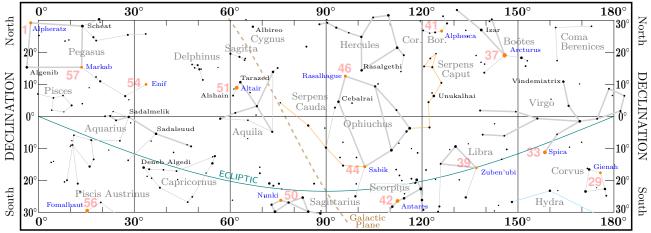
GENERATED USING SKYFIELD

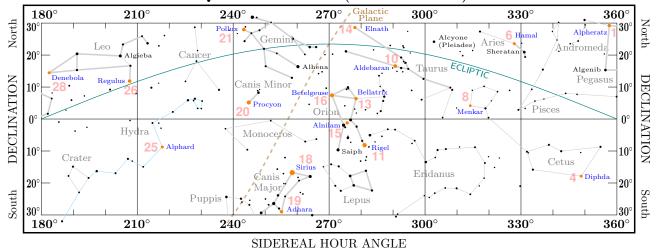
http://rhodesmill.org/skyfield/

EQUATORIAL STARS (SHA 0° to 180°)



SIDEREAL HOUR ANGLE

EQUATORIAL STARS (SHA 180° to 360°)



THE NAUTICAL ALMANAC

27.06.2021 - 02.07.2021

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Original concept from: Enno Rodegerdts

