0	10.2'	19° 14.5	12.4'	57.7'	45°	17:12	17:40	18:03	01:03	02:18	03:35
14	30° 21.0	34.5	236° 21.2	10.2'	19° 02.0	12.6'	57.8'	N 40°	16:55	17:27	17:54	01:23	02:34	03:46
15	45° 21.2	· · 33.6	250° 50.5	10.3'	18° 49.4	12.7'	57.8'	35°	16:40	17:16	17:47	01:40	02:47	03:56
16	60° 21.4	32.7	265° 19.8	10.3'	18° 36.7	12.8'	57.8'	30°	16:27	17:06	17:41	01:55	02:59	04:05
17	75° 21.6	31.7	279° 49.2	10.4'	18° 23.9	12.9'	57.9'	20°	16:05	16:49	17:29	02:20	03:20	04:19
18	90° 21.9	N06° 30.8	294° 18.6	10.4'	S18° 10.9	13.0'	57.9'	N 10°	15:46	16:34	17:19	02:41	03:37	04:32
19	105° 22.1	29.9	308° 48.0	10.5'	17° 57.9	13.1'	57.9'	0°	15:28	16:20	17:10	03:01	03:53	04:44
20	120° 22.3	29.0	323° 17.5	10.5'	17° 44.7	13.2'	58.0'	S 10°	15:10	16:06	17:00	03:20	04:09	04:56
21	135° 22.5	· · 28.0	337° 47.0	10.5'	17° 31.4	13.3'	58.0'	20°	14:51	15:51	16:50	03:41	04:26	05:08
22	150° 22.7	27.1	352° 16.6	10.6'	17° 18.0	13.4'	58.0'	30°	14:28	15:33	16:39	04:05	04:46	05:22
23	165° 22.9	26.2	6° 46.2	10.6'	17° 04.5	13.5'	58.1'	35°	14:15	15:23	16:32	04:19	04:57	05:30
	SD.=15.9	d=-0.9			S.D.=15.6			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
								S 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
								S 60°	12:03	13:48	15:32	06:37	06:40	06:40
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Mer.	Moon		Age
0	180° 23.1	N06° 25.2	21° 15.8	10.7'	S16° 50.9	13.6'	58.1'		Eqn. of Time <td>Mer. <td>Mer. Pass. <td>Upper</td> <td>Lower</td> <td>12-14</td> </td></td>	Mer. <td>Mer. Pass. <td>Upper</td> <td>Lower</td> <td>12-14</td> </td>	Mer. Pass. <td>Upper</td> <td>Lower</td> <td>12-14</td>	Upper	Lower	12-14
1	195° 23.3	24.3	35° 45.5	10.7'	16° 37.3	13.7'	58.1'	4	00 ^h	Pass	Pass.	hh:mm	hh:mm	87-98%
2	210° 23.6	23.4	50° 15.2	10.7'	16° 23.5	13.8'	58.2'	5	mm:ss	hh:mm				
3	225° 23.8	· · 22.4	64° 45.0	10.8'	16° 09.6	13.9'	58.2'	6						
4	240° 24.0	21.5	79° 14.8	10.8'	15° 55.6	14.0'	58.2'							
5	255° 24.2	20.6	93° 44.7	10.9'	15° 41.5	14.1'	58.3'							
6	270° 24.4	N06° 19.6	108° 14.5	10.9'	S15° 27.3	14.2'	58.3'							
7	285° 24.6	18.7	122° 44.5	10.9'	15° 13.0	14.3'	58.3'							
8	300° 24.8	17.8	137° 14.4	11.0'	14° 58.6	14.4'	58.4'							
9	315° 25.0	· · 16.8	151° 44.4	11.0'	14° 44.1	14.5'	58.4'							
10	330° 25.3	15.9	166° 14.4	11.0'	14° 29.6	14.6'	58.4'							
11	345° 25.5	15.0	180° 44.5	11.1'	14° 14.9	14.7'	58.5'							

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

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°33.9	29°14.1
1	1°22.1	223°56.5	47.0	162°58.1	35.7	250°52.6	04.8	0°45.0	26.9	Ankaa	353°06.2	-42°09.8
2	16°24.5	238°55.9	46.2	177°59.0	36.4	265°54.6	04.7	15°47.7	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°46.3	-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°54.1	43.9	223°01.9	38.3	311°00.6	04.6	60°55.6	27.2	Hamal	327°50.4	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	S02°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	Akamars	315°11.1	-40°11.8
8	106°39.3	328°52.4	41.6	268°04.7	40.2	356°06.6	04.4	106°03.5	27.4	Menkar	314°05.4	4°11.6
9	121°41.8	343°51.8	· · 40.8	283°05.6	· · 40.9	11°08.7	· · 04.3	121°06.1	· · 27.5	Mirfak	308°27.3	49°57.0
10	136°44.2	358°51.2	40.0	298°06.6	41.5	26°10.7	04.3	136°08.7	27.6	Aldebaran	290°39.0	16°33.7
11	151°46.7	13°50.6	39.2	313°07.5	42.2	41°12.7	04.2	151°11.3	27.7	Rigel	281°03.3	-8°10.1
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	Capella	280°21.1	46°01.4
13	181°51.6	43°49.5	37.7	343°09.4	43.5	71°16.7	04.1	181°16.6	27.8	Bellatrix	278°22.3	6°22.5
14	196°54.1	58°48.9	36.9	358°10.3	44.1	86°18.7	04.1	196°19.2	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°25.8	-16°44.6
19	272°06.4	133°46.0	33.0	73°15.0	47.3	161°28.8	03.8	271°32.4	28.3	Adara	255°05.6	-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	Procyon	244°50.4	5°09.8
21	302°11.4	163°44.8	· · 31.4	103°16.9	· · 48.6	191°32.8	· · 03.7	301°37.7	· · 28.5	Pollux	243°16.7	27°57.9
22	317°13.8	178°44.2	30.6	118°17.9	49.2	206°34.8	03.6	316°40.3	28.5	Avior	234°15.0	-50°35.2
23	332°16.3	193°43.7	29.8	133°18.8	49.9	221°36.8	03.6	331°42.9	28.6	Suhail	222°46.3	-43°31.9
Mer.pass.:00:54		v-0.6 d-0.8 m-3.9		v0.9 d-0.6 m1.6		v2.0 d-0.1 m-1.9		v2.6 d-0.1 m0.6		Miaplacidus	221°39.1	-69°49.1
										Alphard	217°47.5	-8°46.0
										Regulus	207°34.1	11°50.6
										Dubhe	193°40.9	61°36.8
										Denebola	182°24.6	14°25.8
										Gienah	175°43.3	-17°41.0
										Acrux	173°00.2	-63°14.6
										Gacrux	171°51.6	-57°15.5
										Alioth	166°13.0	55°49.4
										Spica	158°22.0	-11°17.7
										Alkaid	152°51.9	49°11.3
										Hadar	148°35.7	-60°30.0
										Menkent	147°57.3	-36°29.8
										Arcturus	145°47.5	19°03.4
										Rigel Kent.	139°39.9	-60°56.7
										Kochab	137°20.3	74°03.2
										Zuben'ubi	136°55.6	-16°08.9
										Alphecca	126°03.4	26°37.9
										Antares	112°15.2	-26°29.4
										Atria	107°08.9	-69°04.7
										Sabik	102°02.1	-15°45.4
										Shaula	96°09.6	-37°07.4
										Rasalhague	95°58.0	12°32.7
										Eltanin	90°41.8	51°29.4
										Kaus Aust.	83°31.6	-34°22.4
										Vega	80°32.7	38°48.6
										Nunki	75°46.9	-26°15.9
										Altair	61°59.3	8°56.3
										Peacock	53°04.4	-56°39.2
										Deneb	49°25.1	45°22.5
										Enif	33°38.0	9°59.7
										Al Na'ir	27°31.8	-46°50.1
										Fomalhaut	15°13.6	-29°29.0
										Scheat	13°44.4	28°13.4
										Markab	13°29.0	15°20.8
										Sep 07 Sun	SHA	Mer.pass
										Venus	222°37.5	10:05
										Mars	161°37.5	14:07
										Jupiter	249°31.0	08:16
										Saturn	359°22.8	00:57
										Sep 08 Mon	SHA	Mer.pass
										Venus	221°24.3	10:06
										Mars	161°01.0	14:06
										Jupiter	249°20.1	08:12
										Saturn	359°26.8	00:53
										Sep 09 Tue	SHA	Mer.pass
										Venus	220°11.4	10:06
										Mars	160°24.4	14:04
										Jupiter	249°09.3	08:09
										Saturn	359°30.9	00:49
										Horizontal parallax		
										Venus:	0.1	
										Mars:	0.1	
Mer.pass.:00:46		v-0.6 d-0.8 m-3.9		v0.9 d-0.6 m1.6		v2.0 d-0.1 m-1.9		v2.6 d-0.1 m0.6				

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

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	349°17.0	208°15.6	N15°50.1	149°04.6	S08°21.3	238°15.7	N22°00.9	348°51.9	S02°32.4	Alpheratz	357°33.9	29°14.1
1	4°19.5	223°15.1	49.2	164°05.6	22.0	253°17.7	00.8	3°54.6	32.5	Ankaa	353°06.2	-42°09.8
2	19°21.9	238°14.5	48.4	179°06.5	22.6	268°19.8	00.8	18°57.2	32.6	Schedar	349°29.9	56°40.7
3	34°24.4	253°13.9	· · 47.6	194°07.4	· · 23.3	283°21.8	· · 00.7	33°59.8	· · 32.7	Diphda	348°46.3	-17°50.5
4	49°26.9	268°13.4	46.7	209°08.4	23.9	298°23.8	00.7	49°02.5	32.7	Achernar	335°19.3	-57°06.1
5	64°29.3	283°12.8	45.9	224°09.3	24.5	313°25.8	00.6	64°05.1	32.8	Hamal	327°50.4	23°35.1
6	79°31.8	298°12.2	N15°45.1	239°10.2	S08°25.2	328°27.9	N22°00.6	79°07.8	S02°32.9	Polaris	313°30.9	89°22.1
7	94°34.3	313°11.7	44.2	254°11.1	25.8	343°29.9	00.5	94°10.4	33.0	Akamars	315°11.1	-40°11.8
8	109°36.7	328°11.1	43.4	269°12.1	26.5	358°31.9	00.5	109°13.0	33.1	Menkar	314°05.4	4°11.6
9	124°39.2	343°10.6	· · 42.6	284°13.0	· · 27.1	13°33.9	· · 00.4	124°15.7	· · 33.1	Mirfak	308°27.2	49°57.0
10	139°41.7	358°10.0	41.7	299°13.9	27.7	28°36.0	00.3	139°18.3	33.2	Aldebaran	290°38.9	16°33.8
11	154°44.1	13°09.4	40.9	314°14.9	28.4	43°38.0	00.3	154°20.9	33.3	Rigel	281°03.3	-8°10.1
12	169°46.6	28°08.9	N15°40.0	329°15.8	S08°29.0	58°40.0	N22°00.2	169°23.6	S02°33.4	Capella	280°21.1	46°01.4
13	184°49.1	43°08.3	39.2	344°16.7	29.6	73°42.0	00.2	184°26.2	33.4	Bellatrix	278°22.3	6°22.5
14	199°51.5	58°07.8	38.4	359°17.6	30.3	88°44.1	00.1	199°28.8	33.5	Elnath	278°01.2	28°37.7
15	214°54.0	73°07.2	· · 37.5	14°18.6	· · 30.9	103°46.1	· · 00.1	214°31.5	· · 33.6	Alnilam	275°37.2	-1°11.0
16	229°56.4	88°06.6	36.7	29°19.5	31.6	118°48.1	00.0	229°34.1	33.7	Betelgeuse	270°51.5	7°24.8
17	244°58.9	103°06.1	35.8	44°20.4	32.2	133°50.1	22°00.0	244°36.7	33.8	Canopus	263°52.3	-52°42.2
18	260°01.4	118°05.5	N15°35.0	59°21.4	S08°32.8	148°52.2	N21°59.9	259°39.4	S02°33.8	Sirius	258°25.8	-16°44.6
19	275°03.8	133°05.0	34.1	74°22.3	33.5	163°54.2	59.9	274°42.0	33.9	Adara	255°05.6	-29°00.1
20	290°06.3	148°04.4	33.3	89°23.2	34.1	178°56.2	59.8	289°44.6	34.0	Procyon	244°50.3	5°09.8
21	305°08.8	163°03.8	· · 32.5	104°24.1	· · 34.8	193°58.2	· · 59.7	304°47.3	· · 34.1	Pollux	243°16.7	27°57.9
22	320°11.2	178°03.3	31.6	119°25.1	35.4	209°00.3	59.7	319°49.9	34.2	Avior	234°15.0	-50°35.2
23	335°13.7	193°02.7	30.8	134°26.0	36.0	224°02.3	59.6	334°52.5	34.2	Suhail	222°46.3	-43°31.9
Mer.pass.:00:42		v-0.6 d-0.8 m-3.9		v0.9 d-0.6 m1.6		v2.0 d-0.1 m-1.9		v2.6 d-0.1 m0.6		Miaplacidus	221°39.0	-69°49.1
										Alphard	217°47.5	-8°46.0
										Regulus	207°34.1	11°50.6
										Dubhe	193°40.9	61°36.8
										Denebola	182°24.6	14°25.8
										Gienah	175°43.3	-17°41.0
										Acrux	173°00.2	-63°14.5
										Gacrux	171°51.6	-57°15.5
										Alioth	166°13.0	55°49.4
										Spica	158°22.0	-11°17.6
										Alkaid	152°51.9	49°11.3
										Hadar	148°35.7	-60°30.0
										Menkent	147°57.3	-36°29.8
										Arcturus	145°47.5	19°03.4
										Rigel Kent.	139°40.0	-60°56.7
										Kochab	137°20.4	74°03.2
										Zuben'ubi	136°55.6	-16°08.9
										Alphecca	126°03.4	26°37.9
										Antares	112°15.2	-26°29.4
										Atria	107°09.0	-69°04.7
										Sabik	102°02.1	-15°45.4
										Shaula	96°09.6	-37°07.4
										Rasalhague	95°58.0	12°32.7
										Eltanin	90°41.8	51°29.4
										Kaus Aust.	83°31.6	-34°22.4
										Vega	80°32.7	38°48.6
										Nunki	75°46.9	-26°15.9
										Altair	61°59.3	8°56.3
										Peacock	53°04.4	-56°39.2
										Deneb	49°25.1	45°22.5
										Enif	33°38.0	9°59.7
										Al Na'ir	27°31.8	-46°50.1
										Fomalhaut	15°13.6	-29°29.0
										Scheat	13°44.4	28°13.5
										Markab	13°29.0	15°20.8
										Sep 10 Wed	SHA	Mer.pass
										Venus	218°58.6	10:07
										Mars	159°47.6	14:03
										Jupiter	248°58.7	08:06
										Saturn	359°34.9	00:44
										Sep 11 Thu	SHA	Mer.pass
										Venus	217°46.0	10:08
										Mars	159°10.8	14:01
										Jupiter	248°48.2	08:03
										Saturn	359°39.0	00:40
										Sep 12 Fri	SHA	Mer.pass
										Venus	216°33.6	10:09
										Mars	158°33.8	14:00
										Jupiter	248°37.7	07:59
										Saturn	359°43.2	00:36
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:00:34		v-0.5 d-0.9 m-3.9		v0.9 d-0.6 m1.6		v2.0 d-0.1 m-1.9		v2.6 d-0.1 m0.6				

h		Sun		Moon										
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight	
									Naut.	Civil			Civil	Naut.
0	180°43.9	N04°55.1	333°52.9	10.5'	N09°23.3	16.7'	60.1'	N 72°	01:30	03:35	04:50	19:00	20:14	22:13
1	195°44.1	54.1	348°22.4	10.4'	09°39.9	16.6'	60.1'	N 70°	02:14	03:51	04:57	18:53	19:59	21:33
2	210°44.3	53.2	2°51.8	10.4'	09°56.6	16.6'	60.1'	68°	02:42	04:04	05:03	18:48	19:47	21:07
3	225°44.5	52.2	17°21.1	10.3'	10°13.1	16.5'	60.1'	66°	03:02	04:14	05:08	18:43	19:37	20:47
4	240°44.8	51.3	31°50.4	10.3'	10°29.7	16.5'	60.1'	64°	03:19	04:23	05:12	18:39	19:28	20:32
5	255°45.0	50.3	46°19.7	10.2'	10°46.1	16.4'	60.1'	62°	03:32	04:30	05:16	18:36	19:21	20:19
6	270°45.2	N04°49.4	60°48.8	10.1'	N11°02.5	16.4'	60.1'	60°	03:42	04:36	05:19	18:33	19:15	20:08
7	285°45.4	48.4	75°17.9	10.1'	11°18.9	16.3'	60.1'	N 58°	03:52	04:41	05:22	18:30	19:10	19:59
8	300°45.6	47.5	89°47.0	10.0'	11°35.1	16.2'	60.1'	56°	04:00	04:46	05:24	18:28	19:06	19:52
9	315°45.9	46.6	104°16.0	9.9'	11°51.3	16.2'	60.1'	54°	04:06	04:50	05:26	18:26	19:02	19:45
10	330°46.1	45.6	118°44.9	9.9'	12°07.5	16.1'	60.1'	52°	04:13	04:54	05:28	18:24	18:58	19:39
11	345°46.3	44.7	133°13.7	9.8'	12°23.6	16.0'	60.1'	50°	04:18	04:57	05:30	18:22	18:55	19:34
12	0°46.5	N04°43.7	147°42.5	9.7'	N12°39.6	16.0'	60.1'	45°	04:29	05:04	05:34	18:18	18:48	19:23
13	15°46.7	42.8	162°11.2	9.7'	12°55.5	15.9'	60.1'	N 40°	04:38	05:10	05:37	18:15	18:42	19:15
14	30°47.0	41.8	176°39.8	9.6'	13°11.4	15.8'	60.1'	35°	04:45	05:15	05:40	18:12	18:38	19:08
15	45°47.2	40.9	191°08.4	9.5'	13°27.2	15.7'	60.1'	30°	04:50	05:18	05:42	18:10	18:34	19:02
16	60°47.4	39.9	205°36.9	9.5'	13°42.9	15.7'	60.1'	20°	04:59	05:24	05:47	18:06	18:28	18:54
17	75°47.6	39.0	220°05.3	9.4'	13°58.5	15.6'	60.1'	N 10°	05:05	05:29	05:50	18:03	18:24	18:48
18	90°47.8	N04°38.0	234°33.7	9.3'	N14°14.0	15.5'	60.1'	0°	05:09	05:33	05:53	18:00	18:21	18:45
19	105°48.1	37.1	249°02.0	9.2'	14°29.5	15.4'	60.1'	S 10°	05:11	05:35	05:56	17:57	18:18	18:42
20	120°48.3	36.1	263°30.2	9.2'	14°44.9	15.3'	60.1'	20°	05:12	05:38	06:00	17:54	18:16	18:41
21	135°48.5	35.2	277°58.3	9.1'	15°00.2	15.3'	60.1'	30°	05:11	05:39	06:03	17:50	18:14	18:42
22	150°48.7	34.2	292°26.4	9.0'	15°15.4	15.2'	60.1'	35°	05:11	05:40	06:05	17:49	18:14	18:43
23	165°48.9	33.3	306°54.4	8.9'	15°30.5	15.1'	60.1'	40°	05:09	05:40	06:07	17:46	18:14	18:45
	SD.=15.9	d=-0.9			S.D.=16.4			45°	05:07	05:40	06:10	17:44	18:13	18:47
								S 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
								S 60°	04:51	05:39	06:21	17:34	18:15	19:04
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset		
									Wed	Thu	Fri	Wed	Thu	Fri
0	180°49.2	N04°32.3	321°22.3	8.9'	N15°45.5	15.0'	60.1'	N 72°	17:03	□	□	10:54	□	□
1	195°49.4	31.4	335°50.1	8.8'	16°00.5	14.9'	60.1'	N 70°	17:29	16:08	□	10:30	13:44	□
2	210°49.6	30.4	350°17.8	8.7'	16°15.3	14.8'	60.1'	68°	17:49	17:04	□	10:13	12:49	□
3	225°49.8	29.5	4°45.5	8.6'	16°30.0	14.7'	60.1'	66°	18:05	17:39	□	09:58	12:17	□
4	240°50.0	28.5	19°13.1	8.5'	16°44.7	14.6'	60.1'	64°	18:18	18:04	17:38	09:47	11:53	14:18
5	255°50.3	27.6	33°40.6	8.5'	16°59.2	14.5'	60.1'	62°	18:29	18:23	18:16	09:37	11:34	13:41
6	270°50.5	N04°26.6	48°08.0	8.4'	N17°13.6	14.4'	60.1'	60°	18:39	18:40	18:43	09:29	11:19	13:14
7	285°50.7	25.7	62°35.4	8.3'	17°28.0	14.3'	60.0'	N 58°	18:47	18:54	19:05	09:22	11:06	12:53
8	300°50.9	24.7	77°02.6	8.2'	17°42.2	14.2'	60.0'	56°	18:55	19:06	19:22	09:15	10:55	12:37
9	315°51.1	23.8	91°29.8	8.1'	17°56.3	14.1'	60.0'	54°	19:02	19:16	19:37	09:10	10:45	12:22
10	330°51.4	22.8	105°56.9	8.1'	18°10.3	13.9'	60.0'	52°	19:08	19:26	19:50	09:04	10:37	12:10
11	345°51.6	21.9	120°23.9	8.0'	18°24.2	13.8'	60.0'	50°	19:13	19:34	20:02	09:00	10:29	11:59
12	0°51.8	N04°20.9	134°50.9	7.9'	N18°38.0	13.7'	60.0'	45°	19:25	19:52	20:26	08:50	10:13	11:36
13	15°52.0	20.0	149°17.7	7.8'	18°51.6	13.6'	60.0'	N 40°	19:35	20:07	20:45	08:42	09:59	11:18
14	30°52.2	19.0	163°44.5	7.7'	19°05.2	13.5'	60.0'	35°	19:44	20:19	21:01	08:35	09:48	11:02
15	45°52.5	18.0	178°11.2	7.6'	19°18.6	13.4'	60.0'	30°	19:52	20:31	21:15	08:29	09:38	10:49
16	60°52.7	17.1	192°37.7	7.6'	19°31.9	13.2'	60.0'	20°	20:05	20:50	21:40	08:18	09:21	10:27
17	75°52.9	16.1	207°04.3	7.5'	19°45.1	13.1'	60.0'	N 10°	20:17	21:06	22:01	08:09	09:07	10:07
18	90°53.1	N04°15.2	221°30.7	7.4'	N19°58.1	13.0'	60.0'	0°	20:28	21:22	22:20	08:00	08:53	09:49
19	105°53.4	14.2	235°57.0	7.3'	20°11.0	12.9'	60.0'	S 10°	20:39	21:38	22:40	07:52	08:40	09:32
20	120°53.6	13.3	250°23.3	7.2'	20°23.8	12.7'	59.9'	20°	20:51	21:55	23:02	07:43	08:25	09:12
21	135°53.8	12.3	264°49.4	7.1'	20°36.5	12.6'	59.9'	30°	21:05	22:15	23:27	07:32	08:09	08:50
22	150°54.0	11.4	279°15.5	7.0'	20°49.0	12.5'	59.9'	35°	21:13	22:27	23:41	07:26	07:59	08:38
23	165°54.2	10.4	293°41.5	7.0'	21°01.4	12.3'	59.9'	40°	21:22	22:40	23:58	07:20	07:49	08:23
	SD.=15.9	d=-1.0			S.D.=16.4			45°	21:33	22:56	—	07:12	07:36	08:06
								S 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°	22:16	—	00:03	06:43	06:47	06:55
								S 60°	22:26	—	00:20	06:36	06:36	06:37
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Mer.	Moon		Age
									Eqn.of Time	12 ^h	Pass	Upper	Lower	18-20
									00 ^h	mm:ss	hh:mm	hh:mm	hh:mm	90-72%
0	180°54.5	N04°09.5	308°07.4	6.9'	N21°13.7	12.2'	59.9'	10	02:55	03:06	11:57	01:48	14:14	
1	195°54.7	08.5	322°33.3	6.8'	21°25.8	12.1'	59.9'	11	03:17	03:27	11:57	02:40	15:08	
2	210°54.9	07.6	336°59.0	6.7'	21°37.8	11.9'	59.9'	12	03:38	03:48	11:56	03:36	16:05	
3	225°55.1	06.6	351°24.7	6.6'	21°49.7	11.8'	59.9'							
4	240°55.3	05.7	5°50.2	6.5'	22°01.4	11.6'	59.9'							
5	255°55.6	04.7	20°15.7	6.4'	22°12.9	11.5'	59.8'							
6	270°55.8	N04°03.8	34°41.1	6.4'	N22°24.4	11.3'	59.8'							
7	285°56.0	02.8	49°06.5	6.3'	22°35.6	11.2'	59.8'							
8	300°56.2	01.8	63°31.7	6.2'	22°46.8	11.1'	59.8'							
9	315°56.5	04°00.9	77°56.9	6.1'	22°57.7	10.9'	59.8'							
10	330°56.7	03°59.9	92°21.9	6.0'	23°08.6	10.7'	59.8'							
11	345°56.9	59.0	106°46.9	6.0'	23°19.2	10.6'	59.8'							
12	0°57.1	N03°58.0	121°11.8	5.9'	N23°29.7	10.4'	59.7'							
13	15°57.3	57.1	135°36.7	5.8'	23°40.1	10.3'	59.7'							
14	30°57.6	56.1	150°01.4	5.7'	23°50.3	10.1'	59.7'							
15	45°57.8	55.2	164°26.1	5.6'	24°00.4	10.0'	59.7'							
16	60°58.0	54.2	178°50.7	5.6'	24°10.2	9.8'	59.7'							
17	75°58.2	53.2	193°15.2	5.5'	24°20.0	9.6'	59.7'							
18	90°58.5	N03°52.3	207°39.7	5.4'	N24°29.5	9.5'	59.7'							
19	105°58.7	51.3	222°04.1	5.3'	24°38.9	9.3'	59.6'							
20	120°58.9	50.4	236°28.4	5.3'	24°48.2	9.1'	59.6'							
21	135°59.1	49.4	250°52.6	5.2'	24°57.2	9.0'	59.6'							
22	150°59.3	48.5	265°16.8	5.1'	25°06.1	8.8'	59.6'							
23	165°59.6	47.5												

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

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	355°11.9	206°57.6	N13°42.6	151°16.6	S09°52.8	243°09.1	N21°53.1	355°11.7	S02°43.8	Alpheratz	357°33.8	29°14.1	
1	10°14.3	221°57.1	41.7	166°17.5	53.5	258°11.2	53.1	10°14.4	43.9	Ankaa	353°06.1	-42°09.8	
2	25°16.8	236°56.6	40.8	181°18.4	54.1	273°13.2	53.0	25°17.0	43.9	Schedar	349°29.9	56°40.7	
3	40°19.2	251°56.1	· · 39.8	196°19.4	· · 54.7	288°15.3	· · 53.0	40°19.6	· · 44.0	Diphda	348°46.3	-17°50.5	
4	55°21.7	266°55.6	38.9	211°20.3	55.4	303°17.3	52.9	55°22.3	44.1	Achernar	335°19.2	-57°06.1	
5	70°24.2	281°55.1	37.9	226°21.2	56.0	318°19.4	52.8	70°24.9	44.2	Hamal	327°50.3	23°35.1	
6	85°26.6	296°54.5	N13°37.0	241°22.1	S09°56.6	333°21.4	N21°52.8	85°27.6	S02°44.2	Polaris	313°27.7	89°22.1	
7	100°29.1	311°54.0	36.1	256°23.0	57.2	348°23.5	52.7	100°30.2	44.3	Akamars	315°11.0	-40°11.8	
8	115°31.6	326°53.5	35.1	271°23.9	57.9	3°25.5	52.7	115°32.8	44.4	Menkar	314°05.3	4°11.6	
9	130°34.0	341°53.0	· · 34.2	286°24.8	· · 58.5	18°27.6	· · 52.6	130°35.5	· · 44.5	Mirfak	308°27.2	49°57.1	
10	145°36.5	356°52.5	33.2	301°25.7	59.1	33°29.6	52.6	145°38.1	44.6	Aldebaran	290°38.9	16°33.8	
11	160°39.0	11°52.0	32.3	316°26.6	09°59.8	48°31.7	52.5	160°40.8	44.6	Rigel	281°03.3	-8°10.1	
12	175°41.4	26°51.4	N13°31.4	331°27.5	S10°00.4	63°33.8	N21°52.5	175°43.4	S02°44.7	Capella	280°21.0	46°01.4	
13	190°43.9	41°50.9	30.4	346°28.4	01.0	78°35.8	52.4	190°46.0	44.8	Bellatrix	278°22.2	6°22.5	
14	205°46.4	56°50.4	29.5	1°29.3	01.6	93°37.9	52.4	205°48.7	44.9	Elnath	278°01.1	28°37.7	
15	220°48.8	71°49.9	· · 28.5	16°30.2	· · 02.3	108°39.9	· · 52.3	220°51.3	· · 45.0	Alnilam	275°37.1	-1°11.0	
16	235°51.3	86°49.4	27.6	31°31.1	02.9	123°42.0	52.3	235°54.0	45.0	Betelgeuse	270°51.5	7°24.8	
17	250°53.7	101°48.9	26.6	46°32.0	03.5	138°44.0	52.2	250°56.6	45.1	Canopus	263°52.2	-52°42.2	
18	265°56.2	116°48.4	N13°25.7	61°32.9	S10°04.2	153°46.1	N21°52.2	265°59.2	S02°45.2	Sirius	258°25.7	-16°44.6	
19	280°58.7	131°47.8	24.7	76°33.7	04.8	168°48.1	52.1	281°01.9	45.3	Adara	255°05.5	-29°00.1	
20	296°01.1	146°47.3	23.8	91°34.6	05.4	183°50.2	52.1	296°04.5	45.4	Procyon	244°50.3	5°09.8	
21	311°03.6	161°46.8	· · 22.8	106°35.5	· · 06.0	198°52.3	· · 52.0	311°07.2	· · 45.4	Pollux	243°16.7	27°57.8	
22	326°06.1	176°46.3	21.9	121°36.4	06.7	213°54.3	51.9	326°09.8	45.5	Avior	234°14.9	-50°35.2	
23	341°08.5	191°45.8	20.9	136°37.3	07.3	228°56.4	51.9	341°12.4	45.6	Suhail	222°46.2	-43°31.9	
Mer.pass.:00:19		v-0.5 d-0.9 m-3.8		v0.9 d-0.6 m1.6		v2.1 d-0.1 m-1.9		v2.6 d-0.1 m0.6		Miaplacidus		221°39.0	-69°49.1
										Alphard		217°47.5	-8°46.0
										Regulus		207°34.1	11°50.6
										Dubhe		193°40.9	61°36.7
										Denebola		182°24.6	14°25.8
										Gienah		175°43.3	-17°41.0
										Acrux		173°00.2	-63°14.5
										Gacrux		171°51.6	45.8
										Alioth		166°13.0	55°49.3
										Spica		158°22.0	-11°17.6
										Alkaid		152°51.9	49°11.3
										Hadar		148°35.7	-60°29.9
										Menkent		147°57.3	-36°29.8
										Arcturus		145°47.5	19°03.3
										Rigel Kent.		139°40.0	-60°56.6
										Kochab		137°20.5	74°03.2
										Zuben'ubi		136°55.6	-16°08.9
										Alphecca		126°03.4	26°37.9
										Antares		112°15.2	-26°29.4
										Atria		107°09.0	-69°04.7
										Sabik		102°02.2	-15°45.4
										Shaula		96°09.6	-37°07.4
										Rasalhague		95°58.0	12°32.7
										Eltanin		90°41.9	51°29.4
										Kaus Aust.		83°31.7	-34°22.4
										Vega		80°32.8	38°48.6
										Nunki		75°46.9	-26°15.9
										Altair		61°59.3	8°56.3
										Peacock		53°04.4	-56°39.2
										Deneb		49°25.1	45°22.5
										Enif		33°38.0	9°59.7
										Al Na'ir		27°31.8	-46°50.1
										Fomalhaut		15°13.6	-29°29.0
										Scheat		13°44.3	28°13.5
										Markab		13°29.0	15°20.8
										Sep 16 Tue		SHA	Mer.pass
										Venus		211°45.8	10:13
										Mars		156°04.8	13:54
										Jupiter		247°57.3	07:46
										Saturn		359°59.9	00:19
										Sep 17 Wed		SHA	Mer.pass
										Venus		210°34.3	10:13
										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°37.7	07:40
										Saturn		0°08.3	00:11
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:00:11		v-0.5 d-1.0 m-3.8		v0.9 d-0.6 m1.6		v2.1 d-0.1 m-1.9		v2.6 d-0.1 m0.6					

Sun								Moon							
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight		
									Naut.	Civil			Civil	Naut.	
0	181°15.8	N02°37.4	249°59.8	5.5'	N27°30.8	-4.9'	58.1'	N 72°	02:25	04:06	05:17	18:29	19:39	21:17	
1	196°16.1	36.4	264°24.3	5.5'	27°25.8	-5.1'	58.1'	N 70°	02:53	04:18	05:21	18:25	19:28	20:52	
2	211°16.3	35.5	278°48.9	5.6'	27°20.7	-5.2'	58.1'	68°	03:12	04:27	05:24	18:22	19:19	20:33	
3	226°16.5	· · 34.5	293°13.6	5.7'	27°15.4	-5.4'	58.0'	66°	03:28	04:35	05:27	18:20	19:12	20:18	
4	241°16.7	33.5	307°38.3	5.8'	27°09.9	-5.6'	58.0'	64°	03:40	04:41	05:29	18:18	19:06	20:06	
5	256°16.9	32.6	322°03.2	5.9'	27°04.3	-5.7'	58.0'	62°	03:51	04:46	05:31	18:16	19:01	19:56	
6	271°17.2	N02°31.6	336°28.1	6.0'	N26°58.5	-5.9'	58.0'	60°	03:59	04:51	05:33	18:14	18:56	19:47	
7	286°17.4	30.6	350°53.2	6.1'	26°52.5	-6.0'	58.0'	N 58°	04:07	04:55	05:34	18:13	18:53	19:40	
8	301°17.6	29.7	5°18.3	6.2'	26°46.4	-6.2'	57.9'	56°	04:13	04:58	05:36	18:12	18:49	19:34	
9	316°17.8	· · 28.7	19°43.5	6.3'	26°40.2	-6.4'	57.9'	54°	04:19	05:01	05:37	18:11	18:46	19:29	
10	331°18.1	27.8	34°08.8	6.4'	26°33.7	-6.5'	57.9'	52°	04:24	05:04	05:38	18:10	18:44	19:24	
11	346°18.3	26.8	48°34.2	6.5'	26°27.1	-6.7'	57.9'	50°	04:28	05:07	05:39	18:09	18:41	19:20	
12	1°18.5	N02°25.8	62°59.7	6.6'	N26°20.4	-6.8'	57.8'	45°	04:37	05:12	05:41	18:07	18:36	19:11	
13	16°18.7	24.9	77°25.3	6.7'	26°13.5	-7.0'	57.8'	N 40°	04:44	05:16	05:43	18:05	18:32	19:04	
14	31°19.0	23.9	91°51.1	6.8'	26°06.5	-7.1'	57.8'	35°	04:49	05:19	05:44	18:04	18:29	18:59	
15	46°19.2	· · 22.9	106°16.9	6.9'	25°59.3	-7.3'	57.8'	30°	04:54	05:22	05:46	18:03	18:27	18:55	
16	61°19.4	22.0	120°42.8	7.0'	25°51.9	-7.4'	57.8'	20°	05:00	05:26	05:48	18:01	18:23	18:48	
17	76°19.6	21.0	135°08.8	7.1'	25°44.4	-7.6'	57.7'	N 10°	05:04	05:29	05:50	17:59	18:20	18:44	
18	91°19.8	N02°20.0	149°34.9	7.2'	N25°36.8	-7.7'	57.7'	0°	05:06	05:30	05:51	17:58	18:18	18:42	
19	106°20.1	19.1	164°01.1	7.3'	25°29.0	-7.9'	57.7'	S 10°	05:07	05:32	05:53	17:56	18:17	18:42	
20	121°20.3	18.1	178°27.4	7.4'	25°21.1	-8.0'	57.7'	20°	05:07	05:32	05:54	17:55	18:17	18:43	
21	136°20.5	· · 17.1	192°53.9	7.5'	25°13.0	-8.1'	57.6'	30°	05:04	05:32	05:56	17:54	18:18	18:45	
22	151°20.7	16.2	207°20.4	7.6'	25°04.8	-8.3'	57.6'	35°	05:02	05:31	05:56	17:53	18:18	18:48	
23	166°21.0	15.2	221°47.0	7.7'	24°56.5	-8.4'	57.6'	40°	04:59	05:30	05:57	17:52	18:19	18:51	
	SD.=15.9	d=-1.0			S.D.=15.9			45°	04:55	05:29	05:58	17:51	18:20	18:55	
								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	
								S 60°	04:32	05:21	06:03	17:47	18:29	19:18	
0	181°21.2	N02°14.2	236°13.8	7.8'	N24°48.0	-8.5'	57.6'								
1	196°21.4	13.3	250°40.6	7.9'	24°39.4	-8.7'	57.6'								
2	211°21.6	12.3	265°07.6	8.0'	24°30.6	-8.8'	57.5'								
3	226°21.9	· · 11.3	279°34.6	8.1'	24°21.8	-8.9'	57.5'								
4	241°22.1	10.4	294°01.8	8.2'	24°12.8	-9.1'	57.5'								
5	256°22.3	09.4	308°29.1	8.3'	24°03.6	-9.2'	57.5'								
6	271°22.5	N02°08.4	322°56.5	8.4'	N23°54.4	-9.3'	57.5'								
7	286°22.7	07.5	337°24.0	8.6'	23°45.0	-9.5'	57.4'								
8	301°23.0	06.5	351°51.6	8.7'	23°35.4	-9.6'	57.4'								
9	316°23.2	· · 05.5	6°19.3	8.8'	23°25.8	-9.7'	57.4'								
10	331°23.4	04.6	20°47.1	8.9'	23°16.1	-9.8'	57.4'								
11	346°23.6	03.6	35°15.1	9.0'	23°06.2	-9.9'	57.3'								
12	1°23.9	N02°02.6	49°43.1	9.1'	N22°56.2	-10.1'	57.3'								
13	16°24.1	01.7	64°11.2	9.2'	22°46.1	-10.2'	57.3'								
14	31°24.3	02°00.7	78°39.5	9.3'	22°35.8	-10.3'	57.3'								
15	46°24.5	01°59.7	93°07.9	9.4'	22°25.5	-10.4'	57.3'								
16	61°24.8	58.8	107°36.3	9.5'	22°15.1	-10.5'	57.2'								
17	76°25.0	57.8	122°04.9	9.6'	22°04.5	-10.6'	57.2'								
18	91°25.2	N01°56.8	136°33.6	9.7'	N21°53.8	-10.7'	57.2'								
19	106°25.4	55.9	151°02.4	9.9'	21°43.0	-10.8'	57.2'								
20	121°25.6	54.9	165°31.3	10.0'	21°32.2	-10.9'	57.1'								
21	136°25.9	· · 53.9	180°00.3	10.1'	21°21.2	-11.0'	57.1'								
22	151°26.1	53.0	194°29.4	10.2'	21°10.1	-11.1'	57.1'								
23	166°26.3	52.0	208°58.7	10.3'	20°58.9	-11.2'	57.1'								
	SD.=15.9	d=-1.0			S.D.=15.7										
0	181°26.5	N01°51.0	223°28.0	10.4'	N20°47.6	-11.3'	57.1'								
1	196°26.8	50.1	237°57.4	10.5'	20°36.2	-11.4'	57.0'								
2	211°27.0	49.1	252°27.0	10.6'	20°24.7	-11.5'	57.0'								
3	226°27.2	· · 48.1	266°56.6	10.7'	20°13.1	-11.6'	57.0'								
4	241°27.4	47.2	281°26.3	10.8'	20°01.5	-11.7'	57.0'								
5	256°27.6	46.2	295°56.2	10.9'	19°49.7	-11.8'	57.0'								
6	271°27.9	N01°45.2	310°26.2	11.0'	N19°37.9	-11.9'	56.9'								
7	286°28.1	44.2	324°56.2	11.1'	19°25.9	-12.0'	56.9'								
8	301°28.3	43.3	339°26.4	11.2'	19°13.9	-12.1'	56.9'								
9	316°28.5	· · 42.3	353°56.6	11.3'	19°01.8	-12.2'	56.9'								
10	331°28.8	41.3	8°27.0	11.4'	18°49.6	-12.2'	56.8'								
11	346°29.0	40.4	22°57.4	11.5'	18°37.3	-12.3'	56.8'								
12	1°29.2	N01°39.4	37°28.0	11.6'	N18°24.9	-12.4'	56.8'								
13	16°29.4	38.4	51°58.6	11.7'	18°12.5	-12.5'	56.8'								
14	31°29.7	37.5	66°29.4	11.8'	17°59.9	-12.6'	56.8'								
15	46°29.9	· · 36.5	81°00.2	11.9'	17°47.3	-12.6'	56.7'								
16	61°30.1	35.5	95°31.2	12.0'	17°34.7	-12.7'	56.7'								
17	76°30.3	34.6	110°02.2	12.1'	17°21.9	-12.8'	56.7'								
18	91°30.5	N01°33.6	124°33.4	12.2'	N17°09.1	-12.9'	56.7'								
19	106°30.8	32.6	139°04.6	12.3'	16°56.2	-12.9'	56.7'								
20	121°31.0	31.6	153°35.9	12.4'	16°43.2	-13.0'	56.6'								
21	136°31.2	· · 30.7	168°07.3	12.5'	16°30.2	-13.1'	56.6'								
22	151°31.4	29.7	182°38.8	12.5'	16°17.1	-13.1'	56.6'								
23	166°31.7	28.7	197°10.4	12.6'	16°03.9	-13.2'	56.6'								
	SD.=15.9	d=-1.0			S.D.=15.6										

Lat.	Moonrise			Moonset		
	Tue	Wed	Thu	Tue	Wed	Thu
N 72°	☐	☐	23:52	☐	☐	20:11
N 70°	☐	☐	--	☐	☐	19:27
68°	☐	22:15	--	☐	☐	18:57
66°	☐	23:10	--	☐	☐	19:07
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
S 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
S 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</

September 19, 20, 21 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°33.8	29°14.1
1	13°11.7	221°20.6	32.5	167°21.9	38.6	260°39.5	49.3	13°24.5	49.6	Ankaa	353°06.1	-42°09.8
2	28°14.2	236°20.1	31.5	182°22.8	39.2	275°41.6	49.2	28°27.1	49.6	Schedar	349°29.9	56°40.8
3	43°16.7	251°19.6	· · 30.5	197°23.7	· · 39.8	290°43.7	· · 49.2	43°29.8	· · 49.7	Diphda	348°46.3	-17°50.5
4	58°19.1	266°19.1	29.5	212°24.6	40.5	305°45.7	49.1	58°32.4	49.8	Achernar	335°19.2	-57°06.1
5	73°21.6	281°18.6	28.5	227°25.5	41.1	320°47.8	49.1	73°35.0	49.9	Hamal	327°50.3	23°35.2
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	Polaris	313°26.5	89°22.1
7	103°26.5	311°17.6	26.6	257°27.3	42.3	350°51.9	49.0	103°40.3	50.0	Akamar	315°11.0	-40°11.8
8	118°29.0	326°17.1	25.6	272°28.1	43.0	5°54.0	48.9	118°43.0	50.1	Menkar	314°05.3	4°11.6
9	133°31.4	341°16.6	· · 24.6	287°29.0	· · 43.6	20°56.1	· · 48.9	133°45.6	· · 50.2	Mirfak	308°27.1	49°57.1
10	148°33.9	356°16.1	23.6	302°29.9	44.2	35°58.2	48.8	148°48.3	50.3	Aldebaran	290°38.9	16°33.8
11	163°36.4	1°15.6	22.6	317°30.8	44.8	51°00.2	48.8	163°50.9	50.3	Rigel	281°03.2	-8°10.1
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	Capella	280°21.0	46°01.4
13	193°41.3	41°14.7	20.6	347°32.6	46.1	81°04.4	48.6	193°56.2	50.5	Bellatrix	278°22.2	6°22.5
14	208°43.8	56°14.2	19.6	2°33.4	46.7	96°06.4	48.6	208°58.8	50.6	Elnath	278°01.1	28°37.8
15	223°46.2	71°13.7	· · 18.6	17°34.3	· · 47.3	111°08.5	· · 48.5	224°01.5	· · 50.7	Alnilam	275°37.1	-1°10.9
16	238°48.7	86°13.2	17.7	32°35.2	47.9	126°10.6	48.5	239°04.1	50.7	Betelgeuse	270°51.5	7°24.8
17	253°51.2	101°12.7	16.7	47°36.1	48.6	141°12.7	48.4	254°06.7	50.8	Canopus	263°52.2	-52°42.2
18	268°53.6	116°12.2	N12°15.7	62°37.0	S10°49.2	156°14.7	N21°48.4	269°09.4	S02°50.9	Sirius	258°25.7	-16°44.6
19	283°56.1	131°11.7	14.7	77°37.9	49.8	171°16.8	48.3	284°12.0	51.0	Adara	255°05.5	-29°00.1
20	298°58.6	146°11.2	13.7	92°38.7	50.4	186°18.9	48.3	299°14.7	51.1	Procyon	244°50.3	5°09.8
21	314°01.0	161°10.7	· · 12.7	107°39.6	· · 51.1	201°21.0	· · 48.2	314°17.3	· · 51.1	Pollux	243°16.7	27°57.8
22	329°03.5	176°10.2	11.7	122°40.5	51.7	216°23.0	48.2	329°20.0	51.2	Avior	234°14.9	-50°35.2
23	344°05.9	191°09.7	10.7	137°41.4	52.3	231°25.1	48.1	344°22.6	51.3	Suhail	222°46.2	-43°31.9
Mer.pass.:00:07		v-0.5 d-1.0 m-3.8		v0.9 d-0.6 m1.6		v2.1 d-0.1 m-1.9		v2.6 d-0.1 m0.6		Miaplacidus	221°38.9	-69°49.1
										Alphard	217°47.4	-8°46.0
										Regulus	207°34.1	11°50.6
										Dubhe	193°40.9	61°36.7
										Denebola	182°24.6	14°25.8
										Gienah	175°43.3	-17°41.0
										Acrux	173°00.2	-63°14.5
										Gacrux	171°51.6	-57°15.4
										Alioth	166°13.0	55°49.3
										Spica	158°22.0	-11°17.6
										Alkaid	152°51.9	49°11.2
										Hadar	148°35.8	-60°29.9
										Menkent	147°57.3	-36°29.8
										Arcturus	145°47.5	19°03.3
										Rigel Kent.	139°40.0	-60°56.6
										Kochab	137°20.5	74°03.1
										Zuben'ubi	136°55.6	-16°08.9
										Alphecca	126°03.5	26°37.9
										Antares	112°15.2	-26°29.4
										Atria	107°09.1	-69°04.7
										Sabik	102°02.2	-15°45.4
										Shaula	96°09.6	-37°07.4
										Rasalhague	95°58.1	12°32.7
										Eltanin	90°41.9	51°29.4
										Kaus Aust.	83°31.7	-34°22.4
										Vega	80°32.8	38°48.6
										Nunki	75°46.9	-26°15.9
										Altair	61°59.3	8°56.3
										Peacock	53°04.4	-56°39.3
										Deneb	49°25.1	45°22.6
										Enif	33°38.0	9°59.7
										Al Na'ir	27°31.8	-46°50.2
										Fomalhaut	15°13.6	-29°29.0
										Scheat	13°44.3	28°13.5
										Markab	13°29.0	15°20.8
										Sep 19 Fri	SHA	Mer.pass
										Venus	208°11.8	10:15
										Mars	154°11.8	13:50
										Jupiter	247°28.2	07:36
										Saturn	0°12.6	00:07
										Sep 20 Sat	SHA	Mer.pass
										Venus	207°00.8	10:16
										Mars	153°33.9	13:48
										Jupiter	247°18.8	07:33
										Saturn	0°16.8	00:02
										Sep 21 Sun	SHA	Mer.pass
										Venus	205°50.0	10:16
										Mars	152°55.8	13:47
										Jupiter	247°09.5	07:30
										Saturn	0°21.1	23:54
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:23:55		v-0.5 d-1.0 m-3.8		v0.9 d-0.6 m1.6		v2.1 d-0.1 m-1.9		v2.6 d-0.1 m0.6				

h		Sun				Moon										
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight			
									Naut.	Civil			Civil	Naut.		
0	181°31.9	N01°27.8	211°42.1	12.7'	N15°50.7	-13.3'	56.5'	N 72°	02:47	04:21	05:31	18:14	19:22	20:55		
1	196°32.1	26.8	226°13.8	12.8'	15°37.4	-13.3'	56.5'	N 70°	03:09	04:31	05:33	18:12	19:13	20:33		
2	211°32.3	25.8	240°45.7	12.9'	15°24.0	-13.4'	56.5'	68°	03:26	04:38	05:35	18:10	19:06	20:17		
3	226°32.5	· · 24.9	255°17.6	13.0'	15°10.6	-13.4'	56.5'	66°	03:40	04:45	05:36	18:08	19:00	20:04		
4	241°32.8	23.9	269°49.7	13.1'	14°57.1	-13.5'	56.5'	64°	03:51	04:50	05:38	18:07	18:55	19:54		
5	256°33.0	22.9	284°21.8	13.1'	14°43.6	-13.6'	56.4'	62°	04:00	04:54	05:39	18:06	18:51	19:45		
6	271°33.2	N01°22.0	298°54.0	13.2'	N14°30.0	-13.6'	56.4'	60°	04:07	04:58	05:40	18:05	18:47	19:37		
7	286°33.4	21.0	313°26.2	13.3'	14°16.3	-13.7'	56.4'	N 58°	04:14	05:01	05:41	18:05	18:44	19:31		
8	301°33.7	20.0	327°58.6	13.4'	14°02.6	-13.7'	56.4'	56°	04:20	05:04	05:42	18:04	18:41	19:25		
9	316°33.9	· · 19.0	342°31.0	13.5'	13°48.9	-13.8'	56.4'	54°	04:25	05:07	05:42	18:03	18:39	19:21		
10	331°34.1	18.1	357°03.5	13.6'	13°35.1	-13.8'	56.3'	52°	04:29	05:09	05:43	18:03	18:36	19:16		
11	346°34.3	17.1	11°36.1	13.6'	13°21.2	-13.9'	56.3'	50°	04:33	05:11	05:44	18:02	18:34	19:13		
12	1°34.5	N01°16.1	26°08.8	13.7'	N13°07.3	-13.9'	56.3'	45°	04:41	05:15	05:45	18:01	18:30	19:05		
13	16°34.8	15.2	40°41.5	13.8'	12°53.3	-14.0'	56.3'	N 40°	04:47	05:19	05:46	18:00	18:27	18:59		
14	31°35.0	14.2	55°14.4	13.9'	12°39.3	-14.0'	56.3'	35°	04:52	05:21	05:47	18:00	18:25	18:54		
15	46°35.2	· · 13.2	69°47.3	13.9'	12°25.3	-14.1'	56.2'	30°	04:56	05:23	05:47	17:59	18:23	18:51		
16	61°35.4	12.2	84°20.2	14.0'	12°11.2	-14.1'	56.2'	20°	05:01	05:26	05:48	17:58	18:20	18:46		
17	76°35.7	11.3	98°53.3	14.1'	11°57.1	-14.2'	56.2'	N 10°	05:04	05:28	05:49	17:57	18:18	18:43		
18	91°35.9	N01°10.3	113°26.4	14.1'	N11°42.9	-14.2'	56.2'	0°	05:05	05:29	05:50	17:57	18:17	18:41		
19	106°36.1	09.3	127°59.5	14.2'	11°28.7	-14.2'	56.2'	S 10°	05:05	05:30	05:51	17:56	18:17	18:41		
20	121°36.3	08.4	142°32.8	14.3'	11°14.4	-14.3'	56.1'	20°	05:04	05:29	05:51	17:56	18:18	18:43		
21	136°36.5	· · 07.4	157°06.1	14.3'	11°00.1	-14.3'	56.1'	30°	05:00	05:28	05:52	17:55	18:19	18:47		
22	151°36.8	06.4	171°39.5	14.4'	10°45.8	-14.3'	56.1'	35°	04:58	05:27	05:52	17:55	18:20	18:50		
23	166°37.0	05.5	186°12.9	14.5'	10°31.5	-14.4'	56.1'	40°	04:54	05:25	05:52	17:55	18:22	18:54		
	SD.=15.9	d=-1.0			S.D.=15.4			45°	04:49	05:23	05:53	17:55	18:24	18:58		
Sat	GHA	Dec	GHA	ν	Dec	d	HP	S 50°	04:43	05:21	05:53	17:55	18:27	19:05		
0	181°37.2	N01°04.5	200°46.4	14.5'	N10°17.1	-14.4'	56.1'	52°	04:40	05:19	05:53	17:55	18:28	19:08		
1	196°37.4	03.5	215°20.0	14.6'	10°02.6	-14.4'	56.0'	54°	04:36	05:18	05:53	17:55	18:30	19:12		
2	211°37.6	02.5	229°53.7	14.7'	09°48.2	-14.5'	56.0'	56°	04:33	05:16	05:53	17:55	18:32	19:16		
3	226°37.9	· · 01.6	244°27.4	14.7'	09°33.7	-14.5'	56.0'	58°	04:28	05:14	05:53	17:54	18:34	19:20		
4	241°38.1	01°00.6	259°01.1	14.8'	09°19.2	-14.5'	56.0'	S 60°	04:23	05:12	05:54	17:54	18:36	19:26		
5	256°38.3	00°59.6	273°34.9	14.8'	09°04.6	-14.6'	56.0'									
6	271°38.5	N00°58.7	288°08.8	14.9'	N08°50.0	-14.6'	55.9'									
7	286°38.8	57.2	302°42.7	15.0'	08°35.4	-14.6'	55.9'	Lat.	Moonrise		Moonset					
8	301°39.0	56.7	317°16.7	15.0'	08°20.8	-14.6'	55.9'	Fri	Sat	Sun	Fri	Sat	Sun			
9	316°39.2	· · 55.7	331°50.8	15.1'	08°06.1	-14.7'	55.9'	N 72°	--	02:37	04:48	19:01	18:20	17:46		
10	331°39.4	54.8	346°24.9	15.1'	07°51.5	-14.7'	55.9'	N 70°	00:34	02:53	04:52	18:43	18:12	17:47		
11	346°39.6	53.8	0°59.0	15.2'	07°36.8	-14.7'	55.8'	68°	01:02	03:05	04:56	18:28	18:06	17:47		
12	1°39.9	N00°52.8	15°33.2	15.2'	N07°22.1	-14.7'	55.8'	66°	01:23	03:16	04:59	18:16	18:01	17:47		
13	16°40.1	51.9	30°07.4	15.3'	07°07.3	-14.7'	55.8'	64°	01:39	03:24	05:02	18:06	17:56	17:47		
14	31°40.3	50.9	44°41.7	15.3'	06°52.6	-14.8'	55.8'	62°	01:53	03:31	05:04	17:57	17:52	17:47		
15	46°40.5	· · 49.9	59°16.1	15.4'	06°37.8	-14.8'	55.8'	60°	02:04	03:37	05:06	17:49	17:48	17:47		
16	61°40.7	48.9	73°50.5	15.4'	06°23.0	-14.8'	55.7'	N 58°	02:14	03:43	05:07	17:43	17:45	17:47		
17	76°41.0	48.0	88°24.9	15.5'	06°08.2	-14.8'	55.7'	56°	02:23	03:48	05:09	17:37	17:42	17:47		
18	91°41.2	N00°47.0	102°59.4	15.5'	N05°53.4	-14.8'	55.7'	54°	02:30	03:52	05:10	17:32	17:40	17:47		
19	106°41.4	46.0	117°33.9	15.5'	05°38.5	-14.8'	55.7'	52°	02:37	03:56	05:12	17:27	17:38	17:47		
20	121°41.6	45.1	132°08.5	15.6'	05°23.7	-14.9'	55.7'	50°	02:43	03:59	05:13	17:22	17:35	17:47		
21	136°41.9	· · 44.1	146°43.1	15.6'	05°08.8	-14.9'	55.6'	45°	02:56	04:07	05:15	17:13	17:31	17:47		
22	151°42.1	43.1	161°17.7	15.7'	04°54.0	-14.9'	55.6'	N 40°	03:07	04:13	05:17	17:05	17:27	17:47		
23	166°42.3	42.1	175°52.4	15.7'	04°39.1	-14.9'	55.6'	35°	03:16	04:19	05:19	16:58	17:23	17:47		
	SD.=15.9	d=-1.0			S.D.=15.3			30°	03:24	04:24	05:21	16:52	17:20	17:47		
Sun	GHA	Dec	GHA	ν	Dec	d	HP	20°	03:38	04:32	05:23	16:41	17:15	17:47		
0	181°42.5	N00°41.2	190°27.1	15.7'	N04°24.2	-14.9'	55.6'	N 10°	03:50	04:39	05:26	16:32	17:11	17:47		
1	196°42.7	40.2	205°01.9	15.8'	04°09.3	-14.9'	55.6'	0°	04:01	04:46	05:28	16:23	17:06	17:47		
2	211°43.0	39.2	219°36.7	15.8'	03°54.4	-14.9'	55.5'	S 10°	04:12	04:52	05:30	16:14	17:02	17:47		
3	226°43.2	· · 38.2	234°11.5	15.8'	03°39.5	-14.9'	55.5'	20°	04:24	04:59	05:32	16:04	16:57	17:47		
4	241°43.4	37.3	248°46.4	15.9'	03°24.6	-14.9'	55.5'	30°	04:38	05:08	05:35	15:53	16:51	17:47		
5	256°43.6	36.3	263°21.3	15.9'	03°09.7	-14.9'	55.5'	35°	04:45	05:12	05:37	15:47	16:48	17:47		
6	271°43.8	N00°35.3	277°56.2	15.9'	N02°54.8	-14.9'	55.5'	40°	04:54	05:17	05:38	15:39	16:44	17:47		
7	286°44.1	34.4	292°31.2	16.0'	02°39.8	-14.9'	55.4'	45°	05:04	05:23	05:40	15:31	16:40	17:47		
8	301°44.3	33.4	307°06.2	16.0'	02°24.9	-14.9'	55.4'	S 50°	05:17	05:31	05:43	15:20	16:35	17:47		
9	316°44.5	· · 32.4	321°41.2	16.0'	02°10.0	-14.9'	55.4'	52°	05:22	05:34	05:44	15:15	16:33	17:47		
10	331°44.7	31.4	336°16.2	16.1'	01°55.1	-14.9'	55.4'	54°	05:28	05:37	05:45	15:10	16:30	17:47		
11	346°44.9	30.5	350°51.3	16.1'	01°40.2	-14.9'	55.4'	56°	05:35	05:41	05:46	15:04	16:27	17:47		
12	1°45.2	N00°29.5	5°26.4	16.1'	N01°25.3	-14.9'	55.4'	58°	05:43	05:46	05:48	14:57	16:24	17:47		
13	16°45.4	28.5	20°01.5	16.1'	01°10.4	-14.9'	55.3'	S 60°	05:52	05:51	05:49	14:50	16:20	17:47		
14	31°45.6	27.6	34°36.6	16.1'	00°55.5	-14.9'	55.3'									
15	46°45.8	· · 26.6	49°11.8	16.2'	00°40.6	-14.9'	55.3'	Day	Sun		Moon		Age			
16	61°46.0	25.6	63°47.0	16.2'	00°25.7	-14.9'	55.3'	Eqn.of Time	Mer.	Mer.Pass.		27-29				
17	76°46.3	24.6	78°22.2	16.2'	N00°10.8	-14.9'	55.3'	00 ^h	Pass	Upper	Lower	6-0%				
18	91°46.5	N00°23.7	92°57.4	16.2'	S00°04.0	-14.9'	55.2'	mm:ss	hh:mm	hh:mm	hh:mm					
19	106°46.7	22.7	107°32.6	16.2'	00°18.9	-14.9'	55.2'	19	06:07	06:18	11:54	10:12	22:34			
20	121°46.9	21.7	122°07.9	16.3'	00°33.7	-14.8'	55.2'	20	06:29	06:39	11:53	10:56	23:17			
21	136°47.1	· · 20.7	136°43.1	16.3'	00°48.6	-14.8'	55.2'	21	06:50	07:01	11:53	11:38	23:58			
22	151°47.4	19.8	151°18.4	16.3'	01°03.4	-14.8'	55.2'									
23	166°47.6	18.8	165°53.7	16.3'	01°18.2	-14.8'	55.2'									
	SD.=15.9	d=-1.0			S.D.=15.2											

September 22, 23, 24 (Mon., Tue., Wed.)


Aries		Venus		Mars		Jupiter		Saturn		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	S02°55.1	Alpheratz	357°33.8	29°14.1
1	16°09.1	220°45.6	20.0	168°25.2	23.2	263°09.1	45.6	16°34.7	55.2	Ankaa	353°06.1	-42°09.8
2	31°11.6	235°45.1	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°46.3	-17°50.6
4	61°16.5	265°44.2	16.9	213°27.8	25.1	308°15.3	45.4	61°42.6	55.5	Achernar	335°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°35.2
6	91°21.5	295°43.2	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	Akamar	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°58.4	55.9	Aldebaran	290°38.8	16°33.8
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°36.3	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°21.0	46°01.4
13	196°38.7	40°39.9	07.7	348°35.7	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°37.8
15	226°43.6	70°39.0	· · 05.6	18°37.4	· · 31.9	113°38.3	· · 44.9	227°11.7	· · 56.3	Alnilam	275°37.1	-1°10.9
16	241°46.1	85°38.5	04.5	33°38.3	32.5	128°40.4	44.8	242°14.3	56.4	Betelgeuse	270°51.4	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°25.7	-16°44.6
19	286°53.5	130°37.1	01.4	78°40.9	34.3	173°46.7	44.7	287°22.2	56.6	Adara	255°05.5	-29°00.1
20	301°56.0	145°36.6	11°00.4	93°41.7	34.9	188°48.8	44.6	302°24.9	56.7	Procyon	244°50.3	5°09.8
21	316°58.4	160°36.2	10°59.4	108°42.6	· · 35.6	203°50.8	· · 44.6	317°27.5	· · 56.8	Pollux	243°16.6	27°57.8
22	332°00.9	175°35.7	58.3	123°43.5	36.2	218°52.9	44.5	332°30.1	56.9	Avior	234°14.9	-50°35.2
23	347°03.4	190°35.2	57.3	138°44.3	36.8	233°55.0	44.5	347°32.8	57.0	Suhail	222°46.2	-43°31.9
Mer.pass.:23:51		v-0.5 d-1.0 m-3.8		v0.9 d-0.6 m1.6		v2.1 d-0.1 m-1.9		v2.6 d-0.1 m0.6		Miaplacidus	221°38.9	-69°49.1
										Alphard	217°47.4	-8°46.0
										Regulus	207°34.1	11°50.6
										Dubhe	193°40.9	61°36.7
										Denebola	182°24.6	14°25.8
										Gienah	175°43.3	-17°41.0
										Acrux	173°00.2	-63°14.5
										Gacrux	171°51.6	-57°15.4
										Alioth	166°13.0	55°49.3
										Spica	158°22.0	-11°17.6
										Alkaid	152°51.9	49°11.2
										Hadar	148°35.8	-60°29.9
										Menkent	147°57.3	-36°29.8
										Arcturus	145°47.5	19°03.3
										Rigel Kent.	139°40.0	-60°56.6
										Kochab	137°20.6	74°03.1
										Zuben'ubi	136°55.6	-16°08.9
										Alphecca	126°03.5	26°37.9
										Antares	112°15.3	-26°29.4
										Atria	107°09.1	-69°04.6
										Sabik	102°02.2	-15°45.4
										Shaula	96°09.6	-37°07.4
										Rasalhague	95°58.1	12°32.7
										Eltanin	90°41.9	51°29.4
										Kaus Aust.	83°31.7	-34°22.4
										Vega	80°32.8	38°48.6
										Nunki	75°47.0	-26°15.9
										Altair	61°59.3	8°56.3
										Peacock	53°04.5	-56°39.3
										Deneb	49°25.2	45°22.6
										Enif	33°38.0	9°59.7
										Al Na'ir	27°31.8	-46°50.2
										Fomalhaut	15°13.6	-29°29.1
										Scheat	13°44.4	28°13.5
										Markab	13°29.0	15°20.8
										Sep 22 Mon	SHA	Mer.pass
										Venus	204°39.4	10:17
										Mars	152°17.7	13:46
										Jupiter	247°00.3	07:26
										Saturn	0°25.3	23:50
										Sep 23 Tue	SHA	Mer.pass
										Venus	203°28.9	10:18
										Mars	151°39.4	13:44
										Jupiter	246°51.3	07:23
										Saturn	0°29.6	23:45
										Sep 24 Wed	SHA	Mer.pass
										Venus	202°18.6	10:19
										Mars	151°00.9	13:43
										Jupiter	246°42.4	07:20
										Saturn	0°33.9	23:41
										Horizontal parallax		
										Venus:	0.1	
										Mars:	0.1	
Mer.pass.:23:43		v-0.5 d-1.1 m-3.8		v0.9 d-0.6 m1.6		v2.1 d-0.0 m-1.9		v2.6 d-0.1 m0.6				

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

Aries		Venus		Mars		Jupiter		Saturn		Stars							
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec						
0	4°04.1	205°12.6	N10°05.7	154°26.5	S12°06.7	250°37.8	N21°42.0	4°42.2	S03°00.8	Alpheratz	357°33.8	29°14.1					
1	19°06.6	220°12.1	04.6	169°27.3	07.3	265°39.9	42.0	19°44.9	00.8	Ankaa	353°06.1	-42°09.8					
2	34°09.0	235°11.7	03.5	184°28.2	08.0	280°42.0	41.9	34°47.5	00.9	Schedar	349°29.9	56°40.8					
3	49°11.5	250°11.2	· · 02.5	199°29.0	· · 08.6	295°44.1	· · 41.9	49°50.2	· · 01.0	Diphda	348°46.3	-17°50.6					
4	64°14.0	265°10.8	01.4	214°29.9	09.2	310°46.2	41.8	64°52.8	01.1	Achernar	335°19.2	-57°06.2					
5	79°16.4	280°10.3	10°00.3	229°30.8	09.8	325°48.3	41.8	79°55.4	01.2	Hamal	327°50.3	23°35.2					
6	94°18.9	295°09.8	N09°59.3	244°31.6	S12°10.4	340°50.4	N21°41.7	94°58.1	S03°01.2	Polaris	313°24.1	89°22.2					
7	109°21.3	310°09.4	58.2	259°32.5	11.0	355°52.5	41.7	110°00.7	01.3	Akamar	315°11.0	-40°11.8					
8	124°23.8	325°08.9	57.1	274°33.3	11.6	10°54.6	41.6	125°03.4	01.4	Menkar	314°05.3	4°11.6					
9	139°26.3	340°08.5	· · 56.1	289°34.2	· · 12.2	25°56.7	· · 41.6	140°06.0	· · 01.5	Mirfak	308°27.1	49°57.1					
10	154°28.7	355°08.0	55.0	304°35.0	12.8	40°58.8	41.5	155°08.6	01.5	Aldebaran	290°38.8	16°33.8					
11	169°31.2	10°07.6	53.9	319°35.9	13.4	56°00.9	41.5	170°11.3	01.6	Rigel	281°03.2	-8°10.1					
12	184°33.7	25°07.1	N09°52.8	334°36.7	S12°14.0	71°03.0	N21°41.4	185°13.9	S03°01.7	Capella	280°20.9	46°01.4					
13	199°36.1	40°06.7	51.8	349°37.6	14.6	86°05.1	41.4	200°16.6	01.8	Bellatrix	278°22.2	6°22.5					
14	214°38.6	55°06.2	50.7	4°38.4	15.2	101°07.2	41.3	215°19.2	01.9	Elnath	278°01.1	28°37.8					
15	229°41.1	70°05.8	· · 49.6	19°39.3	· · 15.8	116°09.3	· · 41.3	230°21.8	· · 01.9	Alnilam	275°37.1	-1°11.0					
16	244°43.5	85°05.3	48.6	34°40.1	16.5	131°11.4	41.2	245°24.5	02.0	Betelgeuse	270°51.4	7°24.8					
17	259°46.0	100°04.9	47.5	49°41.0	17.1	146°13.6	41.2	260°27.1	02.1	Canopus	263°52.2	-52°42.2					
18	274°48.4	115°04.4	N09°46.4	64°41.8	S12°17.7	161°15.7	N21°41.1	275°29.8	S03°02.2	Sirius	258°25.7	-16°44.6					
19	289°50.9	130°04.0	45.3	79°42.7	18.3	176°17.8	41.1	290°32.4	02.2	Adara	255°05.5	-29°00.1					
20	304°53.4	145°03.5	44.3	94°43.5	18.9	191°19.9	41.0	305°35.1	02.3	Procyon	244°50.2	5°09.8					
21	319°55.8	160°03.1	· · 43.2	109°44.4	· · 19.5	206°22.0	· · 41.0	320°37.7	· · 02.4	Pollux	243°16.6	27°57.8					
22	334°58.3	175°02.6	42.1	124°45.2	20.1	221°24.1	40.9	335°40.3	02.5	Avior	234°14.9	-50°35.2					
23	350°00.8	190°02.2	41.0	139°46.1	20.7	236°26.2	40.9	350°43.0	02.6	Suhail	222°46.2	-43°31.9					
Mer.pass.:23:39		v-0.5 d-1.1 m-3.8		v0.9 d-0.6 m1.6		v2.1 d-0.0 m-2.0		v2.6 d-0.1 m0.6		Miacplacidus		221°38.9	-69°49.1				
Alphard		217°47.4		-8°46.0		Regulus		207°34.0		11°50.6		Dubhe		193°40.8	61°36.7		
Denebola		182°24.6		14°25.8		Gienah		175°43.3		-17°41.0		Acrux		173°00.2	-63°14.5		
Gacrux		171°51.6		-57°15.4		Alioth		166°13.0		55°49.3		Spica		158°22.0	-11°17.6		
Alkaid		152°51.9		49°11.2		Hadar		148°35.8		-60°29.9		Menkent		147°57.3	-36°29.8		
Arcturus		145°47.5		19°03.3		Rigil Kent.		139°40.1		-60°56.6		Kochab		137°20.6	74°03.1		
Zuben'ubi		136°55.6		-16°08.9		Alphecca		126°03.5		26°37.9		Antares		112°15.3	-26°29.4		
Atria		107°09.2		-69°04.6		Sabik		102°02.2		-15°45.4		Shaula		96°09.7	-37°07.4		
Rasalhague		95°58.1		12°32.7		Eltanin		90°42.0		51°29.4		Kaus Aust.		83°31.7	-34°22.4		
Vega		80°32.8		38°48.7		Nunki		75°47.0		-26°15.9		Altair		61°59.3	8°56.3		
Peacock		53°04.5		-56°39.3		Deneb		49°25.2		45°22.6		Enif		33°38.0	9°59.7		
Al Na'ir		27°31.8		-46°50.2		Fomalhaut		15°13.6		-29°29.1		Scheat		13°44.4	28°13.5		
Markab		13°29.0		15°20.8		Sep 25 Thu		SHA		Mer.pass		Venus		201°08.5	10:19		
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°25.1		07:13		Saturn		0°42.4		23:33		Sep 27 Sat		SHA		Mer.pass	
Venus		198°48.6		10:21		Mars		149°04.9		13:39		Jupiter		246°16.6		07:10	
Saturn		0°46.6		23:29		Horizontal parallax		Venus:		0.1		Mars:		0.1			
Mer.pass.:23:31		v-0.4 d-1.1 m-3.8		v0.8 d-0.6 m1.6		v2.1 d-0.0 m-2.0		v2.6 d-0.1 m0.6									

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

Aries		Venus		Mars		Jupiter		Saturn		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	S12°50.2	253°09.8	N21°38.5	7°52.4	S03°06.3	Alpheratz	357°33.8	29°14.1	
1	22°04.0	219°40.0	46.5	170°28.3	50.8	268°11.9	38.5	22°55.0	06.4	Ankaa	353°06.1	-42°09.8	
2	37°06.4	234°39.5	45.4	185°29.1	51.4	283°14.1	38.5	37°57.6	06.5	Schedar	349°29.8	56°40.8	
3	52°08.9	249°39.1	· · 44.3	200°30.0	· · 52.0	298°16.2	· · 38.4	53°00.3	· · 06.5	Diphda	348°46.3	-17°50.6	
4	67°11.4	264°38.7	43.2	215°30.8	52.6	313°18.3	38.4	68°02.9	06.6	Achernar	335°19.2	-57°06.2	
5	82°13.8	279°38.2	42.1	230°31.6	53.2	328°20.4	38.3	83°05.6	06.7	Hamal	327°50.3	23°35.2	
6	97°16.3	294°37.8	N08°41.0	245°32.5	S12°53.8	343°22.5	N21°38.3	98°08.2	S03°06.8	Polaris	313°22.7	89°22.2	
7	112°18.8	309°37.4	39.9	260°33.3	54.4	358°24.7	38.2	113°10.8	06.8	Akamar	315°11.0	-40°11.8	
8	127°21.2	324°36.9	38.8	275°34.1	55.0	373°26.8	38.2	128°13.5	06.9	Menkar	314°05.3	4°11.6	
9	142°23.7	339°36.5	· · 37.7	290°35.0	· · 55.6	388°28.9	· · 38.1	143°16.1	· · 07.0	Mirfak	308°27.1	49°57.1	
10	157°26.2	354°36.0	36.6	305°35.8	56.2	403°31.0	38.1	158°18.8	07.1	Aldebaran	290°38.8	16°33.8	
11	172°28.6	9°35.6	35.5	320°36.7	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°01.4	
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°22.1	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°37.8	
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°25.6	-16°44.6	
19	292°48.3	129°32.1	26.7	80°43.3	01.6	178°50.2	37.7	293°42.5	07.8	Adara	255°05.4	-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°50.2	5°09.8	
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°16.6	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	-50°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	
Mer.pass.:23:28		v-0.4 d-1.1 m-3.8		v0.8 d-0.6 m1.6		v2.1 d-0.0 m-2.0		v2.6 d-0.1 m0.6		Miaplacidus		221°38.8	-69°49.0
										Alphard		217°47.4	-8°46.0
										Regulus		207°34.0	11°50.6
										Dubhe		193°40.8	61°36.7
										Denebola		182°24.6	14°25.8
										Gienah		175°43.3	-17°41.0
										Acrux		173°00.2	-63°14.5
										Gacrux		171°51.6	-57°15.4
										Alioth		166°13.0	55°49.3
										Spica		158°22.0	-11°17.6
										Alkaid		152°52.0	49°11.2
										Hadar		148°35.8	-60°29.9
										Menkent		147°57.3	-36°29.8
										Arcturus		145°47.5	19°03.3
										Rigel Kent.		139°40.1	-60°56.6
										Kochab		137°20.7	74°03.1
										Zuben'ubi		136°55.6	-16°08.9
										Alphecca		126°03.5	26°37.9
										Antares		112°15.3	-26°29.4
										Atria		107°09.2	-69°04.6
										Sabik		102°02.2	-15°45.4
										Shaula		96°09.7	-37°07.4
										Rasalhague		95°58.1	12°32.7
										Eltanin		90°42.0	51°29.4
										Kaus Aust.		83°31.7	-34°22.4
										Vega		80°32.9	38°48.7
										Nunki		75°47.0	-26°15.9
										Altair		61°59.4	8°56.3
										Peacock		53°04.5	-56°39.3
										Deneb		49°25.2	45°22.6
										Enif		33°38.0	9°59.7
										Al Na'ir		27°31.8	-46°50.2
										Fomalhaut		15°13.6	-29°29.1
										Scheat		13°44.4	28°13.5
										Markab		13°29.0	15°20.8
										Sep 28 Sun		SHA	Mer.pass
										Venus		197°38.9	10:22
										Mars		148°25.9	13:37
										Jupiter		246°08.3	07:06
										Saturn		0°50.9	23:24
										Sep 29 Mon		SHA	Mer.pass
										Venus		196°29.3	10:22
										Mars		147°46.8	13:36
										Jupiter		246°00.1	07:03
										Saturn		0°55.1	23:20
										Sep 30 Tue		SHA	Mer.pass
										Venus		195°19.9	10:23
										Mars		147°07.6	13:35
										Jupiter		245°52.1	07:00
										Saturn		0°59.3	23:16
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:23:20		v-0.4 d-1.1 m-3.8		v0.8 d-0.6 m1.6		v2.1 d-0.0 m-2.0		v2.6 d-0.1 m0.7					

h		Sun		Moon				Twilight						
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
0	182°18.8	S02°02.4	116°08.6	10.4'	S27°33.3	-4.1'	54.3'	N 72°	03:40	05:03	06:11	17:27	18:34	19:57
1	197°19.1	03.3	130°37.9	10.3'	27°37.3	-4.0'	54.3'	N 70°	03:53	05:08	06:08	17:30	18:30	19:44
2	212°19.3	04.3	145°07.2	10.3'	27°41.2	-3.9'	54.3'	68°	04:04	05:11	06:07	17:32	18:27	19:34
3	227°19.5	· · 05.3	159°36.4	10.2'	27°45.0	-3.7'	54.3'	66°	04:13	05:14	06:05	17:34	18:25	19:25
4	242°19.7	06.3	174°05.6	10.2'	27°48.7	-3.6'	54.3'	64°	04:20	05:16	06:03	17:35	18:23	19:19
5	257°19.9	07.2	188°34.7	10.1'	27°52.2	-3.5'	54.3'	62°	04:26	05:18	06:02	17:37	18:21	19:13
6	272°20.1	S02°08.2	203°03.8	10.1'	S27°55.6	-3.3'	54.3'	60°	04:31	05:20	06:01	17:38	18:19	19:08
7	287°20.3	09.2	217°32.9	10.0'	27°58.9	-3.2'	54.3'	N 58°	04:35	05:21	06:00	17:39	18:18	19:04
8	302°20.5	10.1	232°01.8	10.0'	28°02.0	-3.1'	54.3'	56°	04:39	05:22	05:59	17:40	18:17	19:00
9	317°20.7	· · 11.1	246°30.8	9.9'	28°05.0	-2.9'	54.4'	54°	04:42	05:23	05:59	17:41	18:16	18:57
10	332°20.9	12.1	260°59.7	9.9'	28°07.9	-2.8'	54.4'	52°	04:45	05:24	05:58	17:42	18:15	18:54
11	347°21.1	13.1	275°28.5	9.8'	28°10.6	-2.7'	54.4'	50°	04:47	05:25	05:57	17:42	18:15	18:52
12	2°21.4	S02°14.0	289°57.3	9.8'	S28°13.2	-2.5'	54.4'	45°	04:52	05:26	05:56	17:44	18:13	18:47
13	17°21.6	15.0	304°26.1	9.7'	28°15.6	-2.4'	54.4'	N 40°	04:56	05:27	05:54	17:45	18:12	18:44
14	32°21.8	16.0	318°54.8	9.7'	28°18.0	-2.2'	54.4'	35°	04:59	05:28	05:53	17:47	18:12	18:41
15	47°22.0	· · 17.0	333°23.5	9.7'	28°20.1	-2.1'	54.4'	30°	05:01	05:28	05:52	17:48	18:12	18:39
16	62°22.2	17.9	347°52.2	9.6'	28°22.2	-2.0'	54.5'	20°	05:03	05:28	05:50	17:50	18:12	18:37
17	77°22.4	18.9	2°20.8	9.6'	28°24.1	-1.8'	54.5'	N 10°	05:03	05:28	05:49	17:52	18:13	18:37
18	92°22.6	S02°19.9	16°49.3	9.6'	S28°25.9	-1.7'	54.5'	0°	05:02	05:26	05:47	17:53	18:14	18:38
19	107°22.8	20.8	31°17.9	9.5'	28°27.5	-1.6'	54.5'	S 10°	05:00	05:24	05:45	17:55	18:16	18:41
20	122°23.0	21.8	45°46.4	9.5'	28°29.0	-1.4'	54.5'	20°	04:55	05:21	05:43	17:58	18:20	18:45
21	137°23.2	· · 22.8	60°14.9	9.5'	28°30.3	-1.3'	54.5'	30°	04:49	05:17	05:41	18:00	18:24	18:52
22	152°23.4	23.8	74°43.3	9.4'	28°31.5	-1.1'	54.6'	35°	04:44	05:14	05:39	18:02	18:27	18:57
23	167°23.7	24.7	89°11.7	9.4'	28°32.6	-1.0'	54.6'	40°	04:39	05:10	05:38	18:04	18:31	19:03
	SD.=16.0	d=-1.0			S.D.=14.8			45°	04:31	05:06	05:36	18:06	18:35	19:10
								S 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
								S 60°	03:53	04:44	05:26	18:16	18:58	19:50
Mon	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset		
0	182°23.9	S02°25.7	103°40.1	9.4'	S28°33.5	-0.9'	54.6'	N 72°	■	■	■	■	■	■
1	197°24.1	26.7	118°08.4	9.3'	28°34.3	-0.7'	54.6'	N 70°	■	■	■	■	■	■
2	212°24.3	27.6	132°36.7	9.3'	28°34.9	-0.6'	54.6'	68°	■	■	■	■	■	■
3	227°24.5	· · 28.6	147°05.0	9.3'	28°35.4	-0.4'	54.6'	66°	■	■	■	■	■	■
4	242°24.7	29.6	161°33.3	9.2'	28°35.8	-0.3'	54.7'	64°	■	■	■	■	■	■
5	257°24.9	30.6	176°01.5	9.2'	28°36.0	-0.1'	54.7'	62°	■	■	17:33	■	■	19:46
6	272°25.1	S02°31.5	190°29.7	9.2'	S28°36.1	0.0'	54.7'	60°	15:26	16:22	16:44	18:12	19:06	20:34
7	287°25.3	32.5	204°57.9	9.2'	28°36.0	0.1'	54.7'	N 58°	14:46	15:41	16:14	18:52	19:46	21:05
8	302°25.5	33.5	219°26.1	9.2'	28°35.8	0.3'	54.7'	56°	14:18	15:13	15:50	19:20	20:14	21:28
9	317°25.7	· · 34.4	233°54.2	9.1'	28°35.4	0.4'	54.8'	54°	13:57	14:51	15:31	19:42	20:36	21:47
10	332°25.9	35.4	248°22.3	9.1'	28°34.9	0.6'	54.8'	52°	13:39	14:33	15:15	20:00	20:54	22:02
11	347°26.1	36.4	262°50.5	9.1'	28°34.3	0.7'	54.8'	50°	13:23	14:18	15:01	20:15	21:10	22:16
12	2°26.3	S02°37.4	277°18.5	9.1'	S28°33.5	0.9'	54.8'	45°	12:53	13:47	14:33	20:46	21:40	22:44
13	17°26.6	38.3	291°46.6	9.1'	28°32.5	1.0'	54.8'	N 40°	12:29	13:23	14:10	21:10	22:04	23:06
14	32°26.8	39.3	306°14.7	9.1'	28°31.4	1.2'	54.9'	35°	12:09	13:03	13:52	21:30	22:24	23:24
15	47°27.0	· · 40.3	320°42.7	9.0'	28°30.2	1.3'	54.9'	30°	11:53	12:46	13:36	21:47	22:41	23:39
16	62°27.2	41.2	335°10.8	9.0'	28°28.8	1.5'	54.9'	20°	11:24	12:18	13:08	22:16	23:09	--
17	77°27.4	42.2	349°38.8	9.0'	28°27.3	1.6'	54.9'	N 10°	11:00	11:53	12:45	22:40	23:33	--
18	92°27.6	S02°43.2	4°06.8	9.0'	S28°25.6	1.7'	54.9'	0°	10:38	11:30	12:23	23:03	23:56	--
19	107°27.8	44.2	18°34.8	9.0'	28°23.8	1.9'	55.0'	S 10°	10:15	11:07	12:01	23:26	--	00:18
20	122°28.0	45.1	33°02.8	9.0'	28°21.9	2.0'	55.0'	20°	09:51	10:43	11:38	23:50	--	00:42
21	137°28.2	· · 46.1	47°30.8	9.0'	28°19.7	2.2'	55.0'	30°	09:23	10:14	11:11	--	00:19	01:10
22	152°28.4	47.1	61°58.8	9.0'	28°17.5	2.3'	55.0'	35°	09:07	09:57	10:54	--	00:36	01:27
23	167°28.6	48.0	76°26.8	9.0'	28°15.1	2.5'	55.1'	40°	08:48	09:38	10:36	--	00:55	01:46
	SD.=16.0	d=-1.0			S.D.=14.9			45°	08:25	09:14	10:13	00:21	01:19	02:09
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Sun			Moon		
0	182°28.8	S02°49.0	90°54.7	9.0'	S28°12.5	2.6'	55.1'	S 50°	07:55	08:43	09:43	00:51	01:50	02:39
1	197°29.0	50.0	105°22.7	9.0'	28°09.9	2.8'	55.1'	52°	07:40	08:27	09:29	01:05	02:06	02:54
2	212°29.2	51.0	119°50.7	9.0'	28°07.0	2.9'	55.1'	54°	07:23	08:09	09:12	01:22	02:24	03:11
3	227°29.4	· · 51.9	134°18.7	9.0'	28°04.0	3.1'	55.2'	56°	07:03	07:47	08:52	01:42	02:45	03:31
4	242°29.6	52.9	148°46.6	9.0'	28°00.9	3.2'	55.2'	58°	06:38	07:19	08:27	02:07	03:13	03:57
5	257°29.8	53.9	163°14.6	9.0'	27°57.6	3.4'	55.2'	S 60°	06:03	06:39	07:52	02:41	03:54	04:32
6	272°30.0	S02°54.8	177°42.6	9.0'	S27°54.2	3.5'	55.2'							
7	287°30.2	55.8	192°10.6	9.0'	27°50.6	3.6'	55.3'							
8	302°30.5	56.8	206°38.6	9.0'	27°46.9	3.8'	55.3'							
9	317°30.7	· · 57.7	221°06.6	9.0'	27°43.0	3.9'	55.3'							
10	332°30.9	58.7	235°34.6	9.0'	27°39.0	4.1'	55.3'							
11	347°31.1	02°59.7	250°02.6	9.0'	27°34.9	4.2'	55.4'							
12	2°31.3	S03°00.7	264°30.6	9.0'	S27°30.6	4.4'	55.4'							
13	17°31.5	01.6	278°58.7	9.0'	27°26.1	4.5'	55.4'							
14	32°31.7	02.6	293°26.7	9.1'	27°21.5	4.7'	55.4'							
15	47°31.9	· · 03.6	307°54.8	9.1'	27°16.8	4.8'	55.5'							
16	62°32.1	04.5	322°22.8	9.1'	27°11.9	5.0'	55.5'							
17	77°32.3	05.5	336°50.9	9.1'	27°06.9	5.1'	55.5'							
18	92°32.5	S03°06.5	351°19.0	9.1'	S27°01.7	5.2'	55.6'							
19	107°32.7	07.4	5°47.2	9.1'	26°56.4	5.4'	55.6'							
20	122°32.9	08.4	20°15.3	9.2'	26°50.9	5.5'	55.6'							
21	137°33.1	· · 09.4	34°43.5	9.2'	26°45.3	5.7'	55.7'							
22	152°33.3	10.4	49°11.6	9.2'	26°39.6	5.8'	55.7'							
23	167°33.5	11.3	63°39.8	9.2'	26°33.7	6.0'	55.7'							
	SD.=16.0	d=-1.0			S.D.=15.0									
								Day	Sun		Mer.	Moon		Age
									Eqn. of Time	Pass	Upper Mer. Pass.	Lower Mer. Pass.	7-9	
									00^h	12^h	hh:mm	hh:mm	36-55%	
									mm:ss	mm:ss	hh:mm	hh:mm		
								28	09:15	09:25	11:51	16:50	04:24	
								29	09:35	09:45	11:50	17:43	05:16	
								30	09:55	10:05	11:50	18:36	06:09	

