

# EVENT TIME TABLES

2020

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**Disclaimer:** These are computer generated tables. They focus on times of rising and setting events and are rounded to the second... primarily intended for comparison with other astronomical algorithms (not for navigation). Meridian Passage times of the sun, moon and four planets are included.

# 2020 January 01 to Jan. 02

01 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:24:20	10:43:51	■	■	13:23:09	15:42:43	12:37:01
N 70°	08:05:17	09:50:05	■	■	14:16:54	16:01:44	12:25:52
68°	07:50:03	09:17:17	■	■	14:49:41	16:16:56	12:16:45
66°	07:37:27	08:53:17	10:28:27	13:38:29	15:13:40	16:29:30	12:09:08
64°	07:26:46	08:34:22	09:49:52	14:17:02	15:32:33	16:40:10	12:02:39
62°	07:17:32	08:18:51	09:23:08	14:43:45	15:48:04	16:49:23	11:57:02
60°	07:09:24	08:05:43	09:02:27	15:04:26	16:01:10	16:57:30	11:52:08
N 58°	07:02:08	07:54:23	08:45:33	15:21:19	16:12:30	17:04:45	11:47:48
56°	06:55:35	07:44:25	08:31:17	15:35:34	16:22:26	17:11:17	11:43:56
54°	06:49:36	07:35:34	08:18:58	15:47:52	16:31:17	17:17:16	11:40:26
52°	06:44:05	07:27:35	08:08:09	15:58:41	16:39:15	17:22:45	11:37:16
50°	06:38:58	07:20:20	07:58:31	16:08:18	16:46:30	17:27:52	11:34:22
45°	06:27:30	07:04:37	07:38:15	16:28:33	17:02:12	17:39:18	11:28:04
N 40°	06:17:25	06:51:23	07:21:47	16:44:59	17:15:24	17:49:22	11:22:47
35°	06:08:15	06:39:51	07:07:53	16:58:53	17:26:55	17:58:30	11:18:12
30°	05:59:42	06:29:30	06:55:45	17:10:59	17:37:15	18:07:03	11:14:10
20°	05:43:34	06:11:00	06:34:56	17:31:47	17:55:43	18:23:09	11:07:08
N 10°	05:27:40	05:53:58	06:16:43	17:49:58	18:12:43	18:39:00	11:00:56
0°	05:10:58	05:37:07	05:59:34	18:07:04	18:29:31	18:55:40	10:55:06
S 10°	04:52:18	05:19:19	05:42:18	18:24:19	18:47:17	19:14:17	10:49:15
20°	04:30:03	04:59:11	05:23:39	18:42:55	19:07:22	19:36:29	10:43:00
30°	04:01:27	04:34:39	05:01:59	19:04:32	19:31:50	20:05:00	10:35:52
35°	03:43:08	04:19:39	04:49:13	19:17:16	19:46:48	20:23:15	10:31:44
40°	03:20:25	04:01:47	04:34:26	19:32:00	20:04:36	20:45:54	10:27:02
45°	02:50:31	03:39:39	04:16:45	19:49:37	20:26:39	21:15:39	10:21:34
S 50°	02:06:29	03:10:37	03:54:42	20:11:35	20:55:33	21:59:21	10:15:00
52°	01:40:11	02:55:55	03:44:05	20:22:09	21:10:10	22:25:21	10:11:58
54°	00:59:14	02:38:31	03:32:04	20:34:07	21:27:27	23:05:17	10:08:38
56°	—:—	02:17:06	03:18:13	20:47:53	21:48:40	—:—	10:04:56
58°	—:—	01:48:55	03:01:56	21:04:03	22:16:31	—:—	10:00:48
S 60°	—:—	01:04:32	02:42:12	21:23:39	22:59:47	—:—	09:56:09

Jan 01	SHA	Mer.pass
Venus	42°33.8	14:29:52
Mars	123°46.4	09:04:00
Jupiter	82°44.4	11:47:07
Saturn	66°53.1	12:50:09

02 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:23:28	10:40:58	■	■	13:27:01	15:44:34	12:17:53
N 70°	08:04:37	09:48:41	■	■	14:19:17	16:03:23	12:13:30
68°	07:49:32	09:16:21	■	■	14:51:35	16:18:26	12:09:53
66°	07:37:03	08:52:36	10:26:45	13:41:09	15:15:18	16:30:53	12:06:49
64°	07:26:28	08:33:52	09:48:53	14:18:59	15:34:01	16:41:27	12:04:11
62°	07:17:18	08:18:28	09:22:28	14:45:23	15:49:24	16:50:35	12:01:54
60°	07:09:14	08:05:26	09:01:58	15:05:53	16:02:25	16:58:38	11:59:54
N 58°	07:02:02	07:54:11	08:45:12	15:22:38	16:13:40	17:05:50	11:58:07
56°	06:55:31	07:44:17	08:31:02	15:36:47	16:23:32	17:12:19	11:56:31
54°	06:49:35	07:35:29	08:18:48	15:49:00	16:32:20	17:18:14	11:55:04
52°	06:44:06	07:27:33	08:08:03	15:59:45	16:40:15	17:23:42	11:53:45
50°	06:39:01	07:20:20	07:58:28	16:09:19	16:47:27	17:28:46	11:52:33
45°	06:27:38	07:04:42	07:38:18	16:29:28	17:03:04	17:40:08	11:49:56
N 40°	06:17:37	06:51:32	07:21:55	16:45:49	17:16:12	17:50:08	11:47:44
35°	06:08:30	06:40:04	07:08:05	16:59:38	17:27:39	17:59:13	11:45:50
30°	05:59:59	06:29:46	06:56:00	17:11:42	17:37:56	18:07:43	11:44:09
20°	05:43:55	06:11:20	06:35:15	17:32:24	17:56:19	18:23:44	11:41:13
N 10°	05:28:06	05:54:23	06:17:07	17:50:30	18:13:14	18:39:30	11:38:38
0°	05:11:28	05:37:36	06:00:03	18:07:32	18:29:58	18:56:06	11:36:12
S 10°	04:52:53	05:19:52	05:42:50	18:24:43	18:47:40	19:14:39	11:33:46
20°	04:30:43	04:59:49	05:24:16	18:43:14	19:07:40	19:36:45	11:31:11
30°	04:02:14	04:35:23	05:02:42	19:04:45	19:32:02	20:05:09	11:28:15
35°	03:43:59	04:20:27	04:49:58	19:17:26	19:46:55	20:23:20	11:26:33
40°	03:21:22	04:02:40	04:35:15	19:32:06	20:04:39	20:45:51	11:24:37
45°	02:51:38	03:40:38	04:17:40	19:49:37	20:26:35	21:15:26	11:22:23
S 50°	02:07:57	03:11:45	03:55:43	20:11:29	20:55:19	21:58:46	11:19:43
52°	01:41:58	02:57:09	03:45:10	20:21:59	21:09:50	22:24:25	11:18:29
54°	01:02:02	02:39:52	03:33:13	20:33:52	21:26:58	23:03:18	11:17:08
56°	—:—	02:18:39	03:19:28	20:47:32	21:48:00	—:—	11:15:39
58°	—:—	01:50:49	03:03:18	21:03:35	22:15:28	—:—	11:13:59
S 60°	—:—	01:07:34	02:43:43	21:23:00	22:57:35	—:—	11:12:07

Jan 02	SHA	Mer.pass
Venus	41°20.1	14:30:49
Mars	123°04.8	09:02:50
Jupiter	82°29.4	11:44:11
Saturn	66°45.6	12:46:43

Day	Sun		Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
01	03:05	03:19	12:03:19	17:05:05	6(34%)
02	03:34	03:48	12:03:48	17:46:01	7(44%)

03 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:22:28	10:37:55	■	■	13:31:02	15:46:32	12:00:06
N 70°	08:03:50	09:47:08	■	■	14:21:48	16:05:07	12:01:49
68°	07:48:55	09:15:18	■	■	14:53:35	16:20:00	12:03:15
66°	07:36:34	08:51:50	10:24:54	13:43:57	15:17:02	16:32:19	12:04:28
64°	07:26:05	08:33:17	09:47:47	14:21:03	15:35:34	16:42:47	12:05:30
62°	07:17:00	08:18:01	09:21:42	14:47:07	15:50:49	16:51:51	12:06:25
60°	07:09:00	08:05:05	09:01:24	15:07:24	16:03:43	16:59:50	12:07:13
N 58°	07:01:51	07:53:55	08:44:47	15:24:00	16:14:53	17:06:57	12:07:56
56°	06:55:24	07:44:05	08:30:43	15:38:03	16:24:41	17:13:23	12:08:34
54°	06:49:31	07:35:21	08:18:34	15:50:11	16:33:25	17:19:16	12:09:09
52°	06:44:05	07:27:28	08:07:53	16:00:52	16:41:17	17:24:41	12:09:41
50°	06:39:02	07:20:18	07:58:21	16:10:23	16:48:27	17:29:43	12:10:10
45°	06:27:43	07:04:45	07:38:18	16:30:24	17:03:57	17:40:59	12:11:14
N 40°	06:17:46	06:51:40	07:22:00	16:46:40	17:17:01	17:50:55	12:12:08
35°	06:08:42	06:40:15	07:08:14	17:00:25	17:28:24	17:59:57	12:12:55
30°	06:00:15	06:30:00	06:56:13	17:12:25	17:38:38	18:08:23	12:13:36
20°	05:44:16	06:11:40	06:35:34	17:33:02	17:56:55	18:24:19	12:14:50
N 10°	05:28:32	05:54:48	06:17:31	17:51:03	18:13:46	18:40:01	12:15:56
0°	05:11:58	05:38:06	06:00:31	18:08:00	18:30:25	18:56:32	12:16:58
S 10°	04:53:28	05:20:26	05:43:23	18:25:06	18:48:02	19:14:59	12:18:02
20°	04:31:24	05:00:28	05:24:54	18:43:32	19:07:57	19:36:59	12:19:11
30°	04:03:01	04:36:09	05:03:25	19:04:57	19:32:11	20:05:16	12:20:30
35°	03:44:52	04:21:16	04:50:45	19:17:34	19:47:01	20:23:21	12:21:16
40°	03:22:21	04:03:34	04:36:07	19:32:09	20:04:39	20:45:46	12:22:09
45°	02:52:48	03:41:39	04:18:37	19:49:35	20:26:28	21:15:09	12:23:10
S 50°	02:09:29	03:12:56	03:56:47	20:11:19	20:55:01	21:58:06	12:24:24
52°	01:43:50	02:58:26	03:46:17	20:21:45	21:09:25	22:23:24	12:24:59
54°	01:04:58	02:41:18	03:34:25	20:33:33	21:26:25	23:01:14	12:25:36
56°	—:—	02:20:18	03:20:45	20:47:07	21:47:13	—:—	12:26:18
58°	—:—	01:52:50	03:04:43	21:03:02	22:14:17	—:—	12:27:04
S 60°	—:—	01:10:44	02:45:19	21:22:16	22:55:15	—:—	12:27:56

Jan 03	SHA	Mer.pass
Venus	40°06.8	14:31:45
Mars	122°23.0	09:01:40
Jupiter	82°14.4	11:41:15
Saturn	66°38.1	12:43:17

04 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:21:21	10:34:44	■	■	13:35:11	15:48:37	11:41:45
N 70°	08:02:58	09:45:26	■	■	14:24:26	16:06:57	11:49:53
68°	07:48:13	09:14:08	11:42:51	12:26:58	14:55:42	16:21:39	11:56:35
66°	07:36:00	08:50:58	10:22:55	13:46:53	15:18:51	16:33:50	12:02:14
64°	07:25:38	08:32:37	09:46:34	14:23:13	15:37:11	16:44:11	12:07:03
62°	07:16:38	08:17:29	09:20:50	14:48:55	15:52:17	16:53:10	12:11:14
60°	07:08:42	08:04:40	09:00:45	15:08:59	16:05:05	17:01:04	12:14:54
N 58°	07:01:38	07:53:35	08:44:16	15:25:27	16:16:09	17:08:07	12:18:10
56°	06:55:14	07:43:50	08:30:20	15:39:23	16:25:53	17:14:30	12:21:05
54°	06:49:23	07:35:09	08:18:16	15:51:25	16:34:33	17:20:19	12:23:43
52°	06:44:00	07:27:19	08:07:39	16:02:01	16:42:22	17:25:42	12:26:07
50°	06:39:00	07:20:12	07:58:11	16:11:28	16:49:28	17:30:41	12:28:18
45°	06:27:46	07:04:46	07:38:15	16:31:23	17:04:53	17:41:52	12:33:05
N 40°	06:17:53	06:51:45	07:22:04	16:47:33	17:17:51	17:51:44	12:37:07
35°	06:08:53	06:40:24	07:08:22	17:01:13	17:29:11	18:00:42	12:40:36
30°	06:00:29	06:30:13	06:56:24	17:13:09	17:39:21	18:09:05	12:43:42
20°	05:44:36	06:11:59	06:35:52	17:33:39	17:57:32	18:24:54	12:49:06
N 10°	05:28:57	05:55:12	06:17:54	17:51:35	18:14:17	18:40:31	12:53:53
0°	05:12:28	05:38:34	06:00:59	18:08:27	18:30:51	18:56:57	12:58:25
S 10°	04:54:03	05:21:00	05:43:56	18:25:28	18:48:23	19:15:19	13:02:59
20°	04:32:05	05:01:07	05:25:32	18:43:48	19:08:12	19:37:13	13:07:52
30°	04:03:50	04:36:55	05:04:09	19:05:07	19:32:20	20:05:21	13:13:29
35°	03:45:46	04:22:07	04:51:33	19:17:40	19:47:04	20:23:21	13:16:45
40°	03:23:23	04:04:30	04:36:59	19:32:10	20:04:37	20:45:37	13:20:27
45°	02:54:01	03:42:42	04:19:35	19:49:30	20:26:18	21:14:49	13:24:46
S 50°	02:11:05	03:14:10	03:57:53	20:11:06	20:54:40	21:57:21	13:29:57
52°	01:45:48	02:59:47	03:47:28	20:21:27	21:08:56	22:22:16	13:32:21
54°	01:07:59	02:42:48	03:35:40	20:33:10	21:25:47	22:59:03	13:34:59
56°	—:—	02:22:01	03:22:07	20:46:38	21:46:21	—:—	13:37:55
58°	—:—	01:54:57	03:06:13	21:02:24	22:13:00	—:—	13:41:10
S 60°	—:—	01:14:00	02:47:00	21:21:26	22:52:49	—:—	13:44:50

Jan 04	SHA	Mer.pass
Venus	38°53.9	14:32:39
Mars	121°41.2	09:00:31
Jupiter	81°59.4	11:38:19
Saturn	66°30.6	12:39:51

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
03	04:02	04:16	12:04:16	18:26:51	06:06:23	8(53%)
04	04:30	04:43	12:04:43	19:08:36	06:47:33	9(62%)

# 2020 January 05 to Jan. 06

05 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:20:07	10:31:24	■	■	13:39:26	15:50:47	11:20:29
N 70°	08:01:59	09:43:36	■	■	14:27:12	16:08:52	11:36:37
68°	07:47:26	09:12:51	11:32:53	12:37:52	14:57:55	16:23:23	11:49:35
66°	07:35:21	08:49:59	10:20:48	13:49:55	15:20:45	16:35:25	12:00:18
64°	07:25:06	08:31:51	09:45:14	14:25:28	15:38:53	16:45:39	12:09:20
62°	07:16:12	08:16:52	09:19:52	14:50:49	15:53:50	16:54:32	12:17:06
60°	07:08:21	08:04:10	09:00:01	15:10:39	16:06:30	17:02:21	12:23:51
N 58°	07:01:20	07:53:11	08:43:42	15:26:57	16:17:29	17:09:20	12:29:49
56°	06:55:00	07:43:31	08:29:52	15:40:45	16:27:07	17:15:39	12:35:07
54°	06:49:13	07:34:54	08:17:54	15:52:42	16:35:43	17:21:25	12:39:54
52°	06:43:53	07:27:08	08:07:22	16:03:14	16:43:28	17:26:44	12:44:13
50°	06:38:55	07:20:04	07:57:59	16:12:37	16:50:32	17:31:41	12:48:10
45°	06:27:47	07:04:44	07:38:11	16:32:23	17:05:49	17:42:47	12:56:44
N 40°	06:17:59	06:51:49	07:22:05	16:48:27	17:18:43	17:52:33	13:03:55
35°	06:09:03	06:40:32	07:08:28	17:02:02	17:29:58	18:01:27	13:10:07
30°	06:00:42	06:30:24	06:56:34	17:13:54	17:40:04	18:09:46	13:15:36
20°	05:44:55	06:12:17	06:36:08	17:34:17	17:58:09	18:25:30	13:25:09
N 10°	05:29:21	05:55:35	06:18:16	17:52:07	18:14:48	18:41:01	13:33:35
0°	05:12:58	05:39:03	06:01:26	18:08:54	18:31:17	18:57:21	13:41:33
S 10°	04:54:38	05:21:33	05:44:28	18:25:49	18:48:43	19:15:38	13:49:34
20°	04:32:46	05:01:47	05:26:10	18:44:04	19:08:26	19:37:25	13:58:10
30°	04:04:40	04:37:42	05:04:54	19:05:15	19:32:26	20:05:24	14:08:02
35°	03:46:42	04:22:58	04:52:23	19:17:44	19:47:06	20:23:18	14:13:46
40°	03:24:27	04:05:27	04:37:54	19:32:09	20:04:32	20:45:26	14:20:18
45°	02:55:16	03:43:48	04:20:36	19:49:23	20:26:05	21:14:25	14:27:56
S 50°	02:12:46	03:15:28	03:59:02	20:10:49	20:54:14	21:56:31	14:37:10
52°	01:47:52	03:01:11	03:48:41	20:21:06	21:08:24	22:21:03	14:41:27
54°	01:11:05	02:44:22	03:36:59	20:32:44	21:25:04	22:56:48	14:46:11
56°	—:—	02:23:49	03:23:32	20:46:04	21:45:24	—:—	14:51:26
58°	—:—	01:57:10	03:07:46	21:01:42	22:11:37	—:—	14:57:19
S 60°	—:—	01:17:22	02:48:46	21:20:31	22:50:18	—:—	15:03:59

Jan 05	SHA	Mer.pass
Venus	37°41.3	14:33:32
Mars	120°59.3	08:59:23
Jupiter	81°44.4	11:35:23
Saturn	66°23.1	12:36:25

06 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:18:45	10:27:58	■	■	13:43:48	15:53:04	10:50:50
N 70°	08:00:54	09:41:39	■	■	14:30:05	16:10:52	11:19:55
68°	07:46:33	09:11:28	11:25:02	12:46:38	15:00:14	16:25:11	11:41:42
66°	07:34:38	08:48:55	10:18:34	13:53:04	15:22:45	16:37:04	11:58:59
64°	07:24:29	08:31:00	09:43:48	14:27:49	15:40:39	16:47:11	12:13:09
62°	07:15:41	08:16:11	09:18:49	14:52:47	15:55:26	16:55:57	12:25:04
60°	07:07:56	08:03:36	08:59:12	15:12:23	16:07:59	17:03:41	12:35:19
N 58°	07:01:00	07:52:43	08:43:03	15:28:31	16:18:51	17:10:35	12:44:14
56°	06:54:43	07:43:08	08:29:21	15:42:11	16:28:25	17:16:50	12:52:06
54°	06:49:00	07:34:36	08:17:29	15:54:02	16:36:56	17:22:33	12:59:08
52°	06:43:42	07:26:53	08:07:02	16:04:28	16:44:37	17:27:49	13:05:28
50°	06:38:47	07:19:53	07:57:43	16:13:47	16:51:37	17:32:43	13:11:13
45°	06:27:46	07:04:40	07:38:03	16:33:24	17:06:48	17:43:42	13:23:37
N 40°	06:18:02	06:51:50	07:22:03	16:49:22	17:19:36	17:53:24	13:33:57
35°	06:09:10	06:40:38	07:08:31	17:02:52	17:30:46	18:02:14	13:42:48
30°	06:00:53	06:30:34	06:56:42	17:14:40	17:40:48	18:10:29	13:50:38
20°	05:45:13	06:12:33	06:36:24	17:34:56	17:58:46	18:26:06	14:04:11
N 10°	05:29:45	05:55:57	06:18:37	17:52:39	18:15:19	18:41:31	14:16:07
0°	05:13:28	05:39:31	06:01:53	18:09:21	18:31:42	18:57:45	14:27:22
S 10°	04:55:13	05:22:07	05:45:01	18:26:10	18:49:03	19:15:55	14:38:40
20°	04:33:29	05:02:27	05:26:49	18:44:18	19:08:39	19:37:35	14:50:48
30°	04:05:32	04:38:30	05:05:40	19:05:22	19:32:30	20:05:25	15:04:46
35°	03:47:39	04:23:51	04:53:13	19:17:46	19:47:05	20:23:13	15:12:54
40°	03:25:32	04:06:27	04:38:49	19:32:06	20:04:25	20:45:12	15:22:12
45°	02:56:35	03:44:55	04:21:38	19:49:12	20:25:49	21:13:58	15:33:08
S 50°	02:14:30	03:16:48	04:00:13	20:10:29	20:53:45	21:55:37	15:46:26
52°	01:50:00	03:02:39	03:49:57	20:20:42	21:07:47	22:19:44	15:52:39
54°	01:14:16	02:45:59	03:38:20	20:32:13	21:24:17	22:54:28	15:59:33
56°	—:—	02:25:41	03:25:01	20:45:27	21:44:21	—:—	16:07:16
58°	—:—	01:59:28	03:09:24	21:00:55	22:10:08	—:—	16:15:59
S 60°	—:—	01:20:48	02:50:36	21:19:30	22:47:42	—:—	16:25:59

Jan 06	SHA	Mer.pass
Venus	36°29.1	14:34:24
Mars	120°17.2	08:58:15
Jupiter	81°29.4	11:32:26
Saturn	66°15.6	12:32:59

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
05	04:57	05:10	12:05:10	19:52:17	07:30:08	10(72%)
06	05:24	05:37	12:05:37	20:38:51	08:15:09	11(80%)

# 2020 January 07 to Jan. 08

07 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:17:18	10:24:26	■	■	13:48:14	15:55:26	09:32:29
N 70°	07:59:43	09:39:34	■	■	14:33:04	16:12:58	10:52:45
68°	07:45:34	09:09:58	11:18:12	12:54:23	15:02:38	16:27:04	11:31:40
66°	07:33:49	08:47:45	10:16:14	13:56:19	15:24:48	16:38:47	11:58:57
64°	07:23:48	08:30:04	09:42:15	14:30:16	15:42:29	16:48:46	12:19:58
62°	07:15:07	08:15:25	09:17:40	14:54:49	15:57:06	16:57:25	12:37:00
60°	07:07:27	08:02:58	08:58:18	15:14:10	16:09:31	17:05:03	12:51:15
N 58°	07:00:36	07:52:12	08:42:19	15:30:08	16:20:16	17:11:53	13:03:27
56°	06:54:23	07:42:42	08:28:46	15:43:40	16:29:44	17:18:04	13:14:04
54°	06:48:43	07:34:14	08:17:00	15:55:25	16:38:11	17:23:43	13:23:26
52°	06:43:29	07:26:36	08:06:38	16:05:45	16:45:48	17:28:56	13:31:49
50°	06:38:37	07:19:39	07:57:23	16:14:59	16:52:44	17:33:46	13:39:22
45°	06:27:42	07:04:33	07:37:53	16:34:28	17:07:48	17:44:39	13:55:31
N 40°	06:18:03	06:51:49	07:22:00	16:50:19	17:20:30	17:54:16	14:08:50
35°	06:09:16	06:40:42	07:08:33	17:03:44	17:31:35	18:03:01	14:20:11
30°	06:01:03	06:30:42	06:56:49	17:15:26	17:41:33	18:11:12	14:30:10
20°	05:45:30	06:12:49	06:36:38	17:35:34	17:59:23	18:26:42	14:47:22
N 10°	05:30:08	05:56:19	06:18:58	17:53:11	18:15:50	18:42:00	15:02:27
0°	05:13:57	05:39:59	06:02:20	18:09:47	18:32:07	18:58:08	15:16:39
S 10°	04:55:49	05:22:41	05:45:34	18:26:30	18:49:21	19:16:12	15:30:54
20°	04:34:11	05:03:08	05:27:28	18:44:31	19:08:50	19:37:44	15:46:13
30°	04:06:24	04:39:19	05:06:27	19:05:27	19:32:33	20:05:24	16:03:52
35°	03:48:38	04:24:46	04:54:04	19:17:46	19:47:02	20:23:05	16:14:11
40°	03:26:40	04:07:27	04:39:46	19:32:00	20:04:15	20:44:55	16:26:03
45°	02:57:56	03:46:05	04:22:42	19:48:59	20:25:30	21:13:27	16:40:03
S 50°	02:16:19	03:18:11	04:01:27	20:10:06	20:53:12	21:54:37	16:57:15
52°	01:52:12	03:04:10	03:51:15	20:20:14	21:07:06	22:18:20	17:05:22
54°	01:17:30	02:47:41	03:39:45	20:31:39	21:23:25	22:52:04	17:14:26
56°	—:—	02:27:38	03:26:32	20:44:45	21:43:13	—:—	17:24:40
58°	—:—	02:01:51	03:11:05	21:00:03	22:08:34	—:—	17:36:23
S 60°	—:—	01:24:19	02:52:31	21:18:25	22:45:01	—:—	17:50:01

Jan 07	SHA	Mer.pass
Venus	35°17.3	14:35:13
Mars	119°35.1	08:57:07
Jupiter	81°14.5	11:29:30
Saturn	66°08.1	12:29:33

08 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:15:43	10:20:49	■	■	13:52:45	15:57:55	□
N 70°	07:58:27	09:37:22	■	■	14:36:09	16:15:08	□
68°	07:44:31	09:08:21	11:11:57	13:01:30	15:05:08	16:29:01	11:14:01
66°	07:32:55	08:46:30	10:13:47	13:59:38	15:26:57	16:40:34	12:02:03
64°	07:23:03	08:29:02	09:40:37	14:32:47	15:44:23	16:50:24	12:33:03
62°	07:14:28	08:14:34	09:16:26	14:56:56	15:58:49	16:58:56	12:56:22
60°	07:06:54	08:02:16	08:57:19	15:16:02	16:11:05	17:06:29	13:15:04
N 58°	07:00:08	07:51:36	08:41:32	15:31:48	16:21:44	17:13:14	13:30:40
56°	06:54:00	07:42:12	08:28:06	15:45:12	16:31:07	17:19:20	13:44:00
54°	06:48:24	07:33:49	08:16:28	15:56:50	16:39:28	17:24:55	13:55:36
52°	06:43:13	07:26:15	08:06:12	16:07:05	16:47:01	17:30:04	14:05:53
50°	06:38:24	07:19:22	07:57:01	16:16:14	16:53:54	17:34:52	14:15:04
45°	06:27:36	07:04:24	07:37:40	16:35:33	17:08:49	17:45:38	14:34:31
N 40°	06:18:03	06:51:46	07:21:54	16:51:17	17:21:25	17:55:08	14:50:22
35°	06:09:21	06:40:44	07:08:33	17:04:36	17:32:25	18:03:48	15:03:49
30°	06:01:12	06:30:49	06:56:54	17:16:14	17:42:18	18:11:55	15:15:33
20°	05:45:46	06:13:03	06:36:51	17:36:13	18:00:01	18:27:17	15:35:43
N 10°	05:30:31	05:56:40	06:19:18	17:53:43	18:16:20	18:42:29	15:53:18
0°	05:14:25	05:40:26	06:02:46	18:10:12	18:32:31	18:58:31	16:09:49
S 10°	04:56:24	05:23:15	05:46:06	18:26:48	18:49:38	19:16:28	16:26:23
20°	04:34:55	05:03:49	05:28:07	18:44:43	19:09:00	19:37:52	16:44:11
30°	04:07:17	04:40:09	05:07:15	19:05:30	19:32:34	20:05:22	17:04:44
35°	03:49:38	04:25:41	04:54:57	19:17:44	19:46:57	20:22:55	17:16:48
40°	03:27:49	04:08:30	04:40:45	19:31:52	20:04:03	20:44:36	17:30:41
45°	02:59:20	03:47:17	04:23:48	19:48:44	20:25:08	21:12:52	17:47:12
S 50°	02:18:11	03:19:37	04:02:42	20:09:40	20:52:35	21:53:34	18:07:38
52°	01:54:29	03:05:44	03:52:36	20:19:42	21:06:21	22:16:51	18:17:22
54°	01:20:46	02:49:25	03:41:12	20:31:01	21:22:29	22:49:36	18:28:19
56°	—:—	02:29:38	03:28:07	20:43:59	21:42:01	—:—	18:40:48
58°	—:—	02:04:19	03:12:50	20:59:07	22:06:54	—:—	18:55:17
S 60°	—:—	01:27:53	02:54:30	21:17:14	22:42:17	—:—	19:12:28

Jan 08	SHA	Mer.pass
Venus	34°05.8	14:36:02
Mars	118°52.9	08:55:59
Jupiter	80°59.5	11:26:33
Saturn	66°00.5	12:26:07

Day	Sun		Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
07	05:50	06:03	12:06:03	21:29:02	12(88%)
08	06:16	06:29	12:06:29	22:23:06	13(94%)

09 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:14:02	10:17:06	■	■	13:57:20	16:00:28	□
N 70°	07:57:04	09:35:03	■	■	14:39:20	16:17:23	□
68°	07:43:22	09:06:39	11:06:07	13:08:13	15:07:42	16:31:02	□
66°	07:31:57	08:45:09	10:11:15	14:03:03	15:29:10	16:42:24	12:15:03 09:23:45
64°	07:22:13	08:27:57	09:38:52	14:35:23	15:46:20	16:52:05	12:59:48 08:39:16
62°	07:13:46	08:13:40	09:15:06	14:59:07	16:00:36	17:00:31	13:29:29 08:09:49
60°	07:06:18	08:01:30	08:56:16	15:17:57	16:12:43	17:07:57	13:52:07 07:47:25
N 58°	06:59:37	07:50:57	08:40:40	15:33:31	16:23:15	17:14:36	14:10:27 07:29:17
56°	06:53:34	07:41:39	08:27:23	15:46:46	16:32:31	17:20:38	14:25:50 07:14:05
54°	06:48:01	07:33:21	08:15:52	15:58:17	16:40:48	17:26:09	14:39:05 07:01:01
52°	06:42:54	07:25:52	08:05:41	16:08:26	16:48:16	17:31:14	14:50:41 06:49:35
50°	06:38:09	07:19:02	07:56:36	16:17:30	16:55:05	17:35:59	15:01:00 06:39:25
45°	06:27:27	07:04:12	07:37:24	16:36:40	17:09:52	17:46:37	15:22:38 06:18:08
N 40°	06:18:00	06:51:41	07:21:46	16:52:16	17:22:21	17:56:02	15:40:08 06:00:57
35°	06:09:23	06:40:45	07:08:31	17:05:28	17:33:15	18:04:37	15:54:53 05:46:30
30°	06:01:19	06:30:54	06:56:57	17:17:01	17:43:04	18:12:39	16:07:42 05:33:57
20°	05:46:01	06:13:16	06:37:02	17:36:52	18:00:38	18:27:53	16:29:39 05:12:31
N 10°	05:30:52	05:57:00	06:19:37	17:54:15	18:16:51	18:42:58	16:48:43 04:53:56
0°	05:14:54	05:40:53	06:03:11	18:10:37	18:32:55	18:58:53	17:06:34 04:36:35
S 10°	04:57:00	05:23:48	05:46:38	18:27:06	18:49:55	19:16:42	17:24:28 04:19:14
20°	04:35:38	05:04:30	05:28:47	18:44:53	19:09:09	19:37:58	17:43:40 04:00:41
30°	04:08:11	04:40:59	05:08:03	19:05:32	19:32:33	20:05:17	18:05:51 03:39:20
35°	03:50:40	04:26:37	04:55:50	19:17:41	19:46:50	20:22:43	18:18:53 03:26:51
40°	03:29:01	04:09:34	04:41:44	19:31:42	20:03:48	20:44:13	18:33:54 03:12:30
45°	03:00:46	03:48:30	04:24:55	19:48:25	20:24:43	21:12:14	18:51:48 02:55:29
S 50°	02:20:07	03:21:05	04:04:00	20:09:11	20:51:55	21:52:26	19:14:03 02:34:29
52°	01:56:50	03:07:21	03:54:00	20:19:07	21:05:32	22:15:18	19:24:43 02:24:30
54°	01:24:06	02:51:13	03:42:42	20:30:20	21:21:29	22:47:06	19:36:45 02:13:17
56°	—:—	02:31:43	03:29:45	20:43:09	21:40:44	—:—	19:50:33 02:00:32
58°	—:—	02:06:50	03:14:39	20:58:06	22:05:09	—:—	20:06:42 01:45:45
S 60°	—:—	01:31:29	02:56:32	21:15:59	22:39:29	—:—	20:26:07 01:28:14

Jan 09	SHA	Mer.pass
Venus	32°54.7	14:36:49
Mars	118°10.5	08:54:52
Jupiter	80°44.6	11:23:37
Saturn	65°53.0	12:22:41

10 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:12:15	10:13:20	■	■	14:01:58	16:03:07	□
N 70°	07:55:36	09:32:39	■	■	14:42:36	16:19:42	□
68°	07:42:08	09:04:51	11:00:34	13:14:37	15:10:21	16:33:07	□
66°	07:30:54	08:43:43	10:08:37	14:06:31	15:31:27	16:44:18	13:02:48 10:38:52
64°	07:21:20	08:26:46	09:37:03	14:38:03	15:48:22	16:53:50	13:53:09 09:48:26
62°	07:13:00	08:12:40	09:13:42	15:01:22	16:02:25	17:02:08	14:24:41 09:16:50
60°	07:05:38	08:00:40	08:55:08	15:19:55	16:14:24	17:09:28	14:48:18 08:53:09
N 58°	06:59:02	07:50:14	08:39:44	15:35:18	16:24:48	17:16:02	15:07:15 08:34:08
56°	06:53:04	07:41:03	08:26:36	15:48:24	16:33:58	17:21:58	15:23:05 08:18:15
54°	06:47:36	07:32:50	08:15:12	15:59:47	16:42:10	17:27:25	15:36:39 08:04:38
52°	06:42:33	07:25:25	08:05:08	16:09:50	16:49:33	17:32:26	15:48:30 07:52:44
50°	06:37:51	07:18:40	07:56:08	16:18:49	16:56:18	17:37:07	15:59:01 07:42:11
45°	06:27:17	07:03:58	07:37:06	16:37:48	17:10:56	17:47:38	16:21:00 07:20:05
N 40°	06:17:56	06:51:34	07:21:36	16:53:16	17:23:18	17:56:56	16:38:44 07:02:16
35°	06:09:24	06:40:43	07:08:28	17:06:22	17:34:07	18:05:26	16:53:38 06:47:17
30°	06:01:24	06:30:58	06:56:58	17:17:49	17:43:50	18:13:24	17:06:35 06:34:15
20°	05:46:14	06:13:28	06:37:13	17:37:32	18:01:16	18:28:29	17:28:40 06:12:01
N 10°	05:31:13	05:57:19	06:19:55	17:54:46	18:17:21	18:43:27	17:47:50 05:52:42
0°	05:15:22	05:41:19	06:03:36	18:11:01	18:33:18	18:59:14	18:05:45 05:34:39
S 10°	04:57:35	05:24:22	05:47:10	18:27:23	18:50:10	19:16:56	18:23:40 05:16:34
20°	04:36:22	05:05:11	05:29:26	18:45:03	19:09:16	19:38:03	18:42:51 04:57:12
30°	04:09:07	04:41:50	05:08:51	19:05:32	19:32:30	20:05:10	19:04:59 04:34:49
35°	03:51:42	04:27:35	04:56:44	19:17:35	19:46:41	20:22:28	19:17:57 04:21:41
40°	03:30:13	04:10:39	04:42:45	19:31:30	20:03:31	20:43:48	19:32:53 04:06:33
45°	03:02:14	03:49:46	04:26:04	19:48:04	20:24:15	21:11:33	19:50:38 03:48:32
S 50°	02:22:05	03:22:36	04:05:20	20:08:39	20:51:12	21:51:14	20:12:38 03:26:08
52°	01:59:13	03:09:00	03:55:25	20:18:29	21:04:40	22:13:41	20:23:09 03:15:25
54°	01:27:27	02:53:05	03:44:14	20:29:34	21:20:24	22:44:33	20:34:59 03:03:19
56°	—:—	02:33:51	03:31:26	20:42:15	21:39:22	—:—	20:48:32 02:49:27
58°	—:—	02:09:26	03:16:30	20:57:01	22:03:20	—:—	21:04:19 02:33:14
S 60°	—:—	01:35:08	02:58:39	21:14:39	22:36:38	—:—	21:23:11 02:13:45

Jan 10	SHA	Mer.pass
Venus	31°43.9	14:37:35
Mars	117°28.1	08:53:46
Jupiter	80°29.7	11:20:40
Saturn	65°45.4	12:19:15

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
09	06:42	06:54	12:06:54	23:20:33	10:51:28	14(98%)
10	07:07	07:19	12:07:19	—:—	11:50:09	15(100%)

11 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	08:10:22	10:09:30	■	■	14:06:38	16:05:51	□
N 70°	07:54:02	09:30:08	■	■	14:45:57	16:22:06	□
68°	07:40:49	09:02:57	10:55:13	13:20:47	15:13:05	16:35:16	13:23:16
66°	07:29:47	08:42:12	10:05:55	14:10:03	15:33:48	16:46:15	14:41:00
64°	07:20:22	08:25:30	09:35:08	14:40:48	15:50:27	16:55:38	15:18:04
62°	07:12:09	08:11:37	09:12:13	15:03:41	16:04:19	17:03:48	15:44:21
60°	07:04:54	07:59:46	08:53:55	15:21:57	16:16:08	17:11:01	16:04:51
N 58°	06:58:24	07:49:28	08:38:44	15:37:07	16:26:24	17:17:29	16:21:39
56°	06:52:31	07:40:23	08:25:46	15:50:04	16:35:28	17:23:21	16:35:52
54°	06:47:07	07:32:16	08:14:29	16:01:19	16:43:33	17:28:42	16:48:08
52°	06:42:08	07:24:55	08:04:31	16:11:16	16:50:52	17:33:40	16:58:55
50°	06:37:30	07:18:14	07:55:36	16:20:09	16:57:32	17:38:17	17:08:31
45°	06:27:04	07:03:42	07:36:46	16:38:57	17:12:02	17:48:40	17:28:42
N 40°	06:17:49	06:51:25	07:21:24	16:54:17	17:24:16	17:57:52	17:45:02
35°	06:09:23	06:40:40	07:08:22	17:07:17	17:34:59	18:06:16	17:58:48
30°	06:01:28	06:31:00	06:56:58	17:18:38	17:44:37	18:14:08	18:10:46
20°	05:46:27	06:13:39	06:37:22	17:38:11	18:01:53	18:29:05	18:31:13
N 10°	05:31:33	05:57:38	06:20:12	17:55:18	18:17:51	18:43:55	18:48:57
0°	05:15:49	05:41:45	06:04:01	18:11:25	18:33:40	18:59:34	19:05:31
S 10°	04:58:10	05:24:55	05:47:42	18:27:40	18:50:25	19:17:08	19:22:03
20°	04:37:07	05:05:53	05:30:06	18:45:11	19:09:22	19:38:06	19:39:43
30°	04:10:03	04:42:42	05:09:41	19:05:30	19:32:25	20:05:01	20:00:01
35°	03:52:46	04:28:33	04:57:39	19:17:27	19:46:30	20:22:11	20:11:51
40°	03:31:28	04:11:45	04:43:47	19:31:15	20:03:11	20:43:20	20:25:25
45°	03:03:45	03:51:03	04:27:14	19:47:41	20:23:45	21:10:49	20:41:27
S 50°	02:24:07	03:24:09	04:06:42	20:08:03	20:50:25	21:49:58	21:01:08
52°	02:01:41	03:10:42	03:56:53	20:17:48	21:03:43	22:11:59	21:10:27
54°	01:30:50	02:54:59	03:45:49	20:28:46	21:19:16	22:41:57	21:20:52
56°	00:24:59	02:36:02	03:33:10	20:41:17	21:37:56	23:39:15	21:32:40
58°	—:—	02:12:06	03:18:25	20:55:52	22:01:26	—:—	21:46:13
S 60°	—:—	01:38:49	03:00:49	21:13:14	22:33:45	—:—	22:02:05

Jan 11	SHA	Mer.pass
Venus	30°33.5	14:38:19
Mars	116°45.6	08:52:39
Jupiter	80°14.8	11:17:44
Saturn	65°37.9	12:15:49

12 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	08:08:22	10:05:36	■	■	14:11:21	16:08:39	□
N 70°	07:52:23	09:27:32	■	■	14:49:22	16:24:34	15:10:36
68°	07:39:25	09:00:58	10:50:03	13:26:45	15:15:53	16:37:29	16:04:40
66°	07:28:35	08:40:36	10:03:08	14:13:39	15:36:12	16:48:16	16:37:18
64°	07:19:19	08:24:10	09:33:08	14:43:36	15:52:35	16:57:29	17:01:11
62°	07:11:15	08:10:29	09:10:39	15:06:03	16:06:15	17:05:30	17:19:59
60°	07:04:07	07:58:48	08:52:39	15:24:02	16:17:54	17:12:36	17:35:25
N 58°	06:57:43	07:48:38	08:37:40	15:38:59	16:28:02	17:18:58	17:48:27
56°	06:51:55	07:39:39	08:24:51	15:51:46	16:36:59	17:24:45	17:59:41
54°	06:46:36	07:31:38	08:13:43	16:02:54	16:44:59	17:30:02	18:09:32
52°	06:41:41	07:24:23	08:03:51	16:12:44	16:52:13	17:34:55	18:18:16
50°	06:37:07	07:17:46	07:55:02	16:21:32	16:58:48	17:39:28	18:26:07
45°	06:26:48	07:03:23	07:36:23	16:40:08	17:13:08	17:49:43	18:42:45
N 40°	06:17:41	06:51:13	07:21:09	16:55:19	17:25:15	17:58:48	18:56:20
35°	06:09:20	06:40:35	07:08:14	17:08:12	17:35:51	18:07:06	19:07:51
30°	06:01:30	06:31:00	06:56:56	17:19:28	17:45:24	18:14:53	19:17:54
20°	05:46:38	06:13:49	06:37:30	17:38:50	18:02:31	18:29:41	19:35:07
N 10°	05:31:53	05:57:56	06:20:28	17:55:48	18:18:20	18:44:22	19:50:05
0°	05:16:16	05:42:10	06:04:25	18:11:48	18:34:02	18:59:54	20:04:03
S 10°	04:58:46	05:25:29	05:48:14	18:27:55	18:50:39	19:17:20	20:18:00
20°	04:37:51	05:06:35	05:30:46	18:45:17	19:09:27	19:38:08	20:32:51
30°	04:11:00	04:43:35	05:10:30	19:05:27	19:32:19	20:04:50	20:49:49
35°	03:53:51	04:29:33	04:58:35	19:17:18	19:46:16	20:21:52	20:59:40
40°	03:32:44	04:12:53	04:44:50	19:30:58	20:02:49	20:42:50	21:10:53
45°	03:05:18	03:52:22	04:28:26	19:47:14	20:23:12	21:10:02	21:24:02
S 50°	02:26:11	03:25:44	04:08:06	20:07:25	20:49:35	21:48:38	21:40:00
52°	02:04:10	03:12:27	03:58:23	20:17:03	21:02:44	22:10:14	21:47:27
54°	01:34:14	02:56:56	03:47:26	20:27:53	21:18:04	22:39:19	21:55:43
56°	00:36:57	02:38:16	03:34:56	20:40:16	21:36:26	23:31:12	22:04:58
58°	—:—	02:14:48	03:20:23	20:54:39	21:59:28	—:—	22:15:26
S 60°	—:—	01:42:31	03:03:02	21:11:45	22:30:49	—:—	22:27:26

Jan 12	SHA	Mer.pass
Venus	29°23.4	14:39:02
Mars	116°02.9	08:51:34
Jupiter	79°59.9	11:14:47
Saturn	65°30.3	12:12:23

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
11	07:31	07:43	12:07:43	00:20:02	12:49:56	16(99%)
12	07:55	08:06	12:08:06	01:19:38	13:48:55	17(96%)

# 2020 January 13 to Jan. 14

13 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:06:17	10:01:39	■	■	14:16:06	16:11:32	17:18:45
N 70°	07:50:39	09:24:50	■	■	14:52:51	16:27:06	17:52:01
68°	07:37:57	08:58:53	10:45:02	13:32:34	15:18:45	16:39:45	18:15:47
66°	07:27:19	08:38:55	10:00:17	14:17:17	15:38:41	16:50:20	18:34:06
64°	07:18:13	08:22:46	09:31:04	14:46:27	15:54:47	16:59:23	18:48:53
62°	07:10:17	08:09:17	09:09:01	15:08:28	16:08:14	17:07:16	19:01:09
60°	07:03:16	07:57:46	08:51:18	15:26:09	16:19:43	17:14:14	19:11:34
N 58°	06:56:59	07:47:44	08:36:32	15:40:54	16:29:43	17:20:30	19:20:34
56°	06:51:16	07:38:53	08:23:54	15:53:31	16:38:33	17:26:11	19:28:27
54°	06:46:02	07:30:57	08:12:53	16:04:30	16:46:26	17:31:23	19:35:27
52°	06:41:11	07:23:48	08:03:08	16:14:13	16:53:35	17:36:12	19:41:43
50°	06:36:41	07:17:15	07:54:25	16:22:55	17:00:06	17:40:41	19:47:23
45°	06:26:31	07:03:02	07:35:57	16:41:20	17:14:16	17:50:47	19:59:32
N 40°	06:17:30	06:51:00	07:20:52	16:56:23	17:26:15	17:59:45	20:09:33
35°	06:09:16	06:40:28	07:08:05	17:09:08	17:36:45	18:07:57	20:18:06
30°	06:01:31	06:30:59	06:56:53	17:20:17	17:46:12	18:15:39	20:25:35
20°	05:46:48	06:13:57	06:37:37	17:39:30	18:03:09	18:30:17	20:38:28
N 10°	05:32:11	05:58:13	06:20:43	17:56:19	18:18:49	18:44:50	20:49:42
0°	05:16:43	05:42:35	06:04:48	18:12:10	18:34:22	19:00:13	21:00:12
S 10°	04:59:21	05:26:02	05:48:45	18:28:09	18:50:51	19:17:30	21:10:41
20°	04:38:36	05:07:17	05:31:26	18:45:23	19:09:30	19:38:08	21:21:48
30°	04:11:57	04:44:28	05:11:21	19:05:21	19:32:11	20:04:38	21:34:28
35°	03:54:58	04:30:33	04:59:32	19:17:06	19:46:01	20:21:30	21:41:47
40°	03:34:02	04:14:02	04:45:54	19:30:39	20:02:25	20:42:17	21:50:04
45°	03:06:52	03:53:42	04:29:40	19:46:46	20:22:35	21:09:11	21:59:43
S 50°	02:28:18	03:27:21	04:09:32	20:06:44	20:48:42	21:47:15	22:11:17
52°	02:06:43	03:14:14	03:59:55	20:16:15	21:01:41	22:08:25	22:16:39
54°	01:37:39	02:58:55	03:49:06	20:26:58	21:16:48	22:36:40	22:22:32
56°	00:45:47	02:40:34	03:36:45	20:39:11	21:34:52	23:24:29	22:29:04
58°	—:—	02:17:34	03:22:24	20:53:22	21:57:26	—:—	22:36:22
S 60°	—:—	01:46:14	03:05:19	21:10:12	22:27:51	—:—	22:44:37

Jan 13	SHA	Mer.pass
Venus	28°13.7	14:39:43
Mars	115°20.2	08:50:28
Jupiter	79°45.1	11:11:50
Saturn	65°22.8	12:08:57

14 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:04:07	09:57:39	■	■	14:20:52	16:14:30	19:50:22
N 70°	07:48:50	09:22:03	■	■	14:56:24	16:29:42	20:05:21
68°	07:36:23	08:56:44	10:40:06	13:38:16	15:21:40	16:42:05	20:17:13
66°	07:25:58	08:37:09	09:57:22	14:20:57	15:41:12	16:52:27	20:26:55
64°	07:17:03	08:21:17	09:28:55	14:49:22	15:57:02	17:01:19	20:35:01
62°	07:09:16	08:08:01	09:07:19	15:10:57	16:10:15	17:09:03	20:41:55
60°	07:02:22	07:56:40	08:49:53	15:28:20	16:21:34	17:15:55	20:47:54
N 58°	06:56:11	07:46:47	08:35:20	15:42:51	16:31:26	17:22:04	20:53:07
56°	06:50:34	07:38:03	08:22:52	15:55:18	16:40:08	17:27:39	20:57:45
54°	06:45:25	07:30:14	08:12:00	16:06:09	16:47:56	17:32:46	21:01:54
52°	06:40:39	07:23:09	08:02:22	16:15:45	16:54:59	17:37:30	21:05:38
50°	06:36:12	07:16:42	07:53:45	16:24:21	17:01:25	17:41:55	21:09:02
45°	06:26:11	07:02:38	07:35:29	16:42:34	17:15:25	17:51:53	21:16:22
N 40°	06:17:18	06:50:45	07:20:33	16:57:27	17:27:16	18:00:43	21:22:28
35°	06:09:10	06:40:19	07:07:53	17:10:05	17:37:38	18:08:48	21:27:42
30°	06:01:31	06:30:56	06:56:48	17:21:08	17:47:00	18:16:25	21:32:18
20°	05:46:57	06:14:04	06:37:42	17:40:09	18:03:47	18:30:53	21:40:15
N 10°	05:32:29	05:58:29	06:20:58	17:56:50	18:19:18	18:45:17	21:47:12
0°	05:17:09	05:42:59	06:05:11	18:12:32	18:34:43	19:00:32	21:53:42
S 10°	04:59:56	05:26:34	05:49:16	18:28:22	18:51:03	19:17:40	22:00:12
20°	04:39:21	05:07:59	05:32:06	18:45:27	19:09:32	19:38:07	22:07:06
30°	04:12:56	04:45:22	05:12:12	19:05:14	19:32:01	20:04:23	22:14:56
35°	03:56:05	04:31:34	05:00:29	19:16:53	19:45:44	20:21:07	22:19:26
40°	03:35:20	04:15:12	04:46:59	19:30:17	20:01:59	20:41:41	22:24:31
45°	03:08:29	03:55:04	04:30:54	19:46:15	20:21:57	21:08:18	22:30:25
S 50°	02:30:27	03:29:01	04:10:59	20:05:59	20:47:45	21:45:48	22:37:26
52°	02:09:18	03:16:03	04:01:29	20:15:24	21:00:34	22:06:33	22:40:40
54°	01:41:05	03:00:57	03:50:48	20:25:59	21:15:28	22:33:59	22:44:12
56°	00:53:17	02:42:54	03:38:36	20:38:02	21:33:15	23:18:30	22:48:06
58°	—:—	02:20:22	03:24:27	20:52:01	21:55:20	—:—	22:52:25
S 60°	—:—	01:49:59	03:07:38	21:08:35	22:24:51	—:—	22:57:15

Jan 14	SHA	Mer.pass
Venus	27°04.3	14:40:24
Mars	114°37.4	08:49:23
Jupiter	79°30.3	11:08:53
Saturn	65°15.2	12:05:32

Day	Sun		Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
13	08:18	08:29	12:08:29	02:17:39	18(90%)
14	08:41	08:52	12:08:52	03:13:09	19(82%)



15 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:01:50	09:53:37	■	■	14:25:40	16:17:32	22:04:08
N 70°	07:46:55	09:19:12	■	■	15:00:01	16:32:22	22:08:43
68°	07:34:45	08:54:30	10:35:16	13:43:51	15:24:40	16:44:28	22:12:27
66°	07:24:33	08:35:19	09:54:24	14:24:40	15:43:48	16:54:37	22:15:34
64°	07:15:48	08:19:44	09:26:42	14:52:20	15:59:20	17:03:18	22:18:12
62°	07:08:10	08:06:42	09:05:32	15:13:28	16:12:20	17:10:54	22:20:28
60°	07:01:24	07:55:31	08:48:25	15:30:33	16:23:28	17:17:37	22:22:26
N 58°	06:55:20	07:45:47	08:34:05	15:44:51	16:33:11	17:23:40	22:24:11
56°	06:49:48	07:37:10	08:21:47	15:57:07	16:41:46	17:29:09	22:25:44
54°	06:44:44	07:29:27	08:11:04	16:07:49	16:49:27	17:34:11	22:27:08
52°	06:40:03	07:22:28	08:01:33	16:17:18	16:56:24	17:38:50	22:28:24
50°	06:35:41	07:16:06	07:53:02	16:25:48	17:02:45	17:43:11	22:29:33
45°	06:25:49	07:02:13	07:34:58	16:43:48	17:16:35	17:52:59	22:32:03
N 40°	06:17:03	06:50:27	07:20:12	16:58:32	17:28:17	18:01:41	22:34:08
35°	06:09:02	06:40:09	07:07:40	17:11:02	17:38:33	18:09:40	22:35:56
30°	06:01:29	06:30:51	06:56:41	17:21:58	17:47:48	18:17:11	22:37:32
20°	05:47:05	06:14:10	06:37:46	17:40:49	18:04:24	18:31:29	22:40:18
N 10°	05:32:46	05:58:44	06:21:11	17:57:20	18:19:46	18:45:43	22:42:44
0°	05:17:35	05:43:23	06:05:33	18:12:53	18:35:02	19:00:49	22:45:01
S 10°	05:00:31	05:27:07	05:49:47	18:28:35	18:51:13	19:17:48	22:47:19
20°	04:40:07	05:08:42	05:32:47	18:45:30	19:09:32	19:38:05	22:49:46
30°	04:13:54	04:46:17	05:13:03	19:05:06	19:31:49	20:04:07	22:52:34
35°	03:57:13	04:32:36	05:01:27	19:16:37	19:45:24	20:20:41	22:54:10
40°	03:36:41	04:16:23	04:48:05	19:29:54	20:01:30	20:41:03	22:55:59
45°	03:10:07	03:56:28	04:32:10	19:45:41	20:21:15	21:07:21	22:58:06
S 50°	02:32:39	03:30:42	04:12:29	20:05:12	20:46:46	21:44:18	23:00:36
52°	02:11:55	03:17:55	04:03:05	20:14:30	20:59:24	22:04:38	23:01:44
54°	01:44:31	03:03:02	03:52:32	20:24:57	21:14:05	22:31:16	23:03:00
56°	01:00:01	02:45:17	03:40:30	20:36:50	21:31:33	23:13:01	23:04:22
58°	—:—	02:23:13	03:26:33	20:50:37	21:53:11	—:—	23:05:54
S 60°	—:—	01:53:44	03:10:00	21:06:54	22:21:49	—:—	23:07:36

Jan 15	SHA	Mer.pass
Venus	25°55.3	14:41:03
Mars	113°54.5	08:48:18
Jupiter	79°15.5	11:05:56
Saturn	65°07.7	12:02:06

16 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:59:29	09:49:33	■	■	14:30:28	16:20:38	.. ..
N 70°	07:44:55	09:16:16	■	■	15:03:40	16:35:06	.. ..
68°	07:33:02	08:52:11	10:30:31	13:49:19	15:27:42	16:46:55	.. ..
66°	07:23:04	08:33:24	09:51:22	14:28:25	15:46:26	16:56:50	.. ..
64°	07:14:30	08:18:07	09:24:25	14:55:20	16:01:40	17:05:20	23:59:09
62°	07:07:01	08:05:18	09:03:41	15:16:02	16:14:27	17:12:46	23:57:03
60°	07:00:23	07:54:18	08:46:52	15:32:49	16:25:24	17:19:22	23:55:14
N 58°	06:54:25	07:44:43	08:32:46	15:46:53	16:34:58	17:25:17	23:53:38
56°	06:49:00	07:36:13	08:20:39	15:58:58	16:43:25	17:30:40	23:52:12
54°	06:44:02	07:28:37	08:10:04	16:09:32	16:51:00	17:35:37	23:50:56
52°	06:39:25	07:21:44	08:00:41	16:18:53	16:57:51	17:40:11	23:49:46
50°	06:35:07	07:15:27	07:52:16	16:27:17	17:04:07	17:44:27	23:48:43
45°	06:25:25	07:01:44	07:34:25	16:45:04	17:17:46	17:54:06	23:46:27
N 40°	06:16:47	06:50:07	07:19:49	16:59:38	17:29:20	18:02:40	23:44:34
35°	06:08:52	06:39:56	07:07:25	17:12:00	17:39:28	18:10:32	23:42:57
30°	06:01:25	06:30:45	06:56:33	17:22:49	17:48:36	18:17:57	23:41:32
20°	05:47:12	06:14:15	06:37:49	17:41:28	18:05:02	18:32:04	23:39:06
N 10°	05:33:02	05:58:58	06:21:24	17:57:49	18:20:14	18:46:09	23:37:00
0°	05:18:00	05:43:46	06:05:54	18:13:14	18:35:21	19:01:06	23:35:03
S 10°	05:01:05	05:27:39	05:50:17	18:28:46	18:51:23	19:17:55	23:33:08
20°	04:40:52	05:09:24	05:33:27	18:45:31	19:09:32	19:38:01	23:31:07
30°	04:14:54	04:47:11	05:13:55	19:04:56	19:31:36	20:03:49	23:28:52
35°	03:58:22	04:33:39	05:02:26	19:16:20	19:45:03	20:20:13	23:27:35
40°	03:38:02	04:17:36	04:49:12	19:29:28	20:00:59	20:40:23	23:26:08
45°	03:11:46	03:57:53	04:33:27	19:45:05	20:20:31	21:06:22	23:24:29
S 50°	02:34:52	03:32:25	04:13:59	20:04:22	20:45:43	21:42:45	23:22:32
52°	02:14:34	03:19:48	04:04:43	20:13:33	20:58:11	22:02:40	23:21:39
54°	01:47:57	03:05:09	03:54:17	20:23:52	21:12:38	22:28:32	23:20:41
56°	01:06:13	02:47:42	03:42:25	20:35:35	21:29:49	23:07:54	23:19:37
58°	—:—	02:26:06	03:28:41	20:49:08	21:50:58	—:—	23:18:26
S 60°	—:—	01:57:29	03:12:25	21:05:09	22:18:46	—:—	23:17:08

Jan 16	SHA	Mer.pass
Venus	24°46.5	14:41:40
Mars	113°11.5	08:47:14
Jupiter	79°00.7	11:02:59
Saturn	65°00.2	11:58:40

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Mer. Pass. Upper Lower hh:mm:ss hh:mm:ss		Age
15	09:02	09:13	12:09:13	04:06:03 16:31:42	20(73%)
16	09:24	09:34	12:09:34	04:56:58 17:21:59	21(62%)

17 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:57:02	09:45:26	■	■	14:35:18	16:23:47	00:12:08
N 70°	07:42:51	09:13:16	11:53:53	12:26:43	15:07:23	16:37:53	00:07:54
68°	07:31:15	08:49:48	10:25:50	13:54:43	15:30:48	16:49:25	00:04:27
66°	07:21:30	08:31:26	09:48:18	14:32:12	15:49:07	16:59:06	00:01:34
64°	07:13:08	08:16:26	09:22:04	14:58:23	16:04:03	17:07:25	.. ..
62°	07:05:48	08:03:51	09:01:47	15:18:38	16:16:36	17:14:41	.. ..
60°	06:59:18	07:53:02	08:45:16	15:35:07	16:27:22	17:21:08	.. ..
N 58°	06:53:28	07:43:36	08:31:24	15:48:57	16:36:47	17:26:57	.. ..
56°	06:48:09	07:35:14	08:19:28	16:00:51	16:45:06	17:32:13	.. ..
54°	06:43:16	07:27:44	08:09:02	16:11:16	16:52:34	17:37:04	.. ..
52°	06:38:44	07:20:57	07:59:46	16:20:30	16:59:20	17:41:34	.. ..
50°	06:34:31	07:14:45	07:51:28	16:28:47	17:05:30	17:45:45	.. ..
45°	06:24:58	07:01:14	07:33:50	16:46:21	17:18:58	17:55:14	.. ..
N 40°	06:16:29	06:49:46	07:19:24	17:00:44	17:30:23	18:03:40	.. ..
35°	06:08:41	06:39:42	07:07:07	17:12:58	17:40:23	18:11:25	.. ..
30°	06:01:20	06:30:38	06:56:22	17:23:40	17:49:25	18:18:43	.. ..
20°	05:47:17	06:14:19	06:37:50	17:42:08	18:05:39	18:32:40	.. ..
N 10°	05:33:17	05:59:11	06:21:35	17:58:19	18:20:42	18:46:35	.. ..
0°	05:18:24	05:44:09	06:06:15	18:13:34	18:35:39	19:01:22	.. ..
S 10°	05:01:40	05:28:11	05:50:47	18:28:57	18:51:32	19:18:01	.. ..
20°	04:41:38	05:10:07	05:34:07	18:45:31	19:09:30	19:37:56	.. ..
30°	04:15:54	04:48:07	05:14:47	19:04:44	19:31:21	20:03:28	.. ..
35°	03:59:31	04:34:42	05:03:25	19:16:01	19:44:40	20:19:43	.. ..
40°	03:39:25	04:18:49	04:50:19	19:29:00	20:00:25	20:39:40	23:56:32
45°	03:13:28	03:59:19	04:34:46	19:44:26	20:19:45	21:05:20	23:51:12
S 50°	02:37:07	03:34:10	04:15:31	20:03:29	20:44:37	21:41:09	23:44:52
52°	02:17:14	03:21:43	04:06:22	20:12:33	20:56:55	22:00:39	23:41:57
54°	01:51:23	03:07:17	03:56:05	20:22:43	21:11:09	22:25:47	23:38:46
56°	01:12:02	02:50:09	03:44:23	20:34:16	21:28:01	23:03:03	23:35:16
58°	—:—	02:29:01	03:30:51	20:47:37	21:48:43	—:—	23:31:24
S 60°	—:—	02:01:15	03:14:52	21:03:21	22:15:42	—:—	23:27:03