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h	Aries	Ve	nus	M	ars	Jup	oiter	Sat	urn		Stars	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	275°19.5	153°01.2	N21°44.4	143°00.0	N19°04.8	300°51.2	\$11°38.7	320°03.5	S17°42.6		SHA	
1	275 19.5 290°21.9	168°00.4		158°00.9		315°53.7		335°06.1		Alpheratz	357°37.7	29°12.3
2	290 21.9 305°24.4	182°59.7	43.8	173° 01.8	04.3	330°56.2	38.7	350°08.7	42.7	Ankaa	$353^{\circ}10.1$	-42°11.2
			43.2		03.9		38.8		42.7	Schedar	349°34.3	56°38.9
3	320°26.9	197°59.0	• • 42.6	188°02.7	• • 03.5	345°58.7	• • 38.8	5°11.3	• • 42.8	Diphda	348°50.2	$-17^{\circ}52.1$
4	335°29.3	212°58.3	42.0	203°03.6	03.1	1°01.2	38.8	20°13.9	42.8	Achernar	335°22.6	-57°07.5
5	350°31.8	227°57.5	41.4	218°04.5	02.6	16°03.7	38.8	35°16.5	42.8	Hamal	327°54.6	23°33.6
6	5°34.2	242°56.8	N21°40.8	233°05.4	N19°02.2	31°06.3	S11°38.9	50°19.1	\$17°42.9	Polaris	315°39.2	89°20.9
7	20°36.7	257°56.1	40.1	248°06.2	01.8	46°08.8	38.9	65°21.7	42.9	Acamar	315°14.3	-40°13.0
8	35°39.2	272°55.3	39.5	263°07.1	01.4	61°11.3	38.9	80°24.2	43.0	Menkar	314°09.4	4°10.3
9	50°41.6	287°54.6	• • 38.9	278°08.0	• • 00.9	76° 13.8	• • 39.0	95°26.8	• • 43.0	Mirfak	308°32.7	49°56.0
10	65°44.1	302°53.9	38.3	293°08.9	00.5	91°16.3	39.0	110°29.4	43.0	Aldebaran	290°43.2	16°33.0
11	80°46.6	317°53.1	37.7	308°09.8	19°00.1	106° 18.8	39.0	125°32.0	43.1	Rigel	281°07.0	-8°10.6
12	95°49.0	332°52.4	N21°37.0	323°10.7	N18°59.6	121°21.3	S11°39.1	140°34.6	S17°43.1	Capella	280°26.6	46°01.0
13	$110^{\circ}51.5$	347°51.7	36.4	338°11.6	59.2	136°23.8	39.1	155°37.2	43.2	Bellatrix	278°26.3	6°22.1
14	125°54.0	2°51.0	35.8	353°12.5	58.8	151°26.3	39.1	170°39.8	43.2	Elnath	278°05.9	28°37.4
15	140°56.4	17°50.2	• • 35.2	8°13.4	• • 58.4	166°28.9	• • 39.2	185°42.4	• • 43.2	Alnilam	275°41.0	-1°11.3
16	155°58.9	32°49.5	34.5	23°14.3	57.9	181°31.4	39.2	200°45.0	43.3	Betelgeuse	270°55.5	7°24.6
17	171°01.4	47°48.8	33.9	$38^{\circ}15.2$	57.5	196°33.9	39.2	215°47.6	43.3	Canopus	263°54.2	-52°42.4
18	186°03.8	62°48.1	N21°33.3	$53^{\circ}16.1$	N18°57.1	211°36.4	S11°39.2	230°50.2	S 17°43.4	Sirius	258° 29.1	-16°44.8
19	201°06.3	77°47.3	32.7	68° 16.9	56.6	226°38.9	39.3	245°52.8	43.4	Adhara	255° 08.5	-10 44.8 -29°00.1
20	216°08.7	92°46.6	32.0	83°17.8	56.2	241°41.4	39.3	260°55.4	43.5		244° 54.2	5°10.2
21	231°11.2	107°45.9	• • 31.4	98° 18.7	• • 55.8	256°43.9	• • 39.3	275°58.0	• • 43.5	Procyon		
22	246°13.7	122°45.2	30.8	113° 19.6	55.4	271°46.5	39.4	291°00.5	43.5	Pollux	243°21.2	27°58.5
23	261°16.1	137°44.4	30.1	128°20.5	54.9	286°49.0	39.4	306°03.1	43.6	Avior	234°16.4	-59°34.8
	05.00	0.7/ 1.0	200	0.0/ 1.	0.4/ 1.0	0.5/ 1.0	0/ 0.61	0.6/ 1.4	20/ 04	Suhail	222°48.7	-43°31.2
Mer.p	ass. 05:38	ν -0.7′ d-0	0.6′ m-3.86	ν 0.9′ d-0	0.4′ m1.8	$\nu^{2.5'} d-0$.0′ m-2.61	$\nu 2.6' d-0$	0.0′ m0.4	Miaplacidus	221°39.5	-69°48.5
										Alphard	217°50.8	-8°45.1
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°37.7	11°51.9
0	276°18.6	152°43.7	N21°29.5	143°21.4	N18°54.5	301°51.5	\$11°39.4	321°05.7	\$17°43.6	Dubhe	193°44.9	61°38.5
1	291°21.1	167°43.0	28.9	158°22.3	54.1	316°54.0	39.5	336°08.3	43.7	Denebola	182°28.0	14°27.3
2	306°23.5	182°42.3	28.2	173° 23.2	53.6	331° 56.5	39.5	351°10.9	43.7	Gienah	175°46.5	-17°39.7
3	300°25.5 321°26.0	102 42.3 197°41.6		173 23.2 188°24.1		346°59.0		6°13.5		Acrux		-63°13.3
			•• 27.6		• • 53.2		• • 39.5		• • 43.8	Gacrux	$171^{\circ}54.7$	-57°14.2
4	336°28.5	212°40.8	27.0	203°25.0	52.8	2°01.6	39.6	21°16.1	43.8	Alioth	$166^{\circ}15.5$	55°51.0
5	351°30.9	227°40.1	26.3	218°25.9	52.3	17°04.1	39.6	36°18.7	43.8	Spica	158°25.2	-11°16.3
6	6°33.4	242°39.4	N21°25.7	233°26.8	N18°51.9	32°06.6	S11°39.6	51°21.3	S17°43.9	Alkaid	152°54.2	49°12.7
7	21°35.9	257°38.7	25.0	248°27.7	51.5	47°09.1	39.7	66°23.9	43.9	Hadar	148°39.7	-60°28.7
8	36°38.3	272°38.0	24.4	263°28.6	51.1	62°11.6	39.7	81°26.5	44.0	Menkent	148°00.8	-36°28.6
9	51°40.8	287°37.3	• • 23.7	278°29.4	• • 50.6	77° 14.1	• • 39.7	96°29.1	• • 44.0	Arcturus	145°50.4	19°04.5
10	66°43.2	302°36.5	23.1	293°30.3	50.2	92°16.7	39.8	111°31.7	44.0	Rigil Kent.	139°43.8	-60°55.5