October 01, 02, 03 (Wed., Thu., Fri.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	9°58.9	204°09.4	N07°27.3	156°27.2	S13°33.0	255°43.2	N21°35.2	11°02.4	S03°11.7	Alpheratz	357°33.8	29°14.1
1	25°01.4	219°09.0	26.1	171°28.0	33.6	270°45.3	35.2	26°05.0	11.8	Ankaa	353°06.1	-42°09.8
2	40°03.9	234°08.6	25.0	186°28.8	34.2	285°47.5	35.1	41°07.7	11.9	Schedar	349°29.8	56°40.8
3	55°06.3	249°08.2	· · 23.9	201°29.7	· · 34.8	300°49.6	· · 35.1	56°10.3	· · 12.0	Diphda	348°46.3	-17°50.6
4	70°08.8	264°07.8	22.7	216°30.5	35.4	315°51.7	35.0	71°12.9	12.0	Achernar	335°19.2	-57°06.2
5	85°11.2	279°07.3	21.6	231°31.3	36.0	330°53.9	35.0	86°15.6	12.1	Hamal	327°50.2	23°35.2
6	100°13.7	294°06.9	N07°20.5	246°32.1	S13°36.6	345°56.0	N21°34.9	101°18.2	S03°12.2	Polaris	313°21.5	89°22.2
7	115°16.2	309°06.5	19.3	261°32.9	37.1	0°58.2	34.9	116°20.8	12.3	Akamar	315°10.9	-40°11.8
8	130°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°33.8
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	N07°13.7	336°37.0	S13°40.1	76°08.9	N21°34.7	191°34.0	S03°12.6	Capella	280°20.9	46°01.4
13	205°31.0	39°04.0	12.5	351°37.8	40.7	91°11.0	34.6	206°36.7	12.7	Bellatrix	278°22.1	6°22.5
14	220°33.4	54°03.5	11.4	6°38.7	41.3	106°13.2	34.6	221°39.3	12.8	Elnath	278°01.0	28°37.8
15	235°35.9	69°03.1	· · 10.3	21°39.5	· · 41.8	121°15.3	· · 34.5	236°41.9	· · 12.9	Alnilam	275°37.0	-1°11.0
16	250°38.4	84°02.7	09.1	36°40.3	42.4	136°17.5	34.5	251°44.6	12.9	Betelgeuse	270°51.4	7°24.8
17	265°40.8	99°02.3	08.0	51°41.1	43.0	151°19.6	34.5	266°47.2	13.0	Canopus	263°52.1	-52°42.2
18	280°43.3	114°01.9	N07°06.8	66°41.9	S13°43.6	166°21.7	N21°34.4	281°49.9	S03°13.1	Sirius	258°25.6	-16°44.6
19	295°45.7	129°01.5	05.7	81°42.8	44.2	181°23.9	34.4	296°52.5	13.2	Adara	255°05.4	-29°00.1
20	310°48.2	144°01.0	04.6	96°43.6	44.8	196°26.0	34.3	311°55.1	13.2	Procyon	244°50.2	5°09.8
21	325°50.7	159°00.6	· · 03.4	111°44.4	· · 45.4	211°28.2	· · 34.3	326°57.8	· · 13.3	Pollux	243°16.6	27°57.8
22	340°53.1	174°00.2	02.3	126°45.2	45.9	226°30.3	34.2	342°00.4	13.4	Avior	234°14.8	-50°35.1
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	222°46.1	-43°31.9
Mer.pass.:23:16		v-0.4 d-1.1 m-3.8		v0.8 d-0.6 m1.6		v2.1 d-0.0 m-2.0		v2.6 d-0.1 m0.7		Miaplacidus	221°38.8	-69°49.0
										Alphard	217°47.4	-8°46.0
										Regulus	207°34.0	11°50.6
										Dubhe	193°40.8	61°36.7
										Denebola	182°24.6	14°25.8
										Gienah	175°43.3	-17°41.0
										Acrux	173°00.2	-63°14.4
										Gacrux	171°51.6	-57°15.4
										Alioth	166°13.0	55°49.2
										Spica	158°22.0	-11°17.6
										Alkaid	152°52.0	49°11.2
										Hadar	148°35.8	-60°29.9
										Menkent	147°57.3	-36°29.8
										Arcturus	145°47.5	19°03.3
										Rigel Kent.	139°40.1	-60°56.6
										Kochab	137°20.7	74°03.1
										Zuben'ubi	136°55.6	-16°08.9
										Alphecca	126°03.5	26°37.9
										Antares	112°15.3	-26°29.4
										Atria	107°09.2	-69°04.6
										Sabik	102°02.2	-15°45.4
										Shaula	96°09.7	-37°07.4
										Rasalhague	95°58.1	12°32.7
										Eltanin	90°42.0	51°29.4
										Kaus Aust.	83°31.7	-34°22.4
										Vega	80°32.9	38°48.7
										Nunki	75°47.0	-26°15.9
										Altair	61°59.4	8°56.3
										Peacock	53°04.5	-56°39.3
										Deneb	49°25.2	45°22.6
										Enif	33°38.0	9°59.8
										Al Na'ir	27°31.8	-46°50.2
										Fomalhaut	15°13.6	-29°29.1
										Scheat	13°44.4	28°13.5
										Markab	13°29.0	15°20.8
										Oct 01 Wed	SHA	Mer.pass
										Venus	194°10.5	10:24
										Mars	146°28.3	13:33
										Jupiter	245°44.3	06:56
										Saturn	1°03.4	23:12
										Oct 02 Thu	SHA	Mer.pass
										Venus	193°01.3	10:24
										Mars	145°48.8	13:32
										Jupiter	245°36.5	06:53
										Saturn	1°07.6	23:08
										Oct 03 Fri	SHA	Mer.pass
										Venus	191°52.2	10:25
										Mars	145°09.1	13:31
										Jupiter	245°29.0	06:49
										Saturn	1°11.7	23:03
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:23:08		v-0.4 d-1.1 m-3.8		v0.8 d-0.6 m1.6		v2.2 d-0.0 m-2.0		v2.6 d-0.1 m0.7				

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

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357° 33.8	29° 14.2
1	27° 58.8	218° 39.1	03.7	172° 26.5	15.6	273° 20.1	32.0	29° 14.8	17.1	Ankaa	353° 06.1	-42° 09.9
2	43° 01.3	233° 38.7	02.5	187° 27.3	16.2	288° 22.3	32.0	44° 17.5	17.2	Schedar	349° 29.8	56° 40.8
3	58° 03.7	248° 38.3	· · 01.4	202° 28.1	· · 16.8	303° 24.4	· · 31.9	59° 20.1	· · 17.3	Diphda	348° 46.2	-17° 50.6
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	Achernar	335° 19.1	-57° 06.2
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	Hamal	327° 50.2	23° 35.2
6	103° 11.1	293° 37.0	N05° 57.9	247° 30.5	S14° 18.5	348° 30.9	N21° 31.8	104° 28.0	S03° 17.5	Polaris	313° 20.6	89° 22.2
7	118° 13.6	308° 36.6	56.8	262° 31.3	19.1	3° 33.1	31.8	119° 30.7	17.6	Akamar	315° 10.9	-40° 11.8
8	133° 16.1	323° 36.2	55.6	277° 32.1	19.7	18° 35.2	31.7	134° 33.3	17.6	Menkar	314° 05.2	4° 11.6
9	148° 18.5	338° 35.8	· · 54.4	292° 32.9	· · 20.3	33° 37.4	· · 31.7	149° 35.9	· · 17.7	Mirfak	308° 27.0	49° 57.1
10	163° 21.0	353° 35.4	53.3	307° 33.7	20.8	48° 39.5	31.6	164° 38.6	17.8	Aldebaran	290° 38.8	16° 33.8
11	178° 23.4	8° 35.0	52.1	322° 34.5	21.4	63° 41.7	31.6	179° 41.2	17.8	Rigel	281° 03.1	-8° 10.1
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	Capella	280° 20.8	46° 01.4
13	208° 28.4	38° 34.2	49.8	352° 36.1	22.6	93° 46.0	31.5	209° 46.5	18.0	Bellatrix	278° 22.1	6° 22.5
14	223° 30.8	53° 33.8	48.6	7° 36.9	23.1	108° 48.2	31.5	224° 49.1	18.1	Elnath	278° 01.0	28° 37.8
15	238° 33.3	68° 33.4	· · 47.5	22° 37.7	· · 23.7	123° 50.3	· · 31.4	239° 51.7	· · 18.1	Alnilam	275° 37.0	-1° 11.0
16	253° 35.8	83° 33.0	46.3	37° 38.5	24.3	138° 52.5	31.4	254° 54.4	18.2	Betelgeuse	270° 51.4	7° 24.8
17	268° 38.2	98° 32.6	45.1	52° 39.3	24.9	153° 54.7	31.3	269° 57.0	18.3	Canopus	263° 52.1	-52° 42.2
18	283° 40.7	113° 32.1	N05° 44.0	67° 40.1	S14° 25.4	168° 56.8	N21° 31.3	284° 59.6	S03° 18.3	Sirius	258° 25.6	-16° 44.6
19	298° 43.2	128° 31.7	42.8	82° 40.9	26.0	183° 59.0	31.2	300° 02.3	18.4	Adara	255° 05.4	-29° 00.1
20	313° 45.6	143° 31.3	41.7	97° 41.7	26.6	199° 01.2	31.2	315° 04.9	18.5	Procyon	244° 50.2	5° 09.8
21	328° 48.1	158° 30.9	· · 40.5	112° 42.5	· · 27.2	214° 03.3	· · 31.2	330° 07.5	· · 18.6	Pollux	243° 16.5	27° 57.8
22	343° 50.6	173° 30.5	39.3	127° 43.3	27.7	229° 05.5	31.1	345° 10.2	18.6	Avior	234° 14.8	-50° 35.1
23	358° 53.0	188° 30.1	38.2	142° 44.1	28.3	244° 07.7	31.1	0° 12.8	18.7	Suhail	222° 46.1	-43° 31.9
Mer.pass.:23:04		v-0.4 d-1.2 m-3.8		v0.8 d-0.6 m1.6		v2.2 d-0.0 m-2.0		v2.6 d-0.1 m0.7		Miaplacidus	221° 38.8	-69° 49.0
										Alphard	217° 47.4	-8° 46.0
										Regulus	207° 34.0	11° 50.6
										Dubhe	193° 40.8	61° 36.6
										Denebola	182° 24.6	14° 25.8
										Gienah	175° 43.3	-17° 41.0
										Acrux	173° 00.2	-63° 14.4
										Gacrux	171° 51.6	-57° 15.4
										Alioth	166° 13.0	55° 49.2
										Spica	158° 22.0	-11° 17.6
										Alkaid	152° 52.0	49° 11.2
										Hadar	148° 35.8	-60° 29.9
										Menkent	147° 57.3	-36° 29.8
										Arcturus	145° 47.5	19° 03.3
										Rigel Kent.	139° 40.1	-60° 56.6
										Kochab	137° 20.7	74° 03.1
										Zuben'ubi	136° 55.6	-16° 08.9
										Alphecca	126° 03.5	26° 37.8
										Antares	112° 15.3	-26° 29.4
										Atria	107° 09.3	-69° 04.6
										Sabik	102° 02.2	-15° 45.4
										Shaula	96° 09.7	-37° 07.4
										Rasalhague	95° 58.1	12° 32.7
										Eltanin	90° 42.0	51° 29.4
										Kaus Aust.	83° 31.7	-34° 22.4
										Vega	80° 32.9	38° 48.7
										Nunki	75° 47.0	-26° 15.9
										Altair	61° 59.4	8° 56.3
										Peacock	53° 04.5	-56° 39.3
										Deneb	49° 25.2	45° 22.6
										Enif	33° 38.0	9° 59.8
										Al Na'ir	27° 31.8	-46° 50.2
										Fomalhaut	15° 13.6	-29° 29.1
										Scheat	13° 44.4	28° 13.5
										Markab	13° 29.0	15° 20.8
										Oct 04 Sat	SHA	Mer.pass
										Venus	190° 43.2	10:26
										Mars	144° 29.4	13:30
										Jupiter	245° 21.6	06:46
										Saturn	1° 15.9	22:59
										Oct 05 Sun	SHA	Mer.pass
										Venus	189° 34.2	10:26
										Mars	143° 49.4	13:28
										Jupiter	245° 14.3	06:42
										Saturn	1° 20.0	22:55
										Oct 06 Mon	SHA	Mer.pass
										Venus	188° 25.4	10:27
										Mars	143° 09.4	13:27
										Jupiter	245° 07.3	06:39
										Saturn	1° 24.0	22:51
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:22:56		v-0.4 d-1.2 m-3.8		v0.8 d-0.6 m1.6		v2.2 d-0.0 m-2.0		v2.6 d-0.1 m0.7				

October 07, 08, 09 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		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	S14°56.3	260°54.1	N21°29.1	17°21.8	S03°22.2	Alpheratz	357°33.8	29°14.2
1	30°56.2	218°10.0	39.5	173°23.7	56.9	275°56.3	29.0	32°24.4	22.3	Ankaa	353°06.1	-42°09.9
2	45°58.7	233°09.6	38.4	188°24.5	57.4	290°58.5	29.0	47°27.1	22.3	Schedar	349°29.8	56°40.9
3	61°01.1	248°09.2	· · 37.2	203°25.3	· · 58.0	306°00.6	· · 28.9	62°29.7	· · 22.4	Diphda	348°46.2	-17°50.6
4	76°03.6	263°08.8	36.0	218°26.1	58.5	321°02.8	28.9	77°32.3	22.5	Achernar	335°19.1	-57°06.2
5	91°06.1	278°08.4	34.8	233°26.9	59.1	336°05.0	28.9	92°34.9	22.5	Hamal	327°50.2	23°35.2
6	106°08.5	293°08.0	N04°33.6	248°27.7	S14°59.7	351°07.2	N21°28.8	107°37.6	S03°22.6	Polaris	313°19.7	89°22.2
7	121°11.0	308°07.6	32.5	263°28.4	15°00.2	6°09.4	28.8	122°40.2	22.7	Akamars	315°10.9	-40°11.8
8	136°13.5	323°07.2	31.3	278°29.2	00.8	21°11.5	28.7	137°42.8	22.8	Menkar	314°05.2	4°11.6
9	151°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°33.8
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	S15°03.1	81°20.3	N21°28.6	197°53.4	S03°23.0	Capella	280°20.8	46°01.4
13	211°25.8	38°05.2	25.4	353°33.1	03.6	96°22.4	28.5	212°56.0	23.1	Bellatrix	278°22.1	6°22.5
14	226°28.3	53°04.8	24.2	8°33.9	04.2	111°24.6	28.5	227°58.6	23.2	Elnath	278°01.0	28°37.8
15	241°30.7	68°04.4	· · 23.0	23°34.7	· · 04.8	126°26.8	· · 28.5	243°01.3	· · 23.2	Alnilam	275°37.0	-1°11.0
16	256°33.2	83°04.0	21.8	38°35.5	05.3	141°29.0	28.4	258°03.9	23.3	Betelgeuse	270°51.3	7°24.8
17	271°35.6	98°03.6	20.6	53°36.3	05.9	156°31.2	28.4	273°06.5	23.4	Canopus	263°52.0	-52°42.2
18	286°38.1	113°03.2	N04°19.5	68°37.1	S15°06.5	171°33.4	N21°28.3	288°09.1	S03°23.5	Sirius	258°25.6	-16°44.6
19	301°40.6	128°02.8	18.3	83°37.8	07.0	186°35.5	28.3	303°11.8	23.5	Adara	255°05.4	-29°00.1
20	316°43.0	143°02.4	17.1	98°38.6	07.6	201°37.7	28.3	318°14.4	23.6	Procyon	244°50.2	5°09.8
21	331°45.5	158°02.0	· · 15.9	113°39.4	· · 08.1	216°39.9	· · 28.2	333°17.0	· · 23.7	Pollux	243°16.5	27°57.8
22	346°48.0	173°01.6	14.7	128°40.2	08.7	231°42.1	28.2	348°19.7	23.7	Avior	234°14.7	-50°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
Mer.pass.:22:52		v-0.4 d-1.2 m-3.8		v0.8 d-0.6 m1.6		v2.2 d-0.0 m-2.0		v2.6 d-0.1 m0.7		Miaplacidus	221°38.7	-69°49.0
										Alphard	217°47.3	-8°46.0
										Regulus	207°34.0	11°50.6
										Dubhe	193°40.8	61°36.6
										Denebola	182°24.6	14°25.8
										Gienah	175°43.3	-17°41.0
										Acrux	173°00.2	-63°14.4
										Gacrux	171°51.6	-57°15.4
										Alioth	166°13.0	55°49.2
										Spica	158°22.0	-11°17.6
										Alkaid	152°52.0	49°11.2
										Hadar	148°35.8	-60°29.9
										Menkent	147°57.3	-36°29.8
										Arcturus	145°47.5	19°03.3
										Rigel Kent.	139°40.1	-60°56.6
										Kochab	137°20.8	74°03.1
										Zuben'ubi	136°55.7	-16°08.9
										Alphecca	126°03.5	26°37.8
										Antares	112°15.3	-26°29.4
										Atria	107°09.3	-69°04.6
										Sabik	102°02.3	-15°45.4
										Shaula	96°09.7	-37°07.4
										Rasalhague	95°58.1	12°32.7
										Eltanin	90°42.1	51°29.4
										Kaus Aust.	83°31.8	-34°22.4
										Vega	80°32.9	38°48.6
										Nunki	75°47.0	-26°15.9
										Altair	61°59.4	8°56.3
										Peacock	53°04.6	-56°39.3
										Deneb	49°25.2	45°22.6
										Enif	33°38.0	9°59.8
										Al Na'ir	27°31.8	-46°50.2
										Fomalhaut	15°13.6	-29°29.1
										Scheat	13°44.4	28°13.5
										Markab	13°29.0	15°20.8
										Oct 07 Tue	SHA	Mer.pass
										Venus	187°16.6	10:28
										Mars	142°29.2	13:26
										Jupiter	245°00.3	06:35
										Saturn	1°28.0	22:47
										Oct 08 Wed	SHA	Mer.pass
										Venus	186°07.9	10:28
										Mars	141°48.8	13:25
										Jupiter	244°53.6	06:32
										Saturn	1°32.0	22:42
										Oct 09 Thu	SHA	Mer.pass
										Venus	184°59.2	10:29
										Mars	141°08.3	13:23
										Jupiter	244°47.0	06:28
										Saturn	1°36.0	22:38
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:22:44		v-0.4 d-1.2 m-3.8		v0.8 d-0.6 m1.5		v2.2 d-0.0 m-2.0		v2.6 d-0.1 m0.7				

October 10, 11, 12 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°33.8	29°14.2
1	33°53.6	217°41.4	14.0	174°19.6	37.2	278°33.9	26.2	35°33.7	27.2	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°46.2	-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°06.0	292°39.4	N03°08.0	249°23.5	S15°39.9	353°44.9	N21°26.0	110°46.8	S03°27.6	Polaris	313°18.5	89°22.2
7	124°08.4	307°39.0	06.8	264°24.2	40.5	8°47.1	26.0	125°49.5	27.6	Akamar	315°10.9	-40°11.9
8	139°10.9	322°38.7	05.6	279°25.0	41.0	23°49.3	26.0	140°52.1	27.7	Menkar	314°05.2	4°11.6
9	154°13.3	337°38.3	· · 04.4	294°25.8	· · 41.6	38°51.5	· · 25.9	155°54.7	· · 27.8	Mirfak	308°27.0	49°57.1
10	169°15.8	352°37.9	03.2	309°26.5	42.1	53°53.7	25.9	170°57.3	27.8	Aldebaran	290°38.7	16°33.8
11	184°18.3	7°37.5	02.0	324°27.3	42.7	68°55.9	25.9	186°00.0	27.9	Rigel	281°03.1	-8°10.1
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	Capella	280°20.8	46°01.4
13	214°23.2	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°37.8
15	244°28.1	67°35.9	· · 57.2	24°30.4	· · 44.9	129°04.7	· · 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°06.9	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°11.4	N21°25.6	291°18.4	S03°28.4	Sirius	258°25.6	-16°44.7
19	304°38.0	127°34.3	52.4	84°33.4	47.1	189°13.6	25.6	306°21.0	28.4	Adara	255°05.3	-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	Procyon	244°50.1	5°09.8
21	334°42.9	157°33.5	· · 50.0	114°34.9	· · 48.2	219°18.0	· · 25.5	336°26.2	· · 28.6	Pollux	243°16.5	27°57.8
22	349°45.4	172°33.2	48.8	129°35.7	48.8	234°20.2	25.5	351°28.9	28.6	Avior	234°14.7	-50°35.1
23	4°47.8	187°32.8	47.6	144°36.5	49.3	249°22.4	25.4	6°31.5	28.7	Suhail	222°46.1	-43°31.9
Mer.pass.:22:40		v-0.4 d-1.2 m-3.8		v0.8 d-0.6 m1.5		v2.2 d-0.0 m-2.0		v2.6 d-0.1 m0.7		Miaplacidus	221°38.7	-69°49.0
										Alphard	217°47.3	-8°46.0
										Regulus	207°34.0	11°50.5
										Dubhe	193°40.7	61°36.6
										Denebola	182°24.5	14°25.8
										Gienah	175°43.3	-17°41.0
										Acrux	173°00.2	-63°14.4
										Gacrux	171°51.6	-57°15.3
										Alioth	166°13.0	55°49.2
										Spica	158°22.0	-11°17.6
										Alkaid	152°52.0	49°11.1
										Hadar	148°35.8	-60°29.8
										Menkent	147°57.3	-36°29.8
										Arcturus	145°47.5	19°03.3
										Rigel Kent.	139°40.1	-60°56.6
										Kochab	137°20.8	74°03.0
										Zuben'ubi	136°55.7	-16°08.9
										Alphecca	126°03.5	26°37.8
										Antares	112°15.3	-26°29.4
										Atria	107°09.3	-69°04.6
										Sabik	102°02.3	-15°45.4
										Shaula	96°09.7	-37°07.4
										Rasalhague	95°58.1	12°32.7
										Eltanin	90°42.1	51°29.4
										Kaus Aust.	83°31.8	-34°22.4
										Vega	80°32.9	38°48.7
										Nunki	75°47.1	-26°15.9
										Altair	61°59.4	8°56.3
										Peacock	53°04.6	-56°39.3
										Deneb	49°25.3	45°22.6
										Enif	33°38.0	9°59.8
										Al Na'ir	27°31.8	-46°50.2
										Fomalhaut	15°13.6	-29°29.1
										Scheat	13°44.4	28°13.5
										Markab	13°29.0	15°20.8
										Oct 10 Fri	SHA	Mer.pass
										Venus	183°50.6	10:29
										Mars	140°27.7	13:22
										Jupiter	244°40.5	06:25
										Saturn	1°39.9	22:34
										Oct 11 Sat	SHA	Mer.pass
										Venus	182°42.1	10:30
										Mars	139°46.9	13:21
										Jupiter	244°34.3	06:21
										Saturn	1°43.8	22:30
										Oct 12 Sun	SHA	Mer.pass
										Venus	181°33.5	10:31
										Mars	139°06.0	13:20
										Jupiter	244°28.2	06:18
										Saturn	1°47.6	22:26
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:22:32		v-0.4 d-1.2 m-3.8		v0.8 d-0.5 m1.5		v2.2 d-0.0 m-2.1		v2.6 d-0.1 m0.8				

h		Sun						Moon						
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight	
									Naut.	Civil			Civil	Naut.
0	183°14.0	S06°39.5	325°36.3	4.2'	N24°09.4	10.1'	60.6'	N 72°	04:38	05:57	07:06	16:26	17:34	18:52
1	198°14.2	40.4	339°59.5	4.2'	24°19.4	9.9'	60.6'	N 70°	04:44	05:55	06:57	16:35	17:36	18:47
2	213°14.4	41.3	354°22.7	4.1'	24°29.2	9.7'	60.6'	68°	04:49	05:53	06:50	16:42	17:38	18:42
3	228°14.5	42.3	8°45.7	4.0'	24°38.8	9.5'	60.6'	66°	04:52	05:52	06:44	16:48	17:40	18:39
4	243°14.7	43.2	23°08.7	3.9'	24°48.3	9.4'	60.6'	64°	04:55	05:50	06:38	16:54	17:41	18:36
5	258°14.9	44.2	37°31.6	3.9'	24°57.5	9.2'	60.5'	62°	04:58	05:49	06:34	16:58	17:43	18:34
6	273°15.0	S06°45.1	51°54.4	3.8'	N25°06.6	9.0'	60.5'	60°	05:00	05:48	06:30	17:02	17:44	18:32
7	288°15.2	46.1	66°17.2	3.7'	25°15.5	8.8'	60.5'	N 58°	05:02	05:47	06:27	17:06	17:45	18:30
8	303°15.4	47.0	80°39.9	3.7'	25°24.2	8.6'	60.5'	56°	05:03	05:46	06:23	17:09	17:46	18:29
9	318°15.5	48.0	95°02.5	3.6'	25°32.8	8.4'	60.5'	54°	05:04	05:45	06:21	17:12	17:47	18:28
10	333°15.7	48.9	109°25.1	3.5'	25°41.1	8.3'	60.5'	52°	05:05	05:44	06:18	17:14	17:48	18:27
11	348°15.9	49.9	123°47.6	3.5'	25°49.3	8.1'	60.4'	50°	05:06	05:43	06:16	17:17	17:49	18:26
12	3°16.0	S06°50.8	138°10.0	3.4'	N25°57.3	7.9'	60.4'	45°	05:07	05:41	06:11	17:22	17:51	18:25
13	18°16.2	51.7	152°32.4	3.4'	26°05.0	7.7'	60.4'	N 40°	05:08	05:39	06:06	17:26	17:53	18:25
14	33°16.4	52.7	166°54.7	3.3'	26°12.6	7.5'	60.4'	35°	05:08	05:37	06:03	17:30	17:55	18:25
15	48°16.5	53.6	181°17.0	3.2'	26°20.0	7.3'	60.3'	30°	05:08	05:35	05:59	17:34	17:58	18:25
16	63°16.7	54.6	195°39.2	3.2'	26°27.3	7.1'	60.3'	20°	05:06	05:31	05:54	17:39	18:02	18:27
17	78°16.8	55.5	210°01.4	3.1'	26°34.3	6.9'	60.3'	N 10°	05:03	05:27	05:48	17:45	18:06	18:30
18	93°17.0	S06°56.5	224°23.5	3.1'	N26°41.1	6.7'	60.3'	0°	04:58	05:23	05:43	17:50	18:11	18:35
19	108°17.2	57.4	238°45.6	3.1'	26°47.7	6.5'	60.3'	S 10°	04:52	05:17	05:38	17:55	18:16	18:41
20	123°17.3	58.3	253°07.6	3.0'	26°54.1	6.3'	60.2'	20°	04:44	05:10	05:33	18:01	18:23	18:49
21	138°17.5	06°59.3	267°29.6	3.0'	27°00.4	6.1'	60.2'	30°	04:34	05:02	05:26	18:08	18:32	19:00
22	153°17.7	07°00.2	281°51.6	2.9'	27°06.4	5.9'	60.2'	35°	04:27	04:57	05:23	18:11	18:37	19:08
23	168°17.8	01.2	296°13.5	2.9'	27°12.2	5.7'	60.2'	40°	04:18	04:51	05:18	18:16	18:43	19:16
	SD.=16.0	d=-0.9			S.D.=16.5			45°	04:07	04:43	05:13	18:21	18:51	19:27
								S 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
								S 60°	03:09	04:06	04:50	18:45	19:29	20:27
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset		
									Fri	Sat	Sun	Fri	Sat	Sun
0	183°18.0	S07°02.1	310°35.3	2.9'	N27°17.9	5.5'	60.1'	N 72°	☐	☐	☐	☐	☐	☐
1	198°18.2	03.1	324°57.2	2.8'	27°23.3	5.3'	60.1'	N 70°	☐	☐	☐	☐	☐	☐
2	213°18.3	04.0	339°19.0	2.8'	27°28.5	5.1'	60.1'	68°	☐	☐	☐	☐	☐	☐
3	228°18.5	04.9	353°40.8	2.8'	27°33.6	4.9'	60.1'	66°	☐	☐	☐	☐	☐	☐
4	243°18.6	05.9	8°02.6	2.8'	27°38.4	4.7'	60.0'	64°	☐	☐	☐	☐	☐	☐
5	258°18.8	06.8	22°24.3	2.7'	27°43.0	4.5'	60.0'	62°	16:24	☐	☐	13:15	☐	☐
6	273°19.0	S07°07.8	36°46.0	2.7'	N27°47.4	4.3'	60.0'	60°	17:03	17:28	18:37	12:37	14:25	15:30
7	288°19.1	08.7	51°07.8	2.7'	27°51.6	4.1'	60.0'	N 58°	17:30	18:07	19:14	12:11	13:47	14:52
8	303°19.3	09.6	65°29.5	2.7'	27°55.7	3.9'	59.9'	56°	17:51	18:34	19:41	11:50	13:21	14:26
9	318°19.4	10.6	79°51.1	2.7'	27°59.5	3.7'	59.9'	54°	18:09	18:55	20:02	11:32	12:59	14:05
10	333°19.6	11.5	94°12.8	2.7'	28°03.1	3.5'	59.9'	52°	18:24	19:13	20:19	11:17	12:42	13:47
11	348°19.8	12.5	108°34.5	2.7'	28°06.5	3.3'	59.9'	50°	18:38	19:28	20:34	11:05	12:27	13:32
12	3°19.9	S07°13.4	122°56.2	2.7'	N28°09.7	3.1'	59.8'	45°	19:05	19:58	21:04	10:38	11:56	13:01
13	18°20.1	14.3	137°17.8	2.7'	28°12.7	2.9'	59.8'	N 40°	19:27	20:22	21:27	10:17	11:33	12:38
14	33°20.2	15.3	151°39.5	2.7'	28°15.5	2.7'	59.8'	35°	19:45	20:42	21:47	10:00	11:13	12:18
15	48°20.4	16.2	166°01.2	2.7'	28°18.0	2.5'	59.7'	30°	20:00	20:59	22:03	09:45	10:57	12:01
16	63°20.6	17.2	180°22.9	2.7'	28°20.4	2.3'	59.7'	20°	20:27	21:28	22:31	09:20	10:28	11:33
17	78°20.7	18.1	194°44.6	2.7'	28°22.6	2.1'	59.7'	N 10°	20:50	21:52	22:55	08:58	10:04	11:08
18	93°20.9	S07°19.0	209°06.3	2.7'	N28°24.6	1.9'	59.7'	0°	21:11	22:15	23:18	08:38	09:42	10:45
19	108°21.0	20.0	223°28.1	2.7'	28°26.3	1.7'	59.6'	S 10°	21:33	22:38	23:40	08:18	09:19	10:22
20	123°21.2	20.9	237°49.8	2.8'	28°27.9	1.5'	59.6'	20°	21:56	23:03	--	07:57	08:55	09:58
21	138°21.4	21.9	252°11.6	2.8'	28°29.3	1.3'	59.6'	30°	22:23	23:32	--	07:32	08:27	09:29
22	153°21.5	22.8	266°33.4	2.8'	28°30.4	1.1'	59.5'	35°	22:39	23:49	--	07:17	08:10	09:12
23	168°21.7	23.7	280°55.2	2.8'	28°31.4	0.9'	59.5'	40°	22:58	--	00:09	07:01	07:51	08:52
	SD.=16.0	d=-0.9			S.D.=16.4			45°	23:21	--	00:33	06:41	07:28	08:28
								S 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
								S 60°	--	01:42	03:13	04:53	05:05	05:48
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun Eqn. of Time		Mer. Pass	Moon Mer. Pass.		Age
									00 ^h	12 ^h	hh:mm	Upper hh:mm	Lower hh:mm	19-21 84-64%
									mm:ss	mm:ss				
0	183°21.8	S07°24.7	295°17.1	2.9'	N28°32.1	0.7'	59.5'	10	12:56	13:04	11:47	02:23	14:55	
1	198°22.0	25.6	309°39.0	2.9'	28°32.7	0.4'	59.5'	11	13:12	13:20	11:47	03:26	15:58	
2	213°22.1	26.6	324°00.9	3.0'	28°33.0	0.2'	59.4'	12	13:27	13:35	11:46	04:30	17:02	
3	228°22.3	27.5	338°22.9	3.0'	28°33.2	0.0'	59.4'							
4	243°22.5	28.4	352°44.9	3.0'	28°33.1	-0.2'	59.4'							
5	258°22.6	29.4	7°07.0	3.1'	28°32.9	-0.4'	59.3'							
6	273°22.8	S07°30.3	21°29.1	3.1'	N28°32.4	-0.6'	59.3'							
7	288°22.9	31.2	35°51.2	3.2'	28°31.8	-0.7'	59.3'							
8	303°23.1	32.2	50°13.5	3.2'	28°30.9	-0.9'	59.2'							
9	318°23.2	33.1	64°35.7	3.3'	28°29.9	-1.1'	59.2'							
10	333°23.4	34.1	78°58.1	3.4'	28°28.6	-1.3'	59.2'							
11	348°23.5	35.0	93°20.4	3.4'	28°27.2	-1.5'	59.2'							
12	3°23.7	S07°35.9	107°42.9	3.5'	N28°25.6	-1.7'	59.1'							
13	18°23.8	36.9	122°05.4	3.5'	28°23.7	-1.9'	59.1'							
14	33°24.0	37.8	136°28.0	3.6'	28°21.7	-2.1'	59.1'							
15	48°24.2	38.7	150°50.6	3.7'	28°19.5	-2.3'	59.0'							
16	63°24.3	39.7	165°13.3	3.8'	28°17.1	-2.5'	59.0'							
17	78°24.5	40.6	179°36.1	3.8'	28°14.6	-2.7'	59.0'							
18	93°24.6	S07°41.5	193°59.0	3.9'	N28°11.8	-2.9'	58.9'							
19	108°24.8	42.5	208°22.0	4.0'	28°08.8	-3.0'	58.9'							
20	123°24.9	43.4	222°45.0	4.1'	28°05.7	-3.2'	58.9'							
21	138°25.1	44.3	237°08.1	4.2'	28°02.4	-3.4'	58.8'							
22	153°25.2	45.3	251°31.3	4.2'	27°58.9	-3.6'	58.8'							
23	168°25.4	46.2	265°54.6	4.3'	27°55.2	-3.8'	58.8'							
	SD.=16.0	d=-0.9			S.D.=16.2									

October 13, 14, 15 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		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	S16°16.0	266°10.8	N21°23.7	23°40.0	S03°31.9	Alpheratz	357°33.8	29°14.2	
1	36°51.1	217°13.2	47.3	175°14.2	16.5	281°13.1	23.6	38°42.6	32.0	Ankaa	353°06.1	-42°09.9	
2	51°53.5	232°12.8	46.1	190°14.9	17.1	296°15.3	23.6	53°45.3	32.0	Schedar	349°29.8	56°40.9	
3	66°56.0	247°12.4	· · 44.9	205°15.7	· · 17.6	311°17.5	· · 23.6	68°47.9	· · 32.1	Diphda	348°46.2	-17°50.6	
4	81°58.4	262°12.0	43.7	220°16.4	18.2	326°19.7	23.5	83°50.5	32.2	Achernar	335°19.1	-57°06.2	
5	97°00.9	277°11.6	42.4	235°17.2	18.7	341°22.0	23.5	98°53.1	32.2	Hamal	327°50.2	23°35.2	
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	Polaris	313°17.4	89°22.3	
7	127°05.8	307°10.8	40.0	265°18.7	19.8	11°26.4	23.4	128°58.4	32.4	Akamar	315°10.9	-40°11.9	
8	142°08.3	322°10.4	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°30.8	· · 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°33.8	
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	S16°22.5	86°37.5	N21°23.3	204°11.5	S03°32.7	Capella	280°20.7	46°01.4	
13	217°20.6	37°08.5	32.8	355°23.2	23.0	101°39.7	23.2	219°14.1	32.7	Bellatrix	278°22.0	6°22.5	
14	232°23.1	52°08.1	31.5	10°23.9	23.5	116°42.0	23.2	234°16.7	32.8	Elnath	278°00.9	28°37.8	
15	247°25.6	67°07.7	· · 30.3	25°24.6	· · 24.1	131°44.2	· · 23.2	249°19.3	· · 32.9	Alnilam	275°36.9	-1°11.0	
16	262°28.0	82°07.3	29.1	40°25.4	24.6	146°46.4	23.1	264°21.9	32.9	Betelgeuse	270°51.3	7°24.8	
17	277°30.5	97°06.9	27.9	55°26.1	25.2	161°48.6	23.1	279°24.6	33.0	Canopus	263°52.0	-52°42.2	
18	292°32.9	112°06.5	N01°26.7	70°26.9	S16°25.7	176°50.9	N21°23.1	294°27.2	S03°33.1	Sirius	258°25.5	-16°44.7	
19	307°35.4	127°06.2	25.5	85°27.6	26.2	191°53.1	23.0	309°29.8	33.1	Adara	255°05.3	-29°00.1	
20	322°37.9	142°05.8	24.3	100°28.4	26.8	206°55.3	23.0	324°32.4	33.2	Procyon	244°50.1	5°09.8	
21	337°40.3	157°05.4	· · 23.1	115°29.1	· · 27.3	221°57.6	· · 23.0	339°35.0	· · 33.3	Pollux	243°16.5	27°57.8	
22	352°42.8	172°05.0	21.8	130°29.9	27.8	236°59.8	22.9	354°37.7	33.3	Avior	234°14.7	-50°35.1	
23	7°45.3	187°04.6	20.6	145°30.6	28.4	252°02.0	22.9	9°40.3	33.4	Suhail	222°46.0	-43°31.9	
Mer.pass.:22:29		v-0.4 d-1.2 m-3.8		v0.7 d-0.5 m1.5		v2.2 d-0.0 m-2.1		v2.6 d-0.1 m0.8		Miaplacidus		221°38.6	-69°49.0
										Alphard		217°47.3	-8°46.1
										Regulus		207°33.9	11°50.5
										Dubhe		193°40.7	61°36.6
										Denebola		182°24.5	14°25.8
										Gienah		175°43.2	-17°41.0
										Acrux		173°00.1	-63°14.4
										Gacrux		171°51.6	-57°15.3
										Alioth		166°13.0	55°49.2
										Spica		158°22.0	-11°17.6
										Alkaid		152°52.0	49°11.1
										Hadar		148°35.8	-60°29.8
										Menkent		147°57.3	-36°29.8
										Arcturus		145°47.5	19°03.3
										Rigel Kent.		139°40.1	-60°56.5
										Kochab		137°20.8	74°03.0
										Zuben'ubi		136°55.7	-16°08.9
										Alphecca		126°03.5	26°37.8
										Antares		112°15.3	-26°29.4
										Atria		107°09.3	-69°04.6
										Sabik		102°02.3	-15°45.4
										Shaula		96°09.7	-37°07.4
										Rasalhague		95°58.2	12°32.6
										Eltanin		90°42.1	51°29.4
										Kaus Aust.		83°31.8	-34°22.4
										Vega		80°32.9	38°48.6
										Nunki		75°47.1	-26°15.9
										Altair		61°59.4	8°56.3
										Peacock		53°04.6	-56°39.3
										Deneb		49°25.3	45°22.6
										Enif		33°38.0	9°59.8
										Al Na'ir		27°31.8	-46°50.2
										Fomalhaut		15°13.6	-29°29.1
										Scheat		13°44.4	28°13.6
										Markab		13°29.0	15°20.8
										Oct 13 Mon		SHA	Mer.pass
										Venus		180°25.0	10:31
										Mars		138°24.9	13:18
										Jupiter		244°22.3	06:14
										Saturn		1°51.4	22:21
										Oct 14 Tue		SHA	Mer.pass
										Venus		179°16.5	10:32
										Mars		137°43.6	13:17
										Jupiter		244°16.5	06:11
										Saturn		1°55.2	22:17
										Oct 15 Wed		SHA	Mer.pass
										Venus		178°08.0	10:33
										Mars		137°02.2	13:16
										Jupiter		244°10.9	06:07
										Saturn		1°58.9	22:13
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:22:21		v-0.4 d-1.2 m-3.8		v0.7 d-0.5 m1.5		v2.2 d-0.0 m-2.1		v2.6 d-0.1 m0.8					

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

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	24°46.0	201°45.4	N00°21.0	161°06.6	S16°54.4	268°51.5	N21°21.3	26°48.5	S03°36.4	Alpheratz	357°33.8	29°14.2
1	39°48.5	216°45.1	19.8	176°07.4	54.9	283°53.8	21.3	41°51.2	36.5	Ankaa	353°06.1	-42°09.9
2	54°50.9	231°44.7	18.6	191°08.1	55.4	298°56.0	21.3	56°53.8	36.6	Schedar	349°29.8	56°40.9
3	69°53.4	246°44.3	· · 17.4	206°08.8	· · 55.9	313°58.3	· · 21.2	71°56.4	· · 36.6	Diphda	348°46.2	-17°50.6
4	84°55.9	261°43.9	16.2	221°09.6	56.5	329°00.5	21.2	86°59.0	36.7	Achernar	335°19.1	-57°06.2
5	99°58.3	276°43.5	15.0	236°10.3	57.0	344°02.8	21.2	102°01.6	36.8	Hamal	327°50.2	23°35.2
6	115°00.8	291°43.1	N00°13.7	251°11.0	S16°57.5	359°05.0	N21°21.1	117°04.2	S03°36.8	Polaris	313°16.7	89°22.3
7	130°03.3	306°42.7	12.5	266°11.7	58.0	14°07.2	21.1	132°06.8	36.9	Akamar	315°10.9	-40°11.9
8	145°05.7	321°42.3	11.3	281°12.5	58.6	29°09.5	21.1	147°09.5	36.9	Menkar	314°05.2	4°11.6
9	160°08.2	336°41.9	· · 10.1	296°13.2	· · 59.1	44°11.7	· · 21.0	162°12.1	· · 37.0	Mirfak	308°26.9	49°57.2
10	175°10.7	351°41.5	08.9	311°13.9	16°59.6	59°14.0	21.0	177°14.7	37.1	Aldebaran	290°38.7	16°33.8
11	190°13.1	6°41.1	07.6	326°14.6	17°00.1	74°16.2	21.0	192°17.3	37.1	Rigel	281°03.1	-8°10.1
12	205°15.6	21°40.7	N00°06.4	341°15.4	S17°00.7	89°18.5	N21°21.0	207°19.9	S03°37.2	Capella	280°20.7	46°01.4
13	220°18.0	36°40.4	05.2	356°16.1	01.2	104°20.7	20.9	222°22.5	37.2	Bellatrix	278°22.0	6°22.5
14	235°20.5	51°40.0	04.0	11°16.8	01.7	119°23.0	20.9	237°25.1	37.3	Elnath	278°00.9	28°37.8
15	250°23.0	66°39.6	· · 02.8	26°17.5	· · 02.2	134°25.2	· · 20.9	252°27.8	· · 37.4	Alnilam	275°36.9	-1°11.0
16	265°25.4	81°39.2	01.5	41°18.3	02.8	149°27.5	20.8	267°30.4	37.4	Betelgeuse	270°51.3	7°24.8
17	280°27.9	96°38.8	N00°00.3	56°19.0	03.3	164°29.7	20.8	282°33.0	37.5	Canopus	263°51.9	-52°42.2
18	295°30.4	111°38.4	S00°09.9	71°19.7	S17°03.8	179°32.0	N21°20.8	297°35.6	S03°37.5	Sirius	258°25.5	-16°44.7
19	310°32.8	126°38.0	02.1	86°20.4	04.3	194°34.2	20.7	312°38.2	37.6	Adara	255°05.3	-29°00.1
20	325°35.3	141°37.6	03.3	101°21.2	04.8	209°36.5	20.7	327°40.8	37.7	Procyon	244°50.1	5°09.8
21	340°37.8	156°37.2	· · 04.6	116°21.9	· · 05.4	224°38.7	· · 20.7	342°43.4	· · 37.7	Pollux	243°16.4	27°57.8
22	355°40.2	171°36.8	05.8	131°22.6	05.9	239°41.0	20.7	357°46.1	37.8	Avior	234°14.6	-59°35.1
23	10°42.7	186°36.4	07.0	146°23.3	06.4	254°43.2	20.6	12°48.7	37.8	Suhail	222°46.0	-43°31.9
Mer.pass.:22:17		v-0.4 d-1.2 m-3.8		v0.7 d-0.5 m1.5		v2.2 d-0.0 m-2.1		v2.6 d-0.1 m0.8		Miaplacidus	221°38.6	-69°49.0
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	25°45.1	201°36.0	S00°08.2	161°24.1	S17°06.9	269°45.5	N21°20.6	27°51.3	S03°37.9	Alphard	217°47.3	-8°46.1
1	40°47.6	216°35.7	09.4	176°24.8	07.4	284°47.7	20.6	42°53.9	38.0	Regulus	207°33.9	11°50.5
2	55°50.1	231°35.3	10.7	191°25.5	08.0	299°50.0	20.5	57°56.5	38.0	Dubhe	193°40.7	61°36.6
3	70°52.5	246°34.9	· · 11.9	206°26.2	· · 08.5	314°52.2	· · 20.5	72°59.1	· · 38.1	Denebola	182°24.5	14°25.7
4	85°55.0	261°34.5	13.1	221°26.9	09.0	329°54.5	20.5	88°01.7	38.1	Gienah	175°43.2	-17°41.0
5	100°57.5	276°34.1	14.3	236°27.7	09.5	344°56.7	20.4	103°04.3	38.2	Acrux	173°00.1	-63°14.4
6	115°59.9	291°33.7	S00°15.5	251°28.4	S17°10.0	359°59.0	N21°20.4	118°07.0	S03°38.3	Gacrux	171°51.5	-57°15.3
7	131°02.4	306°33.3	16.8	266°29.1	10.6	15°01.2	20.4	133°09.6	38.3	Alioth	166°13.0	55°49.2
8	146°04.9	321°32.9	18.0	281°29.8	11.1	30°03.5	20.4	148°12.2	38.4	Spica	158°22.0	-11°17.6
9	161°07.3	336°32.5	· · 19.2	296°30.6	· · 11.6	45°05.7	· · 20.3	163°14.8	· · 38.4	Alkaid	152°52.0	49°11.1
10	176°09.8	351°32.1	20.4	311°31.3	12.1	60°08.0	20.3	178°17.4	38.5	Hadar	148°35.8	-60°29.8
11	191°12.3	6°31.7	21.6	326°32.0	12.6	75°10.2	20.3	193°20.0	38.6	Menkent	147°57.3	-36°29.8
12	206°14.7	21°31.3	S00°22.9	341°32.7	S17°13.1	90°12.5	N21°20.2	208°22.6	S03°38.6	Arcturus	145°47.5	19°03.3
13	221°17.2	36°30.9	24.1	356°33.4	13.7	105°14.7	20.2	223°25.2	38.7	Rigel Kent.	139°40.1	-60°56.5
14	236°19.6	51°30.6	25.3	11°34.1	14.2	120°17.0	20.2	238°27.9	38.7	Kochab	137°20.8	74°03.0
15	251°22.1	66°30.2	· · 26.5	26°34.9	· · 14.7	135°19.3	· · 20.1	253°30.5	· · 38.8	Zuben'ubi	136°55.7	-16°08.9
16	266°24.6	81°29.8	27.8	41°35.6	15.2	150°21.5	20.1	268°33.1	38.9	Alphecca	126°03.5	26°37.8
17	281°27.0	96°29.4	29.0	56°36.3	15.7	165°23.8	20.1	283°35.7	38.9	Antares	112°15.3	-26°29.4
18	296°29.5	111°29.0	S00°30.2	71°37.0	S17°16.3	180°26.0	N21°20.1	298°38.3	S03°39.0	Atria	107°09.4	-69°04.6
19	311°32.0	126°28.6	31.4	86°37.7	16.8	195°28.3	20.0	313°40.9	39.0	Sabik	102°02.3	-15°45.4
20	326°34.4	141°28.2	32.6	101°38.5	17.3	210°30.5	20.0	328°43.5	39.1	Shaula	96°09.7	-37°07.4
21	341°36.9	156°27.8	· · 33.9	116°39.2	· · 17.8	225°32.8	· · 20.0	343°46.1	· · 39.2	Rasalhague	95°58.2	12°32.6
22	356°39.4	171°27.4	35.1	131°39.9	18.3	240°35.0	19.9	358°48.7	39.2	Eltanin	90°42.1	51°29.3
23	11°41.8	186°27.0	36.3	146°40.6	18.8	255°37.3	19.9	13°51.4	39.3	Kaus Aust.	83°31.8	-34°22.4
Mer.pass.:22:13		v-0.4 d-1.2 m-3.8		v0.7 d-0.5 m1.5		v2.3 d-0.0 m-2.1		v2.6 d-0.1 m0.8		Vega	80°33.0	38°48.6
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	26°44.3	201°26.6	S00°37.5	161°41.3	S17°19.3	270°39.6	N21°19.9	28°54.0	S03°39.3	Nunki	75°47.1	-26°15.9
1	41°46.7	216°26.2	38.7	176°42.0	19.9	285°41.8	19.9	43°56.6	39.4	Altair	61°59.4	8°56.3
2	56°49.2	231°25.8	40.0	191°42.8	20.4	300°44.1	19.8	58°59.2	39.5	Peacock	53°04.6	-56°39.3
3	71°51.7	246°25.4	· · 41.2	206°43.5	· · 20.9	315°46.3	· · 19.8	74°01.8	· · 39.5	Deneb	49°25.3	45°22.6
4	86°54.1	261°25.0	42.4	221°44.2	21.4	330°48.6	19.8	89°04.4	39.6	Enif	33°38.0	9°59.8
5	101°56.6	276°24.7	43.6	236°44.9	21.9	345°50.9	19.7	104°07.0	39.6	Al Na'ir	27°31.9	-46°50.2
6	116°59.1	291°24.3	S00°44.9	251°45.6	S17°22.4	0°53.1	N21°19.7	119°09.6	S03°39.7	Fomalhaut	15°13.6	-29°29.1
7	132°01.5	306°23.9	46.1	266°46.3	22.9	15°55.4	19.7	134°12.2	39.7	Markab	13°44.4	28°13.6
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	S00°52.2	341°49.9	S17°25.5	91°06.7	N21°19.5	209°25.3	S03°40.0			
13	222°16.3	36°21.5	53.4	356°50.6	26.0	106°08.9	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	· · 55.9	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	S00°59.5	71°54.2	S17°28.6	181°20.3	N21°19.4	299°40.9	S03°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°18.7	02.0	101°55.6	29.6	211°24.8	19.3	329°46.2	40.5			
21	342°36.0	156°18.3	· · 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			
Mer.pass.:22:09		v-0.4 d-1.2 m-3.8		v0.7 d-0.5 m1.5		v2.3 d-0.0 m-2.1		v2.6 d-0.1 m0.8				

	SHA	Mer.pass
Oct 16 Thu		
Venus	176°59.4	10:33
Mars	136°20.6	13:15
Jupiter	244°05.5	06:04
Saturn	2°02.5	22:09
Oct 17 Fri		
Venus	175°50.9	10:34
Mars	135°38.9	13:14
Jupiter	244°00.3	06:00
Saturn	2°06.1	22:05
Oct 18 Sat		
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	

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

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	27°43.4	201°17.2	S01°06.9	161°58.4	S17°31.6	271°33.9	N21°19.2	29°56.6	S03°40.7	Alpheratz	357°33.8	29°14.2
1	42°45.9	216°16.8	08.1	176°59.1	32.2	286°36.1	19.2	44°59.2	40.8	Ankaa	353°06.1	-42°09.9
2	57°48.4	231°16.4	09.3	191°59.8	32.7	301°38.4	19.2	60°01.8	40.8	Schedar	349°29.8	56°40.9
3	72°50.8	246°16.0	· · 10.5	207°00.5	· · 33.2	316°40.6	· · 19.1	75°04.4	· · 40.9	Diphda	348°46.2	-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	-57°06.3
5	102°55.7	276°15.2	13.0	237°02.0	34.2	346°45.2	19.1	105°09.6	41.0	Hamal	327°50.2	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°16.1	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	Akamar	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	· · 17.9	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°38.7	16°33.8
11	193°10.5	6°12.8	20.3	327°06.2	37.2	76°58.8	18.9	195°25.3	41.4	Rigel	281°03.0	-8°10.1
12	208°13.0	21°12.4	S01°21.5	342°06.9	S17°37.7	92°01.1	N21°18.9	210°27.9	S03°41.4	Capella	280°20.7	46°01.4
13	223°15.5	36°12.0	22.7	357°07.6	38.2	107°03.3	18.9	225°30.5	41.5	Bellatrix	278°22.0	6°22.5
14	238°17.9	51°11.6	24.0	12°08.3	38.8	122°05.6	18.8	240°33.1	41.5	Elnath	278°00.9	28°37.8
15	253°20.4	66°11.2	· · 25.2	27°09.0	· · 39.3	137°07.9	· · 18.8	255°35.7	· · 41.6	Alnilam	275°36.9	-1°11.0
16	268°22.8	81°10.8	26.4	42°09.7	39.8	152°10.1	18.8	270°38.3	41.7	Betelgeuse	270°51.2	7°24.8
17	283°25.3	96°10.4	27.6	57°10.4	40.3	167°12.4	18.8	285°40.9	41.7	Canopus	263°51.9	-52°42.2
18	298°27.8	111°10.0	S01°28.9	72°11.1	S17°40.8	182°14.7	N21°18.7	300°43.5	S03°41.8	Sirius	258°25.5	-16°44.7
19	313°30.2	126°09.6	30.1	87°11.8	41.3	197°17.0	18.7	315°46.1	41.8	Adara	255°05.3	-29°00.1
20	328°32.7	141°09.2	31.3	102°12.6	41.8	212°19.2	18.7	330°48.8	41.9	Procyon	244°50.1	5°09.8
21	343°35.2	156°08.9	· · 32.5	117°13.3	· · 42.3	227°21.5	· · 18.6	345°51.4	· · 41.9	Pollux	243°16.4	27°57.8
22	358°37.6	171°08.5	33.7	132°14.0	42.8	242°23.8	18.6	0°54.0	42.0	Avior	234°14.6	-57°35.1
23	13°40.1	186°08.1	35.0	147°14.7	43.3	257°26.0	18.6	15°56.6	42.0	Suhail	222°46.0	-43°31.9
Mer.pass.:22:05		v-0.4 d-1.2 m-3.8		v0.7 d-0.5 m1.5		v2.3 d-0.0 m-2.1		v2.6 d-0.1 m0.8		Miaplacidus	221°38.5	-69°49.0
										Alphard	217°47.3	-8°46.1
										Regulus	207°33.9	11°50.5
										Dubhe	193°40.7	61°36.6
										Denebola	182°24.5	14°25.7
										Gienah	175°43.2	-17°41.0
										Acrux	173°00.1	-63°14.4
										Gacrux	171°51.5	-57°15.3
										Alioth	166°13.0	55°49.1
										Spica	158°22.0	-11°17.6
										Alkaid	152°52.0	49°11.1
										Hadar	148°35.8	-60°29.8
										Menkent	147°57.3	-36°29.7
										Arcturus	145°47.5	19°03.3
										Rigel Kent.	139°40.1	-60°56.5
										Kochab	137°20.9	74°03.0
										Zuben'ubi	136°55.7	-16°08.9
										Alphecca	126°03.5	26°37.8
										Antares	112°15.3	-26°29.3
										Atria	107°09.4	-69°04.6
										Sabik	102°02.3	-15°45.4
										Shaula	96°09.8	-37°07.4
										Rasalhague	95°58.2	12°32.6
										Eltanin	90°42.1	51°29.3
										Kaus Aust.	83°31.8	-34°22.4
										Vega	80°33.0	38°48.6
										Nunki	75°47.1	-26°15.9
										Altair	61°59.4	8°56.3
										Peacock	53°04.6	-56°39.3
										Deneb	49°25.3	45°22.6
										Enif	33°38.1	9°59.8
										Al Na'ir	27°31.9	-46°50.2
										Fomalhaut	15°13.6	-29°29.1
										Scheat	13°44.4	28°13.6
										Markab	13°29.1	15°20.8
										Oct 19 Sun	SHA	Mer.pass
										Venus	173°33.7	10:35
										Mars	134°15.0	13:11
										Jupiter	243°50.4	05:53
										Saturn	2°13.2	21:56
										Oct 20 Mon	SHA	Mer.pass
										Venus	172°25.1	10:36
										Mars	133°32.8	13:10
										Jupiter	243°45.8	05:49
										Saturn	2°16.6	21:52
										Oct 21 Tue	SHA	Mer.pass
										Venus	171°16.4	10:36
										Mars	132°50.5	13:09
										Jupiter	243°41.3	05:46
										Saturn	2°20.0	21:48
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:21:57		v-0.4 d-1.2 m-3.8		v0.7 d-0.5 m1.5		v2.3 d-0.0 m-2.1		v2.6 d-0.1 m0.8				

h		Sun					Moon					Twilight						
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight					
									Naut.	Civil			Civil	Naut.				
0	183°44.8	S09°59.5	209°57.7	16.5'	S00°00.6	-14.7'	55.0'											
1	198°44.9	10°00.4	224°33.2	16.5'	00°15.3	-14.7'	55.0'	N 72°	05:18	06:37	07:50	15:37	16:51	18:09				
2	213°45.0	01.3	239°08.7	16.5'	00°29.9	-14.6'	55.0'	N 70°	05:19	06:30	07:35	15:52	16:58	18:08				
3	228°45.1	02.2	253°44.2	16.5'	00°44.6	-14.6'	55.0'	68°	05:20	06:25	07:24	16:05	17:03	18:08				
4	243°45.2	03.1	268°19.7	16.5'	00°59.2	-14.6'	55.0'	66°	05:20	06:20	07:14	16:14	17:08	18:07				
5	258°45.3	04.0	282°55.3	16.5'	01°13.8	-14.6'	54.9'	64°	05:21	06:16	07:05	16:23	17:12	18:07				
6	273°45.5	S10°04.9	297°30.8	16.5'	S01°28.4	-14.6'	54.9'	62°	05:21	06:12	06:58	16:30	17:16	18:07				
7	288°45.6	05.8	312°06.3	16.6'	01°43.0	-14.6'	54.9'	60°	05:21	06:09	06:52	16:36	17:19	18:07				
8	303°45.7	06.7	326°41.9	16.6'	01°57.6	-14.6'	54.9'	N 58°	05:21	06:06	06:47	16:42	17:22	18:07				
9	318°45.8	07.6	341°17.5	16.6'	02°12.2	-14.6'	54.9'	56°	05:21	06:04	06:42	16:47	17:25	18:08				
10	333°45.9	08.5	355°53.0	16.6'	02°26.7	-14.5'	54.9'	54°	05:20	06:02	06:38	16:51	17:27	18:08				
11	348°46.0	09.4	10°28.6	16.6'	02°41.3	-14.5'	54.8'	52°	05:20	05:59	06:34	16:55	17:29	18:08				
12	3°46.1	S10°10.3	25°04.2	16.6'	S02°55.8	-14.5'	54.8'	50°	05:20	05:57	06:30	16:59	17:31	18:09				
13	18°46.2	11.2	39°39.7	16.6'	03°10.3	-14.5'	54.8'	45°	05:18	05:53	06:22	17:06	17:36	18:10				
14	33°46.4	12.1	54°15.3	16.6'	03°24.8	-14.5'	54.8'	N 40°	05:17	05:48	06:16	17:13	17:40	18:12				
15	48°46.5	13.0	68°50.9	16.6'	03°39.2	-14.4'	54.8'	35°	05:15	05:45	06:10	17:19	17:44	18:14				
16	63°46.6	13.9	83°26.5	16.6'	03°53.7	-14.4'	54.8'	30°	05:13	05:41	06:05	17:24	17:48	18:16				
17	78°46.7	14.8	98°02.0	16.6'	04°08.1	-14.4'	54.8'	20°	05:08	05:34	05:57	17:33	17:55	18:21				
18	93°46.8	S10°15.7	112°37.6	16.6'	S04°22.5	-14.4'	54.7'	N 10°	05:03	05:27	05:49	17:41	18:02	18:27				
19	108°46.9	16.6	127°13.2	16.6'	04°36.8	-14.4'	54.7'	0°	04:56	05:20	05:41	17:48	18:09	18:34				
20	123°47.0	17.5	141°48.7	16.6'	04°51.2	-14.3'	54.7'	S 10°	04:48	05:13	05:34	17:56	18:17	18:42				
21	138°47.1	18.4	156°24.3	16.5'	05°05.5	-14.3'	54.7'	20°	04:37	05:03	05:26	18:04	18:27	18:53				
22	153°47.2	19.3	170°59.8	16.5'	05°19.8	-14.3'	54.7'	30°	04:23	04:52	05:16	18:14	18:38	19:07				
23	168°47.3	20.2	185°35.4	16.5'	05°34.1	-14.3'	54.7'	35°	04:14	04:45	05:11	18:19	18:45	19:16				
	SD.=16.1	d=-0.9			S.D.=15.0			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				
								S 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				
								S 60°	02:34	03:37	04:23	19:08	19:55	20:59				
Mon	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Sun	Moonrise	Tue	Sun	Moonset	Tue				
0	183°47.4	S10°21.1	200°10.9	16.5'	S05°48.3	-14.2'	54.7'	N 72°	04:22	06:24	08:40	15:37	15:01	14:12				
1	198°47.6	22.0	214°46.4	16.5'	06°02.5	-14.2'	54.6'	N 70°	04:20	06:13	08:13	15:42	15:15	14:41				
2	213°47.7	22.9	229°21.9	16.5'	06°16.7	-14.2'	54.6'	68°	04:19	06:03	07:53	15:47	15:27	15:03				
3	228°47.8	23.8	243°57.4	16.5'	06°30.9	-14.1'	54.6'	66°	04:18	05:56	07:38	15:50	15:36	15:20				
4	243°47.9	24.7	258°32.9	16.5'	06°45.0	-14.1'	54.6'	64°	04:17	05:50	07:25	15:53	15:44	15:34				
5	258°48.0	25.6	273°08.3	16.5'	06°59.1	-14.1'	54.6'	62°	04:16	05:44	07:14	15:56	15:51	15:46				
6	273°48.1	S10°26.5	287°43.8	16.4'	S07°13.2	-14.0'	54.6'	60°	04:15	05:39	07:05	15:58	15:57	15:56				
7	288°48.2	27.4	302°19.2	16.4'	07°27.2	-14.0'	54.6'	N 58°	04:15	05:35	06:57	16:00	16:02	16:05				
8	303°48.3	28.3	316°54.6	16.4'	07°41.2	-14.0'	54.6'	56°	04:14	05:32	06:50	16:02	16:07	16:13				
9	318°48.4	29.2	331°30.0	16.4'	07°55.2	-13.9'	54.5'	54°	04:13	05:28	06:44	16:04	16:11	16:20				
10	333°48.5	30.1	346°05.4	16.4'	08°09.1	-13.9'	54.5'	52°	04:13	05:25	06:38	16:06	16:15	16:26				
11	348°48.6	30.9	0°40.8	16.3'	08°23.0	-13.9'	54.5'	50°	04:13	05:23	06:33	16:07	16:19	16:32				
12	3°48.7	S10°31.8	15°16.1	16.3'	S08°36.8	-13.8'	54.5'	45°	04:12	05:17	06:22	16:10	16:27	16:45				
13	18°48.8	32.7	29°51.4	16.3'	08°50.6	-13.8'	54.5'	N 40°	04:11	05:12	06:13	16:13	16:33	16:55				
14	33°48.9	33.6	44°26.7	16.3'	09°04.4	-13.8'	54.5'	35°	04:10	05:08	06:06	16:15	16:39	17:04				
15	48°49.0	34.5	59°02.0	16.3'	09°18.2	-13.7'	54.5'	30°	04:10	05:04	05:59	16:17	16:44	17:12				
16	63°49.1	35.4	73°37.2	16.2'	09°31.9	-13.7'	54.5'	20°	04:09	04:58	05:48	16:21	16:52	17:25				
17	78°49.2	36.3	88°12.5	16.2'	09°45.5	-13.6'	54.4'	N 10°	04:08	04:53	05:38	16:24	17:00	17:37				
18	93°49.3	S10°37.2	102°47.7	16.2'	S09°59.1	-13.6'	54.4'	0°	04:07	04:47	05:28	16:27	17:07	17:48				
19	108°49.4	38.1	117°22.8	16.2'	10°12.7	-13.5'	54.4'	S 10°	04:07	04:42	05:19	16:29	17:14	18:00				
20	123°49.5	39.0	131°58.0	16.1'	10°26.2	-13.5'	54.4'	20°	04:06	04:37	05:09	16:33	17:22	18:12				
21	138°49.7	39.9	146°33.1	16.1'	10°39.7	-13.5'	54.4'	30°	04:05	04:31	04:58	16:36	17:31	18:26				
22	153°49.8	40.8	161°08.2	16.1'	10°53.1	-13.4'	54.4'	35°	04:04	04:28	04:52	16:38	17:36	18:34				
23	168°49.9	41.6	175°43.2	16.0'	11°06.5	-13.4'	54.4'	40°	04:04	04:24	04:45	16:40	17:42	18:43				
	SD.=16.1	d=-0.9			S.D.=14.9			45°	04:03	04:19	04:36	16:43	17:48	18:54				
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Sun	Eqn.of Time	Mer.	Moon	Mer.Pass.	Age					
0	183°50.0	S10°42.5	190°18.2	16.0'	S11°19.9	-13.3'	54.4'	00 ^h			Upper	Lower	28-30					
1	198°50.1	43.4	204°53.2	16.0'	11°33.2	-13.3'	54.3'	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	4-0%					
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'	19	14:59	15:04	11:45	10:17	22:37					
4	243°50.4	46.1	248°38.0	15.9'	12°12.8	-13.1'	54.3'	20	15:10	15:15	11:45	10:57	23:18					
5	258°50.5	47.0	263°12.8	15.8'	12°25.9	-13.1'	54.3'	21	15:20	15:24	11:45	11:38	--					
6	273°50.6	S10°47.9	277°47.6	15.8'	S12°38.9	-13.0'	54.3'											
7	288°50.7	48.8	292°22.4	15.8'	12°51.9	-13.0'	54.3'											
8	303°50.8	49.7	306°57.1	15.7'	13°04.9	-12.9'	54.3'											
9	318°50.9	50.5	321°31.8	15.7'	13°17.8	-12.9'	54.3'											
10	333°51.0	51.4	336°06.5	15.6'	13°30.6	-12.8'	54.3'											
11	348°51.1	52.3	350°41.1	15.6'	13°43.4	-12.7'	54.2'											
12	3°51.1	S10°53.2	5°15.7	15.6'	S13°56.1	-12.7'	54.2'											
13	18°51.2	54.1	19°50.2	15.5'	14°08.7	-12.6'	54.2'											
14	33°51.3	55.0	34°24.7	15.5'	14°21.3	-12.6'	54.2'											
15	48°51.4	55.9	48°59.2	15.4'	14°33.9	-12.5'	54.2'											
16	63°51.5	56.7	63°33.6	15.4'	14°46.4	-12.5'	54.2'											
17	78°51.6	57.6	78°07.9	15.3'	14°58.8	-12.4'	54.2'											
18	93°51.7	S10°58.5	92°42.3	15.3'	S15°11.2	-12.3'	54.2'											
19	108°51.8	10°59.4	107°16.5	15.2'	15°23.5	-12.3'	54.2'											
20	123°51.9	11°00.3	121°50.8	15.2'	15°35.7	-12.2'	54.2'											
21	138°52.0	01.2	136°24.9	15.2'	15°47.9	-12.1'	54.2'											
22	153°52.1	02.1	150°59.1	15.1'	16°00.0	-12.1'	54.2'											
23	168°52.2	02.9	165°33.1	15.1'	16°12.0	-12.0'	54.1'											
	SD.=16.1	d=-0.9			S.D.=14.8													

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

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	33°38.3	200°19.2	S04°02.6	163°37.7	S18°42.6	277°03.5	N21°15.8	36°11.1	S03°48.5	Alpheratz	357°33.8	29°14.2
1	48°40.7	215°18.8	03.9	178°38.4	43.1	292°05.8	15.8	51°13.7	48.5	Ankaa	353°06.1	-42°09.9
2	63°43.2	230°18.4	05.1	193°39.0	43.5	307°08.1	15.7	66°16.3	48.6	Schedar	349°29.8	56°40.9
3	78°45.6	245°18.0	· · 06.3	208°39.7	· · 44.0	322°10.5	· · 15.7	81°18.9	· · 48.6	Diphda	348°46.2	-17°50.6
4	93°48.1	260°17.5	07.5	223°40.4	44.5	337°12.8	15.7	96°21.5	48.7	Achernar	335°19.1	-57°06.3
5	108°50.6	275°17.1	08.7	238°41.0	45.0	352°15.1	15.7	111°24.1	48.7	Hamal	327°50.2	23°35.2
6	123°53.0	290°16.7	S04°09.9	253°41.7	S18°45.4	7°17.4	N21°15.7	126°26.7	S03°48.8	Polaris	313°14.5	89°22.3
7	138°55.5	305°16.3	11.2	268°42.4	45.9	22°19.7	15.7	141°29.3	48.8	Akamar	315°10.8	-40°11.9
8	153°58.0	320°15.9	12.4	283°43.0	46.4	37°22.0	15.6	156°31.9	48.9	Menkar	314°05.2	4°11.6
9	169°00.4	335°15.5	· · 13.6	298°43.7	· · 46.9	52°24.3	· · 15.6	171°34.4	· · 48.9	Mirfak	308°26.9	49°57.2
10	184°02.9	350°15.1	14.8	313°44.4	47.3	67°26.7	15.6	186°37.0	49.0	Aldebaran	290°38.6	16°33.8
11	199°05.4	5°14.6	16.0	328°45.1	47.8	82°29.0	15.6	201°39.6	49.0	Rigel	281°03.0	-8°10.1
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	S03°49.1	Capella	280°20.6	46°01.4
13	229°10.7	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°12.3	50°13.4	19.7	13°47.0	49.2	127°35.9	15.5	246°47.4	49.2	Elnath	278°00.8	28°37.8
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°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°25.4	-16°44.7
19	319°25.1	125°11.3	25.7	88°50.4	51.6	202°47.5	15.4	322°00.4	49.4	Adara	255°05.2	-29°00.2
20	334°27.5	140°10.9	26.9	103°51.0	52.0	217°49.8	15.4	337°02.9	49.5	Procyon	244°50.0	5°09.8
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°16.4	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	-50°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°45.9	-43°31.9
Mer.pass.:21:41		v-0.4 d-1.2 m-3.8		v0.7 d-0.5 m1.5		v2.3 d-0.0 m-2.1		v2.6 d-0.0 m0.8		Miaplacidus	221°38.4	-69°49.0
										Alphard	217°47.2	-8°46.1
										Regulus	207°33.9	11°50.5
										Dubhe	193°40.6	61°36.5
										Denebola	182°24.5	14°25.7
										Gienah	175°43.2	-17°41.0
										Acrux	173°00.1	-63°14.4
										Gacrux	171°51.5	-57°15.3
										Alioth	166°13.0	55°49.1
										Spica	158°21.9	-11°17.7
										Alkaid	152°52.0	49°11.1
										Hadar	148°35.8	-60°29.8
										Menkent	147°57.3	-36°29.7
										Arcturus	145°47.5	19°03.2
										Rigel Kent.	139°40.1	-60°56.5
										Kochab	137°20.9	74°02.9
										Zuben'ubi	136°55.7	-16°08.9
										Alphecca	126°03.6	26°37.8
										Antares	112°15.4	-26°29.3
										Atria	107°09.4	-69°04.6
										Sabik	102°02.3	-15°45.4
										Shaula	96°09.8	-37°07.4
										Rasalhague	95°58.2	12°32.6
										Eltanin	90°42.2	51°29.3
										Kaus Aust.	83°31.8	-34°22.4
										Vega	80°33.0	38°48.6
										Nunki	75°47.1	-26°15.9
										Altair	61°59.5	8°56.3
										Peacock	53°04.7	-56°39.3
										Deneb	49°25.4	45°22.6
										Enif	33°38.1	9°59.8
										Al Na'ir	27°31.9	-46°50.3
										Fomalhaut	15°13.6	-29°29.1
										Scheat	13°44.4	28°13.6
										Markab	13°29.1	15°20.8
										Oct 25 Sat	SHA	Mer.pass
										Venus	166°40.9	10:39
										Mars	129°59.5	13:05
										Jupiter	243°25.3	05:31
										Saturn	2°32.9	21:32
										Oct 26 Sun	SHA	Mer.pass
										Venus	165°31.8	10:40
										Mars	129°16.3	13:04
										Jupiter	243°21.7	05:27
										Saturn	2°35.9	21:27
										Oct 27 Mon	SHA	Mer.pass
										Venus	164°22.6	10:40
										Mars	128°33.0	13:03
										Jupiter	243°18.4	05:23
										Saturn	2°38.9	21:23
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:21:34		v-0.4 d-1.2 m-3.8		v0.7 d-0.5 m1.5		v2.3 d-0.0 m-2.1		v2.6 d-0.0 m0.9				

h		Sun				Moon									
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight		
									Naut.	Civil			Civil	Naut.	
0	184°02.7	S13°07.8	109°01.2	9.8'	S26°59.7	5.0'	55.0'								
1	199°02.8	08.6	123°30.0	9.8'	26°54.7	5.1'	55.0'	N 72°	05:55	07:17	08:40	14:46	16:09	17:30	
2	214°02.8	09.5	137°58.8	9.8'	26°49.5	5.2'	55.0'	N 70°	05:52	07:05	08:17	15:09	16:21	17:34	
3	229°02.9	10.3	152°27.7	9.9'	26°44.2	5.4'	55.0'	68°	05:50	06:56	07:59	15:27	16:30	17:36	
4	244°02.9	11.1	166°56.6	9.9'	26°38.8	5.5'	55.1'	66°	05:47	06:48	07:45	15:41	16:38	17:39	
5	259°03.0	12.0	181°25.5	9.9'	26°33.2	5.6'	55.1'	64°	05:45	06:41	07:33	15:53	16:45	17:41	
6	274°03.0	S13°12.8	195°54.4	9.9'	S26°27.5	5.8'	55.1'	62°	05:43	06:36	07:24	16:03	16:51	17:43	
7	289°03.1	13.6	210°23.3	10.0'	26°21.7	5.9'	55.1'	60°	05:41	06:30	07:15	16:11	16:56	17:45	
8	304°03.1	14.5	224°52.3	10.0'	26°15.7	6.0'	55.2'	N 58°	05:40	06:26	07:08	16:19	17:01	17:47	
9	319°03.2	15.3	239°21.3	10.0'	26°09.6	6.2'	55.2'	56°	05:38	06:22	07:01	16:26	17:05	17:49	
10	334°03.2	16.1	253°50.4	10.1'	26°03.4	6.3'	55.2'	54°	05:36	06:18	06:55	16:32	17:09	17:50	
11	349°03.3	17.0	268°19.5	10.1'	25°57.0	6.4'	55.2'	52°	05:35	06:14	06:50	16:37	17:12	17:52	
12	4°03.3	S13°17.8	282°48.6	10.1'	S25°50.5	6.6'	55.3'	50°	05:33	06:11	06:45	16:42	17:15	17:53	
13	19°03.3	18.6	297°17.7	10.2'	25°43.8	6.7'	55.3'	45°	05:30	06:04	06:35	16:52	17:23	17:57	
14	34°03.4	19.5	311°46.9	10.2'	25°37.1	6.8'	55.3'	N 40°	05:26	05:58	06:26	17:01	17:29	18:01	
15	49°03.4	20.3	326°16.1	10.2'	25°30.2	7.0'	55.3'	35°	05:23	05:52	06:18	17:09	17:35	18:04	
16	64°03.5	21.1	340°45.3	10.3'	25°23.1	7.1'	55.4'	30°	05:19	05:47	06:12	17:15	17:40	18:08	
17	79°03.5	22.0	355°14.6	10.3'	25°16.0	7.2'	55.4'	20°	05:12	05:38	06:00	17:27	17:50	18:16	
18	94°03.6	S13°22.8	9°43.9	10.3'	S25°08.7	7.4'	55.4'	N 10°	05:03	05:28	05:50	17:37	17:59	18:24	
19	109°03.6	23.6	24°13.3	10.4'	25°01.2	7.5'	55.5'	0°	04:54	05:19	05:40	17:47	18:08	18:33	
20	124°03.7	24.4	38°42.6	10.4'	24°53.7	7.6'	55.5'	S 10°	04:44	05:09	05:31	17:57	18:19	18:44	
21	139°03.7	25.3	53°12.1	10.4'	24°46.0	7.8'	55.5'	20°	04:30	04:57	05:20	18:08	18:31	18:58	
22	154°03.7	26.1	67°41.5	10.5'	24°38.2	7.9'	55.5'	30°	04:13	04:43	05:08	18:20	18:45	19:15	
23	169°03.8	26.9	82°11.0	10.5'	24°30.2	8.0'	55.6'	35°	04:02	04:34	05:01	18:27	18:54	19:26	
	SD.=16.1	d=-0.8			S.D.=15.0			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	
0	184°03.8	S13°27.8	96°40.5	10.5'	S24°22.1	8.1'	55.6'	S 50°	03:11	03:56	04:32	18:57	19:33	20:18	
1	199°03.9	28.6	111°10.1	10.6'	24°13.9	8.3'	55.6'	52°	03:00	03:48	04:26	19:02	19:40	20:29	
2	214°03.9	29.4	125°39.7	10.6'	24°05.6	8.4'	55.7'	54°	02:48	03:40	04:20	19:08	19:49	20:42	
3	229°04.0	30.2	140°09.3	10.7'	23°57.2	8.5'	55.7'	56°	02:33	03:31	04:14	19:15	19:58	20:56	
4	244°04.0	31.1	154°39.0	10.7'	23°48.6	8.6'	55.7'	58°	02:16	03:20	04:06	19:23	20:10	21:15	
5	259°04.0	31.9	169°08.7	10.7'	23°39.9	8.8'	55.7'	S 60°	01:54	03:07	03:58	19:31	20:22	21:37	
6	274°04.1	S13°32.7	183°38.4	10.8'	S23°31.1	8.9'	55.8'								
7	289°04.1	33.5	198°08.2	10.8'	23°22.1	9.0'	55.8'								
8	304°04.2	34.4	212°38.1	10.8'	23°13.1	9.1'	55.8'								
9	319°04.2	35.2	227°07.9	10.9'	23°03.9	9.3'	55.9'								
10	334°04.2	36.0	241°37.8	10.9'	22°54.5	9.4'	55.9'								
11	349°04.3	36.8	256°07.8	11.0'	22°45.1	9.5'	55.9'								
12	4°04.3	S13°37.7	270°37.7	11.0'	S22°35.6	9.6'	56.0'								
13	19°04.4	38.5	285°07.8	11.0'	22°25.9	9.7'	56.0'								
14	34°04.4	39.3	299°37.8	11.1'	22°16.1	9.9'	56.0'								
15	49°04.4	40.1	314°07.9	11.1'	22°06.2	10.0'	56.1'								
16	64°04.5	41.0	328°38.1	11.2'	21°56.1	10.1'	56.1'								
17	79°04.5	41.8	343°08.2	11.2'	21°46.0	10.2'	56.1'								
18	94°04.5	S13°42.6	357°38.4	11.2'	S21°35.7	10.3'	56.2'								
19	109°04.6	43.4	12°08.7	11.3'	21°25.4	10.4'	56.2'								
20	124°04.6	44.2	26°39.0	11.3'	21°14.9	10.6'	56.2'								
21	139°04.6	45.1	41°09.3	11.3'	21°04.3	10.7'	56.3'								
22	154°04.7	45.9	55°39.7	11.4'	20°53.5	10.8'	56.3'								
23	169°04.7	46.7	70°10.1	11.4'	20°42.7	10.9'	56.3'								
	SD.=16.1	d=-0.8			S.D.=15.2										
0	184°04.8	S13°47.5	84°40.5	11.5'	S20°31.8	11.0'	56.4'								
1	199°04.8	48.3	99°11.0	11.5'	20°20.7	11.1'	56.4'								
2	214°04.8	49.2	113°41.5	11.5'	20°09.5	11.2'	56.4'								
3	229°04.9	50.0	128°12.1	11.6'	19°58.2	11.3'	56.5'								
4	244°04.9	50.8	142°42.6	11.6'	19°46.9	11.4'	56.5'								
5	259°04.9	51.6	157°13.3	11.6'	19°35.4	11.6'	56.5'								
6	274°05.0	S13°52.4	171°43.9	11.7'	S16°23.8	11.7'	56.6'								
7	289°05.0	53.2	186°14.6	11.7'	19°12.0	11.8'	56.6'								
8	304°05.0	54.1	200°45.3	11.7'	19°00.2	11.9'	56.6'								
9	319°05.0	54.9	215°16.1	11.8'	18°48.3	12.0'	56.7'								
10	334°05.1	55.7	229°46.9	11.8'	18°36.3	12.1'	56.7'								
11	349°05.1	56.5	244°17.7	11.8'	18°24.1	12.2'	56.7'								
12	4°05.1	S13°57.3	258°48.6	11.9'	S18°11.9	12.3'	56.8'								
13	19°05.2	58.1	273°19.5	11.9'	17°59.6	12.4'	56.8'								
14	34°05.2	58.9	287°50.4	11.9'	17°47.1	12.5'	56.9'								
15	49°05.2	59.8	302°21.4	12.0'	17°34.6	12.6'	56.9'								
16	64°05.3	60.6	316°52.4	12.0'	17°22.0	12.7'	56.9'								
17	79°05.3	61.4	331°23.4	12.0'	17°09.2	12.8'	57.0'								
18	94°05.3	S14°02.2	345°54.4	12.1'	S16°56.4	12.9'	57.0'								
19	109°05.3	63.0	0°25.5	12.1'	16°43.4	13.0'	57.0'								
20	124°05.4	63.8	14°56.6	12.1'	16°30.4	13.1'	57.1'								
21	139°05.4	64.6	29°27.7	12.1'	16°17.3	13.2'	57.1'								
22	154°05.4	65.4	43°58.9	12.2'	16°04.1	13.3'	57.2'								
23	169°05.5	66.2	58°30.1	12.2'	15°50.7	13.4'	57.2'								
	SD.=16.1	d=-0.8			S.D.=15.4										

Lat.	Moonrise			Moonset		
	Tue	Wed	Thu	Tue	Wed	Thu
N 72°	██	██	17:42	██	██	20:39
N 70°	██	██	16:50	██	██	21:29
68°	██	17:34	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	23:08
N 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	--
N 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	--
N 10°	11:28	12:15	13:00	23:13	--	00:06
0°	11:07	11:58	12:47	23:32	--	00:22
S 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
S 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
S 60°	07:04	08:42	10:21	02:51	02:59	03:02

Day	Sun		Mer. Pass	Moon	
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October 31, 01, 02 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°33.8	29°14.2	
1	54°35.6	214°17.2	57.4	180°11.9	48.7	297°42.5	13.5	57°25.7	55.0	Ankaa	353°06.1	-42°10.0	
2	69°38.0	229°16.8	58.5	195°12.5	49.1	312°44.9	13.5	72°28.3	55.1	Schedar	349°29.8	56°41.0	
3	84°40.5	244°16.3	06°59.7	210°13.2	· · 49.5	327°47.3	· · 13.5	87°30.9	· · 55.1	Diphda	348°46.2	-17°50.6	
4	99°42.9	259°15.9	07°00.9	225°13.8	50.0	342°49.6	13.5	102°33.5	55.2	Achernar	335°19.1	-57°06.3	
5	114°45.4	274°15.5	02.1	240°14.4	50.4	357°52.0	13.5	117°36.0	55.2	Hamal	327°50.1	23°35.2	
6	129°47.9	289°15.0	S07°03.3	255°15.1	S19°50.8	12°54.3	N21°13.5	132°38.6	S03°55.2	Polaris	313°13.4	89°22.4	
7	144°50.3	304°14.6	04.5	270°15.7	51.3	27°56.7	13.4	147°41.2	55.3	Akamars	315°10.8	-40°11.9	
8	159°52.8	319°14.1	05.7	285°16.3	51.7	42°59.1	13.4	162°43.7	55.3	Menkar	314°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°37.8	
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°10.5	15.2	45°21.3	55.2	163°18.0	13.3	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°09.6	S07°17.6	75°22.6	S19°56.0	193°22.7	N21°13.3	313°09.5	S03°55.7	Sirius	258°25.4	-16°44.7	
19	325°19.9	124°09.2	18.7	90°23.2	56.5	208°25.1	13.3	328°12.0	55.8	Adara	255°05.2	-29°00.2	
20	340°22.4	139°08.7	19.9	105°23.8	56.9	223°27.5	13.3	343°14.6	55.8	Procyon	244°50.0	5°09.8	
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°16.3	27°57.8	
22	10°27.3	169°07.8	22.3	135°25.1	57.7	253°32.2	13.3	13°19.8	55.9	Avior	234°14.4	-50°35.2	
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	
Mer.pass.:21:18		v-0.4 d-1.2 m-3.8		v0.6 d-0.4 m1.5		v2.4 d-0.0 m-2.2		v2.6 d-0.0 m0.9		Miaaplacidus		221°38.3	-69°49.0
										Alphard		217°47.2	-8°46.1
										Regulus		207°33.8	11°50.5
										Dubhe		193°40.5	61°36.5
										Denebola		182°24.4	14°25.7
										Gienah		175°43.2	-17°41.0
										Acrux		173°00.0	-63°14.3
										Gacrux		171°51.5	-57°15.3
										Alioth		166°12.9	55°49.1
										Spica		158°21.9	-11°17.7
										Alkaid		152°51.9	49°11.0
										Hadar		148°35.8	-60°29.8
										Menkent		147°57.3	-36°29.7
										Arcturus		145°47.5	19°03.2
										Rigel Kent.		139°40.1	-60°56.5
										Kochab		137°20.9	74°02.9
										Zuben'ubi		136°55.6	-16°08.9
										Alphecca		126°03.6	26°37.8
										Antares		112°15.4	-26°29.3
										Atria		107°09.5	-69°04.5
										Sabik		102°02.3	-15°45.4
										Shaula		96°09.8	-37°07.4
										Rasalhague		95°58.2	12°32.6
										Eltanin		90°42.2	51°29.3
										Kaus Aust.		83°31.9	-34°22.4
										Vega		80°33.0	38°48.6
										Nunki		75°47.1	-26°15.9
										Altair		61°59.5	8°56.3
										Peacock		53°04.7	-56°39.3
										Deneb		49°25.4	45°22.6
										Enif		33°38.1	9°59.8
										Al Na'ir		27°31.9	-46°50.3
										Fomalhaut		15°13.7	-29°29.1
										Scheat		13°44.4	28°13.6
										Markab		13°29.1	15°20.8
										Oct 31 Fri		SHA	Mer.pass
										Venus		159°44.6	10:43
										Mars		125°38.2	12:59
										Jupiter		243°07.1	05:09
										Saturn		2°50.1	21:07
										Nov 01 Sat		SHA	Mer.pass
										Venus		158°34.7	10:44
										Mars		124°54.1	12:58
										Jupiter		243°04.7	05:05
										Saturn		2°52.7	21:03
										Nov 02 Sun		SHA	Mer.pass
										Venus		157°24.7	10:45
										Mars		124°09.9	12:57
										Jupiter		243°02.6	05:01
										Saturn		2°55.2	20:59
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:21:10		v-0.5 d-1.2 m-3.8		v0.6 d-0.4 m1.5		v2.4 d-0.0 m-2.2		v2.6 d-0.0 m0.9					

November 03, 04, 05 (Mon., Tue., Wed.)