Jan 17	SHA	Mer.pass
Venus	23°38.1	14:42:17
Mars	112°28.4	08:46:10
Jupiter	78°46.0	11:00:02
Saturn	64°52.6	11:55:14

18 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:54:30	09:41:17	■	■	14:40:08	16:27:01	02:21:36
N 70°	07:40:42	09:10:12	11:33:04	12:48:13	15:11:08	16:40:44	02:07:26
68°	07:29:24	08:47:20	10:21:12	14:00:02	15:33:56	16:51:57	01:56:11
66°	07:19:53	08:29:23	09:45:11	14:36:00	15:51:51	17:01:24	01:46:58
64°	07:11:42	08:14:41	09:19:39	15:01:29	16:06:29	17:09:32	01:39:16
62°	07:04:32	08:02:19	08:59:49	15:21:17	16:18:48	17:16:38	01:32:41
60°	06:58:10	07:51:42	08:43:37	15:37:27	16:29:23	17:22:57	01:27:00
N 58°	06:52:27	07:42:25	08:29:58	15:51:03	16:38:38	17:28:38	01:22:02
56°	06:47:14	07:34:12	08:18:13	16:02:46	16:46:49	17:33:48	01:17:37
54°	06:42:27	07:26:49	08:07:56	16:13:02	16:54:10	17:38:33	01:13:40
52°	06:38:01	07:20:08	07:58:49	16:22:08	17:00:49	17:42:58	01:10:07
50°	06:33:52	07:14:01	07:50:37	16:30:18	17:06:54	17:47:04	01:06:53
45°	06:24:30	07:00:41	07:33:12	16:47:39	17:20:11	17:56:23	00:59:55
N 40°	06:16:08	06:49:22	07:18:56	17:01:52	17:31:26	18:04:41	00:54:08
35°	06:08:27	06:39:26	07:06:48	17:13:57	17:41:19	18:12:18	00:49:10
30°	06:01:13	06:30:28	06:56:11	17:24:32	17:50:14	18:19:30	00:44:50
20°	05:47:22	06:14:21	06:37:51	17:42:47	18:06:17	18:33:15	00:37:21
N 10°	05:33:31	05:59:23	06:21:46	17:58:48	18:21:09	18:47:00	00:30:50
0°	05:18:48	05:44:31	06:06:35	18:13:53	18:35:57	19:01:38	00:24:47
S 10°	05:02:14	05:28:43	05:51:17	18:29:06	18:51:39	19:18:06	00:18:46
20°	04:42:23	05:10:49	05:34:47	18:45:30	19:09:26	19:37:49	00:12:25
30°	04:16:55	04:49:02	05:15:39	19:04:30	19:31:04	20:03:07	00:05:16
35°	04:00:42	04:35:46	05:04:25	19:15:40	19:44:14	20:19:11	00:01:09
40°	03:40:48	04:20:03	04:51:28	19:28:30	19:59:50	20:38:55	.. ..
45°	03:15:10	04:00:46	04:36:05	19:43:45	20:18:56	21:04:15	.. ..
S 50°	02:39:24	03:35:57	04:17:05	20:02:34	20:43:29	21:39:30	.. ..
52°	02:19:56	03:23:40	04:08:03	20:11:30	20:55:36	21:58:35	.. ..
54°	01:54:49	03:09:28	03:57:54	20:21:32	21:09:36	22:23:00	23:58:49
56°	01:17:34	02:52:38	03:46:23	20:32:54	21:26:09	22:58:25	23:52:51
58°	—:—	02:31:57	03:33:04	20:46:02	21:46:24	—:—	23:46:11
S 60°	—:—	02:05:00	03:17:22	21:01:29	22:12:36	—:—	23:38:40

Jan 18	SHA	Mer.pass
Venus	22°30.0	14:42:52
Mars	111°45.2	08:45:06
Jupiter	78°31.3	10:57:04
Saturn	64°45.1	11:51:48

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Mer. Pass. Upper Lower hh:mm:ss hh:mm:ss		Age
17	09:45	09:55	12:09:55	05:46:51 18:11:42	22(51%)
18	10:05	10:14	12:10:14	06:36:40 19:01:51	23(39%)

19 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:51:53	09:37:06	■	■	14:44:58	16:30:18	04:42:46
N 70°	07:38:28	09:07:04	11:20:04	13:01:53	15:14:56	16:43:37	04:12:38
68°	07:27:28	08:44:49	10:16:37	14:05:16	15:37:07	16:54:33	03:50:38
66°	07:18:11	08:27:16	09:42:01	14:39:49	15:54:37	17:03:45	03:33:30
64°	07:10:12	08:12:52	09:17:11	15:04:36	16:08:57	17:11:41	03:19:37
62°	07:03:12	08:00:45	08:57:47	15:23:58	16:21:02	17:18:37	03:08:02
60°	06:56:59	07:50:19	08:41:53	15:39:49	16:31:25	17:24:48	02:58:11
N 58°	06:51:23	07:41:12	08:28:29	15:53:12	16:40:30	17:30:21	02:49:39
56°	06:46:17	07:33:06	08:16:56	16:04:43	16:48:34	17:35:25	02:42:10
54°	06:41:36	07:25:50	08:06:48	16:14:49	16:55:47	17:40:04	02:35:31
52°	06:37:15	07:19:16	07:57:48	16:23:47	17:02:21	17:44:23	02:29:33
50°	06:33:11	07:13:14	07:49:43	16:31:50	17:08:20	17:48:25	02:24:10
45°	06:23:59	07:00:06	07:32:32	16:48:58	17:21:24	17:57:33	02:12:37
N 40°	06:15:46	06:48:57	07:18:27	17:03:00	17:32:30	18:05:42	02:03:05
35°	06:08:12	06:39:09	07:06:28	17:14:56	17:42:15	18:13:12	01:54:58
30°	06:01:04	06:30:18	06:55:57	17:25:24	17:51:03	18:20:17	01:47:51
20°	05:47:25	06:14:22	06:37:50	17:43:26	18:06:54	18:33:50	01:35:39
N 10°	05:33:45	05:59:35	06:21:55	17:59:16	18:21:36	18:47:25	01:25:02
0°	05:19:12	05:44:52	06:06:55	18:14:12	18:36:14	19:01:52	01:15:09
S 10°	05:02:47	05:29:14	05:51:46	18:29:15	18:51:46	19:18:10	01:05:19
20°	04:43:09	05:11:31	05:35:27	18:45:28	19:09:21	19:37:41	00:54:55
30°	04:17:56	04:49:58	05:16:32	19:04:15	19:30:45	20:02:43	00:43:08
35°	04:01:53	04:36:50	05:05:25	19:15:17	19:43:47	20:18:37	00:36:21
40°	03:42:13	04:21:18	04:52:37	19:27:58	19:59:12	20:38:07	00:28:41
45°	03:16:54	04:02:15	04:37:25	19:43:02	20:18:04	21:03:08	00:19:47
S 50°	02:41:43	03:37:45	04:18:40	20:01:36	20:42:18	21:37:49	00:09:08
52°	02:22:39	03:25:39	04:09:45	20:10:25	20:54:14	21:56:29	00:04:13
54°	01:58:15	03:11:40	03:59:46	20:20:17	21:08:00	22:20:13	.. ..
56°	01:22:52	02:55:09	03:48:24	20:31:29	21:24:15	22:53:57	.. ..
58°	—:—	02:34:56	03:35:19	20:44:24	21:44:03	—:—	.. ..
S 60°	—:—	02:08:46	03:19:54	20:59:34	22:09:29	—:—	23:53:40

Jan 19	SHA	Mer.pass
Venus	21°22.2	14:43:26
Mars	111°01.9	08:44:03
Jupiter	78°16.6	10:54:07
Saturn	64°37.6	11:48:22

20 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:49:11	09:32:54	■	■	14:49:49	16:33:38	■
N 70°	07:36:10	09:03:53	11:09:34	13:13:01	15:18:46	16:46:34	06:36:09
68°	07:25:28	08:42:13	10:12:04	14:10:27	15:40:21	16:57:11	05:51:21
66°	07:16:26	08:25:05	09:38:49	14:43:39	15:57:26	17:06:09	05:21:59
64°	07:08:39	08:11:00	09:14:40	15:07:45	16:11:28	17:13:52	04:59:59
62°	07:01:49	07:59:07	08:55:42	15:26:41	16:23:18	17:20:39	04:42:26
60°	06:55:45	07:48:53	08:40:07	15:42:13	16:33:30	17:26:40	04:27:56
N 58°	06:50:16	07:39:55	08:26:57	15:55:21	16:42:25	17:32:06	04:15:38
56°	06:45:17	07:31:58	08:15:35	16:06:41	16:50:20	17:37:02	04:05:00
54°	06:40:42	07:24:49	08:05:37	16:16:38	16:57:26	17:41:35	03:55:40
52°	06:36:26	07:18:21	07:56:45	16:25:28	17:03:53	17:45:49	03:47:22
50°	06:32:27	07:12:25	07:48:47	16:33:24	17:09:47	17:49:46	03:39:55
45°	06:23:25	06:59:29	07:31:50	16:50:17	17:22:39	17:58:43	03:24:05
N 40°	06:15:22	06:48:29	07:17:55	17:04:08	17:33:35	18:06:43	03:11:08
35°	06:07:56	06:38:49	07:06:05	17:15:56	17:43:12	18:14:05	03:00:10
30°	06:00:55	06:30:05	06:55:42	17:26:16	17:51:53	18:21:03	02:50:36
20°	05:47:27	06:14:22	06:37:47	17:44:05	18:07:31	18:34:25	02:34:13
N 10°	05:33:57	05:59:45	06:22:04	17:59:44	18:22:02	18:47:49	02:20:01
0°	05:19:35	05:45:12	06:07:13	18:14:30	18:36:30	19:02:06	02:06:47
S 10°	05:03:21	05:29:45	05:52:15	18:29:22	18:51:51	19:18:13	01:53:37
20°	04:43:55	05:12:14	05:36:07	18:45:24	19:09:15	19:37:31	01:39:39
30°	04:18:57	04:50:55	05:17:25	19:03:58	19:30:25	20:02:17	01:23:44
35°	04:03:05	04:37:55	05:06:26	19:14:52	19:43:18	20:18:01	01:14:32
40°	03:43:38	04:22:33	04:53:47	19:27:24	19:58:32	20:37:17	01:04:05
45°	03:18:40	04:03:44	04:38:47	19:42:16	20:17:10	21:01:59	00:51:52
S 50°	02:44:02	03:39:34	04:20:16	20:00:35	20:41:04	21:36:04	00:37:06
52°	02:25:23	03:27:39	04:11:29	20:09:16	20:52:49	21:54:21	00:30:13
54°	02:01:41	03:13:54	04:01:38	20:19:00	21:06:22	22:17:25	00:22:37
56°	01:27:59	02:57:41	03:50:28	20:30:01	21:22:18	22:49:37	00:14:08
58°	—:—	02:37:55	03:37:35	20:42:43	21:41:39	—:—	00:04:35
S 60°	—:—	02:12:31	03:22:27	20:57:35	22:06:21	—:—	.. ..

Jan 20	SHA	Mer.pass
Venus	20°14.6	14:43:59
Mars	110°18.5	08:43:00
Jupiter	78°01.9	10:51:09
Saturn	64°30.1	11:44:56

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Mer. Pass. Upper Lower hh:mm:ss hh:mm:ss		Age
19	10:24	10:33	12:10:33	07:27:19 19:53:09	24(29%)
20	10:43	10:52	12:10:52	08:19:21 20:45:54	25(20%)

21 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:46:25	09:28:40	■	■	14:54:40	16:37:02	■
N 70°	07:33:48	09:00:38	11:00:25	13:22:47	15:22:38	16:49:34	■
68°	07:23:24	08:39:34	10:07:34	14:15:34	15:43:37	16:59:52	08:09:47
66°	07:14:36	08:22:50	09:35:34	14:47:30	16:00:17	17:08:35	07:11:01
64°	07:07:02	08:09:04	09:12:06	15:10:56	16:14:00	17:16:06	06:37:16
62°	07:00:23	07:57:25	08:53:33	15:29:26	16:25:36	17:22:42	06:12:41
60°	06:54:27	07:47:23	08:38:17	15:44:39	16:35:36	17:28:34	05:53:16
N 58°	06:49:06	07:38:35	08:25:21	15:57:33	16:44:21	17:33:52	05:37:16
56°	06:44:14	07:30:46	08:14:11	16:08:41	16:52:07	17:38:42	05:23:41
54°	06:39:45	07:23:45	08:04:22	16:18:28	16:59:06	17:43:08	05:11:56
52°	06:35:35	07:17:23	07:55:39	16:27:10	17:05:26	17:47:16	05:01:35
50°	06:31:41	07:11:33	07:47:48	16:34:59	17:11:14	17:51:08	04:52:21
45°	06:22:50	06:58:49	07:31:05	16:51:38	17:23:54	17:59:54	04:32:56
N 40°	06:14:55	06:47:59	07:17:22	17:05:18	17:34:41	18:07:45	04:17:12
35°	06:07:37	06:38:28	07:05:41	17:16:56	17:44:09	18:14:59	04:03:57
30°	06:00:43	06:29:51	06:55:26	17:27:08	17:52:42	18:21:50	03:52:25
20°	05:47:28	06:14:20	06:37:44	17:44:44	18:08:08	18:35:00	03:32:46
N 10°	05:34:09	05:59:55	06:22:11	18:00:12	18:22:28	18:48:13	03:15:44
0°	05:19:57	05:45:32	06:07:31	18:14:47	18:36:45	19:02:19	02:59:53
S 10°	05:03:54	05:30:15	05:52:44	18:29:29	18:51:56	19:18:15	02:44:05
20°	04:44:40	05:12:56	05:36:47	18:45:19	19:09:08	19:37:20	02:27:16
30°	04:19:59	04:51:51	05:18:18	19:03:40	19:30:03	20:01:50	02:08:02
35°	04:04:17	04:39:01	05:07:27	19:14:26	19:42:47	20:17:23	01:56:51
40°	03:45:04	04:23:50	04:54:58	19:26:48	19:57:50	20:36:25	01:44:04
45°	03:20:26	04:05:14	04:40:09	19:41:28	20:16:14	21:00:46	01:29:02
S 50°	02:46:23	03:41:24	04:21:54	19:59:32	20:39:47	21:34:18	01:10:39
52°	02:28:08	03:29:41	04:13:14	20:08:05	20:51:21	21:52:11	01:02:00
54°	02:05:06	03:16:10	04:03:32	20:17:40	21:04:40	22:14:36	00:52:21
56°	01:32:55	03:00:15	03:52:33	20:28:30	21:20:18	22:45:24	00:41:29
58°	—:—	02:40:55	03:39:53	20:40:58	21:39:13	—:—	00:29:05
S 60°	—:—	02:16:16	03:25:03	20:55:34	22:03:12	—:—	00:14:40

Jan 21	SHA	Mer.pass
Venus	19°07.4	14:44:30
Mars	109°35.1	08:41:58
Jupiter	77°47.3	10:48:11
Saturn	64°22.5	11:41:30

22 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:43:34	09:24:25	■	■	14:59:31	16:40:28	■
N 70°	07:31:21	08:57:20	10:52:08	13:31:39	15:26:31	16:52:36	■
68°	07:21:15	08:36:51	10:03:05	14:20:38	15:46:55	17:02:36	■
66°	07:12:43	08:20:32	09:32:18	14:51:22	16:03:10	17:11:04	08:52:53
64°	07:05:21	08:07:04	09:09:28	15:14:08	16:16:35	17:18:22	08:03:14
62°	06:58:52	07:55:40	08:51:22	15:32:12	16:27:56	17:24:47	07:32:02
60°	06:53:06	07:45:50	08:36:24	15:47:07	16:37:43	17:30:30	07:08:40
N 58°	06:47:53	07:37:12	08:23:43	15:59:46	16:46:18	17:35:40	06:49:54
56°	06:43:08	07:29:32	08:12:44	16:10:42	16:53:56	17:40:22	06:34:15
54°	06:38:45	07:22:38	08:03:05	16:20:19	17:00:48	17:44:43	06:20:49
52°	06:34:41	07:16:23	07:54:30	16:28:53	17:07:01	17:48:45	06:09:06
50°	06:30:52	07:10:39	07:46:46	16:36:35	17:12:43	17:52:31	05:58:42
45°	06:22:13	06:58:07	07:30:18	16:52:59	17:25:10	18:01:06	05:36:59
N 40°	06:14:27	06:47:28	07:16:46	17:06:27	17:35:46	18:08:47	05:19:29
35°	06:07:17	06:38:05	07:05:14	17:17:56	17:45:06	18:15:54	05:04:48
30°	06:00:30	06:29:36	06:55:07	17:28:00	17:53:32	18:22:38	04:52:03
20°	05:47:27	06:14:17	06:37:39	17:45:23	18:08:44	18:35:34	04:30:20
N 10°	05:34:20	06:00:03	06:22:18	18:00:39	18:22:53	18:48:36	04:11:33
0°	05:20:18	05:45:51	06:07:49	18:15:03	18:36:59	19:02:31	03:54:02
S 10°	05:04:27	05:30:45	05:53:12	18:29:34	18:51:59	19:18:16	03:36:35
20°	04:45:26	05:13:38	05:37:26	18:45:13	19:08:59	19:37:08	03:17:56
30°	04:21:01	04:52:48	05:19:11	19:03:20	19:29:39	20:01:21	02:56:31
35°	04:05:30	04:40:06	05:08:28	19:13:57	19:42:14	20:16:43	02:44:00
40°	03:46:31	04:25:07	04:56:09	19:26:10	19:57:06	20:35:31	02:29:39
45°	03:22:13	04:06:46	04:41:32	19:40:38	20:15:15	20:59:32	02:12:37
S 50°	02:48:45	03:43:16	04:23:32	19:58:26	20:38:28	21:32:29	01:51:38
52°	02:30:53	03:31:43	04:15:00	20:06:51	20:49:51	21:49:58	01:41:39
54°	02:08:30	03:18:26	04:05:28	20:16:17	21:02:56	22:11:46	01:30:26
56°	01:37:43	03:02:50	03:54:39	20:26:57	21:18:16	22:41:18	01:17:41
58°	00:35:34	02:43:57	03:42:13	20:39:11	21:36:45	23:34:31	01:02:55
S 60°	—:—	02:20:00	03:27:40	20:53:29	22:00:03	—:—	00:45:25

Jan 22	SHA	Mer.pass
Venus	18°00.4	14:45:01
Mars	108°51.5	08:40:55
Jupiter	77°32.8	10:45:13
Saturn	64°15.0	11:38:04

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper Mer.Pass. hh:mm:ss	Lower Mer.Pass. hh:mm:ss	Age
21	11:00	11:09	12:11:09	09:12:47	26(12%)
22	11:18	11:26	12:11:26	10:07:06	27(6%)

23 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:40:39	09:20:08	■	■	15:04:21	16:43:58	■
N 70°	07:28:50	08:53:58	10:44:28	13:39:53	15:30:26	16:55:41	■
68°	07:19:03	08:34:05	09:58:39	14:25:38	15:50:15	17:05:22	■
66°	07:10:46	08:18:10	09:28:59	14:55:13	16:06:06	17:13:34	10:00:02
64°	07:03:37	08:05:01	09:06:48	15:17:21	16:19:11	17:20:39	09:05:17
62°	06:57:19	07:53:52	08:49:07	15:35:00	16:30:17	17:26:53	08:32:33
60°	06:51:42	07:44:14	08:34:28	15:49:36	16:39:53	17:32:27	08:08:18
N 58°	06:46:38	07:35:46	08:22:02	16:02:00	16:48:17	17:37:29	07:48:56
56°	06:42:00	07:28:15	08:11:15	16:12:45	16:55:46	17:42:04	07:32:48
54°	06:37:43	07:21:29	08:01:46	16:22:12	17:02:30	17:46:18	07:19:01
52°	06:33:45	07:15:20	07:53:19	16:30:37	17:08:37	17:50:14	07:06:59
50°	06:30:01	07:09:43	07:45:42	16:38:12	17:14:12	17:53:55	06:56:19
45°	06:21:33	06:57:24	07:29:29	16:54:21	17:26:27	18:02:19	06:34:02
N 40°	06:13:57	06:46:54	07:16:09	17:07:38	17:36:53	18:09:50	06:16:06
35°	06:06:55	06:37:40	07:04:46	17:18:57	17:46:03	18:16:48	06:01:02
30°	06:00:16	06:29:19	06:54:47	17:28:53	17:54:21	18:23:25	05:47:57
20°	05:47:25	06:14:13	06:37:33	17:46:02	18:09:21	18:36:08	05:25:40
N 10°	05:34:29	06:00:11	06:22:24	18:01:05	18:23:18	18:48:58	05:06:22
0°	05:20:39	05:46:10	06:08:05	18:15:18	18:37:13	19:02:43	04:48:21
S 10°	05:04:59	05:31:15	05:53:39	18:29:39	18:52:01	19:18:15	04:30:21
20°	04:46:12	05:14:20	05:38:06	18:45:05	19:08:49	19:36:54	04:11:06
30°	04:22:03	04:53:45	05:20:04	19:02:58	19:29:14	20:00:50	03:48:55
35°	04:06:43	04:41:13	05:09:30	19:13:27	19:41:40	20:16:02	03:35:55
40°	03:47:59	04:26:24	04:57:20	19:25:30	19:56:20	20:34:35	03:20:58
45°	03:24:01	04:08:18	04:42:56	19:39:46	20:14:14	20:58:15	03:03:10
S 50°	02:51:07	03:45:09	04:25:12	19:57:17	20:37:07	21:30:38	02:41:07
52°	02:33:39	03:33:47	04:16:48	20:05:35	20:48:18	21:47:44	02:30:34
54°	02:11:53	03:20:44	04:07:24	20:14:51	21:01:09	22:08:56	02:18:41
56°	01:42:23	03:05:26	03:56:47	20:25:20	21:16:11	22:37:16	02:05:04
58°	00:49:11	02:46:59	03:44:34	20:37:21	21:34:15	23:24:52	01:49:11
S 60°	—:—	02:23:43	03:30:18	20:51:22	21:56:52	—:—	01:30:10

Jan 23	SHA	Mer.pass
Venus	16°53.7	14:45:31
Mars	108°07.9	08:39:53
Jupiter	77°18.2	10:42:15
Saturn	64°07.6	11:34:38

24 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:37:40	09:15:50	■	■	15:09:12	16:47:30	■
N 70°	07:26:14	08:50:34	10:37:15	13:47:37	15:34:22	16:58:49	■
68°	07:16:47	08:31:15	09:54:13	14:30:35	15:53:37	17:08:10	■
66°	07:08:46	08:15:45	09:25:39	14:59:06	16:09:03	17:16:07	10:20:24
64°	07:01:49	08:02:55	09:04:05	15:20:36	16:21:49	17:22:59	09:39:56
62°	06:55:43	07:52:01	08:46:50	15:37:49	16:32:40	17:29:02	09:12:01
60°	06:50:15	07:42:35	08:32:30	15:52:06	16:42:03	17:34:26	08:50:26
N 58°	06:45:19	07:34:17	08:20:18	16:04:16	16:50:18	17:39:19	08:32:49
56°	06:40:48	07:26:55	08:09:43	16:14:49	16:57:38	17:43:47	08:17:58
54°	06:36:38	07:20:17	08:00:23	16:24:06	17:04:14	17:47:54	08:05:09
52°	06:32:46	07:14:15	07:52:05	16:32:22	17:10:13	17:51:44	07:53:54
50°	06:29:08	07:08:44	07:44:36	16:39:50	17:15:43	17:55:20	07:43:53
45°	06:20:51	06:56:37	07:28:38	16:55:44	17:27:44	18:03:32	07:22:51
N 40°	06:13:25	06:46:19	07:15:29	17:08:48	17:37:59	18:10:53	07:05:48
35°	06:06:32	06:37:14	07:04:17	17:19:58	17:47:01	18:17:43	06:51:26
30°	05:59:59	06:29:00	06:54:26	17:29:45	17:55:11	18:24:12	06:38:56
20°	05:47:22	06:14:08	06:37:25	17:46:40	18:09:57	18:36:42	06:17:33
N 10°	05:34:38	06:00:17	06:22:28	18:01:32	18:23:42	18:49:20	05:58:59
0°	05:20:59	05:46:28	06:08:21	18:15:33	18:37:26	19:02:53	05:41:37
S 10°	05:05:31	05:31:44	05:54:06	18:29:42	18:52:03	19:18:14	05:24:14
20°	04:46:57	05:15:02	05:38:45	18:44:57	19:08:37	19:36:39	05:05:38
30°	04:23:06	04:54:42	05:20:58	19:02:35	19:28:47	20:00:18	04:44:11
35°	04:07:57	04:42:19	05:10:32	19:12:55	19:41:03	20:15:18	04:31:36
40°	03:49:27	04:27:42	04:58:32	19:24:48	19:55:32	20:33:36	04:17:08
45°	03:25:50	04:09:51	04:44:20	19:38:51	20:13:11	20:56:56	03:59:55
S 50°	02:53:30	03:47:02	04:26:52	19:56:07	20:35:43	21:28:44	03:38:36
52°	02:36:25	03:35:52	04:18:36	20:04:16	20:46:43	21:45:28	03:28:25
54°	02:15:15	03:23:03	04:09:22	20:13:23	20:59:20	22:06:05	03:16:57
56°	01:46:57	03:08:03	03:58:55	20:23:41	21:14:04	22:33:19	03:03:51
58°	00:59:23	02:50:01	03:46:57	20:35:28	21:31:42	23:16:46	02:48:36
S 60°	—:—	02:27:26	03:32:58	20:49:12	21:53:41	—:—	02:30:24

Jan 24	SHA	Mer.pass
Venus	15°47.3	14:45:59
Mars	107°24.2	08:38:52
Jupiter	77°03.7	10:39:17
Saturn	64°00.1	11:31:11

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper Mer.Pass. hh:mm:ss	Lower Mer.Pass. hh:mm:ss	Age
23	11:34	11:42	12:11:42	11:01:18	28(2%)
24	11:50	11:57	12:11:57	11:54:09	29(0%)

25 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:34:36	09:11:31	■	■	15:14:02	16:51:05	■
N 70°	07:23:35	08:47:07	10:30:23	13:54:59	15:38:20	17:01:59	■
68°	07:14:27	08:28:22	09:49:50	14:35:29	15:57:00	17:11:01	11:04:28
66°	07:06:42	08:13:17	09:22:17	15:02:58	16:12:01	17:18:41	10:24:46
64°	06:59:58	08:00:45	09:01:20	15:23:52	16:24:29	17:25:20	09:57:08
62°	06:54:03	07:50:06	08:44:29	15:40:39	16:35:05	17:31:12	09:35:49
60°	06:48:45	07:40:53	08:30:28	15:54:38	16:44:16	17:36:26	09:18:28
N 58°	06:43:57	07:32:46	08:18:31	16:06:33	16:52:19	17:41:11	09:03:54
56°	06:39:34	07:25:32	08:08:08	16:16:53	16:59:30	17:45:31	08:51:23
54°	06:35:31	07:19:02	07:58:58	16:26:01	17:05:58	17:49:32	08:40:26
52°	06:31:44	07:13:07	07:50:49	16:34:08	17:11:51	17:53:16	08:30:43
50°	06:28:12	07:07:42	07:43:27	16:41:28	17:17:14	17:56:46	08:22:01
45°	06:20:07	06:55:49	07:27:44	16:57:07	17:29:02	18:04:45	08:03:33
N 40°	06:12:51	06:45:41	07:14:48	17:09:59	17:39:06	18:11:57	07:48:28
35°	06:06:07	06:36:45	07:03:45	17:20:59	17:47:59	18:18:38	07:35:39
30°	05:59:42	06:28:40	06:54:03	17:30:37	17:56:01	18:24:59	07:24:28
20°	05:47:18	06:14:02	06:37:17	17:47:18	18:10:33	18:37:16	07:05:15
N 10°	05:34:46	06:00:23	06:22:32	18:01:57	18:24:05	18:49:42	06:48:29
0°	05:21:18	05:46:44	06:08:36	18:15:47	18:37:38	19:03:03	06:32:47
S 10°	05:06:02	05:32:13	05:54:33	18:29:44	18:52:03	19:18:11	06:17:03
20°	04:47:42	05:14:43	05:39:24	18:44:46	19:08:24	19:36:23	06:00:12
30°	04:24:08	04:55:39	05:21:51	19:02:10	19:28:19	19:59:44	05:40:47
35°	04:09:11	04:43:26	05:11:34	19:12:21	19:40:25	20:14:32	05:29:26
40°	03:50:55	04:29:00	04:59:45	19:24:04	19:54:41	20:32:36	05:16:23
45°	03:27:39	04:11:24	04:45:45	19:37:54	20:12:06	20:55:35	05:00:56
S 50°	02:55:54	03:48:57	04:28:34	19:54:53	20:34:16	21:26:49	04:41:54
52°	02:39:12	03:37:58	04:20:26	20:02:55	20:45:06	21:43:11	04:32:53
54°	02:18:36	03:25:23	04:11:21	20:11:52	20:57:29	22:03:14	04:22:46
56°	01:51:24	03:10:41	04:01:05	20:21:59	21:11:54	22:29:26	04:11:18
58°	01:07:59	02:53:04	03:49:20	20:33:32	21:29:08	23:09:36	03:58:05
S 60°	—:—	02:31:08	03:35:39	20:46:59	21:50:30	—:—	03:42:33

Jan 25	SHA	Mer.pass
Venus	14°41.1	14:46:27
Mars	106°40.4	08:37:51
Jupiter	76°49.3	10:36:18
Saturn	63°52.6	11:27:45

26 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:31:28	09:07:10	11:53:06	12:32:50	15:18:52	16:54:42	12:14:35
N 70°	07:20:52	08:43:38	10:23:49	14:02:03	15:42:18	17:05:11	11:21:50
68°	07:12:04	08:25:27	09:45:27	14:40:20	16:00:25	17:13:54	10:49:01
66°	07:04:34	08:10:46	09:18:54	15:06:50	16:15:01	17:21:18	10:24:54
64°	06:58:04	07:58:33	08:58:32	15:27:08	16:27:11	17:27:44	10:05:55
62°	06:52:20	07:48:09	08:42:06	15:43:31	16:37:31	17:33:24	09:50:21
60°	06:47:12	07:39:08	08:28:24	15:57:10	16:46:29	17:38:28	09:37:14
N 58°	06:42:33	07:31:12	08:16:41	16:08:51	16:54:22	17:43:04	09:25:58
56°	06:38:17	07:24:07	08:06:30	16:18:59	17:01:24	17:47:17	09:16:06
54°	06:34:21	07:17:45	07:57:31	16:27:56	17:07:44	17:51:10	09:07:22
52°	06:30:41	07:11:57	07:49:30	16:35:55	17:13:29	17:54:48	08:59:33
50°	06:27:14	07:06:38	07:42:16	16:43:07	17:18:46	17:58:12	08:52:29
45°	06:19:21	06:54:59	07:26:49	16:58:30	17:30:21	18:05:59	08:37:22
N 40°	06:12:15	06:45:02	07:14:04	17:11:11	17:40:13	18:13:01	08:24:53
35°	06:05:40	06:36:15	07:03:12	17:22:00	17:48:56	18:19:32	08:14:13
30°	05:59:23	06:28:18	06:53:38	17:31:30	17:56:50	18:25:46	08:04:51
20°	05:47:12	06:13:54	06:37:07	17:47:55	18:11:08	18:37:49	07:48:42
N 10°	05:34:52	06:00:27	06:22:34	18:02:22	18:24:28	18:50:03	07:34:33
0°	05:21:37	05:47:01	06:08:50	18:16:00	18:37:49	19:03:12	07:21:16
S 10°	05:06:33	05:32:41	05:54:59	18:29:46	18:52:02	19:18:08	07:07:57
20°	04:48:27	05:16:25	05:40:02	18:44:35	19:08:10	19:36:05	06:53:42
30°	04:25:11	04:56:36	05:22:45	19:01:43	19:27:48	19:59:08	06:37:18
35°	04:10:25	04:44:33	05:12:36	19:11:46	19:39:45	20:13:45	06:27:44
40°	03:52:24	04:30:19	05:00:57	19:23:18	19:53:49	20:31:34	06:16:48
45°	03:29:29	04:12:58	04:47:11	19:36:55	20:10:59	20:54:12	06:03:54
S 50°	02:58:18	03:50:52	04:30:16	19:53:38	20:32:48	21:24:52	05:48:10
52°	02:41:58	03:40:04	04:22:16	20:01:31	20:43:26	21:40:52	05:40:45
54°	02:21:57	03:27:43	04:13:21	20:10:19	20:55:35	22:00:23	05:32:31
56°	01:55:46	03:13:20	04:03:16	20:20:14	21:09:43	22:25:37	05:23:15
58°	01:15:39	02:56:08	03:51:45	20:31:34	21:26:32	23:03:03	05:12:43
S 60°	—:—	02:34:48	03:38:21	20:44:44	21:47:18	—:—	05:00:33

Jan 26	SHA	Mer.pass
Venus	13°35.2	14:46:53
Mars	105°56.6	08:36:50
Jupiter	76°34.9	10:33:20
Saturn	63°45.2	11:24:19

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
25	12:05	12:12	12:12:12	12:44:43	00:19:46	1(0%)
26	12:19	12:25	12:12:25	13:32:32	01:08:59	2(3%)

27 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:28:17	09:02:49	11:28:36	12:57:48	15:23:41	16:58:22	11:23:45
N 70°	07:18:05	08:40:06	10:17:29	14:08:50	15:46:18	17:08:26	10:58:29
68°	07:09:37	08:22:28	09:41:06	14:45:09	16:03:51	17:16:48	10:39:06
66°	07:02:23	08:08:11	09:15:29	15:10:42	16:18:03	17:23:56	10:23:33
64°	06:56:07	07:56:17	08:55:42	15:30:25	16:29:53	17:30:08	10:10:41
62°	06:50:34	07:46:08	08:39:41	15:46:23	16:39:58	17:35:37	09:59:48
60°	06:45:36	07:37:20	08:26:17	15:59:44	16:48:44	17:40:31	09:50:25
N 58°	06:41:05	07:29:34	08:14:49	16:11:09	16:56:26	17:44:58	09:42:14
56°	06:36:58	07:22:39	08:04:50	16:21:06	17:03:18	17:49:03	09:34:59
54°	06:33:08	07:16:25	07:56:01	16:29:53	17:09:30	17:52:49	09:28:31
52°	06:29:34	07:10:45	07:48:09	16:37:43	17:15:08	17:56:21	09:22:40
50°	06:26:13	07:05:32	07:41:02	16:44:47	17:20:19	17:59:40	09:17:21
45°	06:18:33	06:54:07	07:25:51	16:59:54	17:31:39	18:07:14	09:05:53
N 40°	06:11:38	06:44:21	07:13:19	17:12:22	17:41:21	18:14:05	08:56:20
35°	06:05:11	06:35:44	07:02:37	17:23:01	17:49:54	18:20:27	08:48:08
30°	05:59:02	06:27:54	06:53:12	17:32:22	17:57:40	18:26:33	08:40:54
20°	05:47:06	06:13:45	06:36:55	17:48:33	18:11:43	18:38:22	08:28:22
N 10°	05:34:58	06:00:31	06:22:36	18:02:46	18:24:51	18:50:23	08:17:21
0°	05:21:54	05:47:16	06:09:04	18:16:13	18:37:59	19:03:20	08:06:59
S 10°	05:07:03	05:33:08	05:55:24	18:29:46	18:52:00	19:18:03	07:56:36
20°	04:49:11	05:17:06	05:40:41	18:44:22	19:07:55	19:35:46	07:45:29
30°	04:26:13	04:57:33	05:23:38	19:01:15	19:27:17	19:58:31	07:32:45
35°	04:11:39	04:45:40	05:13:39	19:11:09	19:39:03	20:12:56	07:25:20
40°	03:53:54	04:31:38	05:02:11	19:22:30	19:52:55	20:30:30	07:16:53
45°	03:31:19	04:14:33	04:48:37	19:35:54	20:09:49	20:52:47	07:07:00
S 50°	03:00:43	03:52:48	04:31:58	19:52:20	20:31:17	21:22:53	06:55:00
52°	02:44:45	03:42:12	04:24:07	20:00:05	20:41:43	21:38:31	06:49:25
54°	02:25:15	03:30:04	04:15:21	20:08:43	20:53:39	21:57:31	06:43:14
56°	02:00:03	03:15:59	04:05:28	20:18:27	21:07:29	22:21:51	06:36:20
58°	01:22:39	02:59:11	03:54:11	20:29:33	21:23:55	22:56:58	06:28:34
S 60°	—:—	02:38:28	03:41:04	20:42:26	21:44:05	—:—	06:19:42

Jan 27	SHA	Mer.pass
Venus	12°29.6	14:47:19
Mars	105°12.7	08:35:49
Jupiter	76°20.5	10:30:21
Saturn	63°37.7	11:20:52

28 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:25:01	08:58:26	11:13:14	13:13:36	15:28:30	17:02:04	10:56:54
N 70°	07:15:15	08:36:31	10:11:20	14:15:25	15:50:18	17:11:43	10:42:38
68°	07:07:06	08:19:26	09:36:45	14:49:55	16:07:18	17:19:45	10:31:06
66°	07:00:09	08:05:34	09:12:02	15:14:34	16:21:06	17:26:37	10:21:31
64°	06:54:06	07:53:59	08:52:50	15:33:42	16:32:37	17:32:35	10:13:25
62°	06:48:45	07:44:05	08:37:13	15:49:16	16:42:27	17:37:51	10:06:26
60°	06:43:57	07:35:29	08:24:08	16:02:19	16:50:59	17:42:36	10:00:21
N 58°	06:39:35	07:27:55	08:12:54	16:13:29	16:58:31	17:46:54	09:54:59
56°	06:35:35	07:21:09	08:03:07	16:23:14	17:05:14	17:50:50	09:50:12
54°	06:31:53	07:15:03	07:54:29	16:31:50	17:11:17	17:54:30	09:45:53
52°	06:28:26	07:09:30	07:46:45	16:39:31	17:16:48	17:57:55	09:41:59
50°	06:25:10	07:04:24	07:39:47	16:46:28	17:21:52	18:01:07	09:38:25
45°	06:17:43	06:53:12	07:24:51	17:01:19	17:32:59	18:08:29	09:30:40
N 40°	06:10:58	06:43:38	07:12:32	17:13:34	17:42:29	18:15:09	09:24:11
35°	06:04:40	06:35:10	07:02:00	17:24:02	17:50:52	18:21:22	09:18:35
30°	05:58:40	06:27:29	06:52:44	17:33:14	17:58:29	18:27:19	09:13:38
20°	05:46:58	06:13:34	06:36:43	17:49:10	18:12:18	18:38:54	09:05:02
N 10°	05:35:03	06:00:33	06:22:36	18:03:10	18:25:13	18:50:42	08:57:27
0°	05:22:11	05:47:31	06:09:16	18:16:24	18:38:09	19:03:27	08:50:19
S 10°	05:07:33	05:33:35	05:55:49	18:29:45	18:51:57	19:17:57	08:43:10
20°	04:49:56	05:17:46	05:41:19	18:44:08	19:07:38	19:35:25	08:35:31
30°	04:27:16	04:58:30	05:24:31	19:00:46	19:26:43	19:57:52	08:26:47
35°	04:12:54	04:46:47	05:14:41	19:10:30	19:38:19	20:12:05	08:21:43
40°	03:55:23	04:32:58	05:03:24	19:21:40	19:52:00	20:29:24	08:15:57
45°	03:33:10	04:16:08	04:50:03	19:34:52	20:08:38	20:51:19	08:09:14
S 50°	03:03:08	03:54:44	04:33:42	19:51:00	20:29:44	21:20:52	08:01:09
52°	02:47:31	03:44:19	04:25:59	19:58:37	20:39:59	21:36:09	07:57:24
54°	02:28:33	03:32:26	04:17:23	20:07:05	20:51:40	21:54:38	07:53:16
56°	02:04:15	03:18:38	04:07:41	20:16:38	21:05:13	22:18:07	07:48:42
58°	01:29:10	03:02:14	03:56:37	20:27:30	21:21:16	22:51:14	07:43:35
S 60°	—:—	02:42:06	03:43:47	20:40:06	21:40:52	—:—	07:37:48

Jan 28	SHA	Mer.pass
Venus	11°24.1	14:47:43
Mars	104°28.7	08:34:48
Jupiter	76°06.2	10:27:22
Saturn	63°30.3	11:17:26

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
27	12:32	12:38	12:12:38	14:17:38	01:55:24	3(7%)
28	12:44	12:50	12:12:50	15:00:29	02:39:18	4(12%)

29 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:21:42	08:54:02	11:00:51	13:26:22	15:33:18	17:05:48	10:36:27
N 70°	07:12:21	08:32:55	10:05:21	14:21:47	15:54:19	17:15:01	10:29:37
68°	07:04:32	08:16:22	09:32:26	14:54:38	16:10:47	17:22:43	10:23:57
66°	06:57:51	08:02:54	09:08:35	15:18:25	16:24:10	17:29:18	10:19:12
64°	06:52:02	07:51:37	08:49:56	15:37:00	16:35:22	17:35:03	10:15:07
62°	06:46:53	07:41:59	08:34:43	15:52:10	16:44:57	17:40:07	10:11:35
60°	06:42:15	07:33:36	08:21:56	16:04:54	16:53:16	17:44:41	10:08:29
N 58°	06:38:03	07:26:12	08:10:57	16:15:50	17:00:37	17:48:50	10:05:43
56°	06:34:11	07:19:36	08:01:22	16:25:22	17:07:10	17:52:39	10:03:15
54°	06:30:36	07:13:38	07:52:54	16:33:48	17:13:05	17:56:11	10:01:02
52°	06:27:15	07:08:13	07:45:19	16:41:20	17:18:29	17:59:29	09:59:00
50°	06:24:05	07:03:13	07:38:29	16:48:09	17:23:26	18:02:36	09:57:09
45°	06:16:51	06:52:16	07:23:49	17:02:44	17:34:18	18:09:44	09:53:07
N 40°	06:10:17	06:42:53	07:11:43	17:14:46	17:43:37	18:16:14	09:49:43
35°	06:04:08	06:34:35	07:01:22	17:25:04	17:51:50	18:22:18	09:46:47
30°	05:58:16	06:27:03	06:52:15	17:34:07	17:59:19	18:28:06	09:44:11
20°	05:46:48	06:13:23	06:36:29	17:49:46	18:12:52	18:39:26	09:39:40
N 10°	05:35:06	06:00:35	06:22:36	18:03:33	18:25:34	18:51:01	09:35:41
0°	05:22:27	05:47:44	06:09:28	18:16:35	18:38:18	19:03:33	09:31:55
S 10°	05:08:02	05:34:02	05:56:13	18:29:43	18:51:53	19:17:51	09:28:10
20°	04:50:39	05:18:26	05:41:56	18:43:53	19:07:20	19:35:04	09:24:09
30°	04:28:18	04:59:27	05:25:25	19:00:15	19:26:09	19:57:12	09:19:35
35°	04:14:08	04:47:54	05:15:44	19:09:49	19:37:34	20:11:13	09:16:56
40°	03:56:53	04:34:17	05:04:37	19:20:48	19:51:02	20:28:16	09:13:57
45°	03:35:01	04:17:43	04:51:30	19:33:47	20:07:24	20:49:50	09:10:28
S 50°	03:05:32	03:56:41	04:35:26	19:49:38	20:28:09	21:18:49	09:06:17
52°	02:50:17	03:46:28	04:27:51	19:57:06	20:38:13	21:33:46	09:04:21
54°	02:31:49	03:34:48	04:19:25	20:05:25	20:49:40	21:51:46	09:02:15
56°	02:08:23	03:21:18	04:09:55	20:14:46	21:02:56	22:14:26	08:59:54
58°	01:35:17	03:05:18	03:59:05	20:25:25	21:18:35	22:45:48	08:57:18
S 60°	—:—	02:45:44	03:46:32	20:37:44	21:37:38	—:—	08:54:23

Jan 29	SHA	Mer.pass
Venus	10°18.9	14:48:07
Mars	103°44.6	08:33:48
Jupiter	75°52.0	10:24:22
Saturn	63°23.0	11:13:59

30 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:18:19	08:49:37	10:50:07	13:37:29	15:38:05	17:09:34	10:18:18
N 70°	07:09:23	08:29:16	09:59:31	14:28:00	15:58:20	17:18:22	10:17:42
68°	07:01:54	08:13:15	09:28:07	14:59:19	16:14:16	17:25:44	10:17:11
66°	06:55:30	08:00:11	09:05:06	15:22:16	16:27:15	17:32:02	10:16:45
64°	06:49:55	07:49:13	08:47:00	15:40:18	16:38:08	17:37:32	10:16:23
62°	06:44:58	07:39:50	08:32:10	15:55:04	16:47:27	17:42:24	10:16:04
60°	06:40:30	07:31:40	08:19:41	16:07:30	16:55:34	17:46:48	10:15:47
N 58°	06:36:27	07:24:27	08:08:58	16:18:11	17:02:44	17:50:47	10:15:32
56°	06:32:43	07:18:01	07:59:35	16:27:31	17:09:07	17:54:28	10:15:19
54°	06:29:16	07:12:11	07:51:17	16:35:46	17:14:54	17:57:52	10:15:07
52°	06:26:01	07:06:53	07:43:52	16:43:10	17:20:10	18:01:04	10:14:56
50°	06:22:58	07:02:01	07:37:09	16:49:51	17:25:00	18:04:05	10:14:46
45°	06:15:57	06:51:17	07:22:46	17:04:09	17:35:38	18:11:00	10:14:24
N 40°	06:09:33	06:42:06	07:10:52	17:15:58	17:44:45	18:17:18	10:14:07
35°	06:03:35	06:33:58	07:00:42	17:26:05	17:52:48	18:23:13	10:13:51
30°	05:57:50	06:26:35	06:51:44	17:34:59	18:00:08	18:28:53	10:13:38
20°	05:46:38	06:13:10	06:36:14	17:50:23	18:13:26	18:39:58	10:13:15
N 10°	05:35:09	06:00:35	06:22:34	18:03:56	18:25:54	18:51:20	10:12:55
0°	05:22:43	05:47:57	06:09:39	18:16:45	18:38:26	19:03:39	10:12:37
S 10°	05:08:31	05:34:28	05:56:37	18:29:41	18:51:48	19:17:43	10:12:20
20°	04:51:23	05:19:06	05:42:33	18:43:36	19:07:01	19:34:41	10:12:02
30°	04:29:21	05:00:24	05:26:18	18:59:42	19:25:32	19:56:30	10:11:42
35°	04:15:23	04:49:01	05:16:47	19:09:07	19:36:47	20:10:19	10:11:31
40°	03:58:23	04:35:37	05:05:51	19:19:55	19:50:03	20:27:06	10:11:19
45°	03:36:52	04:19:19	04:52:57	19:32:40	20:06:09	20:48:20	10:11:04
S 50°	03:07:57	03:58:39	04:37:10	19:48:14	20:26:32	21:16:45	10:10:48
52°	02:53:02	03:48:37	04:29:44	19:55:34	20:36:24	21:31:22	10:10:40
54°	02:35:04	03:37:11	04:21:27	20:03:43	20:47:38	21:48:53	10:10:32
56°	02:12:26	03:23:58	04:12:09	20:12:52	21:00:36	22:10:48	10:10:23
58°	01:41:07	03:08:21	04:01:32	20:23:18	21:15:53	22:40:35	10:10:12
S 60°	00:36:43	02:49:20	03:49:16	20:35:19	21:34:24	23:34:01	10:10:01

Jan 30	SHA	Mer.pass
Venus	9°14.0	14:48:30
Mars	103°00.5	08:32:48
Jupiter	75°37.8	10:21:23
Saturn	63°15.6	11:10:33

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Mer. Pass. Upper Lower hh:mm:ss hh:mm:ss		Age
29	12:56	13:02	12:13:02	15:41:47 03:21:16	5(19%)
30	13:07	13:12	12:13:12	16:22:24 04:02:07	6(27%)



31 January 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:14:53	08:45:12	10:40:26	13:47:31	15:42:52	17:13:21	10:00:22
N 70°	07:06:22	08:25:35	09:53:48	14:34:04	16:02:22	17:21:44	10:05:54
68°	06:59:13	08:10:05	09:23:49	15:03:57	16:17:46	17:28:45	10:10:29
66°	06:53:06	07:57:25	09:01:36	15:26:07	16:30:21	17:34:47	10:14:21
64°	06:47:45	07:46:46	08:44:02	15:43:37	16:40:56	17:40:02	10:17:40
62°	06:43:00	07:37:39	08:29:36	15:57:59	16:49:59	17:44:43	10:20:32
60°	06:38:43	07:29:42	08:17:25	16:10:07	16:57:53	17:48:55	10:23:04
N 58°	06:34:49	07:22:40	08:06:56	16:20:33	17:04:51	17:52:46	10:25:19
56°	06:31:14	07:16:23	07:57:46	16:29:40	17:11:05	17:56:18	10:27:21
54°	06:27:53	07:10:42	07:49:38	16:37:46	17:16:43	17:59:35	10:29:10
52°	06:24:46	07:05:31	07:42:21	16:45:00	17:21:52	18:02:40	10:30:50
50°	06:21:48	07:00:46	07:35:46	16:51:33	17:26:35	18:05:34	10:32:21
45°	06:15:00	06:50:17	07:21:40	17:05:34	17:36:58	18:12:16	10:35:40
N 40°	06:08:48	06:41:18	07:09:59	17:17:10	17:45:53	18:18:23	10:38:28
35°	06:02:59	06:33:20	07:00:00	17:27:06	17:53:46	18:24:08	10:40:54
30°	05:57:24	06:26:06	06:51:12	17:35:50	18:00:57	18:29:39	10:43:03
20°	05:46:26	06:12:56	06:35:57	17:50:58	18:14:00	18:40:29	10:46:49
N 10°	05:35:10	06:00:34	06:22:31	18:04:18	18:26:14	18:51:38	10:50:10
0°	05:22:57	05:48:09	06:09:49	18:16:54	18:38:33	19:03:43	10:53:20
S 10°	05:08:59	05:34:53	05:57:00	18:29:37	18:51:42	19:17:34	10:56:31
20°	04:52:06	05:19:46	05:43:10	18:43:18	19:06:40	19:34:16	10:59:57
30°	04:30:23	05:01:20	05:27:11	18:59:08	19:24:54	19:55:46	11:03:53
35°	04:16:37	04:50:09	05:17:49	19:08:23	19:35:59	20:09:23	11:06:09
40°	03:59:53	04:36:57	05:07:05	19:19:00	19:49:02	20:25:55	11:08:45
45°	03:38:43	04:20:55	04:54:25	19:31:31	20:04:52	20:46:47	11:11:46
S 50°	03:10:22	04:00:36	04:38:55	19:46:48	20:24:53	21:14:40	11:15:24
52°	02:55:47	03:50:46	04:31:37	19:53:59	20:34:34	21:28:57	11:17:04
54°	02:38:18	03:39:34	04:23:31	20:01:58	20:45:34	21:46:00	11:18:55
56°	02:16:25	03:26:38	04:14:23	20:10:56	20:58:15	22:07:11	11:20:57
58°	01:46:40	03:11:23	04:04:01	20:21:08	21:13:10	22:35:33	11:23:13
S 60°	00:53:16	02:52:55	03:52:02	20:32:53	21:31:10	23:22:38	11:25:46

Jan 31	SHA	Mer.pass
Venus	8°09.2	14:48:52
Mars	102°16.3	08:31:49
Jupiter	75°23.6	10:18:23
Saturn	63°08.2	11:07:06

01 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:11:23	08:40:45	10:31:30	13:56:46	15:47:38	17:17:11	09:40:41
N 70°	07:03:17	08:21:52	09:48:11	14:39:59	16:06:24	17:25:08	09:53:18
68°	06:56:29	08:06:53	09:19:32	15:08:33	16:21:17	17:31:49	10:03:34
66°	06:50:39	07:54:37	08:58:05	15:29:56	16:33:28	17:37:33	10:12:08
64°	06:45:32	07:44:17	08:41:02	15:46:55	16:43:44	17:42:34	10:19:24
62°	06:40:59	07:35:25	08:26:59	16:00:55	16:52:32	17:47:02	10:25:40
60°	06:36:53	07:27:41	08:15:06	16:12:44	17:00:12	17:51:04	10:31:09
N 58°	06:33:08	07:20:50	08:04:52	16:22:55	17:06:59	17:54:45	10:35:59
56°	06:29:41	07:14:43	07:55:54	16:31:51	17:13:04	17:58:08	10:40:19
54°	06:26:29	07:09:11	07:47:57	16:39:45	17:18:33	18:01:18	10:44:13
52°	06:23:28	07:04:07	07:40:49	16:46:50	17:23:34	18:04:16	10:47:45
50°	06:20:37	06:59:29	07:34:22	16:53:15	17:28:10	18:07:04	10:50:59
45°	06:14:02	06:49:14	07:20:32	17:07:00	17:38:19	18:13:32	10:58:01
N 40°	06:08:02	06:40:27	07:09:05	17:18:23	17:47:01	18:19:28	11:03:56
35°	06:02:22	06:32:40	06:59:17	17:28:07	17:54:44	18:25:03	11:09:02
30°	05:56:55	06:25:35	06:50:38	17:36:42	18:01:46	18:30:25	11:13:34
20°	05:46:13	06:12:40	06:35:40	17:51:34	18:14:33	18:41:00	11:21:27
N 10°	05:35:11	06:00:33	06:22:28	18:04:39	18:26:34	18:51:55	11:28:26
0°	05:23:11	05:48:21	06:09:59	18:17:02	18:38:39	19:03:47	11:35:01
S 10°	05:09:26	05:35:17	05:57:22	18:29:32	18:51:35	19:17:24	11:41:39
20°	04:52:49	05:20:25	05:43:46	18:42:59	19:06:19	19:33:51	11:48:45
30°	04:31:25	05:02:17	05:28:03	18:58:32	19:24:15	19:55:02	11:56:55
35°	04:17:52	04:51:16	05:18:52	19:07:38	19:35:09	20:08:26	12:01:39
40°	04:01:23	04:38:17	05:08:19	19:18:03	19:47:59	20:24:42	12:07:02
45°	03:40:34	04:22:31	04:55:52	19:30:20	20:03:33	20:45:13	12:13:19
S 50°	03:12:46	04:02:34	04:40:40	19:45:20	20:23:12	21:12:33	12:20:54
52°	02:58:31	03:52:55	04:33:31	19:52:22	20:32:42	21:26:30	12:24:25
54°	02:41:30	03:41:57	04:25:34	20:00:11	20:43:29	21:43:06	12:28:17
56°	02:20:21	03:29:18	04:16:39	20:08:58	20:55:53	22:03:37	12:32:34
58°	01:52:01	03:14:26	04:06:30	20:18:56	21:10:26	22:30:41	12:37:22
S 60°	01:04:58	02:56:28	03:54:47	20:30:25	21:27:56	23:13:15	12:42:47

Feb 01	SHA	Mer.pass
Venus	7°04.7	14:49:13
Mars	101°32.0	08:30:49
Jupiter	75°09.5	10:15:23
Saturn	63°00.9	11:03:39

Day	Sun		Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Mer.Pass. Upper Lower hh:mm:ss hh:mm:ss		Age
31	13:17	13:22	12:13:22	17:03:14	7(35%)
01	13:26	13:30	12:13:30	17:45:18	8(45%)

02 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:07:49	08:36:17	10:23:07	14:05:26	15:52:23	17:21:03	09:15:48
N 70°	07:00:09	08:18:07	09:42:40	14:45:47	16:10:27	17:28:34	09:38:25
68°	06:53:42	08:03:39	09:15:15	15:13:07	16:24:48	17:34:54	09:56:02
66°	06:48:09	07:51:46	08:54:32	15:33:45	16:36:36	17:40:21	10:10:19
64°	06:43:16	07:41:45	08:38:00	15:50:14	16:46:33	17:45:07	10:22:11
62°	06:38:56	07:33:09	08:24:20	16:03:50	16:55:05	17:49:23	10:32:17
60°	06:35:00	07:25:37	08:12:45	16:15:21	17:02:32	17:53:14	10:41:01
N 58°	06:31:25	07:18:58	08:02:46	16:25:18	17:09:08	17:56:45	10:48:39
56°	06:28:07	07:13:00	07:54:00	16:34:01	17:15:03	18:00:00	10:55:26
54°	06:25:01	07:07:37	07:46:13	16:41:45	17:20:24	18:03:02	11:01:30
52°	06:22:07	07:02:41	07:39:15	16:48:41	17:25:16	18:05:53	11:06:59
50°	06:19:23	06:58:10	07:32:56	16:54:58	17:29:46	18:08:35	11:11:58
45°	06:13:02	06:48:10	07:19:23	17:08:26	17:39:39	18:14:49	11:22:46
N 40°	06:07:13	06:39:35	07:08:09	17:19:35	17:48:10	18:20:33	11:31:47
35°	06:01:44	06:31:58	06:58:32	17:29:08	17:55:42	18:25:58	11:39:32
30°	05:56:25	06:25:02	06:50:03	17:37:33	18:02:34	18:31:11	11:46:23
20°	05:45:58	06:12:24	06:35:21	17:52:09	18:15:06	18:41:31	11:58:17
N 10°	05:35:10	06:00:30	06:22:23	18:05:00	18:26:52	18:52:11	12:08:47
0°	05:23:24	05:48:31	06:10:07	18:17:09	18:38:44	19:03:50	12:18:40
S 10°	05:09:53	05:35:41	05:57:44	18:29:26	18:51:27	19:17:13	12:28:37
20°	04:53:31	05:21:03	05:44:22	18:42:39	19:05:56	19:33:24	12:39:17
30°	04:32:27	05:03:13	05:28:56	18:57:55	19:23:34	19:54:15	12:51:33
35°	04:19:06	04:52:23	05:19:54	19:06:51	19:34:17	20:07:27	12:58:41
40°	04:02:53	04:39:37	05:09:33	19:17:05	19:46:54	20:23:28	13:06:50
45°	03:42:26	04:24:07	04:57:20	19:29:08	20:02:12	20:43:37	13:16:23
S 50°	03:15:10	04:04:32	04:42:26	19:43:49	20:21:29	21:10:25	13:27:57
52°	03:01:15	03:55:04	04:35:25	19:50:43	20:30:48	21:24:03	13:33:21
54°	02:44:41	03:44:20	04:27:38	19:58:23	20:41:21	21:40:13	13:39:19
56°	02:24:12	03:31:58	04:18:54	20:06:58	20:53:29	22:00:04	13:45:58
58°	01:57:10	03:17:28	04:08:59	20:16:42	21:07:40	22:25:58	13:53:27
S 60°	01:14:39	03:00:00	03:57:33	20:27:55	21:24:41	23:05:02	14:01:59

Feb 02	SHA	Mer.pass
Venus	6°00.3	14:49:33
Mars	100°47.7	08:29:50
Jupiter	74°55.5	10:12:23
Saturn	62°53.6	11:00:12

03 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:04:13	08:31:49	10:15:11	14:13:38	15:57:07	17:24:56	08:33:22
N 70°	06:56:58	08:14:20	09:37:14	14:51:29	16:14:29	17:32:01	09:17:30
68°	06:50:51	08:00:23	09:10:59	15:17:38	16:28:20	17:38:00	09:47:04
66°	06:45:35	07:48:53	08:50:59	15:37:34	16:39:45	17:43:10	10:09:20
64°	06:40:57	07:39:11	08:34:57	15:53:32	16:49:22	17:47:42	10:27:06
62°	06:36:49	07:30:50	08:21:40	16:06:46	16:57:39	17:51:45	10:41:46
60°	06:33:05	07:23:32	08:10:23	16:17:59	17:04:53	17:55:24	10:54:12
N 58°	06:29:40	07:17:04	08:00:37	16:27:41	17:11:18	17:58:46	11:04:55
56°	06:26:30	07:11:16	07:52:04	16:36:12	17:17:02	18:01:52	11:14:19
54°	06:23:32	07:06:01	07:44:28	16:43:45	17:22:14	18:04:46	11:22:40
52°	06:20:45	07:01:13	07:37:39	16:50:32	17:26:59	18:07:30	11:30:09
50°	06:18:07	06:56:48	07:31:28	16:56:41	17:31:22	18:10:06	11:36:56
45°	06:12:00	06:47:04	07:18:12	17:09:52	17:41:00	18:16:06	11:51:28
N 40°	06:06:23	06:38:42	07:07:11	17:20:47	17:49:18	18:21:38	12:03:30
35°	06:01:03	06:31:15	06:57:45	17:30:09	17:56:40	18:26:52	12:13:48
30°	05:55:54	06:24:28	06:49:26	17:38:24	18:03:23	18:31:57	12:22:51
20°	05:45:43	06:12:06	06:35:01	17:52:43	18:15:38	18:42:01	12:38:31
N 10°	05:35:09	06:00:26	06:22:17	18:05:20	18:27:10	18:52:27	12:52:16
0°	05:23:36	05:48:41	06:10:15	18:17:16	18:38:49	19:03:52	13:05:13
S 10°	05:10:19	05:36:04	05:58:05	18:29:19	18:51:18	19:17:01	13:18:14
20°	04:54:13	05:21:42	05:44:58	18:42:17	19:05:31	19:32:56	13:32:12
30°	04:33:28	05:04:09	05:29:48	18:57:17	19:22:52	19:53:28	13:48:17
35°	04:20:20	04:53:30	05:20:56	19:06:03	19:33:24	20:06:27	13:57:40
40°	04:04:23	04:40:57	05:10:47	19:16:05	19:45:48	20:22:12	14:08:26
45°	03:44:17	04:25:43	04:58:48	19:27:54	20:00:49	20:42:00	14:21:07
S 50°	03:17:33	04:06:30	04:44:12	19:42:17	20:19:45	21:08:16	14:36:37
52°	03:03:58	03:57:14	04:37:20	19:49:03	20:28:53	21:21:35	14:43:55
54°	02:47:50	03:46:43	04:29:43	19:56:32	20:39:12	21:37:20	14:52:02
56°	02:28:01	03:34:38	04:21:10	20:04:56	20:51:03	21:56:33	15:01:09
58°	02:02:09	03:20:29	04:11:28	20:14:27	21:04:54	22:21:22	15:11:32
S 60°	01:23:08	03:03:31	04:00:19	20:25:23	21:21:26	22:57:35	15:23:30