11	81°45.7	317°35.8	22.5	308°31.2	49.8	107° 19.2	39.8	126°34.3	44.1	Kochab	$137^{\circ}19.2$	74°04.4
12	96°48.2	332°35.1	N21°21.8	323°32.1	N18°49.3	122°21.7	S11°39.8	141°36.9	S17°44.1	Zuben'ubi	136°59.0	-16°07.8
13	111°50.6	347°34.4	21.2	338°33.0	48.9	137°24.2	39.9	156°39.5	44.2	Alphecca	126°05.9	26°38.7
14	126°53.1	2°33.7	20.5	353°33.9	48.5	152°26.7	39.9	171°42.1	44.2	Antares	112°19.0	-26°28.7
15	141°55.6	17°33.0	• • 19.9	8°34.8	• • 48.0	167°29.3	• • 39.9	186°44.7	• • 44.3	Atria	107° 15.3	-69°04.0
16	156°58.0	32°32.3	19.2	23°35.7	47.6	182°31.8	40.0	201°47.3	44.3	Sabik	102°05.8	-15°45.0
17	172°00.5	47°31.5	18.6	38°36.6	47.2	197°34.3	40.0	216°49.9	44.3	Shaula	96°13.9	-37°07.1
18	187°03.0	62°30.8	N21°17.9	53°37.5	N18°46.7	212° 36.8	S11°40.0	231°52.4	S17°44.4	Rasalhague	96°00.9	12°32.7
19	202°05.4	77°30.1	17.3	68°38.4	46.3	227°39.4	40.1	246°55.0	44.4	Eltanin	90°43.0	51°29.2
20	217°07.9	92°29.4	16.6	83°39.3	45.9	242°41.9	40.1	261°57.6	44.5	Kaus Aust.	83°35.9	-34°22.4
21	232°10.4	107°28.7	• • 15.9	98°40.2	• • 45.4	257° 44.4	• • 40.1	277°00.2	• • 44.5	Vega	80°34.7	38°48.2
22	247°12.8	122°28.0	15.3	113°41.1	45.0	272°46.9	40.2	292°02.8	44.6			-26°16.1
23	262°15.3	137°27.3	14.6	128°42.0	44.6	287°49.4	40.2	307°05.4	44.6	Nunki	75°51.0	-20 10.1 8°55.5
		-	2 2 2 2 2				0/ 0.50			Altair	62°02.4	
Mer.p	ass. 05:34	ν -0.7 d-0).6′ m-3.86	ν 0.9′ d-0	0.4' m 1.8	ν 2.5′ d -0	.0′ m-2.62	ν 2.6′ d -0	0.0' m 0.4	Peacock	53°09.8	-56°39.8
										Deneb	49°27.3	45°21.3
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°41.4	9°58.3
0	277°17.7	152°26.6	N21°14.0	143°42.9	N18°44.1	302°52.0	S11°40.2	322°08.0	\$17°44.6	Al Na'ir	27°36.3	-46°51.3
1	292°20.2	167°25.9	13.3	158°43.8	43.7	317°54.5	40.3	337°10.6	44.7	Fomalhaut	15°17.6	-29°30.4
2	307°22.7	182°25.2	12.6	173° 44.7	43.3	332°57.0	40.3	352°13.2	44.7	Scheat	13° 47.8	28°11.7
3	322°25.1	197°24.4	12.0	173 44.7 188° 45.6	• • 42.8	347°59.5	• • 40.3	7°15.8	• • 44.8	Markab	13°32.6	15°19.1
4	337°27.6	212°23.7	11.3	203°46.5	42.4	3°02.1	40.4	22°18.4	44.8	Jun 27 Sun	SHA	Mer.pass
5	352°30.1	212 23.7 227°23.0	10.7	218° 47.3	41.9	18°04.6	40.4	37°21.0	44.9		237°41.7	13:49
6	7°32.5	242°22.3	N21°10.0	233°48.2	N18°41.5	33°07.1	\$11°40.4	52°23.6	\$17°44.9	Mars		14:27
7	7 32.5 22°35.0	242 22.3 257°21.6	09.3	233 46.2 248°49.1	41.1	48° 09.6	40.4	67°26.2	44.9	Jupiter	25°31.7	03:56
8	22 35.0 37°37.5	257 21.0 272°20.9	09.3	263° 50.0	40.6	63°12.2	40.5	82°28.8	44.9 45.0	Saturn	44° 44.1	03:30
9	52°39.9	272 20.9 287°20.2	08.0	203 50.0 278° 50.9	. 40.0	78° 14.7	• • 40.5	97°31.4	• • 45.0	Jatuill	17.1	02.33
	52 39.9 67°42.4	302°19.5		278 50.9 293°51.8		78 14.7 93°17.2		97 31.4 112°34.0		Jun 28 Mon	SHA	Mer.pass
10	67°42.4 82°44.8	302°19.5 317°18.8	07.3 06.6	293°51.8 308°52.7	39.8 39.3	93°17.2 108°19.7	40.6 40.6	112°34.0 127°36.6	45.1 45.1	Venus	$236^{\circ}25.1$	13:50
11	82 44.8 97°47.3		06.6 N21°06.0	308 52.7 323°53.6	39.3 N18°38.9		511°40.7		45.1 \$17°45.2	Mars	227°02.8	14:26
12		332°18.1	N21°06.0			123°22.3 138°24.8		142°39.2		Jupiter	25°32.9	03:52
13	112°49.8	347°17.4	05.3	338°54.5	38.4		40.7	157°41.8	45.2	Saturn	44°47.1	02:35
14	127°52.2	2°16.7	04.6	353°55.4	38.0	153°27.3	40.7	172°44.4	45.2		<u></u>	
15	142°54.7	17°16.0	04.0	8°56.3	•• 37.6	168°29.9	• • 40.8	187°47.0	• • 45.3	Jun 29 Tue	SHA	Mer.pass
16	157°57.2	32°15.3	03.3	23°57.2	37.1	183°32.4	40.8	202°49.6	45.3	Venus		13:51
17	172°59.6	47°14.6	02.6	38°58.1	36.7	198°34.9	40.8	217°52.2	45.4	Mars		14:24
18	188°02.1	62°13.9	N21°01.9	53°59.0	N18°36.3	213°37.4	S11°40.9	232°54.8	\$17°45.4	Jupiter	25°34.2	03:48
19	203°04.6	77°13.2	01.2	68°59.9	35.8	228° 40.0	40.9	247°57.4	45.5	Saturn	44°50.3	02:31
20	218°07.0	92°12.5	21°00.6	84°00.8	35.4	243° 42.5	41.0	263°00.0	45.5	Horizont	al parallax	
21	233°09.5	107°11.8	20°59.9	99°01.7	• • 34.9	258° 45.0	• • 41.0	278°02.6	• • 45.6	FIORIZONI	Venus:	0.1
22	248°12.0	122°11.1	59.2	114°02.6	34.5	273°47.6	41.0	293°05.2	45.6			
23	263°14.4	137°10.4	58.5	129°03.5	34.1	288°50.1	41.1	308°07.8	45.6		Mars:	0.1
Mer n	ass. 05:30	ν -0.7' d-0).7′ m-3.86	$\nu^{0.9'} d_{-1}$	0.4′ m1.8	$\nu^{2.5'} d-0$.0′ m-2.63	$\nu^{2.6'} d^{-1}$	0.0' m0.4			