Aries		Venus		Mars		Jupiter		Saturn		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	S20°18.9	285°31.2	N21°12.9	45°28.2	S03°57.8	Alpheratz	357°33.8	29°14.2	
1	57°33.0	213°44.5	22.4	180°56.6	19.3	300°33.6	12.8	60°30.7	57.8	Ankaa	353°06.1	-42°10.0	
2	72°35.4	228°44.0	23.6	195°57.2	19.7	315°36.0	12.8	75°33.3	57.8	Schedar	349°29.8	56°41.0	
3	87°37.9	243°43.6	· · 24.7	210°57.8	· · 20.1	330°38.3	· · 12.8	90°35.8	· · 57.9	Diphda	348°46.2	-17°50.6	
4	102°40.4	258°43.1	25.9	225°58.4	20.5	345°40.7	12.8	105°38.4	57.9	Achernar	335°19.1	-57°06.3	
5	117°42.8	273°42.6	27.1	240°59.0	20.9	0°43.1	12.8	120°41.0	57.9	Hamal	327°50.1	23°35.2	
6	132°45.3	288°42.2	S08°28.2	255°59.6	S20°21.3	15°45.5	N21°12.8	135°43.5	S03°58.0	Polaris	313°13.1	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	Akamar	315°10.8	-40°11.9	
8	162°50.2	318°41.2	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°02.0	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	223°00.1	18°39.4	S08°35.2	346°03.3	S20°23.8	105°59.9	N21°12.8	225°58.9	S03°58.2	Capella	280°20.6	46°01.4	
13	238°02.5	33°38.9	36.4	1°03.9	24.2	121°02.3	12.8	241°01.5	58.2	Bellatrix	278°21.9	6°22.5	
14	253°05.0	48°38.4	37.6	16°04.5	24.6	136°04.6	12.8	256°04.0	58.2	Elnath	278°00.7	28°37.8	
15	268°07.5	63°38.0	· · 38.7	31°05.1	· · 25.0	151°07.0	· · 12.8	271°06.6	· · 58.3	Anilam	275°36.8	-1°11.0	
16	283°09.9	78°37.5	39.9	46°05.7	25.5	166°09.4	12.7	286°09.2	58.3	Betelgeuse	270°51.1	7°24.8	
17	298°12.4	93°37.0	41.1	61°06.3	25.9	181°11.8	12.7	301°11.7	58.4	Canopus	263°51.8	-52°42.2	
18	313°14.9	108°36.5	S08°42.2	76°06.9	S20°26.3	196°14.2	N21°12.7	316°14.3	S03°58.4	Sirius	258°25.4	-16°44.7	
19	328°17.3	123°36.1	43.4	91°07.5	26.7	211°16.6	12.7	331°16.9	58.4	Adara	255°05.2	-29°00.2	
20	343°19.8	138°35.6	44.6	106°08.1	27.1	226°19.0	12.7	346°19.4	58.5	Procyon	244°49.9	5°09.8	
21	358°22.2	153°35.1	· · 45.7	121°08.7	· · 27.5	241°21.4	· · 12.7	1°22.0	· · 58.5	Pollux	243°16.3	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	-50°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	
Mer.pass.:21:06		v-0.5 d-1.2 m-3.8		v0.6 d-0.4 m1.5		v2.4 d-0.0 m-2.2		v2.6 d-0.0 m0.9		Miaplacidus	221°38.3	-69°49.0	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	43°29.6	198°33.7	S08°49.2	166°10.5	S20°28.7	286°28.6	N21°12.7	46°29.7	S03°58.6	Alphard	217°47.1	-8°46.1	
1	58°32.1	213°33.2	50.4	181°11.1	29.1	301°31.0	12.7	61°32.2	58.6	Regulus	207°33.8	11°50.5	
2	73°34.6	228°32.8	51.5	196°11.7	29.5	316°33.4	12.7	76°34.8	58.7	Dubhe	193°40.5	61°36.5	
3	88°37.0	243°32.3	· · 52.7	211°12.3	· · 29.9	331°35.8	· · 12.7	91°37.3	· · 58.7	Denebola	182°24.4	14°25.7	
4	103°39.5	258°31.8	53.9	226°12.9	30.4	346°38.2	12.7	106°39.9	58.7	Gienah	175°43.1	-17°41.0	
5	118°42.0	273°31.4	55.0	241°13.6	30.8	1°40.6	12.7	121°42.5	58.8	Acrux	173°00.0	-63°14.3	
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	Gacrux	171°51.4	-57°15.3	
7	148°46.9	303°30.4	57.4	271°14.8	31.6	31°45.4	12.7	151°47.6	58.8	Alioth	166°12.9	55°49.1	
8	163°49.4	318°29.9	58.5	286°15.4	32.0	46°47.8	12.7	166°50.1	58.9	Spica	158°21.9	-11°17.7	
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	Alkaid	152°51.9	49°11.0	
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	Hadar	148°35.7	-60°29.8	
11	208°56.7	3°28.5	02.0	331°17.2	33.2	91°55.0	12.6	211°57.8	59.0	Menkent	147°57.3	-36°29.7	
12	223°59.2	18°28.0	S09°03.2	346°17.8	S20°33.6	106°57.4	N21°12.6	227°00.4	S03°59.0	Arcturus	145°47.5	19°03.2	
13	239°01.7	33°27.5	04.3	1°18.4	34.0	121°59.8	12.6	242°02.9	59.0	Rigel Kent.	139°40.1	-60°56.5	
14	254°04.1	48°27.1	05.5	16°19.0	34.4	137°02.2	12.6	257°05.5	59.1	Kochab	137°20.9	74°02.9	
15	269°06.6	63°26.6	· · 06.6	31°19.6	· · 34.8	152°04.6	· · 12.6	272°08.1	· · 59.1	Zuben'ubi	136°55.6	-16°08.9	
16	284°09.1	78°26.1	07.8	46°20.2	35.2	167°07.0	12.6	287°10.6	59.1	Alphecca	126°03.6	26°37.7	
17	299°11.5	93°25.6	08.9	61°20.8	35.6	182°09.4	12.6	302°13.2	59.2	Antares	112°15.4	-26°29.3	
18	314°14.0	108°25.2	S09°10.1	76°21.4	S20°36.0	197°11.8	N21°12.6	317°15.7	S03°59.2	Atria	107°09.5	-69°04.5	
19	329°16.5	123°24.7	11.3	91°22.0	36.0	212°14.2	12.6	332°18.3	59.2	Sabik	102°02.3	-15°45.4	
20	344°18.9	138°24.2	12.4	106°22.6	36.8	227°16.6	12.6	347°20.8	59.3	Shaula	96°09.8	-37°07.4	
21	359°21.4	153°23.7	· · 13.6	121°23.2	· · 37.2	242°19.0	· · 12.6	1°23.4	· · 59.3	Rasalhague	95°58.2	12°32.6	
22	14°23.8	168°23.2	14.7	136°23.8	37.6	257°21.4	12.6	17°26.0	59.3	Eltanin	90°42.2	51°29.3	
23	29°26.3	183°22.8	15.9	151°24.4	38.0	272°23.8	12.6	32°28.5	59.4	Kaus Aust.	83°31.9	-34°22.4	
Mer.pass.:21:02		v-0.5 d-1.2 m-3.8		v0.6 d-0.4 m1.5		v2.4 d-0.0 m-2.2		v2.6 d-0.0 m0.9		Vega	80°33.1	38°48.6	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	44°28.8	198°22.3	S09°17.0	166°25.0	S20°38.4	287°26.2	N21°12.6	47°31.1	S03°59.4	Nunki	75°47.1	-26°15.9	
1	59°31.2	213°21.8	18.2	181°25.6	38.8	302°28.6	12.6	62°33.6	59.4	Altair	61°59.5	8°56.3	
2	74°33.7	228°21.3	19.3	196°26.2	39.2	317°31.0	12.6	77°36.2	59.5	Peacock	53°04.8	-56°39.3	
3	89°36.2	243°20.8	· · 20.5	211°26.7	· · 39.6	332°33.4	· · 12.6	92°38.8	· · 59.5	Deneb	49°25.4	45°22.6	
4	104°38.6	258°20.3	21.7	226°27.3	40.0	347°35.8	12.6	107°41.3	59.5	Enif	33°38.1	9°59.8	
5	119°41.1	273°19.9	22.8	241°27.9	40.4	2°38.2	12.6	122°43.9	59.6	Al Na'ir	27°32.0	-46°50.3	
6	134°43.6	288°19.4	S09°24.0	256°28.5	S20°40.8	17°40.6	N21°12.6	137°46.4	S03°59.6	Fomalhaut	15°13.7	-29°29.1	
7	149°46.0	303°18.9	25.1	271°29.1	41.2	32°43.1	12.6	152°49.0	59.6	Scheat	13°44.4	28°13.6	
8	164°48.5	318°18.4	26.3	286°29.7	41.6	47°45.5	12.6	167°51.5	59.7	Markab	13°29.1	15°20.8	
9	179°51.0	333°17.9	· · 27.4	301°30.3	· · 42.0	62°47.9	· · 12.5	182°54.1	· · 59.7	Nov 03 Mon		SHA	Mer.pass
10	194°53.4	348°17.4	28.6	316°30.9	42.4	77°50.3	12.5	197°56.6	59.7	Venus	156°14.5	10:45	
11	209°55.9	3°17.0	29.7	331°31.5	42.8	92°52.7	12.5	212°59.2	59.8	Mars	123°25.5	12:56	
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	Jupiter	243°00.7	04:57	
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	2°57.7	20:55	
14	255°03.3	48°15.5	33.2	16°33.3	44.0	137°59.9	12.5	258°06.9	59.8	Nov 04 Tue		SHA	Mer.pass
15	270°05.7	63°15.0	· · 34.3	31°33.9	· · 44.4	153°02.3	· · 12.5	273°09.4	· · 59.9	Venus	155°04.1	10:46	
16	285°08.2	78°14.5	35.5	46°34.5	44.8	168°04.7	12.5	288°12.0	59.9	Mars	122°40.9	12:55	
17	300°10.7	93°14.0	36.6	61°35.1	45.2	183°07.1	12.5	303°14.5	03°59.9	Jupiter	242°59.0	04:53	
18	315°13.1	108°13.6	S09°37.8	76°35.7	S20°45.6	198°09.6	N21°12.5	318°17.1	S04°00.0	Saturn	3°00.0	20:50	
19	330°15.6	123°13.1	38.9	91°36.3	46.0	213°12.0	12.5	333°19.6	00.0	Nov 05 Wed		SHA	Mer.pass
20	345°18.1	138°12.6	40.1	106°36.9	46.4	228°14.4	12.5	348°22.2	00.0	Venus	153°53.5	10:47	
21	0°20.5	153°12.1	· · 41.2	121°37.5	· · 46.8	243°16.8	· · 12.5	3°24.8	· · 00.1	Mars	121°56.2	12:54	
22	15°23.0	168°11.6	42.4	136°38.0	47.1	258°19.2	12.5	18°27.3	00.1	Jupiter	242°57.4	04:49	
23	30°25.5	183°11.1	43.5	151°38.6	47.5	273°21.6	12.5	33°29.9	00.1	Saturn	3°02.3	20:46	
Mer.pass.:20:58		v-0.5 d-1.2 m-3.8		v0.6 d-0.4 m1.5		v2.4 d-0.0 m-2.2		v2.6 d-0.0 m0.9		Horizontal parallax			
Venus: 0.1													
Mars: 0.1													

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

Aries		Venus		Mars		Jupiter		Saturn		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	S20°47.9	288°24.0	N21°12.5	48°32.4	S04°00.2	Alpheratz	357°33.9	29°14.2
1	60°30.4	213°10.1	45.8	181°39.8	48.3	303°26.4	12.5	63°35.0	00.2	Ankaa	353°06.1	-42°10.0
2	75°32.8	228°09.6	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°46.2	-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°06.3
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	S20°50.3	18°38.5	N21°12.5	138°47.7	S04°00.3	Polaris	313°12.5	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	Akamar	315°10.8	-40°12.0
8	165°47.6	318°06.7	53.8	286°43.9	51.1	48°43.4	12.5	168°52.8	00.4	Menkar	314°05.1	4°11.6
9	180°50.1	333°06.2	· · 55.0	301°44.5	· · 51.5	63°45.8	· · 12.5	183°55.4	· · 00.4	Mirfak	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°58.0	00.5	Aldebaran	290°38.6	16°33.8
11	210°55.0	3°05.2	57.2	331°45.7	52.2	93°50.6	12.5	214°00.5	00.5	Rigel	281°02.9	-8°10.2
12	225°57.5	18°04.7	S09°58.4	346°46.3	S20°52.6	108°53.0	N21°12.5	229°03.1	S04°00.5	Capella	280°20.5	46°01.4
13	241°00.0	33°04.2	09°59.5	1°46.9	53.0	123°55.4	12.5	244°05.6	00.6	Bellatrix	278°21.9	6°22.5
14	256°00.4	48°03.7	10°00.7	16°47.5	53.4	138°57.9	12.5	259°08.2	00.6	Elnath	278°00.7	28°37.8
15	271°04.9	63°03.2	· · 01.8	31°48.1	· · 53.8	154°00.3	· · 12.5	274°10.7	· · 00.6	Alnilam	275°36.8	-1°11.0
16	286°07.3	78°02.8	02.9	46°48.7	54.2	169°02.7	12.5	289°13.3	00.7	Betelgeuse	270°51.1	7°24.8
17	301°09.8	93°02.3	04.1	61°49.2	54.6	184°05.1	12.5	304°15.8	00.7	Canopus	263°51.7	-52°42.3
18	316°12.3	108°01.8	S10°05.2	76°49.8	S20°54.9	199°07.5	N21°12.5	319°18.4	S04°00.7	Sirius	258°25.4	-16°44.7
19	331°14.7	123°01.3	06.4	91°50.4	55.3	214°10.0	12.5	334°20.9	00.7	Adara	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	00.8	Procyon	244°49.9	5°09.7
21	1°19.7	153°00.3	· · 08.6	121°51.6	· · 56.1	244°14.8	· · 12.5	4°26.0	· · 00.8	Pollux	243°16.3	27°57.8
22	16°22.1	167°59.8	09.8	136°52.2	56.5	259°17.2	12.5	19°28.6	00.8	Avior	234°14.4	-50°35.2
23	31°24.6	182°59.3	10.9	151°52.8	56.9	274°19.6	12.5	34°31.1	00.9	Suhail	222°45.8	-43°31.9
Mer.pass.:20:54		v-0.5 d-1.1 m-3.8		v0.6 d-0.4 m1.5		v2.4 d-0.0 m-2.2		v2.6 d-0.0 m0.9		Miaplacidus	221°38.2	-69°49.0
										Alphard	217°47.1	-8°46.1
										Regulus	207°33.8	11°50.5
										Dubhe	193°40.5	61°36.5
										Denebola	182°24.4	14°25.7
										Gienah	175°43.1	-17°41.0
										Acrux	172°59.9	-63°14.3
										Gacrux	171°51.4	-57°15.3
										Alioth	166°12.9	55°49.0
										Spica	158°21.9	-11°17.7
										Alkaid	152°51.9	49°11.0
										Hadar	148°35.7	-60°29.7
										Menkent	147°57.2	-36°29.7
										Arcturus	145°47.5	19°03.2
										Rigel Kent.	139°40.1	-60°56.5
										Kochab	137°20.9	74°02.9
										Zuben'ubi	136°55.6	-16°08.9
										Alphecca	126°03.6	26°37.7
										Antares	112°15.4	-26°29.3
										Atria	107°09.5	-69°04.5
										Sabik	102°02.3	-15°45.4
										Shaula	96°09.8	-37°07.4
										Rasalhague	95°58.2	12°32.6
										Eltanin	90°42.3	51°29.3
										Kaus Aust.	83°31.9	-34°22.4
										Vega	80°33.1	38°48.6
										Nunki	75°47.2	-26°15.9
										Altair	61°59.5	8°56.3
										Peacock	53°04.8	-56°39.3
										Deneb	49°25.4	45°22.6
										Enif	33°38.1	9°59.8
										Al Na'ir	27°32.0	-46°50.3
										Fomalhaut	15°13.7	-29°29.1
										Scheat	13°44.4	28°13.6
										Markab	13°29.1	15°20.8
										Nov 06 Thu	SHA	Mer.pass
										Venus	152°42.7	10:48
										Mars	121°11.3	12:53
										Jupiter	242°56.1	04:46
										Saturn	3°04.5	20:42
										Nov 07 Fri	SHA	Mer.pass
										Venus	151°31.7	10:48
										Mars	120°26.3	12:52
										Jupiter	242°55.0	04:42
										Saturn	3°06.6	20:38
										Nov 08 Sat	SHA	Mer.pass
										Venus	150°20.5	10:49
										Mars	119°41.1	12:51
										Jupiter	242°54.1	04:38
										Saturn	3°08.6	20:34
										Horizontal parallax		
										Venus:		0.1
										Mars:		0.1
Mer.pass.:20:46		v-0.5 d-1.1 m-3.8		v0.6 d-0.4 m1.4		v2.4 d0.0 m-2.2		v2.5 d-0.0 m0.9				

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

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	48°25.3	197°34.4	S11°06.2	167°21.1	S21°15.4	291°18.7	N21°12.5	51°35.9	S04°02.2	Alpheratz	357°33.8	29°14.2
1	63°27.8	212°33.9	07.3	182°21.7	15.7	306°21.2	12.5	66°38.5	02.2	Ankaa	353°06.1	-42°10.0
2	78°30.3	227°33.4	08.4	197°22.2	16.1	321°23.6	12.5	81°41.0	02.3	Schedar	349°29.8	56°41.0
3	93°32.7	242°32.9	· · 09.5	212°22.8	· · 16.5	336°26.1	· · 12.5	96°43.6	· · 02.3	Diphda	348°46.2	-17°50.6
4	108°35.2	257°32.3	10.6	227°23.4	16.9	351°28.5	12.5	111°46.1	02.3	Achernar	335°19.1	-57°06.4
5	123°37.7	272°31.8	11.7	242°24.0	17.2	6°30.9	12.5	126°48.6	02.3	Hamal	327°50.1	23°35.3
6	138°40.1	287°31.3	S11°12.9	257°24.5	S21°17.6	21°33.4	N21°12.5	141°51.2	S04°02.4	Polaris	313°12.0	89°22.4
7	153°42.6	302°30.8	14.0	272°25.1	18.0	36°35.8	12.5	156°53.7	02.4	Akamars	315°10.8	-40°12.0
8	168°45.1	317°30.3	15.1	287°25.7	18.3	51°38.3	12.5	171°56.3	02.4	Menkar	314°05.1	4°11.6
9	183°47.5	332°29.7	· · 16.2	302°26.2	· · 18.7	66°40.7	· · 12.5	186°58.8	· · 02.4	Mirfak	308°26.8	49°57.2
10	198°50.0	347°29.2	17.3	317°26.8	19.1	81°43.1	12.5	202°01.4	02.5	Aldebaran	290°38.5	16°33.8
11	213°52.4	2°28.7	18.4	332°27.4	19.4	96°45.6	12.5	217°03.9	02.5	Rigel	281°02.9	-8°10.2
12	228°54.9	17°28.2	S11°19.5	347°27.9	S21°19.8	111°48.0	N21°12.5	232°06.4	S04°02.5	Capella	280°20.5	46°01.4
13	243°57.4	32°27.6	20.6	2°28.5	20.2	126°50.5	12.5	247°09.0	02.5	Bellatrix	278°21.9	6°22.5
14	258°59.8	47°27.1	21.8	17°29.1	20.5	141°52.9	12.5	262°11.5	02.6	Elnath	278°00.7	28°37.8
15	274°02.3	62°26.6	· · 22.9	32°29.6	· · 20.9	156°55.4	· · 12.5	277°14.1	· · 02.6	Alnilam	275°36.8	-1°11.0
16	289°04.8	77°26.1	24.0	47°30.2	21.2	171°57.8	12.5	292°16.6	02.6	Betelgeuse	270°51.1	7°24.8
17	304°07.2	92°25.6	25.1	62°30.8	21.6	187°00.3	12.5	307°19.1	02.6	Canopus	263°51.7	-52°42.3
18	319°09.7	107°25.0	S11°26.2	77°31.3	S21°22.0	202°02.7	N21°12.5	322°21.7	S04°02.7	Sirius	258°25.3	-16°44.7
19	334°12.2	122°24.5	27.3	92°31.9	22.3	217°05.1	12.5	337°24.2	02.7	Adara	255°05.1	-29°00.2
20	349°14.6	137°24.0	28.4	107°32.5	22.7	232°07.6	12.5	352°26.8	02.7	Procyon	244°49.9	5°09.7
21	4°17.1	152°23.5	· · 29.5	122°33.0	· · 23.1	247°10.0	· · 12.5	7°29.3	· · 02.7	Pollux	243°16.2	27°57.8
22	19°19.6	167°22.9	30.6	137°33.6	23.4	262°12.5	12.5	22°31.8	02.8	Avior	234°14.3	-50°35.2
23	34°22.0	182°22.4	31.7	152°34.2	23.8	277°14.9	12.5	37°34.4	02.8	Suhail	222°45.8	-43°31.9
Mer.pass.:20:42		v-0.5 d-1.1 m-3.8		v0.6 d-0.4 m1.4		v2.4 d0.0 m-2.2		v2.5 d-0.0 m0.9		Miaplacidus	221°38.1	-69°49.0
										Alphard	217°47.1	-8°46.1
										Regulus	207°33.7	11°50.5
										Dubhe	193°40.4	61°36.5
										Denebola	182°24.4	14°25.7
										Gienah	175°43.1	-17°41.0
										Acrux	172°59.9	-63°14.3
										Gacrux	171°51.4	-57°15.3
										Alioth	166°12.9	55°49.0
										Spica	158°21.9	-11°17.7
										Alkaid	152°51.9	49°11.0
										Hadar	148°35.7	-60°29.7
										Menkent	147°57.2	-36°29.7
										Arcturus	145°47.5	19°03.2
										Rigel Kent.	139°40.0	-60°56.4
										Kochab	137°20.9	74°02.8
										Zuben 'ubi	136°55.6	-16°08.9
										Alphecca	126°03.6	26°37.7
										Antares	112°15.4	-26°29.3
										Atria	107°09.5	-69°04.5
										Sabik	102°02.3	-15°45.4
										Shaula	96°09.8	-37°07.4
										Rasalhague	95°58.2	12°32.6
										Eltanin	90°42.3	51°29.3
										Kaus Aust.	83°31.9	-34°22.4
										Vega	80°33.1	38°48.6
										Nunki	75°47.1	-26°15.9
										Altair	61°59.5	8°56.3
										Peacock	53°04.8	-56°39.3
										Deneb	49°25.4	45°22.6
										Enif	33°38.1	9°59.8
										Al Na'ir	27°32.0	-46°50.3
										Fomalhaut	15°13.7	-29°29.2
										Scheat	13°44.4	28°13.6
										Markab	13°29.1	15°20.8
										Nov 09 Sun	SHA	Mer.pass
										Venus	149°09.1	10:50
										Mars	118°55.8	12:50
										Jupiter	242°53.4	04:34
										Saturn	3°10.6	20:30
										Nov 10 Mon	SHA	Mer.pass
										Venus	147°57.4	10:51
										Mars	118°10.3	12:49
										Jupiter	242°52.9	04:30
										Saturn	3°12.4	20:26
										Nov 11 Tue	SHA	Mer.pass
										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:		0.1
										Mars:		0.1
Mer.pass.:20:35		v-0.5 d-1.1 m-3.8		v0.6 d-0.4 m1.4		v2.5 d0.0 m-2.2		v2.5 d-0.0 m1.0				

h		Sun				Moon										
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight			
									Naut.	Civil			Civil	Naut.		
0	183°58.5	S17°42.0	271°03.3	11.3'	N18°04.2	-12.5'	57.3'	N 72°	06:53	08:26	10:36	12:52	15:02	16:34		
1	198°58.4	42.7	285°33.7	11.4'	17°51.6	-12.6'	57.3'	N 70°	06:44	08:05	09:38	13:50	15:23	16:44		
2	213°58.3	43.4	300°04.2	11.5'	17°39.0	-12.7'	57.2'	68°	06:36	07:48	09:04	14:23	15:40	16:52		
3	228°58.2	44.0	314°34.8	11.7'	17°26.3	-12.7'	57.2'	66°	06:29	07:34	08:40	14:47	15:53	16:59		
4	243°58.1	44.7	329°05.5	11.8'	17°13.5	-12.8'	57.2'	64°	06:23	07:23	08:22	15:06	16:05	17:04		
5	258°58.1	45.4	343°36.3	11.9'	17°00.6	-12.9'	57.1'	62°	06:18	07:13	08:06	15:22	16:14	17:10		
6	273°58.0	S17°46.1	358°07.2	12.0'	N16°47.7	-12.9'	57.1'	60°	06:13	07:05	07:53	15:34	16:23	17:14		
7	288°57.9	46.7	12°38.3	12.1'	16°34.8	-13.0'	57.1'	N 58°	06:09	06:57	07:42	15:46	16:30	17:19		
8	303°57.8	47.4	27°09.4	12.2'	16°21.7	-13.1'	57.0'	56°	06:05	06:51	07:33	15:55	16:37	17:23		
9	318°57.7	48.1	41°40.7	12.3'	16°08.6	-13.1'	57.0'	54°	06:02	06:45	07:24	16:04	16:43	17:26		
10	333°57.7	48.8	56°12.1	12.4'	15°55.5	-13.2'	57.0'	52°	05:58	06:39	07:17	16:11	16:49	17:30		
11	348°57.6	49.4	70°43.6	12.5'	15°42.3	-13.2'	56.9'	50°	05:55	06:34	07:10	16:18	16:54	17:33		
12	3°57.5	S17°50.1	85°15.1	12.6'	N15°29.0	-13.3'	56.9'	45°	05:48	06:23	06:55	16:33	17:05	17:40		
13	18°57.4	50.8	99°46.8	12.7'	15°15.7	-13.3'	56.9'	N 40°	05:41	06:14	06:43	16:45	17:14	17:47		
14	33°57.3	51.4	114°18.6	12.8'	15°02.3	-13.4'	56.8'	35°	05:35	06:06	06:33	16:56	17:22	17:53		
15	48°57.3	52.1	128°50.5	12.9'	14°48.9	-13.5'	56.8'	30°	05:29	05:58	06:24	17:05	17:30	17:59		
16	63°57.2	52.8	143°22.5	13.0'	14°35.4	-13.5'	56.8'	20°	05:18	05:45	06:08	17:21	17:44	18:10		
17	78°57.1	53.4	157°54.6	13.1'	14°21.9	-13.6'	56.7'	N 10°	05:06	05:32	05:54	17:35	17:57	18:22		
18	93°57.0	S17°54.1	172°26.8	13.2'	N14°08.3	-13.6'	56.7'	0°	04:54	05:19	05:41	17:48	18:10	18:35		
19	108°56.9	54.8	186°59.0	13.3'	13°54.7	-13.6'	56.7'	S 10°	04:39	05:05	05:28	18:01	18:23	18:49		
20	123°56.8	55.4	201°31.4	13.4'	13°41.0	-13.7'	56.6'	20°	04:22	04:50	05:13	18:16	18:39	19:07		
21	138°56.7	56.1	216°03.9	13.5'	13°27.3	-13.7'	56.6'	30°	04:00	04:31	04:57	18:32	18:58	19:29		
22	153°56.7	56.8	230°36.4	13.6'	13°13.5	-13.8'	56.6'	35°	03:46	04:19	04:47	18:42	19:10	19:44		
23	168°56.6	57.4	245°09.1	13.7'	12°59.7	-13.8'	56.5'	40°	03:29	04:06	04:36	18:53	19:23	20:01		
	SD.=16.2	d=-0.7			S.D.=15.6			45°	03:07	03:49	04:23	19:06	19:40	20:23		
								S 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		
								S 60°	□	02:18	03:19	20:12	21:13	□		
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset				
									Wed	Thu	Fri	Wed	Thu	Fri		
0	183°56.5	S17°58.1	259°41.8	13.8'	N12°45.9	-13.9'	56.5'	N 72°	21:32	23:55	--	15:57	15:06	14:30		
1	198°56.4	58.8	274°14.6	13.9'	12°32.0	-13.9'	56.5'	N 70°	21:58	--	00:05	15:28	14:53	14:26		
2	213°56.3	17°59.4	288°47.5	14.0'	12°18.1	-13.9'	56.4'	68°	22:18	--	00:14	15:06	14:42	14:22		
3	228°56.2	18°00.1	303°20.5	14.0'	12°04.2	-14.0'	56.4'	66°	22:34	--	00:21	14:49	14:33	14:19		
4	243°56.1	00.8	317°53.6	14.1'	11°50.2	-14.0'	56.4'	64°	22:47	--	00:27	14:35	14:25	14:16		
5	258°56.1	01.4	332°26.8	14.2'	11°36.1	-14.0'	56.3'	62°	22:57	--	00:32	14:23	14:18	14:14		
6	273°56.0	S18°02.1	347°00.0	14.3'	N11°22.1	-14.1'	56.3'	60°	23:07	--	00:37	14:13	14:12	14:12		
7	288°55.9	02.7	1°33.3	14.4'	11°08.0	-14.1'	56.3'	N 58°	23:15	--	00:41	14:04	14:07	14:10		
8	303°55.8	03.4	16°06.7	14.4'	10°53.9	-14.1'	56.2'	56°	23:21	--	00:44	13:56	14:03	14:08		
9	318°55.7	04.1	30°40.2	14.5'	10°39.7	-14.2'	56.2'	54°	23:28	--	00:47	13:49	13:58	14:06		
10	333°55.6	04.7	45°13.7	14.6'	10°25.5	-14.2'	56.2'	52°	23:33	--	00:50	13:42	13:55	14:05		
11	348°55.5	05.4	59°47.4	14.7'	10°11.3	-14.2'	56.1'	50°	23:38	--	00:52	13:36	13:51	14:04		
12	3°55.4	S18°06.0	74°21.1	14.7'	N09°57.1	-14.3'	56.1'	45°	23:49	--	00:58	13:24	13:44	14:01		
13	18°55.3	06.7	88°54.8	14.8'	09°42.8	-14.3'	56.1'	N 40°	23:58	--	01:03	13:13	13:37	13:59		
14	33°55.2	07.4	103°28.7	14.9'	09°28.5	-14.3'	56.1'	35°	--	00:06	01:07	13:04	13:32	13:57		
15	48°55.1	08.0	118°02.6	14.9'	09°14.2	-14.3'	56.0'	30°	--	00:12	01:10	12:56	13:27	13:55		
16	63°55.1	08.7	132°36.5	15.0'	08°59.8	-14.4'	56.0'	20°	--	00:24	01:16	12:43	13:19	13:52		
17	78°55.0	09.3	147°10.6	15.1'	08°45.5	-14.4'	56.0'	N 10°	--	00:34	01:21	12:31	13:11	13:49		
18	93°54.9	S18°10.0	161°44.7	15.1'	N08°31.1	-14.4'	55.9'	0°	--	00:43	01:26	12:19	13:04	13:46		
19	108°54.8	10.6	176°18.8	15.2'	08°16.7	-14.4'	55.9'	S 10°	00:10	00:52	01:31	12:08	12:57	13:43		
20	123°54.7	11.3	190°53.1	15.3'	08°02.3	-14.4'	55.9'	20°	00:24	01:02	01:36	11:55	12:49	13:40		
21	138°54.6	11.9	205°27.4	15.3'	07°47.8	-14.4'	55.9'	30°	00:41	01:13	01:42	11:41	12:40	13:37		
22	153°54.5	12.6	220°01.7	15.4'	07°33.4	-14.5'	55.8'	35°	00:50	01:20	01:46	11:32	12:35	13:35		
23	168°54.4	13.2	234°36.1	15.4'	07°18.9	-14.5'	55.8'	40°	01:01	01:27	01:49	11:23	12:29	13:33		
	SD.=16.2	d=-0.7			S.D.=15.4			45°	01:14	01:36	01:54	11:12	12:23	13:30		
								S 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	02:07	02:10	10:27	11:56	13:20		
								S 60°	02:15	02:15	02:14	10:17	11:50	13:18		
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Mer.	Moon		Age		
									Eqn.of Time	Mer.	Upper	Lower	22-24			
									00 ^h	Pass	hh:mm	hh:mm	47-28%			
									mm:ss	hh:mm						
0	183°54.3	S18°13.9	249°10.6	15.5'	N07°04.4	-14.5'	55.8'	12	15:54	15:50	11:44	06:08	18:31			
1	198°54.2	14.5	263°45.1	15.5'	06°49.9	-14.5'	55.7'	13	15:46	15:42	11:44	06:54	19:15			
2	213°54.1	15.2	278°19.6	15.6'	06°35.4	-14.5'	55.7'	14	15:37	15:33	11:44	07:36	19:57			
3	228°54.0	15.8	292°54.3	15.6'	06°20.9	-14.5'	55.7'									
4	243°53.9	16.5	307°28.9	15.7'	06°06.3	-14.5'	55.7'									
5	258°53.8	17.1	322°03.7	15.7'	05°51.8	-14.6'	55.6'									
6	273°53.7	S18°17.8	336°38.4	15.8'	N05°37.2	-14.6'	55.6'									
7	288°53.6	18.4	351°13.2	15.8'	05°22.7	-14.6'	55.6'									
8	303°53.5	19.1	5°48.1	15.9'	05°08.1	-14.6'	55.6'									
9	318°53.4	19.7	20°23.0	15.9'	04°53.5	-14.6'	55.5'									
10	333°53.3	20.4	34°58.0	16.0'	04°38.9	-14.6'	55.5'									
11	348°53.2	21.0	49°33.0	16.0'	04°24.3	-14.6'	55.5'									
12	3°53.1	S18°21.7	64°08.0	16.1'	N04°09.7	-14.6'	55.5'									
13	18°53.0	22.3	78°43.1	16.1'	03°55.1	-14.6'	55.4'									
14	33°52.9	22.9	93°18.2	16.1'	03°40.5	-14.6'	55.4'									
15	48°52.8	23.6	107°53.3	16.2'	03°25.9	-14.6'	55.4'									
16	63°52.7	24.2	122°28.5	16.2'	03°11.3	-14.6'	55.4'									
17	78°52.6	24.9	137°03.7	16.2'	02°56.7	-14.6'	55.3'									
18	93°52.5	S18°25.5	151°39.0	16.3'	N02°42.1	-14.6'	55.3'									
19	108°52.4	26.2	166°14.3	16.3'	02°27.5	-14.6'	55.3'									
20	123°52.3	26.8	180°49.6	16.3'	02°12.9	-14.6'	55.3'									
21	138°52.2	27.4	195°24.9	16.4'	01°58.3	-14.6'	55.2'									
22	153°52.1	28.1	210°00.3	16.4'	01°43.7	-14.6'	55.2'	</								

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

Aries		Venus		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	S22°05.1	297°13.8	N21°13.4	57°40.6	S04°05.2	Alpheratz	357°33.9	29°14.2	
1	69°22.6	211°14.9	42.9	183°41.2	05.4	312°16.3	13.4	72°43.1	05.2	Ankaa	353°06.2	-42°10.0	
2	84°25.1	226°14.3	44.0	198°41.8	05.7	327°18.8	13.4	87°45.6	05.3	Schedar	349°29.9	56°41.0	
3	99°27.6	241°13.7	· · 45.0	213°42.3	· · 06.1	342°21.3	· · 13.4	102°48.1	· · 05.3	Diphda	348°46.3	-17°50.7	
4	114°30.0	256°13.1	46.1	228°42.8	06.4	357°23.8	13.4	117°50.6	05.3	Achernar	335°19.2	-57°06.4	
5	129°32.5	271°12.6	47.1	243°43.4	06.7	12°26.3	13.4	132°53.2	05.3	Hamal	327°50.1	23°35.3	
6	144°35.0	286°12.0	S13°48.2	258°43.9	S22°07.0	27°28.8	N21°13.5	147°55.7	S04°05.3	Polaris	313°11.9	89°22.4	
7	159°37.4	301°11.4	49.2	273°44.4	07.3	42°31.2	13.5	162°58.2	05.3	Akamars	315°10.8	-40°12.0	
8	174°39.9	316°10.8	50.2	288°45.0	07.6	57°33.7	13.5	178°00.7	05.3	Menkar	314°05.1	4°11.6	
9	189°42.4	331°10.2	· · 51.3	303°45.5	· · 08.0	72°36.2	· · 13.5	193°03.2	· · 05.4	Mirfak	308°26.8	49°57.3	
10	204°44.8	346°09.6	52.3	318°46.0	08.3	87°38.7	13.5	208°05.8	05.4	Aldebaran	290°38.5	16°33.8	
11	219°47.3	1°09.1	53.3	333°46.6	08.6	102°41.2	13.5	223°08.3	05.4	Rigel	281°02.9	-8°10.2	
12	234°49.7	16°08.5	S13°54.4	348°47.1	S22°08.9	117°43.7	N21°13.5	238°10.8	S04°05.4	Capella	280°20.5	46°01.5	
13	249°52.2	31°07.9	55.4	3°47.6	09.2	132°46.2	13.5	253°13.3	05.4	Bellatrix	278°21.8	6°22.5	
14	264°54.7	46°07.3	56.4	18°48.2	09.5	147°48.7	13.5	268°15.8	05.4	Elnath	278°00.7	28°37.8	
15	279°57.1	61°06.7	· · 57.5	33°48.7	· · 09.9	162°51.2	· · 13.6	283°18.3	· · 05.4	Alnilam	275°36.7	-1°11.0	
16	294°59.6	76°06.1	58.5	48°49.2	10.2	177°53.7	13.6	298°20.9	05.5	Betelgeuse	270°51.1	7°24.8	
17	310°02.1	91°05.5	13°59.6	63°49.8	10.5	192°56.2	13.6	313°23.4	05.5	Canopus	263°51.7	-52°42.3	
18	325°04.5	106°04.9	S14°00.6	78°50.3	S22°10.8	207°58.7	N21°13.6	328°25.9	S04°05.5	Sirius	258°25.3	-16°44.7	
19	340°07.0	121°04.4	01.6	93°50.8	11.1	223°01.2	13.6	343°28.4	05.5	Adara	255°05.1	-20°00.2	
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°49.8	5°09.7	
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°16.2	27°57.8	
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°14.3	-50°35.2	
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°45.7	-43°31.9	
Mer.pass.:20:19		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Miaaplacidus		221°38.1	-69°49.0
										Alphard		217°47.0	-8°46.1
										Regulus		207°33.7	11°50.4
										Dubhe		193°40.3	61°36.4
										Denebola		182°24.3	14°25.6
										Gienah		175°43.1	-17°41.0
										Acrux		172°59.8	-63°14.3
										Gacrux		171°51.3	-57°15.3
										Alioth		166°12.8	55°49.0
										Spica		158°21.9	-11°17.7
										Alkaid		152°51.9	49°10.9
										Hadar		148°35.7	-60°29.7
										Menkent		147°57.2	-36°29.7
										Arcturus		145°47.4	19°03.1
										Rigel Kent.		139°40.0	-60°56.4
										Kochab		137°20.9	74°02.8
										Zuben'ubi		136°55.6	-16°08.9
										Alphecca		126°03.5	26°37.7
										Antares		112°15.3	-26°29.3
										Atria		107°09.5	-69°04.5
										Sabik		102°02.3	-15°45.4
										Shaula		96°09.8	-37°07.4
										Rasalhague		95°58.2	12°32.6
										Eltanin		90°42.3	51°29.2
										Kaus Aust.		83°31.9	-34°22.4
										Vega		80°33.1	38°48.6
										Nunki		75°47.2	-26°15.9
										Altair		61°59.5	8°56.3
										Peacock		53°04.8	-56°39.3
										Deneb		49°25.5	45°22.6
										Enif		33°38.1	9°59.8
										Al Na'ir		27°32.0	-46°50.3
										Fomalhaut		15°13.7	-29°29.2
										Scheat		13°44.5	28°13.6
										Markab		13°29.1	15°20.8
										Nov 15 Sat		SHA	Mer.pass
										Venus		141°55.3	10:55
										Mars		114°20.5	12:45
										Jupiter		242°53.6	04:10
										Saturn		3°20.4	20:06
										Nov 16 Sun		SHA	Mer.pass
										Venus		140°42.1	10:56
										Mars		113°34.1	12:44
										Jupiter		242°54.4	04:06
										Saturn		3°21.7	20:02
										Nov 17 Mon		SHA	Mer.pass
										Venus		139°28.6	10:57
										Mars		112°47.6	12:43
										Jupiter		242°55.4	04:02
										Saturn		3°22.9	19:58
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:20:11		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0					

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

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°33.9	29°14.2	
1	72°20.1	210°31.8	56.4	184°19.0	27.5	315°16.7	14.4	75°44.1	06.2	Ankaa	353°06.2	-42°10.0	
2	87°22.5	225°31.2	57.4	199°19.5	27.8	330°19.2	14.4	90°46.6	06.2	Schedar	349°29.9	56°41.0	
3	102°25.0	240°30.6	· · 58.4	214°20.1	· · 28.1	345°21.7	· · 14.4	105°49.2	· · 06.2	Diphda	348°46.3	-17°50.7	
4	117°27.4	255°29.9	14°59.4	229°20.6	28.4	0°24.3	14.4	120°51.7	06.2	Achernar	335°19.2	-57°06.4	
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	Hamal	327°50.1	23°35.3	
6	147°32.4	285°28.7	S15°01.4	259°21.6	S22°29.0	30°29.3	N21°14.4	150°56.7	S04°06.2	Polaris	313°11.8	89°22.5	
7	162°34.8	300°28.1	02.4	274°22.1	29.3	45°31.8	14.5	165°59.2	06.2	Akamars	315°10.8	-40°12.0	
8	177°37.3	315°27.5	03.4	289°22.6	29.6	60°34.3	14.5	181°01.7	06.2	Menkar	314°05.1	4°11.6	
9	192°39.8	330°26.9	· · 04.4	304°23.1	· · 29.9	75°36.9	· · 14.5	196°04.2	· · 06.2	Mirfak	308°26.8	49°57.3	
10	207°42.2	345°26.2	05.4	319°23.7	30.1	90°39.4	14.5	211°06.7	06.3	Aldebaran	290°38.5	16°33.8	
11	222°44.7	0°25.6	06.4	334°24.2	30.4	105°41.9	14.5	226°09.2	06.3	Rigel	281°02.9	-8°10.2	
12	237°47.2	15°25.0	S15°07.4	349°24.7	S22°30.7	120°44.4	N21°14.5	241°11.7	S04°06.3	Capella	280°20.4	46°01.5	
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°23.7	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°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°24.8	
17	312°59.5	90°21.9	12.3	64°27.2	32.2	195°57.0	14.6	316°24.3	06.3	Canopus	263°51.7	-52°42.3	
18	328°01.9	105°21.3	S15°13.3	79°27.8	S22°32.5	210°59.6	N21°14.6	331°26.8	S04°06.3	Sirius	258°25.3	-16°44.8	
19	343°04.4	120°20.6	14.3	94°28.3	32.7	226°02.1	14.7	346°29.3	06.3	Adara	255°05.0	-29°00.2	
20	358°06.9	135°20.0	15.3	109°28.8	33.0	241°04.6	14.7	1°31.8	06.3	Procyon	244°49.8	5°09.7	
21	13°09.3	150°19.4	· · 16.2	124°29.3	· · 33.3	256°07.1	· · 14.7	16°34.3	· · 06.3	Pollux	243°16.1	27°57.8	
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	-50°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	
Mer.pass.:20:07		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Miaplacidus		221°38.0	-69°49.0
Mer.pass.:20:03		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Alphard		217°47.0	-8°46.1
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Regulus		207°33.7	11°50.4
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Dubhe		193°40.3	61°36.4
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Denebola		182°24.3	14°25.6
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Gienah		175°43.0	-17°41.0
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Acrux		172°59.8	-63°14.3
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Gacrux		171°51.3	-57°15.2
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Alioth		166°12.8	55°49.0
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Spica		158°21.8	-11°17.7
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Alkaid		152°51.9	49°10.9
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Hadar		148°35.6	-60°29.7
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Menkent		147°57.2	-36°29.7
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Arcturus		145°47.4	19°03.1
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Rigel Kent.		139°40.0	-60°56.4
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Kochab		137°20.9	74°02.8
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Zuben'ubi		136°55.6	-16°08.9
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Alphecca		126°03.5	26°37.7
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Antares		112°15.3	-26°29.3
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Atria		107°09.5	-69°04.5
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Sabik		102°02.3	-15°45.4
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Shaula		96°09.8	-37°07.4
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Rasalhague		95°58.2	12°32.6
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Eltanin		90°42.3	51°29.2
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Kaus Aust.		83°31.9	-34°22.4
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Vega		80°33.1	38°48.6
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Nunki		75°47.2	-26°15.9
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Altair		61°59.5	8°56.3
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Peacock		53°04.9	-56°39.3
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Deneb		49°25.5	45°22.6
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Enif		33°38.2	9°59.8
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Al Na'ir		27°32.0	-46°50.3
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Fomalhaut		15°13.7	-29°29.2
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Scheat		13°44.5	28°13.6
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Markab		13°29.1	15°20.8
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Nov 18 Tue		SHA	Mer.pass
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Venus		138°14.8	10:58
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Mars		112°00.9	12:42
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Jupiter		242°56.6	03:58
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Saturn		3°24.0	19:54
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Nov 19 Wed		SHA	Mer.pass
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Venus		137°00.8	10:59
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Mars		111°14.1	12:42
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Jupiter		242°58.0	03:54
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Saturn		3°25.1	19:50
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Nov 20 Thu		SHA	Mer.pass
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Venus		135°46.4	11:00
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Mars		110°27.1	12:41
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Jupiter		242°59.6	03:50
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Saturn		3°26.0	19:46
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Horizontal parallax			
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Venus:		0.1	
Mer.pass.:19:59		v-0.6 d-1.0 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Mars:		0.1	

h		Sun						Moon						
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight	
									Naut.	Civil			Civil	Naut.
0	183°43.4	S19°13.8	209°35.9	15.4'	S15°12.7	-12.2'	54.1'	N 72°	07:14	08:54	■	■	14:35	16:15
1	198°43.3	14.4	224°10.3	15.3'	15°24.9	-12.1'	54.1'	N 70°	07:02	08:28	10:20	13:10	15:02	16:27
2	213°43.2	15.0	238°44.6	15.3'	15°36.9	-12.1'	54.1'	68°	06:53	08:08	09:33	13:57	15:22	16:37
3	228°43.0	· · 15.5	253°18.8	15.2'	15°49.0	-12.0'	54.1'	66°	06:44	07:52	09:03	14:27	15:38	16:46
4	243°42.9	16.1	267°53.0	15.2'	16°00.9	-11.9'	54.1'	64°	06:37	07:39	08:41	14:49	15:51	16:53
5	258°42.8	16.7	282°27.2	15.1'	16°12.8	-11.9'	54.1'	62°	06:31	07:28	08:23	15:07	16:03	16:59
6	273°42.6	S19°17.3	297°01.3	15.1'	S16°24.7	-11.8'	54.1'	60°	06:25	07:18	08:08	15:22	16:12	17:05
7	288°42.5	17.9	311°35.3	15.0'	16°36.4	-11.7'	54.1'	N 58°	06:20	07:09	07:56	15:34	16:21	17:10
8	303°42.4	18.5	326°09.3	15.0'	16°48.1	-11.7'	54.1'	56°	06:16	07:02	07:45	15:45	16:28	17:15
9	318°42.2	· · 19.1	340°43.3	14.9'	16°59.8	-11.6'	54.0'	54°	06:11	06:55	07:35	15:55	16:35	17:19
10	333°42.1	19.7	355°17.2	14.9'	17°11.3	-11.5'	54.0'	52°	06:07	06:49	07:27	16:03	16:41	17:23
11	348°42.0	20.3	9°51.0	14.8'	17°22.8	-11.5'	54.0'	50°	06:04	06:43	07:19	16:11	16:47	17:27
12	3°41.8	S19°20.9	24°24.8	14.8'	S17°34.2	-11.4'	54.0'	45°	05:55	06:31	07:03	16:27	16:59	17:35
13	18°41.7	21.5	38°58.5	14.7'	17°45.6	-11.3'	54.0'	N 40°	05:48	06:21	06:50	16:41	17:10	17:43
14	33°41.5	22.0	53°32.2	14.6'	17°56.9	-11.2'	54.0'	35°	05:41	06:11	06:38	16:52	17:19	17:50
15	48°41.4	· · 22.6	68°05.8	14.6'	18°08.1	-11.2'	54.0'	30°	05:34	06:03	06:28	17:02	17:28	17:57
16	63°41.3	23.2	82°39.4	14.5'	18°19.2	-11.1'	54.0'	20°	05:21	05:48	06:11	17:19	17:43	18:10
17	78°41.1	23.8	97°12.9	14.5'	18°30.3	-11.0'	54.0'	N 10°	05:08	05:34	05:56	17:35	17:57	18:23
18	93°41.0	S19°24.4	111°46.3	14.4'	S18°41.3	-10.9'	54.0'	0°	04:54	05:20	05:42	17:49	18:11	18:37
19	108°40.9	25.0	126°19.7	14.4'	18°52.2	-10.9'	54.0'	S 10°	04:39	05:05	05:27	18:04	18:26	18:52
20	123°40.7	25.6	140°53.0	14.3'	19°03.0	-10.8'	54.0'	20°	04:20	04:48	05:12	18:19	18:43	19:11
21	138°40.6	· · 26.1	155°26.3	14.2'	19°13.7	-10.7'	54.0'	30°	03:56	04:28	04:54	18:37	19:04	19:35
22	153°40.4	26.7	169°59.5	14.2'	19°24.4	-10.6'	54.0'	35°	03:41	04:15	04:43	18:48	19:16	19:51
23	168°40.3	27.3	184°32.6	14.1'	19°35.0	-10.6'	54.0'	40°	03:22	04:00	04:31	19:00	19:31	20:10
	SD.=16.2	d=-0.6			S.D.=14.8			45°	02:58	03:42	04:17	19:15	19:49	20:34
								S 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
								S 60°	□	01:59	03:05	20:28	21:35	□
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset		
									Tue	Wed	Thu	Tue	Wed	Thu
0	183°40.2	S19°27.9	199°05.7	14.0'	S19°45.5	-10.5'	54.0'	N 72°	09:02	■	■	11:16	■	■
1	198°40.0	28.5	213°38.7	14.0'	19°55.9	-10.4'	54.0'	N 70°	08:02	■	■	12:17	■	■
2	213°39.9	29.0	228°11.7	13.9'	20°06.3	-10.3'	54.0'	68°	07:28	10:14	■	12:53	11:39	■
3	228°39.7	· · 29.6	242°44.6	13.9'	20°16.6	-10.2'	54.0'	66°	07:03	09:06	■	13:19	12:47	■
4	243°39.6	30.2	247°17.4	13.8'	20°26.7	-10.1'	54.0'	64°	06:44	08:31	10:39	13:38	13:23	12:52
5	258°39.5	30.8	271°50.2	13.7'	20°36.8	-10.1'	54.0'	62°	06:29	08:06	09:50	13:55	13:49	13:43
6	273°39.3	S19°31.4	286°22.9	13.7'	S20°46.8	-10.0'	53.9'	60°	06:16	07:46	09:19	14:08	14:10	14:14
7	288°39.2	31.9	300°55.5	13.6'	20°56.8	-9.9'	53.9'	N 58°	06:05	07:30	08:55	14:20	14:27	14:38
8	303°39.0	32.5	315°28.1	13.5'	21°06.6	-9.8'	53.9'	56°	05:56	07:16	08:37	14:30	14:41	14:57
9	318°38.9	· · 33.1	330°00.6	13.5'	21°16.3	-9.7'	53.9'	54°	05:48	07:04	08:21	14:40	14:53	15:13
10	333°38.8	33.7	344°33.1	13.4'	21°26.0	-9.6'	53.9'	52°	05:40	06:54	08:08	14:48	15:04	15:27
11	348°38.6	34.2	359°05.4	13.4'	21°35.6	-9.5'	53.9'	50°	05:33	06:45	07:56	14:55	15:14	15:39
12	3°38.5	S19°34.8	13°37.8	13.3'	S21°45.0	-9.4'	53.9'	45°	05:19	06:25	07:31	15:11	15:35	16:04
13	18°38.3	35.4	28°10.0	13.2'	21°54.4	-9.3'	53.9'	N 40°	05:07	06:10	07:12	15:24	15:51	16:25
14	33°38.2	36.0	42°42.2	13.2'	22°03.7	-9.2'	53.9'	35°	04:58	05:56	06:56	15:35	16:06	16:41
15	48°38.0	· · 36.5	57°14.3	13.1'	22°12.9	-9.1'	53.9'	30°	04:49	05:45	06:42	15:45	16:18	16:56
16	63°37.9	37.1	71°46.4	13.0'	22°22.0	-9.1'	53.9'	20°	04:34	05:25	06:18	16:01	16:39	17:21
17	78°37.7	37.7	86°18.4	13.0'	22°31.0	-9.0'	53.9'	N 10°	04:21	05:09	05:58	16:16	16:58	17:42
18	93°37.6	S19°38.2	100°50.3	12.9'	S22°39.9	-8.9'	53.9'	0°	04:09	04:53	05:39	16:30	17:15	18:03
19	108°37.4	38.8	115°22.2	12.8'	22°48.7	-8.8'	53.9'	S 10°	03:57	04:37	05:20	16:44	17:32	18:23
20	123°37.3	39.4	129°54.0	12.8'	22°57.4	-8.7'	53.9'	20°	03:45	04:21	05:00	16:59	17:51	18:44
21	138°37.2	· · 40.0	144°25.8	12.7'	23°06.1	-8.6'	53.9'	30°	03:30	04:02	04:37	17:16	18:12	19:10
22	153°37.0	40.5	158°57.4	12.6'	23°14.6	-8.5'	53.9'	35°	03:22	03:51	04:24	17:26	18:25	19:24
23	168°36.9	41.1	173°29.0	12.6'	23°23.0	-8.4'	53.9'	40°	03:12	03:38	04:08	17:37	18:40	19:42
	SD.=16.2	d=-0.6			S.D.=14.7			45°	03:01	03:23	03:50	17:51	18:57	20:03
								S 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
								S 60°	02:10	02:11	02:14	18:59	20:30	22:02
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Mer.	Moon		Age
									Eqn.of Time	Mer.	Upper	Lower		
									00 ^h	Pass	hh:mm	hh:mm	28-0	
									mm:ss	hh:mm			3-0%	
0	183°36.7	S19°41.7	188°00.6	12.5'	S23°31.3	-8.3'	53.9'	18	14:54	14:47	11:45	10:19	22:41	
1	198°36.6	42.2	202°32.1	12.4'	23°39.5	-8.2'	53.9'	19	14:41	14:34	11:45	11:04	23:27	
2	213°36.4	42.8	217°03.5	12.4'	23°47.6	-8.1'	53.9'	20	14:27	14:20	11:46	11:51	--	
3	228°36.3	· · 43.4	231°34.8	12.3'	23°55.6	-7.9'	53.9'							
4	243°36.1	43.9	246°06.1	12.3'	24°03.5	-7.8'	53.9'							
5	258°36.0	44.5	260°37.4	12.2'	24°11.3	-7.7'	53.9'							
6	273°35.8	S19°45.0	275°08.5	12.1'	S24°19.0	-7.6'	53.9'							
7	288°35.7	45.6	289°39.6	12.1'	24°26.6	-7.5'	53.9'							
8	303°35.5	46.2	304°10.6	12.0'	24°34.0	-7.4'	53.9'							
9	318°35.4	· · 46.7	318°41.6	11.9'	24°41.4	-7.3'	53.9'							
10	333°35.2	47.3	333°12.5	11.9'	24°48.6	-7.2'	53.9'							
11	348°35.1	47.9	347°43.4	11.8'	24°55.8	-7.1'	53.9'							
12	3°34.9	S19°48.4	2°14.1	11.8'	S25°02.8	-7.0'	53.9'							
13	18°34.8	49.0	16°44.9	11.7'	25°09.7	-6.9'	53.9'							
14	33°34.6	49.5	31°15.5	11.6'	25°16.5	-6.7'	53.9'							
15	48°34.4	· · 50.1	45°46.1	11.6'	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°47.1	11.4'	25°36.2	-6.4'	53.9'							
18	93°34.0	S19°51.8	89°17.6	11.4'	S25°42.6	-6.3'	53.9'							
19	108°33.8	52.3	103°47.9	11.3'	25°48.8	-6.2'	53.9'							
20	123°33.7	52.9	118°18.2	11.3'	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	11.2'	26°06.8									

November 21, 22, 23 (Fri., Sat., Sun.)

Aries		Venus		Mars		Jupiter		Saturn		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	S22°47.4	303°16.5	N21°15.6	63°41.8	S04°06.7	Alpheratz	357°33.9	29°14.2			
1	75°17.5	209°46.1	06.5	184°55.5	47.7	318°19.0	15.7	78°44.3	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°41.1			
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°46.3	-17°50.7			
4	120°24.9	254°44.2	09.3	229°57.0	48.5	3°26.6	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°35.3			
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°11.6	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	Akamar	315°10.8	-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	Menkar	314°05.1	4°11.6			
9	195°37.2	329°40.9	· · 14.0	304°59.5	· · 49.8	78°39.4	· · 15.8	199°04.3	· · 06.7	Mirfak	308°26.7	49°57.3			
10	210°39.6	344°40.2	15.0	320°00.0	50.1	93°41.9	15.8	214°06.8	06.7	Aldebaran	290°38.5	16°33.8			
11	225°42.1	359°39.6	15.9	335°00.5	50.3	108°44.5	15.9	229°09.3	06.8	Rigel	281°02.9	-8°10.2			
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	Capella	280°20.4	46°01.5			
13	255°47.0	29°38.3	17.8	5°01.5	50.9	138°49.6	15.9	259°14.3	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°11.0			
16	300°54.4	74°36.3	20.6	50°03.0	51.7	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°44.8			
19	346°01.8	119°34.3	23.4	95°04.5	52.4	229°04.9	16.0	349°29.3	06.8	Adara	255°05.0	-29°00.2			
20	1°04.3	134°33.7	24.4	110°05.0	52.7	244°07.4	16.1	4°31.7	06.8	Procyon	244°49.8	5°09.7			
21	16°06.8	149°33.0	· · 25.3	125°05.5	· · 53.0	259°10.0	· · 16.1	19°34.2	· · 06.8	Pollux	243°16.1	27°57.7			
22	31°09.2	164°32.3	26.2	140°05.9	53.2	274°12.5	16.1	34°36.7	06.8	Avior	234°14.2	-59°35.2			
23	46°11.7	179°31.7	27.2	155°06.4	53.5	289°15.1	16.1	49°39.2	06.8	Suhail	222°45.7	-43°31.9			
Mer.pass.:19:55		v-0.7 d-0.9 m-3.8		v0.5 d-0.3 m1.4		v2.5 d0.0 m-2.3		v2.5 d-0.0 m1.0		Miacplacidus		221°37.9	-69°49.0		
Alphard		217°47.0		-8°46.1		Regulus		207°33.7		11°50.4		Dubhe		193°40.3	61°36.4
Denebola		182°24.3		14°25.6		Gienah		175°43.0		-17°41.0		Acrux		172°59.8	-63°14.3
Gacrux		171°51.2		-57°15.2		Alioth		166°12.8		55°48.9		Spica		158°21.8	-11°17.7
Alkaid		152°51.8		49°10.9		Hadar		148°35.6		-60°29.7		Menkent		147°57.2	-36°29.7
Arcturus		145°47.4		19°03.1		Rigil Kent.		139°40.0		-60°56.4		Kochab		137°20.9	74°02.8
Zuben'ubi		136°55.6		-16°08.9		Alphecca		126°03.5		26°37.7		Antares		112°15.3	-26°29.3
Atria		107°09.5		-69°04.4		Sabik		102°02.3		-15°45.4		Shaula		96°09.8	-37°07.4
Rasalhague		95°58.2		12°32.6		Eltanin		90°42.3		51°29.2		Kaus Aust.		83°31.9	-34°22.4
Vega		80°33.1		38°48.6		Nunki		75°47.2		-26°15.9		Altair		61°59.5	8°56.3
Peacock		53°04.9		-56°39.3		Deneb		49°25.5		45°22.6		Enif		33°38.2	9°59.7
Al Na'ir		27°32.1		-46°50.3		Fomalhaut		15°13.7		-29°29.2		Scheat		13°44.5	28°13.6
Markab		13°29.1		15°20.8		Nov 21 Fri		SHA		Mer.pass		Venus		134°31.8	11:01
						Venus		109°40.0		12:40		Mars		108°05.4	12:38
						Jupiter		243°01.5		03:46		Jupiter		243°05.8	03:42
						Saturn		3°26.8		19:42		Saturn		3°27.6	19:38
						Nov 22 Sat		SHA		Mer.pass		Venus		133°16.9	11:02
						Venus		108°52.8		12:39		Mars		108°05.4	12:38
						Jupiter		243°03.5		03:42		Jupiter		243°05.8	03:38
						Saturn		3°27.6		19:38		Saturn		3°28.2	19:34
						Nov 23 Sun		SHA		Mer.pass		Venus		132°01.6	11:04
						Venus		108°05.4		12:38		Mars		108°05.4	12:38
						Jupiter		243°05.8		03:38		Jupiter		243°05.8	03:38
						Saturn		3°28.2		19:34		Saturn		3°28.2	19:34
						Horizontal parallax		Venus:		0.1		Mars:		0.1	
Mer.pass.:19:47		v-0.7 d-0.9 m-3.8		v0.5 d-0.2 m1.4		v2.6 d0.0 m-2.3		v2.5 d-0.0 m1.0							

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

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	63°12.4	193°58.5	S17°11.9	170°30.3	S23°05.6	306°20.6	N21°17.3	66°41.2	S04°06.9	Alpheratz	357°33.9	29°14.3	
1	78°14.9	208°57.8	12.8	185°30.8	05.9	321°25.2	17.3	81°43.7	06.9	Ankaa	353°06.2	-42°10.0	
2	93°17.4	223°57.1	13.7	200°31.3	06.1	336°23.8	17.3	96°46.2	06.9	Schedar	349°29.9	56°41.1	
3	108°19.8	238°56.5	· · 14.6	215°31.8	· · 06.4	351°28.4	· · 17.3	111°48.6	· · 06.9	Diphda	348°46.3	-17°50.7	
4	123°22.3	253°55.8	15.5	230°32.3	06.6	6°30.9	17.4	126°51.1	06.9	Achernar	335°19.2	-57°06.4	
5	138°24.7	268°55.1	16.4	245°32.8	06.8	21°33.5	17.4	141°53.6	06.9	Hamal	327°50.1	23°35.3	
6	153°27.2	283°54.4	S17°17.3	260°33.2	S23°07.1	36°36.1	N21°17.4	156°56.1	S04°06.8	Polaris	313°11.6	89°22.5	
7	168°29.7	298°53.7	18.1	275°33.7	07.3	51°38.6	17.4	171°58.6	06.8	Akamars	315°10.8	-40°12.0	
8	183°32.1	313°53.0	19.0	290°34.2	07.5	66°41.2	17.5	187°01.1	06.8	Menkar	314°05.1	4°11.6	
9	198°34.6	328°52.3	· · 19.9	305°34.7	· · 07.8	81°43.8	· · 17.5	202°03.5	· · 06.8	Mirfak	308°26.7	49°57.3	
10	213°37.1	343°51.6	20.8	320°35.2	08.0	96°46.4	17.5	217°06.0	06.8	Aldebaran	290°38.5	16°33.8	
11	228°39.5	358°50.9	21.7	335°35.6	08.3	111°48.9	17.5	232°08.5	06.8	Rigel	281°02.8	-8°10.2	
12	243°42.0	13°50.2	S17°22.6	350°36.1	S23°08.5	126°51.5	N21°17.6	247°11.0	S04°06.8	Capella	280°20.4	46°01.5	
13	258°44.5	28°49.5	23.5	5°36.6	08.7	141°54.1	17.6	262°13.5	06.8	Bellatrix	278°21.8	6°22.5	
14	273°46.9	43°48.8	24.3	20°37.1	09.0	156°56.7	17.6	277°16.0	06.8	Elnath	278°00.6	28°37.8	
15	288°49.4	58°48.1	· · 25.2	35°37.6	· · 09.2	171°59.2	· · 17.6	292°18.4	· · 06.8	Anilam	275°36.7	-1°11.0	
16	303°51.9	73°47.4	26.1	50°38.0	09.4	187°01.8	17.7	307°20.9	06.8	Betelgeuse	270°51.0	7°24.8	
17	318°54.3	88°46.7	27.0	65°38.5	09.7	202°04.4	17.7	322°23.4	06.8	Canopus	263°51.6	-52°42.3	
18	333°56.8	103°46.0	S17°27.9	80°39.0	S23°09.9	217°07.0	N21°17.7	337°25.9	S04°06.8	Sirius	258°25.2	-16°44.8	
19	348°59.2	118°45.3	28.7	95°39.5	10.1	232°09.6	17.7	352°28.4	06.8	Adara	255°05.0	-29°00.3	
20	4°01.7	133°44.6	29.6	110°39.9	10.3	247°12.1	17.8	7°30.8	06.8	Procyon	244°49.8	5°09.7	
21	19°04.2	148°43.9	· · 30.5	125°40.4	· · 10.6	262°14.7	· · 17.8	22°33.3	· · 06.8	Pollux	243°16.1	27°57.7	
22	34°06.6	163°43.2	31.4	140°40.9	10.8	277°17.3	17.8	37°35.8	06.8	Avior	234°14.1	-50°35.2	
23	49°09.1	178°42.5	32.3	155°41.4	11.0	292°19.9	17.8	52°38.3	06.8	Suhail	222°45.6	-43°31.9	
Mer.pass.:19:43		v-0.7 d-0.9 m-3.8		v0.5 d-0.2 m1.4		v2.6 d0.0 m-2.3		v2.5 d0.0 m1.0		Miaplacidus		221°37.9	-69°49.1
										Alphard		217°47.0	-8°46.1
										Regulus		207°33.6	11°50.4
										Dubhe		193°40.2	61°36.4
										Denebola		182°24.3	14°25.6
										Gienah		175°43.0	-17°41.0
										Acrux		172°59.7	-63°14.3
										Gacrux		171°51.2	-57°15.2
										Alioth		166°12.7	55°48.9
										Spica		158°21.8	-11°17.7
										Alkaid		152°51.8	49°10.9
										Hadar		148°35.6	-60°29.7
										Menkent		147°57.1	-36°29.7
										Arcturus		145°47.4	19°03.1
										Rigel Kent.		139°40.0	-60°56.4
										Kochab		137°20.9	74°02.8
										Zuben'ubi		136°55.6	-16°08.9
										Alphecca		126°03.5	26°37.6
										Antares		112°15.3	-26°29.3
										Atria		107°09.5	-69°04.4
										Sabik		102°02.3	-15°45.4
										Shaula		96°09.8	-37°07.3
										Rasalhague		95°58.2	12°32.6
										Eltanin		90°42.3	51°29.2
										Kaus Aust.		83°31.9	-34°22.4
										Vega		80°33.1	38°48.5
										Nunki		75°47.2	-26°15.9
										Altair		61°59.5	8°56.2
										Peacock		53°04.9	-56°39.3
										Deneb		49°25.5	45°22.6
										Enif		33°38.2	9°59.7
										Al Na'ir		27°32.1	-46°50.3
										Fomalhaut		15°13.7	-29°29.2
										Scheat		13°44.5	28°13.6
										Markab		13°29.1	15°20.8
										Nov 24 Mon		SHA	Mer.pass
										Venus		130°46.1	11:05
										Mars		107°17.9	12:38
										Jupiter		243°08.2	03:34
										Saturn		3°28.8	19:30
										Nov 25 Tue		SHA	Mer.pass
										Venus		129°30.3	11:06
										Mars		106°30.3	12:37
										Jupiter		243°10.9	03:30
										Saturn		3°29.2	19:26
										Nov 26 Wed		SHA	Mer.pass
										Venus		128°14.1	11:07
										Mars		105°42.5	12:36
										Jupiter		243°13.8	03:26
										Saturn		3°29.5	19:22
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:19:36		v-0.7 d-0.9 m-3.8		v0.5 d-0.2 m1.4		v2.6 d0.0 m-2.4		v2.5 d0.0 m1.1					

November 27, 28, 29 (Thu., Fri., Sat.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	66°09.8	193°07.6	S18°14.2	171°04.5	S23°21.8	309°26.7	N21°19.2	69°39.6	S04°06.6	Alpheratz	357°33.9	29°14.3	
1	81°12.3	208°06.8	15.0	186°05.0	22.0	324°29.3	19.2	84°42.1	06.6	Ankaa	353°06.2	-42°10.0	
2	96°14.8	223°06.1	15.8	201°05.5	22.2	339°31.9	19.2	99°44.6	06.6	Schedar	349°29.9	56°41.1	
3	111°17.2	238°05.4	· · 16.7	216°05.9	· · 22.4	354°34.5	· · 19.3	114°47.1	· · 06.6	Diphda	348°46.3	-17°50.7	
4	126°19.7	253°04.7	17.5	231°06.4	22.7	9°37.1	19.3	129°49.5	06.6	Achernar	335°19.2	-57°06.4	
5	141°22.2	268°03.9	18.3	246°06.9	22.9	24°39.7	19.3	144°52.0	06.6	Hamal	327°50.1	23°35.3	
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	Polaris	313°11.9	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	Akamar	315°10.8	-40°12.1	
8	186°29.6	313°01.7	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°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	22.5	321°09.2	23.9	99°52.7	19.5	220°04.4	06.5	Aldebaran	290°38.5	16°33.8	
11	231°37.0	357°59.6	23.3	336°09.6	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°20.4	46°01.5	
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	72°55.9	27.4	51°12.0	25.1	190°08.3	19.7	310°19.2	06.5	Betelgeuse	270°51.0	7°24.8	
17	321°51.7	87°55.1	28.2	66°12.4	25.3	205°10.9	19.7	325°21.6	06.5	Canopus	263°51.6	-52°42.4	
18	336°54.2	102°54.4	S18°29.0	81°12.9	S23°25.5	220°13.5	N21°19.7	340°24.1	S04°06.5	Sirius	258°25.2	-16°44.8	
19	351°56.7	117°53.7	29.8	96°13.4	25.7	235°16.1	19.7	355°26.6	06.5	Adara	255°05.0	-29°00.3	
20	6°59.1	132°52.9	30.7	111°13.8	25.9	250°18.7	19.8	10°29.1	06.5	Procyon	244°49.8	5°09.7	
21	22°01.6	147°52.2	· · 31.5	126°14.3	· · 26.1	265°21.3	· · 19.8	25°31.5	· · 06.5	Pollux	243°16.1	27°57.7	
22	37°04.1	162°51.5	32.3	141°14.7	26.3	280°23.9	19.8	40°34.0	06.5	Avior	234°14.1	-50°35.2	
23	52°06.5	177°50.7	33.1	156°15.2	26.5	295°26.5	19.9	55°36.5	06.5	Suhail	222°45.6	-43°32.0	
Mer.pass.:19:32		v-0.7 d-0.8 m-3.8		v0.5 d-0.2 m1.4		v2.6 d0.0 m-2.4		v2.5 d0.0 m1.1		Miaplacidus		221°37.8	-69°49.1
										Alphard		217°46.9	-8°46.2
										Regulus		207°33.6	11°50.4
										Dubhe		193°40.2	61°36.4
										Denebola		182°24.2	14°25.6
										Gienah		175°43.0	-17°41.0
										Acrux		172°59.7	-63°14.3
										Gacrux		171°51.2	-57°15.2
										Alioth		166°12.7	55°48.9
										Spica		158°21.8	-11°17.7
										Alkaid		152°51.8	49°10.9
										Hadar		148°35.5	-60°29.7
										Menkent		147°57.1	-36°29.7
										Arcturus		145°47.4	19°03.1
										Rigel Kent.		139°39.9	-60°56.4
										Kochab		137°20.9	74°02.7
										Zuben'ubi		136°55.5	-16°08.9
										Alphecca		126°03.5	26°37.6
										Antares		112°15.3	-26°29.3
										Atria		107°09.5	-69°04.4
										Sabik		102°02.3	-15°45.4
										Shaula		96°09.8	-37°07.3
										Rasalhague		95°58.2	12°32.5
										Eltanin		90°42.3	51°29.2
										Kaus Aust.		83°31.9	-34°22.4
										Vega		80°33.1	38°48.5
										Nunki		75°47.2	-26°15.9
										Altair		61°59.6	8°56.2
										Peacock		53°04.9	-56°39.3
										Deneb		49°25.5	45°22.6
										Enif		37°38.2	9°59.7
										Al Na'ir		23°32.1	-46°50.3
										Fomalhaut		15°13.7	-29°29.2
										Scheat		13°44.5	28°13.6
										Markab		13°29.1	15°20.8
										Nov 27 Thu		SHA	Mer.pass
										Venus		126°57.7	11:08
										Mars		104°54.7	12:35
										Jupiter		243°16.8	03:22
										Saturn		3°29.8	19:18
										Nov 28 Fri		SHA	Mer.pass
										Venus		125°41.0	11:09
										Mars		104°06.7	12:35
										Jupiter		243°20.1	03:17
										Saturn		3°29.9	19:14
										Nov 29 Sat		SHA	Mer.pass
										Venus		124°24.0	11:10
										Mars		103°18.6	12:34
										Jupiter		243°23.6	03:13
										Saturn		3°30.0	19:10
										Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	
Mer.pass.:19:24		v-0.8 d-0.8 m-3.8		v0.5 d-0.2 m1.4		v2.6 d0.0 m-2.4		v2.5 d0.0 m1.1					

November 30, 01, 02 (Sun., Mon., Tue.)

Aries		Venus		Mars		Jupiter		Saturn		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	Alpheratz	357°33.9	29°14.3	
1	84°09.7	207°13.2	12.7	186°38.1	36.1	327°37.2	21.5	87°39.7	06.0	Ankaa	353°06.2	-42°10.0	
2	99°12.2	222°12.4	13.5	201°38.5	36.2	342°39.8	21.5	102°42.1	06.0	Schedar	349°29.9	56°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°46.3	-17°50.7	
4	129°17.1	252°10.9	15.0	231°39.4	36.6	12°45.0	21.6	132°47.0	05.9	Achernar	335°19.2	-57°06.4	
5	144°19.6	267°10.1	15.8	246°39.9	36.8	27°47.6	21.6	147°49.5	05.9	Hamal	327°50.1	23°35.3	
6	159°22.0	282°09.3	S19°16.5	261°40.4	S23°36.9	42°50.3	N21°21.6	162°52.0	S04°05.9	Polaris	313°12.3	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	Akamars	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	Aldebaran	290°38.4	16°33.8	
11	234°34.4	357°05.5	20.4	336°42.6	37.8	118°03.5	21.8	238°04.3	05.9	Rigel	281°02.8	-8°10.2	
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	Capella	280°20.4	46°01.5	
13	264°39.3	27°04.0	21.9	6°43.5	38.2	148°08.6	21.9	268°09.2	05.8	Bellatrix	278°21.8	6°22.4	
14	279°41.8	42°03.2	22.6	21°44.0	38.4	163°11.3	21.9	283°11.6	05.8	Elnath	278°00.6	28°37.8	
15	294°44.2	57°02.4	· · 23.4	36°44.4	· · 38.5	178°13.9	· · 21.9	298°14.1	· · 05.8	Alnilam	275°36.7	-1°11.1	
16	309°46.7	72°01.6	24.1	51°44.9	38.7	193°16.5	22.0	313°16.5	05.8	Betelgeuse	270°51.0	7°24.8	
17	324°49.2	87°00.9	24.9	66°45.3	38.9	208°19.2	22.0	328°19.0	05.8	Canopus	263°51.6	-52°42.4	
18	339°51.6	102°00.1	S19°25.6	81°45.8	S23°39.0	223°21.8	N21°22.0	343°21.5	S04°05.8	Sirius	258°25.2	-16°44.8	
19	354°54.1	116°59.3	26.4	96°46.2	39.2	238°24.4	22.1	358°23.9	05.7	Adara	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°49.7	5°09.7	
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°16.0	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	-50°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	
Mer.pass.:19:20		v-0.8 d-0.8 m-3.8		v0.5 d-0.2 m1.4		v2.6 d0.0 m-2.4		v2.5 d0.0 m1.1		Miaplacidus		221°37.8	-69°49.1
Mon		GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Alphard	217°46.9	-8°46.2
0	70°06.4	191°55.5	S19°30.2	171°48.5	S23°40.1	313°37.6	N21°22.2	73°36.2	S04°05.7	Regulus	207°33.6	11°50.4	
1	85°08.9	206°54.7	30.9	186°48.9	40.2	328°40.2	22.3	88°38.7	05.7	Dubhe	193°40.1	61°36.4	
2	100°11.3	221°53.9	31.6	201°49.3	40.4	343°42.8	22.3	103°41.1	05.7	Denebola	182°24.2	14°25.6	
3	115°13.8	236°53.1	· · 32.4	216°49.8	· · 40.6	358°45.4	· · 22.3	118°43.6	· · 05.6	Gienah	175°43.0	-17°41.0	
4	130°16.3	251°52.4	33.1	231°50.2	40.8	13°48.1	22.4	133°46.0	05.6	Acrux	172°59.6	-63°14.3	
5	145°18.7	266°51.6	33.9	246°50.7	40.9	28°50.7	22.4	148°48.5	05.6	Gacrux	171°51.1	-57°15.2	
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	Alioth	166°12.7	55°48.9	
7	175°23.6	296°50.0	35.4	276°51.6	41.3	58°56.0	22.5	178°53.4	05.6	Spica	158°21.8	-11°17.7	
8	190°26.1	311°49.2	36.1	291°52.0	41.4	73°58.6	22.5	193°55.8	05.6	Alkaid	152°51.8	49°10.8	
9	205°28.6	326°48.5	· · 36.8	306°52.5	· · 41.6	89°01.2	· · 22.5	208°58.3	· · 05.6	Hadar	148°35.5	-60°29.7	
10	220°31.0	341°47.7	37.6	321°52.9	41.8	104°03.9	22.6	224°00.8	05.5	Menkent	147°57.1	-36°29.7	
11	235°33.5	356°46.9	38.3	336°53.4	41.9	119°06.5	22.6	239°03.2	05.5	Arcturus	145°47.4	19°03.1	
12	250°36.0	11°46.1	S19°39.1	351°53.8	S23°42.1	134°09.1	N21°22.6	254°05.7	S04°05.5	Rigel Kent.	139°39.9	-60°56.4	
13	265°38.4	26°45.3	39.8	6°54.3	42.3	149°11.8	22.7	269°08.1	05.5	Kochab	137°20.8	74°02.7	
14	280°40.9	41°44.5	40.5	21°54.7	42.4	164°14.4	22.7	284°10.6	05.5	Zuben'ubi	136°55.5	-16°08.9	
15	295°43.4	56°43.8	· · 41.3	36°55.2	· · 42.6	179°17.0	· · 22.8	299°13.0	· · 05.5	Alphecca	126°03.5	26°37.6	
16	310°45.8	71°43.0	42.0	51°55.6	42.7	194°19.7	22.8	314°15.5	05.5	Antares	112°15.3	-26°29.3	
17	325°48.3	86°42.2	42.7	66°56.1	42.9	209°22.3	22.8	329°17.9	05.4	Atria	107°09.5	-69°04.4	
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	Sabik	102°02.3	-15°45.4	
19	355°53.2	116°40.6	44.2	96°56.9	43.2	239°27.6	22.9	359°22.8	05.4	Shaula	96°09.8	-37°07.3	
20	10°55.7	131°39.8	44.9	111°57.4	43.4	254°30.2	22.9	14°25.3	05.4	Rasalhague	95°58.2	12°32.5	
21	25°58.1	146°39.1	· · 45.6	126°57.8	· · 43.6	269°32.8	· · 23.0	29°27.7	· · 05.4	Eltanin	90°42.4	51°29.2	
22	41°00.6	161°38.3	46.4	141°58.3	43.7	284°35.5	23.0	44°30.2	05.4	Kaus Aust.	83°31.9	-34°22.4	
23	56°03.1	176°37.5	47.1	156°58.7	43.9	299°38.1	23.0	59°32.6	05.4	Vega	80°33.1	38°48.5	
Mer.pass.:19:16		v-0.8 d-0.7 m-3.8		v0.4 d-0.2 m1.4		v2.6 d0.0 m-2.4		v2.5 d0.0 m1.1		Nunki		75°47.2	-26°15.9
Tue		GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Altair	61°59.6	8°56.2
0	71°05.5	191°36.7	S19°47.8	171°59.2	S23°44.0	314°40.8	N21°23.1	74°35.1	S04°05.3	Peacock	53°04.9	-56°39.3	
1	86°08.0	206°35.9	48.5	186°59.6	44.2	329°43.4	23.1	89°37.5	05.3	Deneb	49°25.6	45°22.6	
2	101°10.5	221°35.1	49.3	202°00.1	44.4	344°46.0	23.1	104°40.0	05.3	Enif	33°38.2	9°59.7	
3	116°12.9	236°34.3	· · 50.0	217°00.5	· · 44.5	359°48.7	· · 23.2	119°42.5	· · 05.3	Al Na'ir	27°32.1	-46°50.3	
4	131°15.4	251°33.5	50.7	232°00.9	44.7	14°51.3	23.2	134°44.9	05.3	Fomalhaut	15°13.8	-29°29.2	
5	146°17.9	266°32.7	51.4	247°01.4	44.8	29°54.0	23.2	149°47.4	05.3	Scheat	13°44.5	28°13.6	
6	161°20.3	281°32.0	S19°52.2	262°01.8	S23°45.0	44°56.6	N21°23.3	164°49.8	S04°05.3	Markab	13°29.2	15°20.8	
7	176°22.8	296°31.2	52.9	277°02.3	45.2	59°59.2	23.3	179°52.3	05.2	Nov 30 Sun		SHA	Mer.pass
8	191°25.3	311°30.4	53.6	292°02.7	45.3	75°01.9	23.4	194°54.7	05.2	Venus	123°06.7	11:12	
9	206°27.7	326°29.6	· · 54.3	307°03.2	· · 45.5	90°04.5	· · 23.4	209°57.2	· · 05.2	Mars	102°30.4	12:33	
10	221°30.2	341°28.8	55.0	322°03.6	45.6	105°07.2	23.4	224°59.6	05.2	Jupiter	243°27.3	03:09	
11	236°32.6	356°28.0	55.7	337°04.0	45.8	120°09.8	23.5	240°02.1	05.2	Saturn	3°29.9	19:06	
12	251°35.1	11°27.2	S19°56.4	352°04.5	S23°45.9	135°12.4	N21°23.5	255°04.5	S04°05.2	Dec 01 Mon		SHA	Mer.pass
13	266°37.6	26°26.4	57.0	7°04.9	46.1	150°15.1	23.5	270°07.0	05.1	Venus	121°49.1	11:13	
14	281°40.0	41°25.6	57.9	22°05.4	46.2	165°17.7	23.6	285°09.4	05.1	Mars	101°42.1	12:32	
15	296°42.5	56°24.8	· · 58.6	37°05.8	· · 46.4	180°20.4	· · 23.6	300°11.9	· · 05.1	Jupiter	243°31.2	03:05	
16	311°45.0	71°24.0	19°59.3	52°06.2	46.5	195°23.0	23.6	315°14.3	05.1	Saturn	3°29.8	19:02	
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	Dec 02 Tue		SHA	Mer.pass
18	341°49.9	101°22.4	S20°00.7	82°07.1	S23°46.9	225°28.3	N21°23.7	345°19.2	S04°05.1	Venus	120°31.2	11:14	
19	356°52.4	116°21.6	01.4	97°07.6	47.0	240°30.9	23.8	0°21.6	05.0	Mars	100°53.6	12:32	
20	11°54.8	131°20.8	02.1	112°08.0	47.2	255°33.6	23.8	15°24.1	05.0	Jupiter	243°35.2	03:01	
21	26°57.3	146°20.0	· · 02.8	127°08.4	· · 47.3	270°36.2	· · 23.8	30°26.5	· · 05.0	Saturn	3°29.6	18:59	
22	41°59.8	161°19.2	03.5	142°08.9	47.5	285°38.9	23.9	45°29.0	05.0	Horizontal parallax			
23	57°02.2	176°18.4	04.2	157°09.3	47.6	300°41.5	23.9	60°31.4	05.0	Venus:		0.1	
Mer.pass.:19:12		v-0.8 d-0.7 m-3.8		v0.4 d-0.2 m1.4		v2.6 d0.0 m-2.4		v2.5 d0.0 m1.1		Mars:		0.1	

December 03, 04, 05 (Wed., Thu., Fri.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	72°04.7	191°17.6	S20°04.9	172°09.8	S23°47.8	315°44.2	N21°23.9	75°33.9	S04°05.0	Alpheratz	357°33.9	29°14.3	
1	87°07.1	206°16.8	05.6	187°10.2	47.9	330°46.8	24.0	90°36.3	04.9	Ankaa	353°06.2	-42°10.1	
2	102°09.6	221°16.0	06.3	202°10.6	48.1	345°49.5	24.0	105°38.8	04.9	Schedar	349°30.0	56°41.1	
3	117°12.1	236°15.2	· · 07.0	217°11.1	· · 48.2	0°52.1	· · 24.1	120°41.2	· · 04.9	Diphda	348°46.3	-17°50.7	
4	132°14.5	251°14.4	07.7	232°11.5	48.4	15°54.7	24.1	135°43.7	04.9	Achernar	335°19.2	-57°06.5	
5	147°17.0	266°13.6	08.4	247°12.0	48.5	30°57.4	24.1	150°46.1	04.9	Hamal	327°50.1	23°35.3	
6	162°19.5	281°12.8	S20°09.1	262°12.4	S23°48.7	46°00.0	N21°24.2	165°48.6	S04°04.9	Polaris	313°12.4	89°22.5	
7	177°21.9	296°12.0	09.8	277°12.8	48.8	61°02.7	24.2	180°51.0	04.8	Akamar	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°33.8	
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	11°08.0	S20°13.3	352°15.0	S23°49.5	136°15.9	N21°24.4	256°03.2	S04°04.8	Capella	280°20.3	46°01.5	
13	267°36.7	26°07.2	14.0	7°15.5	49.7	151°18.6	24.4	271°05.7	04.7	Bellatrix	278°21.7	6°22.4	
14	282°39.2	41°06.4	14.7	22°15.9	49.8	166°21.2	24.5	286°08.1	04.7	Elnath	278°00.6	28°37.8	
15	297°41.6	56°05.6	· · 15.3	37°16.3	· · 50.0	181°23.9	· · 24.5	301°10.6	· · 04.7	Alnilam	275°36.7	-1°11.1	
16	312°44.1	71°04.8	16.0	52°16.8	50.1	196°26.5	24.5	316°13.0	04.7	Betelgeuse	270°51.0	7°24.7	
17	327°46.6	86°04.0	16.7	67°17.2	50.2	211°29.2	24.6	331°15.5	04.7	Canopus	263°51.6	-52°42.4	
18	342°49.0	101°03.2	S20°17.4	82°17.7	S23°50.4	226°31.8	N21°24.6	346°17.9	S04°04.6	Sirius	258°25.2	-16°44.8	
19	357°51.5	116°02.4	18.1	97°18.1	50.5	241°34.5	24.7	1°20.4	04.6	Adara	255°05.0	-29°00.3	
20	12°54.0	131°01.5	18.8	112°18.5	50.7	256°37.1	24.7	16°22.8	04.6	Procyon	244°49.7	5°09.7	
21	27°56.4	146°00.7	· · 19.4	127°19.0	· · 50.8	271°39.8	· · 24.7	31°25.3	· · 04.6	Pollux	243°16.0	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°14.1	-50°35.3	
23	58°01.4	175°59.1	20.8	157°19.8	51.1	301°45.1	24.8	61°30.1	04.5	Suhail	222°45.6	-43°32.0	
Mer.pass.:19:08		v-0.8 d-0.7 m-3.8		v0.4 d-0.1 m1.4		v2.6 d0.0 m-2.4		v2.4 d0.0 m1.1		Miaplacidus		221°37.7	-69°49.1
Thu		GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec			
0	73°03.8	190°58.3	S20°21.5	172°20.3	S23°51.2	316°47.8	N21°24.8	76°32.6	S04°04.5	Alphard	217°46.9	-8°46.2	
1	88°06.3	205°57.5	22.2	187°20.7	51.4	331°50.4	24.9	91°35.0	04.5	Regulus	207°33.6	11°50.4	
2	103°08.7	220°56.7	22.8	202°21.1	51.5	346°53.1	24.9	106°37.5	04.5	Dubhe	193°40.1	61°36.4	
3	118°11.2	235°55.9	· · 23.5	217°21.6	· · 51.6	1°55.7	· · 25.0	121°39.9	· · 04.5	Denebola	182°24.2	14°25.6	
4	133°13.7	250°55.1	24.2	232°22.0	51.8	16°58.4	25.0	136°42.4	04.5	Gienah	175°42.9	-17°41.0	
5	148°16.1	265°54.2	24.9	247°22.5	51.9	32°01.0	25.0	151°44.8	04.4	Acrux	172°59.6	-63°14.3	
6	163°18.6	280°53.4	S20°25.5	262°22.9	S23°52.1	47°03.7	N21°25.1	166°47.2	S04°04.4	Gacrux	171°51.1	-57°15.2	
7	178°21.1	295°52.6	26.2	277°23.3	52.2	62°06.3	25.1	181°49.7	04.4	Alioth	166°12.7	55°48.9	
8	193°23.5	310°51.8	26.9	292°23.8	52.3	77°09.0	25.1	196°52.1	04.4	Spica	158°21.7	-11°17.7	
9	208°26.0	325°51.0	· · 27.5	307°24.2	· · 52.5	92°11.6	· · 25.2	211°54.6	· · 04.4	Alkaid	152°51.8	49°10.8	
10	223°28.5	340°50.2	28.2	322°24.6	52.6	107°14.3	25.2	226°57.0	04.3	Hadar	148°35.5	-60°29.7	
11	238°30.9	355°49.3	28.9	337°25.1	52.7	122°17.0	25.3	241°59.5	04.3	Menkent	147°57.1	-36°29.7	
12	253°33.4	10°48.5	S20°29.5	352°25.5	S23°52.9	137°19.6	N21°25.3	257°01.9	S04°04.3	Arcturus	145°47.4	19°03.1	
13	268°35.9	25°47.7	30.2	7°25.9	53.0	152°22.3	25.3	272°04.3	04.3	Rigil Kent.	139°39.9	-60°56.4	
14	283°38.3	40°46.9	30.9	22°26.4	53.1	167°24.9	25.4	287°06.8	04.3	Kochab	137°20.8	74°02.7	
15	298°40.8	55°46.1	· · 31.5	37°26.8	· · 53.3	182°27.6	· · 25.4	302°09.2	· · 04.2	Zuben'ubi	136°55.5	-16°08.9	
16	313°43.2	70°45.3	32.2	52°27.2	53.4	197°30.3	25.5	317°11.7	04.2	Alphecca	126°03.5	26°37.6	
17	328°45.7	85°44.4	32.8	67°27.7	53.5	212°32.9	25.5	332°14.1	04.2	Antares	112°15.3	-26°29.3	
18	343°48.2	100°43.6	S20°33.5	82°28.1	S23°53.7	227°35.6	N21°25.5	347°16.5	S04°04.2	Atria	107°09.4	-69°04.4	
19	358°50.6	115°42.8	34.2	97°28.5	53.8	242°38.2	25.6	2°19.0	04.2	Sabik	102°02.3	-15°45.4	
20	13°53.1	130°42.0	34.8	112°29.0	53.9	257°40.9	25.6	17°21.4	04.1	Shaula	96°09.8	-37°07.3	
21	28°55.6	145°41.1	· · 35.5	127°29.4	· · 54.1	272°43.6	· · 25.7	32°23.9	· · 04.1	Rasalhague	95°58.2	12°32.5	
22	43°58.0	160°40.3	36.1	142°29.8	54.2	287°46.2	25.7	47°26.3	04.1	Eltanin	90°42.4	51°29.2	
23	59°00.5	175°39.5	36.8	157°30.2	54.3	302°48.9	25.7	62°28.7	04.1	Kaus Aust.	83°31.9	-34°22.3	
Mer.pass.:19:04		v-0.8 d-0.7 m-3.8		v0.4 d-0.1 m1.4		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Vega		80°33.2	38°48.5
Fri		GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec			
0	74°03.0	190°38.7	S20°37.4	172°30.7	S23°54.5	317°51.5	N21°25.8	77°31.2	S04°04.1	Nunki	75°47.2	-26°15.9	
1	89°05.4	205°37.9	38.1	187°31.1	54.6	332°54.2	25.8	92°33.6	04.0	Altair	61°59.6	8°56.2	
2	104°07.9	220°37.0	38.7	202°31.5	54.7	347°56.9	25.8	107°36.1	04.0	Peacock	53°04.9	-56°39.3	
3	119°10.4	235°36.2	· · 39.4	217°32.0	· · 54.8	2°59.5	· · 25.9	122°38.5	· · 04.0	Deneb	49°25.6	45°22.6	
4	134°12.8	250°35.4	40.0	232°32.4	55.0	18°02.2	25.9	137°40.9	04.0	Enif	33°38.2	9°59.7	
5	149°15.3	265°34.6	40.7	247°32.8	55.1	33°04.8	26.0	152°43.4	04.0	Al Na'ir	27°32.1	-46°50.3	
6	164°17.7	280°33.7	S20°41.3	262°33.3	S23°55.2	48°07.5	N21°26.0	167°45.8	S04°03.9	Fomalhaut	15°13.8	-29°29.2	
7	179°20.2	295°32.9	42.0	277°33.7	55.3	63°10.2	26.0	182°48.3	03.9	Scheat	13°44.5	28°13.6	
8	194°22.7	310°32.1	42.6	292°34.1	55.5	78°12.8	26.1	197°50.7	03.9	Markab	13°29.2	15°20.8	
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 03 Wed		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	Venus	119°13.0	11:15	
11	239°30.1	355°29.6	44.6	337°35.4	55.9	123°20.8	26.2	242°58.0	03.8	Mars	100°05.1	12:31	
12	254°32.5	10°28.8	S20°45.2	352°35.8	S23°56.0	138°23.5	N21°26.2	258°00.4	S04°03.8	Jupiter	243°39.5	02:57	
13	269°35.0	25°27.9	45.8	7°36.3	56.1	153°26.7	26.3	273°02.9	03.8	Saturn	3°29.2	18:55	
14	284°37.5	40°27.1	46.5	22°36.7	56.2	168°28.8	26.3	288°05.3	03.8	Dec 04 Thu		SHA	Mer.pass
15	299°39.9	55°26.3	· · 47.1	37°37.1	· · 56.3	183°31.5	· · 26.4	303°07.8	· · 03.7	Venus	117°54.5	11:17	
16	314°42.4	70°25.4	47.8	52°37.6	56.5	198°34.2	26.4	318°10.2	03.7	Mars	99°16.5	12:30	
17	329°44.9	85°24.6	48.4	67°38.0	56.6	213°36.8	26.4	333°12.6	03.7	Jupiter	243°43.9	02:52	
18	344°47.3	100°23.8	S20°49.0	82°38.4	S23°56.7	228°39.5	N21°26.5	348°15.1	S04°03.7	Saturn	3°28.8	18:51	
19	359°49.8	115°23.0	49.7	97°38.9	56.8	243°42.2	26.5	3°17.5	03.7	Dec 05 Fri		SHA	Mer.pass
20	14°52.2	130°22.1	50.3	112°39.3	57.0	258°44.8	26.6	18°19.9	03.6	Venus	116°35.7	11:18	
21	29°54.7	145°21.3	· · 50.9	127°39.7	· · 57.1	273°47.5	· · 26.6	33°22.4	· · 03.6	Mars	98°27.7	12:30	
22	44°57.2	160°20.5	51.6	142°40.1	57.2	288°50.2	26.6	48°24.8	03.6	Jupiter	243°48.6	02:48	
23	59°59.6	175°19.6	52.2	157°40.6	57.3	303°52.8	26.7	63°27.2	03.6	Saturn	3°28.2	18:47	
Mer.pass.:19:00		v-0.8 d-0.7 m-3.8		v0.4 d-0.1 m1.4		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Horizontal parallax			
											Venus:	0.1	
											Mars:	0.1	