Feb 03	SHA	Mer.pass
Venus	4°56.1	14:49:53
Mars	100°03.3	08:28:51
Jupiter	74°41.5	10:09:23
Saturn	62°46.4	10:56:45

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
02	13:34	13:38	12:13:38	18:29:34	9(54%)
03	13:42	13:45	12:13:45	19:16:54	10(64%)

04 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:00:33	08:27:20	10:07:36	14:21:27	16:01:51	17:28:50	☐ ☐
N 70°	06:53:44	08:10:31	09:31:53	14:57:04	16:18:32	17:35:30	08:27:25 06:44:32
68°	06:47:58	07:57:04	09:06:44	15:22:08	16:31:53	17:41:08	09:34:03 05:38:44
66°	06:42:59	07:45:58	08:47:25	15:41:22	16:42:54	17:46:00	10:10:15 05:03:17
64°	06:38:36	07:36:34	08:31:52	15:56:50	16:52:13	17:50:17	10:36:15 04:37:58
62°	06:34:41	07:28:29	08:18:57	16:09:42	17:00:14	17:54:07	10:56:35 04:18:14
60°	06:31:07	07:21:24	08:07:58	16:20:37	17:07:15	17:57:36	11:13:15 04:02:08
N 58°	06:27:52	07:15:07	07:58:27	16:30:05	17:13:28	18:00:47	11:27:19 03:48:35
56°	06:24:50	07:09:29	07:50:06	16:38:23	17:19:03	18:03:45	11:39:27 03:36:55
54°	06:22:01	07:04:23	07:42:41	16:45:46	17:24:06	18:06:31	11:50:05 03:26:44
52°	06:19:21	06:59:43	07:36:01	16:52:24	17:28:43	18:09:08	11:59:31 03:17:42
50°	06:16:49	06:55:25	07:29:58	16:58:24	17:32:58	18:11:37	12:08:00 03:09:36
45°	06:10:56	06:45:56	07:16:59	17:11:18	17:42:21	18:17:23	12:26:02 02:52:27
N 40°	06:05:31	06:37:46	07:06:12	17:22:00	17:50:26	18:22:43	12:40:49 02:38:27
35°	06:00:21	06:30:31	06:56:57	17:31:10	17:57:37	18:27:47	12:53:23 02:26:36
30°	05:55:21	06:23:53	06:48:48	17:39:15	18:04:11	18:32:43	13:04:22 02:16:16
20°	05:45:26	06:11:47	06:34:40	17:53:17	18:16:10	18:42:30	13:23:18 01:58:34
N 10°	05:35:06	06:00:21	06:22:10	18:05:39	18:27:28	18:52:42	13:39:50 01:43:10
0°	05:23:47	05:48:50	06:10:21	18:17:22	18:38:52	19:03:54	13:55:23 01:28:48
S 10°	05:10:44	05:36:27	05:58:25	18:29:11	18:51:07	19:16:48	14:10:59 01:14:28
20°	04:54:55	05:22:19	05:45:33	18:41:55	19:05:06	19:32:27	14:27:45 00:59:12
30°	04:34:29	05:05:05	05:30:40	18:56:37	19:22:09	19:52:39	14:47:06 00:41:43
35°	04:21:34	04:54:36	05:21:58	19:05:13	19:32:30	20:05:25	14:58:26 00:31:35
40°	04:05:52	04:42:17	05:12:01	19:15:03	19:44:40	20:20:54	15:11:28 00:20:00
45°	03:46:08	04:27:19	05:00:16	19:26:38	19:59:25	20:40:21	15:26:55 00:06:25
S 50°	03:19:57	04:08:29	04:45:58	19:40:43	20:17:59	21:06:05	15:45:59 .. ..
52°	03:06:40	03:59:23	04:39:15	19:47:20	20:26:55	21:19:06	15:55:02 .. ..
54°	02:50:57	03:49:06	04:31:47	19:54:40	20:37:02	21:34:26	16:05:10 .. ..
56°	02:31:45	03:37:17	04:23:26	20:02:52	20:48:37	21:53:04	16:16:41 23:53:01
58°	02:06:59	03:23:29	04:13:58	20:12:09	21:02:06	22:16:53	16:29:58 23:39:22
S 60°	01:30:49	03:07:00	04:03:05	20:22:49	21:18:11	22:50:42	16:45:34 23:23:20




Feb 04	SHA	Mer.pass
Venus	3° 52.2	14:50:12
Mars	99° 18.9	08:27:53
Jupiter	74° 27.5	10:06:23
Saturn	62° 39.1	10:53:18

05 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:56:49	08:22:49	10:00:19	14:28:56	16:06:34	17:32:47	☐ ☐
N 70°	06:50:26	08:06:41	09:26:36	15:02:33	16:22:35	17:39:00	☐ ☐
68°	06:45:01	07:53:43	09:02:29	15:26:35	16:35:26	17:44:17	08:48:24 08:14:45
66°	06:40:20	07:43:00	08:43:50	15:45:08	16:46:04	17:48:51	10:16:22 06:47:14
64°	06:36:12	07:33:55	08:28:46	16:00:08	16:55:04	17:52:54	10:54:32 06:09:29
62°	06:32:29	07:26:05	08:16:13	16:12:38	17:02:49	17:56:31	11:21:28 05:42:55
60°	06:29:07	07:19:13	08:05:31	16:23:16	17:09:37	17:59:48	11:42:29 05:22:14
N 58°	06:26:01	07:13:08	07:56:15	16:32:29	17:15:39	18:02:50	11:59:43 05:05:19
56°	06:23:08	07:07:40	07:48:06	16:40:35	17:21:03	18:05:39	12:14:18 04:51:02
54°	06:20:27	07:02:43	07:40:51	16:47:47	17:25:57	18:08:17	12:26:55 04:38:42
52°	06:17:54	06:58:11	07:34:20	16:54:15	17:30:26	18:10:46	12:38:00 04:27:52
50°	06:15:29	06:54:00	07:28:26	17:00:07	17:34:34	18:13:09	12:47:53 04:18:13
45°	06:09:50	06:44:47	07:15:44	17:12:44	17:43:42	18:18:40	13:08:42 03:57:57
N 40°	06:04:37	06:36:49	07:05:11	17:23:12	17:51:35	18:23:48	13:25:35 03:41:34
35°	05:59:38	06:29:44	06:56:08	17:32:11	17:58:35	18:28:42	13:39:50 03:27:45
30°	05:54:47	06:23:16	06:48:09	17:40:06	18:04:59	18:33:28	13:52:16 03:15:44
20°	05:45:08	06:11:26	06:34:17	17:53:50	18:16:41	18:42:59	14:13:33 02:55:13
N 10°	05:35:03	06:00:16	06:22:03	18:05:58	18:27:45	18:52:57	14:32:05 02:37:26
0°	05:23:57	05:48:58	06:10:27	18:17:27	18:38:55	19:03:54	14:49:28 02:20:49
S 10°	05:11:09	05:36:49	05:58:45	18:29:02	18:50:56	19:16:34	15:06:53 02:04:13
20°	04:55:35	05:22:56	05:46:07	18:41:31	19:04:40	19:31:57	15:25:35 01:46:30
30°	04:35:30	05:06:00	05:31:32	18:55:56	19:21:24	19:51:48	15:47:12 01:26:08
35°	04:22:47	04:55:43	05:23:00	19:04:21	19:31:34	20:04:22	15:59:54 01:14:16
40°	04:07:22	04:43:36	05:13:14	19:14:00	19:43:31	20:19:35	16:14:32 01:00:38
45°	03:47:59	04:28:56	05:01:44	19:25:20	19:58:00	20:38:41	16:31:57 00:44:32
S 50°	03:22:19	04:10:27	04:47:44	19:39:08	20:16:11	21:03:54	16:53:35 00:24:45
52°	03:09:21	04:01:33	04:41:10	19:45:36	20:24:57	21:16:36	17:03:56 00:15:23
54°	02:54:03	03:51:29	04:33:52	19:52:45	20:34:50	21:31:32	17:15:36 00:04:54
56°	02:35:27	03:39:56	04:25:43	20:00:46	20:46:08	21:49:36	17:28:58 .. ..
58°	02:11:41	03:26:29	04:16:28	20:09:50	20:59:18	22:12:29	17:44:33 .. ..
S 60°	01:37:54	03:10:27	04:05:52	20:20:14	21:14:56	22:44:15	18:03:12 23:59:18




Feb 05	SHA	Mer.pass
Venus	2° 48.4	14:50:30
Mars	98° 34.4	08:26:54
Jupiter	74° 13.7	10:03:22
Saturn	62° 31.9	10:49:51

Day	Sun		Moon		
	Eqn. of Time	Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	
04	13:49	13:52	12:13:52	20:07:59 07:41:57	11(73%)
05	13:54	13:57	12:13:57	21:02:57 08:35:00	12(82%)

# 2020 February 06 to Feb. 07



06 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:53:03	08:18:18	09:53:16	14:36:10	16:11:16	17:36:45	
N 70°	06:47:06	08:02:49	09:21:22	15:07:58	16:26:37	17:42:32	
68°	06:42:02	07:50:21	08:58:14	15:31:00	16:38:59	17:47:27	
66°	06:37:38	07:40:00	08:40:15	15:48:54	16:49:14	17:51:44	10:41:28 08:20:32
64°	06:33:45	07:31:14	08:25:39	16:03:26	16:57:55	17:55:31	11:32:31 07:29:35
62°	06:30:15	07:23:40	08:13:27	16:15:34	17:05:25	17:58:55	12:04:17 06:57:54
60°	06:27:04	07:17:01	08:03:03	16:25:54	17:11:59	18:02:01	12:28:04 06:34:13
N 58°	06:24:08	07:11:07	07:54:01	16:34:53	17:17:50	18:04:53	12:47:08 06:15:13
56°	06:21:25	07:05:49	07:46:04	16:42:46	17:23:04	18:07:33	13:03:04 05:59:21
54°	06:18:51	07:01:01	07:39:00	16:49:48	17:27:49	18:10:03	13:16:43 05:45:46
52°	06:16:25	06:56:37	07:32:39	16:56:07	17:32:11	18:12:25	13:28:39 05:33:54
50°	06:14:07	06:52:33	07:26:52	17:01:50	17:36:11	18:14:41	13:39:14 05:23:23
45°	06:08:43	06:43:35	07:14:27	17:14:10	17:45:04	18:19:58	14:01:22 05:01:22
N 40°	06:03:41	06:35:51	07:04:08	17:24:24	17:52:43	18:24:53	14:19:13 04:43:38
35°	05:58:53	06:28:57	06:55:17	17:33:11	17:59:32	18:29:37	14:34:14 04:28:43
30°	05:54:11	06:22:38	06:47:28	17:40:56	18:05:46	18:34:13	14:47:17 04:15:47
20°	05:44:49	06:11:05	06:33:53	17:54:23	18:17:12	18:43:28	15:09:34 03:53:41
N 10°	05:34:58	06:00:09	06:21:54	18:06:16	18:28:01	18:53:11	15:28:55 03:34:31
0°	05:24:07	05:49:05	06:10:32	18:17:31	18:38:57	19:03:54	15:47:00 03:16:37
S 10°	05:11:33	05:37:10	05:59:04	18:28:52	18:50:44	19:16:19	16:05:07 02:58:42
20°	04:56:16	05:23:33	05:46:42	18:41:06	19:04:12	19:31:26	16:24:32 02:39:31
30°	04:36:31	05:06:56	05:32:24	18:55:13	19:20:38	19:50:57	16:46:58 02:17:24
35°	04:24:01	04:56:49	05:24:02	19:03:28	19:30:37	20:03:18	17:00:08 02:04:27
40°	04:08:51	04:44:56	05:14:28	19:12:55	19:42:21	20:18:15	17:15:18 01:49:32
45°	03:49:49	04:30:32	05:03:13	19:24:01	19:56:32	20:37:00	17:33:23 01:31:47
S 50°	03:24:41	04:12:25	04:49:30	19:37:30	20:14:22	21:01:41	17:55:50 01:09:48
52°	03:12:01	04:03:42	04:43:05	19:43:49	20:22:56	21:14:06	18:06:36 00:59:18
54°	02:57:07	03:53:51	04:35:57	19:50:49	20:32:36	21:28:39	18:18:45 00:47:28
56°	02:39:05	03:42:35	04:27:59	19:58:39	20:43:39	21:46:10	18:32:41 00:33:56
58°	02:16:15	03:29:28	04:18:58	20:07:29	20:56:29	22:08:10	18:48:59 00:18:10
S 60°	01:44:31	03:13:53	04:08:38	20:17:37	21:11:40	22:38:09	19:08:35 .. ..

Feb 06	SHA	Mer.pass
Venus	1°44.8	14:50:47
Mars	97°49.8	08:25:56
Jupiter	73°59.8	10:00:21
Saturn	62°24.7	10:46:24

07 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:49:13	08:13:46	09:46:26	14:43:09	16:15:57	17:40:44	
N 70°	06:43:42	07:58:56	09:16:12	15:13:17	16:30:40	17:46:05	
68°	06:38:59	07:46:56	08:54:00	15:35:23	16:42:33	17:50:39	
66°	06:34:53	07:36:58	08:36:38	15:52:40	16:52:25	17:54:38	11:57:16 09:09:01
64°	06:31:15	07:28:31	08:22:30	16:06:43	17:00:47	17:58:10	12:42:30 08:23:33
62°	06:27:58	07:21:12	08:10:40	16:18:30	17:08:01	18:01:21	13:12:14 07:53:34
60°	06:24:59	07:14:47	08:00:33	16:28:33	17:14:22	18:04:15	13:34:49 07:30:46
N 58°	06:22:13	07:09:04	07:51:45	16:37:17	17:20:01	18:06:57	13:53:05 07:12:19
56°	06:19:38	07:03:56	07:44:01	16:44:58	17:25:06	18:09:27	14:08:23 06:56:50
54°	06:17:13	06:59:17	07:37:07	16:51:49	17:29:42	18:11:49	14:21:32 06:43:30
52°	06:14:55	06:55:01	07:30:55	16:57:59	17:33:55	18:14:04	14:33:02 06:31:50
50°	06:12:43	06:51:05	07:25:17	17:03:34	17:37:48	18:16:13	14:43:15 06:21:28
45°	06:07:33	06:42:22	07:13:09	17:15:36	17:46:25	18:21:15	15:04:39 05:59:44
N 40°	06:02:44	06:34:50	07:03:04	17:25:36	17:53:51	18:25:59	15:21:55 05:42:09
35°	05:58:07	06:28:07	06:54:25	17:34:12	18:00:29	18:30:31	15:36:27 05:27:20
30°	05:53:34	06:21:59	06:46:46	17:41:46	18:06:34	18:34:58	15:49:04 05:14:27
20°	05:44:28	06:10:42	06:33:29	17:54:56	18:17:42	18:43:56	16:10:36 04:52:26
N 10°	05:34:52	06:00:01	06:21:44	18:06:34	18:28:16	18:53:24	16:29:17 04:33:17
0°	05:24:15	05:49:11	06:10:37	18:17:34	18:38:59	19:03:53	16:46:43 04:15:21
S 10°	05:11:56	05:37:31	05:59:22	18:28:41	18:50:31	19:16:03	17:04:09 03:57:23
20°	04:56:56	05:24:09	05:47:15	18:40:40	19:03:43	19:30:53	17:22:48 03:38:06
30°	04:37:31	05:07:50	05:33:15	18:54:30	19:19:50	19:50:04	17:44:17 03:15:48
35°	04:25:14	04:57:55	05:25:04	19:02:34	19:29:38	20:02:12	17:56:50 03:02:43
40°	04:10:20	04:46:15	05:15:42	19:11:48	19:41:08	20:16:53	18:11:16 02:47:38
45°	03:51:39	04:32:08	05:04:41	19:22:40	19:55:04	20:35:17	18:28:23 02:29:38
S 50°	03:27:03	04:14:23	04:51:16	19:35:51	20:12:32	20:59:28	18:49:30 02:07:17
52°	03:14:40	04:05:51	04:45:00	19:42:02	20:20:55	21:11:35	18:59:33 01:56:34
54°	03:00:09	03:56:14	04:38:02	19:48:52	20:30:22	21:25:45	19:10:51 01:44:28
56°	02:42:41	03:45:13	04:30:16	19:56:30	20:41:09	21:42:45	19:23:42 01:30:35
58°	02:20:43	03:32:27	04:21:28	20:05:07	20:53:39	22:03:56	19:38:35 01:14:20
S 60°	01:50:46	03:17:18	04:11:24	20:14:58	21:08:25	22:32:20	19:56:14 00:54:47

Feb 07	SHA	Mer.pass
Venus	0°41.3	14:51:04
Mars	97°05.2	08:24:58
Jupiter	73°46.1	09:57:19
Saturn	62°17.5	10:42:56

Day	Sun		Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
06	13:59	14:02	12:14:02	22:01:08 09:31:43	13(90%)
07	14:04	14:05	12:14:05	23:01:05 10:31:00	14(95%)

08 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:45:21	08:09:14	09:39:47	14:49:56	16:20:37	17:44:45	
N 70°	06:40:15	07:55:01	09:11:04	15:18:32	16:34:43	17:49:40	
68°	06:35:54	07:43:30	08:49:46	15:39:43	16:46:07	17:53:52	13:04:15
66°	06:32:06	07:33:55	08:33:01	15:56:24	16:55:36	17:57:33	13:50:09
64°	06:28:43	07:25:45	08:19:20	16:10:00	17:03:40	18:00:49	14:20:04
62°	06:25:39	07:18:42	08:07:51	16:21:25	17:10:38	18:03:47	14:42:36
60°	06:22:51	07:12:30	07:58:01	16:31:11	17:16:46	18:06:30	15:00:40
N 58°	06:20:16	07:06:59	07:49:28	16:39:41	17:22:13	18:09:01	15:15:42
56°	06:17:50	07:02:01	07:41:56	16:47:10	17:27:07	18:11:23	15:28:31
54°	06:15:33	06:57:31	07:35:13	16:53:50	17:31:35	18:13:36	15:39:41
52°	06:13:22	06:53:23	07:29:10	16:59:51	17:35:39	18:15:43	15:49:32
50°	06:11:17	06:49:34	07:23:40	17:05:18	17:39:25	18:17:45	15:58:20
45°	06:06:22	06:41:07	07:11:50	17:17:02	17:47:46	18:22:33	16:16:55
N 40°	06:01:45	06:33:48	07:01:59	17:26:48	17:54:59	18:27:04	16:32:01
35°	05:57:19	06:27:17	06:53:31	17:35:12	18:01:26	18:31:25	16:44:47
30°	05:52:56	06:21:18	06:46:02	17:42:36	18:07:21	18:35:43	16:55:54
20°	05:44:06	06:10:19	06:33:03	17:55:28	18:18:12	18:44:24	17:14:54
N 10°	05:34:46	05:59:52	06:21:33	18:06:50	18:28:31	18:53:37	17:31:24
0°	05:24:23	05:49:16	06:10:40	18:17:36	18:38:59	19:03:51	17:46:49
S 10°	05:12:19	05:37:50	05:59:40	18:28:29	18:50:17	19:15:47	18:02:11
20°	04:57:35	05:24:45	05:47:48	18:40:12	19:03:13	19:30:20	18:18:36
30°	04:38:31	05:08:45	05:34:06	18:53:44	19:19:02	19:49:10	18:37:23
35°	04:26:27	04:59:01	05:26:05	19:01:38	19:28:38	20:01:05	18:48:19
40°	04:11:49	04:47:35	05:16:55	19:10:40	19:39:55	20:15:30	19:00:48
45°	03:53:29	04:33:44	05:06:09	19:21:17	19:53:34	20:33:33	19:15:31
S 50°	03:29:24	04:16:21	04:53:03	19:34:11	20:10:40	20:57:13	19:33:27
52°	03:17:18	04:08:00	04:46:55	19:40:12	20:18:52	21:09:04	19:41:53
54°	03:03:10	03:58:36	04:40:07	19:46:52	20:28:06	21:22:52	19:51:17
56°	02:46:13	03:47:51	04:32:32	19:54:19	20:38:37	21:39:21	20:01:51
58°	02:25:04	03:35:24	04:23:58	20:02:43	20:50:48	21:59:46	20:13:53
S 60°	01:56:43	03:20:41	04:14:10	20:12:19	21:05:09	22:26:45	20:27:50

Feb 08	SHA	Mer.pass
Venus	359°38.0	14:51:21
Mars	96°20.6	08:24:00
Jupiter	73°32.4	09:54:18
Saturn	62°10.4	10:39:29

09 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:41:25	08:04:40	09:33:17	14:56:31	16:25:17	17:48:47	13:57:53
N 70°	06:36:46	07:51:04	09:05:59	15:23:42	16:38:45	17:53:16	14:53:42
68°	06:32:46	07:40:01	08:45:33	15:44:02	16:49:41	17:57:06	15:26:53
66°	06:29:16	07:30:49	08:29:23	16:00:07	16:58:47	18:00:29	15:50:51
64°	06:26:08	07:22:58	08:16:09	16:13:17	17:06:32	18:03:30	16:09:32
62°	06:23:18	07:16:10	08:05:00	16:24:21	17:13:15	18:06:14	16:24:44
60°	06:20:41	07:10:11	07:55:28	16:33:50	17:19:10	18:08:45	16:37:28
N 58°	06:18:16	07:04:52	07:47:09	16:42:05	17:24:25	18:11:06	16:48:21
56°	06:16:00	07:00:04	07:39:49	16:49:22	17:29:09	18:13:18	16:57:50
54°	06:13:50	06:55:43	07:33:16	16:55:52	17:33:27	18:15:24	17:06:12
52°	06:11:47	06:51:43	07:27:23	17:01:43	17:37:24	18:17:23	17:13:40
50°	06:09:49	06:48:02	07:22:01	17:07:01	17:41:03	18:19:18	17:20:23
45°	06:05:09	06:39:51	07:10:29	17:18:28	17:49:07	18:23:51	17:34:43
N 40°	06:00:45	06:32:45	07:00:52	17:28:00	17:56:07	18:28:09	17:46:30
35°	05:56:29	06:26:25	06:52:36	17:36:11	18:02:23	18:32:19	17:56:30
30°	05:52:16	06:20:36	06:45:18	17:43:25	18:08:08	18:36:27	18:05:16
20°	05:43:44	06:09:54	06:32:36	17:56:00	18:18:42	18:44:51	18:20:18
N 10°	05:34:38	05:59:42	06:21:22	18:07:06	18:28:45	18:53:49	18:33:23
0°	05:24:30	05:49:21	06:10:43	18:17:38	18:38:59	19:03:49	18:45:37
S 10°	05:12:41	05:38:10	05:59:57	18:28:16	18:50:02	19:15:29	18:57:48
20°	04:58:14	05:25:20	05:48:21	18:39:44	19:02:42	19:29:46	19:10:46
30°	04:39:30	05:09:39	05:34:56	18:52:58	19:18:12	19:48:15	19:25:33
35°	04:27:39	05:00:06	05:27:06	19:00:41	19:27:37	19:59:57	19:34:07
40°	04:13:17	04:48:54	05:18:09	19:09:31	19:38:40	20:14:06	19:43:50
45°	03:55:19	04:35:20	05:07:37	19:19:53	19:52:02	20:31:48	19:55:10
S 50°	03:31:44	04:18:19	04:54:49	19:32:28	20:08:46	20:54:58	20:08:51
52°	03:19:55	04:10:09	04:48:50	19:38:21	20:16:47	21:06:32	20:15:12
54°	03:06:09	04:00:57	04:42:13	19:44:51	20:25:49	21:19:58	20:22:13
56°	02:49:43	03:50:28	04:34:49	19:52:07	20:36:05	21:35:58	20:30:01
58°	02:29:20	03:38:21	04:26:28	20:00:18	20:47:56	21:55:40	20:38:47
S 60°	02:02:24	03:24:02	04:16:56	20:09:37	21:01:53	22:21:22	20:48:45

Feb 09	SHA	Mer.pass
Venus	358°34.8	14:51:36
Mars	95°35.9	08:23:02
Jupiter	73°18.8	09:51:16
Saturn	62°03.3	10:36:01

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
08	14:07	14:08	12:14:08	—:—	11:31:08	15(99%)
09	14:10	14:11	12:14:11	00:00:58	12:30:22	16(100%)

# 2020 February 10 to Feb. 11

10 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:37:27	08:00:06	09:26:55	15:02:57	16:29:56	17:52:51	16:59:10
N 70°	06:33:14	07:47:06	09:00:57	15:28:49	16:42:47	17:56:53	17:20:22
68°	06:29:36	07:36:31	08:41:20	15:48:19	16:53:15	18:00:21	17:36:41
66°	06:26:24	07:27:41	08:25:45	16:03:49	17:01:59	18:03:26	17:49:47
64°	06:23:31	07:20:09	08:12:56	16:16:33	17:09:26	18:06:11	18:00:36
62°	06:20:54	07:13:36	08:02:09	16:27:16	17:15:53	18:08:42	18:09:44
60°	06:18:29	07:07:51	07:52:53	16:36:28	17:21:34	18:11:01	18:17:34
N 58°	06:16:14	07:02:43	07:44:48	16:44:29	17:26:38	18:13:12	18:24:24
56°	06:14:07	06:58:06	07:37:40	16:51:34	17:31:12	18:15:15	18:30:26
54°	06:12:06	06:53:53	07:31:18	16:57:53	17:35:21	18:17:11	18:35:49
52°	06:10:11	06:50:02	07:25:34	17:03:35	17:39:09	18:19:03	18:40:39
50°	06:08:19	06:46:28	07:20:21	17:08:45	17:42:40	18:20:52	18:45:02
45°	06:03:55	06:38:33	07:09:06	17:19:54	17:50:29	18:25:09	18:54:29
N 40°	05:59:43	06:31:40	06:59:43	17:29:12	17:57:15	18:29:14	19:02:18
35°	05:55:38	06:25:31	06:51:39	17:37:11	18:03:19	18:33:14	19:09:00
30°	05:51:35	06:19:52	06:44:32	17:44:14	18:08:54	18:37:12	19:14:53
20°	05:43:20	06:09:28	06:32:07	17:56:31	18:19:11	18:45:18	19:25:01
N 10°	05:34:29	05:59:32	06:21:09	18:07:22	18:28:59	18:54:00	19:33:53
0°	05:24:36	05:49:25	06:10:45	18:17:39	18:38:58	19:03:46	19:42:10
S 10°	05:13:02	05:38:28	06:00:14	18:28:03	18:49:46	19:15:11	19:50:25
20°	04:58:52	05:25:55	05:48:53	18:39:15	19:02:10	19:29:10	19:59:12
30°	04:40:29	05:10:32	05:35:46	18:52:11	19:17:21	19:47:19	20:09:10
35°	04:28:51	05:01:12	05:28:07	18:59:43	19:26:34	19:58:48	20:14:55
40°	04:14:45	04:50:12	05:19:22	19:08:21	19:37:24	20:12:41	20:21:24
45°	03:57:08	04:36:55	05:09:05	19:18:28	19:50:29	20:30:02	20:28:56
S 50°	03:34:03	04:20:16	04:56:35	19:30:45	20:06:52	20:52:42	20:37:56
52°	03:22:31	04:12:17	04:50:45	19:36:29	20:14:42	21:03:59	20:42:05
54°	03:09:07	04:03:18	04:44:18	19:42:49	20:23:30	21:17:05	20:46:38
56°	02:53:10	03:53:05	04:37:05	19:49:53	20:33:31	21:32:37	20:51:39
58°	02:33:30	03:41:16	04:28:58	19:57:51	20:45:04	21:51:37	20:57:14
S 60°	02:07:51	03:27:22	04:19:41	20:06:55	20:58:38	22:16:09	21:03:30

Feb 10	SHA	Mer.pass
Venus	357°31.8	14:51:51
Mars	94°51.1	08:22:05
Jupiter	73°05.3	09:48:14
Saturn	61°56.3	10:32:33

11 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:33:25	07:55:31	09:20:41	15:09:14	16:34:34	17:56:56	19:24:02
N 70°	06:29:39	07:43:07	08:55:57	15:33:51	16:46:50	18:00:31	19:32:21
68°	06:26:22	07:33:00	08:37:07	15:52:35	16:56:49	18:03:38	19:39:04
66°	06:23:28	07:24:32	08:22:06	16:07:31	17:05:11	18:06:24	19:44:38
64°	06:20:52	07:17:18	08:09:43	16:19:49	17:12:19	18:08:53	19:49:20
62°	06:18:28	07:11:01	07:59:16	16:30:12	17:18:31	18:11:11	19:53:22
60°	06:16:15	07:05:29	07:50:16	16:39:07	17:23:59	18:13:18	19:56:52
N 58°	06:14:10	07:00:32	07:42:26	16:46:54	17:28:51	18:15:18	19:59:57
56°	06:12:13	06:56:05	07:35:30	16:53:46	17:33:14	18:17:11	20:02:42
54°	06:10:20	06:52:02	07:29:19	16:59:54	17:37:14	18:19:00	20:05:09
52°	06:08:32	06:48:19	07:23:44	17:05:27	17:40:54	18:20:44	20:07:23
50°	06:06:48	06:44:52	07:18:39	17:10:28	17:44:18	18:22:25	20:09:25
45°	06:02:39	06:37:13	07:07:42	17:21:20	17:51:50	18:26:27	20:13:48
N 40°	05:58:40	06:30:34	06:58:33	17:30:23	17:58:23	18:30:19	20:17:28
35°	05:54:46	06:24:37	06:50:42	17:38:10	18:04:16	18:34:07	20:20:37
30°	05:50:53	06:19:08	06:43:44	17:45:03	18:09:40	18:37:56	20:23:23
20°	05:42:55	06:09:00	06:31:38	17:57:01	18:19:39	18:45:45	20:28:12
N 10°	05:34:20	05:59:20	06:20:56	18:07:37	18:29:12	18:54:11	20:32:25
0°	05:24:41	05:49:28	06:10:46	18:17:39	18:38:56	19:03:42	20:36:22
S 10°	05:13:22	05:38:46	06:00:29	18:27:48	18:49:30	19:14:51	20:40:19
20°	04:59:29	05:26:29	05:49:24	18:38:44	19:01:37	19:28:34	20:44:32
30°	04:41:28	05:11:26	05:36:36	18:51:22	19:16:29	19:46:21	20:49:19
35°	04:30:02	05:02:16	05:29:08	18:58:44	19:25:30	19:57:37	20:52:04
40°	04:16:13	04:51:31	05:20:35	19:07:09	19:36:07	20:11:15	20:55:10
45°	03:58:56	04:38:30	05:10:33	19:17:01	19:48:55	20:28:15	20:58:45
S 50°	03:36:21	04:22:13	04:58:22	19:28:59	20:04:56	20:50:25	21:03:01
52°	03:25:06	04:14:25	04:52:40	19:34:35	20:12:35	21:01:26	21:04:59
54°	03:12:03	04:05:39	04:46:23	19:40:45	20:21:11	21:14:12	21:07:07
56°	02:56:34	03:55:41	04:39:22	19:47:38	20:30:57	21:29:16	21:09:28
58°	02:37:35	03:44:11	04:31:27	19:55:22	20:42:12	21:47:38	21:12:04
S 60°	02:13:07	03:30:41	04:22:26	20:04:11	20:55:22	22:11:05	21:14:59

Feb 11	SHA	Mer.pass
Venus	356°29.0	14:52:06
Mars	94°06.3	08:21:08
Jupiter	72°51.8	09:45:12
Saturn	61°49.2	10:29:05

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
10	14:11	14:12	12:14:12	00:59:15	13:27:32	17(98%)
11	14:12	14:13	12:14:13	01:55:12	14:22:18	18(93%)

12 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:29:21	07:50:55	09:14:33	15:15:23	16:39:11	18:01:02	21:38:49
N 70°	06:26:01	07:39:06	08:50:59	15:38:50	16:50:52	18:04:11	21:37:38
68°	06:23:06	07:29:26	08:32:55	15:56:48	17:00:24	18:06:55	21:36:41
66°	06:20:31	07:21:20	08:18:26	16:11:11	17:08:23	18:09:22	21:35:53
64°	06:18:10	07:14:25	08:06:28	16:23:04	17:15:13	18:11:36	21:35:12
62°	06:16:00	07:08:23	07:56:21	16:33:06	17:21:09	18:13:40	21:34:37
60°	06:13:59	07:03:04	07:47:39	16:41:45	17:26:23	18:15:35	21:34:07
N 58°	06:12:04	06:58:20	07:40:02	16:49:18	17:31:04	18:17:25	21:33:40
56°	06:10:16	06:54:03	07:33:19	16:55:58	17:35:17	18:19:09	21:33:17
54°	06:08:32	06:50:09	07:27:18	17:01:56	17:39:08	18:20:48	21:32:56
52°	06:06:52	06:46:34	07:21:52	17:07:19	17:42:39	18:22:25	21:32:37
50°	06:05:15	06:43:15	07:16:56	17:12:12	17:45:55	18:23:59	21:32:19
45°	06:01:21	06:35:52	07:06:16	17:22:46	17:53:12	18:27:45	21:31:42
N 40°	05:57:35	06:29:26	06:57:22	17:31:34	17:59:31	18:31:24	21:31:12
35°	05:53:52	06:23:41	06:49:43	17:39:09	18:05:12	18:35:01	21:30:46
30°	05:50:09	06:18:22	06:42:56	17:45:51	18:10:26	18:38:39	21:30:24
20°	05:42:28	06:08:32	06:31:08	17:57:31	18:20:07	18:46:11	21:29:46
N 10°	05:34:09	05:59:07	06:20:41	18:07:51	18:29:24	18:54:22	21:29:15
0°	05:24:45	05:49:30	06:10:46	18:17:38	18:38:54	19:03:37	21:28:46
S 10°	05:13:42	05:39:03	06:00:45	18:27:32	18:49:12	19:14:31	21:28:19
20°	05:00:06	05:27:02	05:49:56	18:38:13	19:01:03	19:27:56	21:27:52
30°	04:42:26	05:12:19	05:37:26	18:50:32	19:15:35	19:45:23	21:27:23
35°	04:31:13	05:03:21	05:30:08	18:57:43	19:24:25	19:56:26	21:27:06
40°	04:17:40	04:52:49	05:21:48	19:05:55	19:34:48	20:09:47	21:26:48
45°	04:00:44	04:40:05	05:12:00	19:15:33	19:47:20	20:26:27	21:26:28
S 50°	03:38:39	04:24:10	05:00:08	19:27:13	20:02:59	20:48:08	21:26:04
52°	03:27:40	04:16:33	04:54:35	19:32:39	20:10:27	20:58:53	21:25:54
54°	03:14:57	04:08:00	04:48:28	19:38:40	20:18:51	21:11:18	21:25:42
56°	02:59:55	03:58:16	04:41:38	19:45:21	20:28:22	21:25:57	21:25:30
58°	02:41:36	03:47:04	04:33:57	19:52:53	20:39:19	21:43:42	21:25:16
S 60°	02:18:12	03:33:58	04:25:11	20:01:27	20:52:06	22:06:09	21:25:01

Feb 12	SHA	Mer.pass
Venus	355°26.2	14:52:20
Mars	93°21.5	08:20:11
Jupiter	72°38.4	09:42:09
Saturn	61°42.3	10:25:37

13 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:25:14	07:46:18	09:08:31	15:21:25	16:43:48	18:05:10	23:51:47
N 70°	06:22:20	07:35:04	08:46:03	15:43:46	16:54:54	18:07:52	23:40:58
68°	06:19:48	07:25:51	08:28:43	16:01:00	17:03:58	18:10:14	23:32:17
66°	06:17:31	07:18:07	08:14:46	16:14:51	17:11:36	18:12:22	23:25:08
64°	06:15:25	07:11:30	08:03:13	16:26:19	17:18:07	18:14:20	23:19:06
62°	06:13:29	07:05:44	07:53:26	16:36:01	17:23:48	18:16:10	23:13:57
60°	06:11:40	07:00:38	07:45:00	16:44:23	17:28:49	18:17:54	23:09:29
N 58°	06:09:56	06:56:05	07:37:37	16:51:42	17:33:17	18:19:32	23:05:34
56°	06:08:17	06:51:59	07:31:06	16:58:10	17:37:20	18:21:06	23:02:05
54°	06:06:42	06:48:14	07:25:15	17:03:57	17:41:01	18:22:37	22:58:58
52°	06:05:10	06:44:47	07:19:59	17:09:11	17:44:25	18:24:06	22:56:09
50°	06:03:40	06:41:36	07:15:11	17:13:56	17:47:33	18:25:33	22:53:36
45°	06:00:01	06:34:29	07:04:49	17:24:11	17:54:33	18:29:03	22:48:05
N 40°	05:56:29	06:28:17	06:56:10	17:32:45	18:00:39	18:32:29	22:43:29
35°	05:52:57	06:22:43	06:48:42	17:40:08	18:06:08	18:35:55	22:39:34
30°	05:49:24	06:17:35	06:42:07	17:46:39	18:11:12	18:39:23	22:36:07
20°	05:42:01	06:08:03	06:30:37	17:58:01	18:20:35	18:46:37	22:30:11
N 10°	05:33:58	05:58:54	06:20:26	18:08:05	18:29:36	18:54:32	22:25:01
0°	05:24:49	05:49:31	06:10:46	18:17:37	18:38:51	19:03:32	22:20:13
S 10°	05:14:01	05:39:20	06:00:59	18:27:16	18:48:54	19:14:10	22:15:28
20°	05:00:43	05:27:35	05:50:26	18:37:40	19:00:29	19:27:18	22:10:27
30°	04:43:23	05:13:11	05:38:15	18:49:41	19:14:41	19:44:23	22:04:49
35°	04:32:24	05:04:25	05:31:08	18:56:41	19:23:19	19:55:13	22:01:35
40°	04:19:07	04:54:07	05:23:00	19:04:41	19:33:28	20:08:19	21:57:57
45°	04:02:32	04:41:40	05:13:28	19:14:04	19:45:43	20:24:38	21:53:46
S 50°	03:40:56	04:26:07	05:01:54	19:25:25	20:01:00	20:45:50	21:48:48
52°	03:30:13	04:18:40	04:56:30	19:30:42	20:08:18	20:56:19	21:46:32
54°	03:17:50	04:10:19	04:50:33	19:36:33	20:16:29	21:08:25	21:44:03
56°	03:03:14	04:00:51	04:43:54	19:43:03	20:25:46	21:22:39	21:41:19
58°	02:45:32	03:49:57	04:36:26	19:50:22	20:36:25	21:39:48	21:38:18
S 60°	02:23:07	03:37:13	04:27:56	19:58:41	20:48:50	22:01:21	21:34:56

Feb 13	SHA	Mer.pass
Venus	354°23.6	14:52:34
Mars	92°36.6	08:19:14
Jupiter	72°25.0	09:39:06
Saturn	61°35.3	10:22:08

Day	Sun		Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
12	14:13	14:13	12:14:13	02:48:55	19(86%)
13	14:12	14:12	12:14:12	03:41:01	20(76%)

14 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:21:04	07:41:41	09:02:34	15:27:21	16:48:24	18:09:20	08:44:26
N 70°	06:18:37	07:31:01	08:41:08	15:48:39	16:58:55	18:11:34	08:57:46
68°	06:16:27	07:22:15	08:24:31	16:05:10	17:07:33	18:13:34	09:08:37
66°	06:14:28	07:14:53	08:11:05	16:18:29	17:14:48	18:15:23	09:17:39
64°	06:12:39	07:08:33	07:59:56	16:29:33	17:21:02	18:17:05	09:25:19
62°	06:10:56	07:03:03	07:50:29	16:38:55	17:26:27	18:18:41	09:31:55
60°	06:09:19	06:58:11	07:42:19	16:47:01	17:31:14	18:20:12	09:37:42
N 58°	06:07:46	06:53:49	07:35:11	16:54:06	17:35:31	18:21:40	09:42:48
56°	06:06:17	06:49:53	07:28:51	17:00:22	17:39:23	18:23:04	09:47:21
54°	06:04:50	06:46:18	07:23:11	17:05:59	17:42:55	18:24:27	09:51:28
52°	06:03:26	06:42:59	07:18:04	17:11:02	17:46:10	18:25:47	09:55:11
50°	06:02:03	06:39:55	07:13:25	17:15:39	17:49:11	18:27:07	09:58:35
45°	05:58:40	06:33:05	07:03:21	17:25:37	17:55:54	18:30:22	10:05:59
N 40°	05:55:21	06:27:07	06:54:56	17:33:56	18:01:46	18:33:34	23:54:27
35°	05:52:01	06:21:45	06:47:41	17:41:06	18:07:04	18:36:48	23:47:12
30°	05:48:38	06:16:46	06:41:16	17:47:27	18:11:57	18:40:06	23:40:50
20°	05:41:33	06:07:33	06:30:05	17:58:30	18:21:02	18:47:02	23:29:55
N 10°	05:33:45	05:58:40	06:20:10	18:08:18	18:29:47	18:54:41	23:20:26
0°	05:24:52	05:49:32	06:10:45	18:17:35	18:38:47	19:03:26	23:11:35
S 10°	05:14:20	05:39:36	06:01:13	18:26:59	18:48:35	19:13:48	23:02:48
20°	05:01:19	05:28:08	05:50:56	18:37:07	18:59:53	19:26:39	22:53:31
30°	04:44:20	05:14:03	05:39:04	18:48:49	19:13:45	19:43:23	22:43:01
35°	04:33:34	05:05:29	05:32:08	18:55:38	19:22:12	19:54:00	22:36:59
40°	04:20:33	04:55:24	05:24:13	19:03:25	19:32:07	20:06:49	22:30:10
45°	04:04:19	04:43:15	05:14:55	19:12:33	19:44:05	20:22:48	22:22:16
S 50°	03:43:12	04:28:03	05:03:40	19:23:36	19:59:01	20:43:31	22:12:50
52°	03:32:44	04:20:47	04:58:25	19:28:44	20:06:08	20:53:46	22:08:29
54°	03:20:41	04:12:39	04:52:37	19:34:25	20:14:07	21:05:33	22:03:43
56°	03:06:30	04:03:25	04:46:10	19:40:44	20:23:10	21:19:21	21:58:28
58°	02:49:23	03:52:49	04:38:55	19:47:50	20:33:31	21:35:57	21:52:37
S 60°	02:27:54	03:40:27	04:30:40	19:55:54	20:45:35	21:56:38	21:46:02

Feb 14	SHA	Mer.pass
Venus	353°21.0	14:52:47
Mars	91°51.6	08:18:17
Jupiter	72°11.8	09:36:03
Saturn	61°28.4	10:18:40

15 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:16:51	07:37:03	08:56:42	15:33:10	16:53:00	18:13:31	02:11:38
N 70°	06:14:51	07:26:56	08:36:16	15:53:28	17:02:57	18:15:17	01:47:13
68°	06:13:03	07:18:37	08:20:19	16:09:18	17:11:08	18:16:55	01:28:45
66°	06:11:23	07:11:36	08:07:24	16:22:07	17:18:01	18:18:25	01:14:06
64°	06:09:50	07:05:35	07:56:39	16:32:46	17:23:56	18:19:51	01:02:04
62°	06:08:21	07:00:20	07:47:31	16:41:49	17:29:06	18:21:13	00:51:58
60°	06:06:56	06:55:41	07:39:38	16:49:39	17:33:40	18:22:31	00:43:20
N 58°	06:05:34	06:51:32	07:32:43	16:56:30	17:37:45	18:23:48	00:35:49
56°	06:04:15	06:47:46	07:26:35	17:02:34	17:41:27	18:25:03	00:29:12
54°	06:02:57	06:44:20	07:21:06	17:08:00	17:44:49	18:26:17	00:23:19
52°	06:01:40	06:41:10	07:16:09	17:12:54	17:47:56	18:27:29	00:18:01
50°	06:00:25	06:38:14	07:11:38	17:17:22	17:50:49	18:28:41	00:13:14
45°	05:57:18	06:31:40	07:01:51	17:27:02	17:57:15	18:31:40	00:02:57
N 40°	05:54:12	06:25:55	06:53:41	17:35:07	18:02:54	18:34:39	00:00:00
35°	05:51:03	06:20:45	06:46:38	17:42:05	18:07:59	18:37:42	00:00:00
30°	05:47:51	06:15:57	06:40:24	17:48:14	18:12:42	18:40:49	00:00:00
20°	05:41:03	06:07:01	06:29:31	17:58:59	18:21:29	18:47:27	00:00:00
N 10°	05:33:32	05:58:24	06:19:53	18:08:30	18:29:58	18:54:50	00:00:00
0°	05:24:54	05:49:32	06:10:43	18:17:32	18:38:42	19:03:19	00:00:00
S 10°	05:14:38	05:39:51	06:01:26	18:26:41	18:48:15	19:13:26	23:51:13
20°	05:01:54	05:28:40	05:51:26	18:36:32	18:59:16	19:25:59	23:38:08
30°	04:45:17	05:14:55	05:39:52	18:47:55	19:12:49	19:42:22	23:23:15
35°	04:34:44	05:06:32	05:33:07	18:54:34	19:21:04	19:52:45	23:14:39
40°	04:21:59	04:56:42	05:25:25	19:02:08	19:30:45	20:05:19	23:04:54
45°	04:06:05	04:44:49	05:16:22	19:11:01	19:42:27	20:20:57	22:53:32
S 50°	03:45:26	04:29:58	05:05:26	19:21:45	19:57:01	20:41:12	22:39:50
52°	03:35:15	04:22:54	05:00:20	19:26:45	20:03:58	20:51:11	22:33:28
54°	03:23:30	04:14:58	04:54:42	19:32:16	20:11:44	21:02:40	22:26:26
56°	03:09:44	04:05:58	04:48:26	19:38:24	20:20:32	21:16:05	22:18:38
58°	02:53:11	03:55:40	04:41:24	19:45:17	20:30:37	21:32:08	22:09:51
S 60°	02:32:33	03:43:39	04:33:24	19:53:06	20:42:19	21:52:01	21:59:52

Feb 15	SHA	Mer.pass
Venus	352°18.6	14:53:00
Mars	91°06.7	08:17:21
Jupiter	71°58.6	09:32:59
Saturn	61°21.5	10:15:11

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
14	14:11	14:10	12:14:10	04:32:23	16:58:04	21(66%)
15	14:09	14:08	12:14:08	05:23:53	17:49:52	22(55%)



# 2020 February 16 to Feb. 17

16 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:12:35	07:32:23	08:50:53	15:38:53	16:57:35	18:17:43	05:13:13
N 70°	06:11:03	07:22:50	08:31:24	15:58:15	17:06:58	18:19:02	04:05:24
68°	06:09:37	07:14:57	08:16:07	16:13:24	17:14:43	18:20:17	03:29:20
66°	06:08:16	07:08:18	08:03:42	16:25:43	17:21:14	18:21:28	03:03:52
64°	06:06:59	07:02:35	07:53:21	16:35:59	17:26:51	18:22:37	02:44:15
62°	06:05:44	06:57:36	07:44:32	16:44:43	17:31:45	18:23:45	02:28:22
60°	06:04:32	06:53:10	07:36:55	16:52:16	17:36:05	18:24:51	02:15:08
N 58°	06:03:21	06:49:13	07:30:14	16:58:53	17:39:59	18:25:57	02:03:49
56°	06:02:11	06:45:37	07:24:18	17:04:45	17:43:30	18:27:02	01:54:00
54°	06:01:02	06:42:20	07:19:00	17:10:01	17:46:43	18:28:07	01:45:22
52°	05:59:53	06:39:19	07:14:11	17:14:46	17:49:41	18:29:11	01:37:40
50°	05:58:45	06:36:30	07:09:49	17:19:05	17:52:27	18:30:16	01:30:44
45°	05:55:54	06:30:13	07:00:20	17:28:27	17:58:37	18:32:59	01:15:58
N 40°	05:53:01	06:24:42	06:52:25	17:36:17	18:04:01	18:35:44	01:03:52
35°	05:50:05	06:19:44	06:45:35	17:43:03	18:08:55	18:38:35	00:53:36
30°	05:47:02	06:15:06	06:39:31	17:49:01	18:13:27	18:41:32	00:44:39
20°	05:40:33	06:06:29	06:28:57	17:59:27	18:21:55	18:47:51	00:29:17
N 10°	05:33:18	05:58:08	06:19:35	18:08:42	18:30:08	18:54:58	00:15:58
0°	05:24:55	05:49:31	06:10:40	18:17:29	18:38:37	19:03:12	00:03:33
S 10°	05:14:55	05:40:06	06:01:39	18:26:22	18:47:54	19:13:03	.. ..
20°	05:02:29	05:29:11	05:51:55	18:35:57	18:58:38	19:25:18	.. ..
30°	04:46:13	05:15:46	05:40:40	18:47:01	19:11:52	19:41:20	.. ..
35°	04:35:53	05:07:35	05:34:07	18:53:28	19:19:55	19:51:30	23:55:49
40°	04:23:24	04:57:59	05:26:37	19:00:50	19:29:22	20:03:48	23:43:34
45°	04:07:51	04:46:22	05:17:49	19:09:28	19:40:47	20:19:05	23:29:10
S 50°	03:47:41	04:31:54	05:07:11	19:19:53	19:55:00	20:38:53	23:11:38
52°	03:37:44	04:25:00	05:02:14	19:24:45	20:01:46	20:48:37	23:03:24
54°	03:26:18	04:17:16	04:56:46	19:30:06	20:09:20	20:59:48	22:54:14
56°	03:12:55	04:08:31	04:50:42	19:36:03	20:17:54	21:12:50	22:43:57
58°	02:56:55	03:58:29	04:43:52	19:42:43	20:27:42	21:28:22	22:32:15
S 60°	02:37:05	03:46:50	04:36:07	19:50:17	20:39:04	21:47:30	22:18:43

Feb 16	SHA	Mer.pass
Venus	351°16.3	14:53:13
Mars	90°21.7	08:16:24
Jupiter	71°45.4	09:29:55
Saturn	61°14.7	10:11:43

17 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:08:16	07:27:43	08:45:09	15:44:32	17:02:09	18:21:57	■ ■ ■ ■
N 70°	06:07:11	07:18:43	08:26:34	16:02:58	17:11:00	18:22:48	■ ■ ■ ■
68°	06:06:08	07:11:16	08:11:56	16:17:30	17:18:18	18:23:40	05:41:24
66°	06:05:06	07:04:59	08:00:00	16:29:19	17:24:28	18:24:32	04:53:59
64°	06:04:05	06:59:34	07:50:02	16:39:12	17:29:46	18:25:25	04:23:35
62°	06:03:05	06:54:50	07:41:33	16:47:36	17:34:25	18:26:18	04:00:48
60°	06:02:05	06:50:38	07:34:11	16:54:53	17:38:31	18:27:12	03:42:36
N 58°	06:01:05	06:46:52	07:27:44	17:01:17	17:42:13	18:28:06	03:27:28
56°	06:00:05	06:43:27	07:22:00	17:06:57	17:45:34	18:29:01	03:14:35
54°	05:59:04	06:40:19	07:16:52	17:12:02	17:48:37	18:29:57	03:03:22
52°	05:58:04	06:37:26	07:12:13	17:16:37	17:51:27	18:30:53	02:53:29
50°	05:57:03	06:34:45	07:07:59	17:20:49	17:54:05	18:31:51	02:44:39
45°	05:54:28	06:28:45	06:58:48	17:29:52	17:59:58	18:34:17	02:26:02
N 40°	05:51:49	06:23:28	06:51:08	17:37:28	18:05:08	18:36:49	02:10:55
35°	05:49:04	06:18:41	06:44:30	17:44:00	18:09:50	18:39:28	01:58:10
30°	05:46:12	06:14:15	06:38:37	17:49:48	18:14:11	18:42:14	01:47:04
20°	05:40:02	06:05:56	06:28:22	17:59:55	18:22:21	18:48:16	01:28:08
N 10°	05:33:02	05:57:51	06:19:16	18:08:53	18:30:18	18:55:06	01:11:43
0°	05:24:55	05:49:29	06:10:37	18:17:25	18:38:31	19:03:04	00:56:26
S 10°	05:15:11	05:40:20	06:01:51	18:26:02	18:47:33	19:12:39	00:41:14
20°	05:03:03	05:29:42	05:52:24	18:35:21	18:58:00	19:24:36	00:25:03
30°	04:47:09	05:16:37	05:41:28	18:46:06	19:10:53	19:40:17	00:06:33
35°	04:37:02	05:08:38	05:35:05	18:52:22	19:18:45	19:50:14	.. ..
40°	04:24:49	04:59:15	05:27:48	18:59:31	19:27:58	20:02:16	.. ..
45°	04:09:36	04:47:56	05:19:16	19:07:53	19:39:06	20:17:13	.. ..
S 50°	03:49:54	04:33:49	05:08:57	19:18:01	19:52:57	20:36:33	23:50:05
52°	03:40:12	04:27:05	05:04:09	19:22:43	19:59:33	20:46:03	23:40:21
54°	03:29:04	04:19:33	04:58:50	19:27:54	20:06:56	20:56:55	23:29:27
56°	03:16:04	04:11:02	04:52:57	19:33:40	20:15:16	21:09:35	23:17:04
58°	03:00:35	04:01:18	04:46:20	19:40:08	20:24:47	21:24:38	23:02:46
S 60°	02:41:30	03:50:00	04:38:50	19:47:27	20:35:48	21:43:03	22:45:55

Feb 17	SHA	Mer.pass
Venus	350°14.0	14:53:25
Mars	89°36.6	08:15:28
Jupiter	71°32.4	09:26:51
Saturn	61°07.9	10:08:14

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
16	14:06	14:05	12:14:05	06:16:05	18:42:33	23(44%)
17	14:03	14:01	12:14:01	07:09:14	19:36:04	24(33%)

18 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	06:03:55	07:23:02	08:39:28	15:50:05	17:06:43	18:26:12	■ ■
N 70°	06:03:17	07:14:34	08:21:45	16:07:40	17:15:01	18:26:35	■ ■
68°	06:02:37	07:07:34	08:07:45	16:21:33	17:21:53	18:27:04	■ ■
66°	06:01:54	07:01:38	07:56:18	16:32:54	17:27:41	18:27:37	06:39:57 09:21:22
64°	06:01:10	06:56:31	07:46:43	16:42:23	17:32:41	18:28:13	05:53:49 10:07:47
62°	06:00:24	06:52:02	07:38:32	16:50:29	17:37:04	18:28:52	05:23:50 10:38:01
60°	05:59:36	06:48:04	07:31:26	16:57:30	17:40:58	18:29:33	05:01:09 11:00:57
N 58°	05:58:47	06:44:29	07:25:13	17:03:40	17:44:27	18:30:16	04:42:51 11:19:28
56°	05:57:57	06:41:15	07:19:41	17:09:08	17:47:37	18:31:01	04:27:32 11:34:59
54°	05:57:06	06:38:17	07:14:43	17:14:02	17:50:32	18:31:48	04:14:23 11:48:19
52°	05:56:13	06:35:32	07:10:13	17:18:29	17:53:13	18:32:36	04:02:53 12:00:00
50°	05:55:20	06:32:59	07:06:08	17:22:31	17:55:43	18:33:26	03:52:41 12:10:22
45°	05:53:01	06:27:15	06:57:15	17:31:17	18:01:19	18:35:36	03:31:21 12:32:05
N 40°	05:50:36	06:22:13	06:49:49	17:38:38	18:06:15	18:37:54	03:14:09 12:49:38
35°	05:48:03	06:17:38	06:43:24	17:44:58	18:10:44	18:40:21	02:59:42 13:04:24
30°	05:45:22	06:13:22	06:37:43	17:50:34	18:14:55	18:42:57	02:47:09 13:17:14
20°	05:39:29	06:05:22	06:27:46	18:00:22	18:22:47	18:48:40	02:25:47 13:39:09
N 10°	05:32:46	05:57:33	06:18:57	18:09:04	18:30:27	18:55:13	02:07:18 13:58:10
0°	05:24:55	05:49:27	06:10:33	18:17:20	18:38:25	19:02:56	01:50:05 14:15:56
S 10°	05:15:27	05:40:33	06:02:03	18:25:42	18:47:10	19:12:14	01:32:55 14:33:42
20°	05:03:37	05:30:13	05:52:52	18:34:44	18:57:21	19:23:54	01:14:35 14:52:43
30°	04:48:04	05:17:27	05:42:15	18:45:10	19:09:54	19:39:13	00:53:34 15:14:40
35°	04:38:10	05:09:40	05:36:04	18:51:14	19:17:33	19:48:57	00:41:18 15:27:31
40°	04:26:13	05:00:31	05:29:00	18:58:11	19:26:33	20:00:43	00:27:13 15:42:20
45°	04:11:20	04:49:29	05:20:43	19:06:18	19:37:24	20:15:20	00:10:34 15:59:57
S 50°	03:52:06	04:35:43	05:10:42	19:16:07	19:50:54	20:34:13	.. .. 16:21:48
52°	03:42:39	04:29:10	05:06:03	19:20:40	19:57:20	20:43:28	.. .. 16:32:16
54°	03:31:48	04:21:50	05:00:54	19:25:42	20:04:30	20:54:04	.. .. 16:44:03
56°	03:19:11	04:13:33	04:55:12	19:31:16	20:12:37	21:06:22	.. .. 16:57:33
58°	03:04:11	04:04:05	04:48:48	19:37:32	20:21:51	21:20:56	23:44:39 17:13:17
S 60°	02:45:50	03:53:07	04:41:32	19:44:36	20:32:33	21:38:40	23:25:41 17:32:09

Feb 18	SHA	Mer.pass
Venus	349°11.9	14:53:37
Mars	88°51.6	08:14:31
Jupiter	71°19.4	09:23:47
Saturn	61°01.1	10:04:45

19 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	05:59:30	07:18:21	08:33:51	15:55:34	17:11:17	18:30:29	■ ■
N 70°	05:59:21	07:10:25	08:16:58	16:12:18	17:19:02	18:30:24	■ ■
68°	05:59:04	07:03:50	08:03:34	16:25:35	17:25:28	18:30:29	■ ■
66°	05:58:40	06:58:16	07:52:35	16:36:28	17:30:55	18:30:42	08:01:36 09:51:47
64°	05:58:12	06:53:27	07:43:22	16:45:35	17:35:37	18:31:02	07:03:20 10:50:03
62°	05:57:41	06:49:13	07:35:30	16:53:22	17:39:44	18:31:26	06:29:45 11:23:37
60°	05:57:05	06:45:28	07:28:40	17:00:07	17:43:24	18:31:54	06:05:05 11:48:17
N 58°	05:56:28	06:42:06	07:22:40	17:06:03	17:46:42	18:32:26	05:45:28 12:07:54
56°	05:55:48	06:39:02	07:17:20	17:11:19	17:49:41	18:33:01	05:29:10 12:24:12
54°	05:55:05	06:36:13	07:12:33	17:16:03	17:52:26	18:33:39	05:15:14 12:38:07
52°	05:54:21	06:33:37	07:08:13	17:20:20	17:54:59	18:34:19	05:03:06 12:50:15
50°	05:53:35	06:31:12	07:04:15	17:24:14	17:57:21	18:35:01	04:52:22 13:00:59
45°	05:51:33	06:25:45	06:55:41	17:32:42	18:02:40	18:36:54	04:29:56 13:23:24
N 40°	05:49:21	06:20:56	06:48:30	17:39:47	18:07:22	18:38:59	04:11:54 13:41:26
35°	05:47:00	06:16:34	06:42:17	17:45:55	18:11:39	18:41:14	03:56:46 13:56:34
30°	05:44:30	06:12:28	06:36:47	17:51:20	18:15:39	18:43:39	03:43:38 14:09:42
20°	05:38:56	06:04:47	06:27:09	18:00:49	18:23:12	18:49:03	03:21:16 14:32:03
N 10°	05:32:30	05:57:15	06:18:37	18:09:14	18:30:35	18:55:20	03:01:54 14:51:25
0°	05:24:54	05:49:24	06:10:29	18:17:14	18:38:18	19:02:47	02:43:50 15:09:28
S 10°	05:15:42	05:40:46	06:02:14	18:25:21	18:46:47	19:11:49	02:25:48 15:27:30
20°	05:04:10	05:30:43	05:53:20	18:34:06	18:56:41	19:23:11	02:06:31 15:46:47
30°	04:48:58	05:18:17	05:43:02	18:44:12	19:08:54	19:38:08	01:44:18 16:08:59
35°	04:39:18	05:10:42	05:37:02	18:50:06	19:16:21	19:47:39	01:31:18 16:21:59
40°	04:27:37	05:01:47	05:30:11	18:56:49	19:25:07	19:59:09	01:16:20 16:36:56
45°	04:13:04	04:51:01	05:22:09	19:04:42	19:35:41	20:13:26	00:58:33 16:54:43
S 50°	03:54:17	04:37:37	05:12:27	19:14:11	19:48:50	20:31:52	00:36:30 17:16:46
52°	03:45:04	04:31:15	05:07:56	19:18:36	19:55:05	20:40:53	00:25:58 17:27:18
54°	03:34:31	04:24:07	05:02:58	19:23:28	20:02:04	20:51:12	00:14:05 17:39:11
56°	03:22:16	04:16:03	04:57:27	19:28:52	20:09:57	21:03:09	00:00:30 17:52:46
58°	03:07:45	04:06:52	04:51:15	19:34:54	20:18:56	21:17:15	.. .. 18:08:37
S 60°	02:50:03	03:56:14	04:44:14	19:41:45	20:29:18	21:34:22	.. .. 18:27:35

Feb 19	SHA	Mer.pass
Venus	348°09.8	14:53:49
Mars	88°06.5	08:13:35
Jupiter	71°06.6	09:20:42
Saturn	60°54.4	10:01:15

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
18	13:59	13:57	12:13:57	08:03:00	20:29:55	25(24%)
19	13:54	13:51	12:13:51	08:56:41	21:23:11	26(16%)