h	Su	n	Moon				
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°14.7	N23° 19.2	325°55.9	5.8'	S22°58.6	7.3'	59.1'
1	194°14.6 209°14.4	19.1	340°20.7 354°45.6	5.9'	22°51.3 22°43.9	7.4'	59.1'
2	209 14.4 224°14.3	19.0 •• 18.9	9°10.6	6.0' 6.1'	22 43.9 22°36.4	7.5' 7.7'	59.1' 59.0'
4	239°14.2	18.8	23°35.7	6.3'	22°28.7	7.8'	59.0'
5	254°14.1	18.7	38°01.0	6.4'	$22^{\circ}21.0$	7.9'	59.0'
6	269°13.9	N23° 18.6	52°26.4	6.5'	\$22°13.0 22°05.0	8.1'	58.9'
7 8	284°13.8 299°13.7	18.4 18.3	66°51.9 81°17.5	6.6' 6.7'	22 05.0 21°56.8	8.2' 8.3'	58.9' 58.8'
9	314°13.5	• • 18.2	95°43.2	6.9'	21°48.5	8.4'	58.8'
10	329°13.4	18.1	110°09.1	7.0'	21°40.0	8.6'	58.8'
11 12	344°13.3 359°13.2	18.0 N23°17.9	124°35.0 139°01.1	7.1' 7.2'	21°31.5 S 21°22.8	8.7' 8.8'	58.7' 58.7'
13	14°13.0	17.8	159 01.1 153°27.3	7.2 7.3'	21°14.0	8.9'	58.7'
14	29°12.9	17.7	167°53.7	7.5'	21°05.1	9.0'	58.6'
15	44°12.8	•• 17.6	182°20.1	7.6'	20°56.1	9.1'	58.6'
16 17	59°12.6 74°12.5	17.5 17.4	196°46.7 211°13.4	7.7' 7.8'	20°46.9 20°37.7	9.3' 9.4'	58.6' 58.5'
18	89°12.4	N23°17.2	211 13.4 225°40.2	7.0 7.9'	520°28.3	9.4	58.5
19	104°12.3	17.1	240°07.1	8.1'	20°18.9	9.6'	58.4'
20	119°12.1	17.0	254°34.2	8.2'	20°09.3	9.7'	58.4'
21	134°12.0 149°11.9	16.9	269°01.4 283°28.7	8.3'	19°59.6 19°49.8	9.8'	58.4'
22 23	149°11.9 164°11.8	16.8 16.7	283°28.7 297°56.1	8.4' 8.5'	19°49.8 19°39.9	9.9' 10.0'	58.3' 58.3'
	SD = 15.7'	d = -0.1'			0 = 16.1'	0	
				- 52	- 10.1		
Mon	GHA 179°11.6	Dec N23° 16.6	GHA 312°23.7	ν 8.7'	Dec 519°29.9	d 10.1'	HP 58.3'
0 1	179°11.6 194°11.5	N23° 16.6 16.4	312°23.7 326°51.3	8.7	19°19.9	10.1	58.3' 58.2'
2	209°11.4	16.3	341°19.1	8.9'	19°09.7	10.2	58.2'
3	224°11.2	•• 16.2	355°47.0	9.0'	18°59.4	10.4'	58.1'
4	239°11.1	16.1	10°15.0 24°43.2	9.1'	18°49.1	10.5	58.1'
5 6	254°11.0 269°10.9	16.0 N23°15.8	24°43.2 39°11.4	9.3' 9.4'	18°38.6 \$18°28.1	10.5' 10.6'	58.1' 58.0'
7	284°10.7	15.7	53°39.8	9.5'	18°17.4	10.7	58.0'
8	299°10.6	15.6	68°08.3	9.6'	$18^{\circ}06.7$	10.8'	57.9'
9	314°10.5	• • 15.5	82°36.9	9.7'	17°55.9	10.9'	57.9'
10 11	329°10.4 344°10.2	15.3 15.2	97°05.6 111°34.5	9.8' 10.0'	17°45.0 17°34.1	11.0' 11.0'	57.9' 57.8'
12	359°10.1	N23° 15.1	126°03.4	10.1	\$17°23.0	11.1'	57.8'
13	14°10.0	15.0	$140^{\circ}32.5$	10.2'	$17^{\circ}11.9$	11.2'	57.8'
14	29°09.9	14.8	155°01.7	10.3'	17°00.7	11.3'	57.7'
15 16	44°09.7 59°09.6	· · 14.7 14.6	169°31.0 184°00.4	10.4' 10.5'	16°49.4 16°38.1	11.3' 11.4'	57.7' 57.6'
17	74°09.5	14.5	198°29.9	10.6'	16°26.7	11.5'	57.6'
18	89°09.4	N23° 14.3	212°59.6	10.7'	S 16°15.2	11.5'	57.6'
19	104°09.2	14.2	227°29.3	10.9'	16°03.7	11.6'	57.5'
20 21	119°09.1 134°09.0	14.1 •• 13.9	241°59.2 256°29.1	11.0' 11.1'	15°52.0 15°40.4	11.7' 11.7'	57.5' 57.4'
22	149°08.8	13.8	270°59.2	11.2'	15°28.6	11.8'	57.4°
23	164°08.7	13.7	285°29.4	11.3'	15°16.8	11.9'	57.4'
	SD = 15.7'	d = -0.1'		SE	0 = 15.9'		
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°08.6	N23° 13.5	299°59.7	11.4'	S 15°04.9	11.9'	57.3'
1	194°08.5	13.4	314°30.1	11.5'	14°53.0	12.0'	57.3'
2	209°08.3 224°08.2	13.3 •• 13.1	329°00.5 343°31.1	11.6' 11.7'	14°41.0 14°29.0	12.0' 12.1'	57.3' 57.2'
3 4	239°08.1	13.0	358°01.8	11.7	14°29.0	12.1'	57.2'
5	254°08.0	12.9	12°32.6	11.9'	14°04.8	12.2'	57.1'
6	269°07.8	N23°12.7	27°03.5	12.0'	\$13°52.6	12.3'	57.1'
7 8	284°07.7 299°07.6	12.6 12.4	41°34.5 56°05.6	12.1' 12.2'	13°40.3 13°28.0	12.3' 12.3'	57.1' 57.0'
9	314°07.5	12.3	70°36.8	12.3'	13° 15.7	12.4	57.0'
10	329°07.4	12.2	85°08.1	12.4'	13°03.3	12.4'	57.0'
11	344°07.2	12.0	99°39.5	12.5'	12°50.8	12.5'	56.9'
12 13	359°07.1 14°07.0	N23°11.9 11.7	114°10.9 128°42.5	12.6' 12.7'	\$12°38.3 12°25.8	12.5' 12.6'	56.9' 56.9'
14	29°06.9	11.7	126 42.5 143°14.2	12.7'	12°23.6	12.6'	56.8'
15	44°06.7	• • 11.4	157°45.9	12.8'	$12^{\circ}00.6$	12.6'	56.8'
16	59°06.6	11.3	172°17.7	12.9'	11°48.0	12.7'	56.7'
17 18	74°06.5 89°06.4	11.1 N23°11.0	186°49.7 201°21.7	13.0' 13.1'	11°35.3 \$11°22.6	12.7' 12.8'	56.7' 56.7'
19	104°06.2	10.9	201 21.7 215°53.8	13.1	11°09.8	12.8'	56.6'
20	119°06.1	10.7	230°25.9	13.3'	$10^{\circ}57.0$	12.8'	56.6'
21	134°06.0	• • 10.6	244°58.2	13.3'	10°44.2	12.9'	56.6'
22 23	149°05.9 164°05.7	10.4 10.3	259°30.5 274°03.0	13.4' 13.5'	10°31.4 10°18.5	12.9' 12.9'	56.5' 56.5'
23	SD = 15.7'	d = -0.1'			0 = 15.6'	14.3	30.3
	3D = 15.1	u = -0.1)L	- 10.0		