Sun		Moon					
h	Wed	Dec	GHA	ν	Dec	d	HP
0	182°34.6	S22°06.0	32°55.7	5.9'	N19°48.9	13.3'	61.1'
1	197°34.4	06.4	47°20.5	5.8'	20°02.2	13.2'	61.1'
2	212°34.2	06.8	61°45.3	5.7'	20°15.3	13.0'	61.1'
3	227°33.9	· · 07.1	76°09.9	5.5'	20°28.2	12.9'	61.1'
4	242°33.7	07.5	90°34.3	5.4'	20°41.1	12.8'	61.1'
5	257°33.4	07.8	104°58.6	5.3'	20°53.8	12.6'	61.2'
6	272°33.2	S22°08.2	119°22.8	5.1'	N21°06.3	12.5'	61.2'
7	287°32.9	08.5	133°46.9	5.0'	21°18.8	12.4'	61.2'
8	302°32.7	08.8	148°10.8	4.9'	21°31.1	12.2'	61.2'
9	317°32.4	· · 09.2	162°34.7	4.7'	21°43.2	12.1'	61.2'
10	332°32.2	09.5	176°58.3	4.6'	21°55.2	11.9'	61.2'
11	347°31.9	09.9	191°21.9	4.5'	22°07.1	11.8'	61.3'
12	2°31.7	S22°10.2	205°45.3	4.4'	N22°18.8	11.6'	61.3'
13	17°31.4	10.6	220°08.6	4.2'	22°30.4	11.5'	61.3'
14	32°31.2	10.9	234°31.8	4.1'	22°41.8	11.3'	61.3'
15	47°31.0	· · 11.3	248°54.8	4.0'	22°53.0	11.2'	61.3'
16	62°30.7	11.6	263°17.7	3.9'	23°04.1	11.0'	61.3'
17	77°30.5	11.9	277°40.5	3.7'	23°15.1	10.9'	61.3'
18	92°30.2	S22°12.3	292°03.2	3.6'	N23°25.8	10.7'	61.3'
19	107°30.0	12.6	306°25.7	3.5'	23°36.5	10.5'	61.3'
20	122°29.7	13.0	320°48.1	3.4'	23°46.9	10.4'	61.4'
21	137°29.5	· · 13.3	335°10.4	3.2'	23°57.2	10.2'	61.4'
22	152°29.2	13.6	349°32.6	3.1'	24°07.3	10.0'	61.4'
23	167°29.0	14.0	3°54.7	3.0'	24°17.2	9.8'	61.4'
SD.=16.2		d=-0.4	S.D.=16.7				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	182°28.7	S22°14.3	18°16.6	2.9'	N24°26.9	9.7'	61.4'
1	197°28.5	14.6	32°38.5	2.8'	24°36.5	9.5'	61.4'
2	212°28.2	15.0	47°00.2	2.7'	24°45.9	9.3'	61.4'
3	227°28.0	· · 15.3	61°21.8	2.6'	24°55.1	9.1'	61.4'
4	242°27.7	15.6	75°43.3	2.5'	25°04.1	8.9'	61.4'
5	257°27.5	16.0	90°04.7	2.3'	25°13.0	8.7'	61.4'
6	272°27.2	S22°16.3	104°26.0	2.2'	N25°21.6	8.6'	61.4'
7	287°27.0	16.6	118°47.2	2.1'	25°30.1	8.4'	61.4'
8	302°26.7	17.0	133°08.3	2.0'	25°38.3	8.2'	61.4'
9	317°26.4	· · 17.3	147°29.3	1.9'	25°46.4	8.0'	61.4'
10	332°26.2	17.6	161°50.2	1.9'	25°54.3	7.8'	61.4'
11	347°25.9	17.9	176°11.0	1.8'	26°01.9	7.6'	61.4'
12	2°25.7	S22°18.3	190°31.7	1.7'	N26°09.4	7.4'	61.4'
13	17°25.4	18.6	204°52.3	1.6'	26°16.7	7.2'	61.4'
14	32°25.2	18.9	219°12.9	1.5'	26°23.8	7.0'	61.4'
15	47°24.9	· · 19.2	233°33.3	1.4'	26°30.6	6.8'	61.4'
16	62°24.7	19.6	247°53.7	1.3'	26°37.3	6.6'	61.4'
17	77°24.4	19.9	262°14.0	1.3'	26°43.7	6.3'	61.4'
18	92°24.2	S22°20.2	276°34.3	1.2'	N26°50.0	6.1'	61.4'
19	107°23.9	20.5	290°54.4	1.1'	26°56.0	5.9'	61.4'
20	122°23.7	20.9	305°14.5	1.1'	27°01.8	5.7'	61.4'
21	137°23.4	· · 21.2	319°34.5	1.0'	27°07.4	5.5'	61.4'
22	152°23.1	21.5	333°54.5	0.9'	27°12.8	5.3'	61.4'
23	167°22.9	21.8	348°14.4	0.9'	27°18.0	5.1'	61.4'
SD.=16.2		d=-0.3	S.D.=16.7				
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	182°22.6	S22°22.1	2°34.2	0.8'	N27°23.0	4.9'	61.4'
1	197°22.4	22.4	16°54.0	0.8'	27°27.7	4.6'	61.4'
2	212°22.1	22.8	31°13.8	0.7'	27°32.2	4.4'	61.4'
3	227°21.9	· · 23.1	45°33.5	0.7'	27°36.5	4.2'	61.4'
4	242°21.6	23.4	59°53.2	0.6'	27°40.6	4.0'	61.3'
5	257°21.3	23.7	74°12.8	0.6'	27°44.5	3.8'	61.3'
6	272°21.1	S22°24.0	88°32.4	0.6'	N27°48.1	3.5'	61.3'
7	287°20.8	24.3	102°51.9	0.5'	27°51.5	3.3'	61.3'
8	302°20.6	24.6	117°11.5	0.5'	27°54.7	3.1'	61.3'
9	317°20.3	· · 25.0	131°31.0	0.5'	27°57.7	2.9'	61.3'
10	332°20.1	25.3	145°50.5	0.5'	28°00.5	2.6'	61.3'
11	347°19.8	25.6	160°09.9	0.5'	28°03.0	2.4'	61.3'
12	2°19.5	S22°25.9	174°29.4	0.5'	N28°05.3	2.2'	61.2'
13	17°19.3	26.2	188°48.9	0.5'	28°07.3	2.0'	61.2'
14	32°19.0	26.5	203°08.3	0.5'	28°09.2	1.7'	61.2'
15	47°18.8	· · 26.8	217°27.8	0.5'	28°10.8	1.5'	61.2'
16	62°18.5	27.1	231°47.2	0.5'	28°12.2	1.3'	61.2'
17	77°18.2	27.4	246°06.7	0.5'	28°13.4	1.1'	61.2'
18	92°18.0	S22°27.7	260°26.2	0.5'	N28°14.3	0.8'	61.1'
19	107°17.7	28.0	274°45.7	0.5'	28°15.1	0.6'	61.1'
20	122°17.5	28.3	289°05.2	0.5'	28°15.6	0.4'	61.1'
21	137°17.2	· · 28.6	303°24.7	0.5'	28°15.8	0.2'	61.1'
22	152°16.9	28.9	317°44.3	0.6'	28°15.9	-0.1'	61.1'
23	167°16.7	29.2	332°03.9	0.6'	28°15.7	-0.3'	61.0'
SD.=16.2		d=-0.3	S.D.=16.7				

Lat.	Twilight		Sunrise	Sunset	Twilight	
	Naut.	Civil			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
S 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	03:25	20:16	21:08	22:37
56°	□	02:14	03:12	20:29	21:28	□
58°	□	01:49	02:57	20:44	21:53	□
S 60°	□	01:14	02:39	21:03	22:30	□

Lat.	Moonrise			Moonset		
	Wed	Thu	Fri	Wed	Thu	Fri
N 72°	□	□	□	□	□	□
N 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
S 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
S 60°	19:58	22:00	23:32	01:12	01:17	01:33

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time	12 ^h		Upper Mer. Pass.	Lower Mer. Pass.	
3	10:19	10:07	11:50	22:44	10:13	
4	09:55	09:43	11:50	23:49	11:16	
5	09:31	09:18	11:51	--	12:23	

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

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	75°02.1	190°18.8	S20°52.8	172°41.0	S23°57.4	318°55.5	N21°26.7	78°29.7	S04°03.5	Alpheratz	357°33.9	29°14.3	
1	90°04.6	205°17.9	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°07.0	220°17.1	54.1	202°41.8	57.7	349°00.8	26.8	108°34.6	03.5	Schedar	349°30.0	56°41.1	
3	120°09.5	235°16.3	· · 54.7	217°42.3	· · 57.8	4°03.5	· · 26.8	123°37.0	· · 03.5	Diphda	348°46.3	-17°50.7	
4	135°12.0	250°15.4	55.3	232°42.7	57.9	19°06.2	26.9	138°39.4	03.5	Achernar	335°19.3	-57°06.5	
5	150°14.4	265°14.6	55.9	247°43.1	58.0	34°08.8	26.9	153°41.9	03.4	Hamal	327°50.1	23°35.3	
6	165°16.9	280°13.8	S20°56.6	262°43.6	S23°58.1	49°11.5	N21°27.0	168°44.3	S04°03.4	Polaris	313°12.5	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	Akamars	315°10.8	-40°12.1	
8	195°21.8	310°12.1	57.8	292°44.4	58.4	79°16.9	27.1	198°49.2	03.4	Menkar	314°05.1	4°11.6	
9	210°24.3	325°11.3	· · 58.4	307°44.8	· · 58.5	94°19.5	· · 27.1	213°51.6	· · 03.3	Mirfak	308°26.7	49°57.3	
10	225°26.7	340°10.4	59.0	322°45.3	58.6	109°22.2	27.1	228°54.0	03.3	Aldebaran	290°38.4	16°33.8	
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	Rigel	281°02.8	-8°10.2	
12	255°31.7	10°08.7	S21°00.3	352°46.1	S23°58.8	139°27.5	N21°27.2	258°58.9	S04°03.3	Capella	280°20.3	46°01.5	
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	275°36.6	-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	Betelgeuse	270°50.9	7°24.7	
17	330°44.0	85°04.5	03.3	67°48.2	59.4	214°40.9	27.4	334°11.1	03.2	Canopus	263°51.5	-52°42.4	
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	Sirius	258°25.2	-16°44.8	
19	0°48.9	115°02.8	04.6	97°49.1	59.6	244°46.3	27.5	4°15.9	03.1	Adara	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°49.7	5°09.7	
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°16.0	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	Avior	234°14.0	-50°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	Suhail	222°45.5	-43°32.0	
Mer.pass.:18:56		v-0.8 d-0.6 m-3.8		v0.4 d-0.1 m1.4		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Miaplacidus		221°37.7	-69°49.1
Mer.pass.:18:52		v-0.8 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Alphard		217°46.9	-8°46.2
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Regulus		207°33.5	11°50.4
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Dubhe		193°40.1	61°36.4
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Denebola		182°24.2	14°25.6
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Gienah		175°42.9	-17°41.1
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Acrux		172°59.5	-63°14.3
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Gacrux		171°51.1	-57°15.2
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Alioth		166°12.6	55°48.9
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Spica		158°21.7	-11°17.7
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Alkaid		152°51.7	49°10.8
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Hadar		148°35.4	-60°29.7
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Menkent		147°57.0	-36°29.7
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Arcturus		145°47.3	19°03.0
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Rigel Kent.		139°39.8	-60°56.4
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Kochab		137°20.8	74°02.7
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Zuben'ubi		136°55.5	-16°08.9
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Alphecca		126°03.5	26°37.6
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Antares		112°15.3	-26°29.3
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Atria		107°09.4	-69°04.4
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Sabik		102°02.3	-15°45.4
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Shaula		96°09.8	-37°07.3
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Rasalhague		95°58.2	12°32.5
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Eltanin		90°42.4	51°29.1
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Kaus Aust.		83°31.9	-34°22.3
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Vega		80°33.2	38°48.5
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Nunki		75°47.2	-26°15.9
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Altair		61°59.6	8°56.2
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Peacock		53°04.9	-56°39.3
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Deneb		49°25.6	45°22.6
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Enif		33°38.2	9°59.7
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Al Na'ir		27°32.1	-46°50.3
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Fomalhaut		15°13.8	-29°29.2
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Scheat		13°44.5	28°13.6
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Markab		13°29.2	15°20.8
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Dec 06 Sat		SHA	Mer.pass
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Venus		115°16.7	11:19
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Mars		97°38.9	12:29
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Jupiter		243°53.4	02:44
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Saturn		3°27.6	18:43
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Dec 07 Sun		SHA	Mer.pass
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Venus		113°57.4	11:21
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Mars		96°50.0	12:28
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Jupiter		243°58.4	02:40
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Saturn		3°26.8	18:39
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Dec 08 Mon		SHA	Mer.pass
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Venus		112°37.8	11:22
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Mars		96°00.9	12:28
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Jupiter		244°03.6	02:35
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Saturn		3°26.0	18:35
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Horizontal parallax			
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Venus:		0.1	
Mer.pass.:18:48		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Mars:		0.1	

December 09, 10, 11 (Tue., Wed., Thu.)

Aries		Venus		Mars		Jupiter		Saturn		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°01.7	Alpheratz	357°33.9	29°14.3	
1	93°02.0	204°16.6	35.9	188°11.8	04.9	337°11.2	29.8	96°27.0	01.7	Ankaa	353°06.2	-42°10.1	
2	108°04.5	219°15.8	36.4	203°12.2	05.0	352°13.9	29.9	111°29.4	01.7	Schedar	349°30.0	56°41.1	
3	123°06.9	234°14.9	· · 36.9	218°12.6	· · 05.1	7°16.6	· · 29.9	126°31.9	· · 01.7	Diphda	348°46.3	-17°50.7	
4	138°09.4	249°14.0	37.5	233°13.0	05.2	22°19.3	29.9	141°34.3	01.6	Achernar	335°19.3	-57°06.5	
5	153°11.8	264°13.1	38.0	248°13.5	05.3	37°21.9	30.0	156°36.7	01.6	Hamal	327°50.1	23°35.3	
6	168°14.3	279°12.3	S21°38.6	263°13.9	S24°05.4	52°24.6	N21°30.0	171°39.1	S04°01.6	Polaris	313°13.0	89°22.6	
7	183°16.8	294°11.4	39.1	278°14.3	05.4	67°27.3	30.1	186°41.5	01.6	Akamars	315°10.8	-40°12.1	
8	198°19.2	309°10.5	39.7	293°14.7	05.5	82°30.0	30.1	201°44.0	01.5	Menkar	314°05.1	4°11.6	
9	213°21.7	324°09.7	· · 40.2	308°15.1	· · 05.6	97°32.7	· · 30.2	216°46.4	· · 01.5	Mirfak	308°26.7	49°57.3	
10	228°24.2	339°08.8	40.8	323°15.5	05.7	112°35.4	30.2	231°48.8	01.5	Aldebaran	290°38.4	16°33.8	
11	243°26.6	354°07.9	41.3	338°16.0	05.8	127°38.1	30.3	246°51.2	01.4	Rigel	281°02.8	-8°10.3	
12	258°29.1	9°07.0	S21°41.8	353°16.4	S24°05.9	142°40.8	N21°30.3	261°53.7	S04°01.4	Capella	280°20.3	46°01.5	
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°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°25.1	-16°44.8	
19	3°46.3	114°00.9	45.6	98°19.3	06.4	247°59.7	30.6	7°10.6	01.2	Adara	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°49.7	5°09.7	
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°16.0	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	-57°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.pass.:18:44		v-0.9 d-0.6 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Miaplacidus		221°37.7	-69°49.1
Wed		GHA		GHA		GHA		GHA		SHA		Dec	
0	78°58.7	188°56.5	S21°48.2	173°21.3	S24°06.8	323°13.2	N21°30.8	82°22.7	S04°01.1	Alphard	217°46.8	-8°46.2	
1	94°01.1	203°55.7	48.7	188°21.7	06.9	338°15.9	30.9	97°25.1	01.0	Regulus	207°33.5	11°50.4	
2	109°03.6	218°54.8	49.3	203°22.2	07.0	353°18.6	30.9	112°27.5	01.0	Dubhe	193°40.0	61°36.4	
3	124°06.1	233°53.9	· · 49.8	218°22.6	· · 07.0	8°21.3	· · 31.0	127°29.9	· · 01.0	Denebola	182°24.1	14°25.5	
4	139°08.5	248°53.0	50.3	233°23.0	07.1	23°24.0	31.0	142°32.4	00.9	Gienah	175°42.9	-17°41.1	
5	154°11.0	263°52.1	50.8	248°23.4	07.2	38°26.7	31.1	157°34.8	00.9	Acrux	172°59.5	-63°14.3	
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	Gacrux	171°51.0	-57°15.3	
7	184°15.9	293°50.4	51.9	278°24.2	07.3	68°32.1	31.1	187°39.6	00.9	Alioth	166°12.6	55°48.9	
8	199°18.4	308°49.5	52.4	293°24.6	07.4	83°34.8	31.2	202°42.0	00.8	Spica	158°21.7	-11°17.7	
9	214°20.8	323°48.6	· · 52.9	308°25.0	· · 07.5	98°37.5	· · 31.2	217°44.5	· · 00.8	Alkaid	152°51.7	49°10.8	
10	229°23.3	338°47.7	53.4	323°25.5	07.6	113°40.2	31.3	232°46.9	00.8	Hadar	148°35.4	-60°29.7	
11	244°25.8	353°46.9	53.9	338°25.9	07.6	128°42.9	31.3	247°49.3	00.7	Menkent	147°57.0	-36°29.7	
12	259°28.2	8°46.0	S21°54.4	353°26.3	S24°07.7	143°45.6	N21°31.4	262°51.7	S04°00.7	Arcturus	145°47.3	19°03.0	
13	274°30.7	23°45.1	54.9	8°26.7	07.8	158°48.3	31.4	277°54.1	00.7	Rigel Kent.	139°39.8	-60°56.4	
14	289°33.2	38°44.2	55.4	23°27.1	07.8	173°51.0	31.5	292°56.5	00.6	Kochab	137°20.8	74°02.7	
15	304°35.6	53°43.3	· · 56.0	38°27.5	· · 07.9	188°53.7	· · 31.5	307°59.0	· · 00.6	Zuben'ubi	136°55.5	-16°08.9	
16	319°38.1	68°42.4	56.5	53°27.9	08.0	203°56.4	31.6	323°01.4	00.6	Alphecca	126°03.5	26°37.6	
17	334°40.6	83°41.6	57.0	68°28.3	08.0	218°59.1	31.6	338°03.8	00.6	Antares	112°15.3	-26°29.3	
18	349°43.0	98°40.7	S21°57.5	83°28.7	S24°08.1	234°01.8	N21°31.6	353°06.2	S04°00.5	Atria	107°09.4	-69°04.4	
19	4°45.5	113°39.8	58.0	98°29.2	08.2	249°04.5	31.7	8°08.6	00.5	Sabik	102°02.3	-15°45.4	
20	19°47.9	128°38.9	58.5	113°29.6	08.2	264°07.2	31.7	23°11.0	00.5	Shaula	96°09.8	-37°07.3	
21	34°50.4	143°38.0	· · 59.0	128°30.0	· · 08.3	279°09.9	· · 31.8	38°13.5	· · 00.4	Rasalhague	95°58.2	12°32.5	
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	Eltanin	90°42.4	51°29.1	
23	64°55.3	173°36.2	22°00.0	158°30.8	08.4	309°15.3	31.9	68°18.3	00.4	Kaus Aust.	83°31.9	-34°22.3	
Mer.pass.:18:41		v-0.9 d-0.5 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Vega		80°33.2	38°48.5
Thu		GHA		GHA		GHA		GHA		SHA		Dec	
0	79°57.8	188°35.4	S22°00.5	173°31.2	S24°08.5	324°18.0	N21°31.9	83°20.7	S04°00.3	Nunki	75°47.2	-26°15.9	
1	95°00.3	203°34.5	01.0	188°31.6	08.6	339°20.7	32.0	98°23.1	00.3	Altair	61°59.6	8°56.2	
2	110°02.7	218°33.6	01.5	203°32.0	08.6	354°23.4	32.0	113°25.5	00.3	Peacock	53°04.9	-56°39.2	
3	125°05.2	233°32.7	· · 02.0	218°32.4	· · 08.7	9°26.1	· · 32.1	128°27.9	· · 00.2	Deneb	49°25.6	45°22.6	
4	140°07.7	248°31.8	02.5	233°32.8	08.8	24°28.8	32.1	143°30.4	00.2	Enif	33°38.2	9°59.7	
5	155°10.1	263°30.9	03.0	248°33.3	08.8	39°31.6	32.2	158°32.8	00.2	Al Na'ir	27°32.1	-46°50.3	
6	170°12.6	278°30.0	S22°03.4	263°33.7	S24°08.9	54°34.3	N21°32.2	173°35.2	S04°00.2	Fomalhaut	15°13.8	-29°29.2	
7	185°15.1	293°29.1	03.9	278°34.1	09.0	69°37.0	32.2	188°37.6	00.1	Scheat	13°44.5	28°13.6	
8	200°17.5	308°28.2	04.4	293°34.5	09.0	84°39.7	32.3	203°40.0	00.1	Markab	13°29.2	15°20.8	
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 09 Tue		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	Venus	111°18.0	11:23	
11	245°24.9	353°25.6	05.9	338°35.7	09.2	129°47.8	32.4	248°47.3	00.0	Mars	95°11.8	12:27	
12	260°27.4	8°24.7	S22°06.4	353°36.1	S24°09.3	144°50.5	N21°32.5	263°49.7	S04°00.0	Jupiter	244°09.0	02:31	
13	275°29.8	23°23.8	06.9	8°36.5	09.3	159°53.2	32.5	278°52.1	03°59.9	Saturn	3°25.1	18:31	
14	290°32.3	38°22.9	07.3	23°36.9	09.4	174°55.9	32.6	293°54.5	59.9	Dec 10 Wed		SHA	Mer.pass
15	305°34.8	53°22.0	· · 07.8	38°37.3	· · 09.4	189°58.6	· · 32.6	308°56.9	· · 59.9	Venus	109°57.9	11:25	
16	320°37.2	68°21.1	08.3	53°37.8	09.5	205°01.4	32.7	323°59.3	59.8	Mars	94°22.7	12:26	
17	335°39.7	83°20.2	08.8	68°38.2	09.6	220°04.1	32.7	339°01.7	59.8	Jupiter	244°14.5	02:27	
18	350°42.2	98°19.3	S22°09.3	83°38.6	S24°09.6	235°06.8	N21°32.8	354°04.1	S03°59.8	Saturn	3°24.0	18:28	
19	5°44.6	113°18.4	09.7	98°39.0	09.7	250°09.5	32.8	9°06.6	59.7	Dec 11 Thu		SHA	Mer.pass
20	20°47.1	128°17.5	10.2	113°39.4	09.7	265°12.2	32.9	24°09.0	59.7	Venus	108°37.6	11:26	
21	35°49.6	143°16.6	· · 10.7	128°39.8	· · 09.8	280°14.9	· · 32.9	39°11.4	· · 59.7	Mars	93°33.4	12:26	
22	50°52.0	158°15.7	11.2	143°40.2	09.8	295°17.6	32.9	54°13.8	59.6	Jupiter	244°20.2	02:22	
23	65°54.5	173°14.8	11.6	158°40.6	09.9	310°20.3	33.0	69°16.2	59.6	Saturn	3°22.9	18:24	
Mer.pass.:18:37		v-0.9 d-0.5 m-3.8		v0.4 d-0.1 m1.3		v2.7 d0.0 m-2.4		v2.4 d0.0 m1.1		Horizontal parallax		Venus: 0.1	
										Mars: 0.1			

h		Sun			Moon									
Tue	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight	
									Naut.	Civil			Civil	Naut.
0	181°57.0	S22°49.1	302°21.9	9.2'	N19°32.9	-12.3'	58.6'	N 72°	08:12	10:30	■	■	13:15	15:33
1	196°56.7	49.3	316°50.1	9.3'	19°20.6	-12.4'	58.5'	N 70°	07:54	09:38	■	■	14:08	15:52
2	211°56.4	49.6	331°18.5	9.4'	19°08.1	-12.5'	58.5'	68°	07:38	09:05	■	■	14:40	16:07
3	226°56.1	· · 49.8	345°47.0	9.6'	18°55.6	-12.6'	58.4'	66°	07:26	08:42	10:16	13:29	15:04	16:19
4	241°55.9	50.0	0°15.7	9.7'	18°43.0	-12.7'	58.4'	64°	07:15	08:23	09:38	14:07	15:23	16:30
5	256°55.6	50.3	14°44.4	9.8'	18°30.3	-12.7'	58.4'	62°	07:06	08:07	09:12	14:34	15:38	16:39
6	271°55.3	S22°50.5	29°13.3	10.0'	N18°17.5	-12.8'	58.3'	60°	06:58	07:54	08:51	14:54	15:51	16:47
7	286°55.0	50.8	43°42.4	10.1'	18°04.7	-12.9'	58.3'	N 58°	06:51	07:43	08:34	15:11	16:02	16:55
8	301°54.8	51.0	58°11.6	10.2'	17°51.7	-13.0'	58.2'	56°	06:44	07:33	08:20	15:25	16:12	17:01
9	316°54.5	· · 51.2	72°40.9	10.4'	17°38.7	-13.0'	58.2'	54°	06:39	07:24	08:08	15:38	16:21	17:07
10	331°54.2	51.5	87°10.3	10.5'	17°25.6	-13.1'	58.2'	52°	06:33	07:17	07:57	15:48	16:29	17:12
11	346°53.9	51.7	101°39.9	10.6'	17°12.5	-13.2'	58.1'	50°	06:28	07:09	07:47	15:58	16:36	17:18
12	1°53.6	S22°51.9	116°09.6	10.8'	N16°59.3	-13.3'	58.1'	45°	06:17	06:54	07:27	16:18	16:52	17:29
13	16°53.4	52.2	130°39.4	10.9'	16°46.0	-13.3'	58.0'	N 40°	06:07	06:41	07:11	16:35	17:05	17:39
14	31°53.1	52.4	145°09.3	11.0'	16°32.6	-13.4'	58.0'	35°	05:58	06:29	06:57	16:49	17:17	17:48
15	46°52.8	· · 52.6	159°39.4	11.1'	16°19.2	-13.4'	58.0'	30°	05:49	06:19	06:45	17:01	17:27	17:57
16	61°52.5	52.9	174°09.6	11.2'	16°05.7	-13.5'	57.9'	20°	05:33	06:00	06:24	17:21	17:45	18:13
17	76°52.2	53.1	188°39.9	11.4'	15°52.2	-13.6'	57.9'	N 10°	05:17	05:43	06:06	17:40	18:02	18:29
18	91°52.0	S22°53.3	203°10.3	11.5'	N15°38.6	-13.6'	57.8'	0°	05:01	05:27	05:49	17:57	18:19	18:45
19	106°51.7	53.6	217°40.8	11.6'	15°24.9	-13.7'	57.8'	S 10°	04:42	05:09	05:32	18:14	18:37	19:04
20	121°51.4	53.8	232°11.5	11.7'	15°11.2	-13.7'	57.8'	20°	04:20	04:49	05:13	18:32	18:57	19:26
21	136°51.1	· · 54.0	246°42.3	11.8'	14°57.5	-13.8'	57.7'	30°	03:51	04:25	04:52	18:54	19:21	19:55
22	151°50.8	54.2	261°13.1	11.9'	14°43.7	-13.8'	57.7'	35°	03:33	04:10	04:39	19:07	19:36	20:13
23	166°50.5	54.5	275°44.2	12.1'	14°29.8	-13.9'	57.6'	40°	03:11	03:52	04:24	19:21	19:54	20:35
	SD.=16.2	d=-0.2			S.D.=16.0			45°	02:41	03:30	04:07	19:39	20:16	21:05
								S 50°	01:58	03:01	03:45	20:01	20:45	21:49
								52°	01:32	02:47	03:35	20:12	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	□
								S 60°	□	00:58	02:33	21:13	22:50	□
Wed	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset		
									Tue	Wed	Thu	Tue	Wed	Thu
0	181°50.3	S22°54.7	290°15.3	12.2'	N14°15.9	-13.9'	57.6'	N 72°	18:37	21:21	23:32	14:36	13:30	12:51
1	196°50.0	54.9	304°46.5	12.3'	14°01.9	-14.0'	57.5'	N 70°	19:16	21:36	23:35	13:56	13:13	12:44
2	211°49.7	55.1	319°17.8	12.4'	13°47.9	-14.0'	57.5'	68°	19:43	21:48	23:38	13:27	12:59	12:38
3	226°49.4	· · 55.4	333°49.3	12.5'	13°33.8	-14.1'	57.5'	66°	20:03	21:57	23:41	13:06	12:48	12:33
4	241°49.1	55.6	348°20.8	12.6'	13°19.7	-14.1'	57.4'	64°	20:19	22:05	23:43	12:48	12:38	12:29
5	256°48.9	55.8	2°52.5	12.7'	13°05.6	-14.2'	57.4'	62°	20:32	22:12	23:45	12:34	12:30	12:25
6	271°48.6	S22°56.0	17°24.2	12.8'	N12°51.4	-14.2'	57.4'	60°	20:43	22:18	23:47	12:22	12:22	12:22
7	286°48.3	56.2	31°56.1	12.9'	12°37.2	-14.2'	57.3'	N 58°	20:53	22:23	23:48	12:11	12:16	12:19
8	301°48.0	56.5	46°28.0	13.0'	12°22.9	-14.3'	57.3'	56°	21:01	22:28	23:49	12:02	12:10	12:17
9	316°47.7	· · 56.7	61°00.1	13.1'	12°08.6	-14.3'	57.2'	54°	21:08	22:32	23:51	11:54	12:05	12:14
10	331°47.4	56.9	75°32.2	13.2'	11°54.3	-14.3'	57.2'	52°	21:15	22:35	23:52	11:46	12:01	12:12
11	346°47.1	57.1	90°04.5	13.3'	11°39.9	-14.4'	57.2'	50°	21:21	22:39	23:52	11:40	11:56	12:10
12	1°46.9	S22°57.3	104°36.8	13.4'	N11°25.5	-14.4'	57.1'	45°	21:34	22:46	23:55	11:25	11:47	12:06
13	16°46.6	57.6	119°09.3	13.5'	11°11.1	-14.4'	57.1'	N 40°	21:44	22:52	23:56	11:13	11:40	12:02
14	31°46.3	57.8	133°41.8	13.6'	10°56.6	-14.5'	57.0'	35°	21:53	22:57	23:58	11:03	11:33	11:59
15	46°46.0	· · 58.0	148°14.4	13.7'	10°42.1	-14.5'	57.0'	30°	22:01	23:02	23:59	10:54	11:27	11:56
16	61°45.7	58.2	162°47.1	13.8'	10°27.6	-14.5'	57.0'	20°	22:14	23:09	-:-	10:38	11:17	11:52
17	76°45.4	58.4	177°19.9	13.8'	10°13.1	-14.6'	56.9'	N 10°	22:26	23:16	-:-	10:24	11:08	11:47
18	91°45.2	S22°58.6	191°52.8	13.9'	N09°58.5	-14.6'	56.9'	0°	22:37	23:23	-:-	10:11	10:59	11:43
19	106°44.9	58.8	206°25.8	14.0'	09°43.9	-14.6'	56.8'	S 10°	22:48	23:29	-:-	09:58	10:51	11:39
20	121°44.6	59.0	220°58.8	14.1'	09°29.3	-14.6'	56.8'	20°	22:59	23:36	-:-	09:44	10:41	11:35
21	136°44.3	· · 59.2	235°31.9	14.2'	09°14.7	-14.6'	56.8'	30°	23:12	23:43	-:-	09:27	10:31	11:30
22	151°44.0	59.5	250°05.1	14.2'	09°00.0	-14.7'	56.7'	35°	23:20	23:48	-:-	09:18	10:24	11:27
23	166°43.7	59.7	264°38.4	14.3'	08°45.4	-14.7'	56.7'	40°	23:28	23:53	-:-	09:07	10:17	11:23
	SD.=16.2	d=-0.2			S.D.=15.7			45°	23:38	23:58	-:-	08:54	10:09	11:19
								S 50°	23:50	-:-	00:05	08:38	09:59	11:15
								52°	23:56	-:-	00:08	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°	00:10	00:16	00:20	08:02	09:37	11:04
								S 60°	00:24	00:25	00:24	07:49	09:29	11:01
Thu	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun		Mer.	Moon		Age
									Eqn.of Time	12h	Pass	Upper	Lower	19-21
									00h	mm:ss	hh:mm	hh:mm	hh:mm	74-54%
0	181°43.4	S22°59.9	279°11.8	14.4'	N08°30.7	-14.7'	56.7'	9	07:48	07:35	11:52	03:59	16:24	
1	196°43.2	23°00.1	293°45.2	14.5'	08°16.0	-14.7'	56.6'	10	07:21	07:08	11:53	04:48	17:11	
2	211°42.9	00.3	308°18.7	14.6'	08°01.2	-14.7'	56.6'	11	06:54	06:40	11:53	05:33	17:54	
3	226°42.6	· · 00.5	322°52.3	14.6'	07°46.5	-14.7'	56.6'							
4	241°42.3	00.7	337°26.0	14.7'	07°31.8	-14.8'	56.5'							
5	256°42.0	00.9	351°59.7	14.8'	07°17.0	-14.8'	56.5'							
6	271°41.7	S23°01.1	6°33.5	14.8'	N07°02.2	-14.8'	56.4'							
7	286°41.4	01.3	21°07.4	14.9'	06°47.4	-14.8'	56.4'							
8	301°41.1	01.5	35°41.3	15.0'	06°32.7	-14.8'	56.4'							
9	316°40.9	· · 01.7	50°15.3	15.0'	06°17.9	-14.8'	56.3'							
10	331°40.6	01.9	64°49.4	15.1'	06°03.1	-14.8'	56.3'							
11	346°40.3	02.1	79°23.5	15.1'	05°48.2	-14.8'	56.3'							
12	1°40.0	S23°02.3	93°57.7	15.2'	N05°33.4	-14.8'	56.2'							
13	16°39.7	02.5	108°31.9	15.3'	05°18.6	-14.8'	56.2'							
14	31°39.4	02.7	123°06.2	15.3'	05°03.8	-14.8'	56.2'							
15	46°39.1	· · 02.9	137°40.5	15.4'	04°48.9	-14.8'	56.1'							
16	61°38.8	03.1	152°14.9	15.4'	04°34.1	-14.8'	56.1'							
17	76°38.5	03.3	166°49.4	15.5'	04°19.3	-14.8'	56.1'							
18	91°38.3	S23°03.4	181°23.9	15.5'	N04°04.5	-14.8'	56.0'							
19	106°38.0	03.6	195°58.5	15.6'	03°49.6	-14.8'	56.0'							
20	121°37.7	03.8	210°33.1	15.6'	03°34.8	-14.8'	56.0'							
21	136°37.4	· · 04.0	225°07.7	15.7'	03°20.0	-14.8'	55.9'							
22	151°37.1	04.2	239°42.4	15.7'	03°05.2	-14.8'	55.9'							
23	166°36.8	04.4	254°17.2	15.8'	02°50.3	-14.8'	55.9'							
	SD.=16.2	d=-0.2			S.D.=15.5									

h		Sun		Moon										
Fri	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Twilight		Sunrise	Sunset	Twilight	
								Naut.	Civil				Civil	Naut.
0	181°36.5	S23°04.6	268°51.9	15.8'	N02°35.5	-14.8'	55.8'	N 72°	08:18	10:41	■	■	13:07	15:31
1	196°36.2	04.8	283°26.8	15.8'	02°20.7	-14.8'	55.8'	N 70°	07:58	09:44	■	■	14:04	15:50
2	211°35.9	05.0	298°01.6	15.9'	02°05.9	-14.8'	55.8'	68°	07:43	09:11	■	■	14:38	16:06
3	226°35.6	· · 05.1	312°36.5	15.9'	01°51.2	-14.8'	55.8'	66°	07:30	08:46	10:23	13:25	15:02	16:18
4	241°35.3	05.3	327°11.5	16.0'	01°36.4	-14.8'	55.7'	64°	07:19	08:27	09:43	14:05	15:21	16:29
5	256°35.1	05.5	341°46.5	16.0'	01°21.6	-14.8'	55.7'	62°	07:10	08:11	09:16	14:32	15:37	16:39
6	271°34.8	S23°05.7	356°21.5	16.0'	N01°06.8	-14.8'	55.7'	60°	07:01	07:58	08:55	14:53	15:50	16:47
7	286°34.5	05.9	10°56.5	16.1'	00°52.1	-14.7'	55.6'	N 58°	06:54	07:46	08:38	15:10	16:02	16:54
8	301°34.2	06.1	25°31.6	16.1'	00°37.4	-14.7'	55.6'	56°	06:47	07:36	08:23	15:25	16:12	17:01
9	316°33.9	· · 06.2	40°06.7	16.1'	00°22.6	-14.7'	55.6'	54°	06:41	07:27	08:11	15:37	16:21	17:07
10	331°33.6	06.4	54°41.9	16.2'	N00°07.9	-14.7'	55.5'	52°	06:36	07:19	08:00	15:48	16:29	17:13
11	346°33.3	06.6	69°17.0	16.2'	S00°06.8	-14.7'	55.5'	50°	06:31	07:12	07:50	15:58	16:36	17:18
12	1°33.0	S23°06.8	83°52.2	16.2'	S00°21.4	-14.7'	55.5'	45°	06:19	06:56	07:30	16:19	16:52	17:29
13	16°32.7	06.9	98°27.5	16.2'	00°36.1	-14.7'	55.5'	N 40°	06:09	06:43	07:13	16:35	17:06	17:40
14	31°32.4	07.1	113°02.7	16.3'	00°50.7	-14.6'	55.4'	35°	06:00	06:31	06:59	16:49	17:17	17:49
15	46°32.1	· · 07.3	127°38.0	16.3'	01°05.4	-14.6'	55.4'	30°	05:51	06:21	06:47	17:01	17:28	17:58
16	61°31.8	07.5	142°13.3	16.3'	01°20.0	-14.6'	55.4'	20°	05:35	06:02	06:26	17:22	17:46	18:14
17	76°31.5	07.6	156°48.6	16.3'	01°34.6	-14.6'	55.3'	N 10°	05:19	05:45	06:08	17:41	18:04	18:30
18	91°31.3	S23°07.8	171°23.9	16.3'	S01°49.1	-14.6'	55.3'	0°	05:02	05:28	05:51	17:58	18:21	18:47
19	106°31.0	08.0	185°59.3	16.4'	02°03.7	-14.5'	55.3'	S 10°	04:43	05:10	05:33	18:15	18:38	19:05
20	121°30.7	08.2	200°34.6	16.4'	02°18.2	-14.5'	55.3'	20°	04:21	04:50	05:14	18:34	18:59	19:28
21	136°30.4	· · 08.3	215°10.0	16.4'	02°32.7	-14.5'	55.2'	30°	03:52	04:25	04:53	18:56	19:23	19:57
22	151°30.1	08.5	229°45.4	16.4'	02°47.2	-14.5'	55.2'	35°	03:34	04:10	04:40	19:09	19:39	20:15
23	166°29.8	08.7	244°20.8	16.4'	03°01.7	-14.4'	55.2'	40°	03:11	03:52	04:25	19:24	19:57	20:38
	SD.=16.2	d=-0.2			S.D.=15.2			45°	02:41	03:30	04:07	19:42	20:19	21:08
								S 50°	01:56	03:01	03:45	20:04	20:48	21:53
								52°	01:30	02:46	03:34	20:15	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	□
								S 60°	□	00:52	02:32	21:17	22:58	□
Sat	GHA	Dec	GHA	ν	Dec	d	HP	Lat.	Moonrise			Moonset		
									Fri	Sat	Sun	Fri	Sat	Sun
0	181°29.5	S23°08.8	258°56.2	16.4'	S03°16.1	-14.4'	55.2'	N 72°	--	01:33	03:38	12:18	11:46	11:07
1	196°29.2	09.0	273°31.7	16.4'	03°30.5	-14.4'	55.1'	N 70°	--	01:28	03:22	12:19	11:54	11:26
2	211°28.9	09.2	288°07.1	16.4'	03°44.9	-14.4'	55.1'	68°	--	01:23	03:09	12:20	12:01	11:41
3	226°28.6	· · 09.3	302°42.6	16.5'	03°59.3	-14.3'	55.1'	66°	--	01:20	02:58	12:20	12:07	11:53
4	241°28.3	09.5	317°18.0	16.5'	04°13.6	-14.3'	55.1'	64°	--	01:17	02:50	12:21	12:12	12:03
5	256°28.0	09.7	331°53.5	16.5'	04°27.9	-14.3'	55.0'	62°	--	01:14	02:42	12:21	12:16	12:12
6	271°27.7	S23°09.8	346°28.9	16.5'	S04°42.2	-14.3'	55.0'	60°	--	01:12	02:36	12:21	12:20	12:20
7	286°27.4	10.0	1°04.4	16.5'	04°56.4	-14.2'	55.0'	N 58°	--	01:10	02:30	12:21	12:24	12:26
8	301°27.1	10.2	15°39.9	16.5'	05°10.6	-14.2'	55.0'	56°	--	01:08	02:25	12:22	12:27	12:32
9	316°26.8	· · 10.3	30°15.3	16.5'	05°24.8	-14.2'	55.0'	54°	--	01:06	02:21	12:22	12:29	12:38
10	331°26.5	10.5	44°50.8	16.5'	05°39.0	-14.1'	54.9'	52°	--	01:05	02:17	12:22	12:32	12:42
11	346°26.2	10.6	59°26.3	16.5'	05°53.1	-14.1'	54.9'	50°	--	01:03	02:13	12:22	12:34	12:47
12	1°25.9	S23°10.8	74°01.7	16.5'	S06°07.2	-14.1'	54.9'	45°	--	01:01	02:06	12:23	12:39	12:56
13	16°25.7	11.0	88°37.2	16.5'	06°21.3	-14.0'	54.9'	N 40°	--	00:58	01:59	12:23	12:43	13:04
14	31°25.4	11.1	103°12.7	16.5'	06°35.3	-14.0'	54.8'	35°	--	00:56	01:54	12:23	12:47	13:11
15	46°25.1	· · 11.3	117°48.1	16.4'	06°49.3	-14.0'	54.8'	30°	--	00:54	01:49	12:24	12:50	13:17
16	61°24.8	11.4	132°23.6	16.4'	07°03.3	-13.9'	54.8'	20°	00:01	00:51	01:40	12:24	12:56	13:28
17	76°24.5	11.6	146°59.0	16.4'	07°17.2	-13.9'	54.8'	N 10°	00:03	00:48	01:33	12:24	13:01	13:37
18	91°24.2	S23°11.7	161°34.4	16.4'	S07°31.1	-13.9'	54.8'	0°	00:05	00:46	01:26	12:25	13:05	13:46
19	106°23.9	11.9	176°09.8	16.4'	07°44.9	-13.8'	54.7'	S 10°	00:07	00:43	01:20	12:25	13:10	13:55
20	121°23.6	12.0	190°45.2	16.4'	07°58.7	-13.8'	54.7'	20°	00:09	00:41	01:12	12:25	13:15	14:04
21	136°23.3	· · 12.2	205°20.6	16.4'	08°12.5	-13.8'	54.7'	30°	00:11	00:38	01:04	12:26	13:21	14:15
22	151°23.0	12.3	219°56.0	16.4'	08°26.2	-13.7'	54.7'	35°	00:13	00:36	01:00	12:26	13:24	14:21
23	166°22.7	12.5	234°31.4	16.4'	08°39.9	-13.7'	54.7'	40°	00:14	00:34	00:55	12:26	13:28	14:28
	SD.=16.2	d=-0.2			S.D.=15.1			45°	00:16	00:32	00:49	12:27	13:32	14:37
								S 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
								S 60°	00:23	00:22	00:21	12:28	13:52	15:17
Sun	GHA	Dec	GHA	ν	Dec	d	HP	Day	Sun Eqn. of Time		Mer. Pass	Moon Mer. Pass.		Age
									00 ^h	12 ^h	hh:mm	Upper	Lower	22-24
									mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	44-26%
0	181°22.4	S23°12.6	249°06.7	16.3'	S08°53.6	-13.6'	54.6'	12	06:26	06:12	11:54	06:15	18:35	
1	196°22.1	12.8	263°42.1	16.3'	09°07.2	-13.6'	54.6'	13	05:58	05:44	11:54	06:56	19:16	
2	211°21.8	12.9	278°17.4	16.3'	09°20.8	-13.5'	54.6'	14	05:30	05:15	11:55	07:36	19:57	
3	226°21.5	· · 13.1	292°52.7	16.3'	09°34.3	-13.5'	54.6'							
4	241°21.2	13.2	307°27.9	16.3'	09°47.8	-13.5'	54.6'							
5	256°20.9	13.4	322°03.2	16.2'	10°01.2	-13.4'	54.6'							
6	271°20.6	S23°13.5	336°38.4	16.2'	S10°14.6	-13.4'	54.5'							
7	286°20.3	13.7	351°13.6	16.2'	10°28.0	-13.3'	54.5'							
8	301°20.0	13.8	5°48.8	16.2'	10°41.3	-13.3'	54.5'							
9	316°19.7	· · 13.9	20°23.9	16.1'	10°54.5	-13.2'	54.5'							
10	331°19.4	14.1	34°59.1	16.1'	11°07.7	-13.2'	54.5'							
11	346°19.1	14.2	49°34.2	16.1'	11°20.9	-13.1'	54.5'							
12	1°18.8	S23°14.4	64°09.2	16.1'	S11°34.0	-13.1'	54.4'							
13	16°18.5	14.5	78°44.3	16.0'	11°47.1	-13.0'	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	16.0'	12°13.0	-12.9'	54.4'							
16	61°17.6	14.9	122°29.2	15.9'	12°26.0	-12.9'	54.4'							
17	76°17.3	15.1	137°04.1	15.9'	12°38.8	-12.8'	54.4'							
18	91°17.0	S23°15.2	151°39.0	15.9'	S12°51.6	-12.8'	54.4'							
19	106°16.7	15.3	166°13.8	15.8'	13°04.4	-12.7'	54.3'							
20	121°16.4	15.5	180°48.6	15.8'	13°17.1	-12.7'	54.3'							
21	136°16.1	· · 15.6	195°23.4	15.8'	13°29.7	-12.6'	54.3'							
22	151°15.8	15.7	209°58.1	15.7'	13°42.3	-12.6'	54.3'							
23	166°15.5	15.9	224°32.8	15.7'	13°54.8	-12.5'	54.3'							

h		Sun						Moon						Lat.		Twilight		Sunrise	Sunset	Twilight	
Mon	GHA	Dec	GHA	ν	Dec	d	HP	Naut.	Civil			Civil	Naut.								
0	181°15.2	S23°16.0	239°07.5	15.6'	S14°07.3	-12.4'	54.3'														
1	196°14.9	16.1	253°42.1	15.6'	14°19.7	-12.4'	54.3'														
2	211°14.6	16.2	268°16.7	15.5'	14°32.1	-12.3'	54.3'														
3	226°14.3	· · 16.4	282°51.2	15.5'	14°44.4	-12.3'	54.2'														
4	241°14.0	16.5	297°25.7	15.5'	14°56.6	-12.2'	54.2'														
5	256°13.7	16.6	312°00.1	15.4'	15°08.8	-12.1'	54.2'														
6	271°13.4	S23°16.7	326°34.5	15.4'	S15°20.9	-12.1'	54.2'														
7	286°13.1	16.9	341°08.9	15.3'	15°33.0	-12.0'	54.2'														
8	301°12.8	17.0	355°43.2	15.3'	15°44.9	-12.0'	54.2'														
9	316°12.5	· · 17.1	10°17.4	15.2'	15°56.9	-11.9'	54.2'														
10	331°12.2	17.2	24°51.6	15.2'	16°08.7	-11.8'	54.2'														
11	346°11.9	17.4	39°25.8	15.1'	16°20.5	-11.8'	54.2'														
12	1°11.6	S23°17.5	53°59.9	15.1'	S16°32.2	-11.7'	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	-11.6'	54.1'														
15	46°10.7	· · 17.8	97°41.9	14.9'	17°07.0	-11.5'	54.1'														
16	61°10.4	17.9	112°15.8	14.9'	17°18.5	-11.4'	54.1'														
17	76°10.1	18.1	126°49.7	14.8'	17°29.9	-11.3'	54.1'														
18	91°09.8	S23°18.2	141°23.5	14.8'	S17°41.2	-11.3'	54.1'														
19	106°09.5	18.3	155°57.2	14.7'	17°52.4	-11.2'	54.1'														
20	121°09.2	18.4	170°30.9	14.7'	18°03.6	-11.1'	54.1'														
21	136°08.9	· · 18.5	185°04.5	14.6'	18°14.7	-11.1'	54.1'														
22	151°08.6	18.6	199°38.1	14.5'	18°25.7	-11.0'	54.1'														
23	166°08.3	18.7	214°11.6	14.5'	18°36.6	-10.9'	54.1'														
SD.=16.2		d=-0.1	S.D.=14.8																		
Tue	GHA	Dec	GHA	ν	Dec	d	HP														
0	181°07.9	S23°18.9	228°45.1	14.4'	S18°47.5	-10.8'	54.1'														
1	196°07.6	19.0	243°18.5	14.4'	18°58.3	-10.8'	54.1'														
2	211°07.3	19.1	257°51.8	14.3'	19°09.0	-10.7'	54.0'														
3	226°07.0	· · 19.2	272°25.1	14.3'	19°19.7	-10.6'	54.0'														
4	241°06.7	19.3	286°58.3	14.2'	19°30.2	-10.5'	54.0'														
5	256°06.4	19.4	301°31.5	14.1'	19°40.7	-10.4'	54.0'														
6	271°06.1	S23°19.5	316°04.6	14.1'	S19°51.1	-10.4'	54.0'														
7	286°05.8	19.6	330°37.6	14.0'	20°01.4	-10.3'	54.0'														
8	301°05.5	19.7	345°10.6	13.9'	20°11.6	-10.2'	54.0'														
9	316°05.2	· · 19.8	359°43.5	13.9'	20°21.8	-10.1'	54.0'														
10	331°04.9	19.9	14°16.4	13.8'	20°31.9	-10.0'	54.0'														
11	346°04.6	20.0	28°49.2	13.8'	20°41.8	-9.9'	54.0'														
12	1°04.3	S23°20.1	43°21.9	13.7'	S20°51.7	-9.9'	54.0'														
13	16°04.0	20.2	57°54.5	13.6'	21°01.6	-9.8'	54.0'														
14	31°03.7	20.3	72°27.1	13.6'	21°11.3	-9.7'	54.0'														
15	46°03.4	· · 20.4	86°59.7	13.5'	21°20.9	-9.6'	54.0'														
16	61°03.1	20.5	101°32.1	13.4'	21°30.5	-9.5'	54.0'														
17	76°02.8	20.6	116°04.6	13.4'	21°39.9	-9.4'	54.0'														
18	91°02.5	S23°20.7	130°36.9	13.3'	S21°49.3	-9.3'	54.0'														
19	106°02.2	20.8	145°09.2	13.2'	21°58.5	-9.2'	54.0'														
20	121°01.9	20.9	159°41.4	13.2'	22°07.7	-9.1'	54.0'														
21	136°01.6	· · 21.0	174°13.5	13.1'	22°16.8	-9.0'	54.0'														
22	151°01.2	21.1	188°45.6	13.0'	22°25.8	-8.9'	54.0'														
23	166°00.9	21.2	203°17.6	13.0'	22°34.7	-8.8'	54.0'														
SD.=16.2		d=-0.1	S.D.=14.7																		
Wed	GHA	Dec	GHA	ν	Dec	d	HP														
0	181°00.6	S23°21.3	217°49.5	12.9'	S22°43.5	-8.8'	54.0'														
1	196°00.3	21.4	232°21.4	12.8'	22°52.2	-8.7'	54.0'														
2	211°00.0	21.4	246°53.2	12.8'	23°00.8	-8.6'	54.0'														
3	225°59.7	· · 21.5	261°25.0	12.7'	23°09.3	-8.5'	54.0'														
4	240°59.4	21.6	275°56.6	12.6'	23°17.7	-8.4'	54.0'														
5	255°59.1	21.7	290°28.2	12.6'	23°26.0	-8.3'	54.0'														
6	270°58.8	S23°21.8	304°59.8	12.5'	S23°34.2	-8.2'	54.0'														
7	285°58.5	21.9	319°31.3	12.4'	23°42.3	-8.1'	54.0'														
8	300°58.2	22.0	334°02.7	12.4'	23°50.4	-8.0'	54.0'														
9	315°57.9	· · 22.0	348°34.0	12.3'	23°58.2	-7.8'	54.0'														
10	330°57.6	22.1	3°05.3	12.2'	24°06.0	-7.7'	54.0'														
11	345°57.3	22.2	17°36.5	12.2'	24°13.7	-7.6'	54.0'														
12	0°57.0	S23°22.3	32°07.6	12.1'	S24°21.3	-7.5'	54.0'														
13	15°56.7	22.4	46°38.7	12.0'	24°28.8	-7.4'	54.0'														
14	30°56.3	22.4	61°09.7	12.0'	24°36.2	-7.3'	54.0'														
15	45°56.0	· · 22.5	75°40.7	11.9'	24°43.4	-7.2'	54.0'														
16	60°55.7	22.6	90°11.6	11.8'	24°50.6	-7.1'	54.0'														
17	75°55.4	22.7	104°42.4	11.8'	24°57.6	-7.0'	54.0'														
18	90°55.1	S23°22.8	119°13.1	11.7'	S25°04.5	-6.9'	54.0'														
19	105°54.8	22.8	133°43.8	11.7'	25°11.4	-6.8'	54.0'														
20	120°54.5	22.9	148°14.4	11.6'	25°18.1	-6.6'	54.0'														
21	135°54.2	· · 23.0	162°45.0	11.5'	25°24.7	-6.5'	54.0'														
22	150°53.9	23.1	177°15.5	11.5'	25°31.1	-6.4'	54.0'														
23	165°53.6	23.1	191°45.9	11.4'	25°37.5	-6.3'	54.0'														
SD.=16.3		d=-0.1	S.D.=14.7																		
								Lat.		Moonrise			Moonset								
								Mon		Tue		Wed		Mon		Tue		Wed			
								N 72°		06:07		00:00		10:06		00:00		00:00			
								N 70°		05:28		00:00		10:46		00:00		00:00			
								68°		05:02		07:20		11:14		10:27		00:00			
								66°		04:42		06:37		11:36		11:11		00:00			
								64°		04:26		06:09		11:53		11:40		11:18			
								62°		04:12		05:47		12:07		12:02		11:57			
								60°		04:01		05:30		12:19		12:20		12:24			
								N 58°		03:52		05:15		12:30		12:36		12:45			
								56°		03:43		05:03		12:39		12:49		13:03			
								54°		03:36		04:52		12:47		13:00		13:18			
								52°		03:29		04:43		12:55		13:10		13:31			
								50°		03:23		04:34		13:01		13:19		13:42			
								45°		03:11		04:16		13:15		13:38		14:06			
								N 40°		03:00		04:02		13:27		13:54		14:25			

December 21, 22, 23 (Sun., Mon., Tue.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	80°49.2	184°52.6	S23°26.0	175°06.3	S24°11.1	335°15.2	N21°44.0	92°55.4	S03°50.8	Alpheratz	357°34.0	29°14.3	
1	104°51.7	199°51.6	26.2	190°06.7	11.1	350°18.0	44.0	107°57.8	50.8	Ankaa	353°06.3	-42°10.1	
2	119°54.1	214°50.6	26.4	205°07.1	11.0	5°20.8	44.1	123°00.2	50.7	Schedar	349°30.0	56°41.1	
3	134°56.6	229°49.7	· · 26.6	220°07.5	· · 11.0	20°23.5	· · 44.1	138°02.6	· · 50.7	Diphda	348°46.3	-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°19.3	-57°06.5	
5	165°01.5	259°47.8	27.0	250°08.3	10.9	50°29.1	44.2	168°07.3	50.6	Hamal	327°50.1	23°35.3	
6	180°04.0	274°46.8	S23°27.2	265°08.7	S24°10.9	65°31.8	N21°44.3	183°09.7	S03°50.5	Polaris	313°15.4	89°22.6	
7	195°06.4	289°45.8	27.4	280°09.0	10.8	80°34.6	44.4	198°12.1	50.5	Akamar	315°10.8	-40°12.1	
8	210°08.9	304°44.9	27.6	295°09.4	10.8	95°37.4	44.4	213°14.4	50.4	Menkar	314°05.1	4°11.6	
9	225°11.4	319°43.9	· · 27.8	310°09.8	· · 10.7	110°40.2	· · 44.5	228°16.8	· · 50.4	Mirfak	308°26.7	49°57.4	
10	240°13.8	334°43.0	28.0	325°10.2	10.7	125°42.9	44.5	243°19.2	50.3	Aldebaran	290°38.4	16°33.8	
11	255°16.3	349°42.0	28.2	340°10.6	10.6	140°45.7	44.6	258°21.6	50.3	Rigel	281°02.8	-8°10.3	
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	S03°50.2	Capella	280°20.3	46°01.5	
13	285°21.2	19°40.1	28.6	10°11.4	10.5	170°51.2	44.7	288°26.3	50.2	Bellatrix	278°21.7	6°22.4	
14	300°23.7	34°39.1	28.8	25°11.7	10.5	185°54.0	44.7	303°28.7	50.1	Elnath	278°00.5	28°37.8	
15	315°26.2	49°38.2	· · 29.0	40°12.1	· · 10.4	200°56.8	· · 44.8	318°31.1	· · 50.1	Anilam	275°36.6	-1°11.1	
16	330°28.6	64°37.2	29.2	55°12.5	10.4	215°59.5	44.8	333°33.4	50.0	Betelgeuse	270°50.9	7°24.7	
17	345°31.1	79°36.2	29.4	70°12.9	10.3	231°02.3	44.9	348°35.8	50.0	Canopus	263°51.5	-52°42.5	
18	0°33.6	94°35.3	S23°29.6	85°13.3	S24°10.3	246°05.1	N21°45.0	3°38.2	S03°49.9	Sirius	258°25.1	-16°44.9	
19	15°36.0	109°34.3	29.8	100°13.7	10.2	261°07.9	45.0	18°40.5	49.9	Adara	255°04.9	-29°00.4	
20	30°38.5	124°33.3	30.0	115°14.1	10.2	276°10.6	45.1	33°42.9	49.8	Procyon	244°49.6	5°09.6	
21	45°40.9	139°32.4	· · 30.1	130°14.4	· · 10.1	291°13.4	· · 45.1	48°45.3	· · 49.8	Pollux	243°15.9	27°57.7	
22	60°43.4	154°31.4	30.3	145°14.8	10.1	306°16.2	45.2	63°47.7	49.7	Avior	234°13.9	-50°35.4	
23	75°45.9	169°30.4	30.5	160°15.2	10.0	321°18.9	45.2	78°50.0	49.7	Suhail	222°45.4	-43°32.1	
Mer.pass.:17:57		v-1.0 d-0.2 m-3.8		v0.4 d0.0 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Miaplacidus		221°37.5	-69°49.2
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Alphard		217°46.8	-8°46.2
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Regulus		207°33.4	11°50.3
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Dubhe		193°39.8	61°36.3
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Denebola		182°24.0	14°25.5
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Gienah		175°42.8	-17°41.1
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Acrux		172°59.3	-63°14.3
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Gacrux		171°50.9	-57°15.3
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Alioth		166°12.4	55°48.8
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Spica		158°21.6	-11°17.8
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Alkaid		152°51.6	49°10.7
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Hadar		148°35.2	-60°29.7
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Menkent		147°56.9	-36°29.7
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Arcturus		145°47.2	19°03.0
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Rigel Kent.		139°39.7	-60°56.3
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Kochab		137°20.6	74°02.6
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Zuben'ubi		136°55.4	-16°08.9
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Alphecca		126°03.4	26°37.5
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Antares		112°15.2	-26°29.3
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Atria		107°09.3	-69°04.3
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Sabik		102°02.2	-15°45.4
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Shaula		96°09.7	-37°07.3
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Rasalhague		95°58.2	12°32.5
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Eltanin		90°42.4	51°29.1
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Kaus Aust.		83°31.9	-34°22.3
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Vega		80°33.2	38°48.4
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Nunki		75°47.2	-26°15.9
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Altair		61°59.6	8°56.2
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Peacock		53°05.0	-56°39.2
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Deneb		49°25.6	45°22.5
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Enif		33°38.2	9°59.7
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Al Na'ir		27°32.2	-46°50.3
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Fomalhaut		15°13.8	-29°29.2
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Scheat		13°44.6	28°13.6
Mer.pass.:17:53		v-1.0 d-0.2 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.0 m1.1		Markab		13°29.2	15°20.8
Mer.pass.:17:49		v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Dec 21 Sun		SHA	Mer.pass
Mer.pass.:17:49		v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Venus		95°03.4	11:41
Mer.pass.:17:49		v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Mars		85°17.1	12:19
Mer.pass.:17:49		v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Jupiter		245°26.0	01:39
Mer.pass.:17:49		v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Saturn		3°06.2	17:45
Mer.pass.:17:49		v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Dec 22 Mon		SHA	Mer.pass
Mer.pass.:17:49		v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Venus		93°41.1	11:43
Mer.pass.:17:49		v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Mars		84°27.2	12:19
Mer.pass.:17:49		v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Jupiter		245°33.4	01:34
Mer.pass.:17:49		v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Saturn		3°04.1	17:42
Mer.pass.:17:49		v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Dec 23 Tue		SHA	Mer.pass
Mer.pass.:17:49		v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Venus		92°18.8	11:44
Mer.pass.:17:49		v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Mars		83°37.3	12:18
Mer.pass.:17:49		v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Jupiter		245°40.8	01:30
Mer.pass.:17:49		v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Saturn		3°01.8	17:38
Mer.pass.:17:49		v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Horizontal parallax			
Mer.pass.:17:49		v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Venus:		0.1	
Mer.pass.:17:49		v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Mars:		0.1	

December 24, 25, 26 (Wed., Thu., Fri.)

Aries		Venus		Mars		Jupiter		Saturn		Stars		
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec	
0	92°46.6	183°43.1	S23°37.9	175°34.0	S24°06.7	338°35.1	N21°47.9	95°46.0	S03°47.2	Alpheratz	357°34.0	29°14.3
1	107°49.1	198°42.1	38.0	190°34.4	06.7	353°37.8	48.0	110°48.4	47.1	Ankaa	353°06.3	-42°10.1
2	122°51.6	213°41.1	38.1	205°34.7	06.6	8°40.6	48.0	125°50.7	47.1	Schedar	349°30.1	56°41.1
3	137°54.0	228°40.1	· · 38.2	220°35.1	· · 06.5	23°43.4	· · 48.1	140°53.1	· · 47.0	Diphda	348°46.3	-17°50.7
4	152°56.5	243°39.2	38.4	235°35.5	06.4	38°46.2	48.1	155°55.5	47.0	Achernar	335°19.4	-57°06.5
5	167°58.9	258°38.2	38.5	250°35.9	06.3	53°49.0	48.2	170°57.8	46.9	Hamal	327°50.1	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	Polaris	313°16.4	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	Akamars	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°11.6
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°33.3	39.0	325°37.8	05.9	129°02.9	48.5	246°09.6	46.6	Aldebaran	290°38.4	16°33.8
11	258°13.7	348°32.4	39.1	340°38.2	05.9	144°05.7	48.5	261°12.0	46.6	Rigel	281°02.8	-8°10.3
12	273°16.2	3°31.4	S23°39.2	355°38.6	S24°05.8	159°08.5	N21°48.6	276°14.4	S03°46.5	Capella	280°20.2	46°01.6
13	288°18.7	18°30.4	39.3	10°38.9	05.7	174°11.2	48.6	291°16.7	46.5	Bellatrix	278°21.7	6°22.4
14	303°21.1	33°29.5	39.4	25°39.3	05.6	189°14.0	48.7	306°19.1	46.4	Elnath	278°00.5	28°37.8
15	318°23.6	48°28.5	· · 39.5	40°39.7	· · 05.5	204°16.8	· · 48.7	321°21.4	· · 46.4	Alnilam	275°36.6	-1°11.1
16	333°26.0	63°27.5	39.6	55°40.1	05.4	219°19.6	48.8	336°23.8	46.3	Betelgeuse	270°50.9	7°24.7
17	348°28.5	78°26.5	39.7	70°40.5	05.3	234°22.4	48.9	351°26.2	46.3	Canopus	263°51.5	-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	Sirius	258°25.1	-16°44.9
19	18°33.4	108°24.6	39.9	100°41.2	05.2	264°28.0	49.0	21°30.9	46.2	Adara	255°04.8	-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°49.6	5°09.6
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°15.9	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	-50°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
										Miaplacidus	221°37.5	-69°49.2
	Mer.pass.:17:45	v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.1		Alphard	217°46.7	-8°46.3
										Regulus	207°33.4	11°50.3
										Dubhe	193°39.8	61°36.3
										Denebola	182°24.0	14°25.5
										Gienah	175°42.7	-17°41.1
										Acrux	172°59.3	-63°14.3
										Gacrux	171°50.8	-57°15.3
										Alioth	166°12.4	55°48.8
										Spica	158°21.6	-11°17.8
										Alkaid	152°51.6	49°10.7
										Hadar	148°35.2	-60°29.7
										Menkent	147°56.9	-36°29.7
										Arcturus	145°47.2	19°03.0
										Rigel Kent.	139°39.6	-60°56.3
										Kochab	137°20.6	74°02.6
										Zuben'ubi	136°55.4	-16°08.9
										Alphecca	126°03.4	26°37.5
										Antares	112°15.2	-26°29.3
										Atria	107°09.2	-69°04.3
										Sabik	102°02.2	-15°45.4
										Shaula	96°09.7	-37°07.3
										Rasalhague	95°58.2	12°32.5
										Eltanin	90°42.3	51°29.0
										Kaus Aust.	83°31.8	-34°22.3
										Vega	80°33.1	38°48.4
										Nunki	75°47.1	-26°15.9
										Altair	61°59.6	8°56.2
										Peacock	53°05.0	-56°39.2
										Deneb	49°25.7	45°22.5
										Enif	33°38.2	9°59.7
										Al Na'ir	27°32.2	-46°50.3
										Fomalhaut	15°13.8	-29°29.2
										Scheat	13°44.6	28°13.6
										Markab	13°29.2	15°20.8
										Dec 24 Wed	SHA	Mer.pass
										Venus	90°56.4	11:46
										Mars	82°47.4	12:17
										Jupiter	245°48.4	01:25
										Saturn	2°59.4	17:34
										Dec 25 Thu	SHA	Mer.pass
										Venus	89°34.0	11:47
										Mars	81°57.4	12:17
										Jupiter	245°56.1	01:21
										Saturn	2°56.9	17:30
										Dec 26 Fri	SHA	Mer.pass
										Venus	88°11.5	11:49
										Mars	81°07.4	12:16
										Jupiter	246°03.9	01:17
										Saturn	2°54.4	17:27
										Horizontal parallax		
										Venus:	0.1	
										Mars:	0.1	
	Mer.pass.:17:38	v-1.0 d-0.1 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.2				

December 27, 28, 29 (Sat., Sun., Mon.)

Aries		Venus		Mars		Jupiter		Saturn		Stars			
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	SHA	Dec		
0	95°44.0	182°33.0	S23°43.2	176°01.4	S23°59.9	341°55.9	N21°51.9	98°35.8	S03°43.2	Alpheratz	357°34.0	29°14.2	
1	110°46.5	197°32.0	43.2	191°01.8	59.8	356°58.7	52.0	113°38.1	43.1	Ankaa	353°06.3	-42°10.1	
2	125°49.0	212°31.1	43.3	206°02.2	59.7	12°01.5	52.0	128°40.5	43.1	Schedar	349°30.1	56°41.1	
3	140°51.4	227°30.1	· · 43.3	221°02.5	· · 59.6	27°04.2	· · 52.1	143°42.8	· · 43.0	Diphda	348°46.3	-17°50.7	
4	155°53.9	242°29.1	43.3	236°02.9	59.5	42°07.0	52.2	158°45.2	42.9	Achernar	335°19.4	-57°06.5	
5	170°56.4	257°28.2	43.3	251°03.3	59.4	57°09.8	52.2	173°47.5	42.9	Hamal	327°50.2	23°35.3	
6	185°58.8	272°27.2	S23°43.3	266°03.7	S23°59.2	72°12.6	N21°52.3	188°49.9	S03°42.8	Polaris	313°17.4	89°22.7	
7	201°01.3	287°26.2	43.4	281°04.1	59.1	87°15.4	52.3	203°52.2	42.8	Akamars	315°10.9	-40°12.2	
8	216°03.8	302°25.2	43.4	296°04.4	59.0	102°18.2	52.4	218°54.6	42.7	Menkar	314°05.1	4°11.6	
9	231°06.2	317°24.3	· · 43.4	311°04.8	· · 58.9	117°21.0	· · 52.4	233°56.9	· · 42.7	Mirfak	308°26.7	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°33.8	
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°01.6	
13	291°16.1	17°20.4	43.5	11°06.3	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	· · 52.8	324°11.0	· · 42.3	Alnilam	275°36.6	-1°11.1	
16	336°23.5	62°17.4	43.5	56°07.5	58.1	222°40.6	52.8	339°13.4	42.2	Betelgeuse	270°50.9	7°24.7	
17	351°25.9	77°16.5	43.5	71°07.9	58.0	237°43.4	52.9	354°15.7	42.2	Canopus	263°51.5	-52°42.5	
18	6°28.4	92°15.5	S23°43.5	86°08.2	S23°57.8	252°46.2	N21°53.0	9°18.1	S03°42.1	Sirius	258°25.1	-16°44.9	
19	21°30.9	107°14.5	43.5	101°08.6	57.7	267°49.0	53.0	24°20.4	42.1	Adara	255°04.8	-29°00.4	
20	36°33.3	122°13.5	43.5	116°09.0	57.6	282°51.8	53.1	39°22.8	42.0	Procyon	244°49.6	5°09.6	
21	51°35.8	137°12.6	· · 43.5	131°09.4	· · 57.5	297°54.6	· · 53.1	54°25.1	· · 42.0	Pollux	243°15.9	27°57.7	
22	66°38.2	152°11.6	43.5	146°09.8	57.4	312°57.4	53.2	69°27.5	41.9	Avior	234°13.9	-50°35.4	
23	81°40.7	167°10.6	43.5	161°10.1	57.2	328°00.2	53.2	84°29.8	41.8	Suhail	222°45.4	-43°32.1	
Mer.pass.:17:34		v-1.0 d-0.0 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.4 d0.1 m1.2		Miaplacidus		221°37.4	-69°49.2
Sun		GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec			
0	96°43.2	182°09.6	S23°43.5	176°10.5	S23°57.1	343°03.0	N21°53.3	99°32.2	S03°41.8	Alphard	217°46.7	-8°46.3	
1	111°45.6	197°08.7	43.5	191°10.9	57.0	358°05.8	53.3	114°34.5	41.7	Regulus	207°33.4	11°50.3	
2	126°48.1	212°07.7	43.5	206°11.3	56.9	13°08.6	53.4	129°36.9	41.7	Dubhe	193°39.7	61°36.3	
3	141°50.6	227°06.7	· · 43.5	221°11.7	· · 56.7	28°11.4	· · 53.5	144°39.2	· · 41.6	Denebola	182°24.0	14°25.5	
4	156°53.0	242°05.7	43.5	236°12.0	56.6	43°14.2	53.5	159°41.5	41.5	Gienah	175°42.7	-17°41.1	
5	171°55.5	257°04.8	43.5	251°12.4	56.5	58°17.0	53.6	174°43.9	41.5	Acrux	172°59.2	-63°14.3	
6	186°58.0	272°03.8	S23°43.5	266°12.8	S23°56.4	73°19.8	N21°53.6	189°46.2	S03°41.4	Gacrux	171°50.8	-57°15.3	
7	202°00.4	287°02.8	43.5	281°13.2	56.2	88°22.6	53.7	204°48.6	41.4	Alioth	166°12.4	55°48.8	
8	217°02.9	302°01.8	43.4	296°13.6	56.1	103°25.4	53.7	219°50.9	41.3	Spica	158°21.5	-11°17.8	
9	232°05.4	317°00.9	· · 43.4	311°13.9	· · 56.0	118°28.2	· · 53.8	234°53.3	· · 41.2	Alkaid	152°51.5	49°10.7	
10	247°07.8	331°59.9	43.4	326°14.3	55.9	133°31.0	53.9	249°55.6	41.2	Hadar	148°35.2	-60°29.7	
11	262°10.3	346°58.9	43.4	341°14.7	55.7	148°33.8	53.9	264°58.0	41.1	Menkent	147°56.9	-36°29.7	
12	277°12.7	1°57.9	S23°43.4	356°15.1	S23°55.6	163°36.6	N21°54.0	280°00.3	S03°41.1	Arcturus	145°47.2	19°03.0	
13	292°15.2	16°57.0	43.4	11°15.5	55.5	178°39.4	54.0	295°02.7	41.0	Rigel Kent.	139°39.6	-60°56.3	
14	307°17.7	31°56.0	43.3	26°15.8	55.4	193°42.2	54.1	310°05.0	40.9	Kochab	137°20.5	74°02.6	
15	322°20.1	46°55.0	· · 43.3	41°16.2	· · 55.2	208°45.0	· · 54.1	325°07.4	· · 40.9	Zuben'ubi	136°55.3	-16°09.0	
16	337°22.6	61°54.1	43.3	56°16.6	55.1	223°47.8	54.2	340°09.7	40.8	Alphecca	126°03.4	26°37.5	
17	352°25.1	76°53.1	43.3	71°17.0	55.0	238°50.6	54.3	355°12.1	40.8	Antares	112°15.2	-26°29.3	
18	7°27.5	91°52.1	S23°43.2	86°17.3	S23°54.8	253°53.4	N21°54.3	10°14.4	S03°40.7	Atria	107°09.2	-69°04.3	
19	22°30.0	106°51.1	43.2	101°17.7	54.8	268°56.2	54.4	25°16.7	40.6	Sabik	102°02.2	-15°45.4	
20	37°32.5	121°50.2	43.2	116°18.1	54.6	283°59.0	54.4	40°19.1	40.6	Shaula	96°09.7	-37°07.3	
21	52°34.9	136°49.2	· · 43.2	131°18.5	· · 54.4	299°01.8	· · 54.5	55°21.4	· · 40.5	Rasalhague	95°58.2	12°32.4	
22	67°37.4	151°48.2	43.1	146°18.9	54.3	314°04.6	54.5	70°23.8	40.5	Eltanin	90°42.3	51°29.0	
23	82°39.8	166°47.2	43.1	161°19.2	54.2	329°07.4	54.6	85°26.1	40.4	Kaus Aust.	83°31.8	-34°22.3	
Mer.pass.:17:30		v-1.0 d0.0 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.3 d0.1 m1.2		Vega		80°33.1	38°48.4
Mon		GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec			
0	97°42.3	181°46.3	S23°43.1	176°19.6	S23°54.0	344°10.2	N21°54.7	100°28.5	S03°40.3	Nunki	75°47.1	-26°15.9	
1	112°44.8	196°45.3	43.0	191°20.0	53.9	359°13.0	54.7	115°30.8	40.3	Altair	61°59.6	8°56.2	
2	127°47.2	211°44.3	43.0	206°20.4	53.8	14°15.8	54.8	130°33.2	40.2	Peacock	53°05.0	-56°39.2	
3	142°49.7	226°43.3	· · 43.0	221°20.8	· · 53.6	29°18.6	· · 54.8	145°35.5	· · 40.1	Deneb	49°25.7	45°22.5	
4	157°52.2	241°42.4	42.9	236°21.1	53.5	44°21.4	54.9	160°37.8	40.1	Enif	33°38.2	9°59.7	
5	172°54.6	256°41.4	42.9	251°21.5	53.4	59°24.2	54.9	175°40.2	40.0	Al Na'ir	27°32.2	-46°50.3	
6	187°57.1	271°40.4	S23°42.8	266°21.9	S23°53.2	74°27.0	N21°55.0	190°42.5	S03°40.0	Fomalhaut	15°13.8	-29°29.2	
7	202°59.6	286°39.4	42.8	281°22.3	53.1	89°29.8	55.0	205°44.9	39.9	Scheat	13°44.6	28°13.6	
8	218°02.0	301°38.5	42.8	296°22.7	53.0	104°32.6	55.1	220°47.2	39.8	Markab	13°29.2	15°20.8	
9	233°04.5	316°37.5	· · 42.7	311°23.0	· · 52.8	119°35.4	· · 55.2	235°49.6	· · 39.8	Dec 27 Sat		SHA	Mer.pass
10	248°07.0	331°36.5	42.7	326°23.4	52.7	134°38.2	55.2	250°51.9	39.7	Venus	86°49.0	11:51	
11	263°09.4	346°35.6	42.6	341°23.8	52.5	149°41.0	55.3	265°54.2	39.7	Mars	80°17.4	12:16	
12	278°11.9	1°34.6	S23°42.6	356°24.2	S23°52.4	164°43.8	N21°55.3	280°56.6	S03°39.6	Jupiter	246°11.8	01:12	
13	293°14.3	16°33.6	42.5	11°24.6	52.3	179°46.6	55.4	295°58.9	39.5	Saturn	2°51.7	17:23	
14	308°16.8	31°32.6	42.5	26°24.9	52.1	194°49.4	55.4	311°01.3	39.5	Dec 28 Sun		SHA	Mer.pass
15	323°19.3	46°31.7	· · 42.4	41°25.3	· · 52.0	209°52.2	· · 55.5	326°03.6	· · 39.4	Venus	85°26.5	11:52	
16	338°21.7	61°30.7	42.4	56°25.7	51.8	224°55.0	55.6	341°06.0	39.3	Mars	79°27.3	12:15	
17	353°24.2	76°29.7	42.3	71°26.1	51.7	239°57.9	55.6	356°08.3	39.3	Jupiter	246°19.8	01:08	
18	8°26.7	91°28.7	S23°42.3	86°26.5	S23°51.6	255°00.7	N21°55.7	11°10.6	S03°39.2	Saturn	2°49.0	17:19	
19	23°29.1	106°27.8	42.2	101°26.8	51.4	270°03.5	55.7	26°13.0	39.2	Dec 29 Mon		SHA	Mer.pass
20	38°31.6	121°26.8	42.1	116°27.2	51.3	285°06.3	55.8	41°15.3	39.1	Venus	84°03.9	11:54	
21	53°34.1	136°25.8	· · 42.1	131°27.6	· · 51.1	300°09.1	· · 55.8	56°17.7	· · 39.0	Mars	78°37.3	12:14	
22	68°36.5	151°24.9	42.0	146°28.0	51.0	315°11.9	55.9	71°20.0	39.0	Jupiter	246°27.9	01:03	
23	83°39.0	166°23.9	42.0	161°28.4	50.8	330°14.7	56.0	86°22.3	38.9	Saturn	2°46.2	17:15	
Mer.pass.:17:26		v-1.0 d0.0 m-3.8		v0.4 d0.1 m1.3		v2.8 d0.1 m-2.5		v2.3 d0.1 m1.2		Horizontal parallax			
										Venus:		0.1	
										Mars:		0.1	