# 2020 February 20 to Feb. 21

20 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	05:55:03	07:13:38	08:28:16	16:00:59	17:15:50	18:34:48	■ ■
N 70°	05:55:22	07:06:14	08:12:11	16:16:55	17:23:03	18:34:14	■ ■
68°	05:55:28	07:00:05	07:59:23	16:29:36	17:29:03	18:33:56	■ ■
66°	05:55:24	06:54:52	07:48:51	16:40:01	17:34:08	18:33:49	08:31:08 11:11:57
64°	05:55:13	06:50:21	07:40:01	16:48:45	17:38:32	18:33:51	07:44:42 11:58:06
62°	05:54:55	06:46:23	07:32:27	16:56:14	17:42:24	18:34:01	07:14:29 12:28:04
60°	05:54:33	06:42:51	07:25:53	17:02:43	17:45:50	18:34:17	06:51:34 12:50:44
N 58°	05:54:07	06:39:41	07:20:07	17:08:26	17:48:56	18:34:37	06:33:04 13:09:01
56°	05:53:36	06:36:47	07:14:58	17:13:30	17:51:45	18:35:02	06:17:34 13:24:19
54°	05:53:03	06:34:08	07:10:21	17:18:03	17:54:20	18:35:30	06:04:15 13:37:27
52°	05:52:27	06:31:40	07:06:11	17:22:11	17:56:44	18:36:02	05:52:35 13:48:57
50°	05:51:49	06:29:23	07:02:22	17:25:57	17:58:58	18:36:36	05:42:14 13:59:08
45°	05:50:03	06:24:13	06:54:05	17:34:06	18:04:01	18:38:13	05:20:31 14:20:28
N 40°	05:48:06	06:19:38	06:47:09	17:40:57	18:08:29	18:40:04	05:03:00 14:37:39
35°	05:45:57	06:15:28	06:41:09	17:46:51	18:12:33	18:42:06	04:48:14 14:52:06
30°	05:43:37	06:11:34	06:35:50	17:52:06	18:16:23	18:44:21	04:35:25 15:04:38
20°	05:38:21	06:04:11	06:26:32	18:01:15	18:23:36	18:49:26	04:13:32 15:26:00
N 10°	05:32:12	05:56:55	06:18:16	18:09:23	18:30:43	18:55:27	03:54:32 15:44:29
0°	05:24:52	05:49:20	06:10:23	18:17:08	18:38:10	19:02:37	03:36:47 16:01:42
S 10°	05:15:57	05:40:58	06:02:24	18:24:59	18:46:24	19:11:23	03:19:01 16:18:53
20°	05:04:42	05:31:12	05:53:47	18:33:27	18:56:00	19:22:27	03:00:01 16:37:13
30°	04:49:52	05:19:07	05:43:49	18:43:14	19:07:53	19:37:03	02:38:05 16:58:16
35°	04:40:25	05:11:44	05:38:00	18:48:57	19:15:08	19:46:20	02:25:14 17:10:33
40°	04:29:00	05:03:03	05:31:22	18:55:27	19:23:40	19:57:35	02:10:26 17:24:38
45°	04:14:47	04:52:34	05:23:35	19:03:04	19:33:58	20:11:32	01:52:49 17:41:20
S 50°	03:56:27	04:39:31	05:14:12	19:12:15	19:46:46	20:29:31	01:30:59 18:01:52
52°	03:47:28	04:33:18	05:09:50	19:16:31	19:52:51	20:38:18	01:20:32 18:11:38
54°	03:37:12	04:26:22	05:05:01	19:21:13	19:59:38	20:48:20	01:08:45 18:22:34
56°	03:25:18	04:18:33	04:59:41	19:26:26	20:07:17	20:59:57	00:55:15 18:35:00
58°	03:11:14	04:09:37	04:53:42	19:32:16	20:16:00	21:13:37	00:39:31 18:49:22
S 60°	02:54:11	03:59:19	04:46:56	19:38:52	20:26:03	21:30:07	00:20:39 19:06:18

Feb 20	SHA	Mer.pass
Venus	347°07.7	14:54:00
Mars	87°21.4	08:12:39
Jupiter	70°53.8	09:17:37
Saturn	60°47.7	09:57:46

21 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	05:50:33	07:08:54	08:22:44	16:06:19	17:20:22	18:39:08	■ ■
N 70°	05:51:20	07:02:02	08:07:26	16:21:29	17:27:04	18:38:06	■ ■
68°	05:51:49	06:56:19	07:55:12	16:33:35	17:32:38	18:37:23	09:27:09 12:01:49
66°	05:52:05	06:51:27	07:45:08	16:43:33	17:37:22	18:36:56	08:37:03 12:51:20
64°	05:52:11	06:47:14	07:36:39	16:51:55	17:41:28	18:36:42	08:05:25 13:22:26
62°	05:52:08	06:43:31	07:29:24	16:59:05	17:45:04	18:36:37	07:41:47 13:45:35
60°	05:51:59	06:40:13	07:23:05	17:05:19	17:48:17	18:36:39	07:22:53 14:04:02
N 58°	05:51:44	06:37:14	07:17:32	17:10:48	17:51:11	18:36:48	07:07:10 14:19:21
56°	05:51:24	06:34:31	07:12:35	17:15:41	17:53:49	18:37:03	06:53:45 14:32:23
54°	05:51:00	06:32:01	07:08:09	17:20:04	17:56:15	18:37:22	06:42:04 14:43:42
52°	05:50:32	06:29:42	07:04:08	17:24:02	17:58:30	18:37:45	06:31:45 14:53:42
50°	05:50:01	06:27:33	07:00:27	17:27:39	18:00:36	18:38:12	06:22:32 15:02:36
45°	05:48:32	06:22:40	06:52:29	17:35:30	18:05:22	18:39:32	06:03:02 15:21:24
N 40°	05:46:49	06:18:20	06:45:47	17:42:06	18:09:35	18:41:08	05:47:09 15:36:39
35°	05:44:52	06:14:21	06:40:00	17:47:48	18:13:28	18:42:59	05:33:43 15:49:31
30°	05:42:42	06:10:38	06:34:52	17:52:51	18:17:06	18:45:02	05:21:59 16:00:43
20°	05:37:46	06:03:34	06:25:53	18:01:41	18:24:01	18:49:49	05:01:53 16:19:50
N 10°	05:31:53	05:56:35	06:17:54	18:09:32	18:30:51	18:55:32	04:44:22 16:36:24
0°	05:24:50	05:49:16	06:10:17	18:17:01	18:38:02	19:02:27	04:27:59 16:51:50
S 10°	05:16:10	05:41:10	06:02:34	18:24:36	18:45:59	19:10:57	04:11:33 17:07:13
20°	05:05:14	05:31:41	05:54:14	18:32:48	18:55:18	19:21:42	03:53:58 17:23:35
30°	04:50:46	05:19:56	05:44:35	18:42:15	19:06:51	19:35:56	03:33:41 17:42:19
35°	04:41:32	05:12:45	05:38:57	18:47:46	19:13:55	19:45:01	03:21:49 17:53:12
40°	04:30:22	05:04:17	05:32:32	18:54:04	19:22:13	19:55:59	03:08:10 18:05:37
45°	04:16:30	04:54:05	05:25:01	19:01:25	19:32:13	20:09:37	02:51:58 18:20:15
S 50°	03:58:36	04:41:24	05:15:56	19:10:18	19:44:40	20:27:10	02:31:58 18:38:05
52°	03:49:51	04:35:22	05:11:43	19:14:25	19:50:35	20:35:44	02:22:27 18:46:28
54°	03:39:52	04:28:37	05:07:04	19:18:58	19:57:11	20:45:29	02:11:46 18:55:49
56°	03:28:18	04:21:01	05:01:55	19:24:00	20:04:36	20:56:46	01:59:37 19:06:19
58°	03:14:41	04:12:22	04:56:08	19:29:38	20:13:04	21:10:00	01:45:33 19:18:18
S 60°	02:58:14	04:02:22	04:49:37	19:35:59	20:22:48	21:25:56	01:28:55 19:32:11

Feb 21	SHA	Mer.pass
Venus	346°05.8	14:54:11
Mars	86°36.2	08:11:43
Jupiter	70°41.1	09:14:32
Saturn	60°41.1	09:54:16

Day	Sun		Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
20	13:49	13:46	12:13:46	09:49:18 22:14:55	27(9%)
21	13:43	13:39	12:13:39	10:39:59 23:04:25	28(4%)

22 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:45:59	07:04:10	08:17:14	16:11:36	17:24:55	18:43:30	■
N 70°	05:47:15	06:57:49	08:02:41	16:26:00	17:31:05	18:41:58	09:47:08
68°	05:48:08	06:52:31	07:51:01	16:37:33	17:36:13	18:40:52	13:22:50
66°	05:48:44	06:48:00	07:41:24	16:47:04	17:40:36	18:40:05	09:05:46
64°	05:49:07	06:44:05	07:33:17	16:55:04	17:44:23	18:39:33	14:03:14
62°	05:49:19	06:40:38	07:26:19	17:01:56	17:47:44	18:39:13	08:37:24
60°	05:49:22	06:37:33	07:20:16	17:07:55	17:50:43	18:39:03	14:30:44
N 58°	05:49:19	06:34:46	07:14:56	17:13:10	17:53:25	18:39:00	08:15:45
56°	05:49:09	06:32:14	07:10:12	17:17:51	17:55:53	18:39:04	14:51:38
54°	05:48:54	06:29:53	07:05:55	17:22:03	17:58:09	18:39:14	07:58:17
52°	05:48:35	06:27:43	07:02:03	17:25:52	18:00:16	18:39:29	15:08:24
50°	05:48:12	06:25:41	06:58:32	17:29:21	18:02:14	18:39:48	15:22:20
45°	05:47:00	06:21:05	06:50:51	17:36:54	18:06:42	18:40:51	07:43:44
N 40°	05:45:30	06:17:00	06:44:25	17:43:15	18:10:41	18:42:13	15:34:11
35°	05:43:46	06:13:14	06:38:50	17:48:44	18:14:21	18:43:51	07:31:18
30°	05:41:47	06:09:41	06:33:53	17:53:36	18:17:49	18:45:44	07:20:30
20°	05:37:10	06:02:56	06:25:14	18:02:06	18:24:25	18:50:11	15:44:27
N 10°	05:31:34	05:56:14	06:17:31	18:09:41	18:30:58	18:55:38	07:10:58
0°	05:24:46	05:49:11	06:10:11	18:16:54	18:37:53	19:02:16	15:53:28
S 10°	05:16:24	05:41:20	06:02:43	18:24:13	18:45:34	19:10:30	07:02:28
20°	05:05:45	05:32:09	05:54:40	18:32:07	18:54:36	19:20:57	16:01:31
30°	04:51:38	05:20:44	05:45:21	18:41:15	19:05:48	19:34:50	06:54:48
35°	04:42:38	05:13:45	05:39:55	18:46:35	19:12:40	19:43:41	16:08:44
40°	04:31:44	05:05:32	05:33:42	18:52:39	19:20:44	19:54:24	06:38:27
45°	04:18:11	04:55:37	05:26:26	18:59:46	19:30:28	20:07:42	16:24:06
S 50°	04:00:45	04:43:16	05:17:41	19:08:20	19:42:34	20:24:48	06:25:00
52°	03:52:13	04:37:24	05:13:36	19:12:19	19:48:19	20:33:09	16:36:41
54°	03:42:30	04:30:51	05:09:07	19:16:41	19:54:43	20:42:38	06:13:32
56°	03:31:16	04:23:29	05:04:09	19:21:32	20:01:55	20:53:35	16:47:22
58°	03:18:05	04:15:05	04:58:35	19:26:58	20:10:07	21:06:25	06:03:29
S 60°	03:02:13	04:05:24	04:52:17	19:33:05	20:19:33	21:21:48	16:56:41

Feb 22	SHA	Mer.pass
Venus	345°03.9	14:54:22
Mars	85°51.1	08:10:47
Jupiter	70°28.4	09:11:26
Saturn	60°34.5	09:50:46

23 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:41:23	06:59:24	08:11:47	16:16:50	17:29:27	18:47:54	09:48:30
N 70°	05:43:08	06:53:34	07:57:58	16:30:30	17:35:05	18:45:53	14:57:36
68°	05:44:25	06:48:42	07:46:50	16:41:29	17:39:48	18:44:22	09:17:13
66°	05:45:21	06:44:32	07:37:39	16:50:34	17:43:49	18:43:14	15:27:27
64°	05:46:01	06:40:55	07:29:54	16:58:13	17:47:19	18:42:25	08:54:08
62°	05:46:28	06:37:43	07:23:14	17:04:47	17:50:24	18:41:50	15:49:17
60°	05:46:45	06:34:52	07:17:27	17:10:30	17:53:10	18:41:26	08:35:59
N 58°	05:46:52	06:32:17	07:12:20	17:15:32	17:55:40	18:41:12	16:06:18
56°	05:46:53	06:29:55	07:07:47	17:20:01	17:57:57	18:41:06	08:21:11
54°	05:46:48	06:27:44	07:03:41	17:24:03	18:00:04	18:41:06	16:20:08
52°	05:46:37	06:25:43	06:59:58	17:27:42	18:02:02	18:41:12	08:08:45
50°	05:46:22	06:23:49	06:56:35	17:31:03	18:03:52	18:41:23	16:31:39
45°	05:45:26	06:19:30	06:49:13	17:38:18	18:08:03	18:42:10	16:41:29
N 40°	05:44:11	06:15:38	06:43:01	17:44:23	18:11:48	18:43:18	07:58:08
35°	05:42:39	06:12:05	06:37:40	17:49:39	18:15:15	18:44:43	07:48:53
30°	05:40:51	06:08:43	06:32:54	17:54:20	18:18:31	18:46:25	16:49:59
20°	05:36:33	06:02:17	06:24:34	18:02:31	18:24:48	18:50:33	07:40:44
N 10°	05:31:14	05:55:52	06:17:08	18:09:49	18:31:04	18:55:43	07:33:28
0°	05:24:42	05:49:05	06:10:03	18:16:46	18:37:43	19:02:05	17:04:05
S 10°	05:16:36	05:41:31	06:02:52	18:23:49	18:45:09	19:10:02	07:26:56
20°	05:06:16	05:32:37	05:55:06	18:31:26	18:53:53	19:20:11	07:21:01
30°	04:52:31	05:21:32	05:46:06	18:40:15	19:04:45	19:33:42	17:15:25
35°	04:43:44	05:14:45	05:40:51	18:45:23	19:11:25	19:42:20	17:06:58
40°	04:33:05	05:06:46	05:34:52	18:51:14	19:19:15	19:52:47	16:14:32
45°	04:19:52	04:57:08	05:27:52	18:58:05	19:28:42	20:05:46	18:14:38
S 50°	04:02:52	04:45:08	05:19:24	19:06:21	19:40:27	20:22:26	06:03:06
52°	03:54:34	04:39:26	05:15:29	19:10:11	19:46:02	20:30:34	18:34:26
54°	03:45:07	04:33:05	05:11:10	19:14:24	19:52:15	20:39:48	18:44:55
56°	03:34:12	04:25:55	05:06:22	19:19:04	19:59:14	20:50:26	18:56:48
58°	03:21:26	04:17:47	05:01:00	19:24:17	20:07:11	21:02:52	19:03:39
S 60°	03:06:07	04:08:25	04:54:57	19:30:11	20:16:19	21:17:43	19:11:24

Feb 23	SHA	Mer.pass
Venus	344°02.0	14:54:33
Mars	85°05.9	08:09:51
Jupiter	70°15.9	09:08:20
Saturn	60°28.0	09:47:16

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
22	13:36	13:32	12:13:32	11:28:12	23:51:22	29(1%)
23	13:29	13:25	12:13:25	12:13:54	--:--	30(0%)

24 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:36:44	06:54:38	08:06:21	16:22:00	17:33:59	18:52:20	09:16:42
N 70°	05:38:58	06:49:19	07:53:15	16:34:58	17:39:06	18:49:48	08:59:14
68°	05:40:40	06:44:52	07:42:40	16:45:24	17:43:23	18:47:53	08:45:17
66°	05:41:56	06:41:03	07:33:54	16:54:03	17:47:03	18:46:25	08:33:49
64°	05:42:53	06:37:44	07:26:30	17:01:21	17:50:15	18:45:18	08:24:10
62°	05:43:35	06:34:47	07:20:09	17:07:37	17:53:05	18:44:28	08:15:54
60°	05:44:05	06:32:10	07:14:36	17:13:05	17:55:37	18:43:51	08:08:43
N 58°	05:44:24	06:29:46	07:09:43	17:17:53	17:57:55	18:43:25	08:02:24
56°	05:44:36	06:27:35	07:05:21	17:22:11	18:00:01	18:43:08	07:56:46
54°	05:44:40	06:25:34	07:01:26	17:26:02	18:01:58	18:42:59	07:51:43
52°	05:44:37	06:23:41	06:57:52	17:29:32	18:03:47	18:42:56	07:47:09
50°	05:44:30	06:21:55	06:54:37	17:32:44	18:05:30	18:42:59	07:42:59
45°	05:43:52	06:17:54	06:47:33	17:39:41	18:09:23	18:43:28	07:33:56
N 40°	05:42:50	06:14:16	06:41:37	17:45:31	18:12:53	18:44:22	07:26:23
35°	05:41:30	06:10:55	06:36:28	17:50:35	18:16:08	18:45:35	07:19:52
30°	05:39:54	06:07:45	06:31:54	17:55:04	18:19:14	18:47:06	07:14:07
20°	05:35:54	06:01:38	06:23:53	18:02:56	18:25:11	18:50:55	07:04:07
N 10°	05:30:52	05:55:30	06:16:44	18:09:56	18:31:11	18:55:48	06:55:19
0°	05:24:37	05:48:59	06:09:56	18:16:37	18:37:33	19:01:54	06:47:02
S 10°	05:16:48	05:41:40	06:03:00	18:23:24	18:44:43	19:09:33	06:38:44
20°	05:06:46	05:33:04	05:55:31	18:30:44	18:53:09	19:19:25	06:29:51
30°	04:53:22	05:22:20	05:46:51	18:39:13	19:03:41	19:32:34	06:19:41
35°	04:44:48	05:15:45	05:41:48	18:44:10	19:10:08	19:40:59	06:13:47
40°	04:34:26	05:08:00	05:36:02	18:49:48	19:17:45	19:51:10	06:07:05
45°	04:21:32	04:58:38	05:29:16	18:56:24	19:26:55	20:03:50	05:59:15
S 50°	04:04:58	04:46:59	05:21:08	19:04:21	19:38:20	20:20:04	05:49:48
52°	03:56:53	04:41:28	05:17:21	19:08:02	19:43:44	20:27:59	05:45:24
54°	03:47:42	04:35:18	05:13:12	19:12:05	19:49:46	20:36:58	05:40:34
56°	03:37:06	04:28:21	05:08:35	19:16:35	19:56:33	20:47:17	05:35:11
58°	03:24:43	04:20:28	05:03:25	19:21:36	20:04:14	20:59:20	05:29:09
S 60°	03:09:56	04:11:24	04:57:36	19:27:16	20:13:04	21:13:41	05:22:20

Feb 24	SHA	Mer.pass
Venus	343°00.2	14:54:43
Mars	84°20.8	08:08:56
Jupiter	70°03.4	09:05:13
Saturn	60°21.5	09:43:46

25 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:32:02	06:49:51	08:00:58	16:27:07	17:38:30	18:56:48	08:54:20
N 70°	05:34:46	06:45:02	07:48:32	16:39:24	17:43:07	18:53:45	08:45:10
68°	05:36:52	06:41:00	07:38:29	16:49:18	17:46:58	18:51:25	08:37:37
66°	05:38:29	06:37:32	07:30:09	16:57:31	17:50:17	18:49:36	08:31:18
64°	05:39:43	06:34:31	07:23:06	17:04:28	17:53:11	18:48:12	08:25:54
62°	05:40:40	06:31:50	07:17:02	17:10:26	17:55:45	18:47:06	08:21:13
60°	05:41:23	06:29:26	07:11:44	17:15:39	17:58:04	18:46:15	08:17:07
N 58°	05:41:55	06:27:15	07:07:04	17:20:15	18:00:10	18:45:38	08:13:29
56°	05:42:16	06:25:14	07:02:54	17:24:20	18:02:05	18:45:10	08:10:14
54°	05:42:30	06:23:22	06:59:09	17:28:02	18:03:53	18:44:51	08:07:19
52°	05:42:36	06:21:38	06:55:45	17:31:22	18:05:33	18:44:40	08:04:39
50°	05:42:37	06:20:00	06:52:39	17:34:26	18:07:07	18:44:35	08:02:13
45°	05:42:15	06:16:16	06:45:53	17:41:04	18:10:43	18:44:47	07:56:55
N 40°	05:41:29	06:12:53	06:40:11	17:46:39	18:13:59	18:45:26	07:52:28
35°	05:40:21	06:09:45	06:35:15	17:51:30	18:17:02	18:46:27	07:48:37
30°	05:38:55	06:06:45	06:30:52	17:55:48	18:19:56	18:47:47	07:45:12
20°	05:35:15	06:00:58	06:23:11	18:03:20	18:25:34	18:51:16	07:39:16
N 10°	05:30:31	05:55:07	06:16:20	18:10:03	18:31:16	18:55:52	07:34:03
0°	05:24:32	05:48:51	06:09:47	18:16:28	18:37:23	19:01:41	07:29:08
S 10°	05:16:59	05:41:50	06:03:08	18:22:59	18:44:16	19:09:05	07:24:11
20°	05:07:15	05:33:31	05:55:56	18:30:02	18:52:25	19:18:38	07:18:55
30°	04:54:14	05:23:07	05:47:36	18:38:11	19:02:36	19:31:25	07:12:55
35°	04:45:53	05:16:44	05:42:44	18:42:56	19:08:52	19:39:37	07:09:26
40°	04:35:46	05:09:13	05:37:11	18:48:21	19:16:14	19:49:33	07:05:29
45°	04:23:12	05:00:08	05:30:41	18:54:42	19:25:08	20:01:53	07:00:53
S 50°	04:07:03	04:48:50	05:22:51	19:02:20	19:36:12	20:17:42	06:55:22
52°	03:59:11	04:43:28	05:19:13	19:05:53	19:41:26	20:25:24	06:52:50
54°	03:50:15	04:37:30	05:15:13	19:09:46	19:47:17	20:34:08	06:50:02
56°	03:39:58	04:30:46	05:10:47	19:14:05	19:53:51	20:44:09	06:46:56
58°	03:27:59	04:23:08	05:05:50	19:18:54	20:01:17	20:55:50	06:43:29
S 60°	03:13:42	04:14:22	05:00:15	19:24:20	20:09:50	21:09:41	06:39:35

Feb 25	SHA	Mer.pass
Venus	341°58.5	14:54:54
Mars	83°35.6	08:08:00
Jupiter	69°51.1	09:02:06
Saturn	60°15.1	09:40:16

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
24	13:21	13:16	12:13:16	12:57:20	1(1%)
25	13:12	13:08	12:13:08	13:39:04	2(3%)

26 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:27:17	06:45:02	07:55:36	16:32:12	17:43:02	19:01:17	08:35:19
N 70°	05:30:31	06:40:44	07:43:51	16:43:48	17:47:07	18:57:44	08:32:40
68°	05:33:02	06:37:07	07:34:19	16:53:11	17:50:34	18:54:59	08:30:28
66°	05:34:59	06:34:01	07:26:24	17:00:59	17:53:31	18:52:49	08:28:37
64°	05:36:32	06:31:17	07:19:41	17:07:35	17:56:07	18:51:06	08:27:01
62°	05:37:44	06:28:52	07:13:55	17:13:16	17:58:26	18:49:45	08:25:38
60°	05:38:40	06:26:41	07:08:52	17:18:13	18:00:30	18:48:41	08:24:25
N 58°	05:39:23	06:24:42	07:04:25	17:22:35	18:02:24	18:47:51	08:23:20
56°	05:39:56	06:22:52	07:00:27	17:26:30	18:04:09	18:47:13	08:22:21
54°	05:40:19	06:21:10	06:56:52	17:30:00	18:05:47	18:46:44	08:21:29
52°	05:40:34	06:19:34	06:53:37	17:33:12	18:07:18	18:46:24	08:20:41
50°	05:40:42	06:18:04	06:50:39	17:36:07	18:08:45	18:46:12	08:19:57
45°	05:40:38	06:14:37	06:44:11	17:42:27	18:12:03	18:46:06	08:18:22
N 40°	05:40:06	06:11:29	06:38:45	17:47:47	18:15:05	18:46:31	08:17:01
35°	05:39:11	06:08:33	06:34:02	17:52:24	18:17:54	18:47:19	08:15:52
30°	05:37:56	06:05:45	06:29:50	17:56:31	18:20:37	18:48:27	08:14:51
20°	05:34:36	06:00:17	06:22:29	18:03:44	18:25:56	18:51:37	08:13:04
N 10°	05:30:08	05:54:43	06:15:55	18:10:09	18:31:21	18:55:56	08:11:31
0°	05:24:26	05:48:44	06:09:38	18:16:18	18:37:12	19:01:29	08:10:03
S 10°	05:17:09	05:41:58	06:03:15	18:22:33	18:43:48	19:08:35	08:08:35
20°	05:07:44	05:33:57	05:56:20	18:29:18	18:51:39	19:17:50	08:07:02
30°	04:55:04	05:23:54	05:48:20	18:37:08	19:01:31	19:30:16	08:05:17
35°	04:46:56	05:17:43	05:43:39	18:41:42	19:07:34	19:38:15	08:04:16
40°	04:37:05	05:10:25	05:38:20	18:46:54	19:14:43	19:47:55	08:03:07
45°	04:24:50	05:01:37	05:32:05	18:52:59	19:23:20	19:59:56	08:01:48
S 50°	04:09:07	04:50:40	05:24:34	19:00:19	19:34:03	20:15:20	08:00:12
52°	04:01:28	04:45:28	05:21:05	19:03:42	19:39:08	20:22:49	07:59:28
54°	03:52:47	04:39:41	05:17:14	19:07:26	19:44:47	20:31:18	07:58:40
56°	03:42:48	04:33:10	05:12:59	19:11:35	19:51:08	20:41:02	07:57:47
58°	03:31:11	04:25:47	05:08:14	19:16:12	19:58:21	20:52:21	07:56:48
S 60°	03:17:23	04:17:18	05:02:53	19:21:24	20:06:36	21:05:44	07:55:42

Feb 26	SHA	Mer.pass
Venus	340°56.8	14:55:04
Mars	82°50.4	08:07:04
Jupiter	69°38.8	08:58:59
Saturn	60°08.8	09:36:45

27 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:22:28	06:40:13	07:50:16	16:37:13	17:47:33	19:05:49	08:17:09
N 70°	05:26:13	06:36:26	07:39:10	16:48:10	17:51:08	19:01:45	08:20:36
68°	05:29:09	06:33:13	07:30:08	16:57:03	17:54:09	18:58:33	08:23:28
66°	05:31:28	06:30:28	07:22:38	17:04:25	17:56:45	18:56:02	08:25:54
64°	05:33:18	06:28:02	07:16:16	17:10:41	17:59:03	18:54:01	08:27:59
62°	05:34:46	06:25:52	07:10:47	17:16:04	18:01:06	18:52:24	08:29:47
60°	05:35:55	06:23:55	07:05:59	17:20:46	18:02:57	18:51:07	08:31:23
N 58°	05:36:51	06:22:08	07:01:45	17:24:56	18:04:39	18:50:05	08:32:48
56°	05:37:33	06:20:28	06:57:58	17:28:38	18:06:13	18:49:16	08:34:05
54°	05:38:06	06:18:56	06:54:34	17:31:59	18:07:41	18:48:38	08:35:14
52°	05:38:30	06:17:29	06:51:28	17:35:01	18:09:04	18:48:09	08:36:17
50°	05:38:46	06:16:07	06:48:39	17:37:47	18:10:22	18:47:48	08:37:15
45°	05:39:00	06:12:58	06:42:29	17:43:49	18:13:23	18:47:25	08:39:21
N 40°	05:38:42	06:10:04	06:37:18	17:48:54	18:16:10	18:47:35	08:41:07
35°	05:37:59	06:07:21	06:32:48	17:53:19	18:18:47	18:48:11	08:42:40
30°	05:36:56	06:04:44	06:28:47	17:57:14	18:21:19	18:49:08	08:44:02
20°	05:33:55	05:59:35	06:21:46	18:04:07	18:26:18	18:51:58	08:46:26
N 10°	05:29:45	05:54:18	06:15:29	18:10:15	18:31:26	18:55:59	08:48:34
0°	05:24:19	05:48:35	06:09:28	18:16:08	18:37:00	19:01:16	08:50:35
S 10°	05:17:19	05:42:06	06:03:21	18:22:06	18:43:20	19:08:05	08:52:38
20°	05:08:12	05:34:23	05:56:44	18:28:34	18:50:54	19:17:02	08:54:50
30°	04:55:54	05:24:40	05:49:03	18:36:04	19:00:24	19:29:06	08:57:21
35°	04:48:00	05:18:41	05:44:35	18:40:26	19:06:16	19:36:52	08:58:49
40°	04:38:24	05:11:38	05:39:28	18:45:25	19:13:10	19:46:17	09:00:29
45°	04:26:28	05:03:06	05:33:29	18:51:15	19:21:31	19:57:58	09:02:25
S 50°	04:11:10	04:52:29	05:26:16	18:58:16	19:31:54	20:12:58	09:04:45
52°	04:03:43	04:47:28	05:22:56	19:01:31	19:36:49	20:20:15	09:05:50
54°	03:55:17	04:41:51	05:19:15	19:05:06	19:42:17	20:28:29	09:07:01
56°	03:45:36	04:35:33	05:15:11	19:09:03	19:48:26	20:37:56	09:08:19
58°	03:34:21	04:28:25	05:10:38	19:13:28	19:55:24	20:48:53	09:09:46
S 60°	03:21:01	04:20:13	05:05:30	19:18:27	20:03:22	21:01:50	09:11:24

Feb 27	SHA	Mer.pass
Venus	339°55.1	14:55:14
Mars	82°05.3	08:06:08
Jupiter	69°26.7	08:55:51
Saturn	60°02.4	09:33:14

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
26	13:03	12:58	12:12:58	14:19:50	01:59:31	3(7%)
27	12:53	12:48	12:12:48	15:00:24	02:40:05	4(13%)

28 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:17:36	06:35:22	07:44:57	16:42:12	17:52:05	19:10:23	07:57:56
N 70°	05:21:53	06:32:05	07:34:29	16:52:30	17:55:08	19:05:47	08:08:02
68°	05:25:14	06:29:18	07:25:58	17:00:53	17:57:44	19:02:10	08:16:19
66°	05:27:54	06:26:54	07:18:52	17:07:51	18:00:00	18:59:17	08:23:15
64°	05:30:02	06:24:46	07:12:50	17:13:46	18:01:59	18:56:57	08:29:11
62°	05:31:46	06:22:51	07:07:38	17:18:52	18:03:47	18:55:05	08:34:18
60°	05:33:09	06:21:08	07:03:06	17:23:20	18:05:24	18:53:33	08:38:47
N 58°	05:34:16	06:19:32	06:59:05	17:27:16	18:06:54	18:52:19	08:42:46
56°	05:35:10	06:18:04	06:55:29	17:30:47	18:08:17	18:51:19	08:46:19
54°	05:35:52	06:16:41	06:52:15	17:33:57	18:09:35	18:50:31	08:49:32
52°	05:36:25	06:15:23	06:49:19	17:36:50	18:10:49	18:49:54	08:52:27
50°	05:36:49	06:14:09	06:46:38	17:39:28	18:12:00	18:49:25	08:55:07
45°	05:37:20	06:11:17	06:40:46	17:45:12	18:14:43	18:48:44	09:00:55
N 40°	05:37:17	06:08:38	06:35:50	17:50:01	18:17:15	18:48:39	09:05:49
35°	05:36:47	06:06:08	06:31:33	17:54:13	18:19:39	18:49:02	09:10:02
30°	05:35:55	06:03:41	06:27:44	17:57:56	18:22:00	18:49:48	09:13:47
20°	05:33:14	05:58:52	06:21:02	18:04:29	18:26:39	18:52:19	09:20:20
N 10°	05:29:21	05:53:53	06:15:02	18:10:21	18:31:30	18:56:02	09:26:07
0°	05:24:11	05:48:26	06:09:18	18:15:57	18:36:48	19:01:02	09:31:35
S 10°	05:17:28	05:42:14	06:03:28	18:21:39	18:42:52	19:07:35	09:37:06
20°	05:08:39	05:34:48	05:57:07	18:27:50	18:50:07	19:16:13	09:43:00
30°	04:56:43	05:25:26	05:49:47	18:34:59	18:59:18	19:27:55	09:49:46
35°	04:49:02	05:19:39	05:45:30	18:39:10	19:04:57	19:35:28	09:53:42
40°	04:39:42	05:12:49	05:40:36	18:43:56	19:11:38	19:44:38	09:58:10
45°	04:28:05	05:04:34	05:34:53	18:49:30	19:19:42	19:56:01	10:03:23
S 50°	04:13:12	04:54:18	05:27:59	18:56:13	19:29:44	20:10:36	10:09:39
52°	04:05:58	04:49:26	05:24:47	18:59:20	19:34:29	20:17:40	10:12:33
54°	03:57:46	04:44:01	05:21:16	19:02:45	19:39:47	20:25:41	10:15:45
56°	03:48:22	04:37:56	05:17:22	19:06:31	19:45:43	20:34:50	10:19:17
58°	03:37:28	04:31:01	05:13:01	19:10:45	19:52:27	20:45:27	10:23:14
S 60°	03:24:35	04:23:07	05:08:07	19:15:29	20:00:09	20:57:57	10:27:40

Feb 28	SHA	Mer.pass
Venus	338°53.5	14:55:24
Mars	81°20.1	08:05:12
Jupiter	69°14.6	08:52:43
Saturn	59°56.2	09:29:43

29 February 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:12:41	06:30:31	07:39:40	16:47:09	17:56:36	19:14:59	07:34:59
N 70°	05:17:29	06:27:44	07:29:49	16:56:49	17:59:09	19:09:51	07:53:44
68°	05:21:16	06:25:22	07:21:47	17:04:42	18:01:20	19:05:47	08:08:38
66°	05:24:18	06:23:18	07:15:06	17:11:16	18:03:14	19:02:32	08:20:51
64°	05:26:44	06:21:28	07:09:24	17:16:51	18:04:56	18:59:54	08:31:06
62°	05:28:44	06:19:49	07:04:29	17:21:40	18:06:27	18:57:46	08:39:52
60°	05:30:21	06:18:19	07:00:11	17:25:52	18:07:51	18:56:00	08:47:28
N 58°	05:31:40	06:16:56	06:56:23	17:29:36	18:09:09	18:54:34	08:54:10
56°	05:32:45	06:15:38	06:52:59	17:32:55	18:10:21	18:53:23	09:00:07
54°	05:33:37	06:14:25	06:49:56	17:35:55	18:11:30	18:52:25	09:05:27
52°	05:34:18	06:13:16	06:47:08	17:38:38	18:12:35	18:51:39	09:10:17
50°	05:34:51	06:12:10	06:44:36	17:41:08	18:13:37	18:51:01	09:14:41
45°	05:35:39	06:09:36	06:39:02	17:46:33	18:16:03	18:50:03	09:24:14
N 40°	05:35:51	06:07:11	06:34:21	17:51:08	18:18:20	18:49:43	09:32:13
35°	05:35:34	06:04:53	06:30:17	17:55:06	18:20:31	18:49:53	09:39:06
30°	05:34:53	06:02:39	06:26:40	17:58:39	18:22:41	18:50:28	09:45:11
20°	05:32:31	05:58:09	06:20:17	18:04:52	18:27:00	18:52:39	09:55:47
N 10°	05:28:56	05:53:27	06:14:35	18:10:25	18:31:34	18:56:05	10:05:07
0°	05:24:03	05:48:16	06:09:07	18:15:45	18:36:35	19:00:48	10:13:56
S 10°	05:17:37	05:42:20	06:03:33	18:21:11	18:42:23	19:07:04	10:22:48
20°	05:09:06	05:35:12	05:57:30	18:27:05	18:49:21	19:15:24	10:32:18
30°	04:57:32	05:26:11	05:50:30	18:33:54	18:58:10	19:26:44	10:43:13
35°	04:50:04	05:20:36	05:46:24	18:37:53	19:03:37	19:34:04	10:49:33
40°	04:40:59	05:14:00	05:41:44	18:42:26	19:10:04	19:42:58	10:56:47
45°	04:29:41	05:06:02	05:36:16	18:47:45	19:17:52	19:54:03	11:05:15
S 50°	04:15:12	04:56:07	05:29:40	18:54:09	19:27:34	20:08:13	11:15:29
52°	04:08:11	04:51:24	05:26:37	18:57:07	19:32:09	20:15:06	11:20:15
54°	04:00:13	04:46:10	05:23:16	19:00:23	19:37:16	20:22:52	11:25:30
56°	03:51:06	04:40:17	05:19:33	19:03:59	19:43:00	20:31:45	11:31:21
58°	03:40:33	04:33:37	05:15:24	19:08:00	19:49:30	20:42:02	11:37:55
S 60°	03:28:06	04:25:59	05:10:43	19:12:32	19:56:56	20:54:07	11:45:23

Feb 29	SHA	Mer.pass
Venus	337°51.9	14:55:33
Mars	80°34.9	08:04:16
Jupiter	69°02.6	08:49:35
Saturn	59°50.0	09:26:12

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
28	12:43	12:37	12:12:37	15:41:38	03:20:53	5(20%)
29	12:32	12:26	12:12:26	16:24:25	04:02:47	6(28%)

# 2020 March 01 to Mar. 02

01 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:07:43	06:25:38	07:34:24	16:52:03	18:01:08	19:19:38	07:01:05
N 70°	05:13:03	06:23:22	07:25:10	17:01:07	18:03:10	19:13:56	07:35:06
68°	05:17:16	06:21:24	07:17:37	17:08:30	18:04:56	19:09:26	07:59:45
66°	05:20:40	06:19:42	07:11:19	17:14:40	18:06:29	19:05:49	08:18:56
64°	05:23:25	06:18:10	07:05:57	17:19:55	18:07:52	19:02:52	08:34:30
62°	05:25:40	06:16:46	07:01:20	17:24:27	18:09:08	19:00:27	08:47:32
60°	05:27:31	06:15:30	06:57:16	17:28:25	18:10:18	18:58:28	08:58:38
N 58°	05:29:03	06:14:19	06:53:41	17:31:55	18:11:24	18:56:49	09:08:17
56°	05:30:18	06:13:12	06:50:29	17:35:03	18:12:25	18:55:27	09:16:47
54°	05:31:20	06:12:08	06:47:35	17:37:52	18:13:24	18:54:19	09:24:21
52°	05:32:11	06:11:08	06:44:57	17:40:27	18:14:20	18:53:24	09:31:09
50°	05:32:51	06:10:10	06:42:33	17:42:48	18:15:14	18:52:38	09:37:19
45°	05:33:57	06:07:53	06:37:18	17:47:55	18:17:22	18:51:22	09:50:36
N 40°	05:34:24	06:05:44	06:32:52	17:52:14	18:19:24	18:50:47	10:01:38
35°	05:34:20	06:03:38	06:29:01	17:56:00	18:21:23	18:50:44	10:11:05
30°	05:33:50	06:01:35	06:25:35	17:59:20	18:23:21	18:51:08	10:19:25
20°	05:31:48	05:57:25	06:19:32	18:05:13	18:27:21	18:52:59	10:33:50
N 10°	05:28:30	05:53:00	06:14:07	18:10:30	18:31:37	18:56:07	10:46:31
0°	05:23:54	05:48:06	06:08:56	18:15:33	18:36:22	19:00:34	10:58:27
S 10°	05:17:45	05:42:27	06:03:38	18:20:43	18:41:53	19:06:33	11:10:28
20°	05:09:33	05:35:36	05:57:53	18:26:19	18:48:33	19:14:34	11:23:20
30°	04:58:20	05:26:55	05:51:12	18:32:48	18:57:02	19:25:33	11:38:10
35°	04:51:05	05:21:33	05:47:18	18:36:36	19:02:17	19:32:40	11:46:48
40°	04:42:16	05:15:11	05:42:51	18:40:55	19:08:30	19:41:19	11:56:41
45°	04:31:17	05:07:29	05:37:38	18:45:59	19:16:02	19:52:04	12:08:20
S 50°	04:17:12	04:57:54	05:31:22	18:52:05	19:25:23	20:05:51	12:22:30
52°	04:10:23	04:53:22	05:28:27	18:54:54	19:29:49	20:12:31	12:29:09
54°	04:02:39	04:48:18	05:25:15	18:58:00	19:34:45	20:20:04	12:36:31
56°	03:53:49	04:42:37	05:21:43	19:01:26	19:40:17	20:28:41	12:44:47
58°	03:43:35	04:36:11	05:17:46	19:05:15	19:46:33	20:38:39	12:54:09
S 60°	03:31:34	04:28:50	05:13:19	19:09:33	19:53:43	20:50:19	13:04:54



Mar 01	SHA	Mer.pass
Venus	336° 50.4	14:55:43
Mars	79° 49.8	08:03:21
Jupiter	68° 50.8	08:46:26
Saturn	59° 43.8	09:22:40

02 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:02:41	06:20:44	07:29:09	16:56:56	18:05:40	19:24:19	☐ ☐
N 70°	05:08:34	06:18:58	07:20:31	17:05:23	18:07:11	19:18:04	07:01:58
68°	05:13:14	06:17:26	07:13:27	17:12:17	18:08:32	19:13:06	07:47:49
66°	05:17:00	06:16:04	07:07:32	17:18:04	18:09:43	19:09:07	08:18:03
64°	05:20:03	06:14:50	07:02:30	17:22:59	18:10:49	19:05:51	08:40:50
62°	05:22:35	06:13:42	06:58:09	17:27:13	18:11:49	19:03:10	08:59:05
60°	05:24:40	06:12:39	06:54:21	17:30:56	18:12:45	19:00:56	09:14:13
N 58°	05:26:24	06:11:40	06:50:58	17:34:14	18:13:39	18:59:04	09:27:06
56°	05:27:50	06:10:44	06:47:57	17:37:10	18:14:29	18:57:31	09:38:17
54°	05:29:02	06:09:50	06:45:14	17:39:50	18:15:18	18:56:14	09:48:08
52°	05:30:02	06:08:59	06:42:45	17:42:14	18:16:05	18:55:09	09:56:55
50°	05:30:50	06:08:09	06:40:29	17:44:27	18:16:51	18:54:15	10:04:50
45°	05:32:14	06:06:10	06:35:32	17:49:16	18:18:42	18:52:41	10:21:41
N 40°	05:32:56	06:04:15	06:31:22	17:53:20	18:20:29	18:51:51	10:35:34
35°	05:33:05	06:02:23	06:27:44	17:56:53	18:22:15	18:51:35	10:47:23
30°	05:32:47	06:00:31	06:24:29	18:00:02	18:24:01	18:51:47	10:57:44
20°	05:31:04	05:56:40	06:18:46	18:05:35	18:27:42	18:53:18	11:15:36
N 10°	05:28:04	05:52:33	06:13:39	18:10:34	18:31:40	18:56:09	11:31:14
0°	05:23:44	05:47:55	06:08:44	18:15:21	18:36:09	19:00:19	11:45:56
S 10°	05:17:52	05:42:32	06:03:43	18:20:14	18:41:23	19:06:01	12:00:41
20°	05:09:59	05:36:00	05:58:15	18:25:32	18:47:45	19:13:44	12:16:32
30°	04:59:08	05:27:40	05:51:54	18:31:42	18:55:54	19:24:21	12:34:49
35°	04:52:06	05:22:29	05:48:12	18:35:18	19:00:57	19:31:15	12:45:31
40°	04:43:31	05:16:21	05:43:58	18:39:24	19:06:56	19:39:39	12:57:48
45°	04:32:51	05:08:56	05:39:01	18:44:12	19:14:11	19:50:06	13:12:20
S 50°	04:19:11	04:59:41	05:33:03	18:49:59	19:23:12	20:03:29	13:30:12
52°	04:12:33	04:55:18	05:30:17	18:52:40	19:27:29	20:09:57	13:38:40
54°	04:05:03	04:50:25	05:27:15	18:55:37	19:32:14	20:17:17	13:48:07
56°	03:56:29	04:44:57	05:23:53	18:58:52	19:37:34	20:25:38	13:58:49
58°	03:46:35	04:38:45	05:20:08	19:02:30	19:43:36	20:35:16	14:11:05
S 60°	03:34:58	04:31:40	05:15:54	19:06:35	19:50:30	20:46:33	14:25:25




Mar 02	SHA	Mer.pass
Venus	335° 48.9	14:55:52
Mars	79° 04.6	08:02:25
Jupiter	68° 39.0	08:43:17
Saturn	59° 37.7	09:19:09

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
01	12:21	12:15	12:12:15	17:09:35	04:46:39	7(37%)
02	12:09	12:02	12:12:02	17:57:50	05:33:17	8(47%)



03 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	04:57:35	06:15:49	07:23:55	17:01:46	18:10:12	19:29:04	
N 70°	05:04:02	06:14:33	07:15:52	17:09:38	18:11:13	19:22:14	
68°	05:09:09	06:13:26	07:09:16	17:16:04	18:12:08	19:16:48	07:23:36 05:14:21
66°	05:13:17	06:12:25	07:03:45	17:21:27	18:12:58	19:12:26	08:19:48 04:18:43
64°	05:16:40	06:11:29	06:59:03	17:26:02	18:13:45	19:08:51	08:53:16 03:45:46
62°	05:19:28	06:10:37	06:54:59	17:30:00	18:14:30	19:05:53	09:17:54 03:21:36
60°	05:21:47	06:09:48	06:51:25	17:33:28	18:15:12	19:03:25	09:37:28 03:02:27
N 58°	05:23:44	06:09:01	06:48:15	17:36:32	18:15:53	19:01:20	09:53:40 02:46:38
56°	05:25:21	06:08:15	06:45:25	17:39:18	18:16:33	18:59:36	10:07:29 02:33:12
54°	05:26:43	06:07:32	06:42:52	17:41:47	18:17:12	18:58:08	10:19:28 02:21:33
52°	05:27:52	06:06:49	06:40:33	17:44:02	18:17:50	18:56:54	10:30:03 02:11:17
50°	05:28:49	06:06:07	06:38:25	17:46:06	18:18:28	18:55:52	10:39:30 02:02:08
45°	05:30:31	06:04:26	06:33:46	17:50:37	18:20:01	18:54:00	10:59:28 01:42:51
N 40°	05:31:27	06:02:46	06:29:51	17:54:26	18:21:33	18:52:55	11:15:43 01:27:12
35°	05:31:49	06:01:06	06:26:26	17:57:45	18:23:06	18:52:26	11:29:28 01:14:00
30°	05:31:42	05:59:25	06:23:23	18:00:43	18:24:41	18:52:27	11:41:28 01:02:31
20°	05:30:20	05:55:55	06:18:00	18:05:56	18:28:02	18:53:38	12:02:03 00:42:53
N 10°	05:27:37	05:52:05	06:13:10	18:10:37	18:31:43	18:56:11	12:20:00 00:25:50
0°	05:23:34	05:47:44	06:08:32	18:15:08	18:35:55	19:00:04	12:36:50 00:09:56
S 10°	05:17:59	05:42:38	06:03:47	18:19:44	18:40:52	19:05:29	12:53:43 .. ..
20°	05:10:24	05:36:23	05:58:37	18:24:45	18:46:57	19:12:53	13:11:51 .. ..
30°	04:59:55	05:28:23	05:52:36	18:30:35	18:54:45	19:23:09	13:32:49 .. ..
35°	04:53:06	05:23:25	05:49:05	18:33:59	18:59:36	19:29:50	13:45:07 23:51:43
40°	04:44:47	05:17:31	05:45:05	18:37:52	19:05:21	19:37:58	13:59:17 23:37:07
45°	04:34:25	05:10:22	05:40:23	18:42:25	19:12:20	19:48:07	14:16:08 23:19:49
S 50°	04:21:09	05:01:28	05:34:43	18:47:54	19:21:01	20:01:06	14:37:01 22:58:25
52°	04:14:42	04:57:14	05:32:06	18:50:26	19:25:08	20:07:24	14:47:00 22:48:13
54°	04:07:26	04:52:32	05:29:13	18:53:13	19:29:43	20:14:30	14:58:13 22:36:45
56°	03:59:08	04:47:15	05:26:02	18:56:18	19:34:51	20:22:35	15:11:03 22:23:41
58°	03:49:33	04:41:17	05:22:29	18:59:44	19:40:40	20:31:55	15:25:57 22:08:30
S 60°	03:38:20	04:34:28	05:18:29	19:03:35	19:47:17	20:42:49	15:43:42 21:50:28

Mar 03	SHA	Mer.pass
Venus	334° 47.4	14:56:01
Mars	78° 19.5	08:01:29
Jupiter	68° 27.3	08:40:07
Saturn	59° 31.7	09:15:37

04 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	04:52:26	06:10:52	07:18:42	17:06:34	18:14:44	19:33:51	
N 70°	04:59:27	06:10:07	07:11:13	17:13:51	18:15:14	19:26:26	
68°	05:05:02	06:09:25	07:05:06	17:19:49	18:15:44	19:20:32	
66°	05:09:33	06:08:45	06:59:58	17:24:49	18:16:13	19:15:46	08:30:30 05:59:17
64°	05:13:15	06:08:07	06:55:35	17:29:04	18:16:42	19:11:51	09:19:10 05:10:52
62°	05:16:19	06:07:31	06:51:47	17:32:45	18:17:11	19:08:37	09:50:11 04:40:03
60°	05:18:53	06:06:55	06:48:28	17:35:59	18:17:39	19:05:54	10:13:34 04:16:52
N 58°	05:21:02	06:06:20	06:45:31	17:38:51	18:18:08	19:03:37	10:32:23 03:58:14
56°	05:22:51	06:05:46	06:42:53	17:41:24	18:18:37	19:01:41	10:48:08 03:42:39
54°	05:24:23	06:05:12	06:40:30	17:43:43	18:19:06	19:00:03	11:01:39 03:29:18
52°	05:25:40	06:04:38	06:38:20	17:45:49	18:19:35	18:58:40	11:13:28 03:17:37
50°	05:26:46	06:04:05	06:36:20	17:47:45	18:20:05	18:57:30	11:23:58 03:07:16
45°	05:28:46	06:02:41	06:32:00	17:51:58	18:21:20	18:55:19	11:45:57 02:45:36
N 40°	05:29:57	06:01:16	06:28:19	17:55:31	18:22:37	18:53:59	12:03:42 02:28:08
35°	05:30:32	05:59:49	06:25:07	17:58:37	18:23:57	18:53:17	12:18:39 02:13:27
30°	05:30:37	05:58:20	06:22:16	18:01:24	18:25:21	18:53:06	12:31:38 02:00:42
20°	05:29:35	05:55:09	06:17:13	18:06:17	18:28:22	18:53:57	12:53:51 01:38:57
N 10°	05:27:09	05:51:36	06:12:41	18:10:40	18:31:45	18:56:12	13:13:08 01:20:06
0°	05:23:23	05:47:32	06:08:19	18:14:54	18:35:41	18:59:49	13:31:11 01:02:29
S 10°	05:18:05	05:42:42	06:03:50	18:19:14	18:40:21	19:04:57	13:49:17 00:44:54
20°	05:10:49	05:36:46	05:58:58	18:23:58	18:46:08	19:12:02	14:08:41 00:26:04
30°	05:00:41	05:29:07	05:53:18	18:29:27	18:53:35	19:21:56	14:31:07 00:04:24
35°	04:54:05	05:24:20	05:49:58	18:32:40	18:58:14	19:28:24	14:44:18 .. ..
40°	04:46:01	05:18:40	05:46:11	18:36:20	19:03:46	19:36:18	14:59:30 .. ..
45°	04:35:58	05:11:48	05:41:45	18:40:37	19:10:28	19:46:08	15:17:37 .. ..
S 50°	04:23:05	05:03:13	05:36:24	18:45:47	19:18:50	19:58:44	15:40:10 23:48:25
52°	04:16:51	04:59:09	05:33:55	18:48:11	19:22:47	20:04:50	15:50:59 23:37:33
54°	04:09:48	04:54:38	05:31:12	18:50:49	19:27:12	20:11:43	16:03:12 23:25:17
56°	04:01:45	04:49:33	05:28:11	18:53:43	19:32:08	20:19:34	16:17:14 23:11:11
58°	03:52:29	04:43:49	05:24:49	18:56:57	19:37:43	20:28:35	16:33:41 22:54:41
S 60°	03:41:38	04:37:15	05:21:03	19:00:36	19:44:05	20:39:07	16:53:31 22:34:47

Mar 04	SHA	Mer.pass
Venus	333° 46.0	14:56:11
Mars	77° 34.3	08:00:33
Jupiter	68° 15.8	08:36:57
Saturn	59° 25.7	09:12:04

Day	Sun		Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Mer.Pass. Upper Lower hh:mm:ss hh:mm:ss		Age
03	11:56	11:50	12:11:50	18:49:34 06:23:15	9(57%)
04	11:43	11:37	12:11:37	19:44:40 07:16:44	10(67%)

# 2020 March 05 to Mar. 06

05 March 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	04:47:13	06:05:54	07:13:29	17:11:21	18:19:17	19:38:41	☐	☐
N 70°	04:54:49	06:05:40	07:06:35	17:18:03	18:19:16	19:30:40	☐	☐
68°	05:00:52	06:05:23	07:00:55	17:23:33	18:19:20	19:24:17	☐	☐
66°	05:05:46	06:05:04	06:56:10	17:28:10	18:19:28	19:19:08	09:17:14	07:10:45
64°	05:09:48	06:04:44	06:52:07	17:32:06	18:19:39	19:14:53	10:11:36	06:16:19
62°	05:13:08	06:04:23	06:48:36	17:35:30	18:19:52	19:11:21	10:44:15	05:43:35
60°	05:15:57	06:04:02	06:45:31	17:38:30	18:20:07	19:08:24	11:08:28	05:19:18
N 58°	05:18:19	06:03:39	06:42:47	17:41:09	18:20:23	19:05:54	11:27:48	04:59:54
56°	05:20:19	06:03:15	06:40:20	17:43:31	18:20:41	19:03:47	11:43:54	04:43:44
54°	05:22:01	06:02:51	06:38:07	17:45:39	18:21:00	19:01:58	11:57:41	04:29:54
52°	05:23:28	06:02:26	06:36:06	17:47:36	18:21:21	19:00:26	12:09:42	04:17:50
50°	05:24:42	06:02:01	06:34:15	17:49:24	18:21:42	18:59:07	12:20:21	04:07:08
45°	05:27:00	06:00:55	06:30:13	17:53:18	18:22:39	18:56:38	12:42:37	03:44:46
N 40°	05:28:27	05:59:45	06:26:47	17:56:36	18:23:41	18:55:03	13:00:32	03:26:45
35°	05:29:14	05:58:31	06:23:48	17:59:29	18:24:48	18:54:08	13:15:36	03:11:36
30°	05:29:31	05:57:13	06:21:08	18:02:04	18:26:01	18:53:45	13:28:40	02:58:27
20°	05:28:49	05:54:22	06:16:26	18:06:37	18:28:41	18:54:16	13:50:58	02:35:59
N 10°	05:26:41	05:51:07	06:12:11	18:10:43	18:31:47	18:56:13	14:10:18	02:16:30
0°	05:23:12	05:47:20	06:08:06	18:14:40	18:35:26	18:59:33	14:28:22	01:58:16
S 10°	05:18:11	05:42:47	06:03:54	18:18:44	18:39:50	19:04:24	14:46:27	01:40:01
20°	05:11:13	05:37:08	05:59:19	18:23:09	18:45:19	19:11:11	15:05:48	01:20:28
30°	05:01:27	05:29:50	05:53:59	18:28:19	18:52:25	19:20:44	15:28:08	00:57:52
35°	04:55:04	05:25:15	05:50:51	18:31:20	18:56:52	19:26:59	15:41:14	00:44:36
40°	04:47:15	05:19:49	05:47:17	18:34:47	19:02:10	19:34:37	15:56:18	00:29:19
45°	04:37:30	05:13:13	05:43:06	18:38:49	19:08:36	19:44:09	16:14:14	00:11:05
S 50°	04:25:01	05:04:58	05:38:04	18:43:41	19:16:38	19:56:22	16:36:29	.. ..
52°	04:18:58	05:01:04	05:35:44	18:45:56	19:20:26	20:02:17	16:47:07	.. ..
54°	04:12:08	04:56:43	05:33:10	18:48:24	19:24:40	20:08:57	16:59:07	.. ..
56°	04:04:20	04:51:50	05:30:19	18:51:08	19:29:25	20:16:32	17:12:51	.. ..
58°	03:55:22	04:46:19	05:27:09	18:54:11	19:34:46	20:25:16	17:28:53	23:59:05
S 60°	03:44:54	04:40:01	05:23:36	18:57:36	19:40:53	20:35:27	17:48:06	23:40:03

Mar 05	SHA	Mer.pass
Venus	332° 44.6	14:56:19
Mars	76° 49.2	07:59:37
Jupiter	68° 04.3	08:33:47
Saturn	59° 19.8	09:08:32

06 March 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	04:41:56	06:00:55	07:08:18	17:16:06	18:23:51	19:43:35	<div></div>	<div></div>
N 70°	04:50:08	06:01:11	07:01:58	17:22:14	18:23:19	19:34:56	<div></div>	<div></div>
68°	04:56:40	06:01:19	06:56:45	17:27:17	18:22:57	19:28:04	<div></div>	<div></div>
66°	05:01:57	06:01:22	06:52:22	17:31:31	18:22:44	19:22:30	10:57:35	07:32:59
64°	05:06:19	06:01:20	06:48:38	17:35:07	18:22:36	19:17:56	11:36:14	06:53:53
62°	05:09:56	06:01:15	06:45:24	17:38:15	18:22:33	19:14:07	12:03:15	06:26:29
60°	05:12:59	06:01:07	06:42:33	17:41:00	18:22:34	19:10:55	12:24:12	06:05:11
N 58°	05:15:34	06:00:57	06:40:02	17:43:26	18:22:38	19:08:12	12:41:19	05:47:44
56°	05:17:46	06:00:44	06:37:46	17:45:37	18:22:45	19:05:53	12:55:45	05:32:59
54°	05:19:38	06:00:30	06:35:43	17:47:35	18:22:54	19:03:54	13:08:12	05:20:14
52°	05:21:14	06:00:14	06:33:51	17:49:23	18:23:05	19:02:12	13:19:09	05:09:01
50°	05:22:37	05:59:57	06:32:09	17:51:02	18:23:18	19:00:45	13:28:52	04:59:02
45°	05:25:13	05:59:08	06:28:25	17:54:38	18:23:58	18:57:58	13:49:18	04:38:02
N 40°	05:26:55	05:58:13	06:25:15	17:57:41	18:24:45	18:56:07	14:05:50	04:20:59
35°	05:27:56	05:57:13	06:22:29	18:00:21	18:25:39	18:54:58	14:19:45	04:06:35
30°	05:28:24	05:56:06	06:20:00	18:02:44	18:26:40	18:54:24	14:31:50	03:54:03
20°	05:28:02	05:53:35	06:15:38	18:06:57	18:29:00	18:54:34	14:52:30	03:32:34
N 10°	05:26:12	05:50:38	06:11:41	18:10:45	18:31:48	18:56:14	15:10:25	03:13:51
0°	05:23:00	05:47:07	06:07:52	18:14:26	18:35:11	18:59:17	15:27:09	02:56:19
S 10°	05:18:16	05:42:50	06:03:56	18:18:13	18:39:18	19:03:51	15:43:51	02:38:44
20°	05:11:37	05:37:30	05:59:39	18:22:21	18:44:29	19:10:20	16:01:42	02:19:50
30°	05:02:12	05:30:32	05:54:39	18:27:10	18:51:15	19:19:30	16:22:12	01:58:00
35°	04:56:02	05:26:10	05:51:44	18:30:00	18:55:30	19:25:33	16:34:09	01:45:10
40°	04:48:28	05:20:57	05:48:22	18:33:13	19:00:34	19:32:56	16:47:52	01:30:22
45°	04:39:02	05:14:37	05:44:27	18:37:00	19:06:44	19:42:10	17:04:05	01:12:44
S 50°	04:26:55	05:06:43	05:39:43	18:41:33	19:14:26	19:54:00	17:24:00	00:50:50
52°	04:21:03	05:02:58	05:37:32	18:43:40	19:18:04	19:59:44	17:33:26	00:40:20
54°	04:14:26	04:58:47	05:35:07	18:45:59	19:22:08	20:06:11	17:44:00	00:28:30
56°	04:06:54	04:54:06	05:32:27	18:48:32	19:26:41	20:13:32	17:55:57	00:14:56
58°	03:58:14	04:48:48	05:29:29	18:51:24	19:31:50	20:21:59	18:09:43	.. ..
S 60°	03:48:07	04:42:46	05:26:09	18:54:36	19:37:42	20:31:48	18:25:51	.. ..