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

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

			Sun		Moon			
İ	Day	Eqn.of	Time	Mer.	Mer.	Pass.	Age	
	,	00 ^h	12 ^h	Pass	Upper	Lower	17-19	
		mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	93-78%	
ſ	27	03:01	03:07	12:03	02:22	14:50		
İ	28	03:13	03:20	12:03	03:17	15:43		
	29	03:26	03:32	12:04	04:08	16:32		

h	Aries	Ve	nus	M	ars	Jup	iter	Sat	urn		Stars	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec		SHA	Dec
0	278°16.9	152°09.7	N20° 57.8	144°04.4	N18°33.6	303°52.6	S11°41.1	323°10.4	\$17°45.7			
1	293°19.3	167°09.0	57.2	159°05.3	33.2	318°55.2	41.1	338° 13.0	45.7	Alpheratz	357°37.7	29°12.3
2	308°21.8	182°08.3	56.5	174°06.2	32.7	333° 57.7	41.2	353° 15.6	45.8	Ankaa	353°10.0	-42°11.2
3	323°24.3	197°07.6	• • 55.8	189°07.1	• • 32.3	349°00.2	• • 41.2	8° 18.2	• • 45.8	Schedar	349°34.2	56°38.9
4	338°26.7	212°06.9	55.1	204°08.0	31.9	4°02.8	41.3	23°20.8	45.9	Diphda	348°50.2	-17°52.1 -57°07.5
5	353°29.2	227°06.2	54.4	219°08.9	31.4	$19^{\circ}05.3$	41.3	38°23.4	45.9	Achernar Hamal	335°22.6 327°54.6	-57 07.5 23°33.6
6	8°31.7	242°05.5	N20°53.7	234°09.8	N18°31.0	34°07.8	S 11°41.3	53°26.0	S17°45.9	Polaris	315°38.1	89°20.9
7	23°34.1	257°04.9	53.0	249°10.7	30.5	49° 10.4	41.4	68°28.6	46.0	Acamar	315° 14.3	-40°13.0
8	38°36.6	272°04.2	52.3	264°11.6	30.1	64°12.9	41.4	83°31.2	46.0	Menkar	314°09.4	4°10.3
9	53°39.1	287°03.5	• • 51.6	279°12.5	• • 29.7	79° 15.4	• • 41.4	98°33.8	• • 46.1	Mirfak	308°32.7	49°56.0
10	68°41.5	302°02.8	51.0	294°13.4	29.2	94°18.0	41.5	113°36.4	46.1	Aldebaran	290°43.2	16°33.0
11 12	83°44.0 98°46.5	317°02.1 332°01.4	50.3 N20°49.6	309°14.3 324°15.2	28.8 N18°28.3	109°20.5 124°23.0	41.5 \$11°41.6	128°39.0 143°41.6	46.2 \$17°46.2	Rigel	281°07.0	-8°10.6
13	113°48.9	347°00.7	48.9	339° 16.1	27.9	139°25.6	41.6	158° 44.2	46.3	Capella	$280^{\circ}26.6$	46°01.0
14	128°51.4	2°00.0	48.2	354°17.0	27.4	154°28.1	41.6	173° 46.8	46.3	Bellatrix	278°26.3	6°22.1
15	143°53.8	16°59.3	• • 47.5	9°17.9	27.0	169°30.6	41.7	188°49.4	• • 46.3	Elnath	278°05.9	28°37.4
16	158°56.3	31°58.6	46.8	24°18.8	26.6	184°33.2	41.7	203°52.0	46.4	Alnilam	275°41.0	-1°11.3
17	173°58.8	46°58.0	46.1	39°19.7	26.1	199°35.7	41.8	218°54.6	46.4	Betelgeuse	270°55.5	7°24.6 -52°42.4
18	189°01.2	61°57.3	N20°45.4	54°20.6	$N18^{\circ}25.7$	214°38.2	S11°41.8	233° 57.2	S17°46.5	Canopus Sirius	263°54.2 258°29.1	-52 42.4 -16°44.7
19	204°03.7	76°56.6	44.7	69°21.5	25.2	229°40.8	41.8	248°59.8	46.5	Adhara	255°08.5	-10 44.7 -29°00.1
20	219°06.2	91°55.9	44.0	84°22.4	24.8	244°43.3	41.9	264°02.4	46.6	Procyon	244°54.2	5°10.2
21	234°08.6	106°55.2	• • 43.3	99°23.3	• • 24.3	259°45.8	• • 41.9	279°05.0	• • 46.6	Pollux	243°21.2	27°58.5
22	249°11.1	121°54.5	42.6	114°24.2	23.9	274°48.4	42.0	294°07.6	46.6	Avior	234°16.4	-59°34.8
23	264°13.6	136°53.9	41.8	129°25.1	23.4	289°50.9	42.0	309°10.2	46.7	Suhail	222°48.7	-43°31.2
Mer.p	ass. 05:26	ν -0.7′ d-0	.7′ m-3.86	ν 0.9 $^{\prime}$ d-0	0.4' m 1.8	ν 2.5′ <i>d</i> -0.	.0′ m-2.63	ν 2.6′ d-0	0.0′ m0.4	Miaplacidus	221°39.5	-69°48.4
-		-	_	-					_	Alphard	217°50.8	-8°45.1
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Regulus	207°37.7	11°51.9
0	$279^{\circ}16.0$	151°53.2	N20°41.1	144°26.0	N18°23.0	304°53.5	S11°42.0	324° 12.8	S17°46.7	Dubhe Denebola	193°44.9 182°28.0	61°38.5 14°27.3
1	294°18.5	166°52.5	40.4	159°26.9	22.6	$319^{\circ}56.0$	42.1	339° 15.4	46.8	Gienah	175°46.6	-17°39.7
2	309°20.9	181°51.8	39.7	174°27.8	22.1	334°58.5	42.1	354° 18.0	46.8		173°03.2	-63°13.3
3	324°23.4	196°51.1	• • 39.0	189°28.7	• • 21.7	350°01.1	• • 42.2	9°20.6	• • 46.9	Gacrux	171°54.8	-57°14.2
4	339°25.9	211°50.4	38.3	204°29.6	21.2	5°03.6	42.2	24°23.2	46.9	Alioth	$166^{\circ}15.5$	55°51.0
5 6	354°28.3 9°30.8	226°49.8 241°49.1	37.6 N20°36.9	219°30.5 234°31.4	20.8 N18°20.3	20°06.2 35°08.7	42.2 \$11°42.3	39°25.8 54°28.4	47.0 \$17°47.0	Spica	158°25.2	-11°16.3
7	24°33.3	256°48.4	36.2	249° 32.3	19.9	50°11.2	42.3	69°31.0	47.0	Alkaid	152°54.2	49°12.7
8	39°35.7	271°47.7	35.4	264°33.2	19.4	65° 13.8	42.4	84°33.6	47.1	Hadar	148°39.7	-60°28.7
9	54°38.2	286°47.0	• • 34.7	279°34.1	• • 19.0	80° 16.3	• • 42.4	99°36.2	• • 47.1	Menkent	148°00.8 145°50.4	-36°28.6