Increments and Corrections

m	Sun	Aries	Moon	v and d corr			m	Sun	Aries	Moon	v and d corr			m	Sun	Aries	Moon	v and d corr		
0	Plan.						1	Plan.					2	Plan.						
0	0°00.0	0°00.0	0°00.0	0.0 - 0.0	6.0 - 0.1	12.0 - 0.1	0	0°15.0	0°15.0	0°14.3	0.0 - 0.0	6.0 - 0.2	12.0 - 0.3	0	0°30.0	0°30.1	0°28.6	0.0 - 0.0	6.0 - 0.3	12.0 - 0.5
1	0°00.3	0°00.3	0°00.2	0.1 - 0.0	6.1 - 0.1	12.1 - 0.1	1	0°15.3	0°15.3	0°14.6	0.1 - 0.0	6.1 - 0.2	12.1 - 0.3	1	0°30.3	0°30.3	0°28.9	0.1 - 0.0	6.1 - 0.3	12.1 - 0.5
2	0°00.5	0°00.5	0°00.5	0.2 - 0.0	6.2 - 0.1	12.2 - 0.1	2	0°15.5	0°15.5	0°14.8	0.2 - 0.0	6.2 - 0.2	12.2 - 0.3	2	0°30.5	0°30.6	0°29.1	0.2 - 0.0	6.2 - 0.3	12.2 - 0.5
3	0°00.8	0°00.8	0°00.7	0.3 - 0.0	6.3 - 0.1	12.3 - 0.1	3	0°15.8	0°15.8	0°15.0	0.3 - 0.0	6.3 - 0.2	12.3 - 0.3	3	0°30.7	0°30.8	0°29.3	0.3 - 0.0	6.3 - 0.3	12.3 - 0.5
4	0°01.0	0°01.0	0°01.0	0.4 - 0.0	6.4 - 0.1	12.4 - 0.1	4	0°16.0	0°16.0	0°15.3	0.4 - 0.0	6.4 - 0.2	12.4 - 0.3	4	0°31.0	0°31.1	0°29.6	0.4 - 0.0	6.4 - 0.3	12.4 - 0.5
5	0°01.3	0°01.3	0°01.2	0.5 - 0.0	6.5 - 0.1	12.5 - 0.1	5	0°16.3	0°16.3	0°15.5	0.5 - 0.0	6.5 - 0.2	12.5 - 0.3	5	0°31.3	0°31.3	0°29.8	0.5 - 0.0	6.5 - 0.3	12.5 - 0.5
6	0°01.5	0°01.5	0°01.4	0.6 - 0.0	6.6 - 0.1	12.6 - 0.1	6	0°16.5	0°16.5	0°15.7	0.6 - 0.0	6.6 - 0.2	12.6 - 0.3	6	0°31.5	0°31.6	0°30.1	0.6 - 0.0	6.6 - 0.3	12.6 - 0.5
7	0°01.8	0°01.8	0°01.7	0.7 - 0.0	6.7 - 0.1	12.7 - 0.1	7	0°16.8	0°16.8	0°16.0	0.7 - 0.0	6.7 - 0.2	12.7 - 0.3	7	0°31.8	0°31.8	0°30.3	0.7 - 0.0	6.7 - 0.3	12.7 - 0.5
8	0°02.0	0°02.0	0°01.9	0.8 - 0.0	6.8 - 0.1	12.8 - 0.1	8	0°17.0	0°17.0	0°16.2	0.8 - 0.0	6.8 - 0.2	12.8 - 0.3	8	0°32.0	0°32.1	0°30.5	0.8 - 0.0	6.8 - 0.3	12.8 - 0.5
9	0°02.3	0°02.3	0°02.1	0.9 - 0.0	6.9 - 0.1	12.9 - 0.1	9	0°17.3	0°17.3	0°16.5	0.9 - 0.0	6.9 - 0.2	12.9 - 0.3	9	0°32.3	0°32.3	0°30.8	0.9 - 0.0	6.9 - 0.3	12.9 - 0.5
10	0°02.5	0°02.5	0°02.4	1.0 - 0.0	7.0 - 0.1	13.0 - 0.1	10	0°17.5	0°17.5	0°16.7	1.0 - 0.0	7.0 - 0.2	13.0 - 0.3	10	0°32.5	0°32.6	0°31.0	1.0 - 0.0	7.0 - 0.3	13.0 - 0.5
11	0°02.8	0°02.8	0°02.6	1.1 - 0.0	7.1 - 0.1	13.1 - 0.1	11	0°17.8	0°17.8	0°16.9	1.1 - 0.0	7.1 - 0.2	13.1 - 0.3	11	0°32.8	0°32.8	0°31.3	1.1 - 0.0	7.1 - 0.3	13.1 - 0.5
12	0°03.0	0°03.0	0°02.9	1.2 - 0.0	7.2 - 0.1	13.2 - 0.1	12	0°18.0	0°18.0	0°17.2	1.2 - 0.0	7.2 - 0.2	13.2 - 0.3	12	0°33.0	0°33.1	0°31.5	1.2 - 0.1	7.2 - 0.3	13.2 - 0.5
13	0°03.3	0°03.3	0°03.1	1.3 - 0.0	7.3 - 0.1	13.3 - 0.1	13	0°18.3	0°18.3	0°17.4	1.3 - 0.0	7.3 - 0.2	13.3 - 0.3	13	0°33.3	0°33.3	0°31.7	1.3 - 0.1	7.3 - 0.3	13.3 - 0.6
14	0°03.5	0°03.5	0°03.3	1.4 - 0.0	7.4 - 0.1	13.4 - 0.1	14	0°18.5	0°18.6	0°17.7	1.4 - 0.0	7.4 - 0.2	13.4 - 0.3	14	0°33.5	0°33.6	0°32.0	1.4 - 0.1	7.4 - 0.3	13.4 - 0.6
15	0°03.8	0°03.8	0°03.6	1.5 - 0.0	7.5 - 0.1	13.5 - 0.1	15	0°18.8	0°18.8	0°17.9	1.5 - 0.0	7.5 - 0.2	13.5 - 0.3	15	0°33.8	0°33.8	0°32.2	1.5 - 0.1	7.5 - 0.3	13.5 - 0.6
16	0°04.0	0°04.0	0°03.8	1.6 - 0.0	7.6 - 0.1	13.6 - 0.1	16	0°19.0	0°19.1	0°18.1	1.6 - 0.0	7.6 - 0.2	13.6 - 0.3	16	0°34.0	0°34.1	0°32.5	1.6 - 0.1	7.6 - 0.3	13.6 - 0.6
17	0°04.3	0°04.3	0°04.1	1.7 - 0.0	7.7 - 0.1	13.7 - 0.1	17	0°19.3	0°19.3	0°18.4	1.7 - 0.0	7.7 - 0.2	13.7 - 0.3	17	0°34.3	0°34.3	0°32.7	1.7 - 0.1	7.7 - 0.3	13.7 - 0.6
18	0°04.5	0°04.5	0°04.3	1.8 - 0.0	7.8 - 0.1	13.8 - 0.1	18	0°19.5	0°19.6	0°18.6	1.8 - 0.0	7.8 - 0.2	13.8 - 0.3	18	0°34.5	0°34.6	0°32.9	1.8 - 0.1	7.8 - 0.3	13.8 - 0.6
19	0°04.8	0°04.8	0°04.5	1.9 - 0.0	7.9 - 0.1	13.9 - 0.1	19	0°19.8	0°19.8	0°18.9	1.9 - 0.0	7.9 - 0.2	13.9 - 0.3	19	0°34.8	0°34.8	0°33.2	1.9 - 0.1	7.9 - 0.3	13.9 - 0.6
20	0°05.0	0°05.0	0°04.8	2.0 - 0.0	8.0 - 0.1	14.0 - 0.1	20	0°20.0	0°20.1	0°19.1	2.0 - 0.1	8.0 - 0.2	14.0 - 0.4	20	0°35.0	0°35.1	0°33.4	2.0 - 0.1	8.0 - 0.3	14.0 - 0.6
21	0°05.3	0°05.3	0°05.0	2.1 - 0.0	8.1 - 0.1	14.1 - 0.1	21	0°20.3	0°20.3	0°19.3	2.1 - 0.1	8.1 - 0.2	14.1 - 0.4	21	0°35.3	0°35.3	0°33.6	2.1 - 0.1	8.1 - 0.3	14.1 - 0.6
22	0°05.5	0°05.5	0°05.2	2.2 - 0.0	8.2 - 0.1	14.2 - 0.1	22	0°20.5	0°20.6	0°19.6	2.2 - 0.1	8.2 - 0.2	14.2 - 0.4	22	0°35.5	0°35.6	0°33.9	2.2 - 0.1	8.2 - 0.3	14.2 - 0.6
23	0°05.8	0°05.8	0°05.5	2.3 - 0.0	8.3 - 0.1	14.3 - 0.1	23	0°20.8	0°20.8	0°19.8	2.3 - 0.1	8.3 - 0.2	14.3 - 0.4	23	0°35.8	0°35.8	0°34.1	2.3 - 0.1	8.3 - 0.3	14.3 - 0.6
24	0°06.0	0°06.0	0°05.7	2.4 - 0.0	8.4 - 0.1	14.4 - 0.1	24	0°21.0	0°21.1	0°20.0	2.4 - 0.1	8.4 - 0.2	14.4 - 0.4	24	0°36.0	0°36.1	0°34.4	2.4 - 0.1	8.4 - 0.3	14.4 - 0.6
25	0°06.3	0°06.3	0°06.0	2.5 - 0.0	8.5 - 0.1	14.5 - 0.1	25	0°21.3	0°21.3	0°20.3	2.5 - 0.1	8.5 - 0.2	14.5 - 0.4	25	0°36.3	0°36.3	0°34.6	2.5 - 0.1	8.5 - 0.4	14.5 - 0.6
26	0°06.5	0°06.5	0°06.2	2.6 - 0.0	8.6 - 0.1	14.6 - 0.1	26	0°21.5	0°21.6	0°20.5	2.6 - 0.1	8.6 - 0.2	14.6 - 0.4	26	0°36.5	0°36.6	0°34.8	2.6 - 0.1	8.6 - 0.4	14.6 - 0.6
27	0°06.8	0°06.8	0°06.4	2.7 - 0.0	8.7 - 0.1	14.7 - 0.1	27	0°21.8	0°21.8	0°20.8	2.7 - 0.1	8.7 - 0.2	14.7 - 0.4	27	0°36.8	0°36.9	0°35.1	2.7 - 0.1	8.7 - 0.4	14.7 - 0.6
28	0°07.0	0°07.0	0°06.7	2.8 - 0.0	8.8 - 0.1	14.8 - 0.1	28	0°22.0	0°22.1	0°21.0	2.8 - 0.1	8.8 - 0.2	14.8 - 0.4	28	0°37.0	0°37.1	0°35.3	2.8 - 0.1	8.8 - 0.4	14.8 - 0.6
29	0°07.3	0°07.3	0°06.9	2.9 - 0.0	8.9 - 0.1	14.9 - 0.1	29	0°22.3	0°22.3	0°21.2	2.9 - 0.1	8.9 - 0.2	14.9 - 0.4	29	0°37.3	0°37.4	0°35.6	2.9 - 0.1	8.9 - 0.4	14.9 - 0.6
30	0°07.5	0°07.5	0°07.2	3.0 - 0.0	9.0 - 0.1	15.0 - 0.1	30	0°22.5	0°22.6	0°21.5	3.0 - 0.1	9.0 - 0.2	15.0 - 0.4	30	0°37.5	0°37.6	0°35.8	3.0 - 0.1	9.0 - 0.4	15.0 - 0.6
31	0°07.8	0°07.8	0°07.4	3.1 - 0.0	9.1 - 0.1	15.1 - 0.1	31	0°22.8	0°22.8	0°21.7	3.1 - 0.1	9.1 - 0.2	15.1 - 0.4	31	0°37.8	0°37.9	0°36.0	3.1 - 0.1	9.1 - 0.4	15.1 - 0.6
32	0°08.0	0°08.0	0°07.6	3.2 - 0.0	9.2 - 0.1	15.2 - 0.1	32	0°23.0	0°23.1	0°22.0	3.2 - 0.1	9.2 - 0.2	15.2 - 0.4	32	0°38.0	0°38.1	0°36.3	3.2 - 0.1	9.2 - 0.4	15.2 - 0.6
33	0°08.3	0°08.3	0°07.9	3.3 - 0.0	9.3 - 0.1	15.3 - 0.1	33	0°23.3	0°23.3	0°22.2	3.3 - 0.1	9.3 - 0.2	15.3 - 0.4	33	0°38.3	0°38.4	0°36.5	3.3 - 0.1	9.3 - 0.4	15.3 - 0.6
34	0°08.5	0°08.5	0°08.1	3.4 - 0.0	9.4 - 0.1	15.4 - 0.1	34	0°23.5	0°23.6	0°22.4	3.4 - 0.1	9.4 - 0.2	15.4 - 0.4	34	0°38.5	0°38.6	0°36.7	3.4 - 0.1	9.4 - 0.4	15.4 - 0.6
35	0°08.8	0°08.8	0°08.4	3.5 - 0.0	9.5 - 0.1	15.5 - 0.1	35	0°23.8	0°23.8	0°22.7	3.5 - 0.1	9.5 - 0.2	15.5 - 0.4	35	0°38.8	0°38.9	0°37.0	3.5 - 0.1	9.5 - 0.4	15.5 - 0.6
36	0°09.0	0°09.0	0°08.6	3.6 - 0.0	9.6 - 0.1	15.6 - 0.1	36	0°24.0	0°24.1	0°22.9	3.6 - 0.1	9.6 - 0.2	15.6 - 0.4	36	0°39.0	0°39.1	0°37.2	3.6 - 0.1	9.6 - 0.4	15.6 - 0.6
37	0°09.3	0°09.3	0°08.8	3.7 - 0.0	9.7 - 0.1	15.7 - 0.1	37	0°24.3	0°24.3	0°23.1	3.7 - 0.1	9.7 - 0.2	15.7 - 0.4	37	0°39.3	0°39.4	0°37.5	3.7 - 0.2	9.7 - 0.4	15.7 - 0.7
38	0°09.5	0°09.5	0°09.1	3.8 - 0.0	9.8 - 0.1	15.8 - 0.1	38	0°24.5	0°24.6	0°23.4	3.8 - 0.1	9.8 - 0.2	15.8 - 0.4	38	0°39.5	0°39.6	0°37.7	3.8 - 0.2	9.8 - 0.4	15.8 - 0.7
39	0°09.8	0°09.8	0°09.3	3.9 - 0.0	9.9 - 0.1	15.9 - 0.1	39	0°24.8	0°24.8	0°23.6	3.9 - 0.1	9.9 - 0.2	15.9 - 0.4	39	0°39.8	0°39.9	0°37.9	3.9 - 0.2	9.9 - 0.4	15.9 - 0.7
40	0°10.0	0°10.0	0°09.5	4.0 - 0.0	10.0 - 0.1	16.0 - 0.1	40	0°25.0	0°25.1	0°23.9	4.0 - 0.1	10.0 - 0.3	16.0 - 0.4	40	0°40.0	0°40.1	0°38.2	4.0 - 0.2	10.0 - 0.4	16.0 - 0.7
41	0°10.3	0°10.3	0°09.8	4.1 - 0.0	10.1 - 0.1	16.1 - 0.1	41	0°25.3	0°25.3	0°24.1	4.1 - 0.1	10.1 - 0.3	16.1 - 0.4	41	0°40.3	0°40.4	0°38.4	4.1 - 0.2	10.1 - 0.4	16.1 - 0.7
42	0°10.5	0°10.5	0°10.0	4.2 - 0.0	10.2 - 0.1	16.2 - 0.1	42	0°25.5	0°25.6	0°24.3	4.2 - 0.1	10.2 - 0.3	16.2 - 0.4	42	0°40.5	0°40.6	0°38.7	4.2 - 0.2	10.2 - 0.4	16.2 - 0.7
43	0°10.8	0°10.8	0°10.3	4.3 - 0.0	10.3 - 0.1	16.3 - 0.1	43	0°25.8	0°25.8	0°24.6	4.3 - 0.1	10.3 - 0.3	16.3 - 0.4	43	0°40.8	0°40.9	0°38.9	4.3 - 0.2	10.3 - 0.4	16.3 - 0.7
44	0°11.0	0°11.0	0°10.5	4.4 - 0.0	10.4 - 0.1	16.4 - 0.1	44	0°26.0	0°26.1	0°24.8	4.4 - 0.1	10.4 - 0.3	16.4 - 0.4	44	0°41.0	0°41.1	0°39.1	4.4 - 0.2	10.4 - 0.4	16.4 - 0.7
45	0°11.3	0°11.3	0°10.7	4.5 - 0.0	10.5 - 0.1	16.5 - 0.1	45	0°26.3	0°26.3	0°25.1	4.5 - 0.1	10.5 - 0.3	16.5 - 0.4	45	0°41.3	0°41.4	0°39.4	4.5 - 0.2	10.5 - 0.4	16.5 - 0.7
46	0°11.5	0°11.5	0°11.0	4.6 - 0.0	10.6 - 0.1	16.6 - 0.1	46	0°26.5	0°26.6	0°25.3	4.6 - 0.1	10.6 - 0.3	16.6 - 0.4	46	0°41.5	0°41.6	0°39.6	4.6 - 0.2	10.6 - 0.4	16.6 - 0.7
47	0°11.8	0°11.8	0°11.2	4.7 - 0.0	10.7 - 0.1	16.7 - 0.1	47	0°26.8	0°26.8	0°25.5	4.7 - 0.1	10.7 - 0.3	16.7 - 0.4	47	0°41.8	0°41.9	0°39.8	4.7 - 0.2	10.7 - 0.4	16.7 - 0.7
48	0°12.0	0°12.0	0°11.5	4.8 - 0.0	10.8 - 0.1	16.8 - 0.1	48	0°27.0	0°27.1	0°25.8	4.8 - 0.1	10.8 - 0.3	16.8 - 0.4	48	0°42.0	0°42.1	0°40.1	4.8 - 0.2	10.8 - 0.5	16.8 - 0.7
49	0°12.3	0°12.3	0°11.7	4.9 - 0.0	10.9 - 0.1	16.9														

Increments and Corrections

m 3	Sun Plan.	Aries	Moon	v and d corr			m 4	Sun Plan.	Aries	Moon	v and d corr			m 5	Sun Plan.	Aries	Moon	v and d corr		
0	0°45.0	0°45.1	0°43.0	0.0 - 0.0	6.0 - 0.3	12.0 - 0.7	0	1°00.0	1°00.2	0°57.3	0.0 - 0.0	6.0 - 0.4	12.0 - 0.9	0	1°15.0	1°15.2	1°11.6	0.0 - 0.0	6.0 - 0.5	12.0 - 1.1
1	0°45.3	0°45.4	0°43.2	0.1 - 0.0	6.1 - 0.4	12.1 - 0.7	1	1°00.2	1°00.4	0°57.5	0.1 - 0.0	6.1 - 0.5	12.1 - 0.9	1	1°15.3	1°15.5	1°11.8	0.1 - 0.0	6.1 - 0.6	12.1 - 1.1
2	0°45.5	0°45.6	0°43.4	0.2 - 0.0	6.2 - 0.4	12.2 - 0.7	2	1°00.5	1°00.7	0°57.7	0.2 - 0.0	6.2 - 0.5	12.2 - 0.9	2	1°15.5	1°15.7	1°12.1	0.2 - 0.0	6.2 - 0.6	12.2 - 1.1
3	0°45.8	0°45.9	0°43.7	0.3 - 0.0	6.3 - 0.4	12.3 - 0.7	3	1°00.7	1°00.9	0°58.0	0.3 - 0.0	6.3 - 0.5	12.3 - 0.9	3	1°15.7	1°16.0	1°12.3	0.3 - 0.0	6.3 - 0.6	12.3 - 1.1
4	0°46.0	0°46.1	0°43.9	0.4 - 0.0	6.4 - 0.4	12.4 - 0.7	4	1°01.0	1°01.2	0°58.2	0.4 - 0.0	6.4 - 0.5	12.4 - 0.9	4	1°16.0	1°16.2	1°12.5	0.4 - 0.0	6.4 - 0.6	12.4 - 1.1
5	0°46.3	0°46.4	0°44.1	0.5 - 0.0	6.5 - 0.4	12.5 - 0.7	5	1°01.2	1°01.4	0°58.5	0.5 - 0.0	6.5 - 0.5	12.5 - 0.9	5	1°16.2	1°16.5	1°12.8	0.5 - 0.0	6.5 - 0.6	12.5 - 1.1
6	0°46.5	0°46.6	0°44.4	0.6 - 0.0	6.6 - 0.4	12.6 - 0.7	6	1°01.5	1°01.7	0°58.7	0.6 - 0.0	6.6 - 0.5	12.6 - 0.9	6	1°16.5	1°16.7	1°13.0	0.6 - 0.1	6.6 - 0.6	12.6 - 1.2
7	0°46.8	0°46.9	0°44.6	0.7 - 0.0	6.7 - 0.4	12.7 - 0.7	7	1°01.7	1°01.9	0°58.9	0.7 - 0.1	6.7 - 0.5	12.7 - 1.0	7	1°16.7	1°17.0	1°13.3	0.7 - 0.1	6.7 - 0.6	12.7 - 1.2
8	0°47.0	0°47.1	0°44.9	0.8 - 0.0	6.8 - 0.4	12.8 - 0.7	8	1°02.0	1°02.2	0°59.2	0.8 - 0.1	6.8 - 0.5	12.8 - 1.0	8	1°17.0	1°17.2	1°13.5	0.8 - 0.1	6.8 - 0.6	12.8 - 1.2
9	0°47.3	0°47.4	0°45.1	0.9 - 0.1	6.9 - 0.4	12.9 - 0.8	9	1°02.3	1°02.4	0°59.4	0.9 - 0.1	6.9 - 0.5	12.9 - 1.0	9	1°17.3	1°17.5	1°13.7	0.9 - 0.1	6.9 - 0.6	12.9 - 1.2
10	0°47.5	0°47.6	0°45.3	1.0 - 0.1	7.0 - 0.4	13.0 - 0.8	10	1°02.5	1°02.7	0°59.7	1.0 - 0.1	7.0 - 0.5	13.0 - 1.0	10	1°17.5	1°17.7	1°14.0	1.0 - 0.1	7.0 - 0.6	13.0 - 1.2
11	0°47.8	0°47.9	0°45.6	1.1 - 0.1	7.1 - 0.4	13.1 - 0.8	11	1°02.8	1°02.9	0°59.9	1.1 - 0.1	7.1 - 0.5	13.1 - 1.0	11	1°17.8	1°18.0	1°14.2	1.1 - 0.1	7.1 - 0.7	13.1 - 1.2
12	0°48.0	0°48.1	0°45.8	1.2 - 0.1	7.2 - 0.4	13.2 - 0.8	12	1°03.0	1°03.2	1°00.1	1.2 - 0.1	7.2 - 0.5	13.2 - 1.0	12	1°18.0	1°18.2	1°14.4	1.2 - 0.1	7.2 - 0.7	13.2 - 1.2
13	0°48.3	0°48.4	0°46.1	1.3 - 0.1	7.3 - 0.4	13.3 - 0.8	13	1°03.3	1°03.4	1°00.4	1.3 - 0.1	7.3 - 0.5	13.3 - 1.0	13	1°18.3	1°18.5	1°14.7	1.3 - 0.1	7.3 - 0.7	13.3 - 1.2
14	0°48.5	0°48.6	0°46.3	1.4 - 0.1	7.4 - 0.4	13.4 - 0.8	14	1°03.5	1°03.7	1°00.6	1.4 - 0.1	7.4 - 0.6	13.4 - 1.0	14	1°18.5	1°18.7	1°14.9	1.4 - 0.1	7.4 - 0.7	13.4 - 1.2
15	0°48.8	0°48.9	0°46.5	1.5 - 0.1	7.5 - 0.4	13.5 - 0.8	15	1°03.8	1°03.9	1°00.8	1.5 - 0.1	7.5 - 0.6	13.5 - 1.0	15	1°18.8	1°19.0	1°15.2	1.5 - 0.1	7.5 - 0.7	13.5 - 1.2
16	0°49.0	0°49.1	0°46.8	1.6 - 0.1	7.6 - 0.4	13.6 - 0.8	16	1°04.0	1°04.2	1°01.1	1.6 - 0.1	7.6 - 0.6	13.6 - 1.0	16	1°19.0	1°19.2	1°15.4	1.6 - 0.1	7.6 - 0.7	13.6 - 1.2
17	0°49.3	0°49.4	0°47.0	1.7 - 0.1	7.7 - 0.4	13.7 - 0.8	17	1°04.2	1°04.4	1°01.3	1.7 - 0.1	7.7 - 0.6	13.7 - 1.0	17	1°19.3	1°19.5	1°15.6	1.7 - 0.2	7.7 - 0.7	13.7 - 1.3
18	0°49.5	0°49.6	0°47.2	1.8 - 0.1	7.8 - 0.5	13.8 - 0.8	18	1°04.5	1°04.7	1°01.6	1.8 - 0.1	7.8 - 0.6	13.8 - 1.0	18	1°19.5	1°19.7	1°15.9	1.8 - 0.2	7.8 - 0.7	13.8 - 1.3
19	0°49.8	0°49.9	0°47.5	1.9 - 0.1	7.9 - 0.5	13.9 - 0.8	19	1°04.7	1°04.9	1°01.8	1.9 - 0.1	7.9 - 0.6	13.9 - 1.0	19	1°19.7	1°20.0	1°16.1	1.9 - 0.2	7.9 - 0.7	13.9 - 1.3
20	0°50.0	0°50.1	0°47.7	2.0 - 0.1	8.0 - 0.5	14.0 - 0.8	20	1°05.0	1°05.2	1°02.0	2.0 - 0.1	8.0 - 0.6	14.0 - 1.1	20	1°20.0	1°20.2	1°16.4	2.0 - 0.2	8.0 - 0.7	14.0 - 1.3
21	0°50.3	0°50.4	0°48.0	2.1 - 0.1	8.1 - 0.5	14.1 - 0.8	21	1°05.2	1°05.4	1°02.3	2.1 - 0.2	8.1 - 0.6	14.1 - 1.1	21	1°20.2	1°20.5	1°16.6	2.1 - 0.2	8.1 - 0.7	14.1 - 1.3
22	0°50.5	0°50.6	0°48.2	2.2 - 0.1	8.2 - 0.5	14.2 - 0.8	22	1°05.5	1°05.7	1°02.5	2.2 - 0.2	8.2 - 0.6	14.2 - 1.1	22	1°20.5	1°20.7	1°16.8	2.2 - 0.2	8.2 - 0.8	14.2 - 1.3
23	0°50.8	0°50.9	0°48.4	2.3 - 0.1	8.3 - 0.5	14.3 - 0.8	23	1°05.8	1°05.9	1°02.8	2.3 - 0.2	8.3 - 0.6	14.3 - 1.1	23	1°20.8	1°21.0	1°17.1	2.3 - 0.2	8.3 - 0.8	14.3 - 1.3
24	0°51.0	0°51.1	0°48.7	2.4 - 0.1	8.4 - 0.5	14.4 - 0.8	24	1°06.0	1°06.2	1°03.0	2.4 - 0.2	8.4 - 0.6	14.4 - 1.1	24	1°21.0	1°21.2	1°17.3	2.4 - 0.2	8.4 - 0.8	14.4 - 1.3
25	0°51.3	0°51.4	0°48.9	2.5 - 0.1	8.5 - 0.5	14.5 - 0.8	25	1°06.3	1°06.4	1°03.2	2.5 - 0.2	8.5 - 0.6	14.5 - 1.1	25	1°21.3	1°21.5	1°17.5	2.5 - 0.2	8.5 - 0.8	14.5 - 1.3
26	0°51.5	0°51.6	0°49.2	2.6 - 0.2	8.6 - 0.5	14.6 - 0.9	26	1°06.5	1°06.7	1°03.5	2.6 - 0.2	8.6 - 0.6	14.6 - 1.1	26	1°21.5	1°21.7	1°17.8	2.6 - 0.2	8.6 - 0.8	14.6 - 1.3
27	0°51.8	0°51.9	0°49.4	2.7 - 0.2	8.7 - 0.5	14.7 - 0.9	27	1°06.8	1°06.9	1°03.7	2.7 - 0.2	8.7 - 0.7	14.7 - 1.1	27	1°21.8	1°22.0	1°18.0	2.7 - 0.2	8.7 - 0.8	14.7 - 1.3
28	0°52.0	0°52.1	0°49.6	2.8 - 0.2	8.8 - 0.5	14.8 - 0.9	28	1°07.0	1°07.2	1°03.9	2.8 - 0.2	8.8 - 0.7	14.8 - 1.1	28	1°22.0	1°22.2	1°18.3	2.8 - 0.3	8.8 - 0.8	14.8 - 1.4
29	0°52.3	0°52.4	0°49.9	2.9 - 0.2	8.9 - 0.5	14.9 - 0.9	29	1°07.3	1°07.4	1°04.2	2.9 - 0.2	8.9 - 0.7	14.9 - 1.1	29	1°22.3	1°22.5	1°18.5	2.9 - 0.3	8.9 - 0.8	14.9 - 1.4
30	0°52.5	0°52.6	0°50.1	3.0 - 0.2	9.0 - 0.5	15.0 - 0.9	30	1°07.5	1°07.7	1°04.4	3.0 - 0.2	9.0 - 0.7	15.0 - 1.1	30	1°22.5	1°22.7	1°18.7	3.0 - 0.3	9.0 - 0.8	15.0 - 1.4
31	0°52.8	0°52.9	0°50.3	3.1 - 0.2	9.1 - 0.5	15.1 - 0.9	31	1°07.7	1°07.9	1°04.7	3.1 - 0.2	9.1 - 0.7	15.1 - 1.1	31	1°22.8	1°23.0	1°19.0	3.1 - 0.3	9.1 - 0.8	15.1 - 1.4
32	0°53.0	0°53.1	0°50.6	3.2 - 0.2	9.2 - 0.5	15.2 - 0.9	32	1°08.0	1°08.2	1°04.9	3.2 - 0.2	9.2 - 0.7	15.2 - 1.1	32	1°23.0	1°23.2	1°19.2	3.2 - 0.3	9.2 - 0.8	15.2 - 1.4
33	0°53.3	0°53.4	0°50.8	3.3 - 0.2	9.3 - 0.5	15.3 - 0.9	33	1°08.2	1°08.4	1°05.1	3.3 - 0.2	9.3 - 0.7	15.3 - 1.1	33	1°23.2	1°23.5	1°19.5	3.3 - 0.3	9.3 - 0.9	15.3 - 1.4
34	0°53.5	0°53.6	0°51.1	3.4 - 0.2	9.4 - 0.5	15.4 - 0.9	34	1°08.5	1°08.7	1°05.4	3.4 - 0.3	9.4 - 0.7	15.4 - 1.2	34	1°23.5	1°23.7	1°19.7	3.4 - 0.3	9.4 - 0.9	15.4 - 1.4
35	0°53.8	0°53.9	0°51.3	3.5 - 0.2	9.5 - 0.6	15.5 - 0.9	35	1°08.7	1°08.9	1°05.6	3.5 - 0.3	9.5 - 0.7	15.5 - 1.2	35	1°23.7	1°24.0	1°19.9	3.5 - 0.3	9.5 - 0.9	15.5 - 1.4
36	0°54.0	0°54.1	0°51.5	3.6 - 0.2	9.6 - 0.6	15.6 - 0.9	36	1°09.0	1°09.2	1°05.9	3.6 - 0.3	9.6 - 0.7	15.6 - 1.2	36	1°24.0	1°24.2	1°20.2	3.6 - 0.3	9.6 - 0.9	15.6 - 1.4
37	0°54.3	0°54.4	0°51.8	3.7 - 0.2	9.7 - 0.6	15.7 - 0.9	37	1°09.3	1°09.4	1°06.1	3.7 - 0.3	9.7 - 0.7	15.7 - 1.2	37	1°24.3	1°24.5	1°20.4	3.7 - 0.3	9.7 - 0.9	15.7 - 1.4
38	0°54.5	0°54.6	0°52.0	3.8 - 0.2	9.8 - 0.6	15.8 - 0.9	38	1°09.5	1°09.7	1°06.3	3.8 - 0.3	9.8 - 0.7	15.8 - 1.2	38	1°24.5	1°24.7	1°20.7	3.8 - 0.3	9.8 - 0.9	15.8 - 1.4
39	0°54.8	0°54.9	0°52.3	3.9 - 0.2	9.9 - 0.6	15.9 - 0.9	39	1°09.8	1°09.9	1°06.6	3.9 - 0.3	9.9 - 0.7	15.9 - 1.2	39	1°24.8	1°25.0	1°20.9	3.9 - 0.4	9.9 - 0.9	15.9 - 1.5
40	0°55.0	0°55.2	0°52.5	4.0 - 0.2	10.0 - 0.6	16.0 - 0.9	40	1°10.0	1°10.2	1°06.8	4.0 - 0.3	10.0 - 0.8	16.0 - 1.2	40	1°25.0	1°25.2	1°21.1	4.0 - 0.4	10.0 - 0.9	16.0 - 1.5
41	0°55.3	0°55.4	0°52.7	4.1 - 0.2	10.1 - 0.6	16.1 - 0.9	41	1°10.3	1°10.4	1°07.0	4.1 - 0.3	10.1 - 0.8	16.1 - 1.2	41	1°25.3	1°25.5	1°21.4	4.1 - 0.4	10.1 - 0.9	16.1 - 1.5
42	0°55.5	0°55.7	0°53.0	4.2 - 0.2	10.2 - 0.6	16.2 - 0.9	42	1°10.5	1°10.7	1°07.3	4.2 - 0.3	10.2 - 0.8	16.2 - 1.2	42	1°25.5	1°25.7	1°21.6	4.2 - 0.4	10.2 - 0.9	16.2 - 1.5
43	0°55.8	0°55.9	0°53.2	4.3 - 0.3	10.3 - 0.6	16.3 - 1.0	43	1°10.8	1°10.9	1°07.5	4.3 - 0.3	10.3 - 0.8	16.3 - 1.2	43	1°25.8	1°26.0	1°21.8	4.3 - 0.4	10.3 - 0.9	16.3 - 1.5
44	0°56.0	0°56.2	0°53.4	4.4 - 0.3	10.4 - 0.6	16.4 - 1.0	44	1°11.0	1°11.2	1°07.8	4.4 - 0.3	10.4 - 0.8	16.4 - 1.2	44	1°26.0	1°26.2	1°22.1	4.4 - 0.4	10.4 - 1.0	16.4 - 1.5
45	0°56.3	0°56.4	0°53.7	4.5 - 0.3	10.5 - 0.6	16.5 - 1.0	45	1°11.3	1°11.4	1°08.0	4.5 - 0.3	10.5 - 0.8	16.5 - 1.2	45	1°26.3	1°26.5	1°22.3	4.5 - 0.4	10.5 - 1.0	16.5 - 1.5
46	0°56.5	0°56.7	0°53.9	4.6 - 0.3	10.6 - 0.6	16.6 - 1.0	46	1°11.5	1°11.7	1°08.2	4.6 - 0.3	10.6 - 0.8	16.6 - 1.2	46	1°26.5	1°26.7	1°22.6	4.6 - 0.4	10.6 - 1.0	16.6 - 1.5
47	0°56.8	0°56.9	0°54.2	4.7 - 0.3	10.7 - 0.6	16.7 - 1.0	47	1°11.7	1°11.9	1°08.5	4.7 - 0.4	10.7 - 0.8	16.7 - 1.3	47	1°26.8	1°27.0	1°22.8	4.7 - 0.4	10.7 - 1.0	16.7 - 1.5
48	0°57.0	0°57.2	0°54.4	4.8 - 0.3	10.8 - 0.6	16.8 - 1.0	48	1°12.0	1°12.2	1°08.7	4.8 - 0.4	10.8 - 0.8	16.8 - 1.3	48	1°27.0	1°27.2	1°23.0	4.8 - 0.4	10.8 - 1.0	16.8 - 1.5
49	0°57.3	0°57.4																		

Increments and Corrections

m 6	Sun Plan.	Aries	Moon	v and d corr			m 7	Sun Plan.	Aries	Moon	v and d corr			m 8	Sun Plan.	Aries	Moon	v and d corr		
0	1°30.0	1°30.2	1°25.9	0.0 - 0.0	6.0 - 0.7	12.0 - 1.3	0	1°45.0	1°45.3	1°40.2	0.0 - 0.0	6.0 - 0.8	12.0 - 1.5	0	2°00.0	2°00.3	1°54.5	0.0 - 0.0	6.0 - 0.8	12.0 - 1.7
1	1°30.3	1°30.5	1°26.1	0.1 - 0.0	6.1 - 0.7	12.1 - 1.3	1	1°45.3	1°45.5	1°40.5	0.1 - 0.0	6.1 - 0.8	12.1 - 1.5	1	2°00.3	2°00.6	1°54.8	0.1 - 0.0	6.1 - 0.9	12.1 - 1.7
2	1°30.5	1°30.7	1°26.4	0.2 - 0.0	6.2 - 0.7	12.2 - 1.3	2	1°45.5	1°45.8	1°40.7	0.2 - 0.0	6.2 - 0.8	12.2 - 1.5	2	2°00.5	2°00.8	1°55.0	0.2 - 0.0	6.2 - 0.9	12.2 - 1.7
3	1°30.7	1°31.0	1°26.6	0.3 - 0.0	6.3 - 0.7	12.3 - 1.3	3	1°45.8	1°46.0	1°40.9	0.3 - 0.0	6.3 - 0.8	12.3 - 1.5	3	2°00.8	2°01.1	1°55.2	0.3 - 0.0	6.3 - 0.9	12.3 - 1.7
4	1°31.0	1°31.2	1°26.9	0.4 - 0.0	6.4 - 0.7	12.4 - 1.3	4	1°46.0	1°46.3	1°41.2	0.4 - 0.1	6.4 - 0.8	12.4 - 1.6	4	2°01.0	2°01.3	1°55.5	0.4 - 0.1	6.4 - 0.9	12.4 - 1.8
5	1°31.2	1°31.5	1°27.1	0.5 - 0.1	6.5 - 0.7	12.5 - 1.4	5	1°46.2	1°46.5	1°41.4	0.5 - 0.1	6.5 - 0.8	12.5 - 1.6	5	2°01.3	2°01.6	1°55.7	0.5 - 0.1	6.5 - 0.9	12.5 - 1.8
6	1°31.5	1°31.8	1°27.3	0.6 - 0.1	6.6 - 0.7	12.6 - 1.4	6	1°46.5	1°46.8	1°41.6	0.6 - 0.1	6.6 - 0.8	12.6 - 1.6	6	2°01.5	2°01.8	1°56.0	0.6 - 0.1	6.6 - 0.9	12.6 - 1.8
7	1°31.7	1°32.0	1°27.6	0.7 - 0.1	6.7 - 0.7	12.7 - 1.4	7	1°46.7	1°47.0	1°41.9	0.7 - 0.1	6.7 - 0.8	12.7 - 1.6	7	2°01.8	2°02.1	1°56.2	0.7 - 0.1	6.7 - 0.9	12.7 - 1.8
8	1°32.0	1°32.3	1°27.8	0.8 - 0.1	6.8 - 0.7	12.8 - 1.4	8	1°47.0	1°47.3	1°42.1	0.8 - 0.1	6.8 - 0.8	12.8 - 1.6	8	2°02.0	2°02.3	1°56.4	0.8 - 0.1	6.8 - 1.0	12.8 - 1.8
9	1°32.3	1°32.5	1°28.0	0.9 - 0.1	6.9 - 0.7	12.9 - 1.4	9	1°47.3	1°47.5	1°42.4	0.9 - 0.1	6.9 - 0.9	12.9 - 1.6	9	2°02.3	2°02.6	1°56.7	0.9 - 0.1	6.9 - 1.0	12.9 - 1.8
10	1°32.5	1°32.8	1°28.3	1.0 - 0.1	7.0 - 0.8	13.0 - 1.4	10	1°47.5	1°47.8	1°42.6	1.0 - 0.1	7.0 - 0.9	13.0 - 1.6	10	2°02.5	2°02.8	1°56.9	1.0 - 0.1	7.0 - 1.0	13.0 - 1.8
11	1°32.8	1°33.0	1°28.5	1.1 - 0.1	7.1 - 0.8	13.1 - 1.4	11	1°47.8	1°48.0	1°42.8	1.1 - 0.1	7.1 - 0.9	13.1 - 1.6	11	2°02.8	2°03.1	1°57.2	1.1 - 0.2	7.1 - 1.0	13.1 - 1.9
12	1°33.0	1°33.3	1°28.8	1.2 - 0.1	7.2 - 0.8	13.2 - 1.4	12	1°48.0	1°48.3	1°43.1	1.2 - 0.2	7.2 - 0.9	13.2 - 1.6	12	2°03.0	2°03.3	1°57.4	1.2 - 0.2	7.2 - 1.0	13.2 - 1.9
13	1°33.3	1°33.5	1°29.0	1.3 - 0.1	7.3 - 0.8	13.3 - 1.4	13	1°48.3	1°48.5	1°43.3	1.3 - 0.2	7.3 - 0.9	13.3 - 1.7	13	2°03.3	2°03.6	1°57.6	1.3 - 0.2	7.3 - 1.0	13.3 - 1.9
14	1°33.5	1°33.8	1°29.2	1.4 - 0.2	7.4 - 0.8	13.4 - 1.5	14	1°48.5	1°48.8	1°43.6	1.4 - 0.2	7.4 - 0.9	13.4 - 1.7	14	2°03.5	2°03.8	1°57.9	1.4 - 0.2	7.4 - 1.0	13.4 - 1.9
15	1°33.8	1°34.0	1°29.5	1.5 - 0.2	7.5 - 0.8	13.5 - 1.5	15	1°48.8	1°49.0	1°43.8	1.5 - 0.2	7.5 - 0.9	13.5 - 1.7	15	2°03.8	2°04.1	1°58.1	1.5 - 0.2	7.5 - 1.1	13.5 - 1.9
16	1°34.0	1°34.3	1°29.7	1.6 - 0.2	7.6 - 0.8	13.6 - 1.5	16	1°49.0	1°49.3	1°44.0	1.6 - 0.2	7.6 - 0.9	13.6 - 1.7	16	2°04.0	2°04.3	1°58.4	1.6 - 0.2	7.6 - 1.1	13.6 - 1.9
17	1°34.3	1°34.5	1°30.0	1.7 - 0.2	7.7 - 0.8	13.7 - 1.5	17	1°49.3	1°49.5	1°44.3	1.7 - 0.2	7.7 - 1.0	13.7 - 1.7	17	2°04.2	2°04.6	1°58.6	1.7 - 0.2	7.7 - 1.1	13.7 - 1.9
18	1°34.5	1°34.8	1°30.2	1.8 - 0.2	7.8 - 0.8	13.8 - 1.5	18	1°49.5	1°49.8	1°44.5	1.8 - 0.2	7.8 - 1.0	13.8 - 1.7	18	2°04.5	2°04.8	1°58.8	1.8 - 0.3	7.8 - 1.1	13.8 - 2.0
19	1°34.8	1°35.0	1°30.4	1.9 - 0.2	7.9 - 0.9	13.9 - 1.5	19	1°49.8	1°50.0	1°44.8	1.9 - 0.2	7.9 - 1.0	13.9 - 1.7	19	2°04.7	2°05.1	1°59.1	1.9 - 0.3	7.9 - 1.1	13.9 - 2.0
20	1°35.0	1°35.3	1°30.7	2.0 - 0.2	8.0 - 0.9	14.0 - 1.5	20	1°50.0	1°50.3	1°45.0	2.0 - 0.3	8.0 - 1.0	14.0 - 1.8	20	2°05.0	2°05.3	1°59.3	2.0 - 0.3	8.0 - 1.1	14.0 - 2.0
21	1°35.2	1°35.5	1°30.9	2.1 - 0.2	8.1 - 0.9	14.1 - 1.5	21	1°50.2	1°50.6	1°45.2	2.1 - 0.3	8.1 - 1.0	14.1 - 1.8	21	2°05.2	2°05.6	1°59.5	2.1 - 0.3	8.1 - 1.1	14.1 - 2.0
22	1°35.5	1°35.8	1°31.1	2.2 - 0.2	8.2 - 0.9	14.2 - 1.5	22	1°50.5	1°50.8	1°45.5	2.2 - 0.3	8.2 - 1.0	14.2 - 1.8	22	2°05.5	2°05.8	1°59.8	2.2 - 0.3	8.2 - 1.2	14.2 - 2.0
23	1°35.8	1°36.0	1°31.4	2.3 - 0.2	8.3 - 0.9	14.3 - 1.5	23	1°50.8	1°51.1	1°45.7	2.3 - 0.3	8.3 - 1.0	14.3 - 1.8	23	2°05.7	2°06.1	2°00.0	2.3 - 0.3	8.3 - 1.2	14.3 - 2.0
24	1°36.0	1°36.3	1°31.6	2.4 - 0.3	8.4 - 0.9	14.4 - 1.6	24	1°51.0	1°51.3	1°45.9	2.4 - 0.3	8.4 - 1.1	14.4 - 1.8	24	2°06.0	2°06.3	2°00.3	2.4 - 0.3	8.4 - 1.2	14.4 - 2.0
25	1°36.3	1°36.5	1°31.9	2.5 - 0.3	8.5 - 0.9	14.5 - 1.6	25	1°51.3	1°51.6	1°46.2	2.5 - 0.3	8.5 - 1.1	14.5 - 1.8	25	2°06.2	2°06.6	2°00.5	2.5 - 0.4	8.5 - 1.2	14.5 - 2.1
26	1°36.5	1°36.8	1°32.1	2.6 - 0.3	8.6 - 0.9	14.6 - 1.6	26	1°51.5	1°51.8	1°46.4	2.6 - 0.3	8.6 - 1.1	14.6 - 1.8	26	2°06.5	2°06.8	2°00.7	2.6 - 0.4	8.6 - 1.2	14.6 - 2.1
27	1°36.8	1°37.0	1°32.3	2.7 - 0.3	8.7 - 0.9	14.7 - 1.6	27	1°51.8	1°52.1	1°46.7	2.7 - 0.3	8.7 - 1.1	14.7 - 1.8	27	2°06.7	2°07.1	2°01.0	2.7 - 0.4	8.7 - 1.2	14.7 - 2.1
28	1°37.0	1°37.3	1°32.6	2.8 - 0.3	8.8 - 1.0	14.8 - 1.6	28	1°52.0	1°52.3	1°46.9	2.8 - 0.4	8.8 - 1.1	14.8 - 1.9	28	2°07.0	2°07.3	2°01.2	2.8 - 0.4	8.8 - 1.2	14.8 - 2.1
29	1°37.3	1°37.5	1°32.8	2.9 - 0.3	8.9 - 1.0	14.9 - 1.6	29	1°52.3	1°52.6	1°47.1	2.9 - 0.4	8.9 - 1.1	14.9 - 1.9	29	2°07.2	2°07.6	2°01.5	2.9 - 0.4	8.9 - 1.3	14.9 - 2.1
30	1°37.5	1°37.8	1°33.1	3.0 - 0.3	9.0 - 1.0	15.0 - 1.6	30	1°52.5	1°52.8	1°47.4	3.0 - 0.4	9.0 - 1.1	15.0 - 1.9	30	2°07.5	2°07.8	2°01.7	3.0 - 0.4	9.0 - 1.3	15.0 - 2.1
31	1°37.8	1°38.0	1°33.3	3.1 - 0.3	9.1 - 1.0	15.1 - 1.6	31	1°52.7	1°53.1	1°47.6	3.1 - 0.4	9.1 - 1.1	15.1 - 1.9	31	2°07.8	2°08.1	2°01.9	3.1 - 0.4	9.1 - 1.3	15.1 - 2.1
32	1°38.0	1°38.3	1°33.5	3.2 - 0.3	9.2 - 1.0	15.2 - 1.6	32	1°53.0	1°53.3	1°47.9	3.2 - 0.4	9.2 - 1.1	15.2 - 1.9	32	2°08.0	2°08.3	2°02.2	3.2 - 0.5	9.2 - 1.3	15.2 - 2.2
33	1°38.3	1°38.5	1°33.8	3.3 - 0.4	9.3 - 1.0	15.3 - 1.7	33	1°53.3	1°53.6	1°48.1	3.3 - 0.4	9.3 - 1.2	15.3 - 1.9	33	2°08.3	2°08.6	2°02.4	3.3 - 0.5	9.3 - 1.3	15.3 - 2.2
34	1°38.5	1°38.8	1°34.0	3.4 - 0.4	9.4 - 1.0	15.4 - 1.7	34	1°53.5	1°53.8	1°48.3	3.4 - 0.4	9.4 - 1.2	15.4 - 1.9	34	2°08.5	2°08.9	2°02.6	3.4 - 0.5	9.4 - 1.3	15.4 - 2.2
35	1°38.7	1°39.0	1°34.3	3.5 - 0.4	9.5 - 1.0	15.5 - 1.7	35	1°53.7	1°54.1	1°48.6	3.5 - 0.4	9.5 - 1.2	15.5 - 1.9	35	2°08.8	2°09.1	2°02.9	3.5 - 0.5	9.5 - 1.3	15.5 - 2.2
36	1°39.0	1°39.3	1°34.5	3.6 - 0.4	9.6 - 1.0	15.6 - 1.7	36	1°54.0	1°54.3	1°48.8	3.6 - 0.5	9.6 - 1.2	15.6 - 1.9	36	2°09.0	2°09.4	2°03.1	3.6 - 0.5	9.6 - 1.4	15.6 - 2.2
37	1°39.3	1°39.5	1°34.7	3.7 - 0.4	9.7 - 1.1	15.7 - 1.7	37	1°54.2	1°54.6	1°49.0	3.7 - 0.5	9.7 - 1.2	15.7 - 2.0	37	2°09.3	2°09.6	2°03.4	3.7 - 0.5	9.7 - 1.4	15.7 - 2.2
38	1°39.5	1°39.8	1°35.0	3.8 - 0.4	9.8 - 1.1	15.8 - 1.7	38	1°54.5	1°54.8	1°49.3	3.8 - 0.5	9.8 - 1.2	15.8 - 2.0	38	2°09.5	2°09.9	2°03.6	3.8 - 0.5	9.8 - 1.4	15.8 - 2.2
39	1°39.8	1°40.0	1°35.2	3.9 - 0.4	9.9 - 1.1	15.9 - 1.7	39	1°54.8	1°55.1	1°49.5	3.9 - 0.5	9.9 - 1.2	15.9 - 2.0	39	2°09.8	2°10.1	2°03.8	3.9 - 0.6	9.9 - 1.4	15.9 - 2.3
40	1°40.0	1°40.3	1°35.4	4.0 - 0.4	10.0 - 1.1	16.0 - 1.7	40	1°55.0	1°55.3	1°49.8	4.0 - 0.5	10.0 - 1.3	16.0 - 2.0	40	2°10.0	2°10.4	2°04.1	4.0 - 0.6	10.0 - 1.4	16.0 - 2.3
41	1°40.3	1°40.5	1°35.7	4.1 - 0.4	10.1 - 1.1	16.1 - 1.7	41	1°55.3	1°55.6	1°50.0	4.1 - 0.5	10.1 - 1.3	16.1 - 2.0	41	2°10.3	2°10.6	2°04.3	4.1 - 0.6	10.1 - 1.4	16.1 - 2.3
42	1°40.5	1°40.8	1°35.9	4.2 - 0.5	10.2 - 1.1	16.2 - 1.8	42	1°55.5	1°55.8	1°50.2	4.2 - 0.5	10.2 - 1.3	16.2 - 2.0	42	2°10.5	2°10.9	2°04.6	4.2 - 0.6	10.2 - 1.4	16.2 - 2.3
43	1°40.8	1°41.0	1°36.2	4.3 - 0.5	10.3 - 1.1	16.3 - 1.8	43	1°55.8	1°56.1	1°50.5	4.3 - 0.5	10.3 - 1.3	16.3 - 2.0	43	2°10.8	2°11.1	2°04.8	4.3 - 0.6	10.3 - 1.5	16.3 - 2.3
44	1°41.0	1°41.3	1°36.4	4.4 - 0.5	10.4 - 1.1	16.4 - 1.8	44	1°56.0	1°56.3	1°50.7	4.4 - 0.6	10.4 - 1.3	16.4 - 2.0	44	2°11.0	2°11.4	2°05.0	4.4 - 0.6	10.4 - 1.5	16.4 - 2.3
45	1°41.3	1°41.5	1°36.6	4.5 - 0.5	10.5 - 1.1	16.5 - 1.8	45	1°56.3	1°56.6	1°51.0	4.5 - 0.6	10.5 - 1.3	16.5 - 2.1	45	2°11.3	2°11.6	2°05.3	4.5 - 0.6	10.5 - 1.5	16.5 - 2.3
46	1°41.5	1°41.8	1°36.9	4.6 - 0.5	10.6 - 1.1	16.6 - 1.8	46	1°56.5	1°56.8	1°51.2	4.6 - 0.6	10.6 - 1.3	16.6 - 2.1	46	2°11.5	2°11.9	2°05.5	4.6 - 0.7	10.6 - 1.5	16.6 - 2.4
47	1°41.8	1°42.0	1°37.1	4.7 - 0.5	10.7 - 1.2	16.7 - 1.8	47	1°56.7	1°57.1	1°51.4	4.7 - 0.6	10.7 - 1.3	16.7 - 2.1	47	2°11.7	2°12.1	2°05.7	4.7 - 0.7	10.7 - 1.5	16.7 - 2.4
48	1°42.0	1°42.3	1°37.4	4.8 - 0.5	10.8 - 1.2	16.8 - 1.8	48	1°57.0	1°57.3	1°51.7	4.8 - 0.6	10.8 - 1.4	16.8 - 2.1	48	2°12.0	2°12.4	2°06.0	4.8 - 0.7	10.8 - 1.5	16.8 - 2.4
49	1°42.3	1°42.5																		

Increments and Corrections

m 9	Sun Plan.	Aries	Moon	v and d corr			m 10	Sun Plan.	Aries	Moon	v and d corr			m 11	Sun Plan.	Aries	Moon	v and d corr		
0	2°15.0	2°15.4	2°08.8	0.0 - 0.0	6.0 - 0.9	12.0 - 1.9	0	2°30.0	2°30.4	2°23.2	0.0 - 0.0	6.0 - 1.0	12.0 - 2.1	0	2°45.0	2°45.5	2°37.5	0.0 - 0.0	6.0 - 1.2	12.0 - 2.3
1	2°15.3	2°15.6	2°09.1	0.1 - 0.0	6.1 - 1.0	12.1 - 1.9	1	2°30.3	2°30.7	2°23.4	0.1 - 0.0	6.1 - 1.1	12.1 - 2.1	1	2°45.3	2°45.7	2°37.7	0.1 - 0.0	6.1 - 1.2	12.1 - 2.3
2	2°15.5	2°15.9	2°09.3	0.2 - 0.0	6.2 - 1.0	12.2 - 1.9	2	2°30.5	2°30.9	2°23.6	0.2 - 0.0	6.2 - 1.1	12.2 - 2.1	2	2°45.5	2°46.0	2°38.0	0.2 - 0.0	6.2 - 1.2	12.2 - 2.3
3	2°15.8	2°16.1	2°09.6	0.3 - 0.0	6.3 - 1.0	12.3 - 1.9	3	2°30.8	2°31.2	2°23.9	0.3 - 0.1	6.3 - 1.1	12.3 - 2.2	3	2°45.8	2°46.2	2°38.2	0.3 - 0.1	6.3 - 1.2	12.3 - 2.4
4	2°16.0	2°16.4	2°09.8	0.4 - 0.1	6.4 - 1.0	12.4 - 2.0	4	2°31.0	2°31.4	2°24.1	0.4 - 0.1	6.4 - 1.1	12.4 - 2.2	4	2°46.0	2°46.5	2°38.4	0.4 - 0.1	6.4 - 1.2	12.4 - 2.4
5	2°16.3	2°16.6	2°10.0	0.5 - 0.1	6.5 - 1.0	12.5 - 2.0	5	2°31.3	2°31.7	2°24.4	0.5 - 0.1	6.5 - 1.1	12.5 - 2.2	5	2°46.3	2°46.7	2°38.7	0.5 - 0.1	6.5 - 1.2	12.5 - 2.4
6	2°16.5	2°16.9	2°10.3	0.6 - 0.1	6.6 - 1.0	12.6 - 2.0	6	2°31.5	2°31.9	2°24.6	0.6 - 0.1	6.6 - 1.2	12.6 - 2.2	6	2°46.5	2°47.0	2°38.9	0.6 - 0.1	6.6 - 1.3	12.6 - 2.4
7	2°16.8	2°17.1	2°10.5	0.7 - 0.1	6.7 - 1.1	12.7 - 2.0	7	2°31.8	2°32.2	2°24.8	0.7 - 0.1	6.7 - 1.2	12.7 - 2.2	7	2°46.8	2°47.2	2°39.2	0.7 - 0.1	6.7 - 1.3	12.7 - 2.4
8	2°17.0	2°17.4	2°10.8	0.8 - 0.1	6.8 - 1.1	12.8 - 2.0	8	2°32.0	2°32.4	2°25.1	0.8 - 0.1	6.8 - 1.2	12.8 - 2.2	8	2°47.0	2°47.5	2°39.4	0.8 - 0.2	6.8 - 1.3	12.8 - 2.5
9	2°17.3	2°17.6	2°11.0	0.9 - 0.1	6.9 - 1.1	12.9 - 2.0	9	2°32.3	2°32.7	2°25.3	0.9 - 0.2	6.9 - 1.2	12.9 - 2.3	9	2°47.3	2°47.7	2°39.6	0.9 - 0.2	6.9 - 1.3	12.9 - 2.5
10	2°17.5	2°17.9	2°11.2	1.0 - 0.2	7.0 - 1.1	13.0 - 2.1	10	2°32.5	2°32.9	2°25.6	1.0 - 0.2	7.0 - 1.2	13.0 - 2.3	10	2°47.5	2°48.0	2°39.9	1.0 - 0.2	7.0 - 1.3	13.0 - 2.5
11	2°17.8	2°18.1	2°11.5	1.1 - 0.2	7.1 - 1.1	13.1 - 2.1	11	2°32.8	2°33.2	2°25.8	1.1 - 0.2	7.1 - 1.2	13.1 - 2.3	11	2°47.8	2°48.2	2°40.1	1.1 - 0.2	7.1 - 1.4	13.1 - 2.5
12	2°18.0	2°18.4	2°11.7	1.2 - 0.2	7.2 - 1.1	13.2 - 2.1	12	2°33.0	2°33.4	2°26.0	1.2 - 0.2	7.2 - 1.3	13.2 - 2.3	12	2°48.0	2°48.5	2°40.3	1.2 - 0.2	7.2 - 1.4	13.2 - 2.5
13	2°18.3	2°18.6	2°12.0	1.3 - 0.2	7.3 - 1.2	13.3 - 2.1	13	2°33.3	2°33.7	2°26.3	1.3 - 0.2	7.3 - 1.3	13.3 - 2.3	13	2°48.3	2°48.7	2°40.6	1.3 - 0.2	7.3 - 1.4	13.3 - 2.5
14	2°18.5	2°18.9	2°12.2	1.4 - 0.2	7.4 - 1.2	13.4 - 2.1	14	2°33.5	2°33.9	2°26.5	1.4 - 0.2	7.4 - 1.3	13.4 - 2.3	14	2°48.5	2°49.0	2°40.8	1.4 - 0.3	7.4 - 1.4	13.4 - 2.6
15	2°18.8	2°19.1	2°12.4	1.5 - 0.2	7.5 - 1.2	13.5 - 2.1	15	2°33.8	2°34.2	2°26.7	1.5 - 0.3	7.5 - 1.3	13.5 - 2.4	15	2°48.8	2°49.2	2°41.1	1.5 - 0.3	7.5 - 1.4	13.5 - 2.6
16	2°19.0	2°19.4	2°12.7	1.6 - 0.3	7.6 - 1.2	13.6 - 2.2	16	2°34.0	2°34.4	2°27.0	1.6 - 0.3	7.6 - 1.3	13.6 - 2.4	16	2°49.0	2°49.5	2°41.3	1.6 - 0.3	7.6 - 1.5	13.6 - 2.6
17	2°19.3	2°19.6	2°12.9	1.7 - 0.3	7.7 - 1.2	13.7 - 2.2	17	2°34.3	2°34.7	2°27.2	1.7 - 0.3	7.7 - 1.3	13.7 - 2.4	17	2°49.3	2°49.7	2°41.5	1.7 - 0.3	7.7 - 1.5	13.7 - 2.6
18	2°19.5	2°19.9	2°13.1	1.8 - 0.3	7.8 - 1.2	13.8 - 2.2	18	2°34.5	2°34.9	2°27.5	1.8 - 0.3	7.8 - 1.4	13.8 - 2.4	18	2°49.5	2°50.0	2°41.8	1.8 - 0.3	7.8 - 1.5	13.8 - 2.6
19	2°19.7	2°20.1	2°13.4	1.9 - 0.3	7.9 - 1.3	13.9 - 2.2	19	2°34.8	2°35.2	2°27.7	1.9 - 0.3	7.9 - 1.4	13.9 - 2.4	19	2°49.8	2°50.2	2°42.0	1.9 - 0.4	7.9 - 1.5	13.9 - 2.7
20	2°20.0	2°20.4	2°13.6	2.0 - 0.3	8.0 - 1.3	14.0 - 2.2	20	2°35.0	2°35.4	2°27.9	2.0 - 0.3	8.0 - 1.4	14.0 - 2.4	20	2°50.0	2°50.5	2°42.3	2.0 - 0.4	8.0 - 1.5	14.0 - 2.7
21	2°20.2	2°20.6	2°13.9	2.1 - 0.3	8.1 - 1.3	14.1 - 2.2	21	2°35.2	2°35.6	2°28.2	2.1 - 0.4	8.1 - 1.4	14.1 - 2.5	21	2°50.2	2°50.7	2°42.5	2.1 - 0.4	8.1 - 1.6	14.1 - 2.7
22	2°20.5	2°20.9	2°14.1	2.2 - 0.3	8.2 - 1.3	14.2 - 2.2	22	2°35.5	2°35.9	2°28.4	2.2 - 0.4	8.2 - 1.4	14.2 - 2.5	22	2°50.5	2°51.0	2°42.7	2.2 - 0.4	8.2 - 1.6	14.2 - 2.7
23	2°20.7	2°21.1	2°14.3	2.3 - 0.4	8.3 - 1.3	14.3 - 2.3	23	2°35.7	2°36.2	2°28.7	2.3 - 0.4	8.3 - 1.5	14.3 - 2.5	23	2°50.7	2°51.2	2°43.0	2.3 - 0.4	8.3 - 1.6	14.3 - 2.7
24	2°21.0	2°21.4	2°14.6	2.4 - 0.4	8.4 - 1.3	14.4 - 2.3	24	2°36.0	2°36.4	2°28.9	2.4 - 0.4	8.4 - 1.5	14.4 - 2.5	24	2°51.0	2°51.5	2°43.2	2.4 - 0.5	8.4 - 1.6	14.4 - 2.8
25	2°21.2	2°21.6	2°14.8	2.5 - 0.4	8.5 - 1.3	14.5 - 2.3	25	2°36.2	2°36.7	2°29.1	2.5 - 0.4	8.5 - 1.5	14.5 - 2.5	25	2°51.2	2°51.7	2°43.4	2.5 - 0.5	8.5 - 1.6	14.5 - 2.8
26	2°21.5	2°21.9	2°15.1	2.6 - 0.4	8.6 - 1.4	14.6 - 2.3	26	2°36.5	2°36.9	2°29.4	2.6 - 0.5	8.6 - 1.5	14.6 - 2.6	26	2°51.5	2°52.0	2°43.7	2.6 - 0.5	8.6 - 1.6	14.6 - 2.8
27	2°21.7	2°22.1	2°15.3	2.7 - 0.4	8.7 - 1.4	14.7 - 2.3	27	2°36.7	2°37.2	2°29.6	2.7 - 0.5	8.7 - 1.5	14.7 - 2.6	27	2°51.7	2°52.2	2°43.9	2.7 - 0.5	8.7 - 1.7	14.7 - 2.8
28	2°22.0	2°22.4	2°15.5	2.8 - 0.4	8.8 - 1.4	14.8 - 2.3	28	2°37.0	2°37.4	2°29.8	2.8 - 0.5	8.8 - 1.5	14.8 - 2.6	28	2°52.0	2°52.5	2°44.2	2.8 - 0.5	8.8 - 1.7	14.8 - 2.8
29	2°22.2	2°22.6	2°15.8	2.9 - 0.5	8.9 - 1.4	14.9 - 2.4	29	2°37.2	2°37.7	2°30.1	2.9 - 0.5	8.9 - 1.6	14.9 - 2.6	29	2°52.2	2°52.7	2°44.4	2.9 - 0.6	8.9 - 1.7	14.9 - 2.9
30	2°22.5	2°22.9	2°16.0	3.0 - 0.5	9.0 - 1.4	15.0 - 2.4	30	2°37.5	2°37.9	2°30.3	3.0 - 0.5	9.0 - 1.6	15.0 - 2.6	30	2°52.5	2°53.0	2°44.6	3.0 - 0.6	9.0 - 1.7	15.0 - 2.9
31	2°22.8	2°23.1	2°16.2	3.1 - 0.5	9.1 - 1.4	15.1 - 2.4	31	2°37.8	2°38.2	2°30.6	3.1 - 0.5	9.1 - 1.6	15.1 - 2.6	31	2°52.8	2°53.2	2°44.9	3.1 - 0.6	9.1 - 1.7	15.1 - 2.9
32	2°23.0	2°23.4	2°16.5	3.2 - 0.5	9.2 - 1.5	15.2 - 2.4	32	2°38.0	2°38.4	2°30.8	3.2 - 0.6	9.2 - 1.6	15.2 - 2.7	32	2°53.0	2°53.5	2°45.1	3.2 - 0.6	9.2 - 1.8	15.2 - 2.9
33	2°23.3	2°23.6	2°16.7	3.3 - 0.5	9.3 - 1.5	15.3 - 2.4	33	2°38.3	2°38.7	2°31.0	3.3 - 0.6	9.3 - 1.6	15.3 - 2.7	33	2°53.3	2°53.7	2°45.4	3.3 - 0.6	9.3 - 1.8	15.3 - 2.9
34	2°23.5	2°23.9	2°17.0	3.4 - 0.5	9.4 - 1.5	15.4 - 2.4	34	2°38.5	2°38.9	2°31.3	3.4 - 0.6	9.4 - 1.6	15.4 - 2.7	34	2°53.5	2°54.0	2°45.6	3.4 - 0.7	9.4 - 1.8	15.4 - 3.0
35	2°23.8	2°24.1	2°17.2	3.5 - 0.6	9.5 - 1.5	15.5 - 2.5	35	2°38.8	2°39.2	2°31.5	3.5 - 0.6	9.5 - 1.7	15.5 - 2.7	35	2°53.8	2°54.2	2°45.8	3.5 - 0.7	9.5 - 1.8	15.5 - 3.0
36	2°24.0	2°24.4	2°17.4	3.6 - 0.6	9.6 - 1.5	15.6 - 2.5	36	2°39.0	2°39.4	2°31.8	3.6 - 0.6	9.6 - 1.7	15.6 - 2.7	36	2°54.0	2°54.5	2°46.1	3.6 - 0.7	9.6 - 1.8	15.6 - 3.0
37	2°24.3	2°24.6	2°17.7	3.7 - 0.6	9.7 - 1.5	15.7 - 2.5	37	2°39.3	2°39.7	2°32.0	3.7 - 0.6	9.7 - 1.7	15.7 - 2.7	37	2°54.3	2°54.7	2°46.3	3.7 - 0.7	9.7 - 1.9	15.7 - 3.0
38	2°24.5	2°24.9	2°17.9	3.8 - 0.6	9.8 - 1.6	15.8 - 2.5	38	2°39.5	2°39.9	2°32.2	3.8 - 0.7	9.8 - 1.7	15.8 - 2.8	38	2°54.5	2°55.0	2°46.6	3.8 - 0.7	9.8 - 1.9	15.8 - 3.0
39	2°24.8	2°25.1	2°18.2	3.9 - 0.6	9.9 - 1.6	15.9 - 2.5	39	2°39.8	2°40.2	2°32.5	3.9 - 0.7	9.9 - 1.7	15.9 - 2.8	39	2°54.8	2°55.2	2°46.8	3.9 - 0.7	9.9 - 1.9	15.9 - 3.0
40	2°25.0	2°25.4	2°18.4	4.0 - 0.6	10.0 - 1.6	16.0 - 2.5	40	2°40.0	2°40.4	2°32.7	4.0 - 0.7	10.0 - 1.8	16.0 - 2.8	40	2°55.0	2°55.5	2°47.0	4.0 - 0.8	10.0 - 1.9	16.0 - 3.1
41	2°25.3	2°25.6	2°18.6	4.1 - 0.6	10.1 - 1.6	16.1 - 2.5	41	2°40.3	2°40.7	2°32.9	4.1 - 0.7	10.1 - 1.8	16.1 - 2.8	41	2°55.3	2°55.7	2°47.3	4.1 - 0.8	10.1 - 1.9	16.1 - 3.1
42	2°25.5	2°25.9	2°18.9	4.2 - 0.7	10.2 - 1.6	16.2 - 2.6	42	2°40.5	2°40.9	2°33.2	4.2 - 0.7	10.2 - 1.8	16.2 - 2.8	42	2°55.5	2°56.0	2°47.5	4.2 - 0.8	10.2 - 2.0	16.2 - 3.1
43	2°25.8	2°26.1	2°19.1	4.3 - 0.7	10.3 - 1.6	16.3 - 2.6	43	2°40.8	2°41.2	2°33.4	4.3 - 0.8	10.3 - 1.8	16.3 - 2.9	43	2°55.8	2°56.2	2°47.7	4.3 - 0.8	10.3 - 2.0	16.3 - 3.1
44	2°26.0	2°26.4	2°19.3	4.4 - 0.7	10.4 - 1.6	16.4 - 2.6	44	2°41.0	2°41.4	2°33.7	4.4 - 0.8	10.4 - 1.8	16.4 - 2.9	44	2°56.0	2°56.5	2°48.0	4.4 - 0.8	10.4 - 2.0	16.4 - 3.1
45	2°26.3	2°26.6	2°19.6	4.5 - 0.7	10.5 - 1.7	16.5 - 2.6	45	2°41.3	2°41.7	2°33.9	4.5 - 0.8	10.5 - 1.8	16.5 - 2.9	45	2°56.3	2°56.7	2°48.2	4.5 - 0.9	10.5 - 2.0	16.5 - 3.2
46	2°26.5	2°26.9	2°19.8	4.6 - 0.7	10.6 - 1.7	16.6 - 2.6	46	2°41.5	2°41.9	2°34.1	4.6 - 0.8	10.6 - 1.9	16.6 - 2.9	46	2°56.5	2°57.0	2°48.5	4.6 - 0.9	10.6 - 2.0	16.6 - 3.2
47	2°26.8	2°27.2	2°20.1	4.7 - 0.7	10.7 - 1.7	16.7 - 2.6	47	2°41.8	2°42.2	2°34.4	4.7 - 0.8	10.7 - 1.9	16.7 - 2.9	47	2°56.8	2°57.2	2°48.7	4.7 - 0.9	10.7 - 2.1	16.7 - 3.2
48	2°27.0	2°27.4	2°20.3	4.8 - 0.8	10.8 - 1.7	16.8 - 2.7	48	2°42.0	2°42.4	2°34.6	4.8 - 0.8	10.8 - 1.9	16.8 - 2.9	48	2°57.0	2°57.5	2°48.9	4.8 - 0.9	10.8 - 2.1	16.8 - 3.2
49	2°27.2	2°27.7																		

Increments and Corrections

m 12	Sun Plan.	Aries	Moon	v and d corr			m 13	Sun Plan.	Aries	Moon	v and d corr			m 14	Sun Plan.	Aries	Moon	v and d corr		
0	3°00.0	3°00.5	2°51.8	0.0 - 0.0	6.0 - 1.3	12.0 - 2.5	0	3°15.0	3°15.5	3°06.1	0.0 - 0.0	6.0 - 1.4	12.0 - 2.7	0	3°30.0	3°30.6	3°20.4	0.0 - 0.0	6.0 - 1.4	12.0 - 2.9
1	3°00.3	3°00.7	2°52.0	0.1 - 0.0	6.1 - 1.3	12.1 - 2.5	1	3°15.3	3°15.8	3°06.4	0.1 - 0.0	6.1 - 1.4	12.1 - 2.7	1	3°30.3	3°30.8	3°20.7	0.1 - 0.0	6.1 - 1.5	12.1 - 2.9
2	3°00.5	3°01.0	2°52.3	0.2 - 0.0	6.2 - 1.3	12.2 - 2.5	2	3°15.5	3°16.0	3°06.6	0.2 - 0.0	6.2 - 1.4	12.2 - 2.7	2	3°30.5	3°31.1	3°20.9	0.2 - 0.0	6.2 - 1.5	12.2 - 2.9
3	3°00.8	3°01.2	2°52.5	0.3 - 0.1	6.3 - 1.3	12.3 - 2.6	3	3°15.8	3°16.3	3°06.8	0.3 - 0.1	6.3 - 1.4	12.3 - 2.8	3	3°30.8	3°31.3	3°21.1	0.3 - 0.1	6.3 - 1.5	12.3 - 3.0
4	3°01.0	3°01.5	2°52.8	0.4 - 0.1	6.4 - 1.3	12.4 - 2.6	4	3°16.0	3°16.5	3°07.1	0.4 - 0.1	6.4 - 1.4	12.4 - 2.8	4	3°31.0	3°31.6	3°21.4	0.4 - 0.1	6.4 - 1.5	12.4 - 3.0
5	3°01.3	3°01.7	2°53.0	0.5 - 0.1	6.5 - 1.4	12.5 - 2.6	5	3°16.3	3°16.8	3°07.3	0.5 - 0.1	6.5 - 1.5	12.5 - 2.8	5	3°31.3	3°31.8	3°21.6	0.5 - 0.1	6.5 - 1.6	12.5 - 3.0
6	3°01.5	3°02.0	2°53.2	0.6 - 0.1	6.6 - 1.4	12.6 - 2.6	6	3°16.5	3°17.0	3°07.5	0.6 - 0.1	6.6 - 1.5	12.6 - 2.8	6	3°31.5	3°32.1	3°21.9	0.6 - 0.1	6.6 - 1.6	12.6 - 3.0
7	3°01.8	3°02.2	2°53.5	0.7 - 0.1	6.7 - 1.4	12.7 - 2.6	7	3°16.8	3°17.3	3°07.8	0.7 - 0.2	6.7 - 1.5	12.7 - 2.9	7	3°31.8	3°32.3	3°22.1	0.7 - 0.2	6.7 - 1.6	12.7 - 3.1
8	3°02.0	3°02.5	2°53.7	0.8 - 0.2	6.8 - 1.4	12.8 - 2.7	8	3°17.0	3°17.5	3°08.0	0.8 - 0.2	6.8 - 1.5	12.8 - 2.9	8	3°32.0	3°32.6	3°22.3	0.8 - 0.2	6.8 - 1.6	12.8 - 3.1
9	3°02.3	3°02.7	2°53.9	0.9 - 0.2	6.9 - 1.4	12.9 - 2.7	9	3°17.3	3°17.8	3°08.3	0.9 - 0.2	6.9 - 1.6	12.9 - 2.9	9	3°32.3	3°32.8	3°22.6	0.9 - 0.2	6.9 - 1.7	12.9 - 3.1
10	3°02.5	3°03.0	2°54.2	1.0 - 0.2	7.0 - 1.5	13.0 - 2.7	10	3°17.5	3°18.0	3°08.5	1.0 - 0.2	7.0 - 1.6	13.0 - 2.9	10	3°32.5	3°33.1	3°22.8	1.0 - 0.2	7.0 - 1.7	13.0 - 3.1
11	3°02.8	3°03.2	2°54.4	1.1 - 0.2	7.1 - 1.5	13.1 - 2.7	11	3°17.8	3°18.3	3°08.7	1.1 - 0.2	7.1 - 1.6	13.1 - 2.9	11	3°32.8	3°33.3	3°23.1	1.1 - 0.3	7.1 - 1.7	13.1 - 3.2
12	3°03.0	3°03.5	2°54.7	1.2 - 0.3	7.2 - 1.5	13.2 - 2.8	12	3°18.0	3°18.5	3°09.0	1.2 - 0.3	7.2 - 1.6	13.2 - 3.0	12	3°33.0	3°33.6	3°23.3	1.2 - 0.3	7.2 - 1.7	13.2 - 3.2
13	3°03.3	3°03.8	2°54.9	1.3 - 0.3	7.3 - 1.5	13.3 - 2.8	13	3°18.3	3°18.8	3°09.2	1.3 - 0.3	7.3 - 1.6	13.3 - 3.0	13	3°33.3	3°33.8	3°23.5	1.3 - 0.3	7.3 - 1.8	13.3 - 3.2
14	3°03.5	3°04.0	2°55.1	1.4 - 0.3	7.4 - 1.5	13.4 - 2.8	14	3°18.5	3°19.0	3°09.5	1.4 - 0.3	7.4 - 1.7	13.4 - 3.0	14	3°33.5	3°34.1	3°23.8	1.4 - 0.3	7.4 - 1.8	13.4 - 3.2
15	3°03.8	3°04.3	2°55.4	1.5 - 0.3	7.5 - 1.6	13.5 - 2.8	15	3°18.8	3°19.3	3°09.7	1.5 - 0.3	7.5 - 1.7	13.5 - 3.0	15	3°33.8	3°34.3	3°24.0	1.5 - 0.4	7.5 - 1.8	13.5 - 3.3
16	3°04.0	3°04.5	2°55.6	1.6 - 0.3	7.6 - 1.6	13.6 - 2.8	16	3°19.0	3°19.5	3°09.9	1.6 - 0.4	7.6 - 1.7	13.6 - 3.1	16	3°34.0	3°34.6	3°24.3	1.6 - 0.4	7.6 - 1.8	13.6 - 3.3
17	3°04.2	3°04.8	2°55.9	1.7 - 0.4	7.7 - 1.6	13.7 - 2.9	17	3°19.3	3°19.8	3°10.2	1.7 - 0.4	7.7 - 1.7	13.7 - 3.1	17	3°34.3	3°34.8	3°24.5	1.7 - 0.4	7.7 - 1.9	13.7 - 3.3
18	3°04.5	3°05.0	2°56.1	1.8 - 0.4	7.8 - 1.6	13.8 - 2.9	18	3°19.5	3°20.0	3°10.4	1.8 - 0.4	7.8 - 1.8	13.8 - 3.1	18	3°34.5	3°35.1	3°24.7	1.8 - 0.4	7.8 - 1.9	13.8 - 3.3
19	3°04.7	3°05.3	2°56.3	1.9 - 0.4	7.9 - 1.6	13.9 - 2.9	19	3°19.7	3°20.3	3°10.7	1.9 - 0.4	7.9 - 1.8	13.9 - 3.1	19	3°34.8	3°35.3	3°25.0	1.9 - 0.5	7.9 - 1.9	13.9 - 3.4
20	3°05.0	3°05.5	2°56.6	2.0 - 0.4	8.0 - 1.7	14.0 - 2.9	20	3°20.0	3°20.5	3°10.9	2.0 - 0.5	8.0 - 1.8	14.0 - 3.1	20	3°35.0	3°35.6	3°25.2	2.0 - 0.5	8.0 - 1.9	14.0 - 3.4
21	3°05.2	3°05.8	2°56.8	2.1 - 0.4	8.1 - 1.7	14.1 - 2.9	21	3°20.2	3°20.8	3°11.1	2.1 - 0.5	8.1 - 1.8	14.1 - 3.2	21	3°35.2	3°35.8	3°25.4	2.1 - 0.5	8.1 - 2.0	14.1 - 3.4
22	3°05.5	3°06.0	2°57.0	2.2 - 0.5	8.2 - 1.7	14.2 - 3.0	22	3°20.5	3°21.0	3°11.4	2.2 - 0.5	8.2 - 1.8	14.2 - 3.2	22	3°35.5	3°36.1	3°25.7	2.2 - 0.5	8.2 - 2.0	14.2 - 3.4
23	3°05.7	3°06.3	2°57.3	2.3 - 0.5	8.3 - 1.7	14.3 - 3.0	23	3°20.7	3°21.3	3°11.6	2.3 - 0.5	8.3 - 1.9	14.3 - 3.2	23	3°35.7	3°36.3	3°25.9	2.3 - 0.6	8.3 - 2.0	14.3 - 3.5
24	3°06.0	3°06.5	2°57.5	2.4 - 0.5	8.4 - 1.8	14.4 - 3.0	24	3°21.0	3°21.5	3°11.8	2.4 - 0.5	8.4 - 1.9	14.4 - 3.2	24	3°36.0	3°36.6	3°26.2	2.4 - 0.6	8.4 - 2.0	14.4 - 3.5
25	3°06.2	3°06.8	2°57.8	2.5 - 0.5	8.5 - 1.8	14.5 - 3.0	25	3°21.2	3°21.8	3°12.1	2.5 - 0.6	8.5 - 1.9	14.5 - 3.3	25	3°36.2	3°36.8	3°26.4	2.5 - 0.6	8.5 - 2.1	14.5 - 3.5
26	3°06.5	3°07.0	2°58.0	2.6 - 0.5	8.6 - 1.8	14.6 - 3.0	26	3°21.5	3°22.1	3°12.3	2.6 - 0.6	8.6 - 1.9	14.6 - 3.3	26	3°36.5	3°37.1	3°26.6	2.6 - 0.6	8.6 - 2.1	14.6 - 3.5
27	3°06.7	3°07.3	2°58.2	2.7 - 0.6	8.7 - 1.8	14.7 - 3.1	27	3°21.7	3°22.3	3°12.6	2.7 - 0.6	8.7 - 2.0	14.7 - 3.3	27	3°36.7	3°37.3	3°26.9	2.7 - 0.7	8.7 - 2.1	14.7 - 3.6
28	3°07.0	3°07.5	2°58.5	2.8 - 0.6	8.8 - 1.8	14.8 - 3.1	28	3°22.0	3°22.6	3°12.8	2.8 - 0.6	8.8 - 2.0	14.8 - 3.3	28	3°37.0	3°37.6	3°27.1	2.8 - 0.7	8.8 - 2.1	14.8 - 3.6
29	3°07.2	3°07.8	2°58.7	2.9 - 0.6	8.9 - 1.9	14.9 - 3.1	29	3°22.2	3°22.8	3°13.0	2.9 - 0.7	8.9 - 2.0	14.9 - 3.4	29	3°37.2	3°37.8	3°27.4	2.9 - 0.7	8.9 - 2.2	14.9 - 3.6
30	3°07.5	3°08.0	2°59.0	3.0 - 0.6	9.0 - 1.9	15.0 - 3.1	30	3°22.5	3°23.1	3°13.3	3.0 - 0.7	9.0 - 2.0	15.0 - 3.4	30	3°37.5	3°38.1	3°27.6	3.0 - 0.7	9.0 - 2.2	15.0 - 3.6
31	3°07.8	3°08.3	2°59.2	3.1 - 0.6	9.1 - 1.9	15.1 - 3.1	31	3°22.8	3°23.3	3°13.5	3.1 - 0.7	9.1 - 2.0	15.1 - 3.4	31	3°37.8	3°38.3	3°27.8	3.1 - 0.7	9.1 - 2.2	15.1 - 3.6
32	3°08.0	3°08.5	2°59.4	3.2 - 0.7	9.2 - 1.9	15.2 - 3.2	32	3°23.0	3°23.6	3°13.8	3.2 - 0.7	9.2 - 2.1	15.2 - 3.4	32	3°38.0	3°38.6	3°28.1	3.2 - 0.8	9.2 - 2.2	15.2 - 3.7
33	3°08.3	3°08.8	2°59.7	3.3 - 0.7	9.3 - 1.9	15.3 - 3.2	33	3°23.3	3°23.8	3°14.0	3.3 - 0.7	9.3 - 2.1	15.3 - 3.4	33	3°38.3	3°38.8	3°28.3	3.3 - 0.8	9.3 - 2.2	15.3 - 3.7
34	3°08.5	3°09.0	2°59.9	3.4 - 0.7	9.4 - 2.0	15.4 - 3.2	34	3°23.5	3°24.1	3°14.2	3.4 - 0.8	9.4 - 2.1	15.4 - 3.5	34	3°38.5	3°39.1	3°28.5	3.4 - 0.8	9.4 - 2.3	15.4 - 3.7
35	3°08.8	3°09.3	3°00.2	3.5 - 0.7	9.5 - 2.0	15.5 - 3.2	35	3°23.8	3°24.3	3°14.5	3.5 - 0.8	9.5 - 2.1	15.5 - 3.5	35	3°38.8	3°39.3	3°28.8	3.5 - 0.8	9.5 - 2.3	15.5 - 3.7
36	3°09.0	3°09.5	3°00.4	3.6 - 0.8	9.6 - 2.0	15.6 - 3.3	36	3°24.0	3°24.6	3°14.7	3.6 - 0.8	9.6 - 2.2	15.6 - 3.5	36	3°39.0	3°39.6	3°29.0	3.6 - 0.9	9.6 - 2.3	15.6 - 3.8
37	3°09.3	3°09.8	3°00.6	3.7 - 0.8	9.7 - 2.0	15.7 - 3.3	37	3°24.3	3°24.8	3°14.9	3.7 - 0.8	9.7 - 2.2	15.7 - 3.5	37	3°39.3	3°39.8	3°29.3	3.7 - 0.9	9.7 - 2.3	15.7 - 3.8
38	3°09.5	3°10.0	3°00.9	3.8 - 0.8	9.8 - 2.0	15.8 - 3.3	38	3°24.5	3°25.1	3°15.2	3.8 - 0.9	9.8 - 2.2	15.8 - 3.6	38	3°39.5	3°40.1	3°29.5	3.8 - 0.9	9.8 - 2.4	15.8 - 3.8
39	3°09.8	3°10.3	3°01.1	3.9 - 0.8	9.9 - 2.1	15.9 - 3.3	39	3°24.8	3°25.3	3°15.4	3.9 - 0.9	9.9 - 2.2	15.9 - 3.6	39	3°39.8	3°40.4	3°29.7	3.9 - 0.9	9.9 - 2.4	15.9 - 3.8
40	3°10.0	3°10.5	3°01.3	4.0 - 0.8	10.0 - 2.1	16.0 - 3.3	40	3°25.0	3°25.6	3°15.7	4.0 - 0.9	10.0 - 2.3	16.0 - 3.6	40	3°40.0	3°40.6	3°30.0	4.0 - 1.0	10.0 - 2.4	16.0 - 3.9
41	3°10.3	3°10.8	3°01.6	4.1 - 0.9	10.1 - 2.1	16.1 - 3.4	41	3°25.3	3°25.8	3°15.9	4.1 - 0.9	10.1 - 2.3	16.1 - 3.6	41	3°40.3	3°40.9	3°30.2	4.1 - 1.0	10.1 - 2.4	16.1 - 3.9
42	3°10.5	3°11.0	3°01.8	4.2 - 0.9	10.2 - 2.1	16.2 - 3.4	42	3°25.5	3°26.1	3°16.1	4.2 - 0.9	10.2 - 2.3	16.2 - 3.6	42	3°40.5	3°41.1	3°30.5	4.2 - 1.0	10.2 - 2.5	16.2 - 3.9
43	3°10.8	3°11.3	3°02.1	4.3 - 0.9	10.3 - 2.1	16.3 - 3.4	43	3°25.8	3°26.3	3°16.4	4.3 - 1.0	10.3 - 2.3	16.3 - 3.7	43	3°40.8	3°41.4	3°30.7	4.3 - 1.0	10.3 - 2.5	16.3 - 3.9
44	3°11.0	3°11.5	3°02.3	4.4 - 0.9	10.4 - 2.2	16.4 - 3.4	44	3°26.0	3°26.6	3°16.6	4.4 - 1.0	10.4 - 2.3	16.4 - 3.7	44	3°41.0	3°41.6	3°30.9	4.4 - 1.1	10.4 - 2.5	16.4 - 4.0
45	3°11.3	3°11.8	3°02.5	4.5 - 0.9	10.5 - 2.2	16.5 - 3.4	45	3°26.3	3°26.8	3°16.9	4.5 - 1.0	10.5 - 2.4	16.5 - 3.7	45	3°41.3	3°41.9	3°31.2	4.5 - 1.1	10.5 - 2.5	16.5 - 4.0
46	3°11.5	3°12.0	3°02.8	4.6 - 1.0	10.6 - 2.2	16.6 - 3.5	46	3°26.5	3°27.1	3°17.1	4.6 - 1.0	10.6 - 2.4	16.6 - 3.7	46	3°41.5	3°42.1	3°31.4	4.6 - 1.1	10.6 - 2.6	16.6 - 4.0
47	3°11.7	3°12.3	3°03.0	4.7 - 1.0	10.7 - 2.2	16.7 - 3.5	47	3°26.8	3°27.3	3°17.3	4.7 - 1.1	10.7 - 2.4	16.7 - 3.8	47	3°41.8	3°42.4	3°31.6	4.7 - 1.1	10.7 - 2.6	16.7 - 4.0
48	3°12.0	3°12.5	3°03.3	4.8 - 1.0	10.8 - 2.3	16.8 - 3.5	48	3°27.0	3°27.6	3°17.6	4.8 - 1.1	10.8 - 2.4	16.8 - 3.8	48	3°42.0	3°42.6	3°31.9	4.8 - 1.2	10.8 - 2.6	16.8 - 4.1
49	3°12.2	3°12.																		