Mar 06	SHA	Mer.pass
Venus	331° 43.2	14:56:28
Mars	76° 04.1	07:58:40
Jupiter	67° 53.0	08:30:36
Saturn	59° 13.9	09:04:59

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
05	11:30	11:23	12:11:23	20:42:19	08:13:15	11(77%)
06	11:16	11:09	12:11:09	21:41:12	09:11:42	12(85%)

# 2020 March 07 to Mar. 08

07 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	04:36:34	05:55:55	07:03:07	17:20:50	18:28:25	19:48:32	☐ ☐
N 70°	04:45:24	05:56:41	06:57:20	17:26:24	18:27:22	19:39:15	11:25:23 09:10:34
68°	04:52:24	05:57:15	06:52:34	17:30:59	18:26:35	19:31:53	12:22:55 08:12:02
66°	04:58:06	05:57:39	06:48:34	17:34:51	18:25:59	19:25:55	12:56:32 07:37:30
64°	05:02:48	05:57:55	06:45:09	17:38:08	18:25:33	19:21:00	13:20:55 07:12:18
62°	05:06:43	05:58:06	06:42:11	17:40:59	18:25:14	19:16:53	13:40:04 06:52:26
60°	05:10:00	05:58:12	06:39:35	17:43:30	18:25:01	19:13:26	13:55:44 06:36:05
N 58°	05:12:48	05:58:13	06:37:16	17:45:43	18:24:53	19:10:30	14:08:58 06:22:14
56°	05:15:11	05:58:12	06:35:12	17:47:43	18:24:49	19:07:59	14:20:21 06:10:17
54°	05:17:14	05:58:07	06:33:19	17:49:31	18:24:48	19:05:50	14:30:19 05:59:47
52°	05:19:00	05:58:01	06:31:37	17:51:10	18:24:50	19:03:59	14:39:10 05:50:26
50°	05:20:30	05:57:52	06:30:02	17:52:40	18:24:55	19:02:23	14:47:06 05:42:02
45°	05:23:25	05:57:21	06:26:36	17:55:58	18:25:16	18:59:17	15:03:55 05:24:10
N 40°	05:25:23	05:56:41	06:23:41	17:58:46	18:25:48	18:57:11	15:17:39 05:09:30
35°	05:26:37	05:55:53	06:21:09	18:01:12	18:26:30	18:55:49	15:29:16 04:57:01
30°	05:27:16	05:54:58	06:18:52	18:03:24	18:27:19	18:55:03	15:39:25 04:46:05
20°	05:27:15	05:52:48	06:14:49	18:07:17	18:29:19	18:54:53	15:56:48 04:27:14
N 10°	05:25:43	05:50:08	06:11:10	18:10:47	18:31:50	18:56:15	16:11:54 04:10:45
0°	05:22:48	05:46:53	06:07:38	18:14:11	18:34:55	18:59:00	16:26:01 03:55:14
S 10°	05:18:21	05:42:54	06:03:59	18:17:42	18:38:46	19:03:17	16:40:05 03:39:39
20°	05:12:00	05:37:51	05:59:59	18:21:32	18:43:39	19:09:28	16:55:04 03:22:54
30°	05:02:57	05:31:14	05:55:20	18:26:01	18:50:04	19:18:17	17:12:12 03:03:33
35°	04:57:00	05:27:04	05:52:36	18:28:39	18:54:07	19:24:06	17:22:08 02:52:12
40°	04:49:41	05:22:05	05:49:28	18:31:39	18:58:57	19:31:15	17:33:27 02:39:09
45°	04:40:33	05:16:01	05:45:48	18:35:11	19:04:51	19:40:11	17:46:44 02:23:40
S 50°	04:28:49	05:08:27	05:41:22	18:39:25	19:12:13	19:51:39	18:02:51 02:04:33
52°	04:23:08	05:04:51	05:39:19	18:41:23	19:15:43	19:57:11	18:10:23 01:55:29
54°	04:16:44	05:00:51	05:37:04	18:43:33	19:19:36	20:03:26	18:18:44 01:45:18
56°	04:09:26	04:56:21	05:34:35	18:45:56	19:23:58	20:10:33	18:28:05 01:33:45
58°	04:01:03	04:51:17	05:31:48	18:48:36	19:28:54	20:18:42	18:38:40 01:20:26
S 60°	03:51:17	04:45:29	05:28:41	18:51:35	19:34:31	20:28:11	18:50:48 01:04:46

Mar 07	SHA	Mer.pass
Venus	330° 41.9	14:56:37
Mars	75° 19.0	07:57:44
Jupiter	67° 41.7	08:27:24
Saturn	59° 08.1	09:01:26

08 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	04:31:09	05:50:53	06:57:56	17:25:32	18:32:59	19:53:33	13:42:25 08:57:36
N 70°	04:40:36	05:52:10	06:52:43	17:30:33	18:31:25	19:43:37	14:15:43 08:22:33
68°	04:48:07	05:53:09	06:48:24	17:34:41	18:30:12	19:35:44	14:39:30 07:57:14
66°	04:54:13	05:53:55	06:44:46	17:38:10	18:29:15	19:29:21	14:57:50 07:37:33
64°	04:59:15	05:54:29	06:41:40	17:41:09	18:28:31	19:24:05	15:12:36 07:21:34
62°	05:03:27	05:54:56	06:38:58	17:43:43	18:27:56	19:19:41	15:24:52 07:08:13
60°	05:07:00	05:55:15	06:36:36	17:45:59	18:27:29	19:15:58	15:35:16 06:56:50
N 58°	05:10:01	05:55:29	06:34:30	17:48:00	18:27:08	19:12:48	15:44:16 06:46:56
56°	05:12:36	05:55:39	06:32:37	17:49:48	18:26:53	19:10:06	15:52:09 06:38:13
54°	05:14:49	05:55:44	06:30:55	17:51:26	18:26:42	19:07:46	15:59:09 06:30:27
52°	05:16:44	05:55:47	06:29:21	17:52:56	18:26:35	19:05:45	16:05:25 06:23:29
50°	05:18:23	05:55:46	06:27:55	17:54:18	18:26:32	19:04:01	16:11:05 06:17:09
45°	05:21:37	05:55:33	06:24:47	17:57:17	18:26:35	19:00:36	16:23:12 06:03:30
N 40°	05:23:49	05:55:08	06:22:08	17:59:50	18:26:52	18:58:14	16:33:13 05:52:11
35°	05:25:17	05:54:34	06:19:48	18:02:03	18:27:20	18:56:39	16:41:45 05:42:28
30°	05:26:08	05:53:50	06:17:43	18:04:03	18:27:58	18:55:41	16:49:13 05:33:53
20°	05:26:27	05:51:59	06:14:01	18:07:36	18:29:38	18:55:11	17:02:05 05:19:02
N 10°	05:25:13	05:49:37	06:10:39	18:10:49	18:31:51	18:56:15	17:13:18 05:05:57
0°	05:22:35	05:46:39	06:07:23	18:13:56	18:34:40	18:58:44	17:23:47 04:53:37
S 10°	05:18:25	05:42:57	06:04:01	18:17:10	18:38:13	19:02:44	17:34:14 04:41:12
20°	05:12:22	05:38:12	06:00:19	18:20:43	18:42:48	19:08:36	17:45:20 04:27:51
30°	05:03:41	05:31:55	05:56:00	18:24:51	18:48:53	19:17:03	17:57:58 04:12:27
35°	04:57:57	05:27:57	05:53:27	18:27:17	18:52:44	19:22:40	18:05:16 04:03:27
40°	04:50:53	05:23:12	05:50:33	18:30:05	18:57:21	19:29:34	18:13:32 03:53:09
45°	04:42:02	05:17:25	05:47:08	18:33:21	19:02:58	19:38:12	18:23:09 03:41:00
S 50°	04:30:41	05:10:10	05:43:01	18:37:17	19:10:01	19:49:17	18:34:41 03:26:10
52°	04:25:12	05:06:44	05:41:07	18:39:07	19:13:21	19:54:39	18:40:01 03:19:12
54°	04:19:00	05:02:53	05:39:01	18:41:07	19:17:05	20:00:42	18:45:54 03:11:27
56°	04:11:57	04:58:36	05:36:42	18:43:20	19:21:15	20:07:34	18:52:24 03:02:45
58°	04:03:51	04:53:44	05:34:07	18:45:48	19:25:58	20:15:27	18:59:40 02:52:51
S 60°	03:54:25	04:48:11	05:31:13	18:48:35	19:31:20	20:24:36	19:07:53 02:41:28

Mar 08	SHA	Mer.pass
Venus	329° 40.6	14:56:45
Mars	74° 34.0	07:56:48
Jupiter	67° 30.6	08:24:13
Saturn	59° 02.4	08:57:53

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss	Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	
07	11:02	10:55	12:10:55	22:39:52	10:10:39	13(93%)
08	10:47	10:40	12:10:40	23:37:14	11:08:45	14(98%)

# 2020 March 09 to Mar. 10

09 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	04:25:38	05:45:49	06:52:47	17:30:13	18:37:35	19:58:38	16:22:21
N 70°	04:35:45	05:47:38	06:48:05	17:34:41	18:35:29	19:48:02	16:36:33
68°	04:43:46	05:49:02	06:44:13	17:38:23	18:33:50	19:39:37	16:47:50
66°	04:50:17	05:50:09	06:40:58	17:41:29	18:32:32	19:32:48	16:57:04
64°	04:55:40	05:51:02	06:38:11	17:44:08	18:31:28	19:27:11	17:04:47
62°	05:00:10	05:51:45	06:35:45	17:46:27	18:30:38	19:22:29	17:11:22
60°	05:03:58	05:52:18	06:33:37	17:48:29	18:29:56	19:18:31	17:17:03
N 58°	05:07:12	05:52:45	06:31:44	17:50:17	18:29:23	19:15:07	17:22:03
56°	05:09:59	05:53:05	06:30:02	17:51:54	18:28:57	19:12:13	17:26:28
54°	05:12:23	05:53:21	06:28:29	17:53:21	18:28:36	19:09:43	17:30:25
52°	05:14:27	05:53:32	06:27:05	17:54:42	18:28:20	19:07:32	17:34:00
50°	05:16:15	05:53:39	06:25:48	17:55:55	18:28:08	19:05:39	17:37:14
45°	05:19:47	05:53:45	06:22:58	17:58:37	18:27:53	19:01:56	17:44:15
N 40°	05:22:16	05:53:35	06:20:34	18:00:54	18:27:55	18:59:18	17:50:04
35°	05:23:56	05:53:13	06:18:27	18:02:54	18:28:10	18:57:30	17:55:04
30°	05:24:59	05:52:41	06:16:33	18:04:42	18:28:36	18:56:20	17:59:27
20°	05:25:38	05:51:11	06:13:11	18:07:55	18:29:56	18:55:29	18:07:03
N 10°	05:24:43	05:49:06	06:10:07	18:10:50	18:31:51	18:56:15	18:13:42
0°	05:22:21	05:46:25	06:07:08	18:13:41	18:34:23	18:58:27	18:19:55
S 10°	05:18:29	05:42:59	06:04:03	18:16:38	18:37:41	19:02:10	18:26:07
20°	05:12:44	05:38:32	06:00:39	18:19:53	18:41:58	19:07:43	18:32:43
30°	05:04:25	05:32:36	05:56:39	18:23:41	18:47:42	19:15:49	18:40:12
35°	04:58:53	05:28:50	05:54:19	18:25:56	18:51:21	19:21:13	18:44:30
40°	04:52:04	05:24:19	05:51:37	18:28:30	18:55:44	19:27:52	18:49:22
45°	04:43:32	05:18:48	05:48:28	18:31:31	19:01:05	19:36:13	18:55:00
S 50°	04:32:33	05:11:53	05:44:40	18:35:09	19:07:48	19:46:56	19:01:42
52°	04:27:14	05:08:35	05:42:54	18:36:50	19:11:00	19:52:07	19:04:47
54°	04:21:14	05:04:56	05:40:57	18:38:41	19:14:33	19:57:58	19:08:09
56°	04:14:26	05:00:49	05:38:49	18:40:43	19:18:32	20:04:36	19:11:52
58°	04:06:36	04:56:10	05:36:25	18:43:00	19:23:02	20:12:13	19:15:59
S 60°	03:57:31	04:50:52	05:33:44	18:45:34	19:28:10	20:21:03	19:20:35

Mar 09	SHA	Mer.pass
Venus	328° 39.4	14:56:53
Mars	73° 48.9	07:55:52
Jupiter	67° 19.6	08:21:00
Saturn	58° 56.7	08:54:20

10 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	04:20:03	05:40:44	06:47:37	17:34:53	18:42:12	20:03:48	18:45:25
N 70°	04:30:50	05:43:04	06:43:28	17:38:49	18:39:34	19:52:29	18:48:40
68°	04:39:23	05:44:54	06:40:03	17:42:04	18:37:29	19:43:32	18:51:18
66°	04:46:20	05:46:23	06:37:09	17:44:48	18:35:48	19:36:17	18:53:30
64°	04:52:04	05:47:34	06:34:41	17:47:08	18:34:27	19:30:18	18:55:22
62°	04:56:51	05:48:33	06:32:32	17:49:10	18:33:19	19:25:18	18:56:59
60°	05:00:55	05:49:20	06:30:38	17:50:57	18:32:24	19:21:04	18:58:23
N 58°	05:04:23	05:49:59	06:28:57	17:52:33	18:31:39	19:17:27	18:59:37
56°	05:07:21	05:50:31	06:27:26	17:53:59	18:31:01	19:14:21	19:00:43
54°	05:09:56	05:50:56	06:26:04	17:55:16	18:30:30	19:11:40	19:01:43
52°	05:12:10	05:51:16	06:24:49	17:56:27	18:30:05	19:09:20	19:02:37
50°	05:14:06	05:51:32	06:23:40	17:57:32	18:29:45	19:07:18	19:03:26
45°	05:17:57	05:51:56	06:21:08	17:59:56	18:29:12	19:03:15	19:05:13
N 40°	05:20:41	05:52:01	06:18:59	18:01:58	18:28:58	19:00:22	19:06:42
35°	05:22:35	05:51:52	06:17:06	18:03:45	18:29:00	18:58:20	19:08:00
30°	05:23:50	05:51:32	06:15:24	18:05:21	18:29:14	18:56:58	19:09:08
20°	05:24:50	05:50:21	06:12:22	18:08:13	18:30:14	18:55:47	19:11:07
N 10°	05:24:12	05:48:35	06:09:35	18:10:51	18:31:52	18:56:15	19:12:52
0°	05:22:07	05:46:10	06:06:53	18:13:25	18:34:07	18:58:10	19:14:32
S 10°	05:18:32	05:43:01	06:04:04	18:16:06	18:37:07	19:01:36	19:16:12
20°	05:13:06	05:38:52	06:00:58	18:19:03	18:41:06	19:06:51	19:18:00
30°	05:05:08	05:33:17	05:57:19	18:22:31	18:46:30	19:14:35	19:20:02
35°	04:59:49	05:29:43	05:55:10	18:24:34	18:49:57	19:19:46	19:21:13
40°	04:53:15	05:25:26	05:52:42	18:26:55	18:54:06	19:26:11	19:22:34
45°	04:45:00	05:20:10	05:49:48	18:29:40	18:59:12	19:34:14	19:24:07
S 50°	04:34:24	05:13:35	05:46:18	18:33:00	19:05:35	19:44:35	19:25:57
52°	04:29:15	05:10:27	05:44:40	18:34:32	19:08:38	19:49:36	19:26:48
54°	04:23:28	05:06:57	05:42:53	18:36:14	19:12:01	19:55:14	19:27:43
56°	04:16:53	05:03:02	05:40:55	18:38:07	19:15:49	20:01:39	19:28:44
58°	04:09:20	04:58:36	05:38:43	18:40:12	19:20:06	20:09:00	19:29:52
S 60°	04:00:34	04:53:33	05:36:15	18:42:33	19:25:00	20:17:31	19:31:07

Mar 10	SHA	Mer.pass
Venus	327° 38.2	14:57:02
Mars	73° 03.9	07:54:55
Jupiter	67° 08.7	08:17:48
Saturn	58° 51.1	08:50:46

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
09	10:32	10:25	12:10:25	—:—	12:05:18	15(100%)
10	10:17	10:09	12:10:09	00:32:57	13:00:15	16(99%)

# 2020 March 11 to Mar. 12

11 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	04:14:23	05:35:38	06:42:28	17:39:32	18:46:49	20:09:02	21:04:07
N 70°	04:25:51	05:38:29	06:38:51	17:42:56	18:43:40	19:57:00	20:57:40
68°	04:34:57	05:40:45	06:35:52	17:45:44	18:41:08	19:47:30	20:52:25
66°	04:42:20	05:42:35	06:33:21	17:48:06	18:39:06	19:39:48	20:48:05
64°	04:48:25	05:44:05	06:31:11	17:50:07	18:37:25	19:33:27	20:44:24
62°	04:53:31	05:45:20	06:29:18	17:51:53	18:36:02	19:28:08	20:41:15
60°	04:57:50	05:46:21	06:27:38	17:53:26	18:34:52	19:23:38	20:38:31
N 58°	05:01:32	05:47:13	06:26:10	17:54:49	18:33:54	19:19:48	20:36:06
56°	05:04:42	05:47:55	06:24:50	17:56:03	18:33:05	19:16:29	20:33:58
54°	05:07:27	05:48:31	06:23:38	17:57:11	18:32:24	19:13:37	20:32:03
52°	05:09:51	05:49:00	06:22:32	17:58:13	18:31:50	19:11:07	20:30:19
50°	05:11:56	05:49:24	06:21:31	17:59:09	18:31:21	19:08:56	20:28:44
45°	05:16:06	05:50:06	06:19:18	18:01:14	18:30:30	19:04:35	20:25:20
N 40°	05:19:06	05:50:27	06:17:24	18:03:01	18:30:01	19:01:26	20:22:30
35°	05:21:13	05:50:31	06:15:44	18:04:35	18:29:50	18:59:11	20:20:05
30°	05:22:40	05:50:22	06:14:13	18:06:00	18:29:53	18:57:37	20:17:57
20°	05:24:00	05:49:32	06:11:31	18:08:32	18:30:32	18:56:05	20:14:18
N 10°	05:23:40	05:48:03	06:09:03	18:10:52	18:31:52	18:56:15	20:11:08
0°	05:21:53	05:45:55	06:06:37	18:13:09	18:33:51	18:57:53	20:08:12
S 10°	05:18:34	05:43:03	06:04:05	18:15:33	18:36:34	19:01:01	20:05:18
20°	05:13:27	05:39:12	06:01:16	18:18:12	18:40:15	19:05:58	20:02:16
30°	05:05:51	05:33:57	05:57:58	18:21:20	18:45:18	19:13:21	19:58:51
35°	05:00:44	05:30:35	05:56:00	18:23:11	18:48:33	19:18:20	19:56:55
40°	04:54:25	05:26:32	05:53:46	18:25:19	18:52:29	19:24:30	19:54:44
45°	04:46:28	05:21:33	05:51:07	18:27:49	18:57:18	19:32:15	19:52:13
S 50°	04:36:13	05:15:16	05:47:56	18:30:50	19:03:23	19:42:14	19:49:15
52°	04:31:16	05:12:17	05:46:27	18:32:15	19:06:16	19:47:04	19:47:54
54°	04:25:40	05:08:58	05:44:49	18:33:47	19:09:29	19:52:31	19:46:26
56°	04:19:19	05:05:14	05:43:01	18:35:29	19:13:06	19:58:43	19:44:48
58°	04:12:02	05:01:00	05:41:00	18:37:23	19:17:11	20:05:48	19:43:01
S 60°	04:03:35	04:56:12	05:38:45	18:39:32	19:21:50	20:14:00	19:41:01

Mar 11	SHA	Mer.pass
Venus	326° 37.1	14:57:09
Mars	72° 18.9	07:53:58
Jupiter	66° 57.9	08:14:35
Saturn	58° 45.6	08:47:12

12 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	04:08:37	05:30:29	06:37:20	17:44:10	18:51:28	20:14:21	23:26:33
N 70°	04:20:49	05:33:52	06:34:14	17:47:02	18:47:46	20:01:34	23:08:10
68°	04:30:28	05:36:35	06:31:41	17:49:23	18:44:48	19:51:30	22:53:49
66°	04:38:17	05:38:47	06:29:32	17:51:23	18:42:23	19:43:20	22:42:13
64°	04:44:45	05:40:36	06:27:41	17:53:06	18:40:24	19:36:37	22:32:35
62°	04:50:09	05:42:06	06:26:04	17:54:35	18:38:44	19:30:59	22:24:26
60°	04:54:44	05:43:22	06:24:38	17:55:54	18:37:20	19:26:14	22:17:24
N 58°	04:58:39	05:44:26	06:23:22	17:57:05	18:36:10	19:22:09	22:11:16
56°	05:02:02	05:45:19	06:22:14	17:58:08	18:35:09	19:18:38	22:05:51
54°	05:04:58	05:46:05	06:21:12	17:59:05	18:34:18	19:15:35	22:01:01
52°	05:07:31	05:46:44	06:20:15	17:59:58	18:33:35	19:12:55	21:56:40
50°	05:09:46	05:47:16	06:19:23	18:00:46	18:32:58	19:10:36	21:52:43
45°	05:14:14	05:48:16	06:17:27	18:02:33	18:31:48	19:05:55	21:44:14
N 40°	05:17:30	05:48:52	06:15:49	18:04:04	18:31:04	19:02:30	21:37:12
35°	05:19:51	05:49:09	06:14:22	18:05:25	18:30:40	19:00:01	21:31:11
30°	05:21:30	05:49:12	06:13:03	18:06:38	18:30:31	18:58:15	21:25:55
20°	05:23:10	05:48:42	06:10:41	18:08:50	18:30:50	18:56:23	21:16:51
N 10°	05:23:08	05:47:31	06:08:30	18:10:52	18:31:52	18:56:15	21:08:59
0°	05:21:38	05:45:40	06:06:21	18:12:53	18:33:34	18:57:36	21:01:39
S 10°	05:18:37	05:43:04	06:04:06	18:15:00	18:36:01	19:00:27	20:54:23
20°	05:13:48	05:39:31	06:01:35	18:17:21	18:39:24	19:05:05	20:46:42
30°	05:06:33	05:34:37	05:58:36	18:20:09	18:44:06	19:12:07	20:38:02
35°	05:01:39	05:31:27	05:56:51	18:21:49	18:47:09	19:16:53	20:33:04
40°	04:55:34	05:27:37	05:54:49	18:23:43	18:50:51	19:22:48	20:27:28
45°	04:47:55	05:22:54	05:52:26	18:25:58	18:55:25	19:30:16	20:21:00
S 50°	04:38:02	05:16:57	05:49:33	18:28:41	19:01:10	19:39:54	20:13:18
52°	04:33:15	05:14:07	05:48:13	18:29:57	19:03:54	19:44:34	20:09:46
54°	04:27:51	05:10:58	05:46:44	18:31:20	19:06:57	19:49:49	20:05:53
56°	04:21:43	05:07:25	05:45:07	18:32:52	19:10:23	19:55:47	20:01:38
58°	04:14:42	05:03:24	05:43:17	18:34:35	19:14:16	20:02:37	19:56:54
S 60°	04:06:34	04:58:50	05:41:15	18:36:30	19:18:41	20:10:31	19:51:36

Mar 12	SHA	Mer.pass
Venus	325° 36.0	14:57:17
Mars	71° 34.0	07:53:02
Jupiter	66° 47.3	08:11:21
Saturn	58° 40.1	08:43:38

Day	Sun		Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Mer.Pass. Upper Lower hh:mm:ss hh:mm:ss		Age
11	10:01	09:53	12:09:53	01:27:17 13:54:07	17(95%)
12	09:45	09:37	12:09:37	02:20:51 14:47:34	18(89%)

# 2020 March 13 to Mar. 14

13 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	04:02:46	05:25:19	06:32:11	17:48:48	18:56:09	20:19:46	06:36:01
N 70°	04:15:43	05:29:14	06:29:38	17:51:07	18:51:54	20:06:13	06:56:34
68°	04:25:56	05:32:23	06:27:30	17:53:03	18:48:29	19:55:32	07:12:47
66°	04:34:12	05:34:57	06:25:43	17:54:41	18:45:41	19:46:55	07:26:02
64°	04:41:02	05:37:05	06:24:10	17:56:04	18:43:23	19:39:49	07:37:07
62°	04:46:45	05:38:52	06:22:49	17:57:18	18:41:27	19:33:52	07:46:34
60°	04:51:37	05:40:22	06:21:38	17:58:22	18:39:49	19:28:50	07:54:46
N 58°	04:55:46	05:41:38	06:20:35	17:59:20	18:38:25	19:24:31	08:01:58
56°	04:59:21	05:42:43	06:19:37	18:00:12	18:37:14	19:20:48	08:08:21
54°	05:02:28	05:43:39	06:18:45	18:00:59	18:36:13	19:17:33	08:14:05
52°	05:05:11	05:44:26	06:17:58	18:01:43	18:35:20	19:14:44	08:19:16
50°	05:07:34	05:45:07	06:17:14	18:02:23	18:34:34	19:12:15	08:24:00
45°	05:12:22	05:46:25	06:15:37	18:03:51	18:33:06	19:07:15	08:34:13
N 40°	05:15:53	05:47:16	06:14:13	18:05:07	18:32:07	19:03:34	08:42:46
35°	05:18:28	05:47:47	06:12:59	18:06:15	18:31:29	19:00:52	08:50:07
30°	05:20:18	05:48:01	06:11:52	18:07:16	18:31:09	18:58:54	08:56:37
20°	05:22:20	05:47:51	06:09:50	18:09:08	18:31:08	18:56:41	09:07:53
N 10°	05:22:36	05:46:58	06:07:57	18:10:52	18:31:52	18:56:14	09:17:48
0°	05:21:22	05:45:24	06:06:05	18:12:36	18:33:17	18:57:18	09:27:07
S 10°	05:18:38	05:43:05	06:04:06	18:14:27	18:35:27	18:59:52	09:36:29
20°	05:14:08	05:39:50	06:01:53	18:16:30	18:38:32	19:04:12	09:46:29
30°	05:07:15	05:35:17	05:59:15	18:18:58	18:42:54	19:10:52	09:57:58
35°	05:02:33	05:32:19	05:57:41	18:20:26	18:45:45	19:15:26	10:04:37
40°	04:56:43	05:28:43	05:55:53	18:22:07	18:49:13	19:21:07	10:12:12
45°	04:49:21	05:24:15	05:53:45	18:24:06	18:53:31	19:28:18	10:21:05
S 50°	04:39:50	05:18:38	05:51:10	18:26:31	18:58:57	19:37:34	10:31:50
52°	04:35:13	05:15:57	05:49:59	18:27:38	19:01:32	19:42:04	10:36:50
54°	04:30:01	05:12:57	05:48:39	18:28:52	19:04:26	19:47:07	10:42:21
56°	04:24:07	05:09:35	05:47:12	18:30:14	19:07:41	19:52:52	10:48:30
58°	04:17:20	05:05:47	05:45:34	18:31:46	19:11:21	19:59:27	10:55:25
S 60°	04:09:30	05:01:27	05:43:44	18:33:29	19:15:32	20:07:04	11:03:16

Mar 13	SHA	Mer.pass
Venus	324° 35.0	14:57:24
Mars	70° 49.1	07:52:05
Jupiter	66° 36.7	08:08:07
Saturn	58° 34.7	08:40:03

14 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	03:56:49	05:20:07	06:27:03	17:53:24	19:00:50	20:25:17	02:10:39
N 70°	04:10:32	05:24:35	06:25:01	17:55:12	18:56:02	20:10:55	01:27:09
68°	04:21:21	05:28:10	06:23:19	17:56:42	18:52:10	19:59:38	00:58:27
66°	04:30:05	05:31:07	06:21:53	17:57:57	18:49:00	19:50:32	00:37:03
64°	04:37:18	05:33:33	06:20:39	17:59:03	18:46:23	19:43:02	00:20:07
62°	04:43:20	05:35:36	06:19:35	18:00:00	18:44:10	19:36:46	00:06:13
60°	04:48:28	05:37:20	06:18:38	18:00:50	18:42:17	19:31:27	00:00:00
N 58°	04:52:51	05:38:49	06:17:47	18:01:35	18:40:41	19:26:54	00:00:00
56°	04:56:38	05:40:06	06:17:00	18:02:16	18:39:18	19:22:58	00:00:00
54°	04:59:56	05:41:12	06:16:18	18:02:53	18:38:07	19:19:32	00:00:00
52°	05:02:50	05:42:08	06:15:40	18:03:28	18:37:05	19:16:33	00:00:00
50°	05:05:22	05:42:58	06:15:04	18:03:59	18:36:11	19:13:55	00:00:00
45°	05:10:29	05:44:34	06:13:45	18:05:09	18:34:25	19:08:35	00:00:00
N 40°	05:14:16	05:45:40	06:12:37	18:06:10	18:33:10	19:04:38	00:00:00
35°	05:17:04	05:46:24	06:11:36	18:07:05	18:32:19	19:01:42	23:48:52
30°	05:19:07	05:46:50	06:10:41	18:07:54	18:31:47	18:59:32	23:38:17
20°	05:21:29	05:47:00	06:08:59	18:09:26	18:31:26	18:56:59	23:20:12
N 10°	05:22:03	05:46:25	06:07:24	18:10:52	18:31:52	18:56:14	23:04:33
0°	05:21:07	05:45:08	06:05:48	18:12:20	18:33:00	18:57:01	22:49:58
S 10°	05:18:40	05:43:06	06:04:06	18:13:53	18:34:53	18:59:18	22:35:28
20°	05:14:28	05:40:09	06:02:11	18:15:39	18:37:40	19:03:19	22:20:03
30°	05:07:56	05:35:56	05:59:53	18:17:46	18:41:41	19:09:38	22:02:28
35°	05:03:27	05:33:10	05:58:31	18:19:02	18:44:20	19:13:59	21:52:17
40°	04:57:52	05:29:47	05:56:56	18:20:31	18:47:35	19:19:26	21:40:40
45°	04:50:47	05:25:36	05:55:04	18:22:15	18:51:37	19:26:19	21:27:04
S 50°	04:41:37	05:20:18	05:52:47	18:24:21	18:56:44	19:35:14	21:10:33
52°	04:37:11	05:17:46	05:51:44	18:25:20	18:59:11	19:39:34	21:02:49
54°	04:32:10	05:14:56	05:50:34	18:26:25	19:01:54	19:44:26	20:54:15
56°	04:26:29	05:11:45	05:49:17	18:27:37	19:04:58	19:49:58	20:44:39
58°	04:19:57	05:08:09	05:47:50	18:28:57	19:08:27	19:56:18	20:33:46
S 60°	04:12:25	05:04:03	05:46:13	18:30:27	19:12:24	20:03:38	20:21:16

Mar 14	SHA	Mer.pass
Venus	323° 34.1	14:57:31
Mars	70° 04.2	07:51:08
Jupiter	66° 26.3	08:04:52
Saturn	58° 29.4	08:36:28

Day	Sun		Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
13	09:29	09:21	12:09:21	03:14:22	19(80%)
14	09:12	09:04	12:09:04	04:08:23	20(70%)

# 2020 March 15 to Mar. 16

15 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	03:50:45	05:14:53	06:21:55	17:58:01	19:05:34	20:30:55	■ ■
N 70°	04:05:17	05:19:54	06:20:24	17:59:17	19:00:12	20:15:41	■ ■
68°	04:16:42	05:23:56	06:19:08	18:00:20	18:55:53	20:03:46	03:11:58 06:42:07
66°	04:25:56	05:27:15	06:18:04	18:01:14	18:52:20	19:54:10	02:32:36 07:22:16
64°	04:33:32	05:30:01	06:17:09	18:02:01	18:49:23	19:46:17	02:05:26 07:50:09
62°	04:39:53	05:32:20	06:16:20	18:02:42	18:46:53	19:39:40	01:44:34 08:11:40
60°	04:45:17	05:34:19	06:15:37	18:03:18	18:44:46	19:34:05	01:27:40 08:29:09
N 58°	04:49:55	05:36:00	06:14:58	18:03:50	18:42:57	19:29:17	01:13:31 08:43:50
56°	04:53:55	05:37:28	06:14:23	18:04:20	18:41:23	19:25:08	01:01:24 08:56:28
54°	04:57:24	05:38:44	06:13:51	18:04:47	18:40:01	19:21:32	00:50:49 09:07:30
52°	05:00:27	05:39:50	06:13:22	18:05:12	18:38:50	19:18:22	00:41:28 09:17:17
50°	05:03:09	05:40:48	06:12:55	18:05:35	18:37:48	19:15:35	00:33:06 09:26:04
45°	05:08:35	05:42:42	06:11:54	18:06:27	18:35:43	19:09:56	00:15:25 09:44:41
N 40°	05:12:38	05:44:04	06:11:01	18:07:13	18:34:13	19:05:43	00:01:02 09:59:54
35°	05:15:40	05:45:01	06:10:13	18:07:54	18:33:09	19:02:33	.. .. 10:12:48
30°	05:17:55	05:45:39	06:09:29	18:08:32	18:32:24	19:00:11	.. .. 10:24:05
20°	05:20:37	05:46:09	06:08:08	18:09:43	18:31:43	18:57:16	.. .. 10:43:28
N 10°	05:21:30	05:45:52	06:06:50	18:10:52	18:31:51	18:56:13	.. .. 11:00:22
0°	05:20:51	05:44:51	06:05:31	18:12:03	18:32:43	18:56:43	23:44:56 11:16:12
S 10°	05:18:41	05:43:06	06:04:06	18:13:19	18:34:19	18:58:43	23:28:04 11:32:04
20°	05:14:48	05:40:27	06:02:29	18:14:47	18:36:48	19:02:26	23:10:06 11:49:03
30°	05:08:37	05:36:35	06:00:31	18:16:35	18:40:28	19:08:24	22:49:29 12:08:38
35°	05:04:21	05:34:01	05:59:21	18:17:39	18:42:56	19:12:32	22:37:28 12:20:06
40°	04:58:59	05:30:52	05:57:59	18:18:54	18:45:57	19:17:44	22:23:43 12:33:16
45°	04:52:12	05:26:56	05:56:22	18:20:23	18:49:44	19:24:21	22:07:27 12:48:52
S 50°	04:43:23	05:21:57	05:54:24	18:22:11	18:54:31	19:32:55	21:47:30 13:08:06
52°	04:39:07	05:19:34	05:53:29	18:23:02	18:56:49	19:37:05	21:38:03 13:17:14
54°	04:34:18	05:16:54	05:52:29	18:23:57	18:59:23	19:41:46	21:27:28 13:27:28
56°	04:28:49	05:13:54	05:51:21	18:24:59	19:02:16	19:47:05	21:15:30 13:39:04
58°	04:22:33	05:10:30	05:50:06	18:26:08	19:05:32	19:53:11	21:01:43 13:52:28
S 60°	04:15:18	05:06:38	05:48:42	18:27:25	19:09:16	20:00:13	20:45:32 14:08:13

Mar 15	SHA	Mer.pass
Venus	322° 33.2	14:57:38
Mars	69° 19.3	07:50:11
Jupiter	66° 16.0	08:01:37
Saturn	58° 24.1	08:32:53

16 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	03:44:34	05:09:37	06:16:46	18:02:37	19:10:19	20:36:40	■ ■
N 70°	03:59:57	05:15:11	06:15:47	18:03:21	19:04:23	20:20:32	■ ■
68°	04:12:01	05:19:41	06:14:57	18:03:59	18:59:36	20:07:58	■ ■
66°	04:21:43	05:23:22	06:14:14	18:04:31	18:55:40	19:57:51	04:26:29 07:23:26
64°	04:29:43	05:26:27	06:13:37	18:04:59	18:52:23	19:49:33	03:43:20 08:06:57
62°	04:36:25	05:29:03	06:13:05	18:05:23	18:49:37	19:42:37	03:14:29 08:36:09
60°	04:42:06	05:31:16	06:12:36	18:05:45	18:47:16	19:36:44	02:52:27 08:58:30
N 58°	04:46:58	05:33:11	06:12:10	18:06:05	18:45:14	19:31:41	02:34:36 09:16:39
56°	04:51:11	05:34:50	06:11:46	18:06:24	18:43:28	19:27:20	02:19:37 09:31:54
54°	04:54:51	05:36:16	06:11:24	18:06:41	18:41:56	19:23:32	02:06:45 09:45:02
52°	04:58:04	05:37:31	06:11:04	18:06:57	18:40:35	19:20:12	01:55:28 09:56:33
50°	05:00:55	05:38:37	06:10:45	18:07:11	18:39:24	19:17:15	01:45:28 10:06:47
45°	05:06:41	05:40:50	06:10:02	18:07:45	18:37:01	19:11:17	01:24:30 10:28:15
N 40°	05:11:00	05:42:27	06:09:24	18:08:15	18:35:16	19:06:47	01:07:36 10:45:38
35°	05:14:16	05:43:38	06:08:50	18:08:43	18:33:58	19:03:23	00:53:23 11:00:16
30°	05:16:42	05:44:27	06:08:17	18:09:10	18:33:02	19:00:49	00:41:03 11:12:59
20°	05:19:46	05:45:18	06:07:17	18:10:01	18:32:00	18:57:34	00:20:02 11:34:44
N 10°	05:20:57	05:45:18	06:06:17	18:10:52	18:31:50	18:56:13	00:01:51 11:53:37
0°	05:20:34	05:44:35	06:05:15	18:11:45	18:32:25	18:56:25	.. .. 12:11:16
S 10°	05:18:42	05:43:06	06:04:06	18:12:45	18:33:44	18:58:08	.. .. 12:28:56
20°	05:15:07	05:40:45	06:02:47	18:13:56	18:35:56	19:01:32	.. .. 12:47:51
30°	05:09:17	05:37:14	06:01:09	18:15:23	18:39:16	19:07:09	23:40:02 13:09:40
35°	05:05:14	05:34:52	06:00:11	18:16:15	18:41:31	19:11:05	23:27:00 13:22:28
40°	05:00:07	05:31:56	05:59:02	18:17:17	18:44:19	19:16:03	23:12:01 13:37:12
45°	04:53:36	05:28:16	05:57:40	18:18:31	18:47:50	19:22:23	22:54:12 13:54:44
S 50°	04:45:09	05:23:36	05:56:01	18:20:01	18:52:19	19:30:36	22:32:08 14:16:29
52°	04:41:02	05:21:22	05:55:14	18:20:43	18:54:28	19:34:36	22:21:35 14:26:53
54°	04:36:24	05:18:52	05:54:23	18:21:29	18:56:52	19:39:06	22:09:43 14:38:37
56°	04:31:08	05:16:03	05:53:26	18:22:21	18:59:35	19:44:13	21:56:08 14:52:03
58°	04:25:07	05:12:51	05:52:22	18:23:19	19:02:39	19:50:04	21:40:18 15:07:43
S 60°	04:18:09	05:09:12	05:51:10	18:24:24	19:06:09	19:56:50	21:21:22 15:26:28

Mar 16	SHA	Mer.pass
Venus	321° 32.3	14:57:45
Mars	68° 34.5	07:49:14
Jupiter	66° 05.8	07:58:22
Saturn	58° 18.9	08:29:18

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
15	08:56	08:47	12:08:47	05:03:03	17:30:34	21(60%)
16	08:39	08:30	12:08:30	05:58:06	18:25:33	22(49%)

# 2020 March 17 to Mar. 18

17 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	03:38:16	05:04:19	06:11:38	18:07:12	19:15:06	20:42:32	■ ■
N 70°	03:54:33	05:10:27	06:11:10	18:07:25	19:08:35	20:25:28	■ ■
68°	04:07:15	05:15:24	06:10:46	18:07:37	19:03:20	20:12:12	■ ■
66°	04:17:28	05:19:29	06:10:25	18:07:47	18:59:01	20:01:35	06:06:04 07:38:09
64°	04:25:53	05:22:53	06:10:06	18:07:56	18:55:24	19:52:51	05:02:36 08:41:41
62°	04:32:55	05:25:45	06:09:50	18:08:05	18:52:22	19:45:34	04:27:57 09:16:24
60°	04:38:53	05:28:13	06:09:35	18:08:13	18:49:45	19:39:24	04:02:46 09:41:39
N 58°	04:43:59	05:30:20	06:09:21	18:08:20	18:47:30	19:34:06	03:42:49 10:01:40
56°	04:48:25	05:32:11	06:09:08	18:08:27	18:45:33	19:29:32	03:26:17 10:18:15
54°	04:52:17	05:33:47	06:08:56	18:08:34	18:43:51	19:25:32	03:12:12 10:32:23
52°	04:55:40	05:35:12	06:08:45	18:08:41	18:42:20	19:22:02	02:59:55 10:44:42
50°	04:58:40	05:36:27	06:08:35	18:08:47	18:41:01	19:18:56	02:49:04 10:55:36
45°	05:04:46	05:38:58	06:08:10	18:09:03	18:38:19	19:12:38	02:26:27 11:18:20
N 40°	05:09:21	05:40:50	06:07:48	18:09:18	18:36:18	19:07:52	02:08:17 11:36:36
35°	05:12:51	05:42:14	06:07:26	18:09:32	18:34:47	19:04:14	01:53:02 11:51:55
30°	05:15:30	05:43:15	06:07:06	18:09:47	18:33:40	19:01:28	01:39:50 12:05:13
20°	05:18:54	05:44:26	06:06:25	18:10:18	18:32:18	18:57:52	01:17:20 12:27:51
N 10°	05:20:23	05:44:44	06:05:43	18:10:51	18:31:50	18:56:12	00:57:53 12:47:28
0°	05:20:18	05:44:18	06:04:57	18:11:28	18:32:08	18:56:08	00:39:45 13:05:45
S 10°	05:18:42	05:43:06	06:04:06	18:12:11	18:33:10	18:57:33	00:21:38 13:24:01
20°	05:15:26	05:41:03	06:03:04	18:13:04	18:35:03	19:00:39	00:02:18 13:43:34
30°	05:09:57	05:37:52	06:01:47	18:14:10	18:38:03	19:05:55	.. .. 14:06:06
35°	05:06:06	05:35:42	06:01:00	18:14:52	18:40:07	19:09:39	.. .. 14:19:19
40°	05:01:14	05:33:00	06:00:05	18:15:40	18:42:41	19:14:22	.. .. 14:34:31
45°	04:55:00	05:29:36	05:58:58	18:16:38	18:45:56	19:20:25	23:47:13 14:52:38
S 50°	04:46:53	05:25:15	05:57:37	18:17:50	18:50:06	19:28:18	23:24:50 15:15:07
52°	04:42:57	05:23:09	05:56:59	18:18:24	18:52:06	19:32:08	23:14:06 15:25:53
54°	04:38:30	05:20:49	05:56:17	18:19:01	18:54:21	19:36:27	23:01:59 15:38:02
56°	04:33:26	05:18:10	05:55:30	18:19:43	18:56:53	19:41:22	22:48:05 15:51:59
58°	04:27:39	05:15:11	05:54:37	18:20:29	18:59:45	19:46:59	22:31:50 16:08:17
S 60°	04:20:58	05:11:45	05:53:38	18:21:22	19:03:02	19:53:28	22:12:16 16:27:54

Mar 17	SHA	Mer.pass
Venus	320° 31.6	14:57:51
Mars	67° 49.7	07:48:16
Jupiter	65° 55.7	07:55:06
Saturn	58° 13.8	08:25:42

18 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	03:31:49	04:58:58	06:06:30	18:11:48	19:19:55	20:48:33	■ ■
N 70°	03:49:03	05:05:41	06:06:33	18:11:29	19:12:49	20:30:29	■ ■
68°	04:02:26	05:11:06	06:06:34	18:11:15	19:07:05	20:16:31	■ ■
66°	04:13:11	05:15:34	06:06:35	18:11:03	19:02:23	20:05:21	06:47:29 08:48:08
64°	04:22:00	05:19:17	06:06:35	18:10:54	18:58:26	19:56:11	05:51:56 09:43:29
62°	04:29:23	05:22:27	06:06:34	18:10:46	18:55:06	19:48:33	05:18:57 10:16:17
60°	04:35:38	05:25:09	06:06:33	18:10:40	18:52:15	19:42:05	04:54:34 10:40:29
N 58°	04:41:00	05:27:29	06:06:32	18:10:35	18:49:47	19:36:32	04:35:06 10:59:48
56°	04:45:39	05:29:31	06:06:31	18:10:31	18:47:38	19:31:44	04:18:54 11:15:51
54°	04:49:42	05:31:18	06:06:29	18:10:27	18:45:45	19:27:33	04:05:02 11:29:34
52°	04:53:16	05:32:52	06:06:27	18:10:25	18:44:06	19:23:52	03:52:56 11:41:32
50°	04:56:25	05:34:15	06:06:24	18:10:23	18:42:38	19:20:37	03:42:13 11:52:08
45°	05:02:50	05:37:05	06:06:18	18:10:20	18:39:38	19:13:59	03:19:50 12:14:14
N 40°	05:07:42	05:39:13	06:06:11	18:10:20	18:37:21	19:08:57	03:01:48 12:32:01
35°	05:11:25	05:40:50	06:06:03	18:10:21	18:35:37	19:05:05	02:46:39 12:46:56
30°	05:14:16	05:42:03	06:05:54	18:10:25	18:34:17	19:02:07	02:33:30 12:59:52
20°	05:18:01	05:43:34	06:05:33	18:10:35	18:32:35	18:58:09	02:11:05 13:21:54
N 10°	05:19:49	05:44:10	06:05:09	18:10:50	18:31:49	18:56:12	01:51:38 13:40:57
0°	05:20:01	05:44:00	06:04:40	18:11:11	18:31:50	18:55:50	01:33:29 13:58:43
S 10°	05:18:42	05:43:06	06:04:05	18:11:37	18:32:36	18:56:58	01:15:21 14:16:26
20°	05:15:44	05:41:21	06:03:21	18:12:12	18:34:11	18:59:46	00:55:55 14:35:21
30°	05:10:37	05:38:31	06:02:25	18:12:58	18:36:50	19:04:41	00:33:31 14:57:05
35°	05:06:58	05:36:32	06:01:49	18:13:28	18:38:42	19:08:12	00:20:23 15:09:48
40°	05:02:20	05:34:03	06:01:07	18:14:03	18:41:03	19:12:42	00:05:15 15:24:25
45°	04:56:23	05:30:55	06:00:16	18:14:46	18:44:02	19:18:28	.. .. 15:41:44
S 50°	04:48:37	05:26:53	05:59:13	18:15:40	18:47:54	19:26:00	.. .. 16:03:08
52°	04:44:50	05:24:56	05:58:43	18:16:05	18:49:45	19:29:40	.. .. 16:13:20
54°	04:40:34	05:22:45	05:58:10	18:16:33	18:51:50	19:33:49	.. .. 16:24:48
56°	04:35:43	05:20:17	05:57:34	18:17:05	18:54:12	19:38:31	23:50:16 16:37:52
58°	04:30:10	05:17:30	05:56:52	18:17:40	18:56:52	19:43:55	23:35:21 16:53:03
S 60°	04:23:45	05:14:18	05:56:06	18:18:20	18:59:56	19:50:08	23:17:34 17:11:05

Mar 18	SHA	Mer.pass
Venus	319° 31.0	14:57:57
Mars	67° 04.9	07:47:19
Jupiter	65° 45.8	07:51:49
Saturn	58° 08.7	08:22:07

Day	Sun		Moon		
	Eqn. of Time	Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup> mm:ss	mm:ss	Upper	Lower	
17	08:21	08:13	12:08:13	06:52:47 19:19:41	23(39%)
18	08:04	07:55	12:07:55	07:46:10 20:12:06	24(29%)



19 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	03:25:14	04:53:35	06:01:21	18:16:23	19:24:47	20:54:44	■ ■
N 70°	03:43:28	05:00:53	06:01:55	18:15:33	19:17:04	20:35:36	■ ■
68°	03:57:33	05:06:47	06:02:22	18:14:53	19:10:52	20:20:53	08:06:51 09:15:55
66°	04:08:50	05:11:38	06:02:45	18:14:19	19:05:45	20:09:09	06:52:59 10:29:16
64°	04:18:05	05:15:41	06:03:03	18:13:51	19:01:29	19:59:34	06:16:12 11:05:35
62°	04:25:49	05:19:08	06:03:19	18:13:27	18:57:51	19:51:34	05:49:56 11:31:26
60°	04:32:22	05:22:05	06:03:32	18:13:07	18:54:45	19:44:47	05:29:21 11:51:38
N 58°	04:37:59	05:24:38	06:03:43	18:12:49	18:52:04	19:38:59	05:12:25 12:08:12
56°	04:42:51	05:26:51	06:03:53	18:12:34	18:49:44	19:33:58	04:58:05 12:22:12
54°	04:47:06	05:28:49	06:04:01	18:12:21	18:47:40	19:29:34	04:45:41 12:34:18
52°	04:50:50	05:30:32	06:04:08	18:12:09	18:45:51	19:25:43	04:34:45 12:44:56
50°	04:54:09	05:32:04	06:04:14	18:11:59	18:44:15	19:22:19	04:25:01 12:54:24
45°	05:00:54	05:35:12	06:04:26	18:11:38	18:40:56	19:15:20	04:04:30 13:14:18
N 40°	05:06:02	05:37:35	06:04:34	18:11:22	18:38:24	19:10:02	03:47:51 13:30:23
35°	05:10:00	05:39:26	06:04:39	18:11:10	18:36:26	19:05:56	03:33:48 13:43:56
30°	05:13:03	05:40:50	06:04:41	18:11:02	18:34:55	19:02:45	03:21:33 13:55:43
20°	05:17:09	05:42:42	06:04:41	18:10:52	18:32:52	18:58:27	03:00:36 14:15:48
N 10°	05:19:14	05:43:36	06:04:35	18:10:49	18:31:48	18:56:11	02:42:22 14:33:12
0°	05:19:43	05:43:43	06:04:23	18:10:53	18:31:32	18:55:32	02:25:19 14:49:24
S 10°	05:18:42	05:43:05	06:04:04	18:11:03	18:32:01	18:56:24	02:08:14 15:05:33
20°	05:16:02	05:41:38	06:03:38	18:11:20	18:33:19	18:58:53	01:49:56 15:22:45
30°	05:11:16	05:39:08	06:03:02	18:11:46	18:35:37	19:03:26	01:28:50 15:42:28
35°	05:07:50	05:37:22	06:02:38	18:12:04	18:37:17	19:06:46	01:16:28 15:53:56
40°	05:03:26	05:35:07	06:02:09	18:12:26	18:39:25	19:11:01	01:02:14 16:07:03
45°	04:57:45	05:32:14	06:01:34	18:12:54	18:42:09	19:16:31	00:45:19 16:22:32
S 50°	04:50:20	05:28:31	06:00:49	18:13:29	18:45:41	19:23:43	00:24:22 16:41:28
52°	04:46:43	05:26:43	06:00:27	18:13:46	18:47:24	19:27:13	00:14:22 16:50:25
54°	04:42:38	05:24:41	06:00:04	18:14:05	18:49:20	19:31:11	00:03:07 17:00:24
56°	04:37:59	05:22:24	05:59:37	18:14:27	18:51:31	19:35:42	.. .. 17:11:40
58°	04:32:40	05:19:48	05:59:07	18:14:51	18:54:00	19:40:51	.. .. 17:24:34
S 60°	04:26:31	05:16:50	05:58:33	18:15:18	18:56:50	19:46:49	.. .. 17:39:38

Mar 19	SHA	Mer.pass
Venus	318° 30.4	14:58:02
Mars	66° 20.2	07:46:21
Jupiter	65° 36.0	07:48:32
Saturn	58° 03.8	08:18:30

20 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	03:18:29	04:48:10	05:56:13	18:20:59	19:29:41	21:01:05	■ ■
N 70°	03:37:46	04:56:04	05:57:18	18:19:37	19:21:21	20:40:49	08:22:50 10:41:54
68°	03:52:37	05:02:26	05:58:11	18:18:30	19:14:39	20:25:19	07:26:13 11:37:39
66°	04:04:27	05:07:41	05:58:55	18:17:35	19:09:08	20:13:00	06:52:25 12:10:39
64°	04:14:09	05:12:04	05:59:32	18:16:48	19:04:32	20:02:58	06:27:41 12:34:41
62°	04:22:14	05:15:48	06:00:03	18:16:08	19:00:37	19:54:35	06:08:10 12:53:34
60°	04:29:05	05:19:00	06:00:30	18:15:34	18:57:16	19:47:31	05:52:06 13:09:04
N 58°	04:34:57	05:21:46	06:00:54	18:15:04	18:54:22	19:41:27	05:38:31 13:22:08
56°	04:40:03	05:24:11	06:01:15	18:14:37	18:51:49	19:36:12	05:26:45 13:33:23
54°	04:44:30	05:26:19	06:01:33	18:14:14	18:49:36	19:31:37	05:16:27 13:43:15
52°	04:48:24	05:28:11	06:01:49	18:13:53	18:47:37	19:27:35	05:07:16 13:52:00
50°	04:51:52	05:29:52	06:02:04	18:13:34	18:45:52	19:24:01	04:59:01 13:59:50
45°	04:58:58	05:33:19	06:02:33	18:12:55	18:42:14	19:16:42	04:41:29 14:16:28
N 40°	05:04:22	05:35:58	06:02:57	18:12:24	18:39:26	19:11:07	04:27:06 14:30:03
35°	05:08:33	05:38:01	06:03:15	18:11:59	18:37:15	19:06:47	04:14:52 14:41:32
30°	05:11:49	05:39:38	06:03:29	18:11:39	18:35:32	19:03:24	04:04:10 14:51:34
20°	05:16:16	05:41:50	06:03:49	18:11:09	18:33:09	18:58:45	03:45:46 15:08:43
N 10°	05:18:40	05:43:02	06:04:00	18:10:48	18:31:47	18:56:10	03:29:42 15:23:36
0°	05:19:26	05:43:25	06:04:05	18:10:35	18:31:15	18:55:14	03:14:38 15:37:28
S 10°	05:18:42	05:43:04	06:04:03	18:10:28	18:31:27	18:55:49	02:59:32 15:51:16
20°	05:16:20	05:41:55	06:03:55	18:10:27	18:32:26	18:58:00	02:43:21 16:05:57
30°	05:11:55	05:39:46	06:03:39	18:10:33	18:34:25	19:02:12	02:24:43 16:22:41
35°	05:08:41	05:38:11	06:03:27	18:10:40	18:35:53	19:05:19	02:13:50 16:32:23
40°	05:04:31	05:36:09	06:03:11	18:10:49	18:37:47	19:09:21	02:01:20 16:43:26
45°	04:59:07	05:33:32	06:02:51	18:11:01	18:40:15	19:14:34	01:46:32 16:56:22
S 50°	04:52:02	05:30:08	06:02:24	18:11:19	18:43:29	19:21:26	01:28:22 17:12:02
52°	04:48:35	05:28:28	06:02:11	18:11:27	18:45:04	19:24:47	01:19:46 17:19:22
54°	04:44:40	05:26:36	06:01:57	18:11:37	18:46:50	19:28:34	01:10:09 17:27:29
56°	04:40:14	05:24:30	06:01:40	18:11:48	18:48:50	19:32:53	00:59:16 17:36:33
58°	04:35:08	05:22:06	06:01:22	18:12:01	18:51:07	19:37:49	00:46:46 17:46:49
S 60°	04:29:15	05:19:21	06:01:00	18:12:16	18:53:45	19:43:31	00:32:09 17:58:35

Mar 20	SHA	Mer.pass
Venus	317° 30.0	14:58:07
Mars	65° 35.6	07:45:23
Jupiter	65° 26.3	07:45:15
Saturn	57° 58.9	08:14:54

Day	Sun		Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss	Mer.Pass.		Age
			Upper hh:mm:ss	Lower hh:mm:ss	
19	07:47	07:38	12:07:38	08:37:26 21:02:07	25(21%)
20	07:29	07:20	12:07:20	09:26:07 21:49:28	26(13%)

# 2020 March 21 to Mar. 22

21 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	03:11:34	04:42:42	05:51:04	18:25:34	19:34:37	21:07:37	08:18:42
N 70°	03:31:58	04:51:12	05:52:40	18:23:41	19:25:40	20:46:08	07:38:56
68°	03:47:36	04:58:04	05:53:59	18:22:08	19:18:28	20:29:49	07:11:21
66°	04:00:01	05:03:43	05:55:04	18:20:51	19:12:33	20:16:55	06:50:18
64°	04:10:09	05:08:26	05:56:00	18:19:45	19:07:35	20:06:24	06:33:24
62°	04:18:37	05:12:27	05:56:47	18:18:49	19:03:23	19:57:39	06:19:23
60°	04:25:46	05:15:54	05:57:29	18:18:00	18:59:47	19:50:15	06:07:28
N 58°	04:31:55	05:18:53	05:58:05	18:17:18	18:56:39	19:43:55	05:57:10
56°	04:37:13	05:21:30	05:58:37	18:16:40	18:53:55	19:38:27	05:48:08
54°	04:41:52	05:23:48	05:59:05	18:16:07	18:51:31	19:33:39	05:40:06
52°	04:45:57	05:25:51	05:59:30	18:15:36	18:49:23	19:29:27	05:32:53
50°	04:49:35	05:27:40	05:59:53	18:15:09	18:47:29	19:25:43	05:26:21
45°	04:57:00	05:31:25	06:00:41	18:14:12	18:43:32	19:18:04	05:12:20
N 40°	05:02:42	05:34:19	06:01:19	18:13:26	18:40:29	19:12:12	05:00:44
35°	05:07:07	05:36:36	06:01:51	18:12:48	18:38:05	19:07:38	04:50:48
30°	05:10:35	05:38:25	06:02:16	18:12:16	18:36:10	19:04:03	04:42:04
20°	05:15:23	05:40:57	06:02:57	18:11:25	18:33:26	18:59:02	04:26:58
N 10°	05:18:05	05:42:27	06:03:26	18:10:47	18:31:46	18:56:10	04:13:44
0°	05:19:08	05:43:08	06:03:47	18:10:17	18:30:57	18:54:57	04:01:18
S 10°	05:18:41	05:43:03	06:04:02	18:09:54	18:30:52	18:55:14	03:48:50
20°	05:16:38	05:42:12	06:04:12	18:09:35	18:31:34	18:57:07	03:35:30
30°	05:12:34	05:40:23	06:04:16	18:09:21	18:33:12	19:00:59	03:20:10
35°	05:09:32	05:39:00	06:04:16	18:09:15	18:34:28	19:03:53	03:11:14
40°	05:05:36	05:37:12	06:04:13	18:09:11	18:36:09	19:07:41	03:01:01
45°	05:00:28	05:34:51	06:04:08	18:09:09	18:38:22	19:12:38	02:49:00
S 50°	04:53:44	05:31:45	06:04:00	18:09:08	18:41:17	19:19:10	02:34:22
52°	04:50:26	05:30:14	06:03:55	18:09:08	18:42:43	19:22:21	02:27:30
54°	04:46:42	05:28:31	06:03:50	18:09:09	18:44:20	19:25:58	02:19:52
56°	04:42:27	05:26:35	06:03:43	18:09:10	18:46:10	19:30:05	02:11:20
58°	04:37:35	05:24:23	06:03:36	18:09:12	18:48:16	19:34:48	02:01:38
S 60°	04:31:57	05:21:51	06:03:27	18:09:15	18:50:40	19:40:15	01:50:29

Mar 21	SHA	Mer.pass
Venus	316° 29.7	14:58:11
Mars	64° 51.0	07:44:25
Jupiter	65° 16.7	07:41:57
Saturn	57° 54.0	08:11:17

22 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	03:04:26	04:37:11	05:45:54	18:30:10	19:39:37	21:14:23	07:38:42
N 70°	03:26:04	04:46:19	05:48:02	18:27:45	19:30:01	20:51:35	07:17:36
68°	03:42:30	04:53:40	05:49:46	18:25:46	19:22:18	20:34:24	07:01:03
66°	03:55:31	04:59:43	05:51:14	18:24:07	19:15:58	20:20:52	06:47:35
64°	04:06:08	05:04:48	05:52:28	18:22:42	19:10:40	20:09:52	06:36:20
62°	04:14:58	05:09:06	05:53:31	18:21:30	19:06:10	20:00:44	06:26:46
60°	04:22:26	05:12:48	05:54:27	18:20:27	19:02:18	19:53:01	06:18:28
N 58°	04:28:50	05:16:00	05:55:15	18:19:32	18:58:57	19:46:25	06:11:12
56°	04:34:23	05:18:49	05:55:58	18:18:43	18:56:01	19:40:42	06:04:45
54°	04:39:14	05:21:18	05:56:37	18:17:59	18:53:26	19:35:43	05:58:58
52°	04:43:30	05:23:29	05:57:11	18:17:20	18:51:09	19:31:19	05:53:45
50°	04:47:17	05:25:27	05:57:42	18:16:45	18:49:06	19:27:26	05:49:00
45°	04:55:03	05:29:31	05:58:48	18:15:29	18:44:51	19:19:26	05:38:42
N 40°	05:01:01	05:32:41	05:59:42	18:14:27	18:41:32	19:13:17	05:30:07
35°	05:05:40	05:35:11	06:00:26	18:13:36	18:38:54	19:08:29	05:22:43
30°	05:09:20	05:37:12	06:01:04	18:12:53	18:36:47	19:04:42	05:16:12
20°	05:14:29	05:40:05	06:02:04	18:11:42	18:33:43	18:59:20	05:04:53
N 10°	05:17:29	05:41:52	06:02:51	18:10:46	18:31:45	18:56:09	04:54:56
0°	05:18:50	05:42:50	06:03:29	18:10:00	18:30:39	18:54:39	04:45:34
S 10°	05:18:40	05:43:02	06:04:01	18:09:19	18:30:18	18:54:39	04:36:10
20°	05:16:55	05:42:29	06:04:29	18:08:43	18:30:41	18:56:14	04:26:07
30°	05:13:12	05:41:00	06:04:53	18:08:08	18:31:59	18:59:45	04:14:37
35°	05:10:22	05:39:49	06:05:04	18:07:51	18:33:04	19:02:27	04:07:56
40°	05:06:40	05:38:14	06:05:15	18:07:34	18:34:32	19:06:01	04:00:19
45°	05:01:49	05:36:08	06:05:25	18:07:16	18:36:29	19:10:42	03:51:24
S 50°	04:55:25	05:33:21	06:05:35	18:06:57	18:39:06	19:16:54	03:40:38
52°	04:52:16	05:31:59	06:05:39	18:06:49	18:40:23	19:19:56	03:35:37
54°	04:48:42	05:30:26	06:05:43	18:06:41	18:41:51	19:23:23	03:30:05
56°	04:44:39	05:28:40	06:05:46	18:06:32	18:43:31	19:27:18	03:23:55
58°	04:40:00	05:26:39	06:05:50	18:06:23	18:45:25	19:31:48	03:17:00
S 60°	04:34:38	05:24:20	06:05:54	18:06:13	18:47:36	19:37:00	03:09:08

Mar 22	SHA	Mer.pass
Venus	315° 29.5	14:58:15
Mars	64° 06.4	07:43:26
Jupiter	65° 07.3	07:38:38
Saturn	57° 49.3	08:07:40