10	69°40.7	301°46.4	34.0	294°35.0	18.5	95° 18.9	42.4	114°38.9	47.2	Arcturus Rigil Kent.	139°43.8	19°04.5 -60°55.6
11	84°43.1	316°45.7	33.3	309°35.9	18.1	110°21.4	42.5	129°41.5	47.2	Kochab	137° 19.2	74°04.4
12	99°45.6	331°45.0	N20°32.6	324°36.8	N18°17.6	125°24.0	S11°42.5	144°44.1	S 17°47.3	Zuben'ubi	136°59.0	-16°07.8
13	114°48.1	346°44.3	31.9	339°37.7	17.2	140°26.5	42.6	159° 46.7	47.3	Alphecca	$126^{\circ}05.9$	26°38.8
14 15	129°50.5 144°53.0	1°43.7 16°43.0	31.1 · · 30.4	354°38.6 9°39.5	16.7 •• 16.3	155°29.0 170°31.6	42.6 •• 42.7	174°49.3 189°51.9	47.4 •• 47.4	Antares	$112^{\circ}19.0$	-26°28.7
16	159°55.4	31°42.3	29.7	9 39.3 24°40.4	15.8	170 31.0 185°34.1	42.7	204°54.5	47.4	Atria	107° 15.3	-69°04.0
17	174°57.9	46°41.6	29.0	39°41.3	15.4	200°36.7	42.7	219°57.1	47.5	Sabik	102°05.8	-15°45.0
18	190°00.4	61°41.0	N20°28.2	54°42.2	N18°15.0	215°39.2	S11°42.8		S17°47.5	Shaula	96°13.9 96°00.9	-37°07.1 12°32.8
19	205°02.8	76°40.3	27.5	69°43.1	14.5	230°41.8	42.8	250°02.3	47.6	Rasalhague Eltanin	90°00.9	51°29.2
20	220°05.3	91°39.6	26.8	84°44.0	14.1	245°44.3	42.9	265°04.9	47.6	Kaus Aust.	83°35.9	-34°22.4
21	235°07.8	106°38.9	• • 26.1	99°44.9	•• 13.6	260°46.8	• • 42.9	280°07.5	• • 47.7	Vega	80°34.7	38°48.2
22	250°10.2	121°38.3	25.3	114°45.8	13.2	275°49.4	43.0	295° 10.1	47.7	Nunki	75°51.0	-26°16.1
23	265°12.7	136°37.6	24.6	129°46.7	12.7	290°51.9	43.0	310° 12.7	47.8	Altair	62°02.4	8°55.5
Mer.p	ass. 05:22	ν -0.7′ d-0	.7′ m-3.86	ν 0.9' d-0	0.4′ m1.8	$\nu 2.5' \ d-0.$.0′ m-2.64	ν 2.6′ d-0	0.0′ m0.4	Peacock	53°09.8	-56°39.8
								-		Deneb	49°27.3	45°21.3
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec	Enif	33°41.4	9°58.3
0	280°15.2	151°36.9	N20°23.9	144° 47.6	N18°12.3	305°54.5	\$11°43.0	325° 15.3	\$17°47.8	Al Na'ir	27°36.3	-46°51.3
1	295°17.6	166°36.3	23.1	159°48.5	11.8	320° 57.0	43.1	340° 17.9	47.9	Fomalhaut Scheat	15° 17.6 13° 47.8	-29°30.4 28°11.7
2	310°20.1	181°35.6	22.4	174°49.4	11.4	335° 59.6	43.1	355° 20.5	47.9	Markab	13 47.8 13°32.6	28 11.7 15°19.1
3	$325^{\circ}22.5$	196°34.9	• • 21.7	$189^{\circ}50.3$	• • 10.9	351°02.1	• • 43.2	$10^{\circ}23.1$	• • 47.9			
4	340°25.0	211°34.3	20.9	204°51.2	10.5	6°04.7	43.2	25°25.7	48.0	Jun 30 Wed	SHA	Mer.pass
5	355°27.5	226°33.6	20.2	219°52.1	10.0	21°07.2	43.3	40°28.3	48.0	Venus	233°52.8	13:52
6	10°29.9	241°32.9	N20° 19.5	234°53.0	N18°09.6	36°09.8	S11°43.3		\$17°48.1	Mars	225°47.5	14:23
7	25°32.4 40°34.9	256°32.3	18.7	249°53.9	09.1	51°12.3	43.3	70°33.6	48.1	Jupiter Saturn	25°35.7 44°53.5	03:44 02:27
8 9	40 34.9 55°37.3	271°31.6 286°30.9	18.0 •• 17.2	264°54.8 279°55.7	08.6 •• 08.2	66° 14.9 81° 17.4	43.4 •• 43.4	85°36.2 100°38.8	48.2 •• 48.2	Saturn	44 33.3	02.21
10	70°39.8	301°30.3	16.5	294°56.7	07.7	96°20.0	43.5	115° 41.4	48.3	Jul 01 Thu	SHA	Mer.pass
11	85°42.3	316°29.6	15.8	309° 57.6	07.3	111°22.5	43.5	130°44.0	48.3	Venus	232°37.1	13:53
12	100°44.7	331°28.9	N20°15.0	324°58.5	$N18^{\circ}06.8$	126°25.1	S11°43.6	145°46.6	S 17°48.3	Mars	225° 10.0 25° 37.4	14:21
13	115°47.2	346°28.3	14.3	339°59.4	06.4	141°27.6	43.6	160°49.2	48.4	Jupiter Saturn	25° 37.4 44° 56.8	03:40 02:23
14	130°49.7	1°27.6	13.5	355°00.3	05.9	156° 30.2	43.7	175°51.8	48.4			02.23
15 16	145°52.1	16°27.0	• • 12.8	10°01.2	05.5	171°32.7	· · 43.7	190°54.4	· · 48.5	Jul 02 Fri	SHA	Mer.pass
16 17	160°54.6 175°57.0	31°26.3 46°25.6	12.0 11.3	25°02.1 40°03.0	05.0 04.6	186°35.3 201°37.8	43.7 43.8	205° 57.0 220° 59.6	48.5 48.6	l l	231°21.8	13:54
18	175 57.0 190°59.5	40 25.0 61°25.0	N20° 10.5	55°03.9	N18°04.1	201 37.8 216°40.4	43.6 \$11°43.8		\$17°48.6	Mars Jupiter	224°32.5 25°39.3	14:20 03:36
19	206°02.0	76°24.3	09.8	70°04.8	03.7	231°42.9	43.9	251°04.8	48.7	Saturn	45°00.2	03.30
20	221°04.4	91°23.7	09.0	85°05.7	03.2	246°45.5	43.9	266°07.4	48.7			
21	236°06.9	106°23.0	•• 08.3	100°06.6	• • 02.8	261°48.0	• • 44.0	281° 10.1	• • 48.8	Horizont	al parallax	0.1
22	251°09.4	121°22.3	07.5	115°07.5	02.3	276°50.6	44.0	296° 12.7	48.8		Venus: Mars:	0.1 0.1
23	266°11.8	136°21.7	06.8	130°08.4	01.8	291°53.1	44.1	311°15.3	48.8		ividIS.	0.1
Mer.p	ass. 05:18	ν -0.7′ d-0	.7′ m-3.86	ν 0.9 $^{\prime}$ d-0	0.5' m 1.8	$\nu 2.5' \ d-0.$.0′ m-2.65	ν 2.6′ d-0	0.0′ m0.4			