Increments and Corrections

m 15	Sun Plan.	Aries	Moon	v and d corr			m 16	Sun Plan.	Aries	Moon	v and d corr			m 17	Sun Plan.	Aries	Moon	v and d corr		
0	3°45.0	3°45.6	3°34.8	0.0 - 0.0	6.0 - 1.6	12.0 - 3.1	0	4°00.0	4°00.7	3°49.1	0.0 - 0.0	6.0 - 1.7	12.0 - 3.3	0	4°15.0	4°15.7	4°03.4	0.0 - 0.0	6.0 - 1.8	12.0 - 3.5
1	3°45.2	3°45.9	3°35.0	0.1 - 0.0	6.1 - 1.6	12.1 - 3.1	1	4°00.2	4°00.9	3°49.3	0.1 - 0.0	6.1 - 1.7	12.1 - 3.3	1	4°15.2	4°15.9	4°03.6	0.1 - 0.0	6.1 - 1.8	12.1 - 3.5
2	3°45.5	3°46.1	3°35.2	0.2 - 0.1	6.2 - 1.6	12.2 - 3.2	2	4°00.5	4°01.2	3°49.5	0.2 - 0.1	6.2 - 1.7	12.2 - 3.4	2	4°15.5	4°16.2	4°03.9	0.2 - 0.1	6.2 - 1.8	12.2 - 3.6
3	3°45.8	3°46.4	3°35.5	0.3 - 0.1	6.3 - 1.6	12.3 - 3.2	3	4°00.8	4°01.4	3°49.8	0.3 - 0.1	6.3 - 1.7	12.3 - 3.4	3	4°15.8	4°16.4	4°04.1	0.3 - 0.1	6.3 - 1.8	12.3 - 3.6
4	3°46.0	3°46.6	3°35.7	0.4 - 0.1	6.4 - 1.7	12.4 - 3.2	4	4°01.0	4°01.7	3°50.0	0.4 - 0.1	6.4 - 1.8	12.4 - 3.4	4	4°16.0	4°16.7	4°04.3	0.4 - 0.1	6.4 - 1.9	12.4 - 3.6
5	3°46.2	3°46.9	3°35.9	0.5 - 0.1	6.5 - 1.7	12.5 - 3.2	5	4°01.2	4°01.9	3°50.3	0.5 - 0.1	6.5 - 1.8	12.5 - 3.4	5	4°16.2	4°17.0	4°04.6	0.5 - 0.1	6.5 - 1.9	12.5 - 3.6
6	3°46.5	3°47.1	3°36.2	0.6 - 0.2	6.6 - 1.7	12.6 - 3.3	6	4°01.5	4°02.2	3°50.5	0.6 - 0.2	6.6 - 1.8	12.6 - 3.5	6	4°16.5	4°17.2	4°04.8	0.6 - 0.2	6.6 - 1.9	12.6 - 3.7
7	3°46.8	3°47.4	3°36.4	0.7 - 0.2	6.7 - 1.7	12.7 - 3.3	7	4°01.8	4°02.4	3°50.7	0.7 - 0.2	6.7 - 1.8	12.7 - 3.5	7	4°16.8	4°17.5	4°05.1	0.7 - 0.2	6.7 - 2.0	12.7 - 3.7
8	3°47.0	3°47.6	3°36.7	0.8 - 0.2	6.8 - 1.8	12.8 - 3.3	8	4°02.0	4°02.7	3°51.0	0.8 - 0.2	6.8 - 1.9	12.8 - 3.5	8	4°17.0	4°17.7	4°05.3	0.8 - 0.2	6.8 - 2.0	12.8 - 3.7
9	3°47.3	3°47.9	3°36.9	0.9 - 0.2	6.9 - 1.8	12.9 - 3.3	9	4°02.2	4°02.9	3°51.2	0.9 - 0.2	6.9 - 1.9	12.9 - 3.5	9	4°17.2	4°18.0	4°05.5	0.9 - 0.3	6.9 - 2.0	12.9 - 3.8
10	3°47.5	3°48.1	3°37.1	1.0 - 0.3	7.0 - 1.8	13.0 - 3.4	10	4°02.5	4°03.2	3°51.5	1.0 - 0.3	7.0 - 1.9	13.0 - 3.6	10	4°17.5	4°18.2	4°05.8	1.0 - 0.3	7.0 - 2.0	13.0 - 3.8
11	3°47.7	3°48.4	3°37.4	1.1 - 0.3	7.1 - 1.8	13.1 - 3.4	11	4°02.8	4°03.4	3°51.7	1.1 - 0.3	7.1 - 2.0	13.1 - 3.6	11	4°17.8	4°18.5	4°06.0	1.1 - 0.3	7.1 - 2.1	13.1 - 3.8
12	3°48.0	3°48.6	3°37.6	1.2 - 0.3	7.2 - 1.9	13.2 - 3.4	12	4°03.0	4°03.7	3°51.9	1.2 - 0.3	7.2 - 2.0	13.2 - 3.6	12	4°18.0	4°18.7	4°06.2	1.2 - 0.4	7.2 - 2.1	13.2 - 3.9
13	3°48.3	3°48.9	3°37.9	1.3 - 0.3	7.3 - 1.9	13.3 - 3.4	13	4°03.2	4°03.9	3°52.2	1.3 - 0.4	7.3 - 2.0	13.3 - 3.7	13	4°18.2	4°19.0	4°06.5	1.3 - 0.4	7.3 - 2.1	13.3 - 3.9
14	3°48.5	3°49.1	3°38.1	1.4 - 0.4	7.4 - 1.9	13.4 - 3.5	14	4°03.5	4°04.2	3°52.4	1.4 - 0.4	7.4 - 2.0	13.4 - 3.7	14	4°18.5	4°19.2	4°06.7	1.4 - 0.4	7.4 - 2.2	13.4 - 3.9
15	3°48.8	3°49.4	3°38.3	1.5 - 0.4	7.5 - 1.9	13.5 - 3.5	15	4°03.8	4°04.4	3°52.6	1.5 - 0.4	7.5 - 2.1	13.5 - 3.7	15	4°18.8	4°19.5	4°07.0	1.5 - 0.4	7.5 - 2.2	13.5 - 3.9
16	3°49.0	3°49.6	3°38.6	1.6 - 0.4	7.6 - 2.0	13.6 - 3.5	16	4°04.0	4°04.7	3°52.9	1.6 - 0.4	7.6 - 2.1	13.6 - 3.7	16	4°19.0	4°19.7	4°07.2	1.6 - 0.5	7.6 - 2.2	13.6 - 4.0
17	3°49.3	3°49.9	3°38.8	1.7 - 0.4	7.7 - 2.0	13.7 - 3.5	17	4°04.3	4°04.9	3°53.1	1.7 - 0.5	7.7 - 2.1	13.7 - 3.8	17	4°19.3	4°20.0	4°07.4	1.7 - 0.5	7.7 - 2.2	13.7 - 4.0
18	3°49.5	3°50.1	3°39.0	1.8 - 0.5	7.8 - 2.0	13.8 - 3.6	18	4°04.5	4°05.2	3°53.4	1.8 - 0.5	7.8 - 2.1	13.8 - 3.8	18	4°19.5	4°20.2	4°07.7	1.8 - 0.5	7.8 - 2.3	13.8 - 4.0
19	3°49.8	3°50.4	3°39.3	1.9 - 0.5	7.9 - 2.0	13.9 - 3.6	19	4°04.7	4°05.4	3°53.6	1.9 - 0.5	7.9 - 2.2	13.9 - 3.8	19	4°19.7	4°20.5	4°07.9	1.9 - 0.6	7.9 - 2.3	13.9 - 4.1
20	3°50.0	3°50.6	3°39.5	2.0 - 0.5	8.0 - 2.1	14.0 - 3.6	20	4°05.0	4°05.7	3°53.8	2.0 - 0.6	8.0 - 2.2	14.0 - 3.9	20	4°20.0	4°20.7	4°08.2	2.0 - 0.6	8.0 - 2.3	14.0 - 4.1
21	3°50.2	3°50.9	3°39.8	2.1 - 0.5	8.1 - 2.1	14.1 - 3.6	21	4°05.3	4°05.9	3°54.1	2.1 - 0.6	8.1 - 2.2	14.1 - 3.9	21	4°20.3	4°21.0	4°08.4	2.1 - 0.6	8.1 - 2.4	14.1 - 4.1
22	3°50.5	3°51.1	3°40.0	2.2 - 0.6	8.2 - 2.1	14.2 - 3.7	22	4°05.5	4°06.2	3°54.3	2.2 - 0.6	8.2 - 2.2	14.2 - 3.9	22	4°20.5	4°21.2	4°08.6	2.2 - 0.6	8.2 - 2.4	14.2 - 4.1
23	3°50.7	3°51.4	3°40.2	2.3 - 0.6	8.3 - 2.1	14.3 - 3.7	23	4°05.7	4°06.4	3°54.6	2.3 - 0.6	8.3 - 2.3	14.3 - 3.9	23	4°20.7	4°21.5	4°08.9	2.3 - 0.7	8.3 - 2.4	14.3 - 4.2
24	3°51.0	3°51.6	3°40.5	2.4 - 0.6	8.4 - 2.2	14.4 - 3.7	24	4°06.0	4°06.7	3°54.8	2.4 - 0.7	8.4 - 2.3	14.4 - 4.0	24	4°21.0	4°21.7	4°09.1	2.4 - 0.7	8.4 - 2.5	14.4 - 4.2
25	3°51.2	3°51.9	3°40.7	2.5 - 0.6	8.5 - 2.2	14.5 - 3.7	25	4°06.3	4°06.9	3°55.0	2.5 - 0.7	8.5 - 2.3	14.5 - 4.0	25	4°21.3	4°22.0	4°09.3	2.5 - 0.7	8.5 - 2.5	14.5 - 4.2
26	3°51.5	3°52.1	3°41.0	2.6 - 0.7	8.6 - 2.2	14.6 - 3.8	26	4°06.5	4°07.2	3°55.3	2.6 - 0.7	8.6 - 2.4	14.6 - 4.0	26	4°21.5	4°22.2	4°09.6	2.6 - 0.8	8.6 - 2.5	14.6 - 4.3
27	3°51.8	3°52.4	3°41.2	2.7 - 0.7	8.7 - 2.2	14.7 - 3.8	27	4°06.7	4°07.4	3°55.5	2.7 - 0.7	8.7 - 2.4	14.7 - 4.0	27	4°21.7	4°22.5	4°09.8	2.7 - 0.8	8.7 - 2.5	14.7 - 4.3
28	3°52.0	3°52.6	3°41.4	2.8 - 0.7	8.8 - 2.3	14.8 - 3.8	28	4°07.0	4°07.7	3°55.7	2.8 - 0.8	8.8 - 2.4	14.8 - 4.1	28	4°22.0	4°22.7	4°10.1	2.8 - 0.8	8.8 - 2.6	14.8 - 4.3
29	3°52.2	3°52.9	3°41.7	2.9 - 0.7	8.9 - 2.3	14.9 - 3.8	29	4°07.3	4°07.9	3°56.0	2.9 - 0.8	8.9 - 2.4	14.9 - 4.1	29	4°22.3	4°23.0	4°10.3	2.9 - 0.8	8.9 - 2.6	14.9 - 4.3
30	3°52.5	3°53.1	3°41.9	3.0 - 0.8	9.0 - 2.3	15.0 - 3.9	30	4°07.5	4°08.2	3°56.2	3.0 - 0.8	9.0 - 2.5	15.0 - 4.1	30	4°22.5	4°23.2	4°10.5	3.0 - 0.9	9.0 - 2.6	15.0 - 4.4
31	3°52.8	3°53.4	3°42.1	3.1 - 0.8	9.1 - 2.4	15.1 - 3.9	31	4°07.7	4°08.4	3°56.5	3.1 - 0.9	9.1 - 2.5	15.1 - 4.2	31	4°22.7	4°23.5	4°10.8	3.1 - 0.9	9.1 - 2.7	15.1 - 4.4
32	3°53.0	3°53.6	3°42.4	3.2 - 0.8	9.2 - 2.4	15.2 - 3.9	32	4°08.0	4°08.7	3°56.7	3.2 - 0.9	9.2 - 2.5	15.2 - 4.2	32	4°23.0	4°23.7	4°11.0	3.2 - 0.9	9.2 - 2.7	15.2 - 4.4
33	3°53.2	3°53.9	3°42.6	3.3 - 0.9	9.3 - 2.4	15.3 - 4.0	33	4°08.3	4°08.9	3°56.9	3.3 - 0.9	9.3 - 2.6	15.3 - 4.2	33	4°23.3	4°24.0	4°11.3	3.3 - 1.0	9.3 - 2.7	15.3 - 4.5
34	3°53.5	3°54.1	3°42.9	3.4 - 0.9	9.4 - 2.4	15.4 - 4.0	34	4°08.5	4°09.2	3°57.2	3.4 - 0.9	9.4 - 2.6	15.4 - 4.2	34	4°23.5	4°24.2	4°11.5	3.4 - 1.0	9.4 - 2.7	15.4 - 4.5
35	3°53.8	3°54.4	3°43.1	3.5 - 0.9	9.5 - 2.5	15.5 - 4.0	35	4°08.7	4°09.4	3°57.4	3.5 - 1.0	9.5 - 2.6	15.5 - 4.3	35	4°23.7	4°24.5	4°11.7	3.5 - 1.0	9.5 - 2.8	15.5 - 4.5
36	3°54.0	3°54.6	3°43.3	3.6 - 0.9	9.6 - 2.5	15.6 - 4.0	36	4°09.0	4°09.7	3°57.7	3.6 - 1.0	9.6 - 2.6	15.6 - 4.3	36	4°24.0	4°24.7	4°12.0	3.6 - 1.1	9.6 - 2.8	15.6 - 4.5
37	3°54.3	3°54.9	3°43.6	3.7 - 1.0	9.7 - 2.5	15.7 - 4.1	37	4°09.3	4°09.9	3°57.9	3.7 - 1.0	9.7 - 2.7	15.7 - 4.3	37	4°24.3	4°25.0	4°12.2	3.7 - 1.1	9.7 - 2.8	15.7 - 4.6
38	3°54.5	3°55.1	3°43.8	3.8 - 1.0	9.8 - 2.5	15.8 - 4.1	38	4°09.5	4°10.2	3°58.1	3.8 - 1.0	9.8 - 2.7	15.8 - 4.3	38	4°24.5	4°25.2	4°12.5	3.8 - 1.1	9.8 - 2.9	15.8 - 4.6
39	3°54.8	3°55.4	3°44.1	3.9 - 1.0	9.9 - 2.6	15.9 - 4.1	39	4°09.7	4°10.4	3°58.4	3.9 - 1.1	9.9 - 2.7	15.9 - 4.4	39	4°24.7	4°25.5	4°12.7	3.9 - 1.1	9.9 - 2.9	15.9 - 4.6
40	3°55.0	3°55.6	3°44.3	4.0 - 1.0	10.0 - 2.6	16.0 - 4.1	40	4°10.0	4°10.7	3°58.6	4.0 - 1.1	10.0 - 2.8	16.0 - 4.4	40	4°25.0	4°25.7	4°12.9	4.0 - 1.2	10.0 - 2.9	16.0 - 4.7
41	3°55.3	3°55.9	3°44.5	4.1 - 1.1	10.1 - 2.6	16.1 - 4.2	41	4°10.3	4°10.9	3°58.8	4.1 - 1.1	10.1 - 2.8	16.1 - 4.4	41	4°25.3	4°26.0	4°13.2	4.1 - 1.2	10.1 - 2.9	16.1 - 4.7
42	3°55.5	3°56.1	3°44.8	4.2 - 1.1	10.2 - 2.6	16.2 - 4.2	42	4°10.5	4°11.2	3°59.1	4.2 - 1.2	10.2 - 2.8	16.2 - 4.5	42	4°25.5	4°26.2	4°13.4	4.2 - 1.2	10.2 - 3.0	16.2 - 4.7
43	3°55.7	3°56.4	3°45.0	4.3 - 1.1	10.3 - 2.7	16.3 - 4.2	43	4°10.7	4°11.4	3°59.3	4.3 - 1.2	10.3 - 2.8	16.3 - 4.5	43	4°25.7	4°26.5	4°13.6	4.3 - 1.3	10.3 - 3.0	16.3 - 4.8
44	3°56.0	3°56.6	3°45.2	4.4 - 1.1	10.4 - 2.7	16.4 - 4.2	44	4°11.0	4°11.7	3°59.6	4.4 - 1.2	10.4 - 2.9	16.4 - 4.5	44	4°26.0	4°26.7	4°13.9	4.4 - 1.3	10.4 - 3.0	16.4 - 4.8
45	3°56.3	3°56.9	3°45.5	4.5 - 1.2	10.5 - 2.7	16.5 - 4.3	45	4°11.3	4°11.9	3°59.8	4.5 - 1.2	10.5 - 2.9	16.5 - 4.5	45	4°26.3	4°27.0	4°14.1	4.5 - 1.3	10.5 - 3.1	16.5 - 4.8
46	3°56.5	3°57.1	3°45.7	4.6 - 1.2	10.6 - 2.7	16.6 - 4.3	46	4°11.5	4°12.2	4°00.0	4.6 - 1.3	10.6 - 2.9	16.6 - 4.6	46	4°26.5	4°27.2	4°14.4	4.6 - 1.3	10.6 - 3.1	16.6 - 4.8
47	3°56.8	3°57.4	3°46.0	4.7 - 1.2	10.7 - 2.8	16.7 - 4.3	47	4°11.8	4°12.4	4°00.3	4.7 - 1.3	10.7 - 2.9	16.7 - 4.6	47	4°26.8	4°27.5	4°14.6	4.7 - 1.4	10.7 - 3.1	16.7 - 4.9
48	3°57.0	3°57.6	3°46.2	4.8 - 1.2	10.8 - 2.8	16.8 - 4.3	48	4°12.0	4°12.7	4°00.5	4.8 - 1.3	10.8 - 3.0	16.8 - 4.6	48	4°27.0	4°27.7	4°14.8	4.8 - 1.4	10.8 - 3.2	16.8 - 4.9
49	3°57.3	3°57.																		

Increments and Corrections

m 18	Sun Plan.	Aries	Moon	v and d corr			m 19	Sun Plan.	Aries	Moon	v and d corr			m 20	Sun Plan.	Aries	Moon	v and d corr		
0	4°30.0	4°30.7	4°17.7	0.0 - 0.0	6.0 - 1.9	12.0 - 3.7	0	4°45.0	4°45.8	4°32.0	0.0 - 0.0	6.0 - 2.0	12.0 - 3.9	0	5°00.0	5°00.8	4°46.3	0.0 - 0.0	6.0 - 2.0	12.0 - 4.1
1	4°30.2	4°31.0	4°17.9	0.1 - 0.0	6.1 - 1.9	12.1 - 3.7	1	4°45.2	4°46.0	4°32.3	0.1 - 0.0	6.1 - 2.0	12.1 - 3.9	1	5°00.2	5°01.1	4°46.6	0.1 - 0.0	6.1 - 2.1	12.1 - 4.1
2	4°30.5	4°31.2	4°18.2	0.2 - 0.1	6.2 - 1.9	12.2 - 3.8	2	4°45.5	4°46.3	4°32.5	0.2 - 0.1	6.2 - 2.0	12.2 - 4.0	2	5°00.5	5°01.3	4°46.8	0.2 - 0.1	6.2 - 2.1	12.2 - 4.2
3	4°30.8	4°31.5	4°18.4	0.3 - 0.1	6.3 - 1.9	12.3 - 3.8	3	4°45.8	4°46.5	4°32.7	0.3 - 0.1	6.3 - 2.0	12.3 - 4.0	3	5°00.8	5°01.6	4°47.0	0.3 - 0.1	6.3 - 2.2	12.3 - 4.2
4	4°31.0	4°31.7	4°18.7	0.4 - 0.1	6.4 - 2.0	12.4 - 3.8	4	4°46.0	4°46.8	4°33.0	0.4 - 0.1	6.4 - 2.1	12.4 - 4.0	4	5°01.0	5°01.8	4°47.3	0.4 - 0.1	6.4 - 2.2	12.4 - 4.2
5	4°31.2	4°32.0	4°18.9	0.5 - 0.2	6.5 - 2.0	12.5 - 3.9	5	4°46.2	4°47.0	4°33.2	0.5 - 0.2	6.5 - 2.1	12.5 - 4.1	5	5°01.2	5°02.1	4°47.5	0.5 - 0.2	6.5 - 2.2	12.5 - 4.3
6	4°31.5	4°32.2	4°19.1	0.6 - 0.2	6.6 - 2.0	12.6 - 3.9	6	4°46.5	4°47.3	4°33.4	0.6 - 0.2	6.6 - 2.1	12.6 - 4.1	6	5°01.5	5°02.3	4°47.8	0.6 - 0.2	6.6 - 2.3	12.6 - 4.3
7	4°31.8	4°32.5	4°19.4	0.7 - 0.2	6.7 - 2.1	12.7 - 3.9	7	4°46.8	4°47.5	4°33.7	0.7 - 0.2	6.7 - 2.2	12.7 - 4.1	7	5°01.8	5°02.6	4°48.0	0.7 - 0.2	6.7 - 2.3	12.7 - 4.3
8	4°32.0	4°32.7	4°19.6	0.8 - 0.2	6.8 - 2.1	12.8 - 3.9	8	4°47.0	4°47.8	4°33.9	0.8 - 0.3	6.8 - 2.2	12.8 - 4.2	8	5°02.0	5°02.8	4°48.2	0.8 - 0.3	6.8 - 2.3	12.8 - 4.4
9	4°32.2	4°33.0	4°19.8	0.9 - 0.3	6.9 - 2.1	12.9 - 4.0	9	4°47.2	4°48.0	4°34.2	0.9 - 0.3	6.9 - 2.2	12.9 - 4.2	9	5°02.2	5°03.1	4°48.5	0.9 - 0.3	6.9 - 2.4	12.9 - 4.4
10	4°32.5	4°33.2	4°20.1	1.0 - 0.3	7.0 - 2.2	13.0 - 4.0	10	4°47.5	4°48.3	4°34.4	1.0 - 0.3	7.0 - 2.3	13.0 - 4.2	10	5°02.5	5°03.3	4°48.7	1.0 - 0.3	7.0 - 2.4	13.0 - 4.4
11	4°32.8	4°33.5	4°20.3	1.1 - 0.3	7.1 - 2.2	13.1 - 4.0	11	4°47.8	4°48.5	4°34.6	1.1 - 0.4	7.1 - 2.3	13.1 - 4.3	11	5°02.8	5°03.6	4°49.0	1.1 - 0.4	7.1 - 2.4	13.1 - 4.5
12	4°33.0	4°33.7	4°20.6	1.2 - 0.4	7.2 - 2.2	13.2 - 4.1	12	4°48.0	4°48.8	4°34.9	1.2 - 0.4	7.2 - 2.3	13.2 - 4.3	12	5°03.0	5°03.8	4°49.2	1.2 - 0.4	7.2 - 2.5	13.2 - 4.5
13	4°33.2	4°34.0	4°20.8	1.3 - 0.4	7.3 - 2.3	13.3 - 4.1	13	4°48.2	4°49.0	4°35.1	1.3 - 0.4	7.3 - 2.4	13.3 - 4.3	13	5°03.2	5°04.1	4°49.4	1.3 - 0.4	7.3 - 2.5	13.3 - 4.5
14	4°33.5	4°34.2	4°21.0	1.4 - 0.4	7.4 - 2.3	13.4 - 4.1	14	4°48.5	4°49.3	4°35.4	1.4 - 0.5	7.4 - 2.4	13.4 - 4.4	14	5°03.5	5°04.3	4°49.7	1.4 - 0.5	7.4 - 2.5	13.4 - 4.6
15	4°33.8	4°34.5	4°21.3	1.5 - 0.5	7.5 - 2.3	13.5 - 4.2	15	4°48.8	4°49.5	4°35.6	1.5 - 0.5	7.5 - 2.4	13.5 - 4.4	15	5°03.8	5°04.6	4°49.9	1.5 - 0.5	7.5 - 2.6	13.5 - 4.6
16	4°34.0	4°34.7	4°21.5	1.6 - 0.5	7.6 - 2.3	13.6 - 4.2	16	4°49.0	4°49.8	4°35.8	1.6 - 0.5	7.6 - 2.5	13.6 - 4.4	16	5°04.0	5°04.8	4°50.2	1.6 - 0.5	7.6 - 2.6	13.6 - 4.6
17	4°34.3	4°35.0	4°21.8	1.7 - 0.5	7.7 - 2.4	13.7 - 4.2	17	4°49.3	4°50.0	4°36.1	1.7 - 0.6	7.7 - 2.5	13.7 - 4.5	17	5°04.3	5°05.1	4°50.4	1.7 - 0.6	7.7 - 2.6	13.7 - 4.7
18	4°34.5	4°35.3	4°22.0	1.8 - 0.6	7.8 - 2.4	13.8 - 4.3	18	4°49.5	4°50.3	4°36.3	1.8 - 0.6	7.8 - 2.5	13.8 - 4.5	18	5°04.5	5°05.3	4°50.6	1.8 - 0.6	7.8 - 2.7	13.8 - 4.7
19	4°34.8	4°35.5	4°22.2	1.9 - 0.6	7.9 - 2.4	13.9 - 4.3	19	4°49.8	4°50.5	4°36.6	1.9 - 0.6	7.9 - 2.6	13.9 - 4.5	19	5°04.7	5°05.6	4°50.9	1.9 - 0.6	7.9 - 2.7	13.9 - 4.7
20	4°35.0	4°35.8	4°22.5	2.0 - 0.6	8.0 - 2.5	14.0 - 4.3	20	4°50.0	4°50.8	4°36.8	2.0 - 0.7	8.0 - 2.6	14.0 - 4.5	20	5°05.0	5°05.8	4°51.1	2.0 - 0.7	8.0 - 2.7	14.0 - 4.8
21	4°35.3	4°36.0	4°22.7	2.1 - 0.6	8.1 - 2.5	14.1 - 4.3	21	4°50.3	4°51.0	4°37.0	2.1 - 0.7	8.1 - 2.6	14.1 - 4.6	21	5°05.3	5°06.1	4°51.3	2.1 - 0.7	8.1 - 2.8	14.1 - 4.8
22	4°35.5	4°36.3	4°22.9	2.2 - 0.7	8.2 - 2.5	14.2 - 4.4	22	4°50.5	4°51.3	4°37.3	2.2 - 0.7	8.2 - 2.7	14.2 - 4.6	22	5°05.5	5°06.3	4°51.6	2.2 - 0.8	8.2 - 2.8	14.2 - 4.9
23	4°35.7	4°36.5	4°23.2	2.3 - 0.7	8.3 - 2.6	14.3 - 4.4	23	4°50.7	4°51.5	4°37.5	2.3 - 0.7	8.3 - 2.7	14.3 - 4.6	23	5°05.7	5°06.6	4°51.8	2.3 - 0.8	8.3 - 2.8	14.3 - 4.9
24	4°36.0	4°36.8	4°23.4	2.4 - 0.7	8.4 - 2.6	14.4 - 4.4	24	4°51.0	4°51.8	4°37.7	2.4 - 0.8	8.4 - 2.7	14.4 - 4.7	24	5°06.0	5°06.8	4°52.1	2.4 - 0.8	8.4 - 2.9	14.4 - 4.9
25	4°36.3	4°37.0	4°23.7	2.5 - 0.8	8.5 - 2.6	14.5 - 4.5	25	4°51.3	4°52.0	4°38.0	2.5 - 0.8	8.5 - 2.8	14.5 - 4.7	25	5°06.3	5°07.1	4°52.3	2.5 - 0.9	8.5 - 2.9	14.5 - 5.0
26	4°36.5	4°37.3	4°23.9	2.6 - 0.8	8.6 - 2.7	14.6 - 4.5	26	4°51.5	4°52.3	4°38.2	2.6 - 0.8	8.6 - 2.8	14.6 - 4.7	26	5°06.5	5°07.3	4°52.5	2.6 - 0.9	8.6 - 2.9	14.6 - 5.0
27	4°36.7	4°37.5	4°24.1	2.7 - 0.8	8.7 - 2.7	14.7 - 4.5	27	4°51.7	4°52.5	4°38.5	2.7 - 0.9	8.7 - 2.8	14.7 - 4.8	27	5°06.7	5°07.6	4°52.8	2.7 - 0.9	8.7 - 3.0	14.7 - 5.0
28	4°37.0	4°37.8	4°24.4	2.8 - 0.9	8.8 - 2.7	14.8 - 4.6	28	4°52.0	4°52.8	4°38.7	2.8 - 0.9	8.8 - 2.9	14.8 - 4.8	28	5°07.0	5°07.8	4°53.0	2.8 - 1.0	8.8 - 3.0	14.8 - 5.1
29	4°37.3	4°38.0	4°24.6	2.9 - 0.9	8.9 - 2.7	14.9 - 4.6	29	4°52.3	4°53.0	4°38.9	2.9 - 0.9	8.9 - 2.9	14.9 - 4.8	29	5°07.3	5°08.1	4°53.3	2.9 - 1.0	8.9 - 3.0	14.9 - 5.1
30	4°37.5	4°38.3	4°24.9	3.0 - 0.9	9.0 - 2.8	15.0 - 4.6	30	4°52.5	4°53.3	4°39.2	3.0 - 1.0	9.0 - 2.9	15.0 - 4.9	30	5°07.5	5°08.3	4°53.5	3.0 - 1.0	9.0 - 3.1	15.0 - 5.1
31	4°37.7	4°38.5	4°25.1	3.1 - 1.0	9.1 - 2.8	15.1 - 4.7	31	4°52.7	4°53.6	4°39.4	3.1 - 1.0	9.1 - 3.0	15.1 - 4.9	31	5°07.7	5°08.6	4°53.7	3.1 - 1.1	9.1 - 3.1	15.1 - 5.2
32	4°38.0	4°38.8	4°25.3	3.2 - 1.0	9.2 - 2.8	15.2 - 4.7	32	4°53.0	4°53.8	4°39.7	3.2 - 1.0	9.2 - 3.0	15.2 - 4.9	32	5°08.0	5°08.8	4°54.0	3.2 - 1.1	9.2 - 3.1	15.2 - 5.2
33	4°38.3	4°39.0	4°25.6	3.3 - 1.0	9.3 - 2.9	15.3 - 4.7	33	4°53.3	4°54.1	4°39.9	3.3 - 1.1	9.3 - 3.0	15.3 - 5.0	33	5°08.3	5°09.1	4°54.2	3.3 - 1.1	9.3 - 3.2	15.3 - 5.2
34	4°38.5	4°39.3	4°25.8	3.4 - 1.0	9.4 - 2.9	15.4 - 4.7	34	4°53.5	4°54.3	4°40.1	3.4 - 1.1	9.4 - 3.1	15.4 - 5.0	34	5°08.5	5°09.3	4°54.4	3.4 - 1.2	9.4 - 3.2	15.4 - 5.3
35	4°38.7	4°39.5	4°26.1	3.5 - 1.1	9.5 - 2.9	15.5 - 4.8	35	4°53.7	4°54.6	4°40.4	3.5 - 1.1	9.5 - 3.1	15.5 - 5.0	35	5°08.7	5°09.6	4°54.7	3.5 - 1.2	9.5 - 3.2	15.5 - 5.3
36	4°39.0	4°39.8	4°26.3	3.6 - 1.1	9.6 - 3.0	15.6 - 4.8	36	4°54.0	4°54.8	4°40.6	3.6 - 1.2	9.6 - 3.1	15.6 - 5.1	36	5°09.0	5°09.8	4°54.9	3.6 - 1.2	9.6 - 3.3	15.6 - 5.3
37	4°39.3	4°40.0	4°26.5	3.7 - 1.1	9.7 - 3.0	15.7 - 4.8	37	4°54.3	4°55.1	4°40.8	3.7 - 1.2	9.7 - 3.2	15.7 - 5.1	37	5°09.3	5°10.1	4°55.2	3.7 - 1.3	9.7 - 3.3	15.7 - 5.4
38	4°39.5	4°40.3	4°26.8	3.8 - 1.2	9.8 - 3.0	15.8 - 4.9	38	4°54.5	4°55.3	4°41.1	3.8 - 1.2	9.8 - 3.2	15.8 - 5.1	38	5°09.5	5°10.3	4°55.4	3.8 - 1.3	9.8 - 3.3	15.8 - 5.4
39	4°39.7	4°40.5	4°27.0	3.9 - 1.2	9.9 - 3.1	15.9 - 4.9	39	4°54.7	4°55.6	4°41.3	3.9 - 1.3	9.9 - 3.2	15.9 - 5.2	39	5°09.7	5°10.6	4°55.6	3.9 - 1.3	9.9 - 3.4	15.9 - 5.4
40	4°40.0	4°40.8	4°27.2	4.0 - 1.2	10.0 - 3.1	16.0 - 4.9	40	4°55.0	4°55.8	4°41.6	4.0 - 1.3	10.0 - 3.3	16.0 - 5.2	40	5°10.0	5°10.8	4°55.9	4.0 - 1.4	10.0 - 3.4	16.0 - 5.5
41	4°40.3	4°41.0	4°27.5	4.1 - 1.3	10.1 - 3.1	16.1 - 5.0	41	4°55.3	4°56.1	4°41.8	4.1 - 1.3	10.1 - 3.3	16.1 - 5.2	41	5°10.3	5°11.1	4°56.1	4.1 - 1.4	10.1 - 3.5	16.1 - 5.5
42	4°40.5	4°41.3	4°27.7	4.2 - 1.3	10.2 - 3.1	16.2 - 5.0	42	4°55.5	4°56.3	4°42.0	4.2 - 1.4	10.2 - 3.3	16.2 - 5.3	42	5°10.5	5°11.3	4°56.4	4.2 - 1.4	10.2 - 3.5	16.2 - 5.5
43	4°40.7	4°41.5	4°28.0	4.3 - 1.3	10.3 - 3.2	16.3 - 5.0	43	4°55.7	4°56.6	4°42.3	4.3 - 1.4	10.3 - 3.3	16.3 - 5.3	43	5°10.7	5°11.6	4°56.6	4.3 - 1.5	10.3 - 3.5	16.3 - 5.6
44	4°41.0	4°41.8	4°28.2	4.4 - 1.4	10.4 - 3.2	16.4 - 5.1	44	4°56.0	4°56.8	4°42.5	4.4 - 1.4	10.4 - 3.4	16.4 - 5.3	44	5°11.0	5°11.9	4°56.8	4.4 - 1.5	10.4 - 3.6	16.4 - 5.6
45	4°41.3	4°42.0	4°28.4	4.5 - 1.4	10.5 - 3.2	16.5 - 5.1	45	4°56.3	4°57.1	4°42.8	4.5 - 1.5	10.5 - 3.4	16.5 - 5.4	45	5°11.3	5°12.1	4°57.1	4.5 - 1.5	10.5 - 3.6	16.5 - 5.6
46	4°41.5	4°42.3	4°28.7	4.6 - 1.4	10.6 - 3.3	16.6 - 5.1	46	4°56.5	4°57.3	4°43.0	4.6 - 1.5	10.6 - 3.4	16.6 - 5.4	46	5°11.5	5°12.4	4°57.3	4.6 - 1.6	10.6 - 3.6	16.6 - 5.7
47	4°41.8	4°42.5	4°28.9	4.7 - 1.4	10.7 - 3.3	16.7 - 5.1	47	4°56.8	4°57.6	4°43.2	4.7 - 1.5	10.7 - 3.5	16.7 - 5.4	47	5°11.8	5°12.6	4°57.5	4.7 - 1.6	10.7 - 3.7	16.7 - 5.7
48	4°42.0	4°42.8	4°29.2	4.8 - 1.5	10.8 - 3.3	16.8 - 5.2	48	4°57.0	4°57.8	4°43.5	4.8 - 1.6	10.8 - 3.5	16.8 - 5.5	48	5°12.0	5°12.9	4°57.8	4.8 - 1.6	10.8 - 3.7	16.8 - 5.7
49	4°42.3	4°43.																		

Increments and Corrections

m 21	Sun Plan.	Aries	Moon	v and d corr			m 22	Sun Plan.	Aries	Moon	v and d corr			m 23	Sun Plan.	Aries	Moon	v and d corr		
0	5°15.0	5°15.9	5°00.6	0.0 - 0.0	6.0 - 2.1	12.0 - 4.3	0	5°30.0	5°30.9	5°15.0	0.0 - 0.0	6.0 - 2.3	12.0 - 4.5	0	5°45.0	5°45.9	5°29.3	0.0 - 0.0	6.0 - 2.4	12.0 - 4.7
1	5°15.2	5°16.1	5°00.9	0.1 - 0.0	6.1 - 2.2	12.1 - 4.3	1	5°30.2	5°31.2	5°15.2	0.1 - 0.0	6.1 - 2.3	12.1 - 4.5	1	5°45.2	5°46.2	5°29.5	0.1 - 0.0	6.1 - 2.4	12.1 - 4.7
2	5°15.5	5°16.4	5°01.1	0.2 - 0.1	6.2 - 2.2	12.2 - 4.4	2	5°30.5	5°31.4	5°15.4	0.2 - 0.1	6.2 - 2.3	12.2 - 4.6	2	5°45.5	5°46.4	5°29.8	0.2 - 0.1	6.2 - 2.4	12.2 - 4.8
3	5°15.8	5°16.6	5°01.4	0.3 - 0.1	6.3 - 2.3	12.3 - 4.4	3	5°30.8	5°31.7	5°15.7	0.3 - 0.1	6.3 - 2.4	12.3 - 4.6	3	5°45.8	5°46.7	5°30.0	0.3 - 0.1	6.3 - 2.5	12.3 - 4.8
4	5°16.0	5°16.9	5°01.6	0.4 - 0.1	6.4 - 2.3	12.4 - 4.4	4	5°31.0	5°31.9	5°15.9	0.4 - 0.2	6.4 - 2.4	12.4 - 4.7	4	5°46.0	5°46.9	5°30.2	0.4 - 0.2	6.4 - 2.5	12.4 - 4.9
5	5°16.2	5°17.1	5°01.8	0.5 - 0.2	6.5 - 2.3	12.5 - 4.5	5	5°31.2	5°32.2	5°16.2	0.5 - 0.2	6.5 - 2.4	12.5 - 4.7	5	5°46.2	5°47.2	5°30.5	0.5 - 0.2	6.5 - 2.5	12.5 - 4.9
6	5°16.5	5°17.4	5°02.1	0.6 - 0.2	6.6 - 2.4	12.6 - 4.5	6	5°31.5	5°32.4	5°16.4	0.6 - 0.2	6.6 - 2.5	12.6 - 4.7	6	5°46.5	5°47.4	5°30.7	0.6 - 0.2	6.6 - 2.6	12.6 - 4.9
7	5°16.8	5°17.6	5°02.3	0.7 - 0.3	6.7 - 2.4	12.7 - 4.6	7	5°31.8	5°32.7	5°16.6	0.7 - 0.3	6.7 - 2.5	12.7 - 4.8	7	5°46.8	5°47.7	5°31.0	0.7 - 0.3	6.7 - 2.6	12.7 - 5.0
8	5°17.0	5°17.9	5°02.6	0.8 - 0.3	6.8 - 2.4	12.8 - 4.6	8	5°32.0	5°32.9	5°16.9	0.8 - 0.3	6.8 - 2.5	12.8 - 4.8	8	5°47.0	5°47.9	5°31.2	0.8 - 0.3	6.8 - 2.7	12.8 - 5.0
9	5°17.2	5°18.1	5°02.8	0.9 - 0.3	6.9 - 2.5	12.9 - 4.6	9	5°32.2	5°33.2	5°17.1	0.9 - 0.3	6.9 - 2.6	12.9 - 4.8	9	5°47.2	5°48.2	5°31.4	0.9 - 0.4	6.9 - 2.7	12.9 - 5.1
10	5°17.5	5°18.4	5°03.0	1.0 - 0.4	7.0 - 2.5	13.0 - 4.7	10	5°32.5	5°33.4	5°17.4	1.0 - 0.4	7.0 - 2.6	13.0 - 4.9	10	5°47.5	5°48.4	5°31.7	1.0 - 0.4	7.0 - 2.7	13.0 - 5.1
11	5°17.8	5°18.6	5°03.3	1.1 - 0.4	7.1 - 2.5	13.1 - 4.7	11	5°32.8	5°33.7	5°17.6	1.1 - 0.4	7.1 - 2.7	13.1 - 4.9	11	5°47.8	5°48.7	5°31.9	1.1 - 0.4	7.1 - 2.8	13.1 - 5.1
12	5°18.0	5°18.9	5°03.5	1.2 - 0.4	7.2 - 2.6	13.2 - 4.7	12	5°33.0	5°33.9	5°17.8	1.2 - 0.5	7.2 - 2.7	13.2 - 4.9	12	5°48.0	5°49.0	5°32.1	1.2 - 0.5	7.2 - 2.8	13.2 - 5.2
13	5°18.2	5°19.1	5°03.8	1.3 - 0.5	7.3 - 2.6	13.3 - 4.8	13	5°33.2	5°34.2	5°18.1	1.3 - 0.5	7.3 - 2.7	13.3 - 5.0	13	5°48.2	5°49.2	5°32.4	1.3 - 0.5	7.3 - 2.9	13.3 - 5.2
14	5°18.5	5°19.4	5°04.0	1.4 - 0.5	7.4 - 2.7	13.4 - 4.8	14	5°33.5	5°34.4	5°18.3	1.4 - 0.5	7.4 - 2.8	13.4 - 5.0	14	5°48.5	5°49.5	5°32.6	1.4 - 0.5	7.4 - 2.9	13.4 - 5.2
15	5°18.8	5°19.6	5°04.2	1.5 - 0.5	7.5 - 2.7	13.5 - 4.8	15	5°33.8	5°34.7	5°18.5	1.5 - 0.6	7.5 - 2.8	13.5 - 5.1	15	5°48.8	5°49.7	5°32.9	1.5 - 0.6	7.5 - 2.9	13.5 - 5.3
16	5°19.0	5°19.9	5°04.5	1.6 - 0.6	7.6 - 2.7	13.6 - 4.9	16	5°34.0	5°34.9	5°18.8	1.6 - 0.6	7.6 - 2.8	13.6 - 5.1	16	5°49.0	5°50.0	5°33.1	1.6 - 0.6	7.6 - 3.0	13.6 - 5.3
17	5°19.3	5°20.1	5°04.7	1.7 - 0.6	7.7 - 2.8	13.7 - 4.9	17	5°34.3	5°35.2	5°19.0	1.7 - 0.6	7.7 - 2.9	13.7 - 5.1	17	5°49.3	5°50.2	5°33.3	1.7 - 0.7	7.7 - 3.0	13.7 - 5.4
18	5°19.5	5°20.4	5°04.9	1.8 - 0.6	7.8 - 2.8	13.8 - 4.9	18	5°34.5	5°35.4	5°19.3	1.8 - 0.7	7.8 - 2.9	13.8 - 5.2	18	5°49.5	5°50.5	5°33.6	1.8 - 0.7	7.8 - 3.1	13.8 - 5.4
19	5°19.7	5°20.6	5°05.2	1.9 - 0.7	7.9 - 2.8	13.9 - 5.0	19	5°34.8	5°35.7	5°19.5	1.9 - 0.7	7.9 - 3.0	13.9 - 5.2	19	5°49.8	5°50.7	5°33.8	1.9 - 0.7	7.9 - 3.1	13.9 - 5.4
20	5°20.0	5°20.9	5°05.4	2.0 - 0.7	8.0 - 2.9	14.0 - 5.0	20	5°35.0	5°35.9	5°19.7	2.0 - 0.8	8.0 - 3.0	14.0 - 5.3	20	5°50.0	5°51.0	5°34.1	2.0 - 0.8	8.0 - 3.1	14.0 - 5.5
21	5°20.3	5°21.1	5°05.7	2.1 - 0.8	8.1 - 2.9	14.1 - 5.1	21	5°35.3	5°36.2	5°20.0	2.1 - 0.8	8.1 - 3.0	14.1 - 5.3	21	5°50.3	5°51.2	5°34.3	2.1 - 0.8	8.1 - 3.2	14.1 - 5.5
22	5°20.5	5°21.4	5°05.9	2.2 - 0.8	8.2 - 2.9	14.2 - 5.1	22	5°35.5	5°36.4	5°20.2	2.2 - 0.8	8.2 - 3.1	14.2 - 5.3	22	5°50.5	5°51.5	5°34.5	2.2 - 0.9	8.2 - 3.2	14.2 - 5.6
23	5°20.7	5°21.6	5°06.1	2.3 - 0.8	8.3 - 3.0	14.3 - 5.1	23	5°35.7	5°36.7	5°20.5	2.3 - 0.9	8.3 - 3.1	14.3 - 5.4	23	5°50.7	5°51.7	5°34.8	2.3 - 0.9	8.3 - 3.3	14.3 - 5.6
24	5°21.0	5°21.9	5°06.4	2.4 - 0.9	8.4 - 3.0	14.4 - 5.2	24	5°36.0	5°36.9	5°20.7	2.4 - 0.9	8.4 - 3.2	14.4 - 5.4	24	5°51.0	5°52.0	5°35.0	2.4 - 0.9	8.4 - 3.3	14.4 - 5.6
25	5°21.3	5°22.1	5°06.6	2.5 - 0.9	8.5 - 3.0	14.5 - 5.2	25	5°36.3	5°37.2	5°20.9	2.5 - 0.9	8.5 - 3.2	14.5 - 5.4	25	5°51.3	5°52.2	5°35.2	2.5 - 1.0	8.5 - 3.3	14.5 - 5.7
26	5°21.5	5°22.4	5°06.9	2.6 - 0.9	8.6 - 3.1	14.6 - 5.2	26	5°36.5	5°37.4	5°21.2	2.6 - 1.0	8.6 - 3.2	14.6 - 5.5	26	5°51.5	5°52.5	5°35.5	2.6 - 1.0	8.6 - 3.4	14.6 - 5.7
27	5°21.7	5°22.6	5°07.1	2.7 - 1.0	8.7 - 3.1	14.7 - 5.3	27	5°36.7	5°37.7	5°21.4	2.7 - 1.0	8.7 - 3.3	14.7 - 5.5	27	5°51.7	5°52.7	5°35.7	2.7 - 1.1	8.7 - 3.4	14.7 - 5.8
28	5°22.0	5°22.9	5°07.3	2.8 - 1.0	8.8 - 3.2	14.8 - 5.3	28	5°37.0	5°37.9	5°21.6	2.8 - 1.1	8.8 - 3.3	14.8 - 5.6	28	5°52.0	5°53.0	5°36.0	2.8 - 1.1	8.8 - 3.4	14.8 - 5.8
29	5°22.3	5°23.1	5°07.6	2.9 - 1.0	8.9 - 3.2	14.9 - 5.3	29	5°37.3	5°38.2	5°21.9	2.9 - 1.1	8.9 - 3.3	14.9 - 5.6	29	5°52.3	5°53.2	5°36.2	2.9 - 1.1	8.9 - 3.5	14.9 - 5.8
30	5°22.5	5°23.4	5°07.8	3.0 - 1.1	9.0 - 3.2	15.0 - 5.4	30	5°37.5	5°38.4	5°22.1	3.0 - 1.1	9.0 - 3.4	15.0 - 5.6	30	5°52.5	5°53.5	5°36.4	3.0 - 1.2	9.0 - 3.5	15.0 - 5.9
31	5°22.7	5°23.6	5°08.0	3.1 - 1.1	9.1 - 3.3	15.1 - 5.4	31	5°37.7	5°38.7	5°22.4	3.1 - 1.2	9.1 - 3.4	15.1 - 5.7	31	5°52.7	5°53.7	5°36.7	3.1 - 1.2	9.1 - 3.6	15.1 - 5.9
32	5°23.0	5°23.9	5°08.3	3.2 - 1.1	9.2 - 3.3	15.2 - 5.4	32	5°38.0	5°38.9	5°22.6	3.2 - 1.2	9.2 - 3.4	15.2 - 5.7	32	5°53.0	5°54.0	5°36.9	3.2 - 1.3	9.2 - 3.6	15.2 - 6.0
33	5°23.3	5°24.1	5°08.5	3.3 - 1.2	9.3 - 3.3	15.3 - 5.5	33	5°38.3	5°39.2	5°22.8	3.3 - 1.2	9.3 - 3.5	15.3 - 5.7	33	5°53.3	5°54.2	5°37.2	3.3 - 1.3	9.3 - 3.6	15.3 - 6.0
34	5°23.5	5°24.4	5°08.8	3.4 - 1.2	9.4 - 3.4	15.4 - 5.5	34	5°38.5	5°39.4	5°23.1	3.4 - 1.3	9.4 - 3.5	15.4 - 5.8	34	5°53.5	5°54.5	5°37.4	3.4 - 1.3	9.4 - 3.7	15.4 - 6.0
35	5°23.7	5°24.6	5°09.0	3.5 - 1.3	9.5 - 3.4	15.5 - 5.6	35	5°38.7	5°39.7	5°23.3	3.5 - 1.3	9.5 - 3.6	15.5 - 5.8	35	5°53.7	5°54.7	5°37.6	3.5 - 1.4	9.5 - 3.7	15.5 - 6.1
36	5°24.0	5°24.9	5°09.2	3.6 - 1.3	9.6 - 3.4	15.6 - 5.6	36	5°39.0	5°39.9	5°23.6	3.6 - 1.4	9.6 - 3.6	15.6 - 5.8	36	5°54.0	5°55.0	5°37.9	3.6 - 1.4	9.6 - 3.8	15.6 - 6.1
37	5°24.3	5°25.1	5°09.5	3.7 - 1.3	9.7 - 3.5	15.7 - 5.6	37	5°39.3	5°40.2	5°23.8	3.7 - 1.4	9.7 - 3.6	15.7 - 5.9	37	5°54.3	5°55.2	5°38.1	3.7 - 1.4	9.7 - 3.8	15.7 - 6.2
38	5°24.5	5°25.4	5°09.7	3.8 - 1.4	9.8 - 3.5	15.8 - 5.7	38	5°39.5	5°40.4	5°24.0	3.8 - 1.4	9.8 - 3.7	15.8 - 5.9	38	5°54.5	5°55.5	5°38.4	3.8 - 1.5	9.8 - 3.8	15.8 - 6.2
39	5°24.7	5°25.6	5°10.0	3.9 - 1.4	9.9 - 3.5	15.9 - 5.7	39	5°39.7	5°40.7	5°24.3	3.9 - 1.5	9.9 - 3.7	15.9 - 6.0	39	5°54.7	5°55.7	5°38.6	3.9 - 1.5	9.9 - 3.9	15.9 - 6.2
40	5°25.0	5°25.9	5°10.2	4.0 - 1.4	10.0 - 3.6	16.0 - 5.7	40	5°40.0	5°40.9	5°24.5	4.0 - 1.5	10.0 - 3.8	16.0 - 6.0	40	5°55.0	5°56.0	5°38.8	4.0 - 1.6	10.0 - 3.9	16.0 - 6.3
41	5°25.3	5°26.1	5°10.4	4.1 - 1.5	10.1 - 3.6	16.1 - 5.8	41	5°40.3	5°41.2	5°24.7	4.1 - 1.5	10.1 - 3.8	16.1 - 6.0	41	5°55.3	5°56.2	5°39.1	4.1 - 1.6	10.1 - 4.0	16.1 - 6.3
42	5°25.5	5°26.4	5°10.7	4.2 - 1.5	10.2 - 3.7	16.2 - 5.8	42	5°40.5	5°41.4	5°25.0	4.2 - 1.6	10.2 - 3.8	16.2 - 6.1	42	5°55.5	5°56.5	5°39.3	4.2 - 1.6	10.2 - 4.0	16.2 - 6.3
43	5°25.7	5°26.6	5°10.9	4.3 - 1.5	10.3 - 3.7	16.3 - 5.8	43	5°40.7	5°41.7	5°25.2	4.3 - 1.6	10.3 - 3.9	16.3 - 6.1	43	5°55.7	5°56.7	5°39.5	4.3 - 1.7	10.3 - 4.0	16.3 - 6.4
44	5°26.0	5°26.9	5°11.1	4.4 - 1.6	10.4 - 3.7	16.4 - 5.9	44	5°41.0	5°41.9	5°25.5	4.4 - 1.7	10.4 - 3.9	16.4 - 6.1	44	5°56.0	5°57.0	5°39.8	4.4 - 1.7	10.4 - 4.1	16.4 - 6.4
45	5°26.3	5°27.1	5°11.4	4.5 - 1.6	10.5 - 3.8	16.5 - 5.9	45	5°41.3	5°42.2	5°25.7	4.5 - 1.7	10.5 - 3.9	16.5 - 6.2	45	5°56.3	5°57.2	5°40.0	4.5 - 1.8	10.5 - 4.1	16.5 - 6.5
46	5°26.5	5°27.4	5°11.6	4.6 - 1.6	10.6 - 3.8	16.6 - 5.9	46	5°41.5	5°42.4	5°25.9	4.6 - 1.7	10.6 - 4.0	16.6 - 6.2	46	5°56.5	5°57.5	5°40.3	4.6 - 1.8	10.6 - 4.2	16.6 - 6.5
47	5°26.8	5°27.6	5°11.9	4.7 - 1.7	10.7 - 3.8	16.7 - 6.0	47	5°41.8	5°42.7	5°26.2	4.7 - 1.8	10.7 - 4.0	16.7 - 6.3	47	5°56.8	5°57.7	5°40.5	4.7 - 1.8	10.7 - 4.2	16.7 - 6.5
48	5°27.0	5°27.9	5°12.1	4.8 - 1.7	10.8 - 3.9	16.8 - 6.0	48	5°42.0	5°42.9	5°26.4	4.8 - 1.8	10.8 - 4.1	16.8 - 6.3	48	5°57.0	5°58.0	5°40.7	4.8 - 1.9	10.8 - 4.2	16.8 - 6.6
49	5°27.2	5°28.																		

Increments and Corrections

m 24	Sun Plan.	Aries	Moon	v and d corr			m 25	Sun Plan.	Aries	Moon	v and d corr			m 26	Sun Plan.	Aries	Moon	v and d corr		
0	6°00.0	6°01.0	5°43.6	0.0 - 0.0	6.0 - 2.5	12.0 - 4.9	0	6°15.0	6°16.0	5°57.9	0.0 - 0.0	6.0 - 2.5	12.0 - 5.1	0	6°30.0	6°31.1	6°12.2	0.0 - 0.0	6.0 - 2.6	12.0 - 5.3
1	6°00.2	6°01.2	5°43.8	0.1 - 0.0	6.1 - 2.5	12.1 - 4.9	1	6°15.2	6°16.3	5°58.2	0.1 - 0.0	6.1 - 2.6	12.1 - 5.1	1	6°30.2	6°31.3	6°12.5	0.1 - 0.0	6.1 - 2.7	12.1 - 5.3
2	6°00.5	6°01.5	5°44.1	0.2 - 0.1	6.2 - 2.5	12.2 - 5.0	2	6°15.5	6°16.5	5°58.4	0.2 - 0.1	6.2 - 2.6	12.2 - 5.2	2	6°30.5	6°31.6	6°12.7	0.2 - 0.1	6.2 - 2.7	12.2 - 5.4
3	6°00.8	6°01.7	5°44.3	0.3 - 0.1	6.3 - 2.6	12.3 - 5.0	3	6°15.8	6°16.8	5°58.6	0.3 - 0.1	6.3 - 2.7	12.3 - 5.2	3	6°30.8	6°31.8	6°12.9	0.3 - 0.1	6.3 - 2.8	12.3 - 5.4
4	6°01.0	6°02.0	5°44.6	0.4 - 0.2	6.4 - 2.6	12.4 - 5.1	4	6°16.0	6°17.0	5°58.9	0.4 - 0.2	6.4 - 2.7	12.4 - 5.3	4	6°31.0	6°32.1	6°13.2	0.4 - 0.2	6.4 - 2.8	12.4 - 5.5
5	6°01.2	6°02.2	5°44.8	0.5 - 0.2	6.5 - 2.7	12.5 - 5.1	5	6°16.2	6°17.3	5°59.1	0.5 - 0.2	6.5 - 2.8	12.5 - 5.3	5	6°31.2	6°32.3	6°13.4	0.5 - 0.2	6.5 - 2.9	12.5 - 5.5
6	6°01.5	6°02.5	5°45.0	0.6 - 0.2	6.6 - 2.7	12.6 - 5.1	6	6°16.5	6°17.5	5°59.3	0.6 - 0.3	6.6 - 2.8	12.6 - 5.4	6	6°31.5	6°32.6	6°13.7	0.6 - 0.3	6.6 - 2.9	12.6 - 5.6
7	6°01.8	6°02.7	5°45.3	0.7 - 0.3	6.7 - 2.7	12.7 - 5.2	7	6°16.8	6°17.8	5°59.6	0.7 - 0.3	6.7 - 2.8	12.7 - 5.4	7	6°31.8	6°32.8	6°13.9	0.7 - 0.3	6.7 - 3.0	12.7 - 5.6
8	6°02.0	6°03.0	5°45.5	0.8 - 0.3	6.8 - 2.8	12.8 - 5.2	8	6°17.0	6°18.0	5°59.8	0.8 - 0.3	6.8 - 2.9	12.8 - 5.4	8	6°32.0	6°33.1	6°14.1	0.8 - 0.4	6.8 - 3.0	12.8 - 5.7
9	6°02.2	6°03.2	5°45.7	0.9 - 0.4	6.9 - 2.8	12.9 - 5.3	9	6°17.2	6°18.3	6°00.1	0.9 - 0.4	6.9 - 2.9	12.9 - 5.5	9	6°32.2	6°33.3	6°14.4	0.9 - 0.4	6.9 - 3.0	12.9 - 5.7
10	6°02.5	6°03.5	5°46.0	1.0 - 0.4	7.0 - 2.9	13.0 - 5.3	10	6°17.5	6°18.5	6°00.3	1.0 - 0.4	7.0 - 3.0	13.0 - 5.5	10	6°32.5	6°33.6	6°14.6	1.0 - 0.4	7.0 - 3.1	13.0 - 5.7
11	6°02.8	6°03.7	5°46.2	1.1 - 0.4	7.1 - 2.9	13.1 - 5.3	11	6°17.8	6°18.8	6°00.5	1.1 - 0.5	7.1 - 3.0	13.1 - 5.6	11	6°32.8	6°33.8	6°14.9	1.1 - 0.5	7.1 - 3.1	13.1 - 5.8
12	6°03.0	6°04.0	5°46.5	1.2 - 0.5	7.2 - 2.9	13.2 - 5.4	12	6°18.0	6°19.0	6°00.8	1.2 - 0.5	7.2 - 3.1	13.2 - 5.6	12	6°33.0	6°34.1	6°15.1	1.2 - 0.5	7.2 - 3.2	13.2 - 5.8
13	6°03.2	6°04.2	5°46.7	1.3 - 0.5	7.3 - 3.0	13.3 - 5.4	13	6°18.2	6°19.3	6°01.0	1.3 - 0.6	7.3 - 3.1	13.3 - 5.7	13	6°33.2	6°34.3	6°15.3	1.3 - 0.6	7.3 - 3.2	13.3 - 5.9
14	6°03.5	6°04.5	5°46.9	1.4 - 0.6	7.4 - 3.0	13.4 - 5.5	14	6°18.5	6°19.5	6°01.3	1.4 - 0.6	7.4 - 3.1	13.4 - 5.7	14	6°33.5	6°34.6	6°15.6	1.4 - 0.6	7.4 - 3.3	13.4 - 5.9
15	6°03.8	6°04.7	5°47.2	1.5 - 0.6	7.5 - 3.1	13.5 - 5.5	15	6°18.8	6°19.8	6°01.5	1.5 - 0.6	7.5 - 3.2	13.5 - 5.7	15	6°33.8	6°34.8	6°15.8	1.5 - 0.7	7.5 - 3.3	13.5 - 6.0
16	6°04.0	6°05.0	5°47.4	1.6 - 0.7	7.6 - 3.1	13.6 - 5.6	16	6°19.0	6°20.0	6°01.7	1.6 - 0.7	7.6 - 3.2	13.6 - 5.8	16	6°34.0	6°35.1	6°16.1	1.6 - 0.7	7.6 - 3.4	13.6 - 6.0
17	6°04.3	6°05.2	5°47.7	1.7 - 0.7	7.7 - 3.1	13.7 - 5.6	17	6°19.3	6°20.3	6°02.0	1.7 - 0.7	7.7 - 3.3	13.7 - 5.8	17	6°34.3	6°35.3	6°16.3	1.7 - 0.8	7.7 - 3.4	13.7 - 6.1
18	6°04.5	6°05.5	5°47.9	1.8 - 0.7	7.8 - 3.2	13.8 - 5.6	18	6°19.5	6°20.5	6°02.2	1.8 - 0.8	7.8 - 3.3	13.8 - 5.9	18	6°34.5	6°35.6	6°16.5	1.8 - 0.8	7.8 - 3.4	13.8 - 6.1
19	6°04.7	6°05.7	5°48.1	1.9 - 0.8	7.9 - 3.2	13.9 - 5.7	19	6°19.7	6°20.8	6°02.5	1.9 - 0.8	7.9 - 3.4	13.9 - 5.9	19	6°34.8	6°35.8	6°16.8	1.9 - 0.8	7.9 - 3.5	13.9 - 6.1
20	6°05.0	6°06.0	5°48.4	2.0 - 0.8	8.0 - 3.3	14.0 - 5.7	20	6°20.0	6°21.0	6°02.7	2.0 - 0.8	8.0 - 3.4	14.0 - 6.0	20	6°35.0	6°36.1	6°17.0	2.0 - 0.9	8.0 - 3.5	14.0 - 6.2
21	6°05.3	6°06.2	5°48.6	2.1 - 0.9	8.1 - 3.3	14.1 - 5.8	21	6°20.3	6°21.3	6°02.9	2.1 - 0.9	8.1 - 3.4	14.1 - 6.0	21	6°35.3	6°36.3	6°17.2	2.1 - 0.9	8.1 - 3.6	14.1 - 6.2
22	6°05.5	6°06.5	5°48.8	2.2 - 0.9	8.2 - 3.3	14.2 - 5.8	22	6°20.5	6°21.5	6°03.2	2.2 - 0.9	8.2 - 3.5	14.2 - 6.0	22	6°35.5	6°36.6	6°17.5	2.2 - 1.0	8.2 - 3.6	14.2 - 6.3
23	6°05.7	6°06.7	5°49.1	2.3 - 0.9	8.3 - 3.4	14.3 - 5.8	23	6°20.7	6°21.8	6°03.4	2.3 - 1.0	8.3 - 3.5	14.3 - 6.1	23	6°35.7	6°36.8	6°17.7	2.3 - 1.0	8.3 - 3.7	14.3 - 6.3
24	6°06.0	6°07.0	5°49.3	2.4 - 1.0	8.4 - 3.4	14.4 - 5.9	24	6°21.0	6°22.0	6°03.6	2.4 - 1.0	8.4 - 3.6	14.4 - 6.1	24	6°36.0	6°37.1	6°18.0	2.4 - 1.1	8.4 - 3.7	14.4 - 6.4
25	6°06.3	6°07.3	5°49.6	2.5 - 1.0	8.5 - 3.5	14.5 - 5.9	25	6°21.3	6°22.3	6°03.9	2.5 - 1.1	8.5 - 3.6	14.5 - 6.2	25	6°36.3	6°37.3	6°18.2	2.5 - 1.1	8.5 - 3.8	14.5 - 6.4
26	6°06.5	6°07.5	5°49.8	2.6 - 1.1	8.6 - 3.5	14.6 - 6.0	26	6°21.5	6°22.5	6°04.1	2.6 - 1.1	8.6 - 3.7	14.6 - 6.2	26	6°36.5	6°37.6	6°18.4	2.6 - 1.1	8.6 - 3.8	14.6 - 6.4
27	6°06.7	6°07.8	5°50.0	2.7 - 1.1	8.7 - 3.6	14.7 - 6.0	27	6°21.7	6°22.8	6°04.4	2.7 - 1.1	8.7 - 3.7	14.7 - 6.2	27	6°36.7	6°37.8	6°18.7	2.7 - 1.2	8.7 - 3.8	14.7 - 6.5
28	6°07.0	6°08.0	5°50.3	2.8 - 1.1	8.8 - 3.6	14.8 - 6.0	28	6°22.0	6°23.0	6°04.6	2.8 - 1.2	8.8 - 3.7	14.8 - 6.3	28	6°37.0	6°38.1	6°18.9	2.8 - 1.2	8.8 - 3.9	14.8 - 6.5
29	6°07.3	6°08.3	5°50.5	2.9 - 1.2	8.9 - 3.6	14.9 - 6.1	29	6°22.3	6°23.3	6°04.8	2.9 - 1.2	8.9 - 3.8	14.9 - 6.3	29	6°37.3	6°38.3	6°19.2	2.9 - 1.3	8.9 - 3.9	14.9 - 6.6
30	6°07.5	6°08.5	5°50.8	3.0 - 1.2	9.0 - 3.7	15.0 - 6.1	30	6°22.5	6°23.5	6°05.1	3.0 - 1.3	9.0 - 3.8	15.0 - 6.4	30	6°37.5	6°38.6	6°19.4	3.0 - 1.3	9.0 - 4.0	15.0 - 6.6
31	6°07.7	6°08.8	5°51.0	3.1 - 1.3	9.1 - 3.7	15.1 - 6.2	31	6°22.7	6°23.8	6°05.3	3.1 - 1.3	9.1 - 3.9	15.1 - 6.4	31	6°37.7	6°38.8	6°19.6	3.1 - 1.4	9.1 - 4.0	15.1 - 6.7
32	6°08.0	6°09.0	5°51.2	3.2 - 1.3	9.2 - 3.8	15.2 - 6.2	32	6°23.0	6°24.0	6°05.6	3.2 - 1.4	9.2 - 3.9	15.2 - 6.5	32	6°38.0	6°39.1	6°19.9	3.2 - 1.4	9.2 - 4.1	15.2 - 6.7
33	6°08.3	6°09.3	5°51.5	3.3 - 1.3	9.3 - 3.8	15.3 - 6.2	33	6°23.3	6°24.3	6°05.8	3.3 - 1.4	9.3 - 4.0	15.3 - 6.5	33	6°38.3	6°39.3	6°20.1	3.3 - 1.5	9.3 - 4.1	15.3 - 6.8
34	6°08.5	6°09.5	5°51.7	3.4 - 1.4	9.4 - 3.8	15.4 - 6.3	34	6°23.5	6°24.5	6°06.0	3.4 - 1.4	9.4 - 4.0	15.4 - 6.5	34	6°38.5	6°39.6	6°20.3	3.4 - 1.5	9.4 - 4.2	15.4 - 6.8
35	6°08.7	6°09.8	5°52.0	3.5 - 1.4	9.5 - 3.9	15.5 - 6.3	35	6°23.7	6°24.8	6°06.3	3.5 - 1.5	9.5 - 4.0	15.5 - 6.6	35	6°38.7	6°39.8	6°20.6	3.5 - 1.5	9.5 - 4.2	15.5 - 6.8
36	6°09.0	6°10.0	5°52.2	3.6 - 1.5	9.6 - 3.9	15.6 - 6.4	36	6°24.0	6°25.0	6°06.5	3.6 - 1.5	9.6 - 4.1	15.6 - 6.6	36	6°39.0	6°40.1	6°20.8	3.6 - 1.6	9.6 - 4.2	15.6 - 6.9
37	6°09.3	6°10.3	5°52.4	3.7 - 1.5	9.7 - 4.0	15.7 - 6.4	37	6°24.3	6°25.3	6°06.7	3.7 - 1.6	9.7 - 4.1	15.7 - 6.7	37	6°39.3	6°40.3	6°21.1	3.7 - 1.6	9.7 - 4.3	15.7 - 6.9
38	6°09.5	6°10.5	5°52.7	3.8 - 1.6	9.8 - 4.0	15.8 - 6.5	38	6°24.5	6°25.6	6°07.0	3.8 - 1.6	9.8 - 4.2	15.8 - 6.7	38	6°39.5	6°40.6	6°21.3	3.8 - 1.7	9.8 - 4.3	15.8 - 7.0
39	6°09.7	6°10.8	5°52.9	3.9 - 1.6	9.9 - 4.0	15.9 - 6.5	39	6°24.7	6°25.8	6°07.2	3.9 - 1.7	9.9 - 4.2	15.9 - 6.8	39	6°39.7	6°40.8	6°21.5	3.9 - 1.7	9.9 - 4.4	15.9 - 7.0
40	6°10.0	6°11.0	5°53.1	4.0 - 1.6	10.0 - 4.1	16.0 - 6.5	40	6°25.0	6°26.1	6°07.5	4.0 - 1.7	10.0 - 4.3	16.0 - 6.8	40	6°40.0	6°41.1	6°21.8	4.0 - 1.8	10.0 - 4.4	16.0 - 7.1
41	6°10.3	6°11.3	5°53.4	4.1 - 1.7	10.1 - 4.1	16.1 - 6.6	41	6°25.3	6°26.3	6°07.7	4.1 - 1.7	10.1 - 4.3	16.1 - 6.8	41	6°40.3	6°41.3	6°22.0	4.1 - 1.8	10.1 - 4.5	16.1 - 7.1
42	6°10.5	6°11.5	5°53.6	4.2 - 1.7	10.2 - 4.2	16.2 - 6.6	42	6°25.5	6°26.6	6°07.9	4.2 - 1.8	10.2 - 4.3	16.2 - 6.9	42	6°40.5	6°41.6	6°22.3	4.2 - 1.9	10.2 - 4.5	16.2 - 7.2
43	6°10.7	6°11.8	5°53.9	4.3 - 1.8	10.3 - 4.2	16.3 - 6.7	43	6°25.7	6°26.8	6°08.2	4.3 - 1.8	10.3 - 4.4	16.3 - 6.9	43	6°40.7	6°41.8	6°22.5	4.3 - 1.9	10.3 - 4.5	16.3 - 7.2
44	6°11.0	6°12.0	5°54.1	4.4 - 1.8	10.4 - 4.2	16.4 - 6.7	44	6°26.0	6°27.1	6°08.4	4.4 - 1.9	10.4 - 4.4	16.4 - 7.0	44	6°41.0	6°42.1	6°22.7	4.4 - 1.9	10.4 - 4.6	16.4 - 7.2
45	6°11.3	6°12.3	5°54.3	4.5 - 1.8	10.5 - 4.3	16.5 - 6.7	45	6°26.3	6°27.3	6°08.7	4.5 - 1.9	10.5 - 4.5	16.5 - 7.0	45	6°41.3	6°42.3	6°23.0	4.5 - 2.0	10.5 - 4.6	16.5 - 7.3
46	6°11.5	6°12.5	5°54.6	4.6 - 1.9	10.6 - 4.3	16.6 - 6.8	46	6°26.5	6°27.6	6°08.9	4.6 - 2.0	10.6 - 4.5	16.6 - 7.1	46	6°41.5	6°42.6	6°23.2	4.6 - 2.0	10.6 - 4.7	16.6 - 7.3
47	6°11.8	6°12.8	5°54.8	4.7 - 1.9	10.7 - 4.4	16.7 - 6.8	47	6°26.8	6°27.8	6°09.1	4.7 - 2.0	10.7 - 4.5	16.7 - 7.1	47	6°41.8	6°42.8	6°23.4	4.7 - 2.1	10.7 - 4.7	16.7 - 7.4
48	6°12.0	6°13.0	5°55.1	4.8 - 2.0	10.8 - 4.4	16.8 - 6.9	48	6°27.0	6°28.1	6°09.4	4.8 - 2.0	10.8 - 4.6	16.8 - 7.1	48	6°42.0	6°43.1	6°23.7	4.8 - 2.1	10.8 - 4.8	16.8 - 7.4
49	6°12.2	6°13.																		

Increments and Corrections

m 27	Sun Plan.	Aries	Moon	v and d corr			m 28	Sun Plan.	Aries	Moon	v and d corr			m 29	Sun Plan.	Aries	Moon	v and d corr		
0	6°45.0	6°46.1	6°26.5	0.0 - 0.0	6.0 - 2.8	12.0 - 5.5	0	7°00.0	7°01.1	6°40.9	0.0 - 0.0	6.0 - 2.8	12.0 - 5.7	0	7°15.0	7°16.2	6°55.2	0.0 - 0.0	6.0 - 2.9	12.0 - 5.9
1	6°45.2	6°46.4	6°26.8	0.1 - 0.0	6.1 - 2.8	12.1 - 5.5	1	7°00.2	7°01.4	6°41.1	0.1 - 0.0	6.1 - 2.9	12.1 - 5.7	1	7°15.2	7°16.4	6°55.4	0.1 - 0.0	6.1 - 3.0	12.1 - 5.9
2	6°45.5	6°46.6	6°27.0	0.2 - 0.1	6.2 - 2.8	12.2 - 5.6	2	7°00.5	7°01.6	6°41.3	0.2 - 0.1	6.2 - 2.9	12.2 - 5.8	2	7°15.5	7°16.7	6°55.7	0.2 - 0.1	6.2 - 3.0	12.2 - 6.0
3	6°45.8	6°46.9	6°27.3	0.3 - 0.1	6.3 - 2.9	12.3 - 5.6	3	7°00.8	7°01.9	6°41.6	0.3 - 0.1	6.3 - 3.0	12.3 - 5.8	3	7°15.8	7°16.9	6°55.9	0.3 - 0.1	6.3 - 3.1	12.3 - 6.0
4	6°46.0	6°47.1	6°27.5	0.4 - 0.2	6.4 - 2.9	12.4 - 5.7	4	7°01.0	7°02.2	6°41.8	0.4 - 0.2	6.4 - 3.0	12.4 - 5.9	4	7°16.0	7°17.2	6°56.1	0.4 - 0.2	6.4 - 3.1	12.4 - 6.1
5	6°46.2	6°47.4	6°27.7	0.5 - 0.2	6.5 - 3.0	12.5 - 5.7	5	7°01.2	7°02.4	6°42.1	0.5 - 0.2	6.5 - 3.1	12.5 - 5.9	5	7°16.2	7°17.4	6°56.4	0.5 - 0.2	6.5 - 3.2	12.5 - 6.1
6	6°46.5	6°47.6	6°28.0	0.6 - 0.3	6.6 - 3.0	12.6 - 5.8	6	7°01.5	7°02.7	6°42.3	0.6 - 0.3	6.6 - 3.1	12.6 - 6.0	6	7°16.5	7°17.7	6°56.6	0.6 - 0.3	6.6 - 3.2	12.6 - 6.2
7	6°46.8	6°47.9	6°28.2	0.7 - 0.3	6.7 - 3.1	12.7 - 5.8	7	7°01.8	7°02.9	6°42.5	0.7 - 0.3	6.7 - 3.2	12.7 - 6.0	7	7°16.8	7°17.9	6°56.9	0.7 - 0.3	6.7 - 3.3	12.7 - 6.2
8	6°47.0	6°48.1	6°28.5	0.8 - 0.4	6.8 - 3.1	12.8 - 5.9	8	7°02.0	7°03.2	6°42.8	0.8 - 0.4	6.8 - 3.2	12.8 - 6.1	8	7°17.0	7°18.2	6°57.1	0.8 - 0.4	6.8 - 3.3	12.8 - 6.3
9	6°47.2	6°48.4	6°28.7	0.9 - 0.4	6.9 - 3.2	12.9 - 5.9	9	7°02.2	7°03.4	6°43.0	0.9 - 0.4	6.9 - 3.3	12.9 - 6.1	9	7°17.2	7°18.4	6°57.3	0.9 - 0.4	6.9 - 3.4	12.9 - 6.3
10	6°47.5	6°48.6	6°28.9	1.0 - 0.5	7.0 - 3.2	13.0 - 6.0	10	7°02.5	7°03.7	6°43.3	1.0 - 0.5	7.0 - 3.3	13.0 - 6.2	10	7°17.5	7°18.7	6°57.6	1.0 - 0.5	7.0 - 3.4	13.0 - 6.4
11	6°47.8	6°48.9	6°29.2	1.1 - 0.5	7.1 - 3.3	13.1 - 6.0	11	7°02.8	7°03.9	6°43.5	1.1 - 0.5	7.1 - 3.4	13.1 - 6.2	11	7°17.8	7°18.9	6°57.8	1.1 - 0.5	7.1 - 3.5	13.1 - 6.4
12	6°48.0	6°49.1	6°29.4	1.2 - 0.6	7.2 - 3.3	13.2 - 6.0	12	7°03.0	7°04.2	6°43.7	1.2 - 0.6	7.2 - 3.4	13.2 - 6.3	12	7°18.0	7°19.2	6°58.0	1.2 - 0.6	7.2 - 3.5	13.2 - 6.5
13	6°48.2	6°49.4	6°29.7	1.3 - 0.6	7.3 - 3.3	13.3 - 6.1	13	7°03.2	7°04.4	6°44.0	1.3 - 0.6	7.3 - 3.5	13.3 - 6.3	13	7°18.2	7°19.4	6°58.3	1.3 - 0.6	7.3 - 3.6	13.3 - 6.5
14	6°48.5	6°49.6	6°29.9	1.4 - 0.6	7.4 - 3.4	13.4 - 6.1	14	7°03.5	7°04.7	6°44.2	1.4 - 0.7	7.4 - 3.5	13.4 - 6.4	14	7°18.5	7°19.7	6°58.5	1.4 - 0.7	7.4 - 3.6	13.4 - 6.6
15	6°48.8	6°49.9	6°30.1	1.5 - 0.7	7.5 - 3.4	13.5 - 6.2	15	7°03.8	7°04.9	6°44.4	1.5 - 0.7	7.5 - 3.6	13.5 - 6.4	15	7°18.8	7°19.9	6°58.8	1.5 - 0.7	7.5 - 3.7	13.5 - 6.6
16	6°49.0	6°50.1	6°30.4	1.6 - 0.7	7.6 - 3.5	13.6 - 6.2	16	7°04.0	7°05.2	6°44.7	1.6 - 0.8	7.6 - 3.6	13.6 - 6.5	16	7°19.0	7°20.2	6°59.0	1.6 - 0.8	7.6 - 3.7	13.6 - 6.7
17	6°49.3	6°50.4	6°30.6	1.7 - 0.8	7.7 - 3.5	13.7 - 6.3	17	7°04.3	7°05.4	6°44.9	1.7 - 0.8	7.7 - 3.7	13.7 - 6.5	17	7°19.3	7°20.5	6°59.2	1.7 - 0.8	7.7 - 3.8	13.7 - 6.7
18	6°49.5	6°50.6	6°30.8	1.8 - 0.8	7.8 - 3.6	13.8 - 6.3	18	7°04.5	7°05.7	6°45.2	1.8 - 0.9	7.8 - 3.7	13.8 - 6.6	18	7°19.5	7°20.7	6°59.5	1.8 - 0.9	7.8 - 3.8	13.8 - 6.8
19	6°49.8	6°50.9	6°31.1	1.9 - 0.9	7.9 - 3.6	13.9 - 6.4	19	7°04.7	7°05.9	6°45.4	1.9 - 0.9	7.9 - 3.8	13.9 - 6.6	19	7°19.7	7°21.0	6°59.7	1.9 - 0.9	7.9 - 3.9	13.9 - 6.8
20	6°50.0	6°51.1	6°31.3	2.0 - 0.9	8.0 - 3.7	14.0 - 6.4	20	7°05.0	7°06.2	6°45.6	2.0 - 0.9	8.0 - 3.8	14.0 - 6.6	20	7°20.0	7°21.2	7°00.0	2.0 - 1.0	8.0 - 3.9	14.0 - 6.9
21	6°50.3	6°51.4	6°31.6	2.1 - 1.0	8.1 - 3.7	14.1 - 6.5	21	7°05.3	7°06.4	6°45.9	2.1 - 1.0	8.1 - 3.8	14.1 - 6.7	21	7°20.3	7°21.5	7°00.2	2.1 - 1.0	8.1 - 4.0	14.1 - 6.9
22	6°50.5	6°51.6	6°31.8	2.2 - 1.0	8.2 - 3.8	14.2 - 6.5	22	7°05.5	7°06.7	6°46.1	2.2 - 1.0	8.2 - 3.9	14.2 - 6.7	22	7°20.5	7°21.7	7°00.4	2.2 - 1.1	8.2 - 4.0	14.2 - 7.0
23	6°50.7	6°51.9	6°32.0	2.3 - 1.1	8.3 - 3.8	14.3 - 6.6	23	7°05.7	7°06.9	6°46.4	2.3 - 1.1	8.3 - 3.9	14.3 - 6.8	23	7°20.7	7°22.0	7°00.7	2.3 - 1.1	8.3 - 4.1	14.3 - 7.0
24	6°51.0	6°52.1	6°32.3	2.4 - 1.1	8.4 - 3.9	14.4 - 6.6	24	7°06.0	7°07.2	6°46.6	2.4 - 1.1	8.4 - 4.0	14.4 - 6.8	24	7°21.0	7°22.2	7°00.9	2.4 - 1.2	8.4 - 4.1	14.4 - 7.1
25	6°51.3	6°52.4	6°32.5	2.5 - 1.1	8.5 - 3.9	14.5 - 6.6	25	7°06.3	7°07.4	6°46.8	2.5 - 1.2	8.5 - 4.0	14.5 - 6.9	25	7°21.3	7°22.5	7°01.1	2.5 - 1.2	8.5 - 4.2	14.5 - 7.1
26	6°51.5	6°52.6	6°32.8	2.6 - 1.2	8.6 - 3.9	14.6 - 6.7	26	7°06.5	7°07.7	6°47.1	2.6 - 1.2	8.6 - 4.1	14.6 - 6.9	26	7°21.5	7°22.7	7°01.4	2.6 - 1.3	8.6 - 4.2	14.6 - 7.2
27	6°51.7	6°52.9	6°33.0	2.7 - 1.2	8.7 - 4.0	14.7 - 6.7	27	7°06.7	7°07.9	6°47.3	2.7 - 1.3	8.7 - 4.1	14.7 - 7.0	27	7°21.7	7°23.0	7°01.6	2.7 - 1.3	8.7 - 4.3	14.7 - 7.2
28	6°52.0	6°53.1	6°33.2	2.8 - 1.3	8.8 - 4.0	14.8 - 6.8	28	7°07.0	7°08.2	6°47.5	2.8 - 1.3	8.8 - 4.2	14.8 - 7.0	28	7°22.0	7°23.2	7°01.9	2.8 - 1.4	8.8 - 4.3	14.8 - 7.3
29	6°52.3	6°53.4	6°33.5	2.9 - 1.3	8.9 - 4.1	14.9 - 6.8	29	7°07.3	7°08.4	6°47.8	2.9 - 1.4	8.9 - 4.2	14.9 - 7.1	29	7°22.3	7°23.5	7°02.1	2.9 - 1.4	8.9 - 4.4	14.9 - 7.3
30	6°52.5	6°53.6	6°33.7	3.0 - 1.4	9.0 - 4.1	15.0 - 6.9	30	7°07.5	7°08.7	6°48.0	3.0 - 1.4	9.0 - 4.3	15.0 - 7.1	30	7°22.5	7°23.7	7°02.3	3.0 - 1.5	9.0 - 4.4	15.0 - 7.4
31	6°52.7	6°53.9	6°33.9	3.1 - 1.4	9.1 - 4.2	15.1 - 6.9	31	7°07.7	7°08.9	6°48.3	3.1 - 1.5	9.1 - 4.3	15.1 - 7.2	31	7°22.7	7°24.0	7°02.6	3.1 - 1.5	9.1 - 4.5	15.1 - 7.4
32	6°53.0	6°54.1	6°34.2	3.2 - 1.5	9.2 - 4.2	15.2 - 7.0	32	7°08.0	7°09.2	6°48.5	3.2 - 1.5	9.2 - 4.4	15.2 - 7.2	32	7°23.0	7°24.2	7°02.8	3.2 - 1.6	9.2 - 4.5	15.2 - 7.5
33	6°53.3	6°54.4	6°34.4	3.3 - 1.5	9.3 - 4.3	15.3 - 7.0	33	7°08.3	7°09.4	6°48.7	3.3 - 1.6	9.3 - 4.4	15.3 - 7.3	33	7°23.3	7°24.5	7°03.1	3.3 - 1.6	9.3 - 4.6	15.3 - 7.5
34	6°53.5	6°54.6	6°34.7	3.4 - 1.6	9.4 - 4.3	15.4 - 7.1	34	7°08.5	7°09.7	6°49.0	3.4 - 1.6	9.4 - 4.5	15.4 - 7.3	34	7°23.5	7°24.7	7°03.3	3.4 - 1.7	9.4 - 4.6	15.4 - 7.6
35	6°53.7	6°54.9	6°34.9	3.5 - 1.6	9.5 - 4.4	15.5 - 7.1	35	7°08.7	7°09.9	6°49.2	3.5 - 1.7	9.5 - 4.5	15.5 - 7.4	35	7°23.7	7°25.0	7°03.5	3.5 - 1.7	9.5 - 4.7	15.5 - 7.6
36	6°54.0	6°55.1	6°35.1	3.6 - 1.6	9.6 - 4.4	15.6 - 7.1	36	7°09.0	7°10.2	6°49.5	3.6 - 1.7	9.6 - 4.6	15.6 - 7.4	36	7°24.0	7°25.2	7°03.8	3.6 - 1.8	9.6 - 4.7	15.6 - 7.7
37	6°54.3	6°55.4	6°35.4	3.7 - 1.7	9.7 - 4.4	15.7 - 7.2	37	7°09.3	7°10.4	6°49.7	3.7 - 1.8	9.7 - 4.6	15.7 - 7.5	37	7°24.3	7°25.5	7°04.0	3.7 - 1.8	9.7 - 4.8	15.7 - 7.7
38	6°54.5	6°55.6	6°35.6	3.8 - 1.7	9.8 - 4.5	15.8 - 7.2	38	7°09.5	7°10.7	6°49.9	3.8 - 1.8	9.8 - 4.7	15.8 - 7.5	38	7°24.5	7°25.7	7°04.3	3.8 - 1.9	9.8 - 4.8	15.8 - 7.8
39	6°54.7	6°55.9	6°35.9	3.9 - 1.8	9.9 - 4.5	15.9 - 7.3	39	7°09.7	7°10.9	6°50.2	3.9 - 1.9	9.9 - 4.7	15.9 - 7.6	39	7°24.7	7°26.0	7°04.5	3.9 - 1.9	9.9 - 4.9	15.9 - 7.8
40	6°55.0	6°56.1	6°36.1	4.0 - 1.8	10.0 - 4.6	16.0 - 7.3	40	7°10.0	7°11.2	6°50.4	4.0 - 1.9	10.0 - 4.8	16.0 - 7.6	40	7°25.0	7°26.2	7°04.7	4.0 - 2.0	10.0 - 4.9	16.0 - 7.9
41	6°55.3	6°56.4	6°36.3	4.1 - 1.9	10.1 - 4.6	16.1 - 7.4	41	7°10.3	7°11.4	6°50.6	4.1 - 1.9	10.1 - 4.8	16.1 - 7.6	41	7°25.3	7°26.5	7°05.0	4.1 - 2.0	10.1 - 5.0	16.1 - 7.9
42	6°55.5	6°56.6	6°36.6	4.2 - 1.9	10.2 - 4.7	16.2 - 7.4	42	7°10.5	7°11.7	6°50.9	4.2 - 2.0	10.2 - 4.8	16.2 - 7.7	42	7°25.5	7°26.7	7°05.2	4.2 - 2.1	10.2 - 5.0	16.2 - 8.0
43	6°55.7	6°56.9	6°36.8	4.3 - 2.0	10.3 - 4.7	16.3 - 7.5	43	7°10.7	7°11.9	6°51.1	4.3 - 2.0	10.3 - 4.9	16.3 - 7.7	43	7°25.7	7°27.0	7°05.4	4.3 - 2.1	10.3 - 5.1	16.3 - 8.0
44	6°56.0	6°57.1	6°37.0	4.4 - 2.0	10.4 - 4.8	16.4 - 7.5	44	7°11.0	7°12.2	6°51.4	4.4 - 2.1	10.4 - 4.9	16.4 - 7.8	44	7°26.0	7°27.2	7°05.7	4.4 - 2.2	10.4 - 5.1	16.4 - 8.1
45	6°56.3	6°57.4	6°37.3	4.5 - 2.1	10.5 - 4.8	16.5 - 7.6	45	7°11.3	7°12.4	6°51.6	4.5 - 2.1	10.5 - 5.0	16.5 - 7.8	45	7°26.3	7°27.5	7°05.9	4.5 - 2.2	10.5 - 5.2	16.5 - 8.1
46	6°56.5	6°57.6	6°37.5	4.6 - 2.1	10.6 - 4.9	16.6 - 7.6	46	7°11.5	7°12.7	6°51.8	4.6 - 2.2	10.6 - 5.0	16.6 - 7.9	46	7°26.5	7°27.7	7°06.2	4.6 - 2.3	10.6 - 5.2	16.6 - 8.2
47	6°56.8	6°57.9	6°37.8	4.7 - 2.2	10.7 - 4.9	16.7 - 7.7	47	7°11.8	7°12.9	6°52.1	4.7 - 2.2	10.7 - 5.1	16.7 - 7.9	47	7°26.8	7°28.0	7°06.4	4.7 - 2.3	10.7 - 5.3	16.7 - 8.2
48	6°57.0	6°58.1	6°38.0	4.8 - 2.2	10.8 - 5.0	16.8 - 7.7	48	7°12.0	7°13.2	6°52.3	4.8 - 2.3	10.8 - 5.1	16.8 - 8.0	48	7°27.0	7°28.2	7°06.6	4.8 - 2.4	10.8 - 5.3	16.8 - 8.3
49	6°57.3	6°58.																		