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
21	07:11	07:02	12:07:02	10:12:11	22:34:19	27(8%)
22	06:53	06:44	12:06:44	10:55:56	23:17:06	28(3%)

# 2020 March 23 to Mar. 24

23 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	02:57:06	04:31:37	05:40:45	18:34:46	19:44:39	21:21:23	07:13:34
N 70°	03:20:02	04:41:23	05:43:24	18:31:49	19:34:24	20:57:10	07:01:58
68°	03:37:20	04:49:15	05:45:34	18:29:24	19:26:10	20:39:04	06:52:30
66°	03:50:59	04:55:43	05:47:23	18:27:22	19:19:24	20:24:53	06:44:35
64°	04:02:04	05:01:08	05:48:56	18:25:39	19:13:45	20:13:23	06:37:52
62°	04:11:17	05:05:44	05:50:16	18:24:11	19:08:57	20:03:51	06:32:03
60°	04:19:05	05:09:41	05:51:25	18:22:54	19:04:50	19:55:49	06:26:58
N 58°	04:25:45	05:13:07	05:52:26	18:21:46	19:01:16	19:48:56	06:22:28
56°	04:31:32	05:16:07	05:53:20	18:20:46	18:58:08	19:42:59	06:18:28
54°	04:36:35	05:18:47	05:54:09	18:19:52	18:55:22	19:37:47	06:14:51
52°	04:41:02	05:21:08	05:54:52	18:19:04	18:52:55	19:33:12	06:11:34
50°	04:44:58	05:23:14	05:55:32	18:18:20	18:50:43	19:29:09	06:08:34
45°	04:53:05	05:27:37	05:56:56	18:16:46	18:46:09	19:20:48	06:02:02
N 40°	04:59:20	05:31:03	05:58:05	18:15:29	18:42:35	19:14:23	05:56:33
35°	05:04:13	05:33:46	05:59:02	18:14:25	18:39:43	19:09:21	05:51:50
30°	05:08:05	05:35:58	05:59:51	18:13:29	18:37:25	19:05:21	05:47:38
20°	05:13:35	05:39:12	06:01:12	18:11:59	18:34:00	18:59:38	05:40:22
N 10°	05:16:54	05:41:18	06:02:17	18:10:45	18:31:45	18:56:09	05:33:57
0°	05:18:32	05:42:32	06:03:11	18:09:42	18:30:22	18:54:22	05:27:54
S 10°	05:18:39	05:43:01	06:04:00	18:08:45	18:29:43	18:54:05	05:21:51
20°	05:17:12	05:42:46	06:04:45	18:07:50	18:29:49	18:55:21	05:15:22
30°	05:13:50	05:41:37	06:05:30	18:06:56	18:30:46	18:58:31	05:07:58
35°	05:11:12	05:40:38	06:05:53	18:06:27	18:31:40	19:01:02	05:03:41
40°	05:07:44	05:39:16	06:06:16	18:05:57	18:32:54	19:04:22	04:58:49
45°	05:03:09	05:37:26	06:06:42	18:05:24	18:34:36	19:08:46	04:53:09
S 50°	04:57:05	05:34:57	06:07:10	18:04:47	18:36:55	19:14:39	04:46:21
52°	04:54:05	05:33:43	06:07:22	18:04:30	18:38:03	19:17:32	04:43:11
54°	04:50:42	05:32:19	06:07:35	18:04:13	18:39:22	19:20:48	04:39:43
56°	04:46:50	05:30:44	06:07:49	18:03:54	18:40:51	19:24:32	04:35:53
58°	04:42:25	05:28:55	06:08:04	18:03:34	18:42:34	19:28:49	04:31:36
S 60°	04:37:18	05:26:49	06:08:20	18:03:12	18:44:32	19:33:46	04:26:46

Mar 23	SHA	Mer.pass
Venus	314° 29.4	14:58:18
Mars	63° 22.0	07:42:28
Jupiter	64° 58.1	07:35:19
Saturn	57° 44.6	08:04:03

24 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	02:49:30	04:25:59	05:35:34	18:39:23	19:49:45	21:28:40	06:53:12
N 70°	03:13:52	04:36:25	05:38:45	18:35:53	19:38:49	21:02:53	06:48:34
68°	03:32:04	04:44:48	05:41:21	18:33:02	19:30:03	20:43:49	06:44:43
66°	03:46:22	04:51:41	05:43:32	18:30:38	19:22:52	20:28:57	06:41:28
64°	03:57:58	04:57:27	05:45:24	18:28:37	19:16:51	20:16:56	06:38:40
62°	04:07:35	05:02:21	05:46:59	18:26:52	19:11:45	20:07:00	06:36:15
60°	04:15:42	05:06:34	05:48:23	18:25:20	19:07:23	19:58:37	06:34:07
N 58°	04:22:39	05:10:13	05:49:37	18:24:00	19:03:34	19:51:28	06:32:14
56°	04:28:40	05:13:25	05:50:42	18:22:48	19:00:15	19:45:16	06:30:32
54°	04:33:55	05:16:15	05:51:40	18:21:45	18:57:18	19:39:52	06:29:00
52°	04:38:33	05:18:46	05:52:33	18:20:47	18:54:41	19:35:06	06:27:37
50°	04:42:39	05:21:01	05:53:21	18:19:55	18:52:21	19:30:53	06:26:20
45°	04:51:07	05:25:43	05:55:03	18:18:02	18:47:28	19:22:11	06:23:33
N 40°	04:57:38	05:29:24	05:56:27	18:16:30	18:43:37	19:15:29	06:21:13
35°	05:02:46	05:32:21	05:57:38	18:15:13	18:40:32	19:10:12	06:19:12
30°	05:06:50	05:34:45	05:58:39	18:14:06	18:38:02	19:06:00	06:17:24
20°	05:12:42	05:38:19	06:00:20	18:12:15	18:34:17	18:59:56	06:14:17
N 10°	05:16:19	05:40:43	06:01:42	18:10:43	18:31:44	18:56:09	06:11:33
0°	05:18:13	05:42:13	06:02:53	18:09:24	18:30:04	18:54:04	06:08:58
S 10°	05:18:37	05:43:00	06:03:59	18:08:10	18:29:09	18:53:30	06:06:23
20°	05:17:29	05:43:02	06:05:02	18:06:58	18:28:57	18:54:29	06:03:38
30°	05:14:27	05:42:14	06:06:06	18:05:43	18:29:34	18:57:18	06:00:30
35°	05:12:02	05:41:26	06:06:41	18:05:03	18:30:15	18:59:37	05:58:42
40°	05:08:47	05:40:18	06:07:18	18:04:20	18:31:17	19:02:43	05:56:39
45°	05:04:29	05:38:43	06:07:59	18:03:31	18:32:43	19:06:51	05:54:16
S 50°	04:58:44	05:36:32	06:08:45	18:02:36	18:34:44	19:12:24	05:51:25
52°	04:55:54	05:35:27	06:09:05	18:02:12	18:35:44	19:15:08	05:50:06
54°	04:52:41	05:34:13	06:09:27	18:01:45	18:36:53	19:18:14	05:48:40
56°	04:49:01	05:32:48	06:09:51	18:01:16	18:38:12	19:21:47	05:47:04
58°	04:44:48	05:31:10	06:10:17	18:00:45	18:39:44	19:25:51	05:45:18
S 60°	04:39:55	05:29:17	06:10:46	18:00:10	18:41:29	19:30:34	05:43:19

Mar 24	SHA	Mer.pass
Venus	313° 29.6	14:58:21
Mars	62° 37.5	07:41:29
Jupiter	64° 48.9	07:31:59
Saturn	57° 40.0	08:00:25

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
23	06:35	06:26	12:06:26	11:37:54	23:58:25	29(1%)
24	06:17	06:08	12:06:08	12:18:46	--:--	0(0%)

25 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	02:41:38	04:20:19	05:30:23	18:44:00	19:54:54	21:36:16	06:34:22
N 70°	03:07:33	04:31:25	05:34:06	18:39:58	19:43:16	21:08:46	06:35:55
68°	03:26:44	04:40:20	05:37:09	18:36:40	19:33:58	20:48:40	06:37:12
66°	03:41:43	04:47:39	05:39:41	18:33:54	19:26:20	20:33:05	06:38:17
64°	03:53:49	04:53:46	05:41:51	18:31:34	19:19:58	20:20:32	06:39:13
62°	04:03:51	04:58:58	05:43:43	18:29:32	19:14:34	20:10:10	06:40:02
60°	04:12:18	05:03:26	05:45:21	18:27:47	19:09:55	20:01:27	06:40:45
N 58°	04:19:31	05:07:19	05:46:47	18:26:14	19:05:54	19:54:00	06:41:23
56°	04:25:47	05:10:43	05:48:04	18:24:51	19:02:22	19:47:34	06:41:58
54°	04:31:15	05:13:44	05:49:12	18:23:37	18:59:14	19:41:57	06:42:29
52°	04:36:03	05:16:24	05:50:14	18:22:30	18:56:28	19:37:00	06:42:57
50°	04:40:20	05:18:48	05:51:10	18:21:29	18:53:58	19:32:37	06:43:24
45°	04:49:08	05:23:49	05:53:11	18:19:19	18:48:46	19:23:34	06:44:21
N 40°	04:55:56	05:27:46	05:54:50	18:17:32	18:44:40	19:16:35	06:45:09
35°	05:01:18	05:30:56	05:56:14	18:16:01	18:41:22	19:11:04	06:45:51
30°	05:05:35	05:33:32	05:57:26	18:14:43	18:38:40	19:06:39	06:46:29
20°	05:11:48	05:37:26	05:59:27	18:12:31	18:34:34	19:00:14	06:47:35
N 10°	05:15:43	05:40:07	06:01:07	18:10:42	18:31:43	18:56:08	06:48:34
0°	05:17:54	05:41:55	06:02:35	18:09:06	18:29:46	18:53:47	06:49:30
S 10°	05:18:36	05:42:58	06:03:57	18:07:35	18:28:34	18:52:56	06:50:27
20°	05:17:45	05:43:18	06:05:18	18:06:06	18:28:05	18:53:36	06:51:29
30°	05:15:05	05:42:50	06:06:43	18:04:31	18:28:22	18:56:05	06:52:41
35°	05:12:51	05:42:14	06:07:29	18:03:39	18:28:51	18:58:12	06:53:22
40°	05:09:50	05:41:19	06:08:19	18:02:43	18:29:40	19:01:04	06:54:10
45°	05:05:48	05:39:59	06:09:15	18:01:39	18:30:51	19:04:57	06:55:05
S 50°	05:00:22	05:38:07	06:10:19	18:00:26	18:32:33	19:10:10	06:56:12
52°	04:57:42	05:37:11	06:10:48	17:59:53	18:33:25	19:12:45	06:56:42
54°	04:54:39	05:36:06	06:11:20	17:59:17	18:34:25	19:15:41	06:57:16
56°	04:51:10	05:34:51	06:11:54	17:58:39	18:35:34	19:19:03	06:57:54
58°	04:47:10	05:33:24	06:12:31	17:57:56	18:36:54	19:22:55	06:58:35
S 60°	04:42:32	05:31:44	06:13:12	17:57:09	18:38:27	19:27:23	06:59:22

Mar 25	SHA	Mer.pass
Venus	312° 29.9	14:58:23
Mars	61° 53.2	07:40:29
Jupiter	64° 39.9	07:28:39
Saturn	57° 35.5	07:56:47

26 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	02:33:27	04:14:35	05:25:12	18:48:37	20:00:07	21:44:15	06:15:02
N 70°	03:01:05	04:26:23	05:29:27	18:44:03	19:47:46	21:14:50	06:23:01
68°	03:21:18	04:35:50	05:32:56	18:40:18	19:37:54	20:53:37	06:29:36
66°	03:36:59	04:43:35	05:35:50	18:37:10	19:29:50	20:37:16	06:35:08
64°	03:49:38	04:50:04	05:38:19	18:34:31	19:23:06	20:24:10	06:39:52
62°	04:00:04	04:55:34	05:40:27	18:32:13	19:17:23	20:13:23	06:43:58
60°	04:08:52	05:00:17	05:42:19	18:30:13	19:12:29	20:04:19	06:47:34
N 58°	04:16:23	05:04:24	05:43:58	18:28:27	19:08:13	19:56:34	06:50:46
56°	04:22:53	05:08:00	05:45:26	18:26:54	19:04:29	19:49:53	06:53:38
54°	04:28:33	05:11:12	05:46:44	18:25:29	19:01:11	19:44:03	06:56:13
52°	04:33:33	05:14:02	05:47:55	18:24:13	18:58:14	19:38:55	06:58:34
50°	04:38:00	05:16:35	05:49:00	18:23:04	18:55:36	19:34:21	07:00:43
45°	04:47:09	05:21:54	05:51:18	18:20:36	18:50:05	19:24:58	07:05:25
N 40°	04:54:14	05:26:07	05:53:13	18:18:33	18:45:43	19:17:41	07:09:22
35°	04:59:50	05:29:31	05:54:50	18:16:49	18:42:11	19:11:56	07:12:47
30°	05:04:20	05:32:18	05:56:14	18:15:19	18:39:17	19:07:19	07:15:50
20°	05:10:53	05:36:33	05:58:35	18:12:48	18:34:51	19:00:32	07:21:08
N 10°	05:15:07	05:39:32	06:00:33	18:10:41	18:31:42	18:56:08	07:25:50
0°	05:17:36	05:41:37	06:02:17	18:08:48	18:29:28	18:53:30	07:30:17
S 10°	05:18:34	05:42:56	06:03:56	18:07:01	18:28:00	18:52:22	07:34:45
20°	05:18:01	05:43:34	06:05:34	18:05:13	18:27:13	18:52:44	07:39:33
30°	05:15:41	05:43:27	06:07:19	18:03:19	18:27:09	18:54:52	07:45:04
35°	05:13:40	05:43:02	06:08:17	18:02:15	18:27:28	18:56:47	07:48:15
40°	05:10:53	05:42:20	06:09:20	18:01:06	18:28:03	18:59:26	07:51:53
45°	05:07:07	05:41:16	06:10:31	17:59:47	18:28:59	19:03:03	07:56:07
S 50°	05:02:00	05:39:42	06:11:54	17:58:16	18:30:23	19:07:57	08:01:12
52°	04:59:29	05:38:54	06:12:31	17:57:35	18:31:06	19:10:23	08:03:33
54°	04:56:36	05:37:58	06:13:12	17:56:50	18:31:57	19:13:09	08:06:08
56°	04:53:18	05:36:53	06:13:56	17:56:01	18:32:56	19:16:20	08:09:00
58°	04:49:31	05:35:38	06:14:44	17:55:08	18:34:05	19:19:59	08:12:11
S 60°	04:45:07	05:34:11	06:15:38	17:54:08	18:35:25	19:24:13	08:15:47

Mar 26	SHA	Mer.pass
Venus	311° 30.4	14:58:24
Mars	61° 08.9	07:39:30
Jupiter	64° 31.1	07:25:18
Saturn	57° 31.1	07:53:08

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
25	05:59	05:50	12:05:50	12:59:17	00:39:01	1(1%)
26	05:41	05:32	12:05:32	13:40:14	01:19:39	2(4%)

# 2020 March 27 to Mar. 28

27 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	02:24:52	04:08:47	05:20:00	18:53:16	20:05:25	21:52:41	05:52:49
N 70°	02:54:25	04:21:18	05:24:47	18:48:09	19:52:19	21:21:05	06:08:43
68°	03:15:45	04:31:18	05:28:42	18:43:57	19:41:53	20:58:41	06:21:30
66°	03:32:12	04:39:30	05:31:59	18:40:26	19:33:21	20:41:32	06:32:04
64°	03:45:24	04:46:20	05:34:47	18:37:28	19:26:15	20:27:52	06:41:00
62°	03:56:16	04:52:09	05:37:11	18:34:54	19:20:13	20:16:37	06:48:39
60°	04:05:25	04:57:08	05:39:17	18:32:40	19:15:02	20:07:12	06:55:20
N 58°	04:13:13	05:01:29	05:41:09	18:30:41	19:10:33	19:59:09	07:01:13
56°	04:19:58	05:05:17	05:42:47	18:28:56	19:06:36	19:52:13	07:06:27
54°	04:25:51	05:08:40	05:44:16	18:27:22	19:03:07	19:46:10	07:11:10
52°	04:31:03	05:11:40	05:45:36	18:25:56	19:00:01	19:40:50	07:15:26
50°	04:35:39	05:14:21	05:46:49	18:24:39	18:57:14	19:36:07	07:19:20
45°	04:45:10	05:20:00	05:49:26	18:21:52	18:51:24	19:26:21	07:27:48
N 40°	04:52:32	05:24:28	05:51:36	18:19:34	18:46:46	19:18:48	07:34:54
35°	04:58:23	05:28:05	05:53:26	18:17:37	18:43:00	19:12:48	07:41:02
30°	05:03:04	05:31:05	05:55:01	18:15:56	18:39:54	19:07:58	07:46:27
20°	05:09:59	05:35:40	05:57:42	18:13:04	18:35:08	19:00:51	07:55:53
N 10°	05:14:31	05:38:57	05:59:58	18:10:39	18:31:41	18:56:08	08:04:13
0°	05:17:17	05:41:18	06:01:59	18:08:30	18:29:11	18:53:13	08:12:05
S 10°	05:18:32	05:42:54	06:03:54	18:06:26	18:27:26	18:51:48	08:20:00
20°	05:18:17	05:43:50	06:05:50	18:04:21	18:26:21	18:51:52	08:28:29
30°	05:16:18	05:44:03	06:07:56	18:02:06	18:25:57	18:53:40	08:38:13
35°	05:14:28	05:43:50	06:09:05	18:00:51	18:26:04	18:55:23	08:43:52
40°	05:11:55	05:43:21	06:10:21	17:59:29	18:26:26	18:57:48	08:50:19
45°	05:08:25	05:42:32	06:11:48	17:57:55	18:27:07	19:01:09	08:57:51
S 50°	05:03:38	05:41:16	06:13:28	17:56:06	18:28:13	19:05:44	09:06:57
52°	05:01:15	05:40:36	06:14:14	17:55:16	18:28:48	19:08:01	09:11:10
54°	04:58:32	05:39:50	06:15:03	17:54:23	18:29:30	19:10:38	09:15:50
56°	04:55:25	05:38:55	06:15:57	17:53:24	18:30:19	19:13:38	09:21:00
58°	04:51:50	05:37:51	06:16:57	17:52:19	18:31:16	19:17:05	09:26:48
S 60°	04:47:41	05:36:36	06:18:03	17:51:07	18:32:24	19:21:05	09:33:22

Mar 27	SHA	Mer.pass
Venus	310° 31.1	14:58:24
Mars	60° 24.7	07:38:30
Jupiter	64° 22.4	07:21:57
Saturn	57° 26.7	07:49:30

28 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	02:15:51	04:02:54	05:14:47	18:57:55	20:10:46	22:01:39	05:22:26
N 70°	02:47:35	04:16:10	05:20:07	18:52:15	19:56:54	21:27:34	05:50:52
68°	03:10:06	04:26:44	05:24:29	18:47:36	19:45:53	21:03:52	06:12:15
66°	03:27:20	04:35:23	05:28:08	18:43:43	19:36:53	20:45:53	06:29:14
64°	03:41:07	04:42:36	05:31:14	18:40:25	19:29:24	20:31:36	06:43:12
62°	03:52:26	04:48:43	05:33:55	18:37:35	19:23:04	20:19:54	06:54:57
60°	04:01:56	04:53:59	05:36:16	18:35:06	19:17:37	20:10:06	07:05:02
N 58°	04:10:02	04:58:33	05:38:19	18:32:55	19:12:53	20:01:46	07:13:50
56°	04:17:02	05:02:34	05:40:09	18:30:58	19:08:44	19:54:34	07:21:36
54°	04:23:09	05:06:07	05:41:48	18:29:14	19:05:04	19:48:17	07:28:33
52°	04:28:32	05:09:17	05:43:17	18:27:39	19:01:48	19:42:46	07:34:48
50°	04:33:18	05:12:07	05:44:39	18:26:13	18:58:52	19:37:52	07:40:28
45°	04:43:10	05:18:05	05:47:34	18:23:08	18:52:42	19:27:45	07:52:43
N 40°	04:50:50	05:22:49	05:49:59	18:20:35	18:47:49	19:19:54	08:02:55
35°	04:56:55	05:26:40	05:52:02	18:18:25	18:43:50	19:13:40	08:11:40
30°	05:01:49	05:29:51	05:53:49	18:16:32	18:40:32	19:08:38	08:19:24
20°	05:09:05	05:34:47	05:56:50	18:13:20	18:35:25	19:01:09	08:32:47
N 10°	05:13:55	05:38:22	05:59:23	18:10:38	18:31:40	18:56:08	08:44:34
0°	05:16:58	05:41:00	06:01:41	18:08:12	18:28:53	18:52:56	08:55:40
S 10°	05:18:30	05:42:52	06:03:53	18:05:52	18:26:52	18:51:14	09:06:50
20°	05:18:33	05:44:06	06:06:07	18:03:29	18:25:29	18:51:01	09:18:48
30°	05:16:54	05:44:39	06:08:32	18:00:54	18:24:46	18:52:28	09:32:35
35°	05:15:17	05:44:37	06:09:53	17:59:28	18:24:41	18:53:59	09:40:36
40°	05:12:56	05:44:22	06:11:22	17:57:52	18:24:50	18:56:11	09:49:46
45°	05:09:42	05:43:48	06:13:04	17:56:03	18:25:16	18:59:16	10:00:33
S 50°	05:05:14	05:42:50	06:15:02	17:53:56	18:26:03	19:03:32	10:13:38
52°	05:03:00	05:42:19	06:15:56	17:52:58	18:26:30	19:05:41	10:19:46
54°	05:00:27	05:41:41	06:16:55	17:51:55	18:27:03	19:08:08	10:26:33
56°	04:57:31	05:40:57	06:17:59	17:50:47	18:27:42	19:10:56	10:34:08
58°	04:54:09	05:40:04	06:19:10	17:49:31	18:28:28	19:14:11	10:42:43
S 60°	04:50:13	05:39:02	06:20:28	17:48:07	18:29:24	19:17:57	10:52:31



Mar 28	SHA	Mer.pass
Venus	309° 32.0	14:58:23
Mars	59° 40.5	07:37:30
Jupiter	64° 13.8	07:18:35
Saturn	57° 22.5	07:45:51

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
27	05:23	05:14	12:05:14	14:22:24	02:01:07	3(9%)
28	05:05	04:56	12:04:56	15:06:31	02:44:10	4(15%)

# 2020 March 29 to Mar. 30

29 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	02:06:18	03:56:58	05:09:33	19:02:36	20:16:13	22:11:18	04:10:50
N 70°	02:40:30	04:11:00	05:15:26	18:56:21	20:01:32	21:34:18	05:22:41
68°	03:04:20	04:22:09	05:20:15	18:51:15	19:49:55	21:09:10	06:00:17
66°	03:22:25	04:31:16	05:24:17	18:46:59	19:40:27	20:50:18	06:26:53
64°	03:36:47	04:38:51	05:27:42	18:43:22	19:32:35	20:35:23	06:47:30
62°	03:48:34	04:45:17	05:30:39	18:40:15	19:25:55	20:23:13	07:04:14
60°	03:58:26	04:50:49	05:33:14	18:37:32	19:20:12	20:13:02	07:18:14
N 58°	04:06:50	04:55:38	05:35:30	18:35:09	19:15:14	20:04:23	07:30:14
56°	04:14:05	04:59:51	05:37:31	18:33:01	19:10:52	19:56:56	07:40:42
54°	04:20:25	05:03:35	05:39:20	18:31:06	19:07:01	19:50:26	07:49:56
52°	04:26:00	05:06:54	05:40:59	18:29:22	19:03:35	19:44:43	07:58:12
50°	04:30:57	05:09:54	05:42:28	18:27:48	19:00:30	19:39:38	08:05:39
45°	04:41:10	05:16:10	05:45:42	18:24:25	18:54:01	19:29:10	08:21:35
N 40°	04:49:07	05:21:10	05:48:22	18:21:36	18:48:52	19:21:01	08:34:44
35°	04:55:26	05:25:15	05:50:38	18:19:13	18:44:39	19:14:32	08:45:57
30°	05:00:33	05:28:38	05:52:37	18:17:08	18:41:10	19:09:18	08:55:48
20°	05:08:10	05:33:54	05:55:58	18:13:36	18:35:42	19:01:28	09:12:47
N 10°	05:13:19	05:37:47	05:58:49	18:10:37	18:31:39	18:56:08	09:27:41
0°	05:16:38	05:40:41	06:01:23	18:07:54	18:28:36	18:52:39	09:41:42
S 10°	05:18:27	05:42:50	06:03:51	18:05:17	18:26:18	18:50:41	09:55:46
20°	05:18:49	05:44:22	06:06:23	18:02:37	18:24:37	18:50:09	10:10:53
30°	05:17:30	05:45:14	06:09:08	17:59:42	18:23:34	18:51:16	10:28:18
35°	05:16:04	05:45:25	06:10:40	17:58:04	18:23:18	18:52:35	10:38:29
40°	05:13:58	05:45:22	06:12:23	17:56:15	18:23:14	18:54:34	10:50:10
45°	05:10:59	05:45:03	06:14:20	17:54:12	18:23:24	18:57:23	11:03:58
S 50°	05:06:50	05:44:24	06:16:36	17:51:46	18:23:54	19:01:21	11:20:54
52°	05:04:45	05:44:01	06:17:39	17:50:40	18:24:13	19:03:21	11:28:53
54°	05:02:21	05:43:32	06:18:46	17:49:28	18:24:37	19:05:38	11:37:48
56°	04:59:37	05:42:58	06:20:00	17:48:10	18:25:06	19:08:16	11:47:52
58°	04:56:26	05:42:16	06:21:22	17:46:43	18:25:41	19:11:19	11:59:22
S 60°	04:52:44	05:41:26	06:22:53	17:45:06	18:26:24	19:14:52	12:12:44

Mar 29	SHA	Mer.pass
Venus	308° 33.2	14:58:21
Mars	58° 56.4	07:36:30
Jupiter	64° 05.4	07:15:12
Saturn	57° 18.3	07:42:11

30 March 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	01:56:04	03:50:56	05:04:18	19:07:17	20:21:45	22:21:50	
N 70°	02:33:11	04:05:46	05:10:45	19:00:29	20:06:14	21:41:20	
68°	02:58:26	04:17:32	05:16:01	18:54:55	19:53:59	21:14:38	05:39:16
66°	03:17:24	04:27:07	05:20:25	18:50:16	19:44:03	20:54:48	06:25:42
64°	03:32:24	04:35:05	05:24:10	18:46:20	19:35:46	20:39:14	06:56:05
62°	03:44:39	04:41:51	05:27:23	18:42:56	19:28:47	20:26:34	07:19:02
60°	03:54:54	04:47:39	05:30:12	18:39:59	19:22:47	20:16:00	07:37:30
N 58°	04:03:37	04:52:41	05:32:41	18:37:22	19:17:35	20:07:02	07:52:54
56°	04:11:08	04:57:07	05:34:54	18:35:03	19:13:01	19:59:19	08:06:05
54°	04:17:41	05:01:02	05:36:53	18:32:58	19:08:58	19:52:35	08:17:35
52°	04:23:28	05:04:32	05:38:40	18:31:05	19:05:22	19:46:40	08:27:45
50°	04:28:35	05:07:40	05:40:18	18:29:22	19:02:08	19:41:25	08:36:51
45°	04:39:10	05:14:16	05:43:50	18:25:41	18:55:20	19:30:34	08:56:06
N 40°	04:47:24	05:19:32	05:46:45	18:22:37	18:49:55	19:22:08	09:11:50
35°	04:53:58	05:23:49	05:49:14	18:20:01	18:45:29	19:15:25	09:25:09
30°	04:59:17	05:27:24	05:51:24	18:17:44	18:41:47	19:09:58	09:36:48
20°	05:07:16	05:33:01	05:55:06	18:13:53	18:35:59	19:01:46	09:56:47
N 10°	05:12:42	05:37:11	05:58:14	18:10:35	18:31:39	18:56:09	10:14:14
0°	05:16:19	05:40:22	06:01:05	18:07:36	18:28:19	18:52:22	10:30:37
S 10°	05:18:25	05:42:48	06:03:50	18:04:43	18:25:44	18:50:07	10:47:03
20°	05:19:04	05:44:37	06:06:39	18:01:45	18:23:46	18:49:18	11:04:42
30°	05:18:06	05:45:50	06:09:44	17:58:30	18:22:23	18:50:04	11:25:06
35°	05:16:52	05:46:12	06:11:28	17:56:41	18:21:55	18:51:12	11:37:03
40°	05:14:59	05:46:22	06:13:23	17:54:39	18:21:38	18:52:58	11:50:49
45°	05:12:15	05:46:18	06:15:35	17:52:20	18:21:34	18:55:32	12:07:11
S 50°	05:08:25	05:45:57	06:18:10	17:49:37	18:21:46	18:59:10	12:27:26
52°	05:06:29	05:45:42	06:19:21	17:48:23	18:21:56	19:01:02	12:37:05
54°	05:04:15	05:45:23	06:20:38	17:47:02	18:22:11	19:03:10	12:47:56
56°	05:01:41	05:44:58	06:22:02	17:45:33	18:22:30	19:05:37	13:00:17
58°	04:58:42	05:44:28	06:23:35	17:43:55	18:22:55	19:08:28	13:14:37
S 60°	04:55:14	05:43:50	06:25:18	17:42:06	18:23:26	19:11:47	13:31:37

Mar 30	SHA	Mer.pass
Venus	307° 34.7	14:58:17
Mars	58° 12.4	07:35:30
Jupiter	63° 57.1	07:11:49
Saturn	57° 14.2	07:38:32

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper Mer.Pass. hh:mm:ss	Lower Mer.Pass. hh:mm:ss	Age
29	04:47	04:38	12:04:38	15:53:12	5(22%)
30	04:29	04:20	12:04:20	16:42:50	6(31%)

31 March 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	01:44:57	03:44:50	04:59:03	19:12:00	20:27:22	22:33:33	<div></div>	<div></div>
N 70°	02:25:34	04:00:30	05:06:03	19:04:37	20:10:59	21:48:41	<div></div>	<div></div>
68°	02:52:23	04:12:52	05:11:46	18:58:35	19:58:06	21:20:14	<div></div>	<div></div>
66°	03:12:18	04:22:56	05:16:33	18:53:33	19:47:39	20:59:24	06:28:13	03:44:04
64°	03:27:58	04:31:18	05:20:37	18:49:17	19:38:59	20:43:08	07:14:07	02:58:30
62°	03:40:43	04:38:23	05:24:07	18:45:37	19:31:40	20:29:57	07:44:12	02:28:44
60°	03:51:21	04:44:28	05:27:11	18:42:25	19:25:23	20:19:00	08:07:03	02:06:10
N 58°	04:00:23	04:49:45	05:29:52	18:39:36	19:19:56	20:09:42	08:25:31	01:47:56
56°	04:08:10	04:54:23	05:32:16	18:37:05	19:15:10	20:01:42	08:41:01	01:32:41
54°	04:14:57	04:58:29	05:34:25	18:34:50	19:10:56	19:54:45	08:54:20	01:19:35
52°	04:20:55	05:02:09	05:36:22	18:32:48	19:07:10	19:48:37	09:06:01	01:08:07
50°	04:26:13	05:05:26	05:38:08	18:30:57	19:03:47	19:43:12	09:16:23	00:57:56
45°	04:37:10	05:12:21	05:41:58	18:26:57	18:56:39	19:31:59	09:38:08	00:36:39
N 40°	04:45:41	05:17:53	05:45:08	18:23:38	18:50:58	19:23:16	09:55:43	00:19:28
35°	04:52:30	05:22:24	05:47:51	18:20:49	18:46:18	19:16:18	10:10:31	00:05:01
30°	04:58:02	05:26:11	05:50:12	18:18:21	18:42:25	19:10:38	10:23:24	.. ..
20°	05:06:21	05:32:08	05:54:14	18:14:09	18:36:16	19:02:05	10:45:26	.. ..
N 10°	05:12:06	05:36:36	05:57:40	18:10:34	18:31:38	18:56:09	11:04:36	.. ..
0°	05:16:00	05:40:04	06:00:47	18:07:18	18:28:02	18:52:06	11:22:32	23:48:26
S 10°	05:18:22	05:42:46	06:03:48	18:04:09	18:25:10	18:49:34	11:40:31	23:30:05
20°	05:19:19	05:44:53	06:06:55	18:00:53	18:22:55	18:48:27	11:59:49	23:10:25
30°	05:18:42	05:46:25	06:10:20	17:57:19	18:21:12	18:48:53	12:22:09	22:47:43
35°	05:17:39	05:46:59	06:12:15	17:55:18	18:20:33	18:49:49	12:35:15	22:34:25
40°	05:15:59	05:47:22	06:14:24	17:53:03	18:20:03	18:51:22	12:50:23	22:19:04
45°	05:13:31	05:47:33	06:16:51	17:50:29	18:19:43	18:53:40	13:08:26	22:00:47
S 50°	05:10:00	05:47:30	06:19:44	17:47:28	18:19:38	18:57:01	13:30:54	21:38:03
52°	05:08:12	05:47:23	06:21:03	17:46:05	18:19:40	18:58:43	13:41:40	21:27:10
54°	05:06:08	05:47:13	06:22:29	17:44:35	18:19:46	19:00:42	13:53:51	21:14:51
56°	05:03:44	05:46:58	06:24:03	17:42:57	18:19:55	19:02:59	14:07:51	21:00:44
58°	05:00:57	05:46:39	06:25:47	17:41:08	18:20:09	19:05:38	14:24:16	20:44:11
S 60°	04:57:43	05:46:14	06:27:43	17:39:06	18:20:27	19:08:44	14:44:03	20:24:14




Mar 31	SHA	Mer.pass
Venus	306°36.5	14:58:13
Mars	57°28.4	07:34:29
Jupiter	63°49.0	07:08:25
Saturn	57°10.2	07:34:52

01 April 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	01:32:39	03:38:38	04:53:46	19:16:44	20:33:06	22:47:01	<div></div>	<div></div>
N 70°	02:17:38	03:55:10	05:01:20	19:08:46	20:15:48	21:56:27	<div></div>	<div></div>
68°	02:46:11	04:08:11	05:07:32	19:02:16	20:02:15	21:26:02	<div></div>	<div></div>
66°	03:07:07	04:18:44	05:12:42	18:56:51	19:51:18	21:04:06	06:50:00	05:14:45
64°	03:23:28	04:27:30	05:17:05	18:52:15	19:42:13	20:47:06	07:52:44	04:12:04
62°	03:36:44	04:34:55	05:20:51	18:48:18	19:34:34	20:33:24	08:27:19	03:37:31
60°	03:47:46	04:41:17	05:24:09	18:44:51	19:28:00	20:22:01	08:52:32	03:12:21
N 58°	03:57:07	04:46:48	05:27:04	18:41:49	19:22:18	20:12:23	09:12:31	02:52:24
56°	04:05:10	04:51:39	05:29:39	18:39:07	19:17:19	20:04:07	09:29:05	02:35:52
54°	04:12:11	04:55:56	05:31:58	18:36:42	19:12:54	19:56:55	09:43:14	02:21:45
52°	04:18:22	04:59:46	05:34:04	18:34:30	19:08:57	19:50:36	09:55:33	02:09:27
50°	04:23:50	05:03:12	05:35:59	18:32:31	19:05:25	19:44:59	10:06:27	01:58:35
45°	04:35:09	05:10:27	05:40:06	18:28:13	18:57:59	19:33:25	10:29:11	01:35:54
N 40°	04:43:58	05:16:14	05:43:32	18:24:39	18:52:01	19:24:23	10:47:29	01:17:39
35°	04:51:01	05:20:59	05:46:27	18:21:36	18:47:08	19:17:11	11:02:51	01:02:21
30°	04:56:46	05:24:58	05:49:01	18:18:57	18:43:03	19:11:18	11:16:11	00:49:04
20°	05:05:27	05:31:15	05:53:22	18:14:25	18:36:34	19:02:24	11:38:55	00:26:24
N 10°	05:11:30	05:36:01	05:57:05	18:10:33	18:31:38	18:56:10	11:58:39	00:06:46
0°	05:15:40	05:39:45	06:00:29	18:07:00	18:27:45	18:51:50	12:17:04	.. ..
S 10°	05:18:20	05:42:44	06:03:47	18:03:34	18:24:37	18:49:01	12:35:31	.. ..
20°	05:19:34	05:45:08	06:07:11	18:00:02	18:22:04	18:47:37	12:55:18	.. ..
30°	05:19:17	05:47:01	06:10:56	17:56:07	18:20:01	18:47:43	13:18:08	23:43:27
35°	05:18:26	05:47:45	06:13:03	17:53:55	18:19:10	18:48:27	13:31:33	23:30:09
40°	05:16:59	05:48:22	06:15:24	17:51:27	18:18:28	18:49:46	13:47:01	23:14:48
45°	05:14:47	05:48:48	06:18:06	17:48:38	18:17:54	18:51:50	14:05:27	22:56:29
S 50°	05:11:34	05:49:02	06:21:17	17:45:19	18:17:30	18:54:52	14:28:25	22:33:41
52°	05:09:55	05:49:04	06:22:45	17:43:48	18:17:24	18:56:26	14:39:26	22:22:44
54°	05:08:00	05:49:02	06:24:20	17:42:09	18:17:21	18:58:15	14:51:53	22:10:20
56°	05:05:47	05:48:58	06:26:04	17:40:21	18:17:21	19:00:22	15:06:12	21:56:06
58°	05:03:12	05:48:49	06:27:59	17:38:21	18:17:23	19:02:50	15:23:00	21:39:22
S 60°	05:00:10	05:48:36	06:30:08	17:36:07	18:17:30	19:05:43	15:43:19	21:19:08



Apr 01	SHA	Mer.pass
Venus	305°38.6	14:58:07
Mars	56°44.5	07:33:28
Jupiter	63°41.0	07:05:01
Saturn	57°06.2	07:31:11

Day	Sun		Mer. Pass hh:mm:ss	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Mer.Pass.		
				Upper hh:mm:ss	Lower hh:mm:ss	
31	04:11	04:03	12:04:03	17:35:25	05:08:47	7(41%)
01	03:54	03:45	12:03:45	18:30:26	06:02:40	8(51%)

2020 April 02 to Apr. 03

02 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	01:18:36	03:32:20	04:48:28	19:21:30	20:38:57	23:03:28	
N 70°	02:09:18	03:49:46	04:56:37	19:12:56	20:20:41	22:04:41	
68°	02:39:49	04:03:27	05:03:17	19:05:57	20:06:27	21:32:01	
66°	03:01:51	04:14:31	05:08:50	19:00:08	19:54:58	21:08:54	08:13:11 05:48:34
64°	03:18:55	04:23:42	05:13:32	18:55:13	19:45:28	20:51:08	09:03:07 04:58:21
62°	03:32:43	04:31:27	05:17:36	18:50:59	19:37:28	20:36:52	09:34:25 04:26:48
60°	03:44:09	04:38:05	05:21:08	18:47:18	19:30:37	20:25:04	09:57:52 04:03:08
N 58°	03:53:51	04:43:51	05:24:15	18:44:03	19:24:41	20:15:06	10:16:41 03:44:06
56°	04:02:10	04:48:55	05:27:02	18:41:09	19:19:28	20:06:33	10:32:23 03:28:12
54°	04:09:26	04:53:23	05:29:31	18:38:34	19:14:52	19:59:07	10:45:50 03:14:34
52°	04:15:48	04:57:23	05:31:46	18:36:13	19:10:45	19:52:35	10:57:36 03:02:38
50°	04:21:27	05:00:58	05:33:49	18:34:05	19:07:04	19:46:48	11:08:01 02:52:03
45°	04:33:08	05:08:32	05:38:15	18:29:29	18:59:18	19:34:50	11:29:48 02:29:54
N 40°	04:42:15	05:14:36	05:41:56	18:25:40	18:53:04	19:25:31	11:47:22 02:12:00
35°	04:49:33	05:19:34	05:45:04	18:22:24	18:47:58	19:18:04	12:02:07 01:56:57
30°	04:55:30	05:23:44	05:47:49	18:19:33	18:43:40	19:11:59	12:14:55 01:43:52
20°	05:04:32	05:30:22	05:52:30	18:14:41	18:36:51	19:02:43	12:36:45 01:21:30
N 10°	05:10:54	05:35:26	05:56:31	18:10:31	18:31:38	18:56:11	12:55:41 01:02:04
0°	05:15:21	05:39:27	06:00:11	18:06:43	18:27:28	18:51:34	13:13:21 00:43:52
S 10°	05:18:17	05:42:42	06:03:45	18:03:01	18:24:04	18:48:29	13:31:00 00:25:38
20°	05:19:49	05:45:23	06:07:27	17:59:11	18:21:13	18:46:46	13:49:54 00:06:04
30°	05:19:52	05:47:36	06:11:32	17:54:56	18:18:51	18:46:33	14:11:38 .. ..
35°	05:19:13	05:48:32	06:13:50	17:52:32	18:17:49	18:47:05	14:24:22 .. ..
40°	05:17:59	05:49:21	06:16:25	17:49:52	18:16:53	18:48:12	14:38:59 .. ..
45°	05:16:02	05:50:02	06:19:22	17:46:48	18:16:04	18:50:00	14:56:21 .. ..
S 50°	05:13:07	05:50:34	06:22:51	17:43:11	18:15:23	18:52:44	15:17:48 23:40:35
52°	05:11:37	05:50:44	06:24:26	17:41:32	18:15:09	18:54:09	15:28:01 23:30:38
54°	05:09:51	05:50:52	06:26:10	17:39:44	18:14:57	18:55:49	15:39:30 23:19:25
56°	05:07:48	05:50:57	06:28:05	17:37:45	18:14:47	18:57:46	15:52:36 23:06:36
58°	05:05:25	05:50:59	06:30:11	17:35:34	18:14:39	19:00:02	16:07:48 22:51:43
S 60°	05:02:37	05:50:59	06:32:32	17:33:07	18:14:33	19:02:42	16:25:53 22:33:59

Apr 02	SHA	Mer.pass
Venus	304°41.1	14:58:00
Mars	56°00.7	07:32:27
Jupiter	63°33.2	07:01:36
Saturn	57°02.4	07:27:30

03 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	01:01:34	03:25:55	04:43:08	19:26:17	20:44:55	23:26:53	
N 70°	02:00:29	03:44:19	04:51:53	19:17:06	20:25:38	22:13:31	
68°	02:33:15	03:58:41	04:59:01	19:09:39	20:10:41	21:38:14	09:17:04 06:44:20
66°	02:56:28	04:10:16	05:04:58	19:03:26	19:58:40	21:13:49	10:07:28 05:53:14
64°	03:14:18	04:19:52	05:10:00	18:58:11	19:48:45	20:55:15	10:38:55 05:21:10
62°	03:28:39	04:27:57	05:14:20	18:53:40	19:40:24	20:40:24	11:02:18 04:57:14
60°	03:40:31	04:34:53	05:18:07	18:49:44	19:33:15	20:28:10	11:20:55 04:38:06
N 58°	03:50:33	04:40:54	05:21:27	18:46:16	19:27:03	20:17:50	11:36:21 04:22:12
56°	03:59:10	04:46:10	05:24:25	18:43:11	19:21:38	20:09:00	11:49:30 04:08:37
54°	04:06:39	04:50:50	05:27:04	18:40:26	19:16:50	20:01:19	12:00:54 03:56:48
52°	04:13:14	04:55:00	05:29:29	18:37:56	19:12:34	19:54:35	12:10:58 03:46:21
50°	04:19:04	04:58:44	05:31:40	18:35:39	19:08:43	19:48:36	12:19:57 03:37:00
45°	04:31:08	05:06:38	05:36:24	18:30:45	19:00:37	19:36:16	12:38:53 03:17:15
N 40°	04:40:32	05:12:57	05:40:20	18:26:40	18:54:08	19:26:39	12:54:15 03:01:09
35°	04:48:05	05:18:09	05:43:41	18:23:12	18:48:47	19:18:57	13:07:14 02:47:30
30°	04:54:14	05:22:32	05:46:38	18:20:09	18:44:18	19:12:39	13:18:32 02:35:35
20°	05:03:38	05:29:30	05:51:39	18:14:58	18:37:09	19:03:03	13:37:51 02:15:08
N 10°	05:10:17	05:34:51	05:55:57	18:10:30	18:31:37	18:56:12	13:54:36 01:57:16
0°	05:15:02	05:39:08	05:59:54	18:06:25	18:27:11	18:51:18	14:10:15 01:40:31
S 10°	05:18:14	05:42:40	06:03:44	18:02:27	18:23:31	18:47:56	14:25:51 01:23:41
20°	05:20:04	05:45:39	06:07:43	17:58:19	18:20:23	18:45:57	14:42:30 01:05:36
30°	05:20:27	05:48:11	06:12:08	17:53:45	18:17:41	18:45:23	15:01:35 00:44:42
35°	05:19:59	05:49:18	06:14:37	17:51:10	18:16:28	18:45:44	15:12:42 00:32:25
40°	05:18:58	05:50:20	06:17:25	17:48:17	18:15:19	18:46:38	15:25:23 00:18:17
45°	05:17:17	05:51:16	06:20:37	17:44:58	18:14:16	18:48:11	15:40:21 00:01:27
S 50°	05:14:40	05:52:06	06:24:24	17:41:03	18:13:17	18:50:37	15:58:37 .. ..
52°	05:13:18	05:52:24	06:26:08	17:39:16	18:12:55	18:51:54	16:07:13 .. ..
54°	05:11:42	05:52:40	06:28:01	17:37:18	18:12:34	18:53:25	16:16:47 .. ..
56°	05:09:49	05:52:55	06:30:05	17:35:10	18:12:14	18:55:11	16:27:35 .. ..
58°	05:07:37	05:53:09	06:32:23	17:32:47	18:11:55	18:57:16	16:39:54 .. ..
S 60°	05:05:02	05:53:20	06:34:57	17:30:09	18:11:38	18:59:43	16:54:12 .. ..

Apr 03	SHA	Mer.pass
Venus	303°44.0	14:57:50
Mars	55°17.0	07:31:25
Jupiter	63°25.5	06:58:10
Saturn	56°58.6	07:23:49

Day	Sun		Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Mer.Pass. Upper Lower hh:mm:ss hh:mm:ss		Age
02	03:36	03:27	12:03:27	19:26:56 06:58:34	9(61%)
03	03:18	03:09	12:03:09	20:23:46 07:55:22	10(72%)



2020 April 04 to Apr. 05

04 April 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	00:37:36	03:19:23	04:37:48	19:31:06	20:51:01	—:—	10:00:10	08:02:43
N 70°	01:51:05	03:38:48	04:47:09	19:21:18	20:30:40	22:23:05	11:05:42	06:55:46
68°	02:26:28	03:53:52	04:54:46	19:13:21	20:14:58	21:44:42	11:41:20	06:18:53
66°	02:50:58	04:06:00	05:01:06	19:06:45	20:02:24	21:18:52	12:06:36	05:52:32
64°	03:09:38	04:16:01	05:06:28	19:01:10	19:52:02	20:59:26	12:26:06	05:32:03
62°	03:24:33	04:24:28	05:11:05	18:56:22	19:43:20	20:43:59	12:41:53	05:15:22
60°	03:36:51	04:31:41	05:15:06	18:52:11	19:35:53	20:31:17	12:55:04	05:01:23
N 58°	03:47:14	04:37:57	05:18:39	18:48:30	19:29:27	20:20:36	13:06:20	04:49:23
56°	03:56:08	04:43:26	05:21:48	18:45:13	19:23:48	20:11:28	13:16:06	04:38:55
54°	04:03:52	04:48:17	05:24:38	18:42:17	19:18:49	20:03:32	13:24:44	04:29:39
52°	04:10:40	04:52:37	05:27:12	18:39:38	19:14:22	19:56:35	13:32:25	04:21:23
50°	04:16:41	04:56:31	05:29:32	18:37:13	19:10:22	19:50:25	13:39:20	04:13:54
45°	04:29:07	05:04:44	05:34:34	18:32:01	19:01:57	19:37:43	13:54:04	03:57:55
N 40°	04:38:49	05:11:19	05:38:45	18:27:41	18:55:11	19:27:48	14:06:09	03:44:42
35°	04:46:36	05:16:45	05:42:19	18:23:59	18:49:37	19:19:51	14:16:25	03:33:26
30°	04:52:59	05:21:19	05:45:27	18:20:45	18:44:56	19:13:20	14:25:24	03:23:31
20°	05:02:43	05:28:37	05:50:47	18:15:14	18:37:26	19:03:22	14:40:48	03:06:24
N 10°	05:09:41	05:34:16	05:55:23	18:10:29	18:31:37	18:56:14	14:54:13	02:51:23
0°	05:14:42	05:38:50	05:59:36	18:06:08	18:26:55	18:51:03	15:06:45	02:37:14
S 10°	05:18:11	05:42:38	06:03:43	18:01:53	18:22:58	18:47:24	15:19:14	02:23:00
20°	05:20:19	05:45:54	06:07:59	17:57:29	18:19:33	18:45:07	15:32:31	02:07:43
30°	05:21:01	05:48:46	06:12:43	17:52:35	18:16:31	18:44:14	15:47:40	01:50:04
35°	05:20:45	05:50:04	06:15:25	17:49:48	18:15:07	18:44:24	15:56:26	01:39:44
40°	05:19:57	05:51:19	06:18:25	17:46:42	18:13:46	18:45:04	16:06:24	01:27:52
45°	05:18:31	05:52:30	06:21:52	17:43:08	18:12:27	18:46:22	16:18:02	01:13:50
S 50°	05:16:12	05:53:37	06:25:57	17:38:55	18:11:11	18:48:30	16:32:05	00:56:36
52°	05:14:58	05:54:03	06:27:49	17:37:00	18:10:41	18:49:39	16:38:37	00:48:28
54°	05:13:31	05:54:29	06:29:52	17:34:54	18:10:11	18:51:01	16:45:50	00:39:22
56°	05:11:49	05:54:53	06:32:06	17:32:35	18:09:42	18:52:37	16:53:51	00:29:06
58°	05:09:48	05:55:18	06:34:35	17:30:02	18:09:12	18:54:31	17:02:53	00:17:20
S 60°	05:07:26	05:55:41	06:37:21	17:27:10	18:08:43	18:56:46	17:13:10	00:03:38

Apr 04	SHA	Mer.pass
Venus	302°47.3	14:57:40
Mars	54°33.3	07:30:23
Jupiter	63°18.0	06:54:44
Saturn	56°54.9	07:20:08

05 April 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	—:—	03:12:43	04:32:25	19:35:57	20:57:16	—:—	13:11:34	06:49:18
N 70°	01:40:56	03:33:12	04:42:23	19:25:32	20:35:47	22:33:40	13:34:09	06:24:41
68°	02:19:26	03:49:01	04:50:29	19:17:05	20:19:19	21:51:28	13:51:24	06:05:39
66°	02:45:21	04:01:42	04:57:13	19:10:04	20:06:10	21:24:03	14:05:11	05:50:18
64°	03:04:52	04:12:10	05:02:55	19:04:08	19:55:21	21:03:41	14:16:31	05:37:35
62°	03:20:24	04:20:57	05:07:49	18:59:03	19:46:17	20:47:36	14:26:05	05:26:47
60°	03:33:10	04:28:28	05:12:06	18:54:37	19:38:33	20:34:26	14:34:17	05:17:27
N 58°	03:43:54	04:34:59	05:15:51	18:50:43	19:31:51	20:23:23	14:41:25	05:09:18
56°	03:53:06	04:40:41	05:19:12	18:47:16	19:25:59	20:13:57	14:47:42	05:02:04
54°	04:01:05	04:45:44	05:22:12	18:44:09	19:20:48	20:05:46	14:53:19	04:55:36
52°	04:08:05	04:50:15	05:24:55	18:41:21	19:16:10	19:58:36	14:58:21	04:49:45
50°	04:14:17	04:54:17	05:27:23	18:38:47	19:12:01	19:52:15	15:02:55	04:44:26
45°	04:27:06	05:02:50	05:32:43	18:33:16	19:03:16	19:39:09	15:12:45	04:32:55
N 40°	04:37:06	05:09:41	05:37:09	18:28:42	18:56:15	19:28:56	15:20:53	04:23:19
35°	04:45:08	05:15:20	05:40:57	18:24:47	18:50:27	19:20:44	15:27:51	04:15:03
30°	04:51:43	05:20:06	05:44:16	18:21:22	18:45:34	19:14:01	15:33:57	04:07:44
20°	05:01:49	05:27:45	05:49:56	18:15:31	18:37:44	19:03:42	15:44:29	03:55:02
N 10°	05:09:05	05:33:41	05:54:49	18:10:28	18:31:38	18:56:15	15:53:41	03:43:49
0°	05:14:23	05:38:31	05:59:19	18:05:51	18:26:39	18:50:48	16:02:17	03:33:14
S 10°	05:18:09	05:42:36	06:03:42	18:01:20	18:22:26	18:46:53	16:10:51	03:22:34
20°	05:20:34	05:46:09	06:08:15	17:56:38	18:18:43	18:44:18	16:19:57	03:11:06
30°	05:21:36	05:49:21	06:13:19	17:51:25	18:15:22	18:43:05	16:30:18	02:57:53
35°	05:21:31	05:50:51	06:16:12	17:48:27	18:13:46	18:43:04	16:36:16	02:50:11
40°	05:20:56	05:52:18	06:19:25	17:45:08	18:12:13	18:43:31	16:43:00	02:41:23
45°	05:19:44	05:53:44	06:23:07	17:41:19	18:10:40	18:44:35	16:50:50	02:31:02
S 50°	05:17:44	05:55:08	06:27:30	17:36:48	18:09:06	18:46:25	17:00:10	02:18:27
52°	05:16:38	05:55:42	06:29:31	17:34:44	18:08:28	18:47:26	17:04:29	02:12:34
54°	05:15:20	05:56:17	06:31:42	17:32:29	18:07:49	18:48:38	17:09:13	02:06:02
56°	05:13:48	05:56:51	06:34:06	17:30:01	18:07:10	18:50:05	17:14:26	01:58:45
58°	05:11:59	05:57:26	06:36:46	17:27:16	18:06:30	18:51:47	17:20:14	01:50:31
S 60°	05:09:49	05:58:02	06:39:45	17:24:12	18:05:48	18:53:50	17:26:46	01:41:07

Apr 05	SHA	Mer.pass
Venus	301°51.0	14:57:27
Mars	53°49.8	07:29:21
Jupiter	63°10.6	06:51:17
Saturn	56°51.4	07:16:26

Day	Sun		Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
04	03:01	02:52	12:02:52	21:20:01	11(82%)
05	02:43	02:35	12:02:35	22:15:17	12(90%)

2020 April 06 to Apr. 07

06 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	--	03:05:55	04:27:01	19:40:50	21:03:41	--	15:40:17
N 70°	01:29:48	03:27:32	04:37:37	19:29:46	20:40:59	22:45:41	15:49:08
68°	02:12:06	03:44:07	04:46:13	19:20:49	20:23:42	21:58:34	15:56:16
66°	02:39:36	03:57:23	04:53:21	19:13:23	20:09:58	21:29:24	16:02:10
64°	03:00:03	04:08:17	04:59:23	19:07:07	19:58:42	21:08:02	16:07:09
62°	03:16:12	04:17:26	05:04:34	19:01:45	19:49:16	20:51:17	16:11:26
60°	03:29:26	04:25:15	05:09:05	18:57:04	19:41:13	20:37:38	16:15:08
N 58°	03:40:33	04:32:01	05:13:04	18:52:57	19:34:15	20:26:12	16:18:24
56°	03:50:02	04:37:57	05:16:36	18:49:18	19:28:10	20:16:27	16:21:18
54°	03:58:16	04:43:11	05:19:46	18:46:01	19:22:47	20:08:01	16:23:54
52°	04:05:30	04:47:52	05:22:39	18:43:03	19:17:59	20:00:38	16:26:16
50°	04:11:53	04:52:04	05:25:15	18:40:21	19:13:41	19:54:06	16:28:24
45°	04:25:05	05:00:56	05:30:54	18:34:32	19:04:36	19:40:37	16:33:02
N 40°	04:35:23	05:08:03	05:35:35	18:29:42	18:57:18	19:30:05	16:36:54
35°	04:43:40	05:13:56	05:39:35	18:25:35	18:51:17	19:21:39	16:40:14
30°	04:50:28	05:18:54	05:43:05	18:21:58	18:46:12	19:14:43	16:43:09
20°	05:00:55	05:26:53	05:49:06	18:15:47	18:38:02	19:04:02	16:48:14
N 10°	05:08:29	05:33:07	05:54:16	18:10:28	18:31:38	18:56:17	16:52:41
0°	05:14:03	05:38:13	05:59:01	18:05:34	18:26:23	18:50:33	16:56:51
S 10°	05:18:06	05:42:34	06:03:40	18:00:47	18:21:53	18:46:22	17:01:01
20°	05:20:48	05:46:24	06:08:31	17:55:48	18:17:54	18:43:30	17:05:27
30°	05:22:10	05:49:55	06:13:55	17:50:15	18:14:13	18:41:57	17:10:29
35°	05:22:16	05:51:37	06:16:59	17:47:06	18:12:26	18:41:44	17:13:23
40°	05:21:54	05:53:17	06:20:25	17:43:34	18:10:40	18:41:59	17:16:39
45°	05:20:58	05:54:57	06:24:22	17:39:30	18:08:53	18:42:48	17:20:26
S 50°	05:19:15	05:56:39	06:29:03	17:34:42	18:07:02	18:44:20	17:24:55
52°	05:18:18	05:57:21	06:31:12	17:32:29	18:06:16	18:45:13	17:26:59
54°	05:17:09	05:58:04	06:33:32	17:30:05	18:05:28	18:46:17	17:29:14
56°	05:15:46	05:58:48	06:36:07	17:27:27	18:04:39	18:47:33	17:31:43
58°	05:14:08	05:59:34	06:38:58	17:24:31	18:03:49	18:49:05	17:34:27
S 60°	05:12:11	06:00:22	06:42:09	17:21:15	18:02:55	18:50:55	17:37:31

Apr 06	SHA	Mer.pass
Venus	300°55.2	14:57:12
Mars	53°06.3	07:28:18
Jupiter	63°03.4	06:47:50
Saturn	56°47.9	07:12:44

07 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	--	02:58:57	04:21:36	19:45:46	21:10:18	--	18:01:21
N 70°	01:17:13	03:21:47	04:32:50	19:34:02	20:46:17	22:59:59	18:00:07
68°	02:04:27	03:39:11	04:41:56	19:24:34	20:28:09	22:06:05	17:59:06
66°	02:33:42	03:53:02	04:49:29	19:16:43	20:13:48	21:34:55	17:58:16
64°	02:55:09	04:04:23	04:55:51	19:10:07	20:02:04	21:12:29	17:57:34
62°	03:11:58	04:13:54	05:01:20	19:04:26	19:52:15	20:55:02	17:56:58
60°	03:25:41	04:22:02	05:06:05	18:59:31	19:43:53	20:40:52	17:56:26
N 58°	03:37:10	04:29:03	05:10:17	18:55:11	19:36:40	20:29:03	17:55:59
56°	03:46:58	04:35:12	05:14:01	18:51:20	19:30:21	20:18:59	17:55:34
54°	03:55:28	04:40:39	05:17:21	18:47:53	19:24:47	20:10:17	17:55:12
52°	04:02:54	04:45:29	05:20:23	18:44:45	19:19:48	20:02:40	17:54:52
50°	04:09:29	04:49:51	05:23:08	18:41:55	19:15:21	19:55:57	17:54:35
45°	04:23:04	04:59:03	05:29:04	18:35:48	19:05:56	19:42:04	17:53:56
N 40°	04:33:41	05:06:26	05:34:00	18:30:43	18:58:22	19:31:15	17:53:25
35°	04:42:12	05:12:32	05:38:14	18:26:22	18:52:07	19:22:33	17:52:58
30°	04:49:13	05:17:42	05:41:55	18:22:34	18:46:51	19:15:24	17:52:35
20°	05:00:01	05:26:01	05:48:15	18:16:04	18:38:20	19:04:22	17:51:56
N 10°	05:07:53	05:32:32	05:53:43	18:10:27	18:31:39	18:56:19	17:51:23
0°	05:13:44	05:37:55	05:58:44	18:05:17	18:26:07	18:50:19	17:50:54
S 10°	05:18:03	05:42:32	06:03:39	18:00:14	18:21:22	18:45:51	17:50:26
20°	05:21:03	05:46:40	06:08:47	17:54:58	18:17:05	18:42:42	17:49:59
30°	05:22:44	05:50:30	06:14:31	17:49:05	18:13:05	18:40:49	17:49:29
35°	05:23:02	05:52:22	06:17:46	17:45:45	18:11:07	18:40:26	17:49:12
40°	05:22:53	05:54:15	06:21:25	17:42:00	18:09:08	18:40:28	17:48:54
45°	05:22:10	05:56:10	06:25:37	17:37:42	18:07:06	18:41:02	17:48:33
S 50°	05:20:46	05:58:10	06:30:36	17:32:36	18:04:58	18:42:17	17:48:10
52°	05:19:56	05:59:00	06:32:53	17:30:15	18:04:04	18:43:01	17:47:59
54°	05:18:56	05:59:51	06:35:22	17:27:42	18:03:08	18:43:56	17:47:47
56°	05:17:44	06:00:45	06:38:07	17:24:53	18:02:10	18:45:03	17:47:35
58°	05:16:16	06:01:42	06:41:09	17:21:46	18:01:08	18:46:24	17:47:21
S 60°	05:14:31	06:02:41	06:44:34	17:18:17	18:00:03	18:48:02	17:47:05

Apr 07	SHA	Mer.pass
Venus	299°59.9	14:56:56
Mars	52°22.8	07:27:15
Jupiter	62°56.4	06:44:22
Saturn	56°44.4	07:09:02

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
06	02:26	02:18	12:02:18	23:09:39	10:42:33	13(96%)
07	02:09	02:01	12:02:01	--	11:36:40	14(99%)