h	Su	n	Moon				
Ved	GHA	Dec	GHA	ν	Dec	d	HP
0	179°05.6	N23°10.1	288°35.5	13.6'	S10°05.6	12.9'	56.5
1	194°05.5	10.0	303°08.1	13.7'	09°52.6	13.0'	56.4
2	209°05.4	09.8	317°40.7	13.7'	09°39.7	13.0'	56.4
3	224°05.2	• • 09.6	332°13.5	13.8'	09°26.7	13.0'	56.4
4	239°05.1	09.5	346°46.3	13.9'	09°13.6	13.0'	56.3
5	254°05.0	09.3	1°19.2	14.0'	09°00.6	13.1'	56.3
6	269°04.9	N23°09.2	15°52.1	14.0'	S08°47.5	13.1'	56.3
7	284°04.8	09.0	30°25.1	14.1'	08°34.4	13.1'	56.2
8	299°04.6	08.9	44°58.2	14.2'	08°21.3	13.1	56.2
9	314°04.5	08.7	59°31.4	14.2'	08° 08.2	13.1	56.2
	329°04.4		74°04.7	14.3'	07°55.0	13.2'	56.1
10		08.6			07 55.0 07°41.9		
11	344°04.3	08.4	88°38.0	14.4'		13.2'	56.1
12	359°04.1	N23°08.2	103°11.3	14.4'	S07°28.7	13.2'	56.1
13	14°04.0	08.1	117°44.8	14.5'	07° 15.5	13.2'	56.0
14	29°03.9	07.9	132°18.3	14.6'	07°02.3	13.2'	56.0
15	44°03.8	• • 07.8	146°51.8	14.6'	06°49.0	13.2'	56.0
16	59°03.7	07.6	161°25.4	14.7'	$06^{\circ}35.8$	13.3'	55.9
17	74°03.5	07.4	175°59.1	14.7'	$06^{\circ}22.5$	13.3'	55.9
18	89°03.4	N23°07.3	190°32.8	14.8'	506°09.3	13.3'	55.9
19	104°03.3	07.1	205°06.6	14.8'	05°56.0	13.3'	55.8
20	119°03.2	06.9	219°40.5	14.9'	05°42.7	13.3'	55.8
21	134°03.1	06.8	234°14.4	15.0'	05°29.4	13.3'	55.8
21	149°02.9	06.6	248°48.4	15.0'	05°29.4	13.3'	55.7
22 23	164° 02.8	06.4	263°22.4	15.1'	05 10.1 05°02.8	13.3'	55.7
دے	104 02.8		203 22.4	13.1	UD UZ.8	13.3	JJ. /
	SD = 15.7'	d = -0.2'		SE	0 = 15.4'		
hu	GHA	Dec	GHA	ν	Dec	d	НР
0	179°02.7	N23°06.3	277°56.4	15.1'	S04°49.5	13.3'	55.7
1	194°02.6	06.1	292°30.5	15.2'	04°36.2	13.3'	55.6
2	209°02.5	05.9	307°04.7	15.2'	04°22.9	13.3'	55.6
3	224°02.3	05.8	321°38.9	15.3	04° 22.5	13.3'	55.6
4	239°02.2	05.6	336°13.2	15.3'	04 09.5 03°56.2	13.3'	55.6
	254°02.2		350° 47.5	15.3'	03°42.9	13.3'	
5		05.4					55.5
6	269°02.0	N23°05.2	5°21.8	15.4'	S03°29.5	13.3'	55.5
7	284°01.9	05.1	19°56.2	15.4'	03°16.2	13.3'	55.5
8	299°01.7	04.9	34°30.6	15.5'	03°02.9	13.3'	55.4
9	314°01.6	• • 04.7	49°05.1	15.5'	02°49.5	13.3'	55.4
10	329°01.5	04.6	63°39.6	15.5'	02°36.2	13.3'	55.4
11	344°01.4	04.4	78°14.1	15.6'	02°22.9	13.3'	55.4
12	359°01.3	N23°04.2	92°48.7	15.6'	S02°09.6	13.3'	55.3
13	$14^{\circ}01.1$	04.0	107°23.3	15.6'	01°56.3	13.3'	55.3
14	29°01.0	03.8	121°58.0	15.7'	01°42.9	13.3'	55.3
15	44°00.9	• • 03.7	136°32.6	15.7'	01°29.6	13.3'	55.3
16	59°00.8	03.5	151°07.4	15.7'	01°16.3	13.3'	55.2
17	74°00.7	03.3	165°42.1	15.8'	01°03.0	13.3'	55.2
18	89°00.5	N23°03.1	180°16.9	15.8'	S00°49.8	13.3'	55.2
19	104° 00.4	02.9	194°51.7		00°36.5		55.2
20	119°00.3	02.8	209°26.5	15.9'	00°23.2	13.3'	55.1
21	134°00.2	• • 02.6	224°01.4	15.9'	S00°10.0	13.2'	55.1
22	149°00.1	02.4	238°36.3	15.9'	N00°03.3	13.2'	55.1
23	163°59.9	02.2	253°11.2	15.9'	00°16.5	13.2'	55.1
	SD = 15.7'	d = -0.2'		SE	0 = 15.2'		