Increments and Corrections

m	Sun Plan.	Aries	Moon	v and d corr			m	Sun Plan.	Aries	Moon	v and d corr			m	Sun Plan.	Aries	Moon	v and d corr		
0	7°30.0	7°31.2	7°09.5	0.0 - 0.0	6.0 - 3.0	12.0 - 6.1	0	7°45.0	7°46.3	7°23.8	0.0 - 0.0	6.0 - 3.2	12.0 - 6.3	0	8°00.0	8°01.3	7°38.1	0.0 - 0.0	6.0 - 3.3	12.0 - 6.5
1	7°30.2	7°31.5	7°09.7	0.1 - 0.1	6.1 - 3.1	12.1 - 6.2	1	7°45.2	7°46.5	7°24.1	0.1 - 0.1	6.1 - 3.2	12.1 - 6.4	1	8°00.2	8°01.6	7°38.4	0.1 - 0.1	6.1 - 3.3	12.1 - 6.6
2	7°30.5	7°31.7	7°10.0	0.2 - 0.1	6.2 - 3.2	12.2 - 6.2	2	7°45.5	7°46.8	7°24.3	0.2 - 0.1	6.2 - 3.3	12.2 - 6.4	2	8°00.5	8°01.8	7°38.6	0.2 - 0.1	6.2 - 3.4	12.2 - 6.6
3	7°30.8	7°32.0	7°10.2	0.3 - 0.2	6.3 - 3.2	12.3 - 6.3	3	7°45.7	7°47.0	7°24.5	0.3 - 0.2	6.3 - 3.3	12.3 - 6.5	3	8°00.7	8°02.1	7°38.8	0.3 - 0.2	6.3 - 3.4	12.3 - 6.7
4	7°31.0	7°32.2	7°10.5	0.4 - 0.2	6.4 - 3.3	12.4 - 6.3	4	7°46.0	7°47.3	7°24.8	0.4 - 0.2	6.4 - 3.4	12.4 - 6.5	4	8°01.0	8°02.3	7°39.1	0.4 - 0.2	6.4 - 3.5	12.4 - 6.7
5	7°31.2	7°32.5	7°10.7	0.5 - 0.3	6.5 - 3.3	12.5 - 6.4	5	7°46.2	7°47.5	7°25.0	0.5 - 0.3	6.5 - 3.4	12.5 - 6.6	5	8°01.3	8°02.6	7°39.3	0.5 - 0.3	6.5 - 3.5	12.5 - 6.8
6	7°31.5	7°32.7	7°10.9	0.6 - 0.3	6.6 - 3.4	12.6 - 6.4	6	7°46.5	7°47.8	7°25.2	0.6 - 0.3	6.6 - 3.5	12.6 - 6.6	6	8°01.5	8°02.8	7°39.6	0.6 - 0.3	6.6 - 3.6	12.6 - 6.8
7	7°31.7	7°33.0	7°11.2	0.7 - 0.4	6.7 - 3.4	12.7 - 6.5	7	7°46.8	7°48.0	7°25.5	0.7 - 0.4	6.7 - 3.5	12.7 - 6.7	7	8°01.8	8°03.1	7°39.8	0.7 - 0.4	6.7 - 3.6	12.7 - 6.9
8	7°32.0	7°33.2	7°11.4	0.8 - 0.4	6.8 - 3.5	12.8 - 6.5	8	7°47.0	7°48.3	7°25.7	0.8 - 0.4	6.8 - 3.6	12.8 - 6.7	8	8°02.0	8°03.3	7°40.0	0.8 - 0.4	6.8 - 3.7	12.8 - 6.9
9	7°32.2	7°33.5	7°11.6	0.9 - 0.5	6.9 - 3.5	12.9 - 6.6	9	7°47.2	7°48.5	7°26.0	0.9 - 0.5	6.9 - 3.6	12.9 - 6.8	9	8°02.2	8°03.6	7°40.3	0.9 - 0.5	6.9 - 3.7	12.9 - 7.0
10	7°32.5	7°33.7	7°11.9	1.0 - 0.5	7.0 - 3.6	13.0 - 6.6	10	7°47.5	7°48.8	7°26.2	1.0 - 0.5	7.0 - 3.7	13.0 - 6.8	10	8°02.5	8°03.8	7°40.5	1.0 - 0.5	7.0 - 3.8	13.0 - 7.0
11	7°32.8	7°34.0	7°12.1	1.1 - 0.6	7.1 - 3.6	13.1 - 6.7	11	7°47.7	7°49.0	7°26.4	1.1 - 0.6	7.1 - 3.7	13.1 - 6.9	11	8°02.7	8°04.1	7°40.8	1.1 - 0.6	7.1 - 3.8	13.1 - 7.1
12	7°33.0	7°34.2	7°12.4	1.2 - 0.6	7.2 - 3.7	13.2 - 6.7	12	7°48.0	7°49.3	7°26.7	1.2 - 0.6	7.2 - 3.8	13.2 - 6.9	12	8°03.0	8°04.3	7°41.0	1.2 - 0.7	7.2 - 3.9	13.2 - 7.1
13	7°33.3	7°34.5	7°12.6	1.3 - 0.7	7.3 - 3.7	13.3 - 6.8	13	7°48.2	7°49.5	7°26.9	1.3 - 0.7	7.3 - 3.8	13.3 - 7.0	13	8°03.3	8°04.6	7°41.2	1.3 - 0.7	7.3 - 4.0	13.3 - 7.2
14	7°33.5	7°34.7	7°12.8	1.4 - 0.7	7.4 - 3.8	13.4 - 6.8	14	7°48.5	7°49.8	7°27.2	1.4 - 0.7	7.4 - 3.9	13.4 - 7.0	14	8°03.5	8°04.8	7°41.5	1.4 - 0.8	7.4 - 4.0	13.4 - 7.3
15	7°33.8	7°35.0	7°13.1	1.5 - 0.8	7.5 - 3.8	13.5 - 6.9	15	7°48.8	7°50.0	7°27.4	1.5 - 0.8	7.5 - 3.9	13.5 - 7.1	15	8°03.8	8°05.1	7°41.7	1.5 - 0.8	7.5 - 4.1	13.5 - 7.3
16	7°34.0	7°35.2	7°13.3	1.6 - 0.8	7.6 - 3.9	13.6 - 6.9	16	7°49.0	7°50.3	7°27.6	1.6 - 0.8	7.6 - 4.0	13.6 - 7.1	16	8°04.0	8°05.3	7°42.0	1.6 - 0.9	7.6 - 4.1	13.6 - 7.4
17	7°34.3	7°35.5	7°13.6	1.7 - 0.9	7.7 - 3.9	13.7 - 7.0	17	7°49.3	7°50.5	7°27.9	1.7 - 0.9	7.7 - 4.0	13.7 - 7.2	17	8°04.2	8°05.6	7°42.2	1.7 - 0.9	7.7 - 4.2	13.7 - 7.4
18	7°34.5	7°35.7	7°13.8	1.8 - 0.9	7.8 - 4.0	13.8 - 7.0	18	7°49.5	7°50.8	7°28.1	1.8 - 0.9	7.8 - 4.1	13.8 - 7.2	18	8°04.5	8°05.8	7°42.4	1.8 - 1.0	7.8 - 4.2	13.8 - 7.5
19	7°34.8	7°36.0	7°14.0	1.9 - 1.0	7.9 - 4.0	13.9 - 7.1	19	7°49.8	7°51.0	7°28.4	1.9 - 1.0	7.9 - 4.1	13.9 - 7.3	19	8°04.8	8°06.1	7°42.7	1.9 - 1.0	7.9 - 4.3	13.9 - 7.5
20	7°35.0	7°36.2	7°14.3	2.0 - 1.0	8.0 - 4.1	14.0 - 7.1	20	7°50.0	7°51.3	7°28.6	2.0 - 1.1	8.0 - 4.2	14.0 - 7.4	20	8°05.0	8°06.3	7°42.9	2.0 - 1.1	8.0 - 4.3	14.0 - 7.6
21	7°35.3	7°36.5	7°14.5	2.1 - 1.1	8.1 - 4.1	14.1 - 7.2	21	7°50.3	7°51.5	7°28.8	2.1 - 1.1	8.1 - 4.3	14.1 - 7.4	21	8°05.3	8°06.6	7°43.1	2.1 - 1.1	8.1 - 4.4	14.1 - 7.6
22	7°35.5	7°36.7	7°14.7	2.2 - 1.1	8.2 - 4.2	14.2 - 7.2	22	7°50.5	7°51.8	7°29.1	2.2 - 1.2	8.2 - 4.3	14.2 - 7.5	22	8°05.5	8°06.8	7°43.4	2.2 - 1.2	8.2 - 4.4	14.2 - 7.7
23	7°35.7	7°37.0	7°15.0	2.3 - 1.2	8.3 - 4.2	14.3 - 7.3	23	7°50.7	7°52.0	7°29.3	2.3 - 1.2	8.3 - 4.4	14.3 - 7.5	23	8°05.7	8°07.1	7°43.6	2.3 - 1.2	8.3 - 4.5	14.3 - 7.7
24	7°36.0	7°37.2	7°15.2	2.4 - 1.2	8.4 - 4.3	14.4 - 7.3	24	7°51.0	7°52.3	7°29.5	2.4 - 1.3	8.4 - 4.4	14.4 - 7.6	24	8°06.0	8°07.3	7°43.9	2.4 - 1.3	8.4 - 4.5	14.4 - 7.8
25	7°36.2	7°37.5	7°15.5	2.5 - 1.3	8.5 - 4.3	14.5 - 7.4	25	7°51.3	7°52.5	7°29.8	2.5 - 1.3	8.5 - 4.5	14.5 - 7.6	25	8°06.2	8°07.6	7°44.1	2.5 - 1.4	8.5 - 4.6	14.5 - 7.9
26	7°36.5	7°37.7	7°15.7	2.6 - 1.3	8.6 - 4.4	14.6 - 7.4	26	7°51.5	7°52.8	7°30.0	2.6 - 1.4	8.6 - 4.5	14.6 - 7.7	26	8°06.5	8°07.8	7°44.3	2.6 - 1.4	8.6 - 4.7	14.6 - 7.9
27	7°36.7	7°38.0	7°15.9	2.7 - 1.4	8.7 - 4.4	14.7 - 7.5	27	7°51.7	7°53.0	7°30.3	2.7 - 1.4	8.7 - 4.6	14.7 - 7.7	27	8°06.8	8°08.1	7°44.6	2.7 - 1.5	8.7 - 4.7	14.7 - 8.0
28	7°37.0	7°38.2	7°16.2	2.8 - 1.4	8.8 - 4.5	14.8 - 7.5	28	7°52.0	7°53.3	7°30.5	2.8 - 1.5	8.8 - 4.6	14.8 - 7.8	28	8°07.0	8°08.3	7°44.8	2.8 - 1.5	8.8 - 4.8	14.8 - 8.0
29	7°37.3	7°38.5	7°16.4	2.9 - 1.5	8.9 - 4.5	14.9 - 7.6	29	7°52.2	7°53.5	7°30.7	2.9 - 1.5	8.9 - 4.7	14.9 - 7.8	29	8°07.3	8°08.6	7°45.1	2.9 - 1.6	8.9 - 4.8	14.9 - 8.1
30	7°37.5	7°38.8	7°16.7	3.0 - 1.5	9.0 - 4.6	15.0 - 7.6	30	7°52.5	7°53.8	7°31.0	3.0 - 1.6	9.0 - 4.7	15.0 - 7.9	30	8°07.5	8°08.8	7°45.3	3.0 - 1.6	9.0 - 4.9	15.0 - 8.1
31	7°37.7	7°39.0	7°16.9	3.1 - 1.6	9.1 - 4.6	15.1 - 7.7	31	7°52.7	7°54.0	7°31.2	3.1 - 1.6	9.1 - 4.8	15.1 - 7.9	31	8°07.7	8°09.1	7°45.5	3.1 - 1.7	9.1 - 4.9	15.1 - 8.2
32	7°38.0	7°39.3	7°17.1	3.2 - 1.6	9.2 - 4.7	15.2 - 7.7	32	7°53.0	7°54.3	7°31.5	3.2 - 1.7	9.2 - 4.8	15.2 - 8.0	32	8°08.0	8°09.3	7°45.8	3.2 - 1.7	9.2 - 5.0	15.2 - 8.2
33	7°38.3	7°39.5	7°17.4	3.3 - 1.7	9.3 - 4.7	15.3 - 7.8	33	7°53.3	7°54.5	7°31.7	3.3 - 1.7	9.3 - 4.9	15.3 - 8.0	33	8°08.2	8°09.6	7°46.0	3.3 - 1.8	9.3 - 5.0	15.3 - 8.3
34	7°38.5	7°39.8	7°17.6	3.4 - 1.7	9.4 - 4.8	15.4 - 7.8	34	7°53.5	7°54.8	7°31.9	3.4 - 1.8	9.4 - 4.9	15.4 - 8.1	34	8°08.5	8°09.8	7°46.2	3.4 - 1.8	9.4 - 5.1	15.4 - 8.3
35	7°38.7	7°40.0	7°17.9	3.5 - 1.8	9.5 - 4.8	15.5 - 7.9	35	7°53.8	7°55.0	7°32.2	3.5 - 1.8	9.5 - 5.0	15.5 - 8.1	35	8°08.8	8°10.1	7°46.5	3.5 - 1.9	9.5 - 5.1	15.5 - 8.4
36	7°39.0	7°40.3	7°18.1	3.6 - 1.8	9.6 - 4.9	15.6 - 7.9	36	7°54.0	7°55.3	7°32.4	3.6 - 1.9	9.6 - 5.0	15.6 - 8.2	36	8°09.0	8°10.3	7°46.7	3.6 - 1.9	9.6 - 5.2	15.6 - 8.4
37	7°39.3	7°40.5	7°18.3	3.7 - 1.9	9.7 - 4.9	15.7 - 8.0	37	7°54.3	7°55.5	7°32.6	3.7 - 1.9	9.7 - 5.1	15.7 - 8.2	37	8°09.3	8°10.6	7°47.0	3.7 - 2.0	9.7 - 5.3	15.7 - 8.5
38	7°39.5	7°40.8	7°18.6	3.8 - 1.9	9.8 - 5.0	15.8 - 8.0	38	7°54.5	7°55.8	7°32.9	3.8 - 2.0	9.8 - 5.1	15.8 - 8.3	38	8°09.5	8°10.8	7°47.2	3.8 - 2.1	9.8 - 5.3	15.8 - 8.6
39	7°39.8	7°41.0	7°18.8	3.9 - 2.0	9.9 - 5.0	15.9 - 8.1	39	7°54.7	7°56.0	7°33.1	3.9 - 2.0	9.9 - 5.2	15.9 - 8.3	39	8°09.7	8°11.1	7°47.4	3.9 - 2.1	9.9 - 5.4	15.9 - 8.6
40	7°40.0	7°41.3	7°19.0	4.0 - 2.0	10.0 - 5.1	16.0 - 8.1	40	7°55.0	7°56.3	7°33.4	4.0 - 2.1	10.0 - 5.3	16.0 - 8.4	40	8°10.0	8°11.3	7°47.7	4.0 - 2.2	10.0 - 5.4	16.0 - 8.7
41	7°40.3	7°41.5	7°19.3	4.1 - 2.1	10.1 - 5.1	16.1 - 8.2	41	7°55.3	7°56.5	7°33.6	4.1 - 2.2	10.1 - 5.3	16.1 - 8.5	41	8°10.2	8°11.6	7°47.9	4.1 - 2.2	10.1 - 5.5	16.1 - 8.7
42	7°40.5	7°41.8	7°19.5	4.2 - 2.1	10.2 - 5.2	16.2 - 8.2	42	7°55.5	7°56.8	7°33.8	4.2 - 2.2	10.2 - 5.4	16.2 - 8.5	42	8°10.5	8°11.8	7°48.2	4.2 - 2.3	10.2 - 5.5	16.2 - 8.8
43	7°40.7	7°42.0	7°19.8	4.3 - 2.2	10.3 - 5.2	16.3 - 8.3	43	7°55.7	7°57.1	7°34.1	4.3 - 2.3	10.3 - 5.4	16.3 - 8.6	43	8°10.8	8°12.1	7°48.4	4.3 - 2.3	10.3 - 5.6	16.3 - 8.8
44	7°41.0	7°42.3	7°20.0	4.4 - 2.2	10.4 - 5.3	16.4 - 8.3	44	7°56.0	7°57.3	7°34.3	4.4 - 2.3	10.4 - 5.5	16.4 - 8.6	44	8°11.0	8°12.3	7°48.6	4.4 - 2.4	10.4 - 5.6	16.4 - 8.9
45	7°41.2	7°42.5	7°20.2	4.5 - 2.3	10.5 - 5.3	16.5 - 8.4	45	7°56.3	7°57.6	7°34.6	4.5 - 2.4	10.5 - 5.5	16.5 - 8.7	45	8°11.3	8°12.6	7°48.9	4.5 - 2.4	10.5 - 5.7	16.5 - 8.9
46	7°41.5	7°42.8	7°20.5	4.6 - 2.3	10.6 - 5.4	16.6 - 8.4	46	7°56.5	7°57.8	7°34.8	4.6 - 2.4	10.6 - 5.6	16.6 - 8.7	46	8°11.5	8°12.8	7°49.1	4.6 - 2.5	10.6 - 5.7	16.6 - 9.0
47	7°41.8	7°43.0	7°20.7	4.7 - 2.4	10.7 - 5.4	16.7 - 8.5	47	7°56.7	7°58.1	7°35.0	4.7 - 2.5	10.7 - 5.6	16.7 - 8.8	47	8°11.7	8°13.1	7°49.3	4.7 - 2.5	10.7 - 5.8	16.7 - 9.0
48	7°42.0	7°43.3	7°21.0	4.8 - 2.4	10.8 - 5.5	16.8 - 8.5	48	7°57.0	7°58.3	7°35.3	4.8 - 2.5	10.8 - 5.7	16.8 - 8.8	48	8°12.0	8°13.3	7°49.6	4.8 - 2.6	10.8 - 5.8	16.8 - 9.1
49	7°42.3	7°43.5																		

Increments and Corrections

m 33	Sun Plan.	Aries	Moon	v and d corr			m 34	Sun Plan.	Aries	Moon	v and d corr			m 35	Sun Plan.	Aries	Moon	v and d corr		
0	8°15.0	8°16.4	7°52.5	0.0 - 0.0	6.0 - 3.4	12.0 - 6.7	0	8°30.0	8°31.4	8°06.8	0.0 - 0.0	6.0 - 3.4	12.0 - 6.9	0	8°45.0	8°46.4	8°21.1	0.0 - 0.0	6.0 - 3.5	12.0 - 7.1
1	8°15.2	8°16.6	7°52.7	0.1 - 0.1	6.1 - 3.4	12.1 - 6.8	1	8°30.2	8°31.6	8°07.0	0.1 - 0.1	6.1 - 3.5	12.1 - 7.0	1	8°45.2	8°46.7	8°21.3	0.1 - 0.1	6.1 - 3.6	12.1 - 7.2
2	8°15.5	8°16.9	7°52.9	0.2 - 0.1	6.2 - 3.5	12.2 - 6.8	2	8°30.5	8°31.9	8°07.2	0.2 - 0.1	6.2 - 3.6	12.2 - 7.0	2	8°45.5	8°46.9	8°21.6	0.2 - 0.1	6.2 - 3.7	12.2 - 7.2
3	8°15.7	8°17.1	7°53.2	0.3 - 0.2	6.3 - 3.5	12.3 - 6.9	3	8°30.7	8°32.1	8°07.5	0.3 - 0.2	6.3 - 3.6	12.3 - 7.1	3	8°45.7	8°47.2	8°21.8	0.3 - 0.2	6.3 - 3.7	12.3 - 7.3
4	8°16.0	8°17.4	7°53.4	0.4 - 0.2	6.4 - 3.6	12.4 - 6.9	4	8°31.0	8°32.4	8°07.7	0.4 - 0.2	6.4 - 3.7	12.4 - 7.1	4	8°46.0	8°47.4	8°22.0	0.4 - 0.2	6.4 - 3.8	12.4 - 7.3
5	8°16.3	8°17.6	7°53.6	0.5 - 0.3	6.5 - 3.6	12.5 - 7.0	5	8°31.3	8°32.6	8°08.0	0.5 - 0.3	6.5 - 3.7	12.5 - 7.2	5	8°46.3	8°47.7	8°22.3	0.5 - 0.3	6.5 - 3.8	12.5 - 7.4
6	8°16.5	8°17.9	7°53.9	0.6 - 0.3	6.6 - 3.7	12.6 - 7.0	6	8°31.5	8°32.9	8°08.2	0.6 - 0.3	6.6 - 3.8	12.6 - 7.2	6	8°46.5	8°47.9	8°22.5	0.6 - 0.4	6.6 - 3.9	12.6 - 7.5
7	8°16.8	8°18.1	7°54.1	0.7 - 0.4	6.7 - 3.7	12.7 - 7.1	7	8°31.8	8°33.1	8°08.4	0.7 - 0.4	6.7 - 3.9	12.7 - 7.3	7	8°46.8	8°48.2	8°22.8	0.7 - 0.4	6.7 - 4.0	12.7 - 7.5
8	8°17.0	8°18.4	7°54.4	0.8 - 0.4	6.8 - 3.8	12.8 - 7.1	8	8°32.0	8°33.4	8°08.7	0.8 - 0.5	6.8 - 3.9	12.8 - 7.4	8	8°47.0	8°48.4	8°23.0	0.8 - 0.5	6.8 - 4.0	12.8 - 7.6
9	8°17.2	8°18.6	7°54.6	0.9 - 0.5	6.9 - 3.9	12.9 - 7.2	9	8°32.2	8°33.7	8°08.9	0.9 - 0.5	6.9 - 4.0	12.9 - 7.4	9	8°47.2	8°48.7	8°23.2	0.9 - 0.5	6.9 - 4.1	12.9 - 7.6
10	8°17.5	8°18.9	7°54.8	1.0 - 0.6	7.0 - 3.9	13.0 - 7.3	10	8°32.5	8°33.9	8°09.2	1.0 - 0.6	7.0 - 4.0	13.0 - 7.5	10	8°47.5	8°48.9	8°23.5	1.0 - 0.6	7.0 - 4.1	13.0 - 7.7
11	8°17.7	8°19.1	7°55.1	1.1 - 0.6	7.1 - 4.0	13.1 - 7.3	11	8°32.7	8°34.2	8°09.4	1.1 - 0.6	7.1 - 4.1	13.1 - 7.5	11	8°47.7	8°49.2	8°23.7	1.1 - 0.7	7.1 - 4.2	13.1 - 7.8
12	8°18.0	8°19.4	7°55.3	1.2 - 0.7	7.2 - 4.0	13.2 - 7.4	12	8°33.0	8°34.4	8°09.6	1.2 - 0.7	7.2 - 4.1	13.2 - 7.6	12	8°48.0	8°49.4	8°23.9	1.2 - 0.7	7.2 - 4.3	13.2 - 7.8
13	8°18.3	8°19.6	7°55.6	1.3 - 0.7	7.3 - 4.1	13.3 - 7.4	13	8°33.3	8°34.7	8°09.9	1.3 - 0.7	7.3 - 4.2	13.3 - 7.6	13	8°48.3	8°49.7	8°24.2	1.3 - 0.8	7.3 - 4.3	13.3 - 7.9
14	8°18.5	8°19.9	7°55.8	1.4 - 0.8	7.4 - 4.1	13.4 - 7.5	14	8°33.5	8°34.9	8°10.1	1.4 - 0.8	7.4 - 4.3	13.4 - 7.7	14	8°48.5	8°49.9	8°24.4	1.4 - 0.8	7.4 - 4.4	13.4 - 7.9
15	8°18.8	8°20.1	7°56.0	1.5 - 0.8	7.5 - 4.2	13.5 - 7.5	15	8°33.8	8°35.2	8°10.3	1.5 - 0.9	7.5 - 4.3	13.5 - 7.8	15	8°48.8	8°50.2	8°24.7	1.5 - 0.9	7.5 - 4.4	13.5 - 8.0
16	8°19.0	8°20.4	7°56.3	1.6 - 0.9	7.6 - 4.2	13.6 - 7.6	16	8°34.0	8°35.4	8°10.6	1.6 - 0.9	7.6 - 4.4	13.6 - 7.8	16	8°49.0	8°50.4	8°24.9	1.6 - 0.9	7.6 - 4.5	13.6 - 8.0
17	8°19.2	8°20.6	7°56.5	1.7 - 0.9	7.7 - 4.3	13.7 - 7.6	17	8°34.2	8°35.7	8°10.8	1.7 - 1.0	7.7 - 4.4	13.7 - 7.9	17	8°49.2	8°50.7	8°25.1	1.7 - 1.0	7.7 - 4.6	13.7 - 8.1
18	8°19.5	8°20.9	7°56.7	1.8 - 1.0	7.8 - 4.4	13.8 - 7.7	18	8°34.5	8°35.9	8°11.1	1.8 - 1.0	7.8 - 4.5	13.8 - 7.9	18	8°49.5	8°50.9	8°25.4	1.8 - 1.1	7.8 - 4.6	13.8 - 8.2
19	8°19.8	8°21.1	7°57.0	1.9 - 1.1	7.9 - 4.4	13.9 - 7.8	19	8°34.8	8°36.2	8°11.3	1.9 - 1.1	7.9 - 4.5	13.9 - 8.0	19	8°49.8	8°51.2	8°25.6	1.9 - 1.1	7.9 - 4.7	13.9 - 8.2
20	8°20.0	8°21.4	7°57.2	2.0 - 1.1	8.0 - 4.5	14.0 - 7.8	20	8°35.0	8°36.4	8°11.5	2.0 - 1.1	8.0 - 4.6	14.0 - 8.0	20	8°50.0	8°51.4	8°25.9	2.0 - 1.2	8.0 - 4.7	14.0 - 8.3
21	8°20.3	8°21.6	7°57.5	2.1 - 1.2	8.1 - 4.5	14.1 - 7.9	21	8°35.3	8°36.7	8°11.8	2.1 - 1.2	8.1 - 4.7	14.1 - 8.1	21	8°50.3	8°51.7	8°26.1	2.1 - 1.2	8.1 - 4.8	14.1 - 8.3
22	8°20.5	8°21.9	7°57.7	2.2 - 1.2	8.2 - 4.6	14.2 - 7.9	22	8°35.5	8°36.9	8°12.0	2.2 - 1.3	8.2 - 4.7	14.2 - 8.2	22	8°50.5	8°52.0	8°26.3	2.2 - 1.3	8.2 - 4.9	14.2 - 8.4
23	8°20.7	8°22.1	7°57.9	2.3 - 1.3	8.3 - 4.6	14.3 - 8.0	23	8°35.7	8°37.2	8°12.3	2.3 - 1.3	8.3 - 4.8	14.3 - 8.2	23	8°50.7	8°52.2	8°26.6	2.3 - 1.4	8.3 - 4.9	14.3 - 8.5
24	8°21.0	8°22.4	7°58.2	2.4 - 1.3	8.4 - 4.7	14.4 - 8.0	24	8°36.0	8°37.4	8°12.5	2.4 - 1.4	8.4 - 4.8	14.4 - 8.3	24	8°51.0	8°52.5	8°26.8	2.4 - 1.4	8.4 - 5.0	14.4 - 8.5
25	8°21.2	8°22.6	7°58.4	2.5 - 1.4	8.5 - 4.7	14.5 - 8.1	25	8°36.2	8°37.7	8°12.7	2.5 - 1.4	8.5 - 4.9	14.5 - 8.3	25	8°51.2	8°52.7	8°27.0	2.5 - 1.5	8.5 - 5.0	14.5 - 8.6
26	8°21.5	8°22.9	7°58.7	2.6 - 1.5	8.6 - 4.8	14.6 - 8.2	26	8°36.5	8°37.9	8°13.0	2.6 - 1.5	8.6 - 4.9	14.6 - 8.4	26	8°51.5	8°53.0	8°27.3	2.6 - 1.5	8.6 - 5.1	14.6 - 8.6
27	8°21.8	8°23.1	7°58.9	2.7 - 1.5	8.7 - 4.9	14.7 - 8.2	27	8°36.8	8°38.2	8°13.2	2.7 - 1.6	8.7 - 5.0	14.7 - 8.5	27	8°51.8	8°53.2	8°27.5	2.7 - 1.6	8.7 - 5.1	14.7 - 8.7
28	8°22.0	8°23.4	7°59.1	2.8 - 1.6	8.8 - 4.9	14.8 - 8.3	28	8°37.0	8°38.4	8°13.4	2.8 - 1.6	8.8 - 5.1	14.8 - 8.5	28	8°52.0	8°53.5	8°27.8	2.8 - 1.7	8.8 - 5.2	14.8 - 8.8
29	8°22.3	8°23.6	7°59.4	2.9 - 1.6	8.9 - 5.0	14.9 - 8.3	29	8°37.3	8°38.7	8°13.7	2.9 - 1.7	8.9 - 5.1	14.9 - 8.6	29	8°52.3	8°53.7	8°28.0	2.9 - 1.7	8.9 - 5.3	14.9 - 8.8
30	8°22.5	8°23.9	7°59.6	3.0 - 1.7	9.0 - 5.0	15.0 - 8.4	30	8°37.5	8°38.9	8°13.9	3.0 - 1.7	9.0 - 5.2	15.0 - 8.6	30	8°52.5	8°54.0	8°28.2	3.0 - 1.8	9.0 - 5.3	15.0 - 8.9
31	8°22.7	8°24.1	7°59.8	3.1 - 1.7	9.1 - 5.1	15.1 - 8.4	31	8°37.7	8°39.2	8°14.2	3.1 - 1.8	9.1 - 5.2	15.1 - 8.7	31	8°52.7	8°54.2	8°28.5	3.1 - 1.8	9.1 - 5.4	15.1 - 8.9
32	8°23.0	8°24.4	8°00.1	3.2 - 1.8	9.2 - 5.1	15.2 - 8.5	32	8°38.0	8°39.4	8°14.4	3.2 - 1.8	9.2 - 5.3	15.2 - 8.7	32	8°53.0	8°54.5	8°28.7	3.2 - 1.9	9.2 - 5.4	15.2 - 9.0
33	8°23.2	8°24.6	8°00.3	3.3 - 1.8	9.3 - 5.2	15.3 - 8.5	33	8°38.2	8°39.7	8°14.6	3.3 - 1.9	9.3 - 5.3	15.3 - 8.8	33	8°53.2	8°54.7	8°29.0	3.3 - 2.0	9.3 - 5.5	15.3 - 9.1
34	8°23.5	8°24.9	8°00.6	3.4 - 1.9	9.4 - 5.2	15.4 - 8.6	34	8°38.5	8°39.9	8°14.9	3.4 - 2.0	9.4 - 5.4	15.4 - 8.9	34	8°53.5	8°55.0	8°29.2	3.4 - 2.0	9.4 - 5.6	15.4 - 9.1
35	8°23.8	8°25.1	8°00.8	3.5 - 2.0	9.5 - 5.3	15.5 - 8.7	35	8°38.8	8°40.2	8°15.1	3.5 - 2.0	9.5 - 5.5	15.5 - 8.9	35	8°53.8	8°55.2	8°29.4	3.5 - 2.1	9.5 - 5.6	15.5 - 9.2
36	8°24.0	8°25.4	8°01.0	3.6 - 2.0	9.6 - 5.4	15.6 - 8.7	36	8°39.0	8°40.4	8°15.4	3.6 - 2.1	9.6 - 5.5	15.6 - 9.0	36	8°54.0	8°55.5	8°29.7	3.6 - 2.1	9.6 - 5.7	15.6 - 9.2
37	8°24.3	8°25.6	8°01.3	3.7 - 2.1	9.7 - 5.4	15.7 - 8.8	37	8°39.3	8°40.7	8°15.6	3.7 - 2.1	9.7 - 5.6	15.7 - 9.0	37	8°54.3	8°55.7	8°29.9	3.7 - 2.2	9.7 - 5.7	15.7 - 9.3
38	8°24.5	8°25.9	8°01.5	3.8 - 2.1	9.8 - 5.5	15.8 - 8.8	38	8°39.5	8°40.9	8°15.8	3.8 - 2.2	9.8 - 5.6	15.8 - 9.1	38	8°54.5	8°56.0	8°30.2	3.8 - 2.2	9.8 - 5.8	15.8 - 9.3
39	8°24.7	8°26.1	8°01.8	3.9 - 2.2	9.9 - 5.5	15.9 - 8.9	39	8°39.7	8°41.2	8°16.1	3.9 - 2.2	9.9 - 5.7	15.9 - 9.1	39	8°54.7	8°56.2	8°30.4	3.9 - 2.3	9.9 - 5.9	15.9 - 9.4
40	8°25.0	8°26.4	8°02.0	4.0 - 2.2	10.0 - 5.6	16.0 - 8.9	40	8°40.0	8°41.4	8°16.3	4.0 - 2.3	10.0 - 5.8	16.0 - 9.2	40	8°55.0	8°56.5	8°30.6	4.0 - 2.4	10.0 - 5.9	16.0 - 9.5
41	8°25.2	8°26.6	8°02.2	4.1 - 2.3	10.1 - 5.6	16.1 - 9.0	41	8°40.2	8°41.7	8°16.5	4.1 - 2.4	10.1 - 5.8	16.1 - 9.3	41	8°55.2	8°56.7	8°30.9	4.1 - 2.4	10.1 - 6.0	16.1 - 9.5
42	8°25.5	8°26.9	8°02.5	4.2 - 2.3	10.2 - 5.7	16.2 - 9.0	42	8°40.5	8°41.9	8°16.8	4.2 - 2.4	10.2 - 5.9	16.2 - 9.3	42	8°55.5	8°57.0	8°31.1	4.2 - 2.5	10.2 - 6.0	16.2 - 9.6
43	8°25.8	8°27.1	8°02.7	4.3 - 2.4	10.3 - 5.8	16.3 - 9.1	43	8°40.8	8°42.2	8°17.0	4.3 - 2.5	10.3 - 5.9	16.3 - 9.4	43	8°55.8	8°57.2	8°31.3	4.3 - 2.5	10.3 - 6.1	16.3 - 9.6
44	8°26.0	8°27.4	8°02.9	4.4 - 2.5	10.4 - 5.8	16.4 - 9.2	44	8°41.0	8°42.4	8°17.3	4.4 - 2.5	10.4 - 6.0	16.4 - 9.4	44	8°56.0	8°57.5	8°31.6	4.4 - 2.6	10.4 - 6.2	16.4 - 9.7
45	8°26.3	8°27.6	8°03.2	4.5 - 2.5	10.5 - 5.9	16.5 - 9.2	45	8°41.3	8°42.7	8°17.5	4.5 - 2.6	10.5 - 6.0	16.5 - 9.5	45	8°56.3	8°57.7	8°31.8	4.5 - 2.7	10.5 - 6.2	16.5 - 9.8
46	8°26.5	8°27.9	8°03.4	4.6 - 2.6	10.6 - 5.9	16.6 - 9.3	46	8°41.5	8°42.9	8°17.7	4.6 - 2.6	10.6 - 6.1	16.6 - 9.5	46	8°56.5	8°58.0	8°32.1	4.6 - 2.7	10.6 - 6.3	16.6 - 9.8
47	8°26.7	8°28.1	8°03.7	4.7 - 2.6	10.7 - 6.0	16.7 - 9.3	47	8°41.7	8°43.2	8°18.0	4.7 - 2.7	10.7 - 6.2	16.7 - 9.6	47	8°56.7	8°58.2	8°32.3	4.7 - 2.8	10.7 - 6.3	16.7 - 9.9
48	8°27.0	8°28.4	8°03.9	4.8 - 2.7	10.8 - 6.0	16.8 - 9.4	48	8°42.0	8°43.4	8°18.2	4.8 - 2.8	10.8 - 6.2	16.8 - 9.7	48	8°57.0	8°58.5	8°32.5	4.8 - 2.8	10.8 - 6.4	16.8 - 9.9
49	8°27.3	8°28.																		

Increments and Corrections

m 36	Sun Plan.	Aries	Moon	v and d corr			m 37	Sun Plan.	Aries	Moon	v and d corr			m 38	Sun Plan.	Aries	Moon	v and d corr		
0	9°00.0	9°01.5	8°35.4	0.0 - 0.0	6.0 - 3.6	12.0 - 7.3	0	9°15.0	9°16.5	8°49.7	0.0 - 0.0	6.0 - 3.8	12.0 - 7.5	0	9°30.0	9°31.6	9°04.0	0.0 - 0.0	6.0 - 3.9	12.0 - 7.7
1	9°00.2	9°01.7	8°35.6	0.1 - 0.1	6.1 - 3.7	12.1 - 7.4	1	9°15.2	9°16.8	8°50.0	0.1 - 0.1	6.1 - 3.8	12.1 - 7.6	1	9°30.2	9°31.8	9°04.3	0.1 - 0.1	6.1 - 3.9	12.1 - 7.8
2	9°00.5	9°02.0	8°35.9	0.2 - 0.1	6.2 - 3.8	12.2 - 7.4	2	9°15.5	9°17.0	8°50.2	0.2 - 0.1	6.2 - 3.9	12.2 - 7.6	2	9°30.5	9°32.1	9°04.5	0.2 - 0.1	6.2 - 4.0	12.2 - 7.8
3	9°00.7	9°02.2	8°36.1	0.3 - 0.2	6.3 - 3.8	12.3 - 7.5	3	9°15.7	9°17.3	8°50.4	0.3 - 0.2	6.3 - 3.9	12.3 - 7.7	3	9°30.7	9°32.3	9°04.7	0.3 - 0.2	6.3 - 4.0	12.3 - 7.9
4	9°01.0	9°02.5	8°36.4	0.4 - 0.2	6.4 - 3.9	12.4 - 7.5	4	9°16.0	9°17.5	8°50.7	0.4 - 0.3	6.4 - 4.0	12.4 - 7.8	4	9°31.0	9°32.6	9°05.0	0.4 - 0.3	6.4 - 4.1	12.4 - 8.0
5	9°01.3	9°02.7	8°36.6	0.5 - 0.3	6.5 - 4.0	12.5 - 7.6	5	9°16.3	9°17.8	8°50.9	0.5 - 0.3	6.5 - 4.1	12.5 - 7.8	5	9°31.3	9°32.8	9°05.2	0.5 - 0.3	6.5 - 4.2	12.5 - 8.0
6	9°01.5	9°03.0	8°36.8	0.6 - 0.4	6.6 - 4.0	12.6 - 7.7	6	9°16.5	9°18.0	8°51.1	0.6 - 0.4	6.6 - 4.1	12.6 - 7.9	6	9°31.5	9°33.1	9°05.5	0.6 - 0.4	6.6 - 4.2	12.6 - 8.1
7	9°01.8	9°03.2	8°37.1	0.7 - 0.4	6.7 - 4.1	12.7 - 7.7	7	9°16.8	9°18.3	8°51.4	0.7 - 0.4	6.7 - 4.2	12.7 - 7.9	7	9°31.8	9°33.3	9°05.7	0.7 - 0.4	6.7 - 4.3	12.7 - 8.1
8	9°02.0	9°03.5	8°37.3	0.8 - 0.5	6.8 - 4.1	12.8 - 7.8	8	9°17.0	9°18.5	8°51.6	0.8 - 0.5	6.8 - 4.3	12.8 - 8.0	8	9°32.0	9°33.6	9°05.9	0.8 - 0.5	6.8 - 4.4	12.8 - 8.2
9	9°02.2	9°03.7	8°37.5	0.9 - 0.5	6.9 - 4.2	12.9 - 7.8	9	9°17.2	9°18.8	8°51.9	0.9 - 0.6	6.9 - 4.3	12.9 - 8.1	9	9°32.2	9°33.8	9°06.2	0.9 - 0.6	6.9 - 4.4	12.9 - 8.3
10	9°02.5	9°04.0	8°37.8	1.0 - 0.6	7.0 - 4.3	13.0 - 7.9	10	9°17.5	9°19.0	8°52.1	1.0 - 0.6	7.0 - 4.4	13.0 - 8.1	10	9°32.5	9°34.1	9°06.4	1.0 - 0.6	7.0 - 4.5	13.0 - 8.3
11	9°02.7	9°04.2	8°38.0	1.1 - 0.7	7.1 - 4.3	13.1 - 8.0	11	9°17.7	9°19.3	8°52.3	1.1 - 0.7	7.1 - 4.4	13.1 - 8.2	11	9°32.7	9°34.3	9°06.7	1.1 - 0.7	7.1 - 4.6	13.1 - 8.4
12	9°03.0	9°04.5	8°38.3	1.2 - 0.7	7.2 - 4.4	13.2 - 8.0	12	9°18.0	9°19.5	8°52.6	1.2 - 0.8	7.2 - 4.5	13.2 - 8.3	12	9°33.0	9°34.6	9°06.9	1.2 - 0.8	7.2 - 4.6	13.2 - 8.5
13	9°03.3	9°04.7	8°38.5	1.3 - 0.8	7.3 - 4.4	13.3 - 8.1	13	9°18.3	9°19.8	8°52.8	1.3 - 0.8	7.3 - 4.6	13.3 - 8.3	13	9°33.3	9°34.8	9°07.1	1.3 - 0.8	7.3 - 4.7	13.3 - 8.5
14	9°03.5	9°05.0	8°38.7	1.4 - 0.9	7.4 - 4.5	13.4 - 8.2	14	9°18.5	9°20.0	8°53.1	1.4 - 0.9	7.4 - 4.6	13.4 - 8.4	14	9°33.5	9°35.1	9°07.4	1.4 - 0.9	7.4 - 4.7	13.4 - 8.6
15	9°03.8	9°05.2	8°39.0	1.5 - 0.9	7.5 - 4.6	13.5 - 8.2	15	9°18.8	9°20.3	8°53.3	1.5 - 0.9	7.5 - 4.7	13.5 - 8.4	15	9°33.8	9°35.3	9°07.6	1.5 - 1.0	7.5 - 4.8	13.5 - 8.7
16	9°04.0	9°05.5	8°39.2	1.6 - 1.0	7.6 - 4.6	13.6 - 8.3	16	9°19.0	9°20.5	8°53.5	1.6 - 1.0	7.6 - 4.8	13.6 - 8.5	16	9°34.0	9°35.6	9°07.9	1.6 - 1.0	7.6 - 4.9	13.6 - 8.7
17	9°04.2	9°05.7	8°39.5	1.7 - 1.0	7.7 - 4.7	13.7 - 8.3	17	9°19.2	9°20.8	8°53.8	1.7 - 1.1	7.7 - 4.8	13.7 - 8.6	17	9°34.2	9°35.8	9°08.1	1.7 - 1.1	7.7 - 4.9	13.7 - 8.8
18	9°04.5	9°06.0	8°39.7	1.8 - 1.1	7.8 - 4.7	13.8 - 8.4	18	9°19.5	9°21.0	8°54.0	1.8 - 1.1	7.8 - 4.9	13.8 - 8.6	18	9°34.5	9°36.1	9°08.3	1.8 - 1.2	7.8 - 5.0	13.8 - 8.9
19	9°04.8	9°06.2	8°39.9	1.9 - 1.2	7.9 - 4.8	13.9 - 8.5	19	9°19.8	9°21.3	8°54.3	1.9 - 1.2	7.9 - 4.9	13.9 - 8.7	19	9°34.8	9°36.3	9°08.6	1.9 - 1.2	7.9 - 5.1	13.9 - 8.9
20	9°05.0	9°06.5	8°40.2	2.0 - 1.2	8.0 - 4.9	14.0 - 8.5	20	9°20.0	9°21.5	8°54.5	2.0 - 1.3	8.0 - 5.0	14.0 - 8.8	20	9°35.0	9°36.6	9°08.8	2.0 - 1.3	8.0 - 5.1	14.0 - 9.0
21	9°05.3	9°06.7	8°40.4	2.1 - 1.3	8.1 - 4.9	14.1 - 8.6	21	9°20.3	9°21.8	8°54.7	2.1 - 1.3	8.1 - 5.1	14.1 - 8.8	21	9°35.3	9°36.8	9°09.0	2.1 - 1.3	8.1 - 5.2	14.1 - 9.1
22	9°05.5	9°07.0	8°40.6	2.2 - 1.3	8.2 - 5.0	14.2 - 8.6	22	9°20.5	9°22.0	8°55.0	2.2 - 1.4	8.2 - 5.1	14.2 - 8.9	22	9°35.5	9°37.1	9°09.3	2.2 - 1.4	8.2 - 5.3	14.2 - 9.0
23	9°05.7	9°07.2	8°40.9	2.3 - 1.4	8.3 - 5.0	14.3 - 8.7	23	9°20.7	9°22.3	8°55.2	2.3 - 1.4	8.3 - 5.2	14.3 - 8.9	23	9°35.7	9°37.3	9°09.5	2.3 - 1.5	8.3 - 5.3	14.3 - 9.2
24	9°06.0	9°07.5	8°41.1	2.4 - 1.5	8.4 - 5.1	14.4 - 8.8	24	9°21.0	9°22.5	8°55.4	2.4 - 1.5	8.4 - 5.3	14.4 - 9.0	24	9°36.0	9°37.6	9°09.8	2.4 - 1.5	8.4 - 5.4	14.4 - 9.2
25	9°06.2	9°07.7	8°41.4	2.5 - 1.5	8.5 - 5.2	14.5 - 8.8	25	9°21.2	9°22.8	8°55.7	2.5 - 1.6	8.5 - 5.3	14.5 - 9.1	25	9°36.2	9°37.8	9°10.0	2.5 - 1.6	8.5 - 5.5	14.5 - 9.3
26	9°06.5	9°08.0	8°41.6	2.6 - 1.6	8.6 - 5.2	14.6 - 8.9	26	9°21.5	9°23.0	8°55.9	2.6 - 1.6	8.6 - 5.4	14.6 - 9.1	26	9°36.5	9°38.1	9°10.2	2.6 - 1.7	8.6 - 5.5	14.6 - 9.4
27	9°06.8	9°08.2	8°41.8	2.7 - 1.6	8.7 - 5.3	14.7 - 8.9	27	9°21.8	9°23.3	8°56.2	2.7 - 1.7	8.7 - 5.4	14.7 - 9.2	27	9°36.8	9°38.3	9°10.5	2.7 - 1.7	8.7 - 5.6	14.7 - 9.4
28	9°07.0	9°08.5	8°42.1	2.8 - 1.7	8.8 - 5.4	14.8 - 9.0	28	9°22.0	9°23.5	8°56.4	2.8 - 1.8	8.8 - 5.5	14.8 - 9.3	28	9°37.0	9°38.6	9°10.7	2.8 - 1.8	8.8 - 5.6	14.8 - 9.5
29	9°07.3	9°08.7	8°42.3	2.9 - 1.8	8.9 - 5.4	14.9 - 9.1	29	9°22.3	9°23.8	8°56.6	2.9 - 1.8	8.9 - 5.6	14.9 - 9.3	29	9°37.3	9°38.8	9°11.0	2.9 - 1.9	8.9 - 5.7	14.9 - 9.6
30	9°07.5	9°09.0	8°42.6	3.0 - 1.8	9.0 - 5.5	15.0 - 9.1	30	9°22.5	9°24.0	8°56.9	3.0 - 1.9	9.0 - 5.6	15.0 - 9.4	30	9°37.5	9°39.1	9°11.2	3.0 - 1.9	9.0 - 5.8	15.0 - 9.6
31	9°07.7	9°09.2	8°42.8	3.1 - 1.9	9.1 - 5.5	15.1 - 9.2	31	9°22.7	9°24.3	8°57.1	3.1 - 1.9	9.1 - 5.7	15.1 - 9.4	31	9°37.7	9°39.3	9°11.4	3.1 - 2.0	9.1 - 5.8	15.1 - 9.7
32	9°08.0	9°09.5	8°43.0	3.2 - 1.9	9.2 - 5.6	15.2 - 9.2	32	9°23.0	9°24.5	8°57.4	3.2 - 2.0	9.2 - 5.8	15.2 - 9.5	32	9°38.0	9°39.6	9°11.7	3.2 - 2.1	9.2 - 5.9	15.2 - 9.8
33	9°08.2	9°09.7	8°43.3	3.3 - 2.0	9.3 - 5.7	15.3 - 9.3	33	9°23.2	9°24.8	8°57.6	3.3 - 2.1	9.3 - 5.8	15.3 - 9.6	33	9°38.2	9°39.8	9°11.9	3.3 - 2.1	9.3 - 6.0	15.3 - 9.8
34	9°08.5	9°10.0	8°43.5	3.4 - 2.1	9.4 - 5.7	15.4 - 9.4	34	9°23.5	9°25.0	8°57.8	3.4 - 2.1	9.4 - 5.9	15.4 - 9.6	34	9°38.5	9°40.1	9°12.1	3.4 - 2.2	9.4 - 6.0	15.4 - 9.9
35	9°08.8	9°10.2	8°43.8	3.5 - 2.1	9.5 - 5.8	15.5 - 9.4	35	9°23.8	9°25.3	8°58.1	3.5 - 2.2	9.5 - 5.9	15.5 - 9.7	35	9°38.8	9°40.3	9°12.4	3.5 - 2.2	9.5 - 6.1	15.5 - 9.9
36	9°09.0	9°10.5	8°44.0	3.6 - 2.2	9.6 - 5.8	15.6 - 9.5	36	9°24.0	9°25.5	8°58.3	3.6 - 2.3	9.6 - 6.0	15.6 - 9.8	36	9°39.0	9°40.6	9°12.6	3.6 - 2.3	9.6 - 6.2	15.6 - 10.0
37	9°09.3	9°10.8	8°44.2	3.7 - 2.3	9.7 - 5.9	15.7 - 9.6	37	9°24.3	9°25.8	8°58.5	3.7 - 2.3	9.7 - 6.1	15.7 - 9.8	37	9°39.3	9°40.8	9°12.9	3.7 - 2.4	9.7 - 6.2	15.7 - 10.1
38	9°09.5	9°11.0	8°44.5	3.8 - 2.3	9.8 - 6.0	15.8 - 9.6	38	9°24.5	9°26.0	8°58.8	3.8 - 2.4	9.8 - 6.1	15.8 - 9.9	38	9°39.5	9°41.1	9°13.1	3.8 - 2.4	9.8 - 6.3	15.8 - 10.1
39	9°09.7	9°11.3	8°44.7	3.9 - 2.4	9.9 - 6.0	15.9 - 9.7	39	9°24.7	9°26.3	8°59.0	3.9 - 2.4	9.9 - 6.2	15.9 - 9.9	39	9°39.7	9°41.3	9°13.3	3.9 - 2.5	9.9 - 6.4	15.9 - 10.2
40	9°10.0	9°11.5	8°44.9	4.0 - 2.4	10.0 - 6.1	16.0 - 9.7	40	9°25.0	9°26.5	8°59.3	4.0 - 2.5	10.0 - 6.3	16.0 - 10.0	40	9°40.0	9°41.6	9°13.6	4.0 - 2.6	10.0 - 6.4	16.0 - 10.3
41	9°10.2	9°11.8	8°45.2	4.1 - 2.5	10.1 - 6.1	16.1 - 9.8	41	9°25.2	9°26.8	8°59.5	4.1 - 2.6	10.1 - 6.3	16.1 - 10.1	41	9°40.2	9°41.8	9°13.8	4.1 - 2.6	10.1 - 6.5	16.1 - 10.3
42	9°10.5	9°12.0	8°45.4	4.2 - 2.6	10.2 - 6.2	16.2 - 9.9	42	9°25.5	9°27.0	8°59.7	4.2 - 2.6	10.2 - 6.4	16.2 - 10.1	42	9°40.5	9°42.1	9°14.1	4.2 - 2.7	10.2 - 6.5	16.2 - 10.4
43	9°10.8	9°12.3	8°45.7	4.3 - 2.6	10.3 - 6.3	16.3 - 9.9	43	9°25.8	9°27.3	9°00.0	4.3 - 2.7	10.3 - 6.4	16.3 - 10.2	43	9°40.8	9°42.3	9°14.3	4.3 - 2.8	10.3 - 6.6	16.3 - 10.5
44	9°11.0	9°12.5	8°45.9	4.4 - 2.7	10.4 - 6.3	16.4 - 10.0	44	9°26.0	9°27.5	9°00.2	4.4 - 2.8	10.4 - 6.5	16.4 - 10.3	44	9°41.0	9°42.6	9°14.5	4.4 - 2.8	10.4 - 6.7	16.4 - 10.5
45	9°11.3	9°12.8	8°46.1	4.5 - 2.7	10.5 - 6.4	16.5 - 10.0	45	9°26.3	9°27.8	9°00.5	4.5 - 2.8	10.5 - 6.6	16.5 - 10.3	45	9°41.3	9°42.8	9°14.8	4.5 - 2.9	10.5 - 6.7	16.5 - 10.6
46	9°11.5	9°13.0	8°46.4	4.6 - 2.8	10.6 - 6.4	16.6 - 10.1	46	9°26.5	9°28.0	9°00.7	4.6 - 2.9	10.6 - 6.6	16.6 - 10.4	46	9°41.5	9°43.1	9°15.0	4.6 - 3.0	10.6 - 6.8	16.6 - 10.7
47	9°11.7	9°13.3	8°46.6	4.7 - 2.9	10.7 - 6.5	16.7 - 10.2	47	9°26.7	9°28.3	9°00.9	4.7 - 2.9	10.7 - 6.7	16.7 - 10.4	47	9°41.7	9°43.3	9°15.2	4.7 - 3.0	10.7 - 6.9	16.7 - 10.7
48	9°12.0	9°13.5	8°46.9	4.8 - 2.9	10.8 - 6.6	16.8 - 10.2	48	9°27.0	9°28.5	9°01.2	4.8 - 3.0	10.8 - 6.8	16.8 - 10.5	48	9°42.0	9°43.6	9°15.5	4.8 - 3.1	10.8 - 6.9	16.8 - 10.8

Increments and Corrections

m 39	Sun Plan.	Aries	Moon	v and d corr			m 40	Sun Plan.	Aries	Moon	v and d corr			m 41	Sun Plan.	Aries	Moon	v and d corr		
0	9°45.0	9°46.6	9°18.4	0.0 - 0.0	6.0 - 4.0	12.0 - 7.9	0	10°00.0	10°01.6	9°32.7	0.0 - 0.0	6.0 - 4.1	12.0 - 8.1	0	10°15.0	10°16.7	9°47.0	0.0 - 0.0	6.0 - 4.2	12.0 - 8.3
1	9°45.2	9°46.8	9°18.6	0.1 - 0.1	6.1 - 4.0	12.1 - 8.0	1	10°00.2	10°01.9	9°32.9	0.1 - 0.1	6.1 - 4.1	12.1 - 8.2	1	10°15.2	10°16.9	9°47.2	0.1 - 0.1	6.1 - 4.2	12.1 - 8.4
2	9°45.5	9°47.1	9°18.8	0.2 - 0.1	6.2 - 4.1	12.2 - 8.0	2	10°00.5	10°02.1	9°33.1	0.2 - 0.1	6.2 - 4.2	12.2 - 8.2	2	10°15.5	10°17.2	9°47.5	0.2 - 0.1	6.2 - 4.3	12.2 - 8.4
3	9°45.7	9°47.4	9°19.1	0.3 - 0.2	6.3 - 4.1	12.3 - 8.1	3	10°00.7	10°02.4	9°33.4	0.3 - 0.2	6.3 - 4.3	12.3 - 8.3	3	10°15.7	10°17.4	9°47.7	0.3 - 0.2	6.3 - 4.4	12.3 - 8.5
4	9°46.0	9°47.6	9°19.3	0.4 - 0.3	6.4 - 4.2	12.4 - 8.2	4	10°01.0	10°02.6	9°33.6	0.4 - 0.3	6.4 - 4.3	12.4 - 8.4	4	10°16.0	10°17.7	9°47.9	0.4 - 0.3	6.4 - 4.4	12.4 - 8.6
5	9°46.3	9°47.9	9°19.5	0.5 - 0.3	6.5 - 4.3	12.5 - 8.2	5	10°01.3	10°02.9	9°33.9	0.5 - 0.3	6.5 - 4.4	12.5 - 8.4	5	10°16.3	10°17.9	9°48.2	0.5 - 0.3	6.5 - 4.5	12.5 - 8.6
6	9°46.5	9°48.1	9°19.8	0.6 - 0.4	6.6 - 4.3	12.6 - 8.3	6	10°01.5	10°03.1	9°34.1	0.6 - 0.4	6.6 - 4.5	12.6 - 8.5	6	10°16.5	10°18.2	9°48.4	0.6 - 0.4	6.6 - 4.6	12.6 - 8.7
7	9°46.8	9°48.4	9°20.0	0.7 - 0.5	6.7 - 4.4	12.7 - 8.4	7	10°01.8	10°03.4	9°34.3	0.7 - 0.5	6.7 - 4.5	12.7 - 8.6	7	10°16.8	10°18.4	9°48.7	0.7 - 0.5	6.7 - 4.6	12.7 - 8.8
8	9°47.0	9°48.6	9°20.3	0.8 - 0.5	6.8 - 4.5	12.8 - 8.4	8	10°02.0	10°03.6	9°34.6	0.8 - 0.5	6.8 - 4.6	12.8 - 8.6	8	10°17.0	10°18.7	9°48.9	0.8 - 0.6	6.8 - 4.7	12.8 - 8.9
9	9°47.2	9°48.9	9°20.5	0.9 - 0.6	6.9 - 4.5	12.9 - 8.5	9	10°02.2	10°03.9	9°34.8	0.9 - 0.6	6.9 - 4.7	12.9 - 8.7	9	10°17.2	10°18.9	9°49.1	0.9 - 0.6	6.9 - 4.8	12.9 - 8.9
10	9°47.5	9°49.1	9°20.7	1.0 - 0.7	7.0 - 4.6	13.0 - 8.6	10	10°02.5	10°04.1	9°35.1	1.0 - 0.7	7.0 - 4.7	13.0 - 8.8	10	10°17.5	10°19.2	9°49.4	1.0 - 0.7	7.0 - 4.8	13.0 - 9.0
11	9°47.7	9°49.4	9°21.0	1.1 - 0.7	7.1 - 4.7	13.1 - 8.6	11	10°02.7	10°04.4	9°35.3	1.1 - 0.7	7.1 - 4.8	13.1 - 8.8	11	10°17.7	10°19.4	9°49.6	1.1 - 0.8	7.1 - 4.9	13.1 - 9.1
12	9°48.0	9°49.6	9°21.2	1.2 - 0.8	7.2 - 4.7	13.2 - 8.7	12	10°03.0	10°04.6	9°35.5	1.2 - 0.8	7.2 - 4.9	13.2 - 8.9	12	10°18.0	10°19.7	9°49.8	1.2 - 0.8	7.2 - 5.0	13.2 - 9.1
13	9°48.3	9°49.9	9°21.5	1.3 - 0.9	7.3 - 4.8	13.3 - 8.8	13	10°03.3	10°04.9	9°35.8	1.3 - 0.9	7.3 - 4.9	13.3 - 9.0	13	10°18.3	10°19.9	9°50.1	1.3 - 0.9	7.3 - 5.0	13.3 - 9.2
14	9°48.5	9°50.1	9°21.7	1.4 - 0.9	7.4 - 4.9	13.4 - 8.8	14	10°03.5	10°05.1	9°36.0	1.4 - 0.9	7.4 - 5.0	13.4 - 9.0	14	10°18.5	10°20.2	9°50.3	1.4 - 1.0	7.4 - 5.1	13.4 - 9.3
15	9°48.8	9°50.4	9°21.9	1.5 - 1.0	7.5 - 4.9	13.5 - 8.9	15	10°03.8	10°05.4	9°36.2	1.5 - 1.0	7.5 - 5.1	13.5 - 9.1	15	10°18.8	10°20.4	9°50.6	1.5 - 1.0	7.5 - 5.2	13.5 - 9.3
16	9°49.0	9°50.6	9°22.2	1.6 - 1.1	7.6 - 5.0	13.6 - 9.0	16	10°04.0	10°05.7	9°36.5	1.6 - 1.1	7.6 - 5.1	13.6 - 9.2	16	10°19.0	10°20.7	9°50.8	1.6 - 1.1	7.6 - 5.3	13.6 - 9.4
17	9°49.2	9°50.9	9°22.4	1.7 - 1.1	7.7 - 5.1	13.7 - 9.0	17	10°04.2	10°05.9	9°36.7	1.7 - 1.1	7.7 - 5.2	13.7 - 9.2	17	10°19.2	10°20.9	9°51.0	1.7 - 1.2	7.7 - 5.3	13.7 - 9.5
18	9°49.5	9°51.1	9°22.6	1.8 - 1.2	7.8 - 5.1	13.8 - 9.1	18	10°04.5	10°06.2	9°37.0	1.8 - 1.2	7.8 - 5.3	13.8 - 9.3	18	10°19.5	10°21.2	9°51.3	1.8 - 1.2	7.8 - 5.4	13.8 - 9.5
19	9°49.8	9°51.4	9°22.9	1.9 - 1.3	7.9 - 5.2	13.9 - 9.2	19	10°04.8	10°06.4	9°37.2	1.9 - 1.3	7.9 - 5.3	13.9 - 9.4	19	10°19.8	10°21.4	9°51.5	1.9 - 1.3	7.9 - 5.5	13.9 - 9.6
20	9°50.0	9°51.6	9°23.1	2.0 - 1.3	8.0 - 5.3	14.0 - 9.2	20	10°05.0	10°06.7	9°37.4	2.0 - 1.4	8.0 - 5.4	14.0 - 9.5	20	10°20.0	10°21.7	9°51.8	2.0 - 1.4	8.0 - 5.5	14.0 - 9.7
21	9°50.3	9°51.9	9°23.4	2.1 - 1.4	8.1 - 5.3	14.1 - 9.3	21	10°05.3	10°06.9	9°37.7	2.1 - 1.4	8.1 - 5.5	14.1 - 9.5	21	10°20.3	10°21.9	9°52.0	2.1 - 1.5	8.1 - 5.6	14.1 - 9.8
22	9°50.5	9°52.1	9°23.6	2.2 - 1.4	8.2 - 5.4	14.2 - 9.3	22	10°05.5	10°07.2	9°37.9	2.2 - 1.5	8.2 - 5.5	14.2 - 9.6	22	10°20.5	10°22.2	9°52.2	2.2 - 1.5	8.2 - 5.7	14.2 - 9.8
23	9°50.7	9°52.4	9°23.8	2.3 - 1.5	8.3 - 5.5	14.3 - 9.4	23	10°05.7	10°07.4	9°38.2	2.3 - 1.6	8.3 - 5.6	14.3 - 9.7	23	10°20.7	10°22.4	9°52.5	2.3 - 1.6	8.3 - 5.7	14.3 - 9.9
24	9°51.0	9°52.6	9°24.1	2.4 - 1.6	8.4 - 5.5	14.4 - 9.5	24	10°06.0	10°07.7	9°38.4	2.4 - 1.6	8.4 - 5.7	14.4 - 9.7	24	10°21.0	10°22.7	9°52.7	2.4 - 1.7	8.4 - 5.8	14.4 - 10.0
25	9°51.2	9°52.9	9°24.3	2.5 - 1.6	8.5 - 5.6	14.5 - 9.5	25	10°06.2	10°07.9	9°38.6	2.5 - 1.7	8.5 - 5.7	14.5 - 9.8	25	10°21.2	10°22.9	9°52.9	2.5 - 1.7	8.5 - 5.9	14.5 - 10.0
26	9°51.5	9°53.1	9°24.6	2.6 - 1.7	8.6 - 5.7	14.6 - 9.6	26	10°06.5	10°08.2	9°38.9	2.6 - 1.8	8.6 - 5.8	14.6 - 9.9	26	10°21.5	10°23.2	9°53.2	2.6 - 1.8	8.6 - 5.9	14.6 - 10.1
27	9°51.8	9°53.4	9°24.8	2.7 - 1.8	8.7 - 5.7	14.7 - 9.7	27	10°06.8	10°08.4	9°39.1	2.7 - 1.8	8.7 - 5.9	14.7 - 9.9	27	10°21.8	10°23.4	9°53.4	2.7 - 1.9	8.7 - 6.0	14.7 - 10.2
28	9°52.0	9°53.6	9°25.0	2.8 - 1.8	8.8 - 5.8	14.8 - 9.7	28	10°07.0	10°08.7	9°39.3	2.8 - 1.9	8.8 - 5.9	14.8 - 10.0	28	10°22.0	10°23.7	9°53.7	2.8 - 1.9	8.8 - 6.1	14.8 - 10.2
29	9°52.3	9°53.9	9°25.3	2.9 - 1.9	8.9 - 5.9	14.9 - 9.8	29	10°07.3	10°08.9	9°39.6	2.9 - 2.0	8.9 - 6.0	14.9 - 10.1	29	10°22.3	10°24.0	9°53.9	2.9 - 2.0	8.9 - 6.2	14.9 - 10.3
30	9°52.5	9°54.1	9°25.5	3.0 - 2.0	9.0 - 5.9	15.0 - 9.9	30	10°07.5	10°09.2	9°39.8	3.0 - 2.0	9.0 - 6.1	15.0 - 10.1	30	10°22.5	10°24.2	9°54.1	3.0 - 2.1	9.0 - 6.2	15.0 - 10.4
31	9°52.7	9°54.4	9°25.7	3.1 - 2.0	9.1 - 6.0	15.1 - 9.9	31	10°07.7	10°09.4	9°40.1	3.1 - 2.1	9.1 - 6.1	15.1 - 10.2	31	10°22.7	10°24.5	9°54.4	3.1 - 2.1	9.1 - 6.3	15.1 - 10.4
32	9°53.0	9°54.6	9°26.0	3.2 - 2.1	9.2 - 6.1	15.2 - 10.0	32	10°08.0	10°09.7	9°40.3	3.2 - 2.2	9.2 - 6.2	15.2 - 10.3	32	10°23.0	10°24.7	9°54.6	3.2 - 2.2	9.2 - 6.4	15.2 - 10.5
33	9°53.2	9°54.9	9°26.2	3.3 - 2.2	9.3 - 6.1	15.3 - 10.1	33	10°08.2	10°09.9	9°40.5	3.3 - 2.2	9.3 - 6.3	15.3 - 10.3	33	10°23.2	10°25.0	9°54.9	3.3 - 2.3	9.3 - 6.4	15.3 - 10.6
34	9°53.5	9°55.1	9°26.5	3.4 - 2.2	9.4 - 6.2	15.4 - 10.1	34	10°08.5	10°10.2	9°40.8	3.4 - 2.3	9.4 - 6.3	15.4 - 10.4	34	10°23.5	10°25.2	9°55.1	3.4 - 2.4	9.4 - 6.5	15.4 - 10.7
35	9°53.8	9°55.4	9°26.7	3.5 - 2.3	9.5 - 6.3	15.5 - 10.2	35	10°08.8	10°10.4	9°41.0	3.5 - 2.4	9.5 - 6.4	15.5 - 10.5	35	10°23.8	10°25.5	9°55.3	3.5 - 2.4	9.5 - 6.6	15.5 - 10.7
36	9°54.0	9°55.6	9°26.9	3.6 - 2.4	9.6 - 6.3	15.6 - 10.3	36	10°09.0	10°10.7	9°41.3	3.6 - 2.4	9.6 - 6.5	15.6 - 10.5	36	10°24.0	10°25.7	9°55.6	3.6 - 2.5	9.6 - 6.6	15.6 - 10.8
37	9°54.3	9°55.9	9°27.2	3.7 - 2.4	9.7 - 6.4	15.7 - 10.3	37	10°09.3	10°10.9	9°41.5	3.7 - 2.5	9.7 - 6.5	15.7 - 10.6	37	10°24.3	10°26.0	9°55.8	3.7 - 2.6	9.7 - 6.7	15.7 - 10.9
38	9°54.5	9°56.1	9°27.4	3.8 - 2.5	9.8 - 6.5	15.8 - 10.4	38	10°09.5	10°11.2	9°41.7	3.8 - 2.6	9.8 - 6.6	15.8 - 10.7	38	10°24.5	10°26.2	9°56.1	3.8 - 2.6	9.8 - 6.8	15.8 - 10.9
39	9°54.7	9°56.4	9°27.7	3.9 - 2.6	9.9 - 6.5	15.9 - 10.5	39	10°09.7	10°11.4	9°42.0	3.9 - 2.6	9.9 - 6.7	15.9 - 10.7	39	10°24.7	10°26.5	9°56.3	3.9 - 2.7	9.9 - 6.8	15.9 - 11.0
40	9°55.0	9°56.6	9°27.9	4.0 - 2.6	10.0 - 6.6	16.0 - 10.5	40	10°10.0	10°11.7	9°42.2	4.0 - 2.7	10.0 - 6.8	16.0 - 10.8	40	10°25.0	10°26.7	9°56.5	4.0 - 2.8	10.0 - 6.9	16.0 - 11.1
41	9°55.2	9°56.9	9°28.1	4.1 - 2.7	10.1 - 6.6	16.1 - 10.6	41	10°10.2	10°11.9	9°42.4	4.1 - 2.8	10.1 - 6.8	16.1 - 10.9	41	10°25.2	10°27.0	9°56.8	4.1 - 2.8	10.1 - 7.0	16.1 - 11.1
42	9°55.5	9°57.1	9°28.4	4.2 - 2.8	10.2 - 6.7	16.2 - 10.7	42	10°10.5	10°12.2	9°42.7	4.2 - 2.8	10.2 - 6.9	16.2 - 10.9	42	10°25.5	10°27.2	9°57.0	4.2 - 2.9	10.2 - 7.1	16.2 - 11.2
43	9°55.8	9°57.4	9°28.6	4.3 - 2.8	10.3 - 6.8	16.3 - 10.7	43	10°10.8	10°12.4	9°42.9	4.3 - 2.9	10.3 - 7.0	16.3 - 11.0	43	10°25.8	10°27.5	9°57.2	4.3 - 3.0	10.3 - 7.1	16.3 - 11.3
44	9°56.0	9°57.6	9°28.8	4.4 - 2.9	10.4 - 6.8	16.4 - 10.8	44	10°11.0	10°12.7	9°43.2	4.4 - 3.0	10.4 - 7.0	16.4 - 11.1	44	10°26.0	10°27.7	9°57.5	4.4 - 3.0	10.4 - 7.2	16.4 - 11.3
45	9°56.3	9°57.9	9°29.1	4.5 - 3.0	10.5 - 6.9	16.5 - 10.9	45	10°11.3	10°12.9	9°43.4	4.5 - 3.0	10.5 - 7.1	16.5 - 11.1	45	10°26.3	10°28.0	9°57.7	4.5 - 3.1	10.5 - 7.3	16.5 - 11.4
46	9°56.5	9°58.1	9°29.3	4.6 - 3.0	10.6 - 7.0	16.6 - 10.9	46	10°11.5	10°13.2	9°43.6	4.6 - 3.1	10.6 - 7.2	16.6 - 11.2	46	10°26.5	10°28.2	9°58.0	4.6 - 3.2	10.6 - 7.3	16.6 - 11.5
47	9°56.7	9°58.4	9°29.6	4.7 - 3.1	10.7 - 7.0	16.7 - 11.0	47	10°11.7	10°13.4	9°43.9	4.7 - 3.2	10.7 - 7.2	16.7 - 11.3	47	10°26.7	10°28.5	9°58.2	4.7 - 3.3	10.7 - 7.4	16.7 - 11.6
48	9°57.0	9																		

Increments and Corrections

m	Sun	Aries	Moon	v and d corr			m	Sun	Aries	Moon	v and d corr			m	Sun	Aries	Moon	v and d corr		
42	Plan.						43	Plan.						44	Plan.					
0	10°30.0	10°31.7	10°01.3	0.0 - 0.0	6.0 - 4.3	12.0 - 8.5	0	10°45.0	10°46.8	10°15.6	0.0 - 0.0	6.0 - 4.3	12.0 - 8.7	0	11°00.0	11°01.8	10°29.9	0.0 - 0.0	6.0 - 4.5	12.0 - 8.9
1	10°30.2	10°32.0	10°01.5	0.1 - 0.1	6.1 - 4.3	12.1 - 8.6	1	10°45.2	10°47.0	10°15.9	0.1 - 0.1	6.1 - 4.4	12.1 - 8.8	1	11°00.2	11°02.1	10°30.2	0.1 - 0.1	6.1 - 4.5	12.1 - 9.0
2	10°30.5	10°32.2	10°01.8	0.2 - 0.1	6.2 - 4.4	12.2 - 8.6	2	10°45.5	10°47.3	10°16.1	0.2 - 0.1	6.2 - 4.5	12.2 - 8.8	2	11°00.5	11°02.3	10°30.4	0.2 - 0.1	6.2 - 4.6	12.2 - 9.0
3	10°30.7	10°32.5	10°02.0	0.3 - 0.2	6.3 - 4.5	12.3 - 8.7	3	10°45.7	10°47.5	10°16.3	0.3 - 0.2	6.3 - 4.6	12.3 - 8.9	3	11°00.7	11°02.6	10°30.6	0.3 - 0.2	6.3 - 4.7	12.3 - 9.1
4	10°31.0	10°32.7	10°02.3	0.4 - 0.3	6.4 - 4.5	12.4 - 8.8	4	10°46.0	10°47.8	10°16.6	0.4 - 0.3	6.4 - 4.6	12.4 - 9.0	4	11°01.0	11°02.8	10°30.9	0.4 - 0.3	6.4 - 4.7	12.4 - 9.2
5	10°31.3	10°33.0	10°02.5	0.5 - 0.4	6.5 - 4.6	12.5 - 8.9	5	10°46.3	10°48.0	10°16.8	0.5 - 0.4	6.5 - 4.7	12.5 - 9.1	5	11°01.3	11°03.1	10°31.1	0.5 - 0.4	6.5 - 4.8	12.5 - 9.3
6	10°31.5	10°33.2	10°02.7	0.6 - 0.4	6.6 - 4.7	12.6 - 8.9	6	10°46.5	10°48.3	10°17.0	0.6 - 0.4	6.6 - 4.8	12.6 - 9.1	6	11°01.5	11°03.3	10°31.4	0.6 - 0.4	6.6 - 4.9	12.6 - 9.3
7	10°31.8	10°33.5	10°03.0	0.7 - 0.5	6.7 - 4.7	12.7 - 9.0	7	10°46.8	10°48.5	10°17.3	0.7 - 0.5	6.7 - 4.9	12.7 - 9.2	7	11°01.8	11°03.6	10°31.6	0.7 - 0.5	6.7 - 5.0	12.7 - 9.4
8	10°32.0	10°33.7	10°03.2	0.8 - 0.6	6.8 - 4.8	12.8 - 9.1	8	10°47.0	10°48.8	10°17.5	0.8 - 0.6	6.8 - 4.9	12.8 - 9.3	8	11°02.0	11°03.8	10°31.8	0.8 - 0.6	6.8 - 5.0	12.8 - 9.5
9	10°32.2	10°34.0	10°03.4	0.9 - 0.6	6.9 - 4.9	12.9 - 9.1	9	10°47.2	10°49.0	10°17.8	0.9 - 0.7	6.9 - 5.0	12.9 - 9.4	9	11°02.2	11°04.1	10°32.1	0.9 - 0.7	6.9 - 5.1	12.9 - 9.6
10	10°32.5	10°34.2	10°03.7	1.0 - 0.7	7.0 - 5.0	13.0 - 9.2	10	10°47.5	10°49.3	10°18.0	1.0 - 0.7	7.0 - 5.1	13.0 - 9.4	10	11°02.5	11°04.3	10°32.3	1.0 - 0.7	7.0 - 5.2	13.0 - 9.6
11	10°32.7	10°34.5	10°03.9	1.1 - 0.8	7.1 - 5.0	13.1 - 9.3	11	10°47.7	10°49.5	10°18.2	1.1 - 0.8	7.1 - 5.1	13.1 - 9.5	11	11°02.7	11°04.6	10°32.6	1.1 - 0.8	7.1 - 5.3	13.1 - 9.7
12	10°33.0	10°34.7	10°04.2	1.2 - 0.9	7.2 - 5.1	13.2 - 9.3	12	10°48.0	10°49.8	10°18.5	1.2 - 0.9	7.2 - 5.2	13.2 - 9.6	12	11°03.0	11°04.8	10°32.8	1.2 - 0.9	7.2 - 5.3	13.2 - 9.8
13	10°33.3	10°35.0	10°04.4	1.3 - 0.9	7.3 - 5.2	13.3 - 9.4	13	10°48.3	10°50.0	10°18.7	1.3 - 0.9	7.3 - 5.3	13.3 - 9.6	13	11°03.3	11°05.1	10°33.0	1.3 - 1.0	7.3 - 5.4	13.3 - 9.9
14	10°33.5	10°35.2	10°04.6	1.4 - 1.0	7.4 - 5.2	13.4 - 9.5	14	10°48.5	10°50.3	10°19.0	1.4 - 1.0	7.4 - 5.4	13.4 - 9.7	14	11°03.5	11°05.3	10°33.3	1.4 - 1.0	7.4 - 5.5	13.4 - 9.9
15	10°33.8	10°35.5	10°04.9	1.5 - 1.1	7.5 - 5.3	13.5 - 9.6	15	10°48.8	10°50.5	10°19.2	1.5 - 1.1	7.5 - 5.4	13.5 - 9.8	15	11°03.8	11°05.6	10°33.5	1.5 - 1.1	7.5 - 5.6	13.5 - 10.0
16	10°34.0	10°35.7	10°05.1	1.6 - 1.1	7.6 - 5.4	13.6 - 9.6	16	10°49.0	10°50.8	10°19.4	1.6 - 1.2	7.6 - 5.5	13.6 - 9.9	16	11°04.0	11°05.8	10°33.8	1.6 - 1.2	7.6 - 5.6	13.6 - 10.1
17	10°34.2	10°36.0	10°05.4	1.7 - 1.2	7.7 - 5.5	13.7 - 9.7	17	10°49.2	10°51.0	10°19.7	1.7 - 1.2	7.7 - 5.6	13.7 - 9.9	17	11°04.2	11°06.1	10°34.0	1.7 - 1.3	7.7 - 5.7	13.7 - 10.2
18	10°34.5	10°36.2	10°05.6	1.8 - 1.3	7.8 - 5.5	13.8 - 9.8	18	10°49.5	10°51.3	10°19.9	1.8 - 1.3	7.8 - 5.7	13.8 - 10.0	18	11°04.5	11°06.3	10°34.2	1.8 - 1.3	7.8 - 5.8	13.8 - 10.2
19	10°34.8	10°36.5	10°05.8	1.9 - 1.3	7.9 - 5.6	13.9 - 9.8	19	10°49.8	10°51.5	10°20.2	1.9 - 1.4	7.9 - 5.7	13.9 - 10.1	19	11°04.8	11°06.6	10°34.5	1.9 - 1.4	7.9 - 5.9	13.9 - 10.3
20	10°35.0	10°36.7	10°06.1	2.0 - 1.4	8.0 - 5.7	14.0 - 9.9	20	10°50.0	10°51.8	10°20.4	2.0 - 1.4	8.0 - 5.8	14.0 - 10.2	20	11°05.0	11°06.8	10°34.7	2.0 - 1.5	8.0 - 5.9	14.0 - 10.4
21	10°35.3	10°37.0	10°06.3	2.1 - 1.5	8.1 - 5.7	14.1 - 10.0	21	10°50.3	10°52.0	10°20.6	2.1 - 1.5	8.1 - 5.9	14.1 - 10.2	21	11°05.3	11°07.1	10°34.9	2.1 - 1.6	8.1 - 6.0	14.1 - 10.5
22	10°35.5	10°37.2	10°06.5	2.2 - 1.6	8.2 - 5.8	14.2 - 10.1	22	10°50.5	10°52.3	10°20.9	2.2 - 1.6	8.2 - 5.9	14.2 - 10.3	22	11°05.5	11°07.3	10°35.1	2.2 - 1.6	8.2 - 6.1	14.2 - 10.5
23	10°35.7	10°37.5	10°06.8	2.3 - 1.6	8.3 - 5.9	14.3 - 10.1	23	10°50.7	10°52.5	10°21.1	2.3 - 1.7	8.3 - 6.0	14.3 - 10.4	23	11°05.7	11°07.6	10°35.4	2.3 - 1.7	8.3 - 6.2	14.3 - 10.6
24	10°36.0	10°37.7	10°07.0	2.4 - 1.7	8.4 - 6.0	14.4 - 10.2	24	10°51.0	10°52.8	10°21.3	2.4 - 1.7	8.4 - 6.1	14.4 - 10.4	24	11°06.0	11°07.8	10°35.7	2.4 - 1.8	8.4 - 6.2	14.4 - 10.7
25	10°36.2	10°38.0	10°07.3	2.5 - 1.8	8.5 - 6.0	14.5 - 10.3	25	10°51.2	10°53.0	10°21.6	2.5 - 1.8	8.5 - 6.2	14.5 - 10.5	25	11°06.2	11°08.1	10°35.9	2.5 - 1.9	8.5 - 6.3	14.5 - 10.8
26	10°36.5	10°38.2	10°07.5	2.6 - 1.8	8.6 - 6.1	14.6 - 10.3	26	10°51.5	10°53.3	10°21.8	2.6 - 1.9	8.6 - 6.2	14.6 - 10.6	26	11°06.5	11°08.3	10°36.1	2.6 - 1.9	8.6 - 6.4	14.6 - 10.8
27	10°36.8	10°38.5	10°07.7	2.7 - 1.9	8.7 - 6.2	14.7 - 10.4	27	10°51.8	10°53.5	10°22.1	2.7 - 2.0	8.7 - 6.3	14.7 - 10.7	27	11°06.8	11°08.6	10°36.4	2.7 - 2.0	8.7 - 6.5	14.7 - 10.9
28	10°37.0	10°38.7	10°08.0	2.8 - 2.0	8.8 - 6.2	14.8 - 10.5	28	10°52.0	10°53.8	10°22.3	2.8 - 2.0	8.8 - 6.4	14.8 - 10.7	28	11°07.0	11°08.8	10°36.6	2.8 - 2.1	8.8 - 6.5	14.8 - 11.0
29	10°37.3	10°39.0	10°08.2	2.9 - 2.1	8.9 - 6.3	14.9 - 10.6	29	10°52.3	10°54.0	10°22.5	2.9 - 2.1	8.9 - 6.5	14.9 - 10.8	29	11°07.3	11°09.1	10°36.9	2.9 - 2.2	8.9 - 6.6	14.9 - 11.1
30	10°37.5	10°39.2	10°08.5	3.0 - 2.1	9.0 - 6.4	15.0 - 10.6	30	10°52.5	10°54.3	10°22.8	3.0 - 2.2	9.0 - 6.5	15.0 - 10.9	30	11°07.5	11°09.3	10°37.1	3.0 - 2.2	9.0 - 6.7	15.0 - 11.1
31	10°37.7	10°39.5	10°08.7	3.1 - 2.2	9.1 - 6.4	15.1 - 10.7	31	10°52.7	10°54.5	10°23.0	3.1 - 2.2	9.1 - 6.6	15.1 - 10.9	31	11°07.7	11°09.6	10°37.3	3.1 - 2.3	9.1 - 6.7	15.1 - 11.2
32	10°38.0	10°39.7	10°08.9	3.2 - 2.3	9.2 - 6.5	15.2 - 10.8	32	10°53.0	10°54.8	10°23.3	3.2 - 2.3	9.2 - 6.7	15.2 - 11.0	32	11°08.0	11°09.8	10°37.6	3.2 - 2.4	9.2 - 6.8	15.2 - 11.3
33	10°38.2	10°40.0	10°09.2	3.3 - 2.3	9.3 - 6.6	15.3 - 10.8	33	10°53.2	10°55.0	10°23.5	3.3 - 2.4	9.3 - 6.7	15.3 - 11.1	33	11°08.2	11°10.1	10°37.8	3.3 - 2.4	9.3 - 6.9	15.3 - 11.3
34	10°38.5	10°40.2	10°09.4	3.4 - 2.4	9.4 - 6.7	15.4 - 10.9	34	10°53.5	10°55.3	10°23.7	3.4 - 2.5	9.4 - 6.8	15.4 - 11.2	34	11°08.5	11°10.3	10°38.0	3.4 - 2.5	9.4 - 7.0	15.4 - 11.4
35	10°38.8	10°40.5	10°09.7	3.5 - 2.5	9.5 - 6.7	15.5 - 11.0	35	10°53.8	10°55.5	10°24.0	3.5 - 2.5	9.5 - 6.9	15.5 - 11.2	35	11°08.8	11°10.6	10°38.3	3.5 - 2.6	9.5 - 7.0	15.5 - 11.5
36	10°39.0	10°40.7	10°09.9	3.6 - 2.6	9.6 - 6.8	15.6 - 11.1	36	10°54.0	10°55.8	10°24.2	3.6 - 2.6	9.6 - 7.0	15.6 - 11.3	36	11°09.0	11°10.8	10°38.5	3.6 - 2.7	9.6 - 7.1	15.6 - 11.6
37	10°39.3	10°41.0	10°10.1	3.7 - 2.6	9.7 - 6.9	15.7 - 11.1	37	10°54.3	10°56.0	10°24.4	3.7 - 2.7	9.7 - 7.0	15.7 - 11.4	37	11°09.3	11°11.1	10°38.8	3.7 - 2.7	9.7 - 7.2	15.7 - 11.6
38	10°39.5	10°41.2	10°10.4	3.8 - 2.7	9.8 - 6.9	15.8 - 11.2	38	10°54.5	10°56.3	10°24.7	3.8 - 2.8	9.8 - 7.1	15.8 - 11.5	38	11°09.5	11°11.3	10°39.0	3.8 - 2.8	9.8 - 7.3	15.8 - 11.7
39	10°39.7	10°41.5	10°10.6	3.9 - 2.8	9.9 - 7.0	15.9 - 11.3	39	10°54.7	10°56.5	10°24.9	3.9 - 2.8	9.9 - 7.2	15.9 - 11.5	39	11°09.7	11°11.6	10°39.2	3.9 - 2.9	9.9 - 7.3	15.9 - 11.8
40	10°40.0	10°41.7	10°10.8	4.0 - 2.8	10.0 - 7.1	16.0 - 11.3	40	10°55.0	10°56.8	10°25.2	4.0 - 2.9	10.0 - 7.3	16.0 - 11.6	40	11°10.0	11°11.8	10°39.5	4.0 - 3.0	10.0 - 7.4	16.0 - 11.9
41	10°40.2	10°42.0	10°11.1	4.1 - 2.9	10.1 - 7.2	16.1 - 11.4	41	10°55.2	10°57.0	10°25.4	4.1 - 3.0	10.1 - 7.3	16.1 - 11.7	41	11°10.2	11°12.1	10°39.7	4.1 - 3.0	10.1 - 7.5	16.1 - 11.9
42	10°40.5	10°42.3	10°11.3	4.2 - 3.0	10.2 - 7.2	16.2 - 11.5	42	10°55.5	10°57.3	10°25.6	4.2 - 3.0	10.2 - 7.4	16.2 - 11.7	42	11°10.5	11°12.3	10°40.0	4.2 - 3.1	10.2 - 7.6	16.2 - 12.0
43	10°40.8	10°42.5	10°11.6	4.3 - 3.0	10.3 - 7.3	16.3 - 11.5	43	10°55.8	10°57.5	10°25.9	4.3 - 3.1	10.3 - 7.5	16.3 - 11.8	43	11°10.8	11°12.6	10°40.2	4.3 - 3.2	10.3 - 7.6	16.3 - 12.1
44	10°41.0	10°42.8	10°11.8	4.4 - 3.1	10.4 - 7.4	16.4 - 11.6	44	10°56.0	10°57.8	10°26.1	4.4 - 3.2	10.4 - 7.5	16.4 - 11.9	44	11°11.0	11°12.8	10°40.4	4.4 - 3.3	10.4 - 7.7	16.4 - 12.2
45	10°41.3	10°43.0	10°12.0	4.5 - 3.2	10.5 - 7.4	16.5 - 11.7	45	10°56.3	10°58.0	10°26.4	4.5 - 3.3	10.5 - 7.6	16.5 - 12.0	45	11°11.3	11°13.1	10°40.7	4.5 - 3.3	10.5 - 7.8	16.5 - 12.2
46	10°41.5	10°43.3	10°12.3	4.6 - 3.3	10.6 - 7.5	16.6 - 11.8	46	10°56.5	10°58.3	10°26.6	4.6 - 3.3	10.6 - 7.7	16.6 - 12.0	46	11°11.5	11°13.3	10°40.9	4.6 - 3.4	10.6 - 7.9	16.6 - 12.3
47	10°41.7	10°43.5	10°12.5	4.7 - 3.3																