2020 April 08 to Apr. 09

08 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	--	02:51:47	04:16:08	19:50:44	21:17:08	--	20:23:55
N 70°	01:02:22	03:15:56	04:28:02	19:38:19	20:51:42	23:18:54	20:12:07
68°	01:56:23	03:34:11	04:37:39	19:28:19	20:32:40	22:14:06	20:02:40
66°	02:27:38	03:48:39	04:45:36	19:20:04	20:17:41	21:40:37	19:54:54
64°	02:50:09	04:00:28	04:52:19	19:13:06	20:05:27	21:17:01	19:48:23
62°	03:07:40	04:10:22	04:58:05	19:07:08	19:55:15	20:58:50	19:42:49
60°	03:21:54	04:18:48	05:03:06	19:01:58	19:46:35	20:44:08	19:38:00
N 58°	03:33:47	04:26:05	05:07:30	18:57:24	19:39:06	20:31:55	19:33:46
56°	03:43:54	04:32:28	05:11:26	18:53:22	19:32:33	20:21:32	19:30:01
54°	03:52:39	04:38:06	05:14:57	18:49:44	19:26:47	20:12:34	19:26:40
52°	04:00:18	04:43:07	05:18:07	18:46:28	19:21:38	20:04:44	19:23:38
50°	04:07:05	04:47:38	05:21:01	18:43:29	19:17:01	19:57:48	19:20:53
45°	04:21:03	04:57:09	05:27:15	18:37:04	19:07:16	19:43:32	19:14:57
N 40°	04:31:58	05:04:49	05:32:26	18:31:44	18:59:26	19:32:24	19:10:02
35°	04:40:45	05:11:09	05:36:53	18:27:10	18:52:58	19:23:27	19:05:49
30°	04:47:58	05:16:30	05:40:46	18:23:11	18:47:29	19:16:06	19:02:07
20°	04:59:07	05:25:09	05:47:25	18:16:20	18:38:38	19:04:43	18:55:46
N 10°	05:07:18	05:31:58	05:53:10	18:10:27	18:31:39	18:56:22	18:50:15
0°	05:13:25	05:37:37	05:58:27	18:05:01	18:25:52	18:50:05	18:45:07
S 10°	05:18:00	05:42:30	06:03:39	17:59:42	18:20:50	18:45:21	18:40:02
20°	05:21:17	05:46:55	06:09:04	17:54:08	18:16:17	18:41:54	18:34:41
30°	05:23:18	05:51:05	06:15:07	17:47:56	18:11:57	18:39:42	18:28:40
35°	05:23:47	05:53:08	06:18:33	17:44:25	18:09:48	18:39:08	18:25:13
40°	05:23:50	05:55:13	06:22:25	17:40:27	18:07:37	18:38:57	18:21:21
45°	05:23:23	05:57:23	06:26:52	17:35:54	18:05:21	18:39:16	18:16:53
S 50°	05:22:16	05:59:40	06:32:08	17:30:30	18:02:55	18:40:14	18:11:36
52°	05:21:34	06:00:38	06:34:34	17:28:01	18:01:53	18:40:51	18:09:10
54°	05:20:43	06:01:38	06:37:12	17:25:19	18:00:49	18:41:37	18:06:32
56°	05:19:41	06:02:42	06:40:07	17:22:20	17:59:41	18:42:34	18:03:37
58°	05:18:24	06:03:49	06:43:21	17:19:02	17:58:28	18:43:44	18:00:24
S 60°	05:16:51	06:05:00	06:46:58	17:15:21	17:57:11	18:45:10	17:56:49

Apr 08	SHA	Mer.pass
Venus	299°05.2	14:56:37
Mars	51°39.5	07:26:12
Jupiter	62°49.5	06:40:53
Saturn	56°41.1	07:05:19

09 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	--	02:44:26	04:10:38	19:55:45	21:24:12	--	22:59:12
N 70°	00:42:56	03:09:59	04:23:13	19:42:38	20:57:14	--	22:30:48
68°	01:47:50	03:29:08	04:33:21	19:32:06	20:37:15	22:22:44	22:09:51
66°	02:21:23	03:44:14	04:41:43	19:23:25	20:21:36	21:46:33	21:53:27
64°	02:45:04	03:56:32	04:48:47	19:16:06	20:08:53	21:21:41	21:40:06
62°	03:03:20	04:06:49	04:54:51	19:09:51	19:58:17	21:02:42	21:28:58
60°	03:18:05	04:15:34	05:00:06	19:04:25	19:49:17	20:47:27	21:19:29
N 58°	03:30:22	04:23:07	05:04:44	18:59:38	19:41:32	20:34:49	21:11:15
56°	03:40:48	04:29:43	05:08:51	18:55:24	19:34:46	20:24:06	21:04:02
54°	03:49:49	04:35:33	05:12:32	18:51:36	19:28:47	20:14:52	20:57:37
52°	03:57:42	04:40:45	05:15:52	18:48:10	19:23:27	20:06:48	20:51:52
50°	04:04:40	04:45:25	05:18:54	18:45:03	19:18:41	19:59:40	20:46:40
45°	04:19:02	04:55:17	05:25:27	18:38:19	19:08:36	19:45:00	20:35:31
N 40°	04:30:15	05:03:12	05:30:53	18:32:44	19:00:30	19:33:34	20:26:19
35°	04:39:17	05:09:46	05:35:32	18:27:58	18:53:48	19:24:22	20:18:29
30°	04:46:43	05:15:19	05:39:36	18:23:47	18:48:08	19:16:48	20:11:38
20°	04:58:14	05:24:18	05:46:35	18:16:37	18:38:57	19:05:04	19:59:51
N 10°	05:06:42	05:31:24	05:52:37	18:10:27	18:31:41	18:56:25	19:49:38
0°	05:13:06	05:37:19	05:58:11	18:04:45	18:25:37	18:49:51	19:40:07
S 10°	05:17:57	05:42:29	06:03:38	17:59:10	18:20:19	18:44:51	19:30:41
20°	05:21:31	05:47:10	06:09:20	17:53:19	18:15:29	18:41:07	19:20:42
30°	05:23:52	05:51:39	06:15:43	17:46:48	18:10:50	18:38:36	19:09:25
35°	05:24:32	05:53:54	06:19:20	17:43:05	18:08:30	18:37:50	19:02:55
40°	05:24:48	05:56:11	06:23:25	17:38:55	18:06:06	18:37:27	18:55:36
45°	05:24:35	05:58:35	06:28:07	17:34:07	18:03:36	18:37:32	18:47:06
S 50°	05:23:45	06:01:10	06:33:41	17:28:25	18:00:53	18:38:12	18:36:57
52°	05:23:12	06:02:16	06:36:15	17:25:48	17:59:43	18:38:41	18:32:17
54°	05:22:30	06:03:25	06:39:02	17:22:57	17:58:30	18:39:19	18:27:09
56°	05:21:37	06:04:38	06:42:07	17:19:48	17:57:12	18:40:06	18:21:29
58°	05:20:31	06:05:55	06:45:32	17:16:19	17:55:50	18:41:06	18:15:10
S 60°	05:19:10	06:07:19	06:49:22	17:12:25	17:54:21	18:42:19	18:08:04

Apr 09	SHA	Mer.pass
Venus	298°11.0	14:56:15
Mars	50°56.2	07:25:08
Jupiter	62°42.8	06:37:24
Saturn	56°37.9	07:01:36

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
08	01:52	01:44	12:01:44	00:03:40	12:30:46	15(100%)
09	01:36	01:28	12:01:28	00:58:02	13:25:33	16(97%)

2020 April 10 to Apr. 11

10 April 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	—:—	02:36:51	04:05:06	20:00:49	21:31:32	—:—	■	04:23:29
N 70°	—:—	03:03:56	04:18:22	19:46:59	21:02:53	—:—	.. ..	04:53:47
68°	01:38:40	03:24:01	04:29:02	19:35:54	20:41:54	22:32:11	.. ..	05:16:23
66°	02:14:56	03:39:47	04:37:51	19:26:47	20:25:34	21:52:44	23:54:29	05:34:14
64°	02:39:53	03:52:35	04:45:16	19:19:07	20:12:20	21:26:27	23:31:52	05:48:52
62°	02:58:55	04:03:15	04:51:37	19:12:33	20:01:20	21:06:38	23:13:56	06:01:10
60°	03:14:14	04:12:20	04:57:08	19:06:52	19:52:01	20:50:49	22:59:09	06:11:43
N 58°	03:26:56	04:20:09	05:01:59	19:01:52	19:43:59	20:37:45	22:46:37	06:20:54
56°	03:37:42	04:26:59	05:06:17	18:57:26	19:36:58	20:26:42	22:35:48	06:29:01
54°	03:46:59	04:33:01	05:10:08	18:53:28	19:30:48	20:17:11	22:26:19	06:36:15
52°	03:55:06	04:38:23	05:13:38	18:49:53	19:25:17	20:08:53	22:17:54	06:42:45
50°	04:02:16	04:43:13	05:16:48	18:46:37	19:20:21	20:01:33	22:10:21	06:48:40
45°	04:17:02	04:53:24	05:23:39	18:39:35	19:09:56	19:46:29	21:54:18	07:01:25
N 40°	04:28:33	05:01:36	05:29:20	18:33:45	19:01:34	19:34:44	21:41:12	07:12:01
35°	04:37:50	05:08:23	05:34:12	18:28:46	18:54:39	19:25:17	21:30:07	07:21:07
30°	04:45:28	05:14:08	05:38:28	18:24:24	18:48:47	19:17:30	21:20:27	07:29:07
20°	04:57:20	05:23:27	05:45:46	18:16:54	18:39:15	19:05:25	21:03:54	07:42:59
N 10°	05:06:07	05:30:51	05:52:05	18:10:27	18:31:42	18:56:28	20:49:34	07:55:10
0°	05:12:47	05:37:02	05:57:54	18:04:29	18:25:22	18:49:38	20:36:14	08:06:37
S 10°	05:17:55	05:42:27	06:03:38	17:58:38	18:19:49	18:44:21	20:22:59	08:18:06
20°	05:21:46	05:47:26	06:09:37	17:52:31	18:14:41	18:40:21	20:08:56	08:30:24
30°	05:24:26	05:52:14	06:16:19	17:45:40	18:09:44	18:37:30	19:52:56	08:44:31
35°	05:25:17	05:54:39	06:20:08	17:41:46	18:07:13	18:36:34	19:43:42	08:52:44
40°	05:25:45	05:57:09	06:24:25	17:37:23	18:04:36	18:35:58	19:33:12	09:02:07
45°	05:25:47	05:59:48	06:29:21	17:32:20	18:01:51	18:35:49	19:20:56	09:13:09
S 50°	05:25:14	06:02:39	06:35:14	17:26:21	17:58:52	18:36:12	19:06:08	09:26:33
52°	05:24:49	06:03:53	06:37:55	17:23:36	17:57:34	18:36:33	18:59:14	09:32:50
54°	05:24:15	06:05:11	06:40:52	17:20:35	17:56:12	18:37:01	18:51:37	09:39:47
56°	05:23:32	06:06:34	06:44:07	17:17:17	17:54:45	18:37:40	18:43:07	09:47:34
58°	05:22:37	06:08:02	06:47:43	17:13:36	17:53:12	18:38:28	18:33:34	09:56:22
S 60°	05:21:28	06:09:37	06:51:46	17:09:29	17:51:32	18:39:30	18:22:39	10:06:27

Apr 10	SHA	Mer.pass
Venus	297°17.5	14:55:51
Mars	50°13.0	07:24:04
Jupiter	62°36.2	06:33:54
Saturn	56°34.8	06:57:52

11 April 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	—:—	02:28:59	03:59:32	20:05:56	21:39:12	—:—	■	■
N 70°	—:—	02:57:46	04:13:31	19:51:22	21:08:41	—:—	01:12:29	04:10:47
68°	01:28:42	03:18:51	04:24:44	19:39:43	20:46:38	22:42:44	00:24:54	04:59:30
66°	02:08:14	03:35:18	04:33:58	19:30:10	20:29:34	21:59:12	.. ..	05:30:56
64°	02:34:35	03:48:37	04:41:44	19:22:08	20:15:49	21:31:22	.. ..	05:54:26
62°	02:54:28	03:59:41	04:48:23	19:15:16	20:04:24	21:10:39	.. ..	06:13:12
60°	03:10:21	04:09:05	04:54:09	19:09:19	19:54:45	20:54:14	.. ..	06:28:44
N 58°	03:23:28	04:17:11	04:59:13	19:04:06	19:46:26	20:40:43	.. ..	06:41:56
56°	03:34:35	04:24:15	05:03:43	18:59:28	19:39:12	20:29:19	.. ..	06:53:23
54°	03:44:09	04:30:29	05:07:45	18:55:20	19:32:49	20:19:31	23:49:27	07:03:28
52°	03:52:29	04:36:02	05:11:24	18:51:35	19:27:08	20:10:58	23:38:41	07:12:26
50°	03:59:51	04:41:01	05:14:43	18:48:11	19:22:02	20:03:27	23:29:07	07:20:31
45°	04:15:01	04:51:32	05:21:51	18:40:51	19:11:17	19:47:58	23:09:02	07:37:43
N 40°	04:26:51	05:00:00	05:27:48	18:34:46	19:02:38	19:35:55	22:52:47	07:51:52
35°	04:36:23	05:07:01	05:32:52	18:29:34	18:55:29	19:26:13	22:39:07	08:03:54
30°	04:44:14	05:12:57	05:37:19	18:25:00	18:49:25	19:18:13	22:27:15	08:14:26
20°	04:56:28	05:22:36	05:44:57	18:17:12	18:39:34	19:05:46	22:07:02	08:32:35
N 10°	05:05:32	05:30:17	05:51:33	18:10:27	18:31:44	18:56:31	21:49:33	08:48:26
0°	05:12:29	05:36:45	05:57:38	18:04:13	18:25:08	18:49:25	21:33:16	09:03:19
S 10°	05:17:52	05:42:26	06:03:38	17:58:06	18:19:18	18:43:52	21:17:04	09:18:13
20°	05:22:00	05:47:41	06:09:54	17:51:42	18:13:54	18:39:35	20:59:49	09:34:12
30°	05:24:59	05:52:48	06:16:55	17:44:32	18:08:38	18:36:26	20:40:05	09:52:36
35°	05:26:01	05:55:25	06:20:55	17:40:27	18:05:56	18:35:18	20:28:37	10:03:21
40°	05:26:42	05:58:07	06:25:25	17:35:52	18:03:07	18:34:30	20:15:30	10:15:42
45°	05:26:58	06:01:00	06:30:36	17:30:34	18:00:08	18:34:06	20:00:03	10:30:18
S 50°	05:26:43	06:04:09	06:36:46	17:24:17	17:56:51	18:34:12	19:41:10	10:48:13
52°	05:26:25	06:05:30	06:39:36	17:21:24	17:55:26	18:34:25	19:32:15	10:56:42
54°	05:26:00	06:06:57	06:42:42	17:18:14	17:53:55	18:34:46	19:22:19	11:06:11
56°	05:25:26	06:08:29	06:46:07	17:14:46	17:52:19	18:35:14	19:11:07	11:16:55
58°	05:24:42	06:10:08	06:49:55	17:10:54	17:50:35	18:35:53	18:58:18	11:29:13
S 60°	05:23:45	06:11:55	06:54:10	17:06:34	17:48:43	18:36:43	18:43:23	11:43:35

Apr 11	SHA	Mer.pass
Venus	296°24.6	14:55:24
Mars	49°29.9	07:23:00
Jupiter	62°29.8	06:30:23
Saturn	56°31.7	06:54:08

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
10	01:20	01:12	12:01:12	01:53:20	14:21:24	17(92%)
11	01:04	00:56	12:00:56	02:49:44	15:18:17	18(84%)

2020 April 12 to Apr. 13

12 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	02:20:49	03:53:55	20:11:07	21:47:15	—:—	■ ■
N 70°	—:—	02:51:27	04:08:38	19:55:47	21:14:39	—:—	■ ■
68°	01:17:37	03:13:37	04:20:24	19:43:34	20:51:27	22:54:57	03:20:49 04:03:39
66°	02:01:15	03:30:47	04:30:05	19:33:33	20:33:38	22:06:00	01:57:07 05:27:57
64°	02:29:09	03:44:37	04:38:12	19:25:09	20:19:19	21:36:25	01:19:40 06:05:56
62°	02:49:56	03:56:06	04:45:09	19:17:59	20:07:29	21:14:45	00:53:16 06:32:50
60°	03:06:25	04:05:50	04:51:11	19:11:47	19:57:30	20:57:41	00:32:43 06:53:50
N 58°	03:19:59	04:14:12	04:56:29	19:06:20	19:48:54	20:43:43	00:15:54 07:11:04
56°	03:31:27	04:21:30	05:01:10	19:01:31	19:41:25	20:31:57	00:01:42 07:25:39
54°	03:41:18	04:27:57	05:05:23	18:57:11	19:34:50	20:21:52	.. .. 07:38:16
52°	03:49:53	04:33:41	05:09:11	18:53:17	19:28:58	20:13:05	.. .. 07:49:21
50°	03:57:27	04:38:49	05:12:38	18:49:45	19:23:43	20:05:21	.. .. 07:59:15
45°	04:13:01	04:49:40	05:20:05	18:42:07	19:12:38	19:49:28	.. .. 08:20:03
N 40°	04:25:10	04:58:25	05:26:16	18:35:46	19:03:43	19:37:06	23:58:41 08:36:57
35°	04:34:56	05:05:39	05:31:33	18:30:22	18:56:20	19:27:08	23:43:28 08:51:12
30°	04:43:00	05:11:47	05:36:12	18:25:37	18:50:05	19:18:56	23:30:17 09:03:37
20°	04:55:35	05:21:46	05:44:09	18:17:29	18:39:54	19:06:08	23:07:52 09:24:52
N 10°	05:04:57	05:29:44	05:51:01	18:10:28	18:31:46	18:56:35	22:48:28 09:43:20
0°	05:12:10	05:36:28	05:57:23	18:03:58	18:24:54	18:49:12	22:30:25 10:00:37
S 10°	05:17:50	05:42:25	06:03:38	17:57:35	18:18:49	18:43:24	22:12:25 10:17:55
20°	05:22:15	05:47:57	06:10:10	17:50:55	18:13:08	18:38:49	21:53:11 10:36:27
30°	05:25:33	05:53:23	06:17:31	17:43:25	18:07:32	18:35:21	21:31:05 10:57:51
35°	05:26:46	05:56:10	06:21:42	17:39:09	18:04:40	18:34:02	21:18:10 11:10:23
40°	05:27:39	05:59:05	06:26:25	17:34:21	18:01:39	18:33:03	21:03:19 11:24:49
45°	05:28:09	06:02:12	06:31:51	17:28:49	17:58:25	18:32:25	20:45:42 11:42:00
S 50°	05:28:11	06:05:38	06:38:19	17:22:14	17:54:51	18:32:14	20:23:55 12:03:17
52°	05:28:01	06:07:07	06:41:17	17:19:12	17:53:18	18:32:19	20:13:31 12:13:27
54°	05:27:45	06:08:42	06:44:32	17:15:54	17:51:39	18:32:31	20:01:50 12:24:54
56°	05:27:20	06:10:24	06:48:07	17:12:15	17:49:54	18:32:50	19:48:30 12:38:00
58°	05:26:46	06:12:13	06:52:06	17:08:12	17:48:00	18:33:18	19:32:59 12:53:14
S 60°	05:26:01	06:14:12	06:56:34	17:03:40	17:45:56	18:33:57	19:14:31 13:11:25

Apr 12	SHA	Mer.pass
Venus	295°32.4	14:54:55
Mars	48°46.9	07:21:56
Jupiter	62°23.6	06:26:52
Saturn	56°28.8	06:50:24

13 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	02:12:16	03:48:15	20:16:21	21:55:45	—:—	■ ■
N 70°	—:—	02:45:00	04:03:44	20:00:13	21:20:47	—:—	■ ■
68°	01:04:54	03:08:18	04:16:04	19:47:25	20:56:21	23:10:04	■ ■
66°	01:53:57	03:26:13	04:26:12	19:36:57	20:37:45	22:13:12	03:57:43 05:26:53
64°	02:23:36	03:40:37	04:34:41	19:28:11	20:22:52	21:41:38	02:53:16 06:31:32
62°	02:45:20	03:52:31	04:41:56	19:20:43	20:10:36	21:18:56	02:18:27 07:06:31
60°	03:02:27	04:02:35	04:48:13	19:14:15	20:00:16	21:01:12	01:53:12 07:31:57
N 58°	03:16:29	04:11:14	04:53:44	19:08:34	19:51:23	20:46:45	01:33:13 07:52:05
56°	03:28:18	04:18:46	04:58:38	19:03:33	19:43:40	20:34:37	01:16:40 08:08:47
54°	03:38:26	04:25:25	05:03:01	18:59:03	19:36:52	20:24:14	01:02:34 08:23:01
52°	03:47:16	04:31:20	05:06:58	18:55:00	19:30:49	20:15:12	00:50:17 08:35:25
50°	03:55:02	04:36:38	05:10:34	18:51:19	19:25:24	20:07:16	00:39:26 08:46:23
45°	04:11:01	04:47:49	05:18:19	18:43:22	19:13:59	19:50:58	00:16:50 09:09:15
N 40°	04:23:28	04:56:50	05:24:45	18:36:47	19:04:48	19:38:17	.. .. 09:27:39
35°	04:33:30	05:04:17	05:30:15	18:31:10	18:57:11	19:28:04	.. .. 09:43:05
30°	04:41:47	05:10:37	05:35:04	18:26:14	18:50:44	19:19:39	.. .. 09:56:28
20°	04:54:43	05:20:56	05:43:21	18:17:47	18:40:13	19:06:30	.. .. 10:19:17
N 10°	05:04:22	05:29:12	05:50:30	18:10:28	18:31:48	18:56:39	23:45:04 10:39:03
0°	05:11:52	05:36:11	05:57:07	18:03:43	18:24:40	18:49:00	23:26:32 10:57:30
S 10°	05:17:47	05:42:24	06:03:38	17:57:05	18:18:19	18:42:56	23:08:01 11:15:56
20°	05:22:29	05:48:12	06:10:27	17:50:07	18:12:22	18:38:05	22:48:12 11:35:41
30°	05:26:06	05:53:57	06:18:07	17:42:19	18:06:28	18:34:18	22:25:21 11:58:27
35°	05:27:30	05:56:56	06:22:29	17:37:52	18:03:24	18:32:48	22:11:57 12:11:48
40°	05:28:35	06:00:03	06:27:25	17:32:51	18:00:11	18:31:36	21:56:30 12:27:12
45°	05:29:20	06:03:24	06:33:05	17:27:04	17:56:43	18:30:44	21:38:06 12:45:33
S 50°	05:29:38	06:07:07	06:39:51	17:20:12	17:52:53	18:30:17	21:15:13 13:08:23
52°	05:29:37	06:08:44	06:42:58	17:17:02	17:51:12	18:30:14	21:04:15 13:19:20
54°	05:29:29	06:10:28	06:46:22	17:13:34	17:49:24	18:30:18	20:51:51 13:31:43
56°	05:29:14	06:12:19	06:50:07	17:09:46	17:47:29	18:30:28	20:37:36 13:45:56
58°	05:28:50	06:14:18	06:54:17	17:05:31	17:45:25	18:30:45	20:20:53 14:02:37
S 60°	05:28:17	06:16:29	06:58:58	17:00:46	17:43:09	18:31:12	20:00:42 14:22:46

Apr 13	SHA	Mer.pass
Venus	294°40.9	14:54:22
Mars	48°03.9	07:20:51
Jupiter	62°17.5	06:23:20
Saturn	56°25.9	06:46:39

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Mer. Pass. Upper Lower hh:mm:ss hh:mm:ss		Age
12	00:48	00:40	12:00:40	03:46:56 16:15:33	19(75%)
13	00:33	00:25	12:00:25	04:43:59 17:12:05	20(65%)

# 2020 April 14 to Apr. 15

14 April 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	--	02:03:17	03:42:32	20:21:40	22:04:49	--	██	██
N 70°	--	02:38:23	03:58:48	20:04:43	21:27:07	--	██	██
68°	00:49:18	03:02:55	04:11:44	19:51:18	21:01:22	23:32:38	██	██
66°	01:46:15	03:21:37	04:22:18	19:40:22	20:41:55	22:20:54	05:11:31	06:09:41
64°	02:17:53	03:36:35	04:31:10	19:31:14	20:26:27	21:47:02	03:56:34	07:24:30
62°	02:40:40	03:48:55	04:38:44	19:23:26	20:13:44	21:23:12	03:20:11	08:00:47
60°	02:58:27	03:59:20	04:45:16	19:16:43	20:03:02	21:04:46	02:54:06	08:26:46
N 58°	03:12:58	04:08:16	04:51:01	19:10:49	19:53:53	20:49:49	02:33:35	08:47:12
56°	03:25:09	04:16:03	04:56:06	19:05:35	19:45:54	20:37:18	02:16:38	09:04:04
54°	03:35:35	04:22:54	05:00:39	19:00:55	19:38:54	20:26:37	02:02:12	09:18:26
52°	03:44:39	04:28:59	05:04:46	18:56:42	19:32:40	20:17:20	01:49:39	09:30:54
50°	03:52:38	04:34:27	05:08:30	18:52:53	19:27:05	20:09:11	01:38:34	09:41:55
45°	04:09:01	04:45:59	05:16:33	18:44:38	19:15:20	19:52:28	01:15:28	10:04:52
N 40°	04:21:47	04:55:15	05:23:14	18:37:48	19:05:52	19:39:28	00:56:55	10:23:16
35°	04:32:04	05:02:56	05:28:57	18:31:58	18:58:02	19:29:01	00:41:22	10:38:41
30°	04:40:34	05:09:28	05:33:58	18:26:51	18:51:23	19:20:22	00:27:53	10:52:03
20°	04:53:51	05:20:07	05:42:33	18:18:04	18:40:33	19:06:52	00:04:56	11:14:47
N 10°	05:03:48	05:28:40	05:49:59	18:10:29	18:31:51	18:56:44	.. ..	11:34:26
0°	05:11:34	05:35:54	05:56:52	18:03:29	18:24:27	18:48:49	.. ..	11:52:46
S 10°	05:17:45	05:42:23	06:03:38	17:56:35	18:17:50	18:42:28	.. ..	12:11:03
20°	05:22:44	05:48:28	06:10:45	17:49:20	18:11:37	18:37:21	23:43:37	12:30:35
30°	05:26:40	05:54:32	06:18:43	17:41:13	18:05:24	18:33:15	23:21:38	12:53:04
35°	05:28:14	05:57:41	06:23:17	17:36:35	18:02:09	18:31:35	23:08:44	13:06:14
40°	05:29:32	06:01:01	06:28:24	17:31:22	17:58:44	18:30:11	22:53:51	13:21:23
45°	05:30:30	06:04:36	06:34:20	17:25:20	17:55:02	18:29:05	22:36:09	13:39:24
S 50°	05:31:05	06:08:35	06:41:23	17:18:10	17:50:55	18:28:21	22:14:10	14:01:45
52°	05:31:11	06:10:21	06:44:38	17:14:52	17:49:06	18:28:10	22:03:38	14:12:25
54°	05:31:12	06:12:13	06:48:11	17:11:16	17:47:10	18:28:05	21:51:45	14:24:28
56°	05:31:06	06:14:13	06:52:07	17:07:17	17:45:06	18:28:06	21:38:08	14:38:15
58°	05:30:53	06:16:23	06:56:28	17:02:51	17:42:51	18:28:14	21:22:13	14:54:21
S 60°	05:30:31	06:18:45	07:01:22	16:57:53	17:40:24	18:28:30	21:03:07	15:13:39

Apr 14	SHA	Mer.pass
Venus	293°50.2	14:53:47
Mars	47°21.1	07:19:46
Jupiter	62°11.6	06:19:47
Saturn	56°23.1	06:42:54

15 April 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	—:—	01:53:45	03:36:45	20:27:03	22:14:35	—:—	██	██
N 70°	—:—	02:31:34	03:53:51	20:09:14	21:33:40	—:—	██	██
68°	00:26:16	02:57:26	04:07:22	19:55:13	21:06:28	—:—	██	██
66°	01:38:04	03:16:58	04:18:25	19:43:48	20:46:08	22:29:14	05:12:51	07:59:28
64°	02:12:01	03:32:31	04:27:39	19:34:17	20:30:04	21:52:38	04:27:31	08:44:24
62°	02:35:54	03:45:18	04:35:31	19:26:11	20:16:54	21:27:35	03:57:39	09:13:54
60°	02:54:24	03:56:04	04:42:20	19:19:11	20:05:50	21:08:24	03:34:56	09:36:17
N 58°	03:09:25	04:05:18	04:48:18	19:13:03	19:56:23	20:52:55	03:16:33	09:54:22
56°	03:21:58	04:13:19	04:53:35	19:07:38	19:48:10	20:40:01	03:01:07	10:09:31
54°	03:32:42	04:20:23	04:58:19	19:02:47	19:40:56	20:29:01	02:47:51	10:22:32
52°	03:42:02	04:26:39	05:02:35	18:58:25	19:34:32	20:19:29	02:36:13	10:33:54
50°	03:50:13	04:32:17	05:06:27	18:54:27	19:28:47	20:11:07	02:25:54	10:44:00
45°	04:07:02	04:44:09	05:14:48	18:45:54	19:16:41	19:53:59	02:04:14	11:05:08
N 40°	04:20:07	04:53:41	05:21:44	18:38:49	19:06:57	19:40:40	01:46:44	11:22:10
35°	04:30:39	05:01:36	05:27:40	18:32:46	18:58:54	19:29:57	01:31:59	11:36:29
30°	04:39:21	05:08:19	05:32:52	18:27:28	18:52:03	19:21:06	01:19:10	11:48:54
20°	04:52:59	05:19:18	05:41:46	18:18:22	18:40:53	19:07:15	00:57:16	12:10:03
N 10°	05:03:14	05:28:08	05:49:29	18:10:31	18:31:53	18:56:49	00:38:15	12:28:21
0°	05:11:16	05:35:38	05:56:37	18:03:15	18:24:14	18:48:38	00:20:28	12:45:24
S 10°	05:17:43	05:42:22	06:03:39	17:56:05	18:17:22	18:42:01	00:02:41	13:02:23
20°	05:22:59	05:48:44	06:11:02	17:48:34	18:10:52	18:36:37	.. ..	13:20:30
30°	05:27:13	05:55:07	06:19:20	17:40:08	18:04:20	18:32:13	.. ..	13:41:17
35°	05:28:58	05:58:27	06:24:04	17:35:19	18:00:55	18:30:22	.. ..	13:53:24
40°	05:30:28	06:01:58	06:29:24	17:29:53	17:57:18	18:28:46	23:53:32	14:07:17
45°	05:31:40	06:05:48	06:35:35	17:23:37	17:53:22	18:27:26	23:37:44	14:23:42
S 50°	05:32:32	06:10:04	06:42:56	17:16:09	17:48:58	18:26:26	23:18:14	14:43:54
52°	05:32:46	06:11:57	06:46:19	17:12:43	17:47:02	18:26:08	23:08:58	14:53:28
54°	05:32:55	06:13:57	06:50:01	17:08:58	17:44:57	18:25:55	22:58:34	15:04:11
56°	05:32:58	06:16:07	06:54:06	17:04:49	17:42:44	18:25:46	22:46:46	15:16:20
58°	05:32:55	06:18:28	06:58:39	17:00:12	17:40:19	18:25:44	22:33:07	15:30:20
S 60°	05:32:45	06:21:01	07:03:46	16:55:01	17:37:40	18:25:48	22:17:03	15:46:49

Apr 15	SHA	Mer.pass
Venus	293°00.4	14:53:07
Mars	46°38.3	07:18:40
Jupiter	62°05.9	06:16:14
Saturn	56°20.5	06:39:09

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
14	00:18	00:10	12:00:10	05:39:43	21(55%)
15	00:03	00:04	11:59:56	06:33:01	22(45%)

2020 April 16 to Apr. 17

16 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	01:43:31	03:30:55	20:32:31	22:25:18	—:—	■ ■
N 70°	—:—	02:24:33	03:48:52	20:13:49	21:40:29	—:—	■ ■
68°	—:—	02:51:52	04:03:00	19:59:09	21:11:41	—:—	05:53:01 09:04:16
66°	01:29:17	03:12:17	04:14:32	19:47:15	20:50:26	22:38:22	05:10:02 09:46:32
64°	02:05:57	03:28:26	04:24:09	19:37:20	20:33:43	21:58:28	04:41:00 10:14:56
62°	02:31:04	03:41:41	04:32:20	19:28:55	20:20:05	21:32:03	04:18:50 10:36:31
60°	02:50:18	03:52:48	04:39:24	19:21:39	20:08:39	21:12:05	04:00:54 10:53:55
N 58°	03:05:50	04:02:19	04:45:35	19:15:18	19:58:53	20:56:04	03:45:54 11:08:26
56°	03:18:47	04:10:36	04:51:04	19:09:40	19:50:25	20:42:46	03:33:02 11:20:51
54°	03:29:50	04:17:52	04:55:59	19:04:39	19:42:59	20:31:27	03:21:48 11:31:40
52°	03:39:24	04:24:20	05:00:24	19:00:07	19:36:23	20:21:39	03:11:52 11:41:13
50°	03:47:49	04:30:07	05:04:25	18:56:01	19:30:29	20:13:04	03:02:57 11:49:46
45°	04:05:03	04:42:19	05:13:04	18:47:10	19:18:02	19:55:30	02:44:04 12:07:48
N 40°	04:18:27	04:52:08	05:20:15	18:39:50	19:08:03	19:41:52	02:28:39 12:22:28
35°	04:29:14	05:00:16	05:26:23	18:33:34	18:59:45	19:30:54	02:15:35 12:34:52
30°	04:38:09	05:07:11	05:31:46	18:28:05	18:52:43	19:21:50	02:04:10 12:45:39
20°	04:52:08	05:18:30	05:41:00	18:18:41	18:41:13	19:07:38	01:44:35 13:04:05
N 10°	05:02:41	05:27:36	05:48:59	18:10:33	18:31:57	18:56:54	01:27:30 13:20:03
0°	05:10:59	05:35:22	05:56:23	18:03:01	18:24:02	18:48:27	01:11:29 13:34:56
S 10°	05:17:42	05:42:22	06:03:40	17:55:36	18:16:54	18:41:35	00:55:27 13:49:45
20°	05:23:13	05:49:00	06:11:20	17:47:49	18:10:08	18:35:54	00:38:16 14:05:31
30°	05:27:46	05:55:41	06:19:56	17:39:04	18:03:18	18:31:12	00:18:27 14:23:31
35°	05:29:42	05:59:12	06:24:52	17:34:04	17:59:42	18:29:10	00:06:52 14:33:58
40°	05:31:24	06:02:56	06:30:24	17:28:26	17:55:53	18:27:22	.. .. 14:45:53
45°	05:32:50	06:06:59	06:36:49	17:21:55	17:51:43	18:25:49	.. .. 14:59:53
S 50°	05:33:58	06:11:32	06:44:28	17:14:09	17:47:02	18:24:32	.. .. 15:16:55
52°	05:34:20	06:13:33	06:47:59	17:10:35	17:44:58	18:24:07	.. .. 15:24:54
54°	05:34:37	06:15:42	06:51:51	17:06:40	17:42:46	18:23:45	.. .. 15:33:46
56°	05:34:49	06:18:01	06:56:06	17:02:21	17:40:23	18:23:28	23:59:10 15:43:44
58°	05:34:56	06:20:32	07:00:50	16:57:33	17:37:47	18:23:15	23:48:23 15:55:03
S 60°	05:34:57	06:23:17	07:06:10	16:52:09	17:34:57	18:23:09	23:35:54 16:08:06

Apr 16	SHA	Mer.pass
Venus	292°11.3	14:52:25
Mars	45°55.6	07:17:34
Jupiter	62°00.3	06:12:40
Saturn	56°17.9	06:35:23

17 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	01:32:23	03:25:01	20:38:04	22:37:18	—:—	07:03:28 09:33:45
N 70°	—:—	02:17:18	03:43:51	20:18:26	21:47:36	—:—	06:05:54 10:30:04
68°	—:—	02:46:12	03:58:38	20:03:06	21:17:02	—:—	05:31:36 11:03:18
66°	01:19:41	03:07:33	04:10:38	19:50:42	20:54:47	22:48:39	05:06:40 11:27:16
64°	01:59:40	03:24:20	04:20:38	19:40:24	20:37:25	22:04:34	04:47:09 11:45:55
62°	02:26:08	03:38:03	04:29:08	19:31:40	20:23:17	21:36:39	04:31:12 12:01:06
60°	02:46:10	03:49:32	04:36:28	19:24:07	20:11:29	21:15:50	04:17:47 12:13:49
N 58°	03:02:14	03:59:21	04:42:54	19:17:32	20:01:25	20:59:15	04:06:16 12:24:41
56°	03:15:35	04:07:53	04:48:35	19:11:43	19:52:42	20:45:32	03:56:12 12:34:09
54°	03:26:57	04:15:22	04:53:40	19:06:31	19:45:03	20:33:53	03:47:18 12:42:30
52°	03:36:47	04:22:01	04:58:14	19:01:50	19:38:15	20:23:50	03:39:20 12:49:57
50°	03:45:25	04:27:58	05:02:24	18:57:35	19:32:11	20:15:02	03:32:08 12:56:39
45°	04:03:04	04:40:30	05:11:21	18:48:26	19:19:24	19:57:02	03:16:45 13:10:57
N 40°	04:16:47	04:50:35	05:18:47	18:40:51	19:09:08	19:43:05	03:04:03 13:22:41
35°	04:27:49	04:58:57	05:25:08	18:34:23	19:00:37	19:31:51	02:53:12 13:32:40
30°	04:36:57	05:06:04	05:30:41	18:28:42	18:53:23	19:22:34	02:43:41 13:41:23
20°	04:51:17	05:17:42	05:40:14	18:18:59	18:41:33	19:08:01	02:27:15 13:56:19
N 10°	05:02:08	05:27:05	05:48:30	18:10:35	18:32:00	18:57:00	02:12:53 14:09:18
0°	05:10:41	05:35:07	05:56:09	18:02:47	18:23:50	18:48:17	01:59:23 14:21:25
S 10°	05:17:40	05:42:22	06:03:42	17:55:07	18:16:27	18:41:09	01:45:51 14:33:27
20°	05:23:28	05:49:17	06:11:38	17:47:04	18:09:24	18:35:12	01:31:21 14:46:14
30°	05:28:19	05:56:16	06:20:33	17:38:00	18:02:16	18:30:11	01:14:40 15:00:47
35°	05:30:26	05:59:57	06:25:39	17:32:49	17:58:29	18:27:59	01:04:57 15:09:11
40°	05:32:20	06:03:53	06:31:24	17:26:59	17:54:28	18:26:00	00:53:48 15:18:43
45°	05:34:00	06:08:10	06:38:04	17:20:13	17:50:05	18:24:12	00:40:40 15:29:51
S 50°	05:35:24	06:13:00	06:46:00	17:12:10	17:45:08	18:22:39	00:24:37 15:43:15
52°	05:35:53	06:15:08	06:49:39	17:08:28	17:42:56	18:22:07	00:17:03 15:49:28
54°	05:36:18	06:17:26	06:53:40	17:04:24	17:40:35	18:21:37	00:08:38 15:56:21
56°	05:36:40	06:19:54	06:58:06	16:59:55	17:38:03	18:21:11	.. .. 16:03:59
58°	05:36:57	06:22:35	07:03:02	16:54:55	17:35:17	18:20:48	.. .. 16:12:34
S 60°	05:37:09	06:25:32	07:08:34	16:49:19	17:32:15	18:20:30	.. .. 16:22:19

Apr 17	SHA	Mer.pass
Venus	291°23.2	14:51:38
Mars	45°13.0	07:16:28
Jupiter	61°54.9	06:09:05
Saturn	56°15.4	06:31:37

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
16	00:11	00:18	11:59:42	07:23:18	19:47:16	23(35%)
17	00:25	00:32	11:59:28	08:10:28	20:33:00	24(26%)

# 2020 April 18 to Apr. 19

18 April 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	—:—	01:19:56	03:19:02	20:43:42	22:51:19	—:—	06:04:46	12:04:47
N 70°	—:—	02:09:45	03:38:48	20:23:06	21:55:03	—:—	05:38:50	12:29:08
68°	—:—	02:40:25	03:54:14	20:07:06	21:22:31	—:—	05:19:00	12:47:34
66°	01:08:58	03:02:45	04:06:44	19:54:11	20:59:13	23:00:40	05:03:08	13:02:13
64°	01:53:08	03:20:12	04:17:08	19:43:29	20:41:09	22:10:58	04:50:02	13:14:15
62°	02:21:06	03:34:24	04:25:57	19:34:25	20:26:31	21:41:23	04:38:57	13:24:21
60°	02:41:58	03:46:16	04:33:34	19:26:36	20:14:20	21:19:40	04:29:25	13:33:01
N 58°	02:58:36	03:56:23	04:40:13	19:19:47	20:03:57	21:02:29	04:21:06	13:40:33
56°	03:12:23	04:05:10	04:46:06	19:13:46	19:54:58	20:48:19	04:13:44	13:47:10
54°	03:24:04	04:12:52	04:51:21	19:08:23	19:47:06	20:36:21	04:07:09	13:53:05
52°	03:34:10	04:19:42	04:56:05	19:03:32	19:40:08	20:26:02	04:01:13	13:58:23
50°	03:43:01	04:25:49	05:00:23	18:59:09	19:33:53	20:17:00	03:55:49	14:03:11
45°	04:01:05	04:38:42	05:09:39	18:49:42	19:20:46	19:58:34	03:44:10	14:13:31
N 40°	04:15:08	04:49:03	05:17:19	18:41:52	19:10:13	19:44:17	03:34:29	14:22:03
35°	04:26:26	04:57:39	05:23:52	18:35:11	19:01:29	19:32:48	03:26:09	14:29:21
30°	04:35:46	05:04:57	05:29:37	18:29:20	18:54:04	19:23:19	03:18:49	14:35:45
20°	04:50:27	05:16:55	05:39:29	18:19:18	18:41:54	19:08:25	03:06:06	14:46:45
N 10°	05:01:35	05:26:35	05:48:01	18:10:37	18:32:04	18:57:06	02:54:55	14:56:20
0°	05:10:25	05:34:52	05:55:55	18:02:35	18:23:39	18:48:07	02:44:25	15:05:16
S 10°	05:17:39	05:42:22	06:03:43	17:54:39	18:16:00	18:40:44	02:33:52	15:14:09
20°	05:23:43	05:49:33	06:11:56	17:46:19	18:08:41	18:34:31	02:22:35	15:23:34
30°	05:28:53	05:56:51	06:21:10	17:36:57	18:01:15	18:29:12	02:09:39	15:34:15
35°	05:31:10	06:00:43	06:26:27	17:31:35	17:57:18	18:26:49	02:02:08	15:40:23
40°	05:33:15	06:04:50	06:32:24	17:25:32	17:53:05	18:24:38	01:53:33	15:47:20
45°	05:35:09	06:09:22	06:39:18	17:18:33	17:48:27	18:22:37	01:43:29	15:55:23
S 50°	05:36:50	06:14:28	06:47:32	17:10:12	17:43:14	18:20:48	01:31:18	16:05:01
52°	05:37:26	06:16:44	06:51:20	17:06:22	17:40:55	18:20:08	01:25:36	16:09:28
54°	05:37:59	06:19:10	06:55:29	17:02:09	17:38:25	18:19:30	01:19:19	16:14:20
56°	05:38:30	06:21:47	07:00:05	16:57:30	17:35:44	18:18:55	01:12:17	16:19:43
58°	05:38:57	06:24:38	07:05:13	16:52:19	17:32:48	18:18:23	01:04:22	16:25:43
S 60°	05:39:20	06:27:47	07:10:58	16:46:29	17:29:35	18:17:54	00:55:21	16:32:28

Apr 18	SHA	Mer.pass
Venus	290°36.1	14:50:48
Mars	44°30.5	07:15:22
Jupiter	61°49.7	06:05:30
Saturn	56°13.0	06:27:51

19 April 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	—:—	01:05:31	03:12:59	20:49:27	23:09:02	—:—	05:35:25	14:02:15
N 70°	—:—	02:01:53	03:33:43	20:27:49	22:02:55	—:—	05:20:56	14:14:42
68°	—:—	02:34:30	03:49:50	20:11:07	21:28:10	—:—	05:09:14	14:24:40
66°	00:56:31	02:57:54	04:02:51	19:57:41	21:03:43	23:15:55	04:59:32	14:32:52
64°	01:46:17	03:16:03	04:13:38	19:46:34	20:44:56	22:17:45	04:51:19	14:39:45
62°	02:15:56	03:30:44	04:22:47	19:37:10	20:29:47	21:46:15	04:44:15	14:45:38
60°	02:37:43	03:43:00	04:30:40	19:29:05	20:17:12	21:23:33	04:38:05	14:50:44
N 58°	02:54:57	03:53:26	04:37:33	19:22:02	20:06:30	21:05:45	04:32:39	14:55:13
56°	03:09:09	04:02:28	04:43:38	19:15:48	19:57:16	20:51:09	04:27:48	14:59:11
54°	03:21:10	04:10:23	04:49:04	19:10:15	19:49:10	20:38:50	04:23:26	15:02:45
52°	03:31:32	04:17:24	04:53:57	19:05:15	19:42:00	20:28:14	04:19:29	15:05:57
50°	03:40:37	04:23:41	04:58:24	19:00:43	19:35:36	20:18:58	04:15:52	15:08:53
45°	03:59:08	04:36:55	05:07:57	18:50:57	19:22:07	20:00:07	04:08:02	15:15:11
N 40°	04:13:29	04:47:32	05:15:52	18:42:53	19:11:19	19:45:30	04:01:27	15:20:26
35°	04:25:02	04:56:21	05:22:38	18:36:00	19:02:21	19:33:46	03:55:47	15:24:56
30°	04:34:36	05:03:51	05:28:34	18:29:58	18:54:44	19:24:04	03:50:47	15:28:53
20°	04:49:37	05:16:08	05:38:44	18:19:37	18:42:15	19:08:49	03:42:04	15:35:42
N 10°	05:01:02	05:26:04	05:47:32	18:10:40	18:32:09	18:57:13	03:34:23	15:41:38
0°	05:10:08	05:34:37	05:55:42	18:02:22	18:23:28	18:47:58	03:27:10	15:47:11
S 10°	05:17:38	05:42:23	06:03:45	17:54:11	18:15:34	18:40:20	03:19:55	15:52:41
20°	05:23:58	05:49:50	06:12:14	17:45:35	18:07:59	18:33:51	03:12:10	15:58:31
30°	05:29:26	05:57:26	06:21:46	17:35:54	18:00:14	18:28:13	03:03:18	16:05:06
35°	05:31:53	06:01:28	06:27:14	17:30:22	17:56:07	18:25:40	02:58:10	16:08:52
40°	05:34:11	06:05:48	06:33:24	17:24:07	17:51:42	18:23:17	02:52:20	16:13:08
45°	05:36:18	06:10:33	06:40:33	17:16:53	17:46:51	18:21:03	02:45:31	16:18:03
S 50°	05:38:15	06:15:55	06:49:04	17:08:15	17:41:21	18:18:58	02:37:19	16:23:53
52°	05:38:58	06:18:19	06:53:00	17:04:16	17:38:54	18:18:11	02:33:31	16:26:35
54°	05:39:40	06:20:53	06:57:19	16:59:54	17:36:17	18:17:25	02:29:20	16:29:31
56°	05:40:19	06:23:40	07:02:05	16:55:05	17:33:26	18:16:41	02:24:41	16:32:44
58°	05:40:56	06:26:41	07:07:24	16:49:42	17:30:20	18:15:59	02:19:29	16:36:19
S 60°	05:41:30	06:30:01	07:13:22	16:43:40	17:26:56	18:15:19	02:13:37	16:40:19

Apr 19	SHA	Mer.pass
Venus	289°49.9	14:49:53
Mars	43°48.1	07:14:15
Jupiter	61°44.7	06:01:54
Saturn	56°10.7	06:24:04

Day	Sun			Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
18	00:39	00:45	11:59:15	08:54:54	21:16:16	25(18%)
19	00:52	00:58	11:59:02	09:37:13	21:57:49	26(11%)



2020 April 20 to Apr. 21

20 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	00:47:23	03:06:50	20:55:19	23:39:02	—:—	05:13:13
N 70°	—:—	01:53:37	03:28:36	20:32:35	22:11:17	—:—	05:06:21
68°	—:—	02:28:27	03:45:25	20:15:09	21:33:58	—:—	05:00:40
66°	00:40:52	02:52:59	03:58:57	20:01:11	21:08:18	23:41:48	04:55:53
64°	01:39:06	03:11:51	04:10:09	19:49:40	20:48:45	22:24:59	04:51:48
62°	02:10:39	03:27:04	04:19:37	19:39:56	20:33:04	21:51:17	04:48:15
60°	02:33:25	03:39:43	04:27:46	19:31:34	20:20:04	21:27:32	04:45:07
N 58°	02:51:16	03:50:28	04:34:53	19:24:17	20:09:04	21:09:04	04:42:21
56°	03:05:55	03:59:46	04:41:10	19:17:51	19:59:33	20:54:00	04:39:53
54°	03:18:17	04:07:54	04:46:47	19:12:07	19:51:14	20:41:20	04:37:38
52°	03:28:55	04:15:07	04:51:50	19:06:57	19:43:53	20:30:27	04:35:36
50°	03:38:13	04:21:34	04:56:25	19:02:16	19:37:18	20:20:58	04:33:45
45°	03:57:10	04:35:08	05:06:16	18:52:13	19:23:29	20:01:39	04:29:41
N 40°	04:11:51	04:46:01	05:14:26	18:43:54	19:12:25	19:46:44	04:26:17
35°	04:23:39	04:55:04	05:21:24	18:36:48	19:03:13	19:34:44	04:23:19
30°	04:33:26	05:02:45	05:27:31	18:30:35	18:55:25	19:24:49	04:20:43
20°	04:48:48	05:15:22	05:38:00	18:19:56	18:42:36	19:09:13	04:16:10
N 10°	05:00:31	05:25:35	05:47:05	18:10:43	18:32:14	18:57:20	04:12:09
0°	05:09:52	05:34:23	05:55:29	18:02:10	18:23:17	18:47:49	04:08:23
S 10°	05:17:37	05:42:24	06:03:48	17:53:44	18:15:09	18:39:56	04:04:36
20°	05:24:13	05:50:06	06:12:32	17:44:52	18:07:18	18:33:11	04:00:34
30°	05:29:59	05:58:01	06:22:23	17:34:53	17:59:15	18:27:15	03:55:58
35°	05:32:37	06:02:13	06:28:02	17:29:10	17:54:57	18:24:32	03:53:18
40°	05:35:06	06:06:45	06:34:24	17:22:43	17:50:21	18:21:58	03:50:17
45°	05:37:26	06:11:43	06:41:47	17:15:14	17:45:16	18:19:30	03:46:47
S 50°	05:39:39	06:17:22	06:50:36	17:06:19	17:39:30	18:17:09	03:42:35
52°	05:40:30	06:19:54	06:54:40	17:02:12	17:36:55	18:16:15	03:40:38
54°	05:41:20	06:22:36	06:59:08	16:57:41	17:34:10	18:15:21	03:38:30
56°	05:42:08	06:25:32	07:04:04	16:52:41	17:31:10	18:14:28	03:36:09
58°	05:42:55	06:28:44	07:09:34	16:47:07	17:27:54	18:13:37	03:33:32
S 60°	05:43:40	06:32:15	07:15:46	16:40:51	17:24:18	18:12:46	03:30:35

Apr 20	SHA	Mer.pass
Venus	289°04.8	14:48:54
Mars	43°05.8	07:13:07
Jupiter	61°39.9	05:58:17
Saturn	56°08.5	06:20:16

21 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	00:16:59	03:00:35	21:01:18	—:—	—:—	04:53:31
N 70°	—:—	01:44:51	03:23:26	20:37:25	22:20:18	—:—	04:53:01
68°	—:—	02:22:15	03:40:59	20:19:14	21:39:59	—:—	04:52:35
66°	00:14:35	02:48:01	03:55:02	20:04:43	21:12:58	—:—	04:52:14
64°	01:31:28	03:07:38	04:06:39	19:52:46	20:52:37	22:32:47	04:51:56
62°	02:05:14	03:23:23	04:16:28	19:42:42	20:36:23	21:56:29	04:51:40
60°	02:29:02	03:36:26	04:24:54	19:34:03	20:22:58	21:31:35	04:51:27
N 58°	02:47:33	03:47:31	04:32:15	19:26:31	20:11:38	21:12:26	04:51:14
56°	03:02:40	03:57:04	04:38:44	19:19:53	20:01:51	20:56:53	04:51:03
54°	03:15:23	04:05:26	04:44:31	19:13:59	19:53:19	20:43:51	04:50:53
52°	03:26:18	04:12:50	04:49:44	19:08:39	19:45:46	20:32:41	04:50:45
50°	03:35:49	04:19:27	04:54:27	19:03:50	19:39:01	20:22:58	04:50:36
45°	03:55:13	04:33:22	05:04:37	18:53:29	19:24:52	20:03:13	04:50:19
N 40°	04:10:13	04:44:32	05:13:01	18:44:55	19:13:30	19:47:57	04:50:04
35°	04:22:17	04:53:47	05:20:12	18:37:37	19:04:06	19:35:42	04:49:52
30°	04:32:16	05:01:40	05:26:29	18:31:13	18:56:06	19:25:34	04:49:41
20°	04:47:59	05:14:36	05:37:16	18:20:15	18:42:58	19:09:38	04:49:22
N 10°	04:59:59	05:25:06	05:46:37	18:10:46	18:32:19	18:57:27	04:49:06
0°	05:09:36	05:34:09	05:55:17	18:01:58	18:23:07	18:47:41	04:48:52
S 10°	05:17:36	05:42:25	06:03:50	17:53:17	18:14:44	18:39:33	04:48:38
20°	05:24:29	05:50:23	06:12:51	17:44:09	18:06:37	18:32:32	04:48:24
30°	05:30:32	05:58:36	06:23:00	17:33:52	17:58:16	18:26:19	04:48:09
35°	05:33:20	06:02:59	06:28:50	17:27:58	17:53:48	18:23:25	04:48:01
40°	05:36:01	06:07:42	06:35:24	17:21:19	17:49:00	18:20:39	04:47:51
45°	05:38:35	06:12:54	06:43:01	17:13:36	17:43:42	18:17:58	04:47:40
S 50°	05:41:03	06:18:49	06:52:08	17:04:23	17:37:39	18:15:22	04:47:27
52°	05:42:01	06:21:28	06:56:20	17:00:08	17:34:58	18:14:20	04:47:22
54°	05:42:59	06:24:19	07:00:57	16:55:28	17:32:04	18:13:19	04:47:15
56°	05:43:56	06:27:24	07:06:03	16:50:19	17:28:55	18:12:17	04:47:08
58°	05:44:52	06:30:46	07:11:45	16:44:33	17:25:29	18:11:16	04:47:01
S 60°	05:45:48	06:34:29	07:18:10	16:38:04	17:21:41	18:10:15	04:46:52

Apr 21	SHA	Mer.pass
Venus	288°20.9	14:47:51
Mars	42°23.6	07:11:59
Jupiter	61°35.2	05:54:40
Saturn	56°06.4	06:16:29

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
20	01:04	01:10	11:58:50	10:18:11	22:38:25	27(6%)
21	01:16	01:22	11:58:38	10:58:37	23:18:54	28(3%)

22 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	02:54:14	21:07:25	—:—	—:—	04:33:56
N 70°	—:—	01:35:28	03:18:14	20:42:19	22:30:08	—:—	04:39:44
68°	—:—	02:15:53	03:36:32	20:23:20	21:46:12	—:—	04:44:33
66°	—:—	02:42:58	03:51:08	20:08:16	21:17:44	—:—	04:48:36
64°	01:23:18	03:03:23	04:03:10	19:55:53	20:56:32	22:41:19	04:52:04
62°	01:59:39	03:19:41	04:13:19	19:45:28	20:39:43	22:01:53	04:55:06
60°	02:24:36	03:33:10	04:22:02	19:36:32	20:25:53	21:35:44	04:57:45
N 58°	02:43:48	03:44:34	04:29:37	19:28:46	20:14:13	21:15:51	05:00:06
56°	02:59:24	03:54:23	04:36:18	19:21:56	20:04:10	20:59:48	05:02:13
54°	03:12:28	04:02:58	04:42:16	19:15:50	19:55:24	20:46:24	05:04:08
52°	03:23:41	04:10:34	04:47:38	19:10:22	19:47:39	20:34:56	05:05:52
50°	03:33:26	04:17:21	04:52:30	19:05:24	19:40:44	20:24:58	05:07:28
45°	03:53:17	04:31:36	05:02:58	18:54:45	19:26:14	20:04:46	05:10:57
N 40°	04:08:37	04:43:03	05:11:37	18:45:56	19:14:36	19:49:11	05:13:53
35°	04:20:56	04:52:32	05:19:00	18:38:26	19:04:58	19:36:41	05:16:26
30°	04:31:07	05:00:36	05:25:28	18:31:51	18:56:47	19:26:20	05:18:41
20°	04:47:11	05:13:51	05:36:34	18:20:35	18:43:20	19:10:03	05:22:38
N 10°	04:59:28	05:24:37	05:46:10	18:10:50	18:32:24	18:57:35	05:26:08
0°	05:09:21	05:33:55	05:55:05	18:01:47	18:22:58	18:47:34	05:29:27
S 10°	05:17:36	05:42:26	06:03:53	17:52:51	18:14:19	18:39:10	05:32:48
20°	05:24:44	05:50:40	06:13:10	17:43:28	18:05:57	18:31:53	05:36:23
30°	05:31:06	05:59:11	06:23:38	17:32:52	17:57:18	18:25:23	05:40:30
35°	05:34:04	06:03:44	06:29:37	17:26:48	17:52:40	18:22:19	05:42:53
40°	05:36:55	06:08:39	06:36:24	17:19:56	17:47:40	18:19:22	05:45:36
45°	05:39:43	06:14:04	06:44:15	17:11:59	17:42:09	18:16:28	05:48:46
S 50°	05:42:27	06:20:16	06:53:39	17:02:29	17:35:50	18:13:36	05:52:34
52°	05:43:32	06:23:02	06:58:00	16:58:06	17:33:01	18:12:27	05:54:19
54°	05:44:38	06:26:01	07:02:46	16:53:17	17:29:59	18:11:18	05:56:15
56°	05:45:43	06:29:15	07:08:03	16:47:57	17:26:41	18:10:08	05:58:23
58°	05:46:49	06:32:48	07:13:56	16:42:00	17:23:05	18:08:57	06:00:45
S 60°	05:47:56	06:36:42	07:20:34	16:35:18	17:19:06	18:07:45	06:03:26

Apr 22	SHA	Mer.pass
Venus	287°38.1	14:46:43
Mars	41°41.5	07:10:51
Jupiter	61°30.7	05:51:01
Saturn	56°04.4	06:12:41

23 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	02:47:45	21:13:42	—:—	—:—	04:12:15
N 70°	—:—	01:25:16	03:12:58	20:47:17	22:41:08	—:—	04:25:24
68°	—:—	02:09:18	03:32:04	20:27:29	21:52:40	—:—	04:36:06
66°	—:—	02:37:50	03:47:14	20:11:49	21:22:36	—:—	04:45:00
64°	01:14:24	02:59:06	03:59:42	19:59:00	21:00:30	22:50:52	04:52:33
62°	01:53:53	03:15:59	04:10:11	19:48:14	20:43:06	22:07:31	04:59:04
60°	02:20:05	03:29:53	04:19:11	19:39:02	20:28:49	21:39:58	05:04:45
N 58°	02:40:01	03:41:37	04:27:00	19:31:01	20:16:48	21:19:18	05:09:47
56°	02:56:07	03:51:42	04:33:54	19:23:58	20:06:29	21:02:44	05:14:16
54°	03:09:34	04:00:31	04:40:03	19:17:42	19:57:29	20:48:57	05:18:19
52°	03:21:03	04:08:19	04:45:34	19:12:04	19:49:32	20:37:12	05:21:59
50°	03:31:04	04:15:16	04:50:34	19:06:58	19:42:27	20:26:59	05:25:20
45°	03:51:21	04:29:52	05:01:20	18:56:00	19:27:36	20:06:20	05:32:38
N 40°	04:07:00	04:41:34	05:10:13	18:46:57	19:15:42	19:50:25	05:38:45
35°	04:19:35	04:51:17	05:17:49	18:39:14	19:05:51	19:37:39	05:44:02
30°	04:29:59	04:59:32	05:24:27	18:32:29	18:57:28	19:27:06	05:48:44
20°	04:46:24	05:13:07	05:35:51	18:20:55	18:43:42	19:10:28	05:56:54
N 10°	04:58:58	05:24:09	05:45:44	18:10:54	18:32:30	18:57:43	06:04:07
0°	05:09:05	05:33:42	05:54:54	18:01:36	18:22:49	18:47:27	06:10:57
S 10°	05:17:36	05:42:28	06:03:57	17:52:26	18:13:56	18:38:48	06:17:48
20°	05:25:00	05:50:58	06:13:29	17:42:46	18:05:18	18:31:16	06:25:10
30°	05:31:39	05:59:46	06:24:15	17:31:53	17:56:21	18:24:28	06:33:37
35°	05:34:47	06:04:29	06:30:25	17:25:38	17:51:33	18:21:14	06:38:31
40°	05:37:50	06:09:35	06:37:24	17:18:35	17:46:22	18:18:06	06:44:06
45°	05:40:50	06:15:15	06:45:30	17:10:23	17:40:37	18:14:59	06:50:37
S 50°	05:43:50	06:21:42	06:55:11	17:00:36	17:34:02	18:11:51	06:58:28
52°	05:45:03	06:24:36	06:59:40	16:56:05	17:31:06	18:10:35	07:02:07
54°	05:46:16	06:27:43	07:04:35	16:51:07	17:27:55	18:09:18	07:06:07
56°	05:47:30	06:31:06	07:10:02	16:45:37	17:24:29	18:08:00	07:10:34
58°	05:48:45	06:34:49	07:16:07	16:39:28	17:20:42	18:06:40	07:15:33
S 60°	05:50:03	06:38:55	07:22:58	16:32:33	17:16:32	18:05:17	07:21:11