Fri	GHA	Dec	GHA	ν	Dec	d	НР
0	178° 59.8	N23°02.0	267°46.1	16.0'	N00°29.7	13.2'	55.0
1	193°59.7	01.8	282°21.0	16.0'	00° 42.9	13.2'	55.0
2	208° 59.6	01.8	296°56.0	16.0'	00° 42.9	13.2'	55.0
3	200 59.0 223°59.5	01.7	311°31.0	16.0'	00°50.1 01°09.3	13.2'	55.0
4	223 59.5 238°59.4		311 31.0 326°06.0	16.0'	01 09.3 01°22.4		54.9
	238°59.4 253°59.2	01.3			01°22.4 01°35.6	13.1'	
5		01.1	340°41.0 355°16.1	16.0'		13.1'	54.9
6	268° 59.1	N23°00.9		16.1'	N01°48.7	13.1'	54.9
7	283°59.0	00.7	9°51.1	16.1'	02°01.8	13.1'	54.9
8	298°58.9	00.5	24°26.2	16.1'	02°14.9	13.1'	54.9
9	313°58.8	• • 00.3	39°01.3	16.1'	02°28.0	13.1'	54.8
10	328°58.7	00.1	53°36.4	16.1'	02°41.1	13.0'	54.8
11	343°58.5	23°00.0	$68^{\circ}11.5$	16.1'	02°54.1	13.0'	54.8
12	358° 58.4	N22°59.8	82°46.6	16.1'	N03°07.1	13.0'	54.8
13	13°58.3	59.6	97°21.7	16.1'	03°20.1	13.0'	54.8
12	28° 58.2	59.4	111°56.9	16.1'	03°33.1	12.9'	54.7
	43°58.1	59.2	126°32.0	16.1	03°46.0	12.9'	54.7
14		J9.∠	120 32.0 141°07.2	16.1	03°58.9	12.9'	54.7
14 15		EO 0	141 07.2	10.1		12.9'	
14 15 16	58°58.0	59.0		16 2'		1/9	54.7
14 15 16 17	58° 58.0 73° 57.8	58.8	155°42.3	16.2'	04°11.8		
14 15 16 17	58° 58.0 73° 57.8 88° 57.7	58.8 N22°58.6	155°42.3 170°17.5	16.2'	N04°24.7	12.9'	
14 15 16 17 18 19	58° 58.0 73° 57.8 88° 57.7 103° 57.6	58.8 N22°58.6 58.4	155°42.3 170°17.5 184°52.6	16.2' 16.2'	N04°24.7 04°37.6	12.9' 12.8'	54.6
14 15 16 17 18 19	58° 58.0 73° 57.8 88° 57.7 103° 57.6 118° 57.5	58.8 N22°58.6 58.4 58.2	155° 42.3 170° 17.5 184° 52.6 199° 27.8	16.2' 16.2' 16.2'	N04°24.7 04°37.6 04°50.4	12.9' 12.8' 12.8'	54.6 54.6
14 15 16 17 18 19 20 21	58° 58.0 73° 57.8 88° 57.7 103° 57.6 118° 57.5 133° 57.4	58.8 N22°58.6 58.4 58.2 •• 58.0	155°42.3 170°17.5 184°52.6 199°27.8 214°02.9	16.2' 16.2' 16.2' 16.2'	N04°24.7 04°37.6 04°50.4 05°03.2	12.9' 12.8' 12.8' 12.8'	54.6 54.6 54.6
14 15 16 17 18 19 20 21	58° 58.0 73° 57.8 88° 57.7 103° 57.6 118° 57.5 133° 57.4 148° 57.3	58.8 N22°58.6 58.4 58.2 •• 58.0 57.8	155° 42.3 170° 17.5 184° 52.6 199° 27.8 214° 02.9 228° 38.1	16.2' 16.2' 16.2' 16.2' 16.2'	N04° 24.7 04° 37.6 04° 50.4 05° 03.2 05° 16.0	12.9' 12.8' 12.8' 12.8' 12.7'	54.7 54.6 54.6 54.6 54.6
14 15 16 17 18 19 20	58° 58.0 73° 57.8 88° 57.7 103° 57.6 118° 57.5 133° 57.4	58.8 N22°58.6 58.4 58.2 •• 58.0	155°42.3 170°17.5 184°52.6 199°27.8 214°02.9	16.2' 16.2' 16.2' 16.2'	N04°24.7 04°37.6 04°50.4 05°03.2	12.9' 12.8' 12.8' 12.8'	54.6 54.6 54.6

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

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

		Sun		Moon			
Day	Eqn.of	f Time	Mer.	Mer.	Mer.Pass.		
Day	00 ^h	12 ^h	Pass	Upper	Lower	20-22	
	mm:ss	mm:ss	hh:mm	hh:mm	hh:mm	69-49%	
30	03:38	03:43	12:04	04:55	17:17		
01	03:49	03:55	12:04	05:38	17:59		
02	04:01	04:06	12:04	06:19	18:40		