Increments and Corrections

m 45	Sun Plan.	Aries	Moon	v and d corr			m 46	Sun Plan.	Aries	Moon	v and d corr			m 47	Sun Plan.	Aries	Moon	v and d corr		
0	11°15.0	11°16.8	10°44.3	0.0 - 0.0	6.0 - 4.5	12.0 - 9.1	0	11°30.0	11°31.9	10°58.6	0.0 - 0.0	6.0 - 4.7	12.0 - 9.3	0	11°45.0	11°46.9	11°12.9	0.0 - 0.0	6.0 - 4.8	12.0 - 9.5
1	11°15.2	11°17.1	10°44.5	0.1 - 0.1	6.1 - 4.6	12.1 - 9.2	1	11°30.2	11°32.1	10°58.8	0.1 - 0.1	6.1 - 4.7	12.1 - 9.4	1	11°45.2	11°47.2	11°13.1	0.1 - 0.1	6.1 - 4.8	12.1 - 9.6
2	11°15.5	11°17.3	10°44.7	0.2 - 0.2	6.2 - 4.7	12.2 - 9.3	2	11°30.5	11°32.4	10°59.0	0.2 - 0.2	6.2 - 4.8	12.2 - 9.5	2	11°45.5	11°47.4	11°13.4	0.2 - 0.2	6.2 - 4.9	12.2 - 9.7
3	11°15.7	11°17.6	10°45.0	0.3 - 0.2	6.3 - 4.8	12.3 - 9.3	3	11°30.7	11°32.6	10°59.3	0.3 - 0.2	6.3 - 4.9	12.3 - 9.5	3	11°45.7	11°47.7	11°13.6	0.3 - 0.2	6.3 - 5.0	12.3 - 9.7
4	11°16.0	11°17.8	10°45.2	0.4 - 0.3	6.4 - 4.9	12.4 - 9.4	4	11°31.0	11°32.9	10°59.5	0.4 - 0.3	6.4 - 5.0	12.4 - 9.6	4	11°46.0	11°47.9	11°13.8	0.4 - 0.3	6.4 - 5.1	12.4 - 9.8
5	11°16.3	11°18.1	10°45.4	0.5 - 0.4	6.5 - 4.9	12.5 - 9.5	5	11°31.3	11°33.1	10°59.8	0.5 - 0.4	6.5 - 5.0	12.5 - 9.7	5	11°46.3	11°48.2	11°14.1	0.5 - 0.4	6.5 - 5.1	12.5 - 9.9
6	11°16.5	11°18.3	10°45.7	0.6 - 0.5	6.6 - 5.0	12.6 - 9.6	6	11°31.5	11°33.4	11°00.0	0.6 - 0.5	6.6 - 5.1	12.6 - 9.8	6	11°46.5	11°48.4	11°14.3	0.6 - 0.5	6.6 - 5.2	12.6 - 10.0
7	11°16.8	11°18.6	10°45.9	0.7 - 0.5	6.7 - 5.1	12.7 - 9.6	7	11°31.8	11°33.6	11°00.2	0.7 - 0.5	6.7 - 5.2	12.7 - 9.8	7	11°46.8	11°48.7	11°14.6	0.7 - 0.6	6.7 - 5.3	12.7 - 10.1
8	11°17.0	11°18.9	10°46.2	0.8 - 0.6	6.8 - 5.2	12.8 - 9.7	8	11°32.0	11°33.9	11°00.5	0.8 - 0.6	6.8 - 5.3	12.8 - 9.9	8	11°47.0	11°48.9	11°14.8	0.8 - 0.6	6.8 - 5.4	12.8 - 10.1
9	11°17.2	11°19.1	10°46.4	0.9 - 0.7	6.9 - 5.2	12.9 - 9.8	9	11°32.2	11°34.1	11°00.7	0.9 - 0.7	6.9 - 5.3	12.9 - 10.0	9	11°47.2	11°49.2	11°15.0	0.9 - 0.7	6.9 - 5.5	12.9 - 10.2
10	11°17.5	11°19.4	10°46.6	1.0 - 0.8	7.0 - 5.3	13.0 - 9.9	10	11°32.5	11°34.4	11°01.0	1.0 - 0.8	7.0 - 5.4	13.0 - 10.1	10	11°47.5	11°49.4	11°15.3	1.0 - 0.8	7.0 - 5.5	13.0 - 10.3
11	11°17.7	11°19.6	10°46.9	1.1 - 0.8	7.1 - 5.4	13.1 - 9.9	11	11°32.7	11°34.6	11°01.2	1.1 - 0.9	7.1 - 5.5	13.1 - 10.2	11	11°47.7	11°49.7	11°15.5	1.1 - 0.9	7.1 - 5.6	13.1 - 10.4
12	11°18.0	11°19.9	10°47.1	1.2 - 0.9	7.2 - 5.5	13.2 - 10.0	12	11°33.0	11°34.9	11°01.4	1.2 - 0.9	7.2 - 5.6	13.2 - 10.2	12	11°48.0	11°49.9	11°15.7	1.2 - 1.0	7.2 - 5.7	13.2 - 10.4
13	11°18.3	11°20.1	10°47.4	1.3 - 1.0	7.3 - 5.5	13.3 - 10.1	13	11°33.3	11°35.1	11°01.7	1.3 - 1.0	7.3 - 5.7	13.3 - 10.3	13	11°48.3	11°50.2	11°16.0	1.3 - 1.0	7.3 - 5.8	13.3 - 10.5
14	11°18.5	11°20.4	10°47.6	1.4 - 1.1	7.4 - 5.6	13.4 - 10.2	14	11°33.5	11°35.4	11°01.9	1.4 - 1.1	7.4 - 5.7	13.4 - 10.4	14	11°48.5	11°50.4	11°16.2	1.4 - 1.1	7.4 - 5.9	13.4 - 10.6
15	11°18.8	11°20.6	10°47.8	1.5 - 1.1	7.5 - 5.7	13.5 - 10.2	15	11°33.8	11°35.6	11°02.1	1.5 - 1.2	7.5 - 5.8	13.5 - 10.5	15	11°48.8	11°50.7	11°16.5	1.5 - 1.2	7.5 - 5.9	13.5 - 10.7
16	11°19.0	11°20.9	10°48.1	1.6 - 1.2	7.6 - 5.8	13.6 - 10.3	16	11°34.0	11°35.9	11°02.4	1.6 - 1.2	7.6 - 5.9	13.6 - 10.5	16	11°49.0	11°50.9	11°16.7	1.6 - 1.3	7.6 - 6.0	13.6 - 10.8
17	11°19.2	11°21.1	10°48.3	1.7 - 1.3	7.7 - 5.8	13.7 - 10.4	17	11°34.2	11°36.1	11°02.6	1.7 - 1.3	7.7 - 6.0	13.7 - 10.6	17	11°49.2	11°51.2	11°16.9	1.7 - 1.3	7.7 - 6.1	13.7 - 10.8
18	11°19.5	11°21.4	10°48.5	1.8 - 1.4	7.8 - 5.9	13.8 - 10.5	18	11°34.5	11°36.4	11°02.9	1.8 - 1.4	7.8 - 6.0	13.8 - 10.7	18	11°49.5	11°51.4	11°17.2	1.8 - 1.4	7.8 - 6.2	13.8 - 10.9
19	11°19.8	11°21.6	10°48.8	1.9 - 1.4	7.9 - 6.0	13.9 - 10.5	19	11°34.8	11°36.6	11°03.1	1.9 - 1.5	7.9 - 6.1	13.9 - 10.8	19	11°49.8	11°51.7	11°17.4	1.9 - 1.5	7.9 - 6.3	13.9 - 11.0
20	11°20.0	11°21.9	10°49.0	2.0 - 1.5	8.0 - 6.1	14.0 - 10.6	20	11°35.0	11°36.9	11°03.3	2.0 - 1.6	8.0 - 6.2	14.0 - 10.8	20	11°50.0	11°51.9	11°17.7	2.0 - 1.6	8.0 - 6.3	14.0 - 11.1
21	11°20.3	11°22.1	10°49.3	2.1 - 1.6	8.1 - 6.1	14.1 - 10.7	21	11°35.3	11°37.2	11°03.6	2.1 - 1.6	8.1 - 6.3	14.1 - 10.9	21	11°50.3	11°52.2	11°17.9	2.1 - 1.7	8.1 - 6.4	14.1 - 11.2
22	11°20.5	11°22.4	10°49.5	2.2 - 1.7	8.2 - 6.2	14.2 - 10.8	22	11°35.5	11°37.4	11°03.8	2.2 - 1.7	8.2 - 6.4	14.2 - 11.0	22	11°50.5	11°52.4	11°18.1	2.2 - 1.7	8.2 - 6.5	14.2 - 11.2
23	11°20.7	11°22.6	10°49.7	2.3 - 1.7	8.3 - 6.3	14.3 - 10.8	23	11°35.7	11°37.7	11°04.1	2.3 - 1.8	8.3 - 6.4	14.3 - 11.1	23	11°50.7	11°52.7	11°18.4	2.3 - 1.8	8.3 - 6.6	14.3 - 11.3
24	11°21.0	11°22.9	10°50.0	2.4 - 1.8	8.4 - 6.4	14.4 - 10.9	24	11°36.0	11°37.9	11°04.3	2.4 - 1.9	8.4 - 6.5	14.4 - 11.2	24	11°51.0	11°52.9	11°18.6	2.4 - 1.9	8.4 - 6.7	14.4 - 11.4
25	11°21.2	11°23.1	10°50.2	2.5 - 1.9	8.5 - 6.4	14.5 - 11.0	25	11°36.2	11°38.2	11°04.5	2.5 - 1.9	8.5 - 6.6	14.5 - 11.2	25	11°51.2	11°53.2	11°18.8	2.5 - 2.0	8.5 - 6.7	14.5 - 11.5
26	11°21.5	11°23.4	10°50.5	2.6 - 2.0	8.6 - 6.5	14.6 - 11.1	26	11°36.5	11°38.4	11°04.8	2.6 - 2.0	8.6 - 6.7	14.6 - 11.3	26	11°51.5	11°53.4	11°19.1	2.6 - 2.1	8.6 - 6.8	14.6 - 11.6
27	11°21.8	11°23.6	10°50.7	2.7 - 2.0	8.7 - 6.6	14.7 - 11.1	27	11°36.8	11°38.7	11°05.0	2.7 - 2.1	8.7 - 6.7	14.7 - 11.4	27	11°51.8	11°53.7	11°19.3	2.7 - 2.1	8.7 - 6.9	14.7 - 11.6
28	11°22.0	11°23.9	10°50.9	2.8 - 2.1	8.8 - 6.7	14.8 - 11.2	28	11°37.0	11°38.9	11°05.2	2.8 - 2.2	8.8 - 6.8	14.8 - 11.5	28	11°52.0	11°53.9	11°19.6	2.8 - 2.2	8.8 - 7.0	14.8 - 11.7
29	11°22.3	11°24.1	10°51.2	2.9 - 2.2	8.9 - 6.7	14.9 - 11.3	29	11°37.3	11°39.2	11°05.5	2.9 - 2.2	8.9 - 6.9	14.9 - 11.5	29	11°52.3	11°54.2	11°19.8	2.9 - 2.3	8.9 - 7.0	14.9 - 11.8
30	11°22.5	11°24.4	10°51.4	3.0 - 2.3	9.0 - 6.8	15.0 - 11.4	30	11°37.5	11°39.4	11°05.7	3.0 - 2.3	9.0 - 7.0	15.0 - 11.6	30	11°52.5	11°54.4	11°20.0	3.0 - 2.4	9.0 - 7.1	15.0 - 11.9
31	11°22.7	11°24.6	10°51.6	3.1 - 2.4	9.1 - 6.9	15.1 - 11.5	31	11°37.7	11°39.7	11°06.0	3.1 - 2.4	9.1 - 7.1	15.1 - 11.7	31	11°52.7	11°54.7	11°20.3	3.1 - 2.5	9.1 - 7.2	15.1 - 12.0
32	11°23.0	11°24.9	10°51.9	3.2 - 2.4	9.2 - 7.0	15.2 - 11.5	32	11°38.0	11°39.9	11°06.2	3.2 - 2.5	9.2 - 7.1	15.2 - 11.8	32	11°53.0	11°54.9	11°20.5	3.2 - 2.5	9.2 - 7.3	15.2 - 12.0
33	11°23.2	11°25.1	10°52.1	3.3 - 2.5	9.3 - 7.1	15.3 - 11.6	33	11°38.2	11°40.2	11°06.4	3.3 - 2.6	9.3 - 7.2	15.3 - 11.9	33	11°53.2	11°55.2	11°20.8	3.3 - 2.6	9.3 - 7.4	15.3 - 12.1
34	11°23.5	11°25.4	10°52.4	3.4 - 2.6	9.4 - 7.1	15.4 - 11.7	34	11°38.5	11°40.4	11°06.7	3.4 - 2.6	9.4 - 7.3	15.4 - 11.9	34	11°53.5	11°55.5	11°21.0	3.4 - 2.7	9.4 - 7.4	15.4 - 12.2
35	11°23.8	11°25.6	10°52.6	3.5 - 2.7	9.5 - 7.2	15.5 - 11.8	35	11°38.8	11°40.7	11°06.9	3.5 - 2.7	9.5 - 7.4	15.5 - 12.0	35	11°53.8	11°55.7	11°21.2	3.5 - 2.8	9.5 - 7.5	15.5 - 12.3
36	11°24.0	11°25.9	10°52.8	3.6 - 2.7	9.6 - 7.3	15.6 - 11.8	36	11°39.0	11°40.9	11°07.2	3.6 - 2.8	9.6 - 7.4	15.6 - 12.1	36	11°54.0	11°56.0	11°21.5	3.6 - 2.9	9.6 - 7.6	15.6 - 12.3
37	11°24.3	11°26.1	10°53.1	3.7 - 2.8	9.7 - 7.4	15.7 - 11.9	37	11°39.3	11°41.2	11°07.4	3.7 - 2.9	9.7 - 7.5	15.7 - 12.2	37	11°54.3	11°56.2	11°21.7	3.7 - 2.9	9.7 - 7.7	15.7 - 12.4
38	11°24.5	11°26.4	10°53.3	3.8 - 2.9	9.8 - 7.4	15.8 - 12.0	38	11°39.5	11°41.4	11°07.6	3.8 - 2.9	9.8 - 7.6	15.8 - 12.2	38	11°54.5	11°56.5	11°22.0	3.8 - 3.0	9.8 - 7.8	15.8 - 12.5
39	11°24.7	11°26.6	10°53.6	3.9 - 3.0	9.9 - 7.5	15.9 - 12.1	39	11°39.7	11°41.7	11°07.9	3.9 - 3.0	9.9 - 7.7	15.9 - 12.3	39	11°54.7	11°56.7	11°22.2	3.9 - 3.1	9.9 - 7.8	15.9 - 12.6
40	11°25.0	11°26.9	10°53.8	4.0 - 3.0	10.0 - 7.6	16.0 - 12.1	40	11°40.0	11°41.9	11°08.1	4.0 - 3.1	10.0 - 7.8	16.0 - 12.4	40	11°55.0	11°57.0	11°22.4	4.0 - 3.2	10.0 - 7.9	16.0 - 12.7
41	11°25.2	11°27.1	10°54.0	4.1 - 3.1	10.1 - 7.7	16.1 - 12.2	41	11°40.2	11°42.2	11°08.3	4.1 - 3.2	10.1 - 7.8	16.1 - 12.5	41	11°55.2	11°57.2	11°22.7	4.1 - 3.2	10.1 - 8.0	16.1 - 12.7
42	11°25.5	11°27.4	10°54.3	4.2 - 3.2	10.2 - 7.7	16.2 - 12.3	42	11°40.5	11°42.4	11°08.6	4.2 - 3.3	10.2 - 7.9	16.2 - 12.6	42	11°55.5	11°57.5	11°22.9	4.2 - 3.3	10.2 - 8.1	16.2 - 12.8
43	11°25.8	11°27.6	10°54.5	4.3 - 3.3	10.3 - 7.8	16.3 - 12.4	43	11°40.8	11°42.7	11°08.8	4.3 - 3.3	10.3 - 8.0	16.3 - 12.6	43	11°55.8	11°57.7	11°23.1	4.3 - 3.4	10.3 - 8.2	16.3 - 12.9
44	11°26.0	11°27.9	10°54.7	4.4 - 3.3	10.4 - 7.9	16.4 - 12.4	44	11°41.0	11°42.9	11°09.1	4.4 - 3.4	10.4 - 8.1	16.4 - 12.7	44	11°56.0	11°58.0	11°23.4	4.4 - 3.5	10.4 - 8.2	16.4 - 13.0
45	11°26.3	11°28.1	10°55.0	4.5 - 3.4	10.5 - 8.0	16.5 - 12.5	45	11°41.3	11°43.2	11°09.3	4.5 - 3.5	10.5 - 8.1	16.5 - 12.8	45	11°56.3	11°58.2	11°23.6	4.5 - 3.6	10.5 - 8.3	16.5 - 13.1
46	11°26.5	11°28.4	10°55.2	4.6 - 3.5	10.6 - 8.0	16.6 - 12.6	46	11°41.5	11°43.4	11°09.5	4.6 - 3.6	10.6 - 8.2	16.6 - 12.9	46	11°56.5	11°58.5	11°23.9	4.6 - 3.6	10.6 - 8.4	16

Increments and Corrections

m 48	Sun Plan.	Aries	Moon	v and d corr			m 49	Sun Plan.	Aries	Moon	v and d corr			m 50	Sun Plan.	Aries	Moon	v and d corr		
0	12°00.0	12°02.0	11°27.2	0.0 - 0.0	6.0 - 4.8	12.0 - 9.7	0	12°15.0	12°17.0	11°41.5	0.0 - 0.0	6.0 - 4.9	12.0 - 9.9	0	12°30.0	12°32.1	11°55.8	0.0 - 0.0	6.0 - 5.0	12.0 - 10.1
1	12°00.2	12°02.2	11°27.4	0.1 - 0.1	6.1 - 4.9	12.1 - 9.8	1	12°15.2	12°17.3	11°41.8	0.1 - 0.1	6.1 - 5.0	12.1 - 10.0	1	12°30.2	12°32.3	11°56.1	0.1 - 0.1	6.1 - 5.1	12.1 - 10.2
2	12°00.5	12°02.5	11°27.7	0.2 - 0.2	6.2 - 5.0	12.2 - 9.9	2	12°15.5	12°17.5	11°42.0	0.2 - 0.2	6.2 - 5.1	12.2 - 10.1	2	12°30.5	12°32.6	11°56.3	0.2 - 0.2	6.2 - 5.2	12.2 - 10.3
3	12°00.7	12°02.7	11°27.9	0.3 - 0.2	6.3 - 5.1	12.3 - 9.9	3	12°15.7	12°17.8	11°42.2	0.3 - 0.2	6.3 - 5.2	12.3 - 10.1	3	12°30.7	12°32.8	11°56.5	0.3 - 0.3	6.3 - 5.3	12.3 - 10.4
4	12°01.0	12°03.0	11°28.2	0.4 - 0.3	6.4 - 5.2	12.4 - 10.0	4	12°16.0	12°18.0	11°42.5	0.4 - 0.3	6.4 - 5.3	12.4 - 10.2	4	12°31.0	12°33.1	11°56.8	0.4 - 0.3	6.4 - 5.4	12.4 - 10.4
5	12°01.3	12°03.2	11°28.4	0.5 - 0.4	6.5 - 5.3	12.5 - 10.1	5	12°16.3	12°18.3	11°42.7	0.5 - 0.4	6.5 - 5.4	12.5 - 10.3	5	12°31.3	12°33.3	11°57.0	0.5 - 0.4	6.5 - 5.5	12.5 - 10.5
6	12°01.5	12°03.5	11°28.6	0.6 - 0.5	6.6 - 5.3	12.6 - 10.2	6	12°16.5	12°18.5	11°42.9	0.6 - 0.5	6.6 - 5.4	12.6 - 10.4	6	12°31.5	12°33.6	11°57.3	0.6 - 0.5	6.6 - 5.6	12.6 - 10.6
7	12°01.8	12°03.7	11°28.9	0.7 - 0.6	6.7 - 5.4	12.7 - 10.3	7	12°16.8	12°18.8	11°43.2	0.7 - 0.6	6.7 - 5.5	12.7 - 10.5	7	12°31.8	12°33.8	11°57.5	0.7 - 0.6	6.7 - 5.6	12.7 - 10.7
8	12°02.0	12°04.0	11°29.1	0.8 - 0.6	6.8 - 5.5	12.8 - 10.3	8	12°17.0	12°19.0	11°43.4	0.8 - 0.7	6.8 - 5.6	12.8 - 10.6	8	12°32.0	12°34.1	11°57.7	0.8 - 0.7	6.8 - 5.7	12.8 - 10.8
9	12°02.2	12°04.2	11°29.3	0.9 - 0.7	6.9 - 5.6	12.9 - 10.4	9	12°17.2	12°19.3	11°43.7	0.9 - 0.7	6.9 - 5.7	12.9 - 10.6	9	12°32.2	12°34.3	11°58.0	0.9 - 0.8	6.9 - 5.8	12.9 - 10.9
10	12°02.5	12°04.5	11°29.6	1.0 - 0.8	7.0 - 5.7	13.0 - 10.5	10	12°17.5	12°19.5	11°43.9	1.0 - 0.8	7.0 - 5.8	13.0 - 10.7	10	12°32.5	12°34.6	11°58.2	1.0 - 0.8	7.0 - 5.9	13.0 - 10.9
11	12°02.7	12°04.7	11°29.8	1.1 - 0.9	7.1 - 5.7	13.1 - 10.6	11	12°17.7	12°19.8	11°44.1	1.1 - 0.9	7.1 - 5.9	13.1 - 10.8	11	12°32.7	12°34.8	11°58.5	1.1 - 0.9	7.1 - 6.0	13.1 - 11.0
12	12°03.0	12°05.0	11°30.1	1.2 - 1.0	7.2 - 5.8	13.2 - 10.7	12	12°18.0	12°20.0	11°44.4	1.2 - 1.0	7.2 - 5.9	13.2 - 10.9	12	12°33.0	12°35.1	11°58.7	1.2 - 1.0	7.2 - 6.1	13.2 - 11.1
13	12°03.3	12°05.2	11°30.3	1.3 - 1.1	7.3 - 5.9	13.3 - 10.8	13	12°18.3	12°20.3	11°44.6	1.3 - 1.1	7.3 - 6.0	13.3 - 11.0	13	12°33.3	12°35.3	11°58.9	1.3 - 1.1	7.3 - 6.1	13.3 - 11.2
14	12°03.5	12°05.5	11°30.5	1.4 - 1.1	7.4 - 6.0	13.4 - 10.8	14	12°18.5	12°20.5	11°44.9	1.4 - 1.2	7.4 - 6.1	13.4 - 11.1	14	12°33.5	12°35.6	11°59.2	1.4 - 1.2	7.4 - 6.2	13.4 - 11.3
15	12°03.8	12°05.7	11°30.8	1.5 - 1.2	7.5 - 6.1	13.5 - 10.9	15	12°18.8	12°20.8	11°45.1	1.5 - 1.2	7.5 - 6.2	13.5 - 11.1	15	12°33.8	12°35.8	11°59.4	1.5 - 1.3	7.5 - 6.3	13.5 - 11.4
16	12°04.0	12°06.0	11°31.0	1.6 - 1.3	7.6 - 6.1	13.6 - 11.0	16	12°19.0	12°21.0	11°45.3	1.6 - 1.3	7.6 - 6.3	13.6 - 11.2	16	12°34.0	12°36.1	11°59.7	1.6 - 1.3	7.6 - 6.4	13.6 - 11.4
17	12°04.2	12°06.2	11°31.3	1.7 - 1.4	7.7 - 6.2	13.7 - 11.1	17	12°19.2	12°21.3	11°45.6	1.7 - 1.4	7.7 - 6.4	13.7 - 11.3	17	12°34.2	12°36.3	11°59.9	1.7 - 1.4	7.7 - 6.5	13.7 - 11.5
18	12°04.5	12°06.5	11°31.5	1.8 - 1.5	7.8 - 6.3	13.8 - 11.2	18	12°19.5	12°21.5	11°45.8	1.8 - 1.5	7.8 - 6.4	13.8 - 11.4	18	12°34.5	12°36.6	12°00.1	1.8 - 1.5	7.8 - 6.6	13.8 - 11.6
19	12°04.8	12°06.7	11°31.7	1.9 - 1.5	7.9 - 6.4	13.9 - 11.2	19	12°19.8	12°21.8	11°46.1	1.9 - 1.6	7.9 - 6.5	13.9 - 11.5	19	12°34.8	12°36.8	12°00.4	1.9 - 1.6	7.9 - 6.6	13.9 - 11.7
20	12°05.0	12°07.0	11°32.0	2.0 - 1.6	8.0 - 6.5	14.0 - 11.3	20	12°20.0	12°22.0	11°46.3	2.0 - 1.6	8.0 - 6.6	14.0 - 11.5	20	12°35.0	12°37.1	12°00.6	2.0 - 1.7	8.0 - 6.7	14.0 - 11.8
21	12°05.3	12°07.2	11°32.2	2.1 - 1.7	8.1 - 6.5	14.1 - 11.4	21	12°20.3	12°22.3	11°46.5	2.1 - 1.7	8.1 - 6.7	14.1 - 11.6	21	12°35.3	12°37.3	12°00.8	2.1 - 1.8	8.1 - 6.8	14.1 - 11.9
22	12°05.5	12°07.5	11°32.4	2.2 - 1.8	8.2 - 6.6	14.2 - 11.5	22	12°20.5	12°22.5	11°46.8	2.2 - 1.8	8.2 - 6.8	14.2 - 11.7	22	12°35.5	12°37.6	12°01.1	2.2 - 1.9	8.2 - 6.9	14.2 - 12.0
23	12°05.7	12°07.7	11°32.7	2.3 - 1.9	8.3 - 6.7	14.3 - 11.6	23	12°20.7	12°22.8	11°47.0	2.3 - 1.9	8.3 - 6.8	14.3 - 11.8	23	12°35.7	12°37.8	12°01.3	2.3 - 1.9	8.3 - 7.0	14.3 - 12.0
24	12°06.0	12°08.0	11°32.9	2.4 - 1.9	8.4 - 6.8	14.4 - 11.6	24	12°21.0	12°23.0	11°47.2	2.4 - 2.0	8.4 - 6.9	14.4 - 11.9	24	12°36.0	12°38.1	12°01.6	2.4 - 2.0	8.4 - 7.1	14.4 - 12.1
25	12°06.2	12°08.2	11°33.2	2.5 - 2.0	8.5 - 6.9	14.5 - 11.7	25	12°21.2	12°23.3	11°47.5	2.5 - 2.1	8.5 - 7.0	14.5 - 12.0	25	12°36.2	12°38.3	12°01.8	2.5 - 2.1	8.5 - 7.2	14.5 - 12.2
26	12°06.5	12°08.5	11°33.4	2.6 - 2.1	8.6 - 7.0	14.6 - 11.8	26	12°21.5	12°23.5	11°47.7	2.6 - 2.1	8.6 - 7.1	14.6 - 12.0	26	12°36.5	12°38.6	12°02.0	2.6 - 2.2	8.6 - 7.2	14.6 - 12.3
27	12°06.8	12°08.7	11°33.6	2.7 - 2.2	8.7 - 7.0	14.7 - 11.9	27	12°21.8	12°23.8	11°48.0	2.7 - 2.2	8.7 - 7.2	14.7 - 12.1	27	12°36.8	12°38.8	12°02.3	2.7 - 2.3	8.7 - 7.3	14.7 - 12.4
28	12°07.0	12°09.0	11°33.9	2.8 - 2.3	8.8 - 7.1	14.8 - 12.0	28	12°22.0	12°24.0	11°48.2	2.8 - 2.3	8.8 - 7.3	14.8 - 12.2	28	12°37.0	12°39.1	12°02.5	2.8 - 2.4	8.8 - 7.4	14.8 - 12.5
29	12°07.3	12°09.2	11°34.1	2.9 - 2.3	8.9 - 7.2	14.9 - 12.0	29	12°22.3	12°24.3	11°48.4	2.9 - 2.4	8.9 - 7.3	14.9 - 12.3	29	12°37.3	12°39.3	12°02.8	2.9 - 2.4	8.9 - 7.5	14.9 - 12.5
30	12°07.5	12°09.5	11°34.4	3.0 - 2.4	9.0 - 7.3	15.0 - 12.1	30	12°22.5	12°24.5	11°48.7	3.0 - 2.5	9.0 - 7.4	15.0 - 12.4	30	12°37.5	12°39.6	12°03.0	3.0 - 2.5	9.0 - 7.6	15.0 - 12.6
31	12°07.7	12°09.7	11°34.6	3.1 - 2.5	9.1 - 7.4	15.1 - 12.2	31	12°22.7	12°24.8	11°48.9	3.1 - 2.6	9.1 - 7.5	15.1 - 12.5	31	12°37.7	12°39.8	12°03.2	3.1 - 2.6	9.1 - 7.7	15.1 - 12.7
32	12°08.0	12°10.0	11°34.8	3.2 - 2.6	9.2 - 7.4	15.2 - 12.3	32	12°23.0	12°25.0	11°49.2	3.2 - 2.6	9.2 - 7.6	15.2 - 12.5	32	12°38.0	12°40.1	12°03.5	3.2 - 2.7	9.2 - 7.7	15.2 - 12.8
33	12°08.2	12°10.2	11°35.1	3.3 - 2.7	9.3 - 7.5	15.3 - 12.4	33	12°23.2	12°25.3	11°49.4	3.3 - 2.7	9.3 - 7.7	15.3 - 12.6	33	12°38.2	12°40.3	12°03.7	3.3 - 2.8	9.3 - 7.8	15.3 - 12.9
34	12°08.5	12°10.5	11°35.3	3.4 - 2.7	9.4 - 7.6	15.4 - 12.4	34	12°23.5	12°25.5	11°49.6	3.4 - 2.8	9.4 - 7.8	15.4 - 12.7	34	12°38.5	12°40.6	12°03.9	3.4 - 2.9	9.4 - 7.9	15.4 - 13.0
35	12°08.8	12°10.7	11°35.6	3.5 - 2.8	9.5 - 7.7	15.5 - 12.5	35	12°23.8	12°25.8	11°49.9	3.5 - 2.9	9.5 - 7.8	15.5 - 12.8	35	12°38.8	12°40.8	12°04.2	3.5 - 2.9	9.5 - 8.0	15.5 - 13.0
36	12°09.0	12°11.0	11°35.8	3.6 - 2.9	9.6 - 7.8	15.6 - 12.6	36	12°24.0	12°26.0	11°50.1	3.6 - 3.0	9.6 - 7.9	15.6 - 12.9	36	12°39.0	12°41.1	12°04.4	3.6 - 3.0	9.6 - 8.1	15.6 - 13.1
37	12°09.3	12°11.2	11°36.0	3.7 - 3.0	9.7 - 7.8	15.7 - 12.7	37	12°24.3	12°26.3	11°50.3	3.7 - 3.1	9.7 - 8.0	15.7 - 13.0	37	12°39.3	12°41.3	12°04.7	3.7 - 3.1	9.7 - 8.2	15.7 - 13.2
38	12°09.5	12°11.5	11°36.3	3.8 - 3.1	9.8 - 7.9	15.8 - 12.8	38	12°24.5	12°26.5	11°50.6	3.8 - 3.1	9.8 - 8.1	15.8 - 13.0	38	12°39.5	12°41.6	12°04.9	3.8 - 3.2	9.8 - 8.2	15.8 - 13.3
39	12°09.7	12°11.7	11°36.5	3.9 - 3.2	9.9 - 8.0	15.9 - 12.9	39	12°24.7	12°26.8	11°50.8	3.9 - 3.2	9.9 - 8.2	15.9 - 13.1	39	12°39.7	12°41.8	12°05.1	3.9 - 3.3	9.9 - 8.3	15.9 - 13.4
40	12°10.0	12°12.0	11°36.7	4.0 - 3.2	10.0 - 8.1	16.0 - 12.9	40	12°25.0	12°27.0	11°51.1	4.0 - 3.3	10.0 - 8.3	16.0 - 13.2	40	12°40.0	12°42.1	12°05.4	4.0 - 3.4	10.0 - 8.4	16.0 - 13.5
41	12°10.2	12°12.2	11°37.0	4.1 - 3.3	10.1 - 8.2	16.1 - 13.0	41	12°25.2	12°27.3	11°51.3	4.1 - 3.4	10.1 - 8.3	16.1 - 13.3	41	12°40.2	12°42.3	12°05.6	4.1 - 3.5	10.1 - 8.5	16.1 - 13.6
42	12°10.5	12°12.5	11°37.2	4.2 - 3.4	10.2 - 8.2	16.2 - 13.1	42	12°25.5	12°27.5	11°51.5	4.2 - 3.5	10.2 - 8.4	16.2 - 13.4	42	12°40.5	12°42.6	12°05.9	4.2 - 3.5	10.2 - 8.6	16.2 - 13.6
43	12°10.8	12°12.7	11°37.5	4.3 - 3.5	10.3 - 8.3	16.3 - 13.2	43	12°25.8	12°27.8	11°51.8	4.3 - 3.5	10.3 - 8.5	16.3 - 13.4	43	12°40.8	12°42.8	12°06.1	4.3 - 3.6	10.3 - 8.7	16.3 - 13.7
44	12°11.0	12°13.0	11°37.7	4.4 - 3.6	10.4 - 8.4	16.4 - 13.3	44	12°26.0	12°28.0	11°52.0	4.4 - 3.6	10.4 - 8.6	16.4 - 13.5	44	12°41.0	12°43.1	12°06.3	4.4 - 3.7	10.4 - 8.8	16.4 - 13.8
45	12°11.3	12°13.2	11°37.9	4.5 - 3.6	10.5 - 8.5	16.5 - 13.3	45	12°26.3	12°28.3	11°52.3	4.5 - 3.7	10.5 - 8.7	16.5 - 13.6	45	12°41.3	12°43.3	12°06.6	4.5 - 3.8	10.5 - 8.8	16.5 - 13.9
46	12°11.5	12°13.5	11°38.2	4.6 - 3.7	10.6 - 8.6	16.6 - 13.4	46	12°26.5	12°28.5	11°52.5	4.6 - 3.8	10.6 - 8.7	16.6 - 13.7	46	12°41.5	12°43.6	12°06.8	4.6 - 3.		

Increments and Corrections

m 51	Sun Plan.	Aries	Moon	v and d corr			m 52	Sun Plan.	Aries	Moon	v and d corr			m 53	Sun Plan.	Aries	Moon	v and d corr		
0	12°45.0	12°47.1	12°10.1	0.0 - 0.0	6.0 - 5.1	12.0 - 10.3	0	13°00.0	13°02.1	12°24.5	0.0 - 0.0	6.0 - 5.3	12.0 - 10.5	0	13°15.0	13°17.2	12°38.8	0.0 - 0.0	6.0 - 5.4	12.0 - 10.7
1	12°45.2	12°47.3	12°10.4	0.1 - 0.1	6.1 - 5.2	12.1 - 10.4	1	13°00.2	13°02.4	12°24.7	0.1 - 0.1	6.1 - 5.3	12.1 - 10.6	1	13°15.2	13°17.4	12°39.0	0.1 - 0.1	6.1 - 5.4	12.1 - 10.8
2	12°45.5	12°47.6	12°10.6	0.2 - 0.2	6.2 - 5.3	12.2 - 10.5	2	13°00.5	13°02.6	12°24.9	0.2 - 0.2	6.2 - 5.4	12.2 - 10.7	2	13°15.5	13°17.7	12°39.3	0.2 - 0.2	6.2 - 5.5	12.2 - 10.9
3	12°45.7	12°47.8	12°10.9	0.3 - 0.3	6.3 - 5.4	12.3 - 10.6	3	13°00.7	13°02.9	12°25.2	0.3 - 0.3	6.3 - 5.5	12.3 - 10.8	3	13°15.7	13°17.9	12°39.5	0.3 - 0.3	6.3 - 5.6	12.3 - 11.0
4	12°46.0	12°48.1	12°11.1	0.4 - 0.3	6.4 - 5.5	12.4 - 10.6	4	13°01.0	13°03.1	12°25.4	0.4 - 0.4	6.4 - 5.6	12.4 - 10.8	4	13°16.0	13°18.2	12°39.7	0.4 - 0.4	6.4 - 5.7	12.4 - 11.1
5	12°46.3	12°48.3	12°11.3	0.5 - 0.4	6.5 - 5.6	12.5 - 10.7	5	13°01.3	13°03.4	12°25.7	0.5 - 0.4	6.5 - 5.7	12.5 - 10.9	5	13°16.3	13°18.4	12°40.0	0.5 - 0.4	6.5 - 5.8	12.5 - 11.1
6	12°46.5	12°48.6	12°11.6	0.6 - 0.5	6.6 - 5.7	12.6 - 10.8	6	13°01.5	13°03.6	12°25.9	0.6 - 0.5	6.6 - 5.8	12.6 - 11.0	6	13°16.5	13°18.7	12°40.2	0.6 - 0.5	6.6 - 5.9	12.6 - 11.2
7	12°46.8	12°48.8	12°11.8	0.7 - 0.6	6.7 - 5.8	12.7 - 10.9	7	13°01.8	13°03.9	12°26.1	0.7 - 0.6	6.7 - 5.9	12.7 - 11.1	7	13°16.8	13°18.9	12°40.5	0.7 - 0.6	6.7 - 6.0	12.7 - 11.3
8	12°47.0	12°49.1	12°12.1	0.8 - 0.7	6.8 - 5.8	12.8 - 11.0	8	13°02.0	13°04.1	12°26.4	0.8 - 0.7	6.8 - 6.0	12.8 - 11.2	8	13°17.0	13°19.2	12°40.7	0.8 - 0.7	6.8 - 6.1	12.8 - 11.4
9	12°47.2	12°49.3	12°12.3	0.9 - 0.8	6.9 - 5.9	12.9 - 11.1	9	13°02.2	13°04.4	12°26.6	0.9 - 0.8	6.9 - 6.0	12.9 - 11.3	9	13°17.2	13°19.4	12°40.9	0.9 - 0.8	6.9 - 6.2	12.9 - 11.5
10	12°47.5	12°49.6	12°12.5	1.0 - 0.9	7.0 - 6.0	13.0 - 11.2	10	13°02.5	13°04.6	12°26.9	1.0 - 0.9	7.0 - 6.1	13.0 - 11.4	10	13°17.5	13°19.7	12°41.2	1.0 - 0.9	7.0 - 6.2	13.0 - 11.6
11	12°47.7	12°49.8	12°12.8	1.1 - 0.9	7.1 - 6.1	13.1 - 11.2	11	13°02.7	13°04.9	12°27.1	1.1 - 1.0	7.1 - 6.2	13.1 - 11.5	11	13°17.7	13°19.9	12°41.4	1.1 - 1.0	7.1 - 6.3	13.1 - 11.7
12	12°48.0	12°50.1	12°13.0	1.2 - 1.0	7.2 - 6.2	13.2 - 11.3	12	13°03.0	13°05.1	12°27.3	1.2 - 1.1	7.2 - 6.3	13.2 - 11.5	12	13°18.0	13°20.2	12°41.6	1.2 - 1.1	7.2 - 6.4	13.2 - 11.8
13	12°48.3	12°50.3	12°13.3	1.3 - 1.1	7.3 - 6.3	13.3 - 11.4	13	13°03.3	13°05.4	12°27.6	1.3 - 1.1	7.3 - 6.4	13.3 - 11.6	13	13°18.3	13°20.4	12°41.9	1.3 - 1.2	7.3 - 6.5	13.3 - 11.9
14	12°48.5	12°50.6	12°13.5	1.4 - 1.2	7.4 - 6.4	13.4 - 11.5	14	13°03.5	13°05.6	12°27.8	1.4 - 1.2	7.4 - 6.5	13.4 - 11.7	14	13°18.5	13°20.7	12°42.1	1.4 - 1.2	7.4 - 6.6	13.4 - 11.9
15	12°48.8	12°50.9	12°13.7	1.5 - 1.3	7.5 - 6.4	13.5 - 11.6	15	13°03.8	13°05.9	12°28.0	1.5 - 1.3	7.5 - 6.6	13.5 - 11.8	15	13°18.8	13°20.9	12°42.4	1.5 - 1.3	7.5 - 6.7	13.5 - 12.0
16	12°49.0	12°51.1	12°14.0	1.6 - 1.4	7.6 - 6.5	13.6 - 11.7	16	13°04.0	13°06.1	12°28.3	1.6 - 1.4	7.6 - 6.6	13.6 - 11.9	16	13°19.0	13°21.2	12°42.6	1.6 - 1.4	7.6 - 6.8	13.6 - 12.1
17	12°49.2	12°51.4	12°14.2	1.7 - 1.5	7.7 - 6.6	13.7 - 11.8	17	13°04.2	13°06.4	12°28.5	1.7 - 1.5	7.7 - 6.7	13.7 - 12.0	17	13°19.2	13°21.4	12°42.8	1.7 - 1.5	7.7 - 6.9	13.7 - 12.2
18	12°49.5	12°51.6	12°14.4	1.8 - 1.5	7.8 - 6.7	13.8 - 11.8	18	13°04.5	13°06.6	12°28.8	1.8 - 1.6	7.8 - 6.8	13.8 - 12.1	18	13°19.5	13°21.7	12°43.1	1.8 - 1.6	7.8 - 7.0	13.8 - 12.3
19	12°49.8	12°51.9	12°14.7	1.9 - 1.6	7.9 - 6.8	13.9 - 11.9	19	13°04.8	13°06.9	12°29.0	1.9 - 1.7	7.9 - 6.9	13.9 - 12.2	19	13°19.8	13°21.9	12°43.3	1.9 - 1.7	7.9 - 7.0	13.9 - 12.4
20	12°50.0	12°52.1	12°14.9	2.0 - 1.7	8.0 - 6.9	14.0 - 12.0	20	13°05.0	13°07.1	12°29.2	2.0 - 1.8	8.0 - 7.0	14.0 - 12.3	20	13°20.0	13°22.2	12°43.6	2.0 - 1.8	8.0 - 7.1	14.0 - 12.5
21	12°50.3	12°52.4	12°15.2	2.1 - 1.8	8.1 - 7.0	14.1 - 12.1	21	13°05.3	13°07.4	12°29.5	2.1 - 1.8	8.1 - 7.1	14.1 - 12.3	21	13°20.3	13°22.4	12°43.8	2.1 - 1.9	8.1 - 7.2	14.1 - 12.6
22	12°50.5	12°52.6	12°15.4	2.2 - 1.9	8.2 - 7.0	14.2 - 12.2	22	13°05.5	13°07.6	12°29.7	2.2 - 1.9	8.2 - 7.2	14.2 - 12.4	22	13°20.5	13°22.7	12°44.0	2.2 - 2.0	8.2 - 7.3	14.2 - 12.7
23	12°50.7	12°52.9	12°15.6	2.3 - 2.0	8.3 - 7.1	14.3 - 12.3	23	13°05.7	13°07.9	12°30.0	2.3 - 2.0	8.3 - 7.3	14.3 - 12.5	23	13°20.7	13°22.9	12°44.3	2.3 - 2.1	8.3 - 7.4	14.3 - 12.8
24	12°51.0	12°53.1	12°15.9	2.4 - 2.1	8.4 - 7.2	14.4 - 12.4	24	13°06.0	13°08.1	12°30.2	2.4 - 2.1	8.4 - 7.4	14.4 - 12.6	24	13°21.0	13°23.2	12°44.5	2.4 - 2.1	8.4 - 7.5	14.4 - 12.8
25	12°51.2	12°53.4	12°16.1	2.5 - 2.1	8.5 - 7.3	14.5 - 12.4	25	13°06.2	13°08.4	12°30.4	2.5 - 2.2	8.5 - 7.4	14.5 - 12.7	25	13°21.2	13°23.4	12°44.7	2.5 - 2.2	8.5 - 7.6	14.5 - 12.9
26	12°51.5	12°53.6	12°16.4	2.6 - 2.2	8.6 - 7.4	14.6 - 12.5	26	13°06.5	13°08.6	12°30.7	2.6 - 2.3	8.6 - 7.5	14.6 - 12.8	26	13°21.5	13°23.7	12°45.0	2.6 - 2.3	8.6 - 7.7	14.6 - 13.0
27	12°51.8	12°53.9	12°16.6	2.7 - 2.3	8.7 - 7.5	14.7 - 12.6	27	13°06.8	13°08.9	12°30.9	2.7 - 2.4	8.7 - 7.6	14.7 - 12.9	27	13°21.8	13°23.9	12°45.2	2.7 - 2.4	8.7 - 7.8	14.7 - 13.1
28	12°52.0	12°54.1	12°16.8	2.8 - 2.4	8.8 - 7.6	14.8 - 12.7	28	13°07.0	13°09.2	12°31.1	2.8 - 2.5	8.8 - 7.7	14.8 - 13.0	28	13°22.0	13°24.2	12°45.5	2.8 - 2.5	8.8 - 7.8	14.8 - 13.2
29	12°52.3	12°54.4	12°17.1	2.9 - 2.5	8.9 - 7.6	14.9 - 12.8	29	13°07.3	13°09.4	12°31.4	2.9 - 2.5	8.9 - 7.8	14.9 - 13.0	29	13°22.3	13°24.4	12°45.7	2.9 - 2.6	8.9 - 7.9	14.9 - 13.3
30	12°52.5	12°54.6	12°17.3	3.0 - 2.6	9.0 - 7.7	15.0 - 12.9	30	13°07.5	13°09.7	12°31.6	3.0 - 2.6	9.0 - 7.9	15.0 - 13.1	30	13°22.5	13°24.7	12°45.9	3.0 - 2.7	9.0 - 8.0	15.0 - 13.4
31	12°52.7	12°54.9	12°17.5	3.1 - 2.7	9.1 - 7.8	15.1 - 13.0	31	13°07.7	13°09.9	12°31.9	3.1 - 2.7	9.1 - 8.0	15.1 - 13.2	31	13°22.7	13°24.9	12°46.2	3.1 - 2.8	9.1 - 8.1	15.1 - 13.5
32	12°53.0	12°55.1	12°17.8	3.2 - 2.7	9.2 - 7.9	15.2 - 13.0	32	13°08.0	13°10.2	12°32.1	3.2 - 2.8	9.2 - 8.0	15.2 - 13.3	32	13°23.0	13°25.2	12°46.4	3.2 - 2.9	9.2 - 8.2	15.2 - 13.6
33	12°53.2	12°55.4	12°18.0	3.3 - 2.8	9.3 - 8.0	15.3 - 13.1	33	13°08.2	13°10.4	12°32.3	3.3 - 2.9	9.3 - 8.1	15.3 - 13.4	33	13°23.2	13°25.4	12°46.7	3.3 - 2.9	9.3 - 8.3	15.3 - 13.7
34	12°53.5	12°55.6	12°18.3	3.4 - 2.9	9.4 - 8.1	15.4 - 13.2	34	13°08.5	13°10.7	12°32.6	3.4 - 3.0	9.4 - 8.2	15.4 - 13.5	34	13°23.5	13°25.7	12°46.9	3.4 - 3.0	9.4 - 8.4	15.4 - 13.6
35	12°53.8	12°55.9	12°18.5	3.5 - 3.0	9.5 - 8.2	15.5 - 13.3	35	13°08.8	13°10.9	12°32.8	3.5 - 3.1	9.5 - 8.3	15.5 - 13.6	35	13°23.8	13°25.9	12°47.1	3.5 - 3.1	9.5 - 8.5	15.5 - 13.8
36	12°54.0	12°56.1	12°18.7	3.6 - 3.1	9.6 - 8.2	15.6 - 13.4	36	13°09.0	13°11.2	12°33.1	3.6 - 3.1	9.6 - 8.4	15.6 - 13.7	36	13°24.0	13°26.2	12°47.4	3.6 - 3.2	9.6 - 8.6	15.6 - 13.9
37	12°54.3	12°56.4	12°19.0	3.7 - 3.2	9.7 - 8.3	15.7 - 13.5	37	13°09.3	13°11.4	12°33.3	3.7 - 3.2	9.7 - 8.5	15.7 - 13.7	37	13°24.3	13°26.4	12°47.6	3.7 - 3.3	9.7 - 8.6	15.7 - 14.0
38	12°54.5	12°56.6	12°19.2	3.8 - 3.3	9.8 - 8.4	15.8 - 13.6	38	13°09.5	13°11.7	12°33.5	3.8 - 3.3	9.8 - 8.6	15.8 - 13.8	38	13°24.5	13°26.7	12°47.9	3.8 - 3.4	9.8 - 8.7	15.8 - 14.1
39	12°54.7	12°56.9	12°19.5	3.9 - 3.3	9.9 - 8.5	15.9 - 13.6	39	13°09.7	13°11.9	12°33.8	3.9 - 3.4	9.9 - 8.7	15.9 - 13.9	39	13°24.7	13°26.9	12°48.1	3.9 - 3.5	9.9 - 8.8	15.9 - 14.2
40	12°55.0	12°57.1	12°19.7	4.0 - 3.4	10.0 - 8.6	16.0 - 13.7	40	13°10.0	13°12.2	12°34.0	4.0 - 3.5	10.0 - 8.8	16.0 - 14.0	40	13°25.0	13°27.2	12°48.3	4.0 - 3.6	10.0 - 8.9	16.0 - 14.3
41	12°55.2	12°57.4	12°19.9	4.1 - 3.5	10.1 - 8.7	16.1 - 13.8	41	13°10.2	13°12.4	12°34.2	4.1 - 3.6	10.1 - 8.8	16.1 - 14.1	41	13°25.2	13°27.5	12°48.6	4.1 - 3.7	10.1 - 9.0	16.1 - 14.4
42	12°55.5	12°57.6	12°20.2	4.2 - 3.6	10.2 - 8.8	16.2 - 13.9	42	13°10.5	13°12.7	12°34.5	4.2 - 3.7	10.2 - 8.9	16.2 - 14.2	42	13°25.5	13°27.7	12°48.8	4.2 - 3.7	10.2 - 9.1	16.2 - 14.4
43	12°55.8	12°57.9	12°20.4	4.3 - 3.7	10.3 - 8.8	16.3 - 14.0	43	13°10.8	13°12.9	12°34.7	4.3 - 3.8	10.3 - 9.0	16.3 - 14.3	43	13°25.8	13°28.0	12°49.0	4.3 - 3.8	10.3 - 9.2	16.3 - 14.5
44	12°56.0	12°58.1	12°20.6	4.4 - 3.8	10.4 - 8.9	16.4 - 14.1	44	13°11.0	13°13.2	12°35.0	4.4 - 3.9	10.4 - 9.1	16.4 - 14.3	44	13°26.0	13°28.2	12°49.3	4.4 - 3.9	10.4 - 9.3	16.4 - 14.6
45	12°56.3	12°58.4	12°20.9	4.5 - 3.9	10.5 - 9.0	16.5 - 14.2	45	13°11.3	13°13.4	12°35.2	4.5 - 3.9	10.5 - 9.2	16.5 - 14.4	45	13°26.3	13°28.5	12°49.5	4.5 - 4.0	10.5 - 9.4	16.5 - 14.7
46	12°56.5	12°58.6	12°21.1	4.6 - 3.9	10.6 - 9.1	16.6 - 14.2	46	13°11.5	13°13.7	12°35.4	4.6 - 4.0	10.6 - 9.3	16.6 - 14.5	46	13°26.5	13°28.7	12°49.8	4.		

Increments and Corrections

m 54	Sun Plan.	Aries	Moon	v and d corr			m 55	Sun Plan.	Aries	Moon	v and d corr			m 56	Sun Plan.	Aries	Moon	v and d corr		
0	13°30.0	13°32.2	12°53.1	0.0 - 0.0	6.0 - 5.5	12.0 - 10.9	0	13°45.0	13°47.3	13°07.4	0.0 - 0.0	6.0 - 5.6	12.0 - 11.1	0	14°00.0	14°02.3	13°21.7	0.0 - 0.0	6.0 - 5.7	12.0 - 11.3
1	13°30.2	13°32.5	12°53.3	0.1 - 0.1	6.1 - 5.5	12.1 - 11.0	1	13°45.2	13°47.5	13°07.7	0.1 - 0.1	6.1 - 5.6	12.1 - 11.2	1	14°00.2	14°02.5	13°22.0	0.1 - 0.1	6.1 - 5.7	12.1 - 11.4
2	13°30.5	13°32.7	12°53.6	0.2 - 0.2	6.2 - 5.6	12.2 - 11.1	2	13°45.5	13°47.8	13°07.9	0.2 - 0.2	6.2 - 5.7	12.2 - 11.3	2	14°00.5	14°02.8	13°22.2	0.2 - 0.2	6.2 - 5.8	12.2 - 11.5
3	13°30.7	13°33.0	12°53.8	0.3 - 0.3	6.3 - 5.7	12.3 - 11.2	3	13°45.7	13°48.0	13°08.1	0.3 - 0.3	6.3 - 5.8	12.3 - 11.4	3	14°00.7	14°03.0	13°22.4	0.3 - 0.3	6.3 - 5.9	12.3 - 11.6
4	13°31.0	13°33.2	12°54.1	0.4 - 0.4	6.4 - 5.8	12.4 - 11.3	4	13°46.0	13°48.3	13°08.4	0.4 - 0.4	6.4 - 5.9	12.4 - 11.5	4	14°01.0	14°03.3	13°22.7	0.4 - 0.4	6.4 - 6.0	12.4 - 11.7
5	13°31.3	13°33.5	12°54.3	0.5 - 0.5	6.5 - 5.9	12.5 - 11.4	5	13°46.3	13°48.5	13°08.6	0.5 - 0.5	6.5 - 6.0	12.5 - 11.6	5	14°01.3	14°03.5	13°22.9	0.5 - 0.5	6.5 - 6.1	12.5 - 11.8
6	13°31.5	13°33.7	12°54.5	0.6 - 0.5	6.6 - 6.0	12.6 - 11.4	6	13°46.5	13°48.8	13°08.8	0.6 - 0.6	6.6 - 6.1	12.6 - 11.7	6	14°01.5	14°03.8	13°23.2	0.6 - 0.6	6.6 - 6.2	12.6 - 11.9
7	13°31.8	13°34.0	12°54.8	0.7 - 0.6	6.7 - 6.1	12.7 - 11.5	7	13°46.8	13°49.0	13°09.1	0.7 - 0.6	6.7 - 6.2	12.7 - 11.7	7	14°01.8	14°04.1	13°23.4	0.7 - 0.7	6.7 - 6.3	12.7 - 12.0
8	13°32.0	13°34.2	12°55.0	0.8 - 0.7	6.8 - 6.2	12.8 - 11.6	8	13°47.0	13°49.3	13°09.3	0.8 - 0.7	6.8 - 6.3	12.8 - 11.8	8	14°02.0	14°04.3	13°23.6	0.8 - 0.8	6.8 - 6.4	12.8 - 12.1
9	13°32.2	13°34.5	12°55.2	0.9 - 0.8	6.9 - 6.3	12.9 - 11.7	9	13°47.2	13°49.5	13°09.6	0.9 - 0.8	6.9 - 6.4	12.9 - 11.9	9	14°02.2	14°04.6	13°23.9	0.9 - 0.8	6.9 - 6.5	12.9 - 12.1
10	13°32.5	13°34.7	12°55.5	1.0 - 0.9	7.0 - 6.4	13.0 - 11.8	10	13°47.5	13°49.8	13°09.8	1.0 - 0.9	7.0 - 6.5	13.0 - 12.0	10	14°02.5	14°04.8	13°24.1	1.0 - 0.9	7.0 - 6.6	13.0 - 12.2
11	13°32.7	13°35.0	12°55.7	1.1 - 1.0	7.1 - 6.4	13.1 - 11.9	11	13°47.7	13°50.0	13°10.0	1.1 - 1.0	7.1 - 6.6	13.1 - 12.1	11	14°02.7	14°05.1	13°24.4	1.1 - 1.0	7.1 - 6.7	13.1 - 12.3
12	13°33.0	13°35.2	12°56.0	1.2 - 1.1	7.2 - 6.5	13.2 - 12.0	12	13°48.0	13°50.3	13°10.3	1.2 - 1.1	7.2 - 6.7	13.2 - 12.2	12	14°03.0	14°05.3	13°24.6	1.2 - 1.1	7.2 - 6.8	13.2 - 12.4
13	13°33.3	13°35.5	12°56.2	1.3 - 1.2	7.3 - 6.6	13.3 - 12.1	13	13°48.3	13°50.5	13°10.5	1.3 - 1.2	7.3 - 6.8	13.3 - 12.3	13	14°03.3	14°05.6	13°24.8	1.3 - 1.2	7.3 - 6.9	13.3 - 12.5
14	13°33.5	13°35.7	12°56.4	1.4 - 1.3	7.4 - 6.7	13.4 - 12.2	14	13°48.5	13°50.8	13°10.8	1.4 - 1.3	7.4 - 6.8	13.4 - 12.4	14	14°03.5	14°05.8	13°25.1	1.4 - 1.3	7.4 - 7.0	13.4 - 12.6
15	13°33.8	13°36.0	12°56.7	1.5 - 1.4	7.5 - 6.8	13.5 - 12.3	15	13°48.8	13°51.0	13°11.0	1.5 - 1.4	7.5 - 6.9	13.5 - 12.5	15	14°03.8	14°06.1	13°25.3	1.5 - 1.4	7.5 - 7.1	13.5 - 12.7
16	13°34.0	13°36.2	12°56.9	1.6 - 1.5	7.6 - 6.9	13.6 - 12.4	16	13°49.0	13°51.3	13°11.2	1.6 - 1.5	7.6 - 7.0	13.6 - 12.6	16	14°04.0	14°06.3	13°25.6	1.6 - 1.5	7.6 - 7.2	13.6 - 12.8
17	13°34.2	13°36.5	12°57.2	1.7 - 1.5	7.7 - 7.0	13.7 - 12.4	17	13°49.2	13°51.5	13°11.5	1.7 - 1.6	7.7 - 7.1	13.7 - 12.7	17	14°04.2	14°06.6	13°25.8	1.7 - 1.6	7.7 - 7.3	13.7 - 12.9
18	13°34.5	13°36.7	12°57.4	1.8 - 1.6	7.8 - 7.1	13.8 - 12.5	18	13°49.5	13°51.8	13°11.7	1.8 - 1.7	7.8 - 7.2	13.8 - 12.8	18	14°04.5	14°06.8	13°26.0	1.8 - 1.7	7.8 - 7.3	13.8 - 13.0
19	13°34.8	13°37.0	12°57.6	1.9 - 1.7	7.9 - 7.2	13.9 - 12.6	19	13°49.8	13°52.0	13°12.0	1.9 - 1.8	7.9 - 7.3	13.9 - 12.9	19	14°04.8	14°07.1	13°26.3	1.9 - 1.8	7.9 - 7.4	13.9 - 13.1
20	13°35.0	13°37.2	12°57.9	2.0 - 1.8	8.0 - 7.3	14.0 - 12.7	20	13°50.0	13°52.3	13°12.2	2.0 - 1.9	8.0 - 7.4	14.0 - 13.0	20	14°05.0	14°07.3	13°26.5	2.0 - 1.9	8.0 - 7.5	14.0 - 13.2
21	13°35.3	13°37.5	12°58.1	2.1 - 1.9	8.1 - 7.4	14.1 - 12.8	21	13°50.3	13°52.5	13°12.4	2.1 - 1.9	8.1 - 7.5	14.1 - 13.0	21	14°05.3	14°07.6	13°26.7	2.1 - 2.0	8.1 - 7.6	14.1 - 13.3
22	13°35.5	13°37.7	12°58.3	2.2 - 2.0	8.2 - 7.4	14.2 - 12.9	22	13°50.5	13°52.8	13°12.7	2.2 - 2.0	8.2 - 7.6	14.2 - 13.1	22	14°05.5	14°07.8	13°27.0	2.2 - 2.1	8.2 - 7.7	14.2 - 13.4
23	13°35.7	13°38.0	12°58.6	2.3 - 2.1	8.3 - 7.5	14.3 - 13.0	23	13°50.7	13°53.0	13°12.9	2.3 - 2.1	8.3 - 7.7	14.3 - 13.2	23	14°05.7	14°08.1	13°27.2	2.3 - 2.2	8.3 - 7.8	14.3 - 13.5
24	13°36.0	13°38.2	12°58.8	2.4 - 2.2	8.4 - 7.6	14.4 - 13.1	24	13°51.0	13°53.3	13°13.1	2.4 - 2.2	8.4 - 7.8	14.4 - 13.3	24	14°06.0	14°08.3	13°27.5	2.4 - 2.3	8.4 - 7.9	14.4 - 13.6
25	13°36.2	13°38.5	12°59.1	2.5 - 2.3	8.5 - 7.7	14.5 - 13.2	25	13°51.2	13°53.5	13°13.4	2.5 - 2.3	8.5 - 7.9	14.5 - 13.4	25	14°06.2	14°08.6	13°27.7	2.5 - 2.4	8.5 - 8.0	14.5 - 13.7
26	13°36.5	13°38.7	12°59.3	2.6 - 2.4	8.6 - 7.8	14.6 - 13.3	26	13°51.5	13°53.8	13°13.6	2.6 - 2.4	8.6 - 8.0	14.6 - 13.5	26	14°06.5	14°08.8	13°27.9	2.6 - 2.4	8.6 - 8.1	14.6 - 13.7
27	13°36.8	13°39.0	12°59.5	2.7 - 2.5	8.7 - 7.9	14.7 - 13.4	27	13°51.8	13°54.0	13°13.9	2.7 - 2.5	8.7 - 8.0	14.7 - 13.6	27	14°06.8	14°09.1	13°28.2	2.7 - 2.5	8.7 - 8.2	14.7 - 13.8
28	13°37.0	13°39.2	12°59.8	2.8 - 2.5	8.8 - 8.0	14.8 - 13.4	28	13°52.0	13°54.3	13°14.1	2.8 - 2.6	8.8 - 8.1	14.8 - 13.7	28	14°07.0	14°09.3	13°28.4	2.8 - 2.6	8.8 - 8.3	14.8 - 13.9
29	13°37.3	13°39.5	13°00.0	2.9 - 2.6	8.9 - 8.1	14.9 - 13.5	29	13°52.3	13°54.5	13°14.3	2.9 - 2.7	8.9 - 8.2	14.9 - 13.8	29	14°07.3	14°09.6	13°28.7	2.9 - 2.7	8.9 - 8.4	14.9 - 14.0
30	13°37.5	13°39.7	13°00.3	3.0 - 2.7	9.0 - 8.2	15.0 - 13.6	30	13°52.5	13°54.8	13°14.6	3.0 - 2.8	9.0 - 8.3	15.0 - 13.9	30	14°07.5	14°09.8	13°28.9	3.0 - 2.8	9.0 - 8.5	15.0 - 14.1
31	13°37.7	13°40.0	13°00.5	3.1 - 2.8	9.1 - 8.3	15.1 - 13.7	31	13°52.7	13°55.0	13°14.8	3.1 - 2.9	9.1 - 8.4	15.1 - 14.0	31	14°07.7	14°10.1	13°29.1	3.1 - 2.9	9.1 - 8.6	15.1 - 14.2
32	13°38.0	13°40.2	13°00.7	3.2 - 2.9	9.2 - 8.4	15.2 - 13.8	32	13°53.0	13°55.3	13°15.1	3.2 - 3.0	9.2 - 8.5	15.2 - 14.1	32	14°08.0	14°10.3	13°29.4	3.2 - 3.0	9.2 - 8.7	15.2 - 14.3
33	13°38.2	13°40.5	13°01.0	3.3 - 3.0	9.3 - 8.4	15.3 - 13.9	33	13°53.2	13°55.5	13°15.3	3.3 - 3.1	9.3 - 8.6	15.3 - 14.2	33	14°08.2	14°10.6	13°29.6	3.3 - 3.1	9.3 - 8.8	15.3 - 14.4
34	13°38.5	13°40.7	13°01.2	3.4 - 3.1	9.4 - 8.5	15.4 - 14.0	34	13°53.5	13°55.8	13°15.5	3.4 - 3.1	9.4 - 8.7	15.4 - 14.2	34	14°08.5	14°10.8	13°29.8	3.4 - 3.2	9.4 - 8.9	15.4 - 14.5
35	13°38.8	13°41.0	13°01.5	3.5 - 3.2	9.5 - 8.6	15.5 - 14.1	35	13°53.8	13°56.0	13°15.8	3.5 - 3.2	9.5 - 8.8	15.5 - 14.3	35	14°08.8	14°11.1	13°30.1	3.5 - 3.3	9.5 - 8.9	15.5 - 14.6
36	13°39.0	13°41.2	13°01.7	3.6 - 3.3	9.6 - 8.7	15.6 - 14.2	36	13°54.0	13°56.3	13°16.0	3.6 - 3.3	9.6 - 8.9	15.6 - 14.4	36	14°09.0	14°11.3	13°30.3	3.6 - 3.4	9.6 - 9.0	15.6 - 14.7
37	13°39.3	13°41.5	13°01.9	3.7 - 3.4	9.7 - 8.8	15.7 - 14.3	37	13°54.3	13°56.5	13°16.2	3.7 - 3.4	9.7 - 9.0	15.7 - 14.5	37	14°09.3	14°11.6	13°30.6	3.7 - 3.5	9.7 - 9.1	15.7 - 14.8
38	13°39.5	13°41.7	13°02.2	3.8 - 3.5	9.8 - 8.9	15.8 - 14.4	38	13°54.5	13°56.8	13°16.5	3.8 - 3.5	9.8 - 9.1	15.8 - 14.6	38	14°09.5	14°11.8	13°30.8	3.8 - 3.6	9.8 - 9.2	15.8 - 14.9
39	13°39.7	13°42.0	13°02.4	3.9 - 3.5	9.9 - 9.0	15.9 - 14.4	39	13°54.7	13°57.0	13°16.7	3.9 - 3.6	9.9 - 9.2	15.9 - 14.7	39	14°09.7	14°12.1	13°31.0	3.9 - 3.7	9.9 - 9.3	15.9 - 15.0
40	13°40.0	13°42.2	13°02.6	4.0 - 3.6	10.0 - 9.1	16.0 - 14.5	40	13°55.0	13°57.3	13°17.0	4.0 - 3.7	10.0 - 9.3	16.0 - 14.8	40	14°10.0	14°12.3	13°31.3	4.0 - 3.8	10.0 - 9.4	16.0 - 15.1
41	13°40.2	13°42.5	13°02.9	4.1 - 3.7	10.1 - 9.2	16.1 - 14.6	41	13°55.2	13°57.5	13°17.2	4.1 - 3.8	10.1 - 9.3	16.1 - 14.9	41	14°10.2	14°12.6	13°31.5	4.1 - 3.9	10.1 - 9.5	16.1 - 15.2
42	13°40.5	13°42.7	13°03.1	4.2 - 3.8	10.2 - 9.3	16.2 - 14.7	42	13°55.5	13°57.8	13°17.4	4.2 - 3.9	10.2 - 9.4	16.2 - 15.0	42	14°10.5	14°12.8	13°31.8	4.2 - 4.0	10.2 - 9.6	16.2 - 15.3
43	13°40.8	13°43.0	13°03.4	4.3 - 3.9	10.3 - 9.4	16.3 - 14.8	43	13°55.8	13°58.0	13°17.7	4.3 - 4.0	10.3 - 9.5	16.3 - 15.1	43	14°10.8	14°13.1	13°32.0	4.3 - 4.0	10.3 - 9.7	16.3 - 15.3
44	13°41.0	13°43.2	13°03.6	4.4 - 4.0	10.4 - 9.4	16.4 - 14.9	44	13°56.0	13°58.3	13°17.9	4.4 - 4.1	10.4 - 9.6	16.4 - 15.2	44	14°11.0	14°13.3	13°32.2	4.4 - 4.1	10.4 - 9.8	16.4 - 15.4
45	13°41.3	13°43.5	13°03.8	4.5 - 4.1	10.5 - 9.5	16.5 - 15.0	45	13°56.3	13°58.5	13°18.2	4.5 - 4.2	10.5 - 9.7	16.5 - 15.3	45	14°11.3	14°13.6	13°32.5	4.5 - 4.2	10.5 - 9.9	16.5 - 15.5
46	13°41.5	13°43.7	13°04.1	4.6 - 4.2	10.6 - 9.6	16.6 - 15.1	46	13°56.5	13°58.8	13°18.4	4.6 - 4.3	10.6 - 9.8	16.6 - 15.4	46	14°11.5	14°13.8	13°32.7	4.		

Increments and Corrections

m	Sun	Aries	Moon	v and d corr			m	Sun	Aries	Moon	v and d corr			m	Sun	Aries	Moon	v and d corr		
57	Plan.						58	Plan.					59	Plan.						
0	14°15.0	14°17.3	13°36.0	0.0 - 0.0	6.0 - 5.8	12.0 - 11.5	0	14°30.0	14°32.4	13°50.4	0.0 - 0.0	6.0 - 5.8	12.0 - 11.7	0	14°45.0	14°47.4	14°04.7	0.0 - 0.0	6.0 - 6.0	12.0 - 11.9
1	14°15.2	14°17.6	13°36.3	0.1 - 0.1	6.1 - 5.8	12.1 - 11.6	1	14°30.2	14°32.6	13°50.6	0.1 - 0.1	6.1 - 5.9	12.1 - 11.8	1	14°45.2	14°47.7	14°04.9	0.1 - 0.1	6.1 - 6.0	12.1 - 12.0
2	14°15.5	14°17.8	13°36.5	0.2 - 0.2	6.2 - 5.9	12.2 - 11.7	2	14°30.5	14°32.9	13°50.8	0.2 - 0.2	6.2 - 6.0	12.2 - 11.9	2	14°45.5	14°47.9	14°05.2	0.2 - 0.2	6.2 - 6.1	12.2 - 12.1
3	14°15.7	14°18.1	13°36.8	0.3 - 0.3	6.3 - 6.0	12.3 - 11.8	3	14°30.7	14°33.1	13°51.1	0.3 - 0.3	6.3 - 6.1	12.3 - 12.0	3	14°45.7	14°48.2	14°05.4	0.3 - 0.3	6.3 - 6.2	12.3 - 12.2
4	14°16.0	14°18.3	13°37.0	0.4 - 0.4	6.4 - 6.1	12.4 - 11.9	4	14°31.0	14°33.4	13°51.3	0.4 - 0.4	6.4 - 6.2	12.4 - 12.1	4	14°46.0	14°48.4	14°05.6	0.4 - 0.4	6.4 - 6.3	12.4 - 12.3
5	14°16.3	14°18.6	13°37.2	0.5 - 0.5	6.5 - 6.2	12.5 - 12.0	5	14°31.3	14°33.6	13°51.6	0.5 - 0.5	6.5 - 6.3	12.5 - 12.2	5	14°46.3	14°48.7	14°05.9	0.5 - 0.5	6.5 - 6.4	12.5 - 12.4
6	14°16.5	14°18.8	13°37.5	0.6 - 0.6	6.6 - 6.3	12.6 - 12.1	6	14°31.5	14°33.9	13°51.8	0.6 - 0.6	6.6 - 6.4	12.6 - 12.3	6	14°46.5	14°48.9	14°06.1	0.6 - 0.6	6.6 - 6.5	12.6 - 12.5
7	14°16.8	14°19.1	13°37.7	0.7 - 0.7	6.7 - 6.4	12.7 - 12.2	7	14°31.8	14°34.1	13°52.0	0.7 - 0.7	6.7 - 6.5	12.7 - 12.4	7	14°46.8	14°49.2	14°06.4	0.7 - 0.7	6.7 - 6.6	12.7 - 12.6
8	14°17.0	14°19.3	13°38.0	0.8 - 0.8	6.8 - 6.5	12.8 - 12.3	8	14°32.0	14°34.4	13°52.3	0.8 - 0.8	6.8 - 6.6	12.8 - 12.5	8	14°47.0	14°49.4	14°06.6	0.8 - 0.8	6.8 - 6.7	12.8 - 12.7
9	14°17.2	14°19.6	13°38.2	0.9 - 0.9	6.9 - 6.6	12.9 - 12.4	9	14°32.2	14°34.6	13°52.5	0.9 - 0.9	6.9 - 6.7	12.9 - 12.6	9	14°47.2	14°49.7	14°06.8	0.9 - 0.9	6.9 - 6.8	12.9 - 12.8
10	14°17.5	14°19.8	13°38.4	1.0 - 1.0	7.0 - 6.7	13.0 - 12.5	10	14°32.5	14°34.9	13°52.8	1.0 - 1.0	7.0 - 6.8	13.0 - 12.7	10	14°47.5	14°49.9	14°07.1	1.0 - 1.0	7.0 - 6.9	13.0 - 12.9
11	14°17.7	14°20.1	13°38.7	1.1 - 1.1	7.1 - 6.8	13.1 - 12.6	11	14°32.7	14°35.1	13°53.0	1.1 - 1.1	7.1 - 6.9	13.1 - 12.8	11	14°47.7	14°50.2	14°07.3	1.1 - 1.1	7.1 - 7.0	13.1 - 13.0
12	14°18.0	14°20.3	13°38.9	1.2 - 1.2	7.2 - 6.9	13.2 - 12.7	12	14°33.0	14°35.4	13°53.2	1.2 - 1.2	7.2 - 7.0	13.2 - 12.9	12	14°48.0	14°50.4	14°07.5	1.2 - 1.2	7.2 - 7.1	13.2 - 13.1
13	14°18.3	14°20.6	13°39.2	1.3 - 1.2	7.3 - 7.0	13.3 - 12.7	13	14°33.3	14°35.6	13°53.5	1.3 - 1.3	7.3 - 7.1	13.3 - 13.0	13	14°48.3	14°50.7	14°07.8	1.3 - 1.3	7.3 - 7.2	13.3 - 13.2
14	14°18.5	14°20.8	13°39.4	1.4 - 1.3	7.4 - 7.1	13.4 - 12.8	14	14°33.5	14°35.9	13°53.7	1.4 - 1.4	7.4 - 7.2	13.4 - 13.1	14	14°48.5	14°50.9	14°08.0	1.4 - 1.4	7.4 - 7.3	13.4 - 13.3
15	14°18.8	14°21.1	13°39.6	1.5 - 1.4	7.5 - 7.2	13.5 - 12.9	15	14°33.8	14°36.1	13°53.9	1.5 - 1.5	7.5 - 7.3	13.5 - 13.2	15	14°48.8	14°51.2	14°08.3	1.5 - 1.5	7.5 - 7.4	13.5 - 13.4
16	14°19.0	14°21.3	13°39.9	1.6 - 1.5	7.6 - 7.3	13.6 - 13.0	16	14°34.0	14°36.4	13°54.2	1.6 - 1.6	7.6 - 7.4	13.6 - 13.3	16	14°49.0	14°51.4	14°08.5	1.6 - 1.6	7.6 - 7.5	13.6 - 13.5
17	14°19.2	14°21.6	13°40.1	1.7 - 1.6	7.7 - 7.4	13.7 - 13.1	17	14°34.2	14°36.6	13°54.4	1.7 - 1.7	7.7 - 7.5	13.7 - 13.4	17	14°49.2	14°51.7	14°08.7	1.7 - 1.7	7.7 - 7.6	13.7 - 13.6
18	14°19.5	14°21.8	13°40.3	1.8 - 1.7	7.8 - 7.5	13.8 - 13.2	18	14°34.5	14°36.9	13°54.7	1.8 - 1.8	7.8 - 7.6	13.8 - 13.5	18	14°49.5	14°51.9	14°09.0	1.8 - 1.8	7.8 - 7.7	13.8 - 13.7
19	14°19.8	14°22.1	13°40.6	1.9 - 1.8	7.9 - 7.6	13.9 - 13.3	19	14°34.8	14°37.1	13°54.9	1.9 - 1.9	7.9 - 7.7	13.9 - 13.6	19	14°49.8	14°52.2	14°09.2	1.9 - 1.9	7.9 - 7.8	13.9 - 13.8
20	14°20.0	14°22.4	13°40.8	2.0 - 1.9	8.0 - 7.7	14.0 - 13.4	20	14°35.0	14°37.4	13°55.1	2.0 - 1.9	8.0 - 7.8	14.0 - 13.7	20	14°50.0	14°52.4	14°09.5	2.0 - 2.0	8.0 - 7.9	14.0 - 13.9
21	14°20.3	14°22.6	13°41.1	2.1 - 2.0	8.1 - 7.8	14.1 - 13.5	21	14°35.3	14°37.6	13°55.4	2.1 - 2.0	8.1 - 7.9	14.1 - 13.7	21	14°50.3	14°52.7	14°09.7	2.1 - 2.1	8.1 - 8.0	14.1 - 14.0
22	14°20.5	14°22.9	13°41.3	2.2 - 2.1	8.2 - 7.9	14.2 - 13.6	22	14°35.5	14°37.9	13°55.6	2.2 - 2.1	8.2 - 8.0	14.2 - 13.8	22	14°50.5	14°52.9	14°09.9	2.2 - 2.2	8.2 - 8.1	14.2 - 14.1
23	14°20.7	14°23.1	13°41.5	2.3 - 2.2	8.3 - 8.0	14.3 - 13.7	23	14°35.7	14°38.1	13°55.9	2.3 - 2.2	8.3 - 8.1	14.3 - 13.9	23	14°50.7	14°53.2	14°10.2	2.3 - 2.3	8.3 - 8.2	14.3 - 14.2
24	14°21.0	14°23.4	13°41.8	2.4 - 2.3	8.4 - 8.1	14.4 - 13.8	24	14°36.0	14°38.4	13°56.1	2.4 - 2.3	8.4 - 8.2	14.4 - 14.0	24	14°51.0	14°53.4	14°10.4	2.4 - 2.4	8.4 - 8.3	14.4 - 14.3
25	14°21.2	14°23.6	13°42.0	2.5 - 2.4	8.5 - 8.1	14.5 - 13.9	25	14°36.2	14°38.6	13°56.3	2.5 - 2.4	8.5 - 8.3	14.5 - 14.1	25	14°51.2	14°53.7	14°10.6	2.5 - 2.5	8.5 - 8.4	14.5 - 14.4
26	14°21.5	14°23.9	13°42.3	2.6 - 2.5	8.6 - 8.2	14.6 - 14.0	26	14°36.5	14°38.9	13°56.6	2.6 - 2.5	8.6 - 8.4	14.6 - 14.2	26	14°51.5	14°53.9	14°10.9	2.6 - 2.6	8.6 - 8.5	14.6 - 14.5
27	14°21.8	14°24.1	13°42.5	2.7 - 2.6	8.7 - 8.3	14.7 - 14.1	27	14°36.8	14°39.1	13°56.8	2.7 - 2.6	8.7 - 8.5	14.7 - 14.3	27	14°51.8	14°54.2	14°11.1	2.7 - 2.7	8.7 - 8.6	14.7 - 14.6
28	14°22.0	14°24.4	13°42.7	2.8 - 2.7	8.8 - 8.4	14.8 - 14.2	28	14°37.0	14°39.4	13°57.0	2.8 - 2.7	8.8 - 8.6	14.8 - 14.4	28	14°52.0	14°54.4	14°11.4	2.8 - 2.8	8.8 - 8.7	14.8 - 14.7
29	14°22.3	14°24.6	13°43.0	2.9 - 2.8	8.9 - 8.5	14.9 - 14.3	29	14°37.3	14°39.6	13°57.3	2.9 - 2.8	8.9 - 8.7	14.9 - 14.5	29	14°52.3	14°54.7	14°11.6	2.9 - 2.9	8.9 - 8.8	14.9 - 14.8
30	14°22.5	14°24.9	13°43.2	3.0 - 2.9	9.0 - 8.6	15.0 - 14.4	30	14°37.5	14°39.9	13°57.5	3.0 - 2.9	9.0 - 8.8	15.0 - 14.6	30	14°52.5	14°54.9	14°11.8	3.0 - 3.0	9.0 - 8.9	15.0 - 14.9
31	14°22.7	14°25.1	13°43.4	3.1 - 3.0	9.1 - 8.7	15.1 - 14.5	31	14°37.7	14°40.1	13°57.8	3.1 - 3.0	9.1 - 8.9	15.1 - 14.7	31	14°52.7	14°55.2	14°12.1	3.1 - 3.1	9.1 - 9.0	15.1 - 15.0
32	14°23.0	14°25.4	13°43.7	3.2 - 3.1	9.2 - 8.8	15.2 - 14.6	32	14°38.0	14°40.4	13°58.0	3.2 - 3.1	9.2 - 9.0	15.2 - 14.8	32	14°53.0	14°55.4	14°12.3	3.2 - 3.2	9.2 - 9.1	15.2 - 15.1
33	14°23.2	14°25.6	13°43.9	3.3 - 3.2	9.3 - 8.9	15.3 - 14.7	33	14°38.2	14°40.7	13°58.2	3.3 - 3.2	9.3 - 9.1	15.3 - 14.9	33	14°53.2	14°55.7	14°12.6	3.3 - 3.3	9.3 - 9.2	15.3 - 15.2
34	14°23.5	14°25.9	13°44.2	3.4 - 3.3	9.4 - 9.0	15.4 - 14.8	34	14°38.5	14°40.9	13°58.5	3.4 - 3.3	9.4 - 9.2	15.4 - 15.0	34	14°53.5	14°55.9	14°12.8	3.4 - 3.4	9.4 - 9.3	15.4 - 15.3
35	14°23.8	14°26.1	13°44.4	3.5 - 3.4	9.5 - 9.1	15.5 - 14.9	35	14°38.8	14°41.2	13°58.7	3.5 - 3.4	9.5 - 9.3	15.5 - 15.1	35	14°53.8	14°56.2	14°13.0	3.5 - 3.5	9.5 - 9.4	15.5 - 15.4
36	14°24.0	14°26.4	13°44.6	3.6 - 3.5	9.6 - 9.2	15.6 - 15.0	36	14°39.0	14°41.4	13°59.0	3.6 - 3.5	9.6 - 9.4	15.6 - 15.2	36	14°54.0	14°56.4	14°13.3	3.6 - 3.6	9.6 - 9.5	15.6 - 15.5
37	14°24.3	14°26.6	13°44.9	3.7 - 3.5	9.7 - 9.3	15.7 - 15.0	37	14°39.3	14°41.7	13°59.2	3.7 - 3.6	9.7 - 9.5	15.7 - 15.3	37	14°54.3	14°56.7	14°13.5	3.7 - 3.7	9.7 - 9.6	15.7 - 15.6
38	14°24.5	14°26.9	13°45.1	3.8 - 3.6	9.8 - 9.4	15.8 - 15.1	38	14°39.5	14°41.9	13°59.4	3.8 - 3.7	9.8 - 9.6	15.8 - 15.4	38	14°54.5	14°56.9	14°13.8	3.8 - 3.8	9.8 - 9.7	15.8 - 15.7
39	14°24.7	14°27.1	13°45.4	3.9 - 3.7	9.9 - 9.5	15.9 - 15.2	39	14°39.7	14°42.2	13°59.7	3.9 - 3.8	9.9 - 9.7	15.9 - 15.5	39	14°54.7	14°57.2	14°14.0	3.9 - 3.9	9.9 - 9.8	15.9 - 15.8
40	14°25.0	14°27.4	13°45.6	4.0 - 3.8	10.0 - 9.6	16.0 - 15.3	40	14°40.0	14°42.4	13°59.9	4.0 - 3.9	10.0 - 9.8	16.0 - 15.6	40	14°55.0	14°57.4	14°14.2	4.0 - 4.0	10.0 - 9.9	16.0 - 15.9
41	14°25.2	14°27.6	13°45.8	4.1 - 3.9	10.1 - 9.7	16.1 - 15.4	41	14°40.2	14°42.7	14°00.1	4.1 - 4.0	10.1 - 9.8	16.1 - 15.7	41	14°55.2	14°57.7	14°14.5	4.1 - 4.1	10.1 - 10.0	16.1 - 16.0
42	14°25.5	14°27.9	13°46.1	4.2 - 4.0	10.2 - 9.8	16.2 - 15.5	42	14°40.5	14°42.9	14°00.4	4.2 - 4.1	10.2 - 9.9	16.2 - 15.8	42	14°55.5	14°57.9	14°14.7	4.2 - 4.2	10.2 - 10.1	16.2 - 16.1
43	14°25.8	14°28.1	13°46.3	4.3 - 4.1	10.3 - 9.9	16.3 - 15.6	43	14°40.8	14°43.2	14°00.6	4.3 - 4.2	10.3 - 10.0	16.3 - 15.9	43	14°55.8	14°58.2	14°14.9	4.3 - 4.3	10.3 - 10.2	16.3 - 16.2
44	14°26.0	14°28.4	13°46.5	4.4 - 4.2	10.4 - 10.0	16.4 - 15.7	44	14°41.0	14°43.4	14°00.9	4.4 - 4.3	10.4 - 10.1	16.4 - 16.0	44	14°56.0	14°58.4	14°15.2	4.4 - 4.4	10.4 - 10.3	16.4 - 16.3
45	14°26.3	14°28.6	13°46.8	4.5 - 4.3	10.5 - 10.1	16.5 - 15.8	45	14°41.3	14°43.7	14°01.1	4.5 - 4.4	10.5 - 10.2	16.5 - 16.1	45	14°56.3	14°58.7	14°15.4	4.5 - 4.5	10.5 - 10.4	16.5 - 16.4
46	14°26.5	14°28.9	13°47.0	4.6 - 4.4	10.6 - 10.2	16.6 - 15.9	46	14°41.5	14°43.9	14°01.3	4.6 - 4.5	10.6 - 10.3	16.6 - 16.2	46	14°56.5	14°59.0	14°15.7	4.6 - 4.6	10.6 - 10	

Increments and Corrections

Refract.		Parallax of the Moon																		DIP			
<i>H_a</i>	<i>ref</i>	<i>H_a</i>	0-5°	5-10°	10-15°	15-20°	20-25°	25-30°	30-35°	35-40°	40-45°	45-50°	50-55°	55-60°	60-65°	65-70°	70-75°	75-80°	80-85°	85-90°	<i>m</i>	<i>dip</i>	<i>ft</i>
5°	9.9		0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	1	1.8	3.2
5.5°	9.1	0	54.0	53.8	53.2	52.2	50.7	48.9	46.8	44.2	41.4	38.2	34.7	31.0	27.0	22.8	18.5	14.0	9.4	4.7	1.5	2.2	4.9
6.0°	8.5	10	54.0	53.8	53.2	52.1	50.7	48.9	46.7	44.1	41.3	38.1	34.6	30.8	26.9	22.7	18.3	13.8	9.2	4.5	2.0	2.5	6.5
6.5°	7.9	20	54.0	53.8	53.1	52.1	50.6	48.8	46.6	44.1	41.2	38.0	34.5	30.7	26.7	22.5	18.2	13.7	9.1	4.4	2.5	2.8	8.1
7.0°	7.5	30	54.0	53.8	53.1	52.0	50.6	48.7	46.5	44.0	41.1	37.8	34.3	30.6	26.6	22.4	18.0	13.5	8.9	4.2	3.0	3.0	9.7
7.5°	7.0	40	54.0	53.7	53.1	52.0	50.5	48.7	46.4	43.9	41.0	37.7	34.2	30.5	26.5	22.3	17.9	13.4	8.8	4.1	3.5	3.3	11.3
8.0°	6.6	50	54.0	53.7	53.0	52.0	50.5	48.6	46.4	43.8	40.9	37.6	34.1	30.3	26.3	22.1	17.7	13.2	8.6	3.9	4.0	3.5	13.0
8.5°	6.3		1°	6°	11°	16°	21°	26°	31°	36°	41°	46°	51°	56°	61°	66°	71°	76°	81°	86°	4.5	3.7	14.6
9.0°	5.9	0	54.0	53.7	53.0	51.9	50.4	48.5	46.3	43.7	40.8	37.5	34.0	30.2	26.2	22.0	17.6	13.1	8.4	3.8	5.0	3.9	16.2
9.5°	5.7	10	54.0	53.7	53.0	51.9	50.4	48.5	46.2	43.6	40.7	37.4	33.9	30.1	26.0	21.8	17.4	12.9	8.3	3.6	5.5	4.1	17.8
10.0°	5.4	20	54.0	53.7	52.9	51.8	50.3	48.4	46.1	43.5	40.5	37.3	33.7	29.9	25.9	21.7	17.3	12.8	8.1	3.5	6.0	4.3	19.5
10.5°	5.1	30	54.0	53.7	52.9	51.8	50.2	48.3	46.0	43.4	40.4	37.2	33.6	29.8	25.8	21.5	17.1	12.6	8.0	3.3	6.5	4.5	21.1
11.0°	4.9	40	54.0	53.6	52.9	51.7	50.2	48.3	46.0	43.3	40.3	37.1	33.5	29.7	25.6	21.4	17.0	12.5	7.8	3.1	7.0	4.7	22.7
11.5°	4.7	50	54.0	53.6	52.9	51.7	50.1	48.2	45.9	43.2	40.2	36.9	33.4	29.5	25.5	21.2	16.8	12.3	7.7	3.0	7.5	4.8	24.3
12.0°	4.5		2°	7°	12°	17°	22°	27°	32°	37°	42°	47°	52°	57°	62°	67°	72°	77°	82°	87°	8.0	5.0	25.9
12.5°	4.4	0	54.0	53.6	52.8	51.6	50.1	48.1	45.8	43.1	40.1	36.8	33.2	29.4	25.4	21.1	16.7	12.1	7.5	2.8	8.5	5.1	27.6
13.0°	4.2	10	54.0	53.6	52.8	51.6	50.0	48.0	45.7	43.0	40.0	36.7	33.1	29.3	25.2	21.0	16.5	12.0	7.4	2.7	9.0	5.3	29.2
13.5°	4.0	20	54.0	53.6	52.8	51.5	49.9	48.0	45.6	42.9	39.9	36.6	33.0	29.1	25.1	20.8	16.4	11.8	7.2	2.5	9.5	5.4	30.8
14.0°	3.9	30	53.9	53.5	52.7	51.5	49.9	47.9	45.5	42.8	39.8	36.5	32.9	29.0	24.9	20.7	16.2	11.7	7.0	2.4	10.0	5.6	32.4
14.5°	3.8	40	53.9	53.5	52.7	51.5	49.8	47.8	45.5	42.7	39.7	36.4	32.7	28.9	24.8	20.5	16.1	11.5	6.9	2.2	10.5	5.7	34.0
15.0°	3.6	50	53.9	53.5	52.7	51.4	49.8	47.8	45.4	42.6	39.6	36.2	32.6	28.7	24.7	20.4	15.9	11.4	6.7	2.0	11.0	5.8	35.7
15.5°	3.5		3°	8°	13°	18°	23°	28°	33°	38°	43°	48°	53°	58°	63°	68°	73°	78°	83°	88°	11.5	6.0	37.3
16.0°	3.4	0	53.9	53.5	52.6	51.4	49.7	47.7	45.3	42.6	39.5	36.1	32.5	28.6	24.5	20.2	15.8	11.2	6.6	1.9	12.0	6.1	38.9
16.5°	3.3	10	53.9	53.5	52.6	51.3	49.6	47.6	45.2	42.5	39.4	36.0	32.4	28.5	24.4	20.1	15.6	11.1	6.4	1.7	12.5	6.2	40.5
17.0°	3.2	20	53.9	53.4	52.5	51.3	49.6	47.5	45.1	42.4	39.3	35.9	32.2	28.3	24.2	19.9	15.5	10.9	6.3	1.6	13.0	6.3	42.2
17.5°	3.1	30	53.9	53.4	52.5	51.2	49.5	47.5	45.0	42.3	39.2	35.8	32.1	28.2	24.1	19.8	15.3	10.8	6.1	1.4	13.5	6.5	43.8
18.0°	3.0	40	53.9	53.4	52.5	51.2	49.5	47.4	44.9	42.2	39.1	35.7	32.0	28.1	24.0	19.6	15.2	10.6	6.0	1.3	14.0	6.6	45.4
18.5°	2.9	50	53.9	53.4	52.4	51.1	49.4	47.3	44.9	42.1	39.0	35.5	31.9	27.9	23.8	19.5	15.0	10.5	5.8	1.1	14.5	6.7	47.0
19.0°	2.9		4°	9°	14°	19°	24°	29°	34°	39°	44°	49°	54°	59°	64°	69°	74°	79°	84°	89°	15.0	6.8	48.6
19.5°	2.8	0	53.9	53.3	52.4	51.1	49.3	47.2	44.8	42.0	38.8	35.4	31.7	27.8	23.7	19.4	14.9	10.3	5.6	0.9	15.5	6.9	50.3
20.0°	2.7	10	53.9	53.3	52.4	51.0	49.3	47.2	44.7	41.9	38.7	35.3	31.6	27.7	23.5	19.2	14.7	10.1	5.5	0.8	16.0	7.0	51.9
21.0°	2.6	20	53.8	53.3	52.3	51.0	49.2	47.1	44.6	41.8	38.6	35.2	31.5	27.5	23.4	19.1	14.6	10.0	5.3	0.6	16.5	7.1	53.5
22.0°	2.4	30	53.8	53.3	52.3	50.9	49.1	47.0	44.5	41.7	38.5	35.1	31.4	27.4	23.2	18.9	14.4	9.8	5.2	0.5	17.0	7.2	55.1
23.0°	2.3	40	53.8	53.2	52.2	50.8	49.1	46.9	44.4	41.6	38.4	35.0	31.2	27.3	23.1	18.8	14.3	9.7	5.0	0.3	17.5	7.4	56.7
24.0°	2.2	50	53.8	53.2	52.2	50.8	49.0	46.8	44.3	41.5	38.3	34.8	31.1	27.1	23.0	18.6	14.1	9.5	4.9	0.2	18.0	7.5	58.4
25.0°	2.1	HP	correction for HP per column																		18.5	7.6	60.0
26.0°	2.0	54.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	19.0	7.7	61.6
27.0°	1.9	54.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.0	19.5	7.8	63.2
28.0°	1.9	54.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.6	0.5	0.5	0.4	0.3	0.3	0.2	0.1	0.0	20.0	7.9	64.9
29.0°	1.8	55.2	1.2	1.2	1.2	1.1	1.1	1.1	1.0	1.0	0.9	0.8	0.7	0.6	0.6	0.5	0.4	0.3	0.2	0.1	20.5	8.0	66.5
30.0°	1.7	55.5	1.5	1.5	1.5	1.4	1.4	1.3	1.3	1.2	1.1	1.0	0.9	0.8	0.7	0.6	0.5	0.3	0.2	0.1	21.0	8.1	68.1
31.0°	1.7	55.8	1.8	1.8	1.8	1.7	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.0	0.8	0.7	0.5	0.4	0.2	0.1	21.5	8.2	69.7
32.0°	1.6	56.1	2.1	2.1	2.1	2.0	1.9	1.9	1.8	1.7	1.5	1.4	1.3	1.1	1.0	0.8	0.6	0.5	0.3	0.1	22.0	8.2	71.3
33.0°	1.5	56.4	2.4	2.4	2.3	2.3	2.2	2.1	2.0	1.9	1.8	1.6	1.5	1.3	1.1	0.9	0.7	0.5	0.3	0.1	22.5	8.3	73.0
34.0°	1.5	56.7	2.7	2.7	2.6	2.6	2.5	2.4	2.3	2.1	2.0	1.8	1.6	1.5	1.2	1.0	0.8	0.6	0.4	0.1	23.0	8.4	74.6
35.0°	1.4	57.0	3.0	3.0	2.9	2.9	2.8	2.7	2.5	2.4	2.2	2.0	1.8	1.6	1.4	1.1	0.9	0.6	0.4	0.1	23.5	8.5	76.2
36.0°	1.4	57.3	3.3	3.3	3.2	3.1	3.0	2.9	2.8	2.6	2.4	2.2	2.0	1.8	1.5	1.3	1.0	0.7	0.4	0.1	24.0	8.6	77.8
37.0°	1.3	57.6	3.6	3.6	3.5	3.4	3.3	3.2	3.0	2.9	2.7	2.4	2.2	1.9	1.7	1.4	1.1	0.8	0.5	0.2	24.5	8.7	79.4
38.0°	1.3	57.9	3.9	3.9	3.8	3.7	3.6	3.5	3.3	3.1	2.9	2.6	2.4	2.1	1.8	1.5	1.2	0.8	0.5	0.2	25.0	8.8	81.1
39.0°	1.2	58.2	4.2	4.2	4.1	4.0	3.9	3.7	3.5	3.3	3.1	2.8	2.6	2.3	1.9	1.6	1.3	0.9	0.5	0.2			
40.0°	1.2	58.5	4.5	4.5	4.4	4.3	4.2	4.0	3.8	3.6	3.3	3.0	2.7	2.4	2.1	1.7	1.4	1.0	0.6	0.2			
45.0°	1.0	58.8	4.8	4.8	4.7	4.6	4.4	4.3	4.0	3.8	3.5	3.2	2.9	2.6	2.2	1.8	1.4	1.0	0.6	0.2			
50.0°	0.8	59.1	5.1	5.1	5.0	4.9	4.7	4.5	4.3	4.0	3.8	3.4	3.1	2.7	2.4	2.0	1.5	1.1	0.7	0.2			
55.0°	0.7	59.4	5.4	5.4	5.3	5.2	5.0	4.8	4.6	4.3	4.0	3.6	3.3	2.9	2.5	2.1	1.6	1.2	0.7	0.2			
60.0°	0.6	59.7	5.7	5.7	5.6	5.4	5.3	5.1	4.8	4.5	4.2	3.9	3.5	3.1	2.6	2.2	1.7	1.2	0.7	0.2			
65.0°	0.5	60.0	6.0	5.9	5.9	5.7	5.5	5.3	5.1	4.8	4.4	4.1	3.7	3.2	2.8	2.3	1.8	1.3	0.8	0.3			
70.0°	0.4	60.3	6.3	6.2	6.2	6.0	5.8	5.6	5.3	5.0	4.6	4.3	3.8	3.4	2.9	2.4	1.9	1.4	0.8	0.3			
75.0°	0.3	60.6	6.6	6.5	6.4	6.3	6.1	5.9	5.6	5.2	4.9	4.5	4.0										