Apr 23	SHA	Mer.pass
Venus	286°56.6	14:45:29
Mars	40°59.5	07:09:43
Jupiter	61°26.5	05:47:22
Saturn	56°02.6	06:08:52

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
22	01:28	01:34	11:58:26	11:39:21	—:—	29(0%)
23	01:40	01:45	11:58:15	12:21:10	00:00:04	0(0%)

24 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	02:41:09	21:20:08	—:—	—:—	03:44:20
N 70°	—:—	01:13:55	03:07:40	20:52:20	22:53:54	—:—	04:08:09
68°	—:—	02:02:29	03:27:34	20:31:40	21:59:25	—:—	04:26:36
66°	—:—	02:32:37	03:43:19	20:15:24	21:27:35	—:—	04:41:28
64°	01:04:29	02:54:47	03:56:14	20:02:08	21:04:32	23:01:58	04:53:49
62°	01:47:54	03:12:16	04:07:04	19:51:01	20:46:30	22:13:24	05:04:18
60°	02:15:29	03:26:36	04:16:20	19:41:31	20:31:46	21:44:19	05:13:20
N 58°	02:36:12	03:38:40	04:24:24	19:33:16	20:19:24	21:22:49	05:21:15
56°	02:52:49	03:49:02	04:31:30	19:26:01	20:08:48	21:05:43	05:28:15
54°	03:06:39	03:58:05	04:37:50	19:19:34	19:59:34	20:51:32	05:34:32
52°	03:18:26	04:06:04	04:43:31	19:13:46	19:51:26	20:39:28	05:40:11
50°	03:28:41	04:13:12	04:48:40	19:08:31	19:44:10	20:29:01	05:45:21
45°	03:49:26	04:28:08	04:59:43	18:57:16	19:28:58	20:07:54	05:56:29
N 40°	04:05:25	04:40:07	05:08:51	18:47:58	19:16:48	19:51:39	06:05:47
35°	04:18:15	04:50:03	05:16:38	18:40:03	19:06:44	19:38:38	06:13:47
30°	04:28:52	04:58:30	05:23:28	18:33:08	18:58:09	19:27:52	06:20:50
20°	04:45:37	05:12:23	05:35:10	18:21:15	18:44:04	19:10:54	06:33:06
N 10°	04:58:28	05:23:41	05:45:18	18:10:58	18:32:37	18:57:52	06:43:54
0°	05:08:51	05:33:30	05:54:43	18:01:26	18:22:40	18:47:20	06:54:05
S 10°	05:17:36	05:42:30	06:04:01	17:52:01	18:13:32	18:38:27	07:04:20
20°	05:25:16	05:51:15	06:13:48	17:42:06	18:04:39	18:30:39	07:15:19
30°	05:32:12	06:00:21	06:24:52	17:30:54	17:55:25	18:23:33	07:27:57
35°	05:35:30	06:05:15	06:31:13	17:24:29	17:50:27	18:20:10	07:35:18
40°	05:38:44	06:10:32	06:38:24	17:17:14	17:45:04	18:16:50	07:43:41
45°	05:41:58	06:16:25	06:46:44	17:08:49	17:39:06	18:13:31	07:53:32
S 50°	05:45:13	06:23:08	06:56:42	16:58:44	17:32:16	18:10:08	08:05:28
52°	05:46:32	06:26:09	07:01:19	16:54:04	17:29:12	18:08:45	08:11:03
54°	05:47:53	06:29:25	07:06:23	16:48:57	17:25:53	18:07:20	08:17:13
56°	05:49:16	06:32:57	07:12:00	16:43:17	17:22:17	18:05:54	08:24:05
58°	05:50:41	06:36:49	07:18:17	16:36:57	17:18:21	18:04:24	08:31:51
S 60°	05:52:09	06:41:07	07:25:22	16:29:48	17:14:00	18:02:51	08:40:41



Apr 24	SHA	Mer.pass
Venus	286°16.3	14:44:10
Mars	40°17.6	07:08:34
Jupiter	61°22.3	05:43:43
Saturn	56°00.8	06:05:03

25 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	02:34:23	21:26:46	—:—	—:—	02:53:53
N 70°	—:—	01:00:50	03:02:18	20:57:27	23:09:49	—:—	03:43:05
68°	—:—	01:55:24	03:23:04	20:35:53	22:06:30	—:—	04:14:40
66°	—:—	02:27:18	03:39:25	20:19:00	21:32:41	—:—	04:38:07
64°	00:53:03	02:50:26	03:52:46	20:05:16	21:08:37	23:15:52	04:56:40
62°	01:41:41	03:08:32	04:03:57	19:53:48	20:49:56	22:19:36	05:11:55
60°	02:10:48	03:23:19	04:13:31	19:44:00	20:34:44	21:48:47	05:24:48
N 58°	02:32:21	03:35:44	04:21:49	19:35:31	20:22:01	21:26:24	05:35:54
56°	02:49:30	03:46:23	04:29:08	19:28:03	20:11:08	21:08:43	05:45:37
54°	03:03:44	03:55:39	04:35:38	19:21:25	20:01:40	20:54:08	05:54:13
52°	03:15:50	04:03:51	04:41:28	19:15:28	19:53:19	20:41:46	06:01:56
50°	03:26:19	04:11:08	04:46:46	19:10:04	19:45:53	20:31:03	06:08:54
45°	03:47:31	04:26:26	04:58:07	18:58:31	19:30:21	20:09:28	06:23:51
N 40°	04:03:50	04:38:40	05:07:29	18:48:59	19:17:54	19:52:54	06:36:13
35°	04:16:56	04:48:49	05:15:29	18:40:52	19:07:36	19:39:37	06:46:48
30°	04:27:45	04:57:28	05:22:29	18:33:46	18:58:51	19:28:38	06:56:05
20°	04:44:51	05:11:40	05:34:29	18:21:35	18:44:27	19:11:19	07:12:09
N 10°	04:57:58	05:23:14	05:44:53	18:11:03	18:32:43	18:58:01	07:26:15
0°	05:08:37	05:33:17	05:54:32	18:01:16	18:22:32	18:47:14	07:39:32
S 10°	05:17:37	05:42:32	06:04:05	17:51:37	18:13:10	18:38:06	07:52:52
20°	05:25:31	05:51:33	06:14:08	17:41:26	18:04:01	18:30:03	08:07:10
30°	05:32:45	06:00:56	06:25:30	17:29:57	17:54:30	18:22:40	08:23:40
35°	05:36:13	06:06:00	06:32:01	17:23:21	17:49:22	18:19:07	08:33:18
40°	05:39:38	06:11:29	06:39:24	17:15:54	17:43:48	18:15:36	08:44:20
45°	05:43:04	06:17:35	06:47:58	17:07:15	17:37:36	18:12:04	08:57:22
S 50°	05:46:35	06:24:34	06:58:13	16:56:53	17:30:30	18:08:26	09:13:18
52°	05:48:02	06:27:43	07:02:58	16:52:05	17:27:19	18:06:56	09:20:48
54°	05:49:30	06:31:06	07:08:12	16:46:49	17:23:52	18:05:24	09:29:10
56°	05:51:01	06:34:47	07:13:59	16:40:59	17:20:08	18:03:49	09:38:34
58°	05:52:36	06:38:50	07:20:27	16:34:27	17:16:01	18:02:10	09:49:17
S 60°	05:54:14	06:43:18	07:27:46	16:27:05	17:11:29	18:00:27	10:01:41




Apr 25	SHA	Mer.pass
Venus	285°37.4	14:42:46
Mars	39°35.7	07:07:24
Jupiter	61°18.4	05:40:02
Saturn	55°59.1	06:01:14

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
24	01:50	01:56	11:58:04	13:04:48	00:42:43	1(2%)
25	02:01	02:06	11:57:54	13:50:52	01:27:30	2(5%)

2020 April 26 to Apr. 27




26 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	02:27:26	21:33:37	—:—	—:—	
N 70°	—:—	00:44:36	02:56:53	21:02:39	23:34:59	—:—	
68°	—:—	01:48:00	03:18:32	20:40:08	22:14:01	—:—	03:55:38 00:23:05
66°	—:—	02:21:53	03:35:30	20:22:37	21:37:55	—:—	04:35:08 .. ..
64°	00:38:50	02:46:02	03:49:18	20:08:25	21:12:45	23:37:52	05:02:41 .. ..
62°	01:35:10	03:04:47	04:00:51	19:56:35	20:53:24	22:26:10	05:23:59 .. ..
60°	02:06:02	03:20:01	04:10:42	19:46:30	20:37:43	21:53:22	05:41:19 23:58:21
N 58°	02:28:27	03:32:48	04:19:15	19:37:45	20:24:38	21:30:02	05:55:53 23:40:42
56°	02:46:11	03:43:44	04:26:46	19:30:05	20:13:28	21:11:46	06:08:24 23:25:53
54°	03:00:48	03:53:15	04:33:27	19:23:16	20:03:45	20:56:45	06:19:22 23:13:07
52°	03:13:13	04:01:38	04:39:27	19:17:10	19:55:13	20:44:04	06:29:05 23:01:57
50°	03:23:57	04:09:06	04:44:53	19:11:38	19:47:37	20:33:06	06:37:48 22:52:01
45°	03:45:37	04:24:44	04:56:32	18:59:47	19:31:43	20:11:03	06:56:19 22:31:12
N 40°	04:02:16	04:37:15	05:06:09	18:50:00	19:19:00	19:54:09	07:11:27 22:14:23
35°	04:15:37	04:47:37	05:14:21	18:41:41	19:08:29	19:40:36	07:24:19 22:00:14
30°	04:26:39	04:56:27	05:21:31	18:34:24	18:59:32	19:29:25	07:35:34 21:47:57
20°	04:44:05	05:10:57	05:33:49	18:21:56	18:44:50	19:11:46	07:54:55 21:26:59
N 10°	04:57:29	05:22:48	05:44:29	18:11:08	18:32:50	18:58:11	08:11:49 21:08:49
0°	05:08:23	05:33:06	05:54:22	18:01:07	18:22:25	18:47:09	08:27:41 20:51:52
S 10°	05:17:37	05:42:35	06:04:09	17:51:13	18:12:48	18:37:46	08:43:37 20:34:56
20°	05:25:47	05:51:51	06:14:28	17:40:47	18:03:24	18:29:28	09:00:44 20:16:51
30°	05:33:18	06:01:31	06:26:07	17:29:00	17:53:36	18:21:48	09:20:29 19:56:05
35°	05:36:56	06:06:45	06:32:49	17:22:14	17:48:18	18:18:06	09:32:05 19:43:57
40°	05:40:32	06:12:25	06:40:23	17:14:35	17:42:33	18:14:24	09:45:24 19:30:02
45°	05:44:11	06:18:44	06:49:11	17:05:42	17:36:08	18:10:39	10:01:14 19:13:33
S 50°	05:47:57	06:26:00	06:59:44	16:55:03	17:28:46	18:06:46	10:20:46 18:53:18
52°	05:49:30	06:29:15	07:04:38	16:50:08	17:25:27	18:05:09	10:30:04 18:43:41
54°	05:51:06	06:32:47	07:10:00	16:44:42	17:21:53	18:03:29	10:40:30 18:32:55
56°	05:52:46	06:36:37	07:15:57	16:38:42	17:18:00	18:01:46	10:52:21 18:20:41
58°	05:54:29	06:40:49	07:22:37	16:31:59	17:13:43	17:59:58	11:06:04 18:06:36
S 60°	05:56:18	06:45:29	07:30:10	16:24:23	17:08:59	17:58:05	11:22:15 17:50:00

Apr 26	SHA	Mer.pass
Venus	285°00.0	14:41:16
Mars	38°54.0	07:06:15
Jupiter	61°14.7	05:36:21
Saturn	55°57.5	05:57:24




27 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	02:20:18	21:40:43	—:—	—:—	
N 70°	—:—	00:19:08	02:51:23	21:07:56	—:—	—:—	
68°	—:—	01:40:11	03:13:59	20:44:26	22:22:01	—:—	
66°	—:—	02:16:21	03:31:35	20:26:16	21:43:18	—:—	04:33:18 01:30:22
64°	00:16:32	02:41:35	03:45:51	20:11:35	21:16:58	—:—	05:15:39 00:48:26
62°	01:28:18	03:01:01	03:57:46	19:59:22	20:56:53	22:33:11	05:44:23 00:20:05
60°	02:01:08	03:16:44	04:07:55	19:48:59	20:40:44	21:58:05	06:06:28 .. ..
N 58°	02:24:31	03:29:52	04:16:43	19:40:00	20:27:16	21:33:44	06:24:25 .. ..
56°	02:42:50	03:41:06	04:24:26	19:32:07	20:15:48	21:14:50	06:39:33 .. ..
54°	02:57:53	03:50:51	04:31:18	19:25:07	20:05:51	20:59:24	06:52:35 .. ..
52°	03:10:37	03:59:26	04:37:27	19:18:51	19:57:07	20:46:22	07:04:01 .. ..
50°	03:21:36	04:07:04	04:43:02	19:13:11	19:49:20	20:35:09	07:14:12 23:54:17
45°	03:43:44	04:23:03	04:54:58	19:01:02	19:33:05	20:12:38	07:35:34 23:31:32
N 40°	04:00:43	04:35:50	05:04:49	18:51:01	19:20:07	19:55:23	07:52:53 23:13:15
35°	04:14:19	04:46:26	05:13:13	18:42:30	19:09:22	19:41:36	08:07:29 22:57:55
30°	04:25:34	04:55:26	05:20:34	18:35:03	19:00:14	19:30:12	08:20:12 22:44:37
20°	04:43:20	05:10:16	05:33:10	18:22:17	18:45:13	19:12:12	08:41:57 22:21:58
N 10°	04:57:01	05:22:22	05:44:05	18:11:13	18:32:58	18:58:21	09:00:53 22:02:20
0°	05:08:09	05:32:54	05:54:13	18:00:58	18:22:18	18:47:04	09:18:37 21:44:00
S 10°	05:17:38	05:42:38	06:04:14	17:50:50	18:12:27	18:37:27	09:36:24 21:25:41
20°	05:26:04	05:52:09	06:14:48	17:40:09	18:02:48	18:28:53	09:55:30 21:06:04
30°	05:33:51	06:02:06	06:26:45	17:28:05	17:52:43	18:20:57	10:17:35 20:43:26
35°	05:37:39	06:07:30	06:33:37	17:21:09	17:47:15	18:17:05	10:30:34 20:30:10
40°	05:41:26	06:13:21	06:41:23	17:13:18	17:41:18	18:13:12	10:45:33 20:14:52
45°	05:45:17	06:19:53	06:50:25	17:04:11	17:34:41	18:09:15	11:03:24 19:56:40
S 50°	05:49:18	06:27:25	07:01:15	16:53:15	17:27:03	18:05:07	11:25:37 19:34:04
52°	05:50:58	06:30:48	07:06:16	16:48:11	17:23:38	18:03:23	11:36:17 19:23:15
54°	05:52:42	06:34:27	07:11:48	16:42:37	17:19:55	18:01:36	11:48:19 19:11:02
56°	05:54:30	06:38:26	07:17:55	16:36:26	17:15:53	17:59:45	12:02:08 18:57:01
58°	05:56:22	06:42:48	07:24:47	16:29:31	17:11:27	17:57:48	12:18:20 18:40:37
S 60°	05:58:21	06:47:40	07:32:33	16:21:42	17:06:32	17:55:44	12:37:50 18:20:54

Apr 27	SHA	Mer.pass
Venus	284°24.0	14:39:39
Mars	38°12.4	07:05:04
Jupiter	61°11.1	05:32:39
Saturn	55°56.0	05:53:34

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
	mm:ss	mm:ss	hh:mm:ss	hh:mm:ss	hh:mm:ss	
26	02:11	02:15	11:57:45	14:39:42	02:14:56	3(11%)
27	02:20	02:25	11:57:35	15:31:15	03:05:09	4(18%)

28 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	02:12:55	21:48:06	—:—	—:—	
N 70°	—:—	—:—	02:45:49	21:13:20	—:—	—:—	
68°	—:—	01:31:54	03:09:25	20:48:46	22:30:40	—:—	
66°	—:—	02:10:42	03:27:40	20:29:55	21:48:51	—:—	04:37:53 03:15:45
64°	—:—	02:37:06	03:42:25	20:14:45	21:21:14	—:—	05:44:37 02:09:08
62°	01:20:59	02:57:14	03:54:42	20:02:10	21:00:25	22:40:46	06:19:56 01:33:57
60°	01:56:08	03:13:27	04:05:09	19:51:28	20:43:45	22:02:57	06:45:31 01:08:30
N 58°	02:20:32	03:26:57	04:14:11	19:42:14	20:29:55	21:37:29	07:05:44 00:48:23
56°	02:39:28	03:38:28	04:22:07	19:34:09	20:18:09	21:17:56	07:22:29 00:31:44
54°	02:54:57	03:48:27	04:29:10	19:26:58	20:07:57	21:02:03	07:36:46 00:17:33
52°	03:08:00	03:57:15	04:35:29	19:20:32	19:59:00	20:48:42	07:49:12 00:05:12
50°	03:19:16	04:05:04	04:41:11	19:14:44	19:51:03	20:37:13	08:00:12 .. ..
45°	03:41:52	04:21:23	04:53:26	19:02:17	19:34:28	20:14:13	08:23:08 .. ..
N 40°	03:59:11	04:34:27	05:03:31	18:52:02	19:21:13	19:56:38	08:41:36 .. ..
35°	04:13:02	04:45:15	05:12:07	18:43:19	19:10:15	19:42:35	08:57:05 23:52:54
30°	04:24:30	04:54:27	05:19:38	18:35:41	19:00:56	19:30:59	09:10:31 23:39:29
20°	04:42:36	05:09:35	05:32:32	18:22:38	18:45:37	19:12:39	09:33:27 23:16:36
N 10°	04:56:33	05:21:57	05:43:42	18:11:19	18:33:06	18:58:31	09:53:21 22:56:44
0°	05:07:56	05:32:43	05:54:04	18:00:50	18:22:11	18:47:00	10:11:57 22:38:09
S 10°	05:17:40	05:42:41	06:04:19	17:50:28	18:12:06	18:37:08	10:30:34 22:19:33
20°	05:26:20	05:52:27	06:15:08	17:39:32	18:02:13	18:28:20	10:50:33 21:59:35
30°	05:34:25	06:02:42	06:27:22	17:27:10	17:51:50	18:20:07	11:13:38 21:36:30
35°	05:38:21	06:08:15	06:34:25	17:20:04	17:46:13	18:16:05	11:27:12 21:22:57
40°	05:42:20	06:14:18	06:42:23	17:12:01	17:40:05	18:12:02	11:42:53 21:07:17
45°	05:46:23	06:21:03	06:51:38	17:02:40	17:33:15	18:07:52	12:01:35 20:48:35
S 50°	05:50:39	06:28:49	07:02:46	16:51:28	17:25:22	18:03:30	12:24:55 20:25:16
52°	05:52:26	06:32:19	07:07:55	16:46:16	17:21:49	18:01:39	12:36:08 20:14:03
54°	05:54:17	06:36:07	07:13:35	16:40:33	17:17:59	17:59:45	12:48:50 20:01:21
56°	05:56:13	06:40:15	07:19:53	16:34:12	17:13:48	17:57:45	13:03:28 19:46:43
58°	05:58:15	06:44:47	07:26:57	16:27:05	17:09:12	17:55:39	13:20:43 19:29:29
S 60°	06:00:24	06:49:50	07:34:56	16:19:02	17:04:05	17:53:26	13:41:40 19:08:32




Apr 28	SHA	Mer.pass
Venus	283°49.6	14:37:56
Mars	37°30.9	07:03:54
Jupiter	61°07.8	05:28:56
Saturn	55°54.6	05:49:44

29 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	02:05:17	21:55:50	—:—	—:—	
N 70°	—:—	—:—	02:40:09	21:18:50	—:—	—:—	
68°	—:—	01:22:59	03:04:48	20:53:10	22:40:11	—:—	
66°	—:—	02:04:53	03:23:45	20:33:36	21:54:34	—:—	05:39:17 04:08:22
64°	—:—	02:32:33	03:38:59	20:17:55	21:25:35	—:—	06:43:13 03:04:16
62°	01:13:08	02:53:26	03:51:38	20:04:57	21:03:59	22:49:08	07:17:58 02:29:23
60°	01:50:59	03:10:10	04:02:23	19:53:58	20:46:47	22:08:00	07:43:12 02:04:00
N 58°	02:16:30	03:24:03	04:11:40	19:44:29	20:32:34	21:41:19	08:03:11 01:43:54
56°	02:36:06	03:35:51	04:19:49	19:36:10	20:20:29	21:21:05	08:19:44 01:27:14
54°	02:52:01	03:46:05	04:27:03	19:28:49	20:10:03	21:04:44	08:33:51 01:13:00
52°	03:05:25	03:55:05	04:33:31	19:22:13	20:00:54	20:51:02	08:46:08 01:00:37
50°	03:16:56	04:03:04	04:39:22	19:16:16	19:52:46	20:39:17	08:57:00 00:49:39
45°	03:40:01	04:19:45	04:51:54	19:03:32	19:35:50	20:15:48	09:19:40 00:26:46
N 40°	03:57:39	04:33:04	05:02:14	18:53:03	19:22:19	19:57:53	09:37:52 00:08:22
35°	04:11:46	04:44:05	05:11:01	18:44:08	19:11:08	19:43:35	09:53:09 .. ..
30°	04:23:26	04:53:28	05:18:43	18:36:20	19:01:38	19:31:46	10:06:24 .. ..
20°	04:41:52	05:08:55	05:31:54	18:22:59	18:46:00	19:13:06	10:28:59 .. ..
N 10°	04:56:06	05:21:32	05:43:19	18:11:25	18:33:14	18:58:42	10:48:33 23:50:54
0°	05:07:44	05:32:33	05:53:55	18:00:42	18:22:05	18:46:56	11:06:48 23:33:18
S 10°	05:17:41	05:42:45	06:04:24	17:50:06	18:11:46	18:36:50	11:25:04 23:15:39
20°	05:26:36	05:52:46	06:15:29	17:38:55	18:01:38	18:27:47	11:44:37 22:56:42
30°	05:34:58	06:03:17	06:28:00	17:26:16	17:50:59	18:19:18	12:07:09 22:34:46
35°	05:39:04	06:09:00	06:35:13	17:19:00	17:45:12	18:15:07	12:20:22 22:21:53
40°	05:43:13	06:15:14	06:43:22	17:10:46	17:38:53	18:10:53	12:35:35 22:07:01
45°	05:47:29	06:22:11	06:52:52	17:01:11	17:31:50	18:06:31	12:53:42 21:49:18
S 50°	05:51:59	06:30:14	07:04:16	16:49:42	17:23:42	18:01:54	13:16:11 21:27:15
52°	05:53:53	06:33:51	07:09:33	16:44:22	17:20:02	17:59:57	13:26:56 21:16:41
54°	05:55:51	06:37:46	07:15:23	16:38:30	17:16:04	17:57:55	13:39:04 21:04:45
56°	05:57:55	06:42:03	07:21:51	16:31:59	17:11:44	17:55:47	13:52:58 20:51:03
58°	06:00:06	06:46:45	07:29:06	16:24:41	17:06:58	17:53:32	14:09:13 20:35:02
S 60°	06:02:25	06:51:59	07:37:19	16:16:24	17:01:41	17:51:09	14:28:43 20:15:46


Apr 29	SHA	Mer.pass
Venus	283°16.8	14:36:07
Mars	36°49.5	07:02:43
Jupiter	61°04.6	05:25:13
Saturn	55°53.3	05:45:53

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
	mm:ss	mm:ss	hh:mm:ss	hh:mm:ss	hh:mm:ss	
28	02:29	02:33	11:57:27	16:25:01	03:57:55	5(26%)
29	02:37	02:41	11:57:19	17:20:04	04:52:27	6(36%)

2020 April 30 to May. 01

30 April 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	01:57:18	22:03:58	—:—	—:—	
N 70°	—:—	—:—	02:34:25	21:24:27	—:—	—:—	
68°	—:—	01:13:14	03:00:11	20:57:36	22:50:55	—:—	
66°	—:—	01:58:54	03:19:49	20:37:18	22:00:31	—:—	07:31:45 04:11:33
64°	—:—	02:27:57	03:35:34	20:21:06	21:30:01	—:—	08:10:54 03:31:55
62°	01:04:31	02:49:37	03:48:36	20:07:45	21:07:35	22:58:36	08:38:06 03:04:17
60°	01:45:41	03:06:52	03:59:39	19:56:27	20:49:50	22:13:14	08:59:08 02:42:50
N 58°	02:12:25	03:21:09	04:09:11	19:46:43	20:35:13	21:45:13	09:16:19 02:25:18
56°	02:32:42	03:33:15	04:17:32	19:38:12	20:22:50	21:24:16	09:30:47 02:10:29
54°	02:49:05	03:43:44	04:24:57	19:30:39	20:12:09	21:07:26	09:43:16 01:57:41
52°	03:02:49	03:52:55	04:31:35	19:23:54	20:02:48	20:53:23	09:54:13 01:46:26
50°	03:14:36	04:01:05	04:37:34	19:17:48	19:54:30	20:41:21	10:03:57 01:36:25
45°	03:38:10	04:18:07	04:50:24	19:04:47	19:37:12	20:17:23	10:24:23 01:15:20
N 40°	03:56:09	04:31:42	05:00:58	18:54:04	19:23:25	19:59:08	10:40:55 00:58:14
35°	04:10:31	04:42:57	05:09:57	18:44:57	19:12:02	19:44:34	10:54:49 00:43:48
30°	04:22:24	04:52:31	05:17:49	18:36:59	19:02:20	19:32:33	11:06:55 00:31:13
20°	04:41:09	05:08:15	05:31:17	18:23:20	18:46:24	19:13:33	11:27:33 00:09:40
N 10°	04:55:39	05:21:08	05:42:57	18:11:32	18:33:22	18:58:53	11:45:26 .. ..
0°	05:07:32	05:32:23	05:53:47	18:00:35	18:22:00	18:46:53	12:02:08 .. ..
S 10°	05:17:43	05:42:49	06:04:30	17:49:45	18:11:27	18:36:33	12:18:48 .. ..
20°	05:26:53	05:53:04	06:15:49	17:38:19	18:01:04	18:27:16	12:36:36 23:56:16
30°	05:35:31	06:03:52	06:28:38	17:25:23	17:50:09	18:18:30	12:57:02 23:37:01
35°	05:39:46	06:09:45	06:36:00	17:17:57	17:44:12	18:14:09	13:08:58 23:25:44
40°	05:44:06	06:16:09	06:44:21	17:09:32	17:37:43	18:09:45	13:22:38 23:12:45
45°	05:48:34	06:23:20	06:54:05	16:59:43	17:30:27	18:05:11	13:38:47 22:57:21
S 50°	05:53:19	06:31:37	07:05:46	16:47:57	17:22:03	18:00:20	13:58:37 22:38:22
52°	05:55:19	06:35:22	07:11:11	16:42:29	17:18:16	17:58:16	14:08:01 22:29:21
54°	05:57:25	06:39:25	07:17:10	16:36:28	17:14:10	17:56:07	14:18:31 22:19:14
56°	05:59:37	06:43:50	07:23:48	16:29:47	17:09:42	17:53:51	14:30:25 22:07:46
58°	06:01:56	06:48:43	07:31:15	16:22:17	17:04:46	17:51:28	14:44:06 21:54:32
S 60°	06:04:25	06:54:07	07:39:42	16:13:47	16:59:18	17:48:54	15:00:09 21:38:58

Apr 30	SHA	Mer.pass
Venus	282°45.8	14:34:10
Mars	36°08.2	07:01:32
Jupiter	61°01.6	05:21:29
Saturn	55°52.1	05:42:02

01 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	01:48:57	22:12:37	—:—	—:—	
N 70°	—:—	—:—	02:28:34	21:30:13	—:—	—:—	07:58:50 05:41:17
68°	—:—	01:02:15	02:55:31	21:02:05	23:03:39	—:—	08:55:25 04:43:41
66°	—:—	01:52:44	03:15:54	20:41:01	22:06:42	—:—	09:28:44 04:09:28
64°	—:—	02:23:18	03:32:09	20:24:18	21:34:31	—:—	09:52:57 03:44:27
62°	00:54:49	02:45:47	03:45:34	20:10:32	21:11:13	23:09:49	10:11:57 03:24:42
60°	01:40:13	03:03:35	03:56:56	19:58:56	20:52:54	22:18:42	10:27:32 03:08:27
N 58°	02:08:17	03:18:15	04:06:43	19:48:56	20:37:53	21:49:13	10:40:41 02:54:41
56°	02:29:17	03:30:40	04:15:17	19:40:12	20:25:12	21:27:28	10:52:00 02:42:48
54°	02:46:09	03:41:24	04:22:52	19:32:29	20:14:16	21:10:09	11:01:55 02:32:21
52°	03:00:14	03:50:48	04:29:40	19:25:34	20:04:41	20:55:44	11:10:43 02:23:03
50°	03:12:17	03:59:08	04:35:48	19:19:20	19:56:13	20:43:26	11:18:36 02:14:42
45°	03:36:21	04:16:31	04:48:55	19:06:01	19:38:34	20:18:58	11:35:19 01:56:55
N 40°	03:54:39	04:30:22	04:59:43	18:55:04	19:24:31	20:00:23	11:48:59 01:42:19
35°	04:09:17	04:41:49	05:08:54	18:45:46	19:12:55	19:45:34	12:00:33 01:29:54
30°	04:21:22	04:51:34	05:16:55	18:37:37	19:03:03	19:33:20	12:10:39 01:19:01
20°	04:40:27	05:07:37	05:30:41	18:23:42	18:46:49	19:14:01	12:27:56 01:00:16
N 10°	04:55:13	05:20:45	05:42:36	18:11:39	18:33:31	18:59:05	12:42:57 00:43:51
0°	05:07:20	05:32:14	05:53:39	18:00:28	18:21:55	18:46:50	12:56:59 00:28:26
S 10°	05:17:46	05:42:53	06:04:36	17:49:25	18:11:09	18:36:17	13:10:58 00:12:55
20°	05:27:10	05:53:23	06:16:10	17:37:44	18:00:31	18:26:45	13:25:52 .. ..
30°	05:36:04	06:04:27	06:29:16	17:24:31	17:49:19	18:17:43	13:42:53 .. ..
35°	05:40:29	06:10:30	06:36:48	17:16:55	17:43:13	18:13:13	13:52:45 .. ..
40°	05:44:58	06:17:05	06:45:21	17:08:18	17:36:33	18:08:38	14:04:00 .. ..
45°	05:49:39	06:24:28	06:55:17	16:58:17	17:29:05	18:03:52	14:17:12 .. ..
S 50°	05:54:38	06:33:01	07:07:15	16:46:14	17:20:26	17:58:47	14:33:12 23:55:43
52°	05:56:45	06:36:52	07:12:49	16:40:38	17:16:32	17:56:37	14:40:41 23:48:48
54°	05:58:58	06:41:03	07:18:56	16:34:28	17:12:18	17:54:21	14:48:58 23:41:05
56°	06:01:18	06:45:37	07:25:45	16:27:37	17:07:41	17:51:57	14:58:15 23:32:27
58°	06:03:46	06:50:39	07:33:23	16:19:55	17:02:36	17:49:25	15:08:45 23:22:37
S 60°	06:06:25	06:56:15	07:42:04	16:11:11	16:56:57	17:46:42	15:20:48 23:11:19

May 01	SHA	Mer.pass
Venus	282°16.5	14:32:07
Mars	35°27.0	07:00:20
Jupiter	60°58.8	05:17:44
Saturn	55°51.0	05:38:10

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
30	02:45	02:49	11:57:11	18:15:19	05:47:43	7(46%)
01	02:53	02:56	11:57:04	19:09:54	06:42:43	8(57%)

2020 May 02 to May. 03

02 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	01:40:05	22:21:55	—:—	—:—	10:08:56
N 70°	—:—	—:—	02:22:36	21:36:07	—:—	—:—	10:42:23
68°	—:—	00:49:19	02:50:49	21:06:37	23:20:24	—:—	11:06:14
66°	—:—	01:46:20	03:11:58	20:44:45	22:13:10	—:—	11:24:37
64°	—:—	02:18:34	03:28:45	20:27:29	21:39:07	—:—	11:39:25
62°	00:43:22	02:41:56	03:42:34	20:13:20	21:14:53	23:24:38	11:51:42
60°	01:34:32	03:00:18	03:54:14	20:01:24	20:56:00	22:24:26	12:02:08
N 58°	02:04:04	03:15:22	04:04:16	19:51:10	20:40:33	21:53:17	12:11:09
56°	02:25:51	03:28:06	04:13:03	19:42:13	20:27:33	21:30:44	12:19:03
54°	02:43:13	03:39:04	04:20:49	19:34:19	20:16:22	21:12:53	12:26:03
52°	02:57:39	03:48:41	04:27:46	19:27:15	20:06:35	20:58:06	12:32:20
50°	03:09:59	03:57:12	04:34:03	19:20:52	19:57:55	20:45:31	12:38:00
45°	03:34:32	04:14:55	04:47:27	19:07:15	19:39:56	20:20:33	12:50:09
N 40°	03:53:11	04:29:03	04:58:29	18:56:04	19:25:37	20:01:38	13:00:11
35°	04:08:04	04:40:43	05:07:51	18:46:34	19:13:48	19:46:34	13:08:44
30°	04:20:21	04:50:38	05:16:03	18:38:16	19:03:45	19:34:07	13:16:13
20°	04:39:46	05:06:59	05:30:06	18:24:04	18:47:13	19:14:29	13:29:06
N 10°	04:54:48	05:20:22	05:42:15	18:11:46	18:33:41	18:59:17	13:40:20
0°	05:07:09	05:32:05	05:53:32	18:00:22	18:21:51	18:46:48	13:50:49
S 10°	05:17:48	05:42:58	06:04:43	17:49:05	18:10:51	18:36:01	14:01:17
20°	05:27:27	05:53:42	06:16:31	17:37:10	17:59:59	18:26:15	14:12:24
30°	05:36:37	06:05:03	06:29:54	17:23:41	17:48:31	18:16:57	14:25:03
35°	05:41:11	06:11:14	06:37:36	17:15:55	17:42:16	18:12:18	14:32:21
40°	05:45:51	06:18:00	06:46:20	17:07:07	17:35:25	18:07:33	14:40:38
45°	05:50:43	06:25:36	06:56:30	16:56:52	17:27:44	18:02:35	14:50:16
S 50°	05:55:56	06:34:24	07:08:45	16:44:32	17:18:51	17:57:16	15:01:49
52°	05:58:10	06:38:22	07:14:26	16:38:48	17:14:50	17:54:59	15:07:10
54°	06:00:30	06:42:41	07:20:42	16:32:29	17:10:28	17:52:36	15:13:03
56°	06:02:58	06:47:24	07:27:41	16:25:28	17:05:43	17:50:05	15:19:34
58°	06:05:35	06:52:35	07:35:31	16:17:35	17:00:28	17:47:24	15:26:51
S 60°	06:08:23	06:58:22	07:44:26	16:08:37	16:54:37	17:44:31	15:35:05

May 02	SHA	Mer.pass
Venus	281° 49.1	14:29:55
Mars	34° 45.9	06:59:07
Jupiter	60° 56.2	05:13:58
Saturn	55° 50.0	05:34:18

03 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	01:30:37	22:32:03	—:—	—:—	12:42:54
N 70°	—:—	—:—	02:16:30	21:42:11	—:—	—:—	12:57:33
68°	—:—	00:32:22	02:46:06	21:11:12	—:—	—:—	13:09:10
66°	—:—	01:39:40	03:08:02	20:48:31	22:19:59	—:—	13:18:40
64°	—:—	02:13:46	03:25:21	20:30:41	21:43:49	—:—	13:26:37
62°	00:28:22	02:38:04	03:39:34	20:16:07	21:18:36	—:—	13:33:22
60°	01:28:37	02:57:00	03:51:33	20:03:53	20:59:06	22:30:28	13:39:13
N 58°	01:59:48	03:12:30	04:01:51	19:53:23	20:43:14	21:57:27	13:44:21
56°	02:22:24	03:25:33	04:10:51	19:44:13	20:29:54	21:34:01	13:48:53
54°	02:40:17	03:36:46	04:18:48	19:36:08	20:18:28	21:15:38	13:52:57
52°	02:55:05	03:46:35	04:25:54	19:28:54	20:08:28	21:00:29	13:56:37
50°	03:07:42	03:55:17	04:32:19	19:22:23	19:59:38	20:47:37	13:59:57
45°	03:32:44	04:13:21	04:46:01	19:08:29	19:41:17	20:22:09	14:07:08
N 40°	03:51:44	04:27:44	04:57:16	18:57:05	19:26:42	20:02:53	14:13:06
35°	04:06:52	04:39:37	05:06:50	18:47:23	19:14:41	19:47:33	14:18:14
30°	04:19:21	04:49:44	05:15:12	18:38:55	19:04:27	19:34:55	14:22:44
20°	04:39:06	05:06:22	05:29:31	18:24:26	18:47:38	19:14:57	14:30:31
N 10°	04:54:23	05:20:00	05:41:55	18:11:54	18:33:51	18:59:29	14:37:20
0°	05:06:58	05:31:56	05:53:26	18:00:16	18:21:47	18:46:46	14:43:42
S 10°	05:17:51	05:43:03	06:04:50	17:48:46	18:10:34	18:35:46	14:50:04
20°	05:27:44	05:54:01	06:16:53	17:36:37	17:59:28	18:25:46	14:56:49
30°	05:37:10	06:05:38	06:30:32	17:22:51	17:47:44	18:16:12	15:04:29
35°	05:41:53	06:11:59	06:38:23	17:14:55	17:41:19	18:11:25	15:08:54
40°	05:46:43	06:18:55	06:47:18	17:05:56	17:34:18	18:06:29	15:13:53
45°	05:51:47	06:26:43	06:57:42	16:55:28	17:26:25	18:01:20	15:19:39
S 50°	05:57:14	06:35:46	07:10:13	16:42:51	17:17:17	17:55:47	15:26:31
52°	05:59:34	06:39:52	07:16:03	16:37:00	17:13:09	17:53:24	15:29:40
54°	06:02:01	06:44:18	07:22:28	16:30:32	17:08:40	17:50:53	15:33:08
56°	06:04:37	06:49:09	07:29:37	16:23:20	17:03:45	17:48:15	15:36:56
58°	06:07:22	06:54:31	07:37:39	16:15:16	16:58:21	17:45:25	15:41:09
S 60°	06:10:21	07:00:29	07:46:47	16:06:04	16:52:20	17:42:23	15:45:53

May 03	SHA	Mer.pass
Venus	281° 23.6	14:27:36
Mars	34° 04.9	06:57:55
Jupiter	60° 53.8	05:10:11
Saturn	55° 49.1	05:30:26

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
	mm:ss	mm:ss	hh:mm:ss	hh:mm:ss	hh:mm:ss	
02	03:00	03:03	11:56:57	20:03:28	07:36:49	9(68%)
03	03:06	03:09	11:56:51	20:56:08	08:29:53	10(78%)

2020 May 04 to May. 05

04 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	01:20:18	22:43:25	—:—	—:—	15:02:24
N 70°	—:—	—:—	02:10:16	21:48:26	—:—	—:—	15:06:10
68°	—:—	—:—	02:41:19	21:15:51	—:—	—:—	15:09:14
66°	—:—	01:32:40	03:04:06	20:52:17	22:27:13	—:—	15:11:47
64°	—:—	02:08:54	03:21:59	20:33:54	21:48:37	—:—	15:13:58
62°	—:—	02:34:10	03:36:36	20:18:55	21:22:21	—:—	15:15:50
60°	01:22:24	02:53:43	03:48:54	20:06:21	21:02:13	22:36:52	15:17:27
N 58°	01:55:27	03:09:38	03:59:27	19:55:35	20:45:55	22:01:43	15:18:53
56°	02:18:55	03:23:00	04:08:39	19:46:13	20:32:15	21:37:21	15:20:10
54°	02:37:20	03:34:29	04:16:47	19:37:56	20:20:33	21:18:24	15:21:19
52°	02:52:32	03:44:31	04:24:03	19:30:33	20:10:21	21:02:52	15:22:22
50°	03:05:26	03:53:23	04:30:37	19:23:54	20:01:20	20:49:42	15:23:19
45°	03:30:58	04:11:48	04:44:35	19:09:43	19:42:39	20:23:44	15:25:23
N 40°	03:50:17	04:26:27	04:56:05	18:58:05	19:27:48	20:04:08	15:27:06
35°	04:05:41	04:38:33	05:05:50	18:48:12	19:15:34	19:48:33	15:28:35
30°	04:18:22	04:48:50	05:14:22	18:39:34	19:05:09	19:35:42	15:29:54
20°	04:38:26	05:05:46	05:28:58	18:24:48	18:48:02	19:15:25	15:32:12
N 10°	04:53:59	05:19:39	05:41:36	18:12:02	18:34:01	18:59:42	15:34:13
0°	05:06:48	05:31:48	05:53:20	18:00:11	18:21:44	18:46:45	15:36:07
S 10°	05:17:55	05:43:08	06:04:57	17:48:28	18:10:17	18:35:31	15:38:02
20°	05:28:01	05:54:21	06:17:14	17:36:04	17:58:58	18:25:18	15:40:05
30°	05:37:42	06:06:13	06:31:09	17:22:02	17:46:58	18:15:28	15:42:25
35°	05:42:35	06:12:43	06:39:11	17:13:57	17:40:24	18:10:32	15:43:46
40°	05:47:35	06:19:50	06:48:17	17:04:47	17:33:13	18:05:27	15:45:17
45°	05:52:50	06:27:50	06:58:54	16:54:05	17:25:08	18:00:06	15:47:03
S 50°	05:58:31	06:37:08	07:11:42	16:41:12	17:15:45	17:54:19	15:49:09
52°	06:00:58	06:41:20	07:17:39	16:35:13	17:11:30	17:51:50	15:50:06
54°	06:03:32	06:45:55	07:24:13	16:28:36	17:06:53	17:49:13	15:51:09
56°	06:06:15	06:50:54	07:31:32	16:21:15	17:01:50	17:46:26	15:52:19
58°	06:09:09	06:56:25	07:39:46	16:12:58	16:56:16	17:43:28	15:53:35
S 60°	06:12:17	07:02:34	07:49:08	16:03:33	16:50:04	17:40:16	15:55:01

May 04	SHA	Mer.pass
Venus	281°00.2	14:25:09
Mars	33°24.0	06:56:42
Jupiter	60°51.6	05:06:24
Saturn	55°48.3	05:26:33

05 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	01:08:47	22:56:40	—:—	—:—	17:20:34
N 70°	—:—	—:—	02:03:51	21:54:54	—:—	—:—	17:14:36
68°	—:—	—:—	02:36:31	21:20:35	—:—	—:—	17:09:45
66°	—:—	01:25:17	03:00:09	20:56:06	22:34:58	—:—	17:05:44
64°	—:—	02:03:56	03:18:37	20:37:07	21:53:33	—:—	17:02:20
62°	—:—	02:30:15	03:33:39	20:21:42	21:26:09	—:—	16:59:25
60°	01:15:49	02:50:26	03:46:16	20:08:49	21:05:21	22:43:45	16:56:53
N 58°	01:51:01	03:06:47	03:57:05	19:57:47	20:48:36	22:06:05	16:54:39
56°	02:15:25	03:20:29	04:06:30	19:48:12	20:34:37	21:40:43	16:52:40
54°	02:34:24	03:32:13	04:14:49	19:39:45	20:22:39	21:21:12	16:50:54
52°	02:49:58	03:42:28	04:22:14	19:32:12	20:12:14	21:05:15	16:49:17
50°	03:03:10	03:51:31	04:28:56	19:25:25	20:03:02	20:51:48	16:47:50
45°	03:29:13	04:10:17	04:43:12	19:10:56	19:44:00	20:25:19	16:44:41
N 40°	03:48:52	04:25:12	04:54:55	18:59:04	19:28:53	20:05:23	16:42:03
35°	04:04:31	04:37:30	05:04:51	18:49:00	19:16:26	19:49:33	16:39:49
30°	04:17:24	04:47:57	05:13:33	18:40:13	19:05:52	19:36:30	16:37:51
20°	04:37:47	05:05:11	05:28:25	18:25:11	18:48:27	19:15:54	16:34:28
N 10°	04:53:36	05:19:18	05:41:17	18:12:11	18:34:11	18:59:56	16:31:33
0°	05:06:39	05:31:41	05:53:14	18:00:07	18:21:41	18:46:45	16:28:50
S 10°	05:17:58	05:43:14	06:05:05	17:48:10	18:10:02	18:35:18	16:26:10
20°	05:28:19	05:54:40	06:17:36	17:35:33	17:58:28	18:24:50	16:23:22
30°	05:38:15	06:06:49	06:31:47	17:21:15	17:46:13	18:14:46	16:20:13
35°	05:43:16	06:13:28	06:39:58	17:13:00	17:39:30	18:09:41	16:18:26
40°	05:48:26	06:20:45	06:49:16	17:03:39	17:32:09	18:04:26	16:16:25
45°	05:53:54	06:28:57	07:00:06	16:52:44	17:23:51	17:58:54	16:14:07
S 50°	05:59:48	06:38:29	07:13:10	16:39:35	17:14:14	17:52:53	16:11:23
52°	06:02:21	06:42:49	07:19:15	16:33:28	17:09:52	17:50:18	16:10:08
54°	06:05:02	06:47:30	07:25:58	16:26:42	17:05:08	17:47:34	16:08:47
56°	06:07:52	06:52:39	07:33:27	16:19:11	16:59:57	17:44:40	16:07:18
58°	06:10:55	06:58:19	07:41:53	16:10:42	16:54:13	17:41:33	16:05:39
S 60°	06:14:12	07:04:39	07:51:29	16:01:03	16:47:50	17:38:12	16:03:49

May 05	SHA	Mer.pass
Venus	280°38.8	14:22:33
Mars	32°43.2	06:55:28
Jupiter	60°49.6	05:02:36
Saturn	55°47.6	05:22:40

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
04	03:12	03:14	11:56:46	21:48:32	09:22:20	11(87%)
05	03:17	03:20	11:56:40	22:41:27	10:14:52	12(94%)



06 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	00:55:24	23:13:34	—:—	—:—	19:46:28
N 70°	—:—	—:—	01:57:15	22:01:38	—:—	—:—	19:28:13
68°	—:—	—:—	02:31:39	21:25:22	—:—	—:—	19:13:58
66°	—:—	01:17:23	02:56:13	20:59:55	22:43:25	—:—	19:02:27
64°	—:—	01:58:52	03:15:15	20:40:20	21:58:36	—:—	18:52:53
62°	—:—	02:26:19	03:30:43	20:24:29	21:29:59	—:—	18:44:47
60°	01:08:47	02:47:09	03:43:40	20:11:16	21:08:30	22:51:16	18:37:49
N 58°	01:46:30	03:03:57	03:54:44	19:59:59	20:51:17	22:10:35	18:31:44
56°	02:11:54	03:17:59	04:04:22	19:50:11	20:36:58	21:44:09	18:26:21
54°	02:31:28	03:29:59	04:12:52	19:41:32	20:24:44	21:24:00	18:21:33
52°	02:47:26	03:40:26	04:20:27	19:33:50	20:14:07	21:07:39	18:17:14
50°	03:00:55	03:49:40	04:27:16	19:26:55	20:04:44	20:53:54	18:13:19
45°	03:27:28	04:08:47	04:41:49	19:12:09	19:45:20	20:26:54	18:04:54
N 40°	03:47:28	04:23:57	04:53:46	19:00:04	19:29:59	20:06:37	17:57:55
35°	04:03:22	04:36:28	05:03:54	18:49:48	19:17:19	19:50:32	17:51:58
30°	04:16:28	04:47:06	05:12:45	18:40:52	19:06:34	19:37:18	17:46:44
20°	04:37:09	05:04:36	05:27:53	18:25:33	18:48:53	19:16:23	17:37:46
N 10°	04:53:13	05:18:58	05:41:00	18:12:19	18:34:22	19:00:09	17:29:57
0°	05:06:30	05:31:34	05:53:10	18:00:03	18:21:39	18:46:45	17:22:42
S 10°	05:18:02	05:43:20	06:05:13	17:47:53	18:09:47	18:35:05	17:15:30
20°	05:28:36	05:55:00	06:17:58	17:35:02	17:58:00	18:24:24	17:07:55
30°	05:38:48	06:07:24	06:32:25	17:20:28	17:45:29	18:14:05	16:59:21
35°	05:43:58	06:14:12	06:40:46	17:12:04	17:38:37	18:08:51	16:54:26
40°	05:49:18	06:21:39	06:50:14	17:02:32	17:31:06	18:03:26	16:48:54
45°	05:54:56	06:30:04	07:01:17	16:51:24	17:22:37	17:57:43	16:42:31
S 50°	06:01:04	06:39:50	07:14:37	16:37:59	17:12:45	17:51:29	16:34:55
52°	06:03:43	06:44:16	07:20:50	16:31:44	17:08:16	17:48:47	16:31:25
54°	06:06:31	06:49:05	07:27:42	16:24:50	17:03:25	17:45:57	16:27:36
56°	06:09:29	06:54:22	07:35:21	16:17:08	16:58:05	17:42:55	16:23:24
58°	06:12:40	07:00:12	07:43:59	16:08:28	16:52:12	17:39:41	16:18:44
S 60°	06:16:06	07:06:43	07:53:49	15:58:35	16:45:38	17:36:10	16:13:31

May 06	SHA	Mer.pass
Venus	280° 19.6	14:19:48
Mars	32° 02.5	06:54:15
Jupiter	60° 47.7	04:58:47
Saturn	55° 47.0	05:18:46

07 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	00:38:23	23:45:40	—:—	—:—	22:42:37
N 70°	—:—	—:—	01:50:24	22:08:39	—:—	—:—	21:55:42
68°	—:—	—:—	02:26:45	21:30:14	—:—	—:—	21:25:38
66°	—:—	01:08:49	02:52:16	21:03:46	22:52:49	—:—	21:03:25
64°	—:—	01:53:41	03:11:55	20:43:33	22:03:48	—:—	20:45:57
62°	—:—	02:22:21	03:27:49	20:27:16	21:33:52	—:—	20:31:39
60°	01:01:09	02:43:53	03:41:05	20:13:43	21:11:40	22:59:39	20:19:38
N 58°	01:41:52	03:01:08	03:52:25	20:02:10	20:53:59	22:15:13	20:09:19
56°	02:08:21	03:15:30	04:02:16	19:52:09	20:39:19	21:47:36	20:00:20
54°	02:28:31	03:27:46	04:10:56	19:43:20	20:26:50	21:26:50	19:52:24
52°	02:44:54	03:38:26	04:18:41	19:35:28	20:15:59	21:10:03	19:45:19
50°	02:58:42	03:47:50	04:25:39	19:28:24	20:06:26	20:55:59	19:38:56
45°	03:25:45	04:07:18	04:40:29	19:13:22	19:46:41	20:28:29	19:25:19
N 40°	03:46:06	04:22:44	04:52:38	19:01:03	19:31:04	20:07:52	19:14:08
35°	04:02:14	04:35:27	05:02:57	18:50:37	19:18:12	19:51:32	19:04:38
30°	04:15:32	04:46:15	05:11:58	18:41:30	19:07:16	19:38:05	18:56:20
20°	04:36:33	05:04:03	05:27:22	18:25:56	18:49:18	19:16:52	18:42:07
N 10°	04:52:52	05:18:39	05:40:42	18:12:29	18:34:34	19:00:23	18:29:47
0°	05:06:21	05:31:28	05:53:05	17:59:59	18:21:37	18:46:46	18:18:19
S 10°	05:18:07	05:43:26	06:05:21	17:47:37	18:09:33	18:34:53	18:06:55
20°	05:28:54	05:55:20	06:18:20	17:34:33	17:57:32	18:23:59	17:54:52
30°	05:39:21	06:07:59	06:33:03	17:19:43	17:44:47	18:13:24	17:41:11
35°	05:44:39	06:14:56	06:41:33	17:11:09	17:37:46	18:08:02	17:33:18
40°	05:50:09	06:22:33	06:51:12	17:01:27	17:30:04	18:02:28	17:24:23
45°	05:55:58	06:31:10	07:02:28	16:50:06	17:21:24	17:56:33	17:14:00
S 50°	06:02:19	06:41:11	07:16:04	16:36:25	17:11:17	17:50:06	17:01:33
52°	06:05:04	06:45:43	07:22:25	16:30:02	17:06:42	17:47:19	16:55:47
54°	06:07:59	06:50:40	07:29:26	16:22:59	17:01:43	17:44:21	16:49:26
56°	06:11:04	06:56:05	07:37:15	16:15:08	16:56:15	17:41:13	16:42:24
58°	06:14:24	07:02:04	07:46:04	16:06:16	16:50:13	17:37:50	16:34:31
S 60°	06:18:00	07:08:46	07:56:08	15:56:09	16:43:29	17:34:10	16:25:37

May 07	SHA	Mer.pass
Venus	280° 02.6	14:16:54
Mars	31° 21.9	06:53:00
Jupiter	60° 46.1	04:54:58
Saturn	55° 46.5	05:14:52

Day	Sun			Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
06	03:22	03:24	11:56:36	23:35:42	11:08:22	13(99%)
07	03:26	03:28	11:56:32	—:—	12:03:30	14(100%)

2020 May 08 to May. 09

08 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	00:06:11	—:—	—:—	—:—	01:59:36
N 70°	—:—	—:—	01:43:17	22:16:01	—:—	—:—	02:48:09
68°	—:—	—:—	02:21:47	21:35:10	—:—	—:—	03:19:39
66°	—:—	00:59:18	02:48:19	21:07:38	23:03:43	—:—	03:43:07
64°	—:—	01:48:23	03:08:35	20:46:46	22:09:10	—:—	04:01:43
62°	—:—	02:18:22	03:24:56	20:30:03	21:37:48	—:—	04:17:02
60°	00:52:39	02:40:36	03:38:32	20:16:09	21:14:51	23:09:21	04:29:59
N 58°	01:37:08	02:58:20	03:50:07	20:04:21	20:56:41	22:20:01	04:41:09
56°	02:04:46	03:13:02	04:00:11	19:54:06	20:41:40	21:51:07	04:50:55
54°	02:25:35	03:25:34	04:09:03	19:45:06	20:28:54	21:29:40	04:59:35
52°	02:42:23	03:36:27	04:16:56	19:37:05	20:17:51	21:12:28	05:07:20
50°	02:56:29	03:46:02	04:24:02	19:29:53	20:08:07	20:58:05	05:14:22
45°	03:24:04	04:05:51	04:39:09	19:14:34	19:48:01	20:30:03	05:29:25
N 40°	03:44:44	04:21:32	04:51:32	19:02:02	19:32:09	20:09:06	05:41:52
35°	04:01:08	04:34:27	05:02:02	18:51:25	19:19:04	19:52:31	05:52:30
30°	04:14:37	04:45:26	05:11:12	18:42:09	19:07:59	19:38:53	06:01:51
20°	04:35:56	05:03:30	05:26:52	18:26:19	18:49:44	19:17:21	06:17:59
N 10°	04:52:30	05:18:20	05:40:26	18:12:38	18:34:45	19:00:38	06:32:07
0°	05:06:13	05:31:22	05:53:01	17:59:56	18:21:36	18:46:47	06:45:25
S 10°	05:18:12	05:43:33	06:05:30	17:47:22	18:09:19	18:34:42	06:58:44
20°	05:29:12	05:55:40	06:18:42	17:34:04	17:57:06	18:23:34	07:13:00
30°	05:39:54	06:08:34	06:33:41	17:18:58	17:44:05	18:12:45	07:29:25
35°	05:45:20	06:15:40	06:42:20	17:10:16	17:36:56	18:07:15	07:39:00
40°	05:50:59	06:23:27	06:52:09	17:00:23	17:29:04	18:01:31	07:49:58
45°	05:57:00	06:32:15	07:03:38	16:48:50	17:20:12	17:55:26	08:02:54
S 50°	06:03:34	06:42:30	07:17:31	16:34:52	17:09:52	17:48:46	08:18:42
52°	06:06:25	06:47:10	07:23:59	16:28:22	17:05:10	17:45:52	08:26:08
54°	06:09:26	06:52:14	07:31:08	16:21:10	17:00:04	17:42:48	08:34:24
56°	06:12:39	06:57:47	07:39:08	16:13:09	16:54:28	17:39:32	08:43:43
58°	06:16:06	07:03:55	07:48:09	16:04:05	16:48:16	17:36:02	08:54:19
S 60°	06:19:51	07:10:48	07:58:27	15:53:44	16:41:21	17:32:13	09:06:34

May 08	SHA	Mer.pass
Venus	279° 47.9	14:13:51
Mars	30° 41.4	06:51:46
Jupiter	60° 44.7	04:51:07
Saturn	55° 46.1	05:10:58

09 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	□
N 70°	—:—	—:—	01:35:50	22:23:50	—:—	—:—	02:52:30
68°	—:—	—:—	02:16:46	21:40:12	—:—	—:—	03:38:25
66°	—:—	00:48:20	02:44:21	21:11:32	23:17:18	—:—	04:08:43
64°	—:—	01:42:55	03:05:17	20:50:00	22:14:44	—:—	04:31:40
62°	—:—	02:14:20	03:22:04	20:32:49	21:41:47	—:—	04:50:10
60°	00:42:52	02:37:20	03:36:00	20:18:35	21:18:03	23:21:29	05:05:36
N 58°	01:32:15	02:55:33	03:47:51	20:06:30	20:59:23	22:24:58	05:18:49
56°	02:01:10	03:10:36	03:58:08	19:56:03	20:44:01	21:54:41	05:30:21
54°	02:22:39	03:23:24	04:07:11	19:46:52	20:30:59	21:32:32	05:40:33
52°	02:39:53	03:34:29	04:15:14	19:38:42	20:19:42	21:14:53	05:49:41
50°	02:54:18	03:44:15	04:22:28	19:31:22	20:09:47	21:00:11	06:09:01
45°	03:22:24	04:04:25	04:37:51	19:15:46	19:49:21	20:31:38	06:24:47
N 40°	03:43:24	04:20:22	04:50:27	19:03:01	19:33:13	20:10:20	06:38:09
35°	04:00:02	04:33:29	05:01:08	18:52:13	19:19:57	19:53:31	06:49:50
30°	04:13:44	04:44:38	05:10:27	18:42:48	19:08:41	19:39:41	07:09:51
20°	04:35:21	05:02:59	05:26:23	18:26:43	18:50:10	19:17:50	07:27:19
N 10°	04:52:10	05:18:03	05:40:10	18:12:48	18:34:58	19:00:52	07:43:40
0°	05:06:06	05:31:17	05:52:58	17:59:54	18:21:36	18:46:49	08:00:03
S 10°	05:18:17	05:43:41	06:05:39	17:47:07	18:09:06	18:34:31	08:17:37
20°	05:29:30	05:56:01	06:19:04	17:33:36	17:56:40	18:23:11	08:37:52
30°	05:40:26	06:09:09	06:34:19	17:18:15	17:43:25	18:12:07	08:49:44
35°	05:46:01	06:16:24	06:43:07	17:09:24	17:36:07	18:06:29	09:03:22
40°	05:51:50	06:24:21	06:53:07	16:59:20	17:28:06	18:00:36	09:19:34
45°	05:58:01	06:33:20	07:04:48	16:47:35	17:19:02	17:54:20	09:39:34
S 50°	06:04:48	06:43:49	07:18:57	16:33:22	17:08:28	17:47:27	09:49:05
52°	06:07:45	06:48:35	07:25:33	16:26:44	17:03:39	17:44:27	09:59:47
54°	06:10:53	06:53:47	07:32:51	16:19:23	16:58:26	17:41:17	10:11:57
56°	06:14:13	06:59:28	07:41:00	16:11:12	16:52:42	17:37:54	10:26:02
58°	06:17:48	07:05:46	07:50:13	16:01:57	16:46:21	17:34:15	10:42:41
S 60°	06:21:42	07:12:49	08:00:45	15:51:22	16:39:15	17:30:18	

May 09	SHA	Mer.pass
Venus	279° 35.5	14:10:39
Mars	30° 01.0	06:50:31
Jupiter	60° 43.4	04:47:16
Saturn	55° 45.8	05:07:03

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
08	03:30	03:31	11:56:29	00:31:48	13:00:33	15(98%)
09	03:33	03:34	11:56:26	01:29:41	13:59:05	16(94%)

2020 May 10 to May. 11

10 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	☐
N 70°	—	—	01:27:57	22:32:13	—	—	☐
68°	—	—	02:11:40	21:45:20	—	—	☐
66°	—	00:34:40	02:40:24	21:15:27	23:39:13	—	01:18:47
64°	—	01:37:18	03:01:59	20:53:14	22:20:31	—	00:26:15
62°	—	02:10:17	03:19:14	20:35:35	21:45:50	—	☐
60°	00:30:39	02:34:04	03:33:30	20:21:00	21:21:16	23:41:04	☐
N 58°	01:27:13	02:52:46	03:45:37	20:08:40	21:02:05	22:30:09	☐
56°	01:57:32	03:08:11	03:56:07	19:57:59	20:46:21	21:58:18	☐
54°	02:19:43	03:21:15	04:05:21	19:48:37	20:33:03	21:35:25	23:50:37
52°	02:37:24	03:32:34	04:13:33	19:40:18	20:21:33	21:17:18	23:37:50
50°	02:52:07	03:42:30	04:20:55	19:32:49	20:11:27	21:02:17	23:26:33
45°	03:20:45	04:03:01	04:36:35	19:16:57	19:50:41	20:33:12	23:03:06
N 40°	03:42:06	04:19:12	04:49:24	19:03:59	19:34:17	20:11:34	22:44:19
35°	03:58:59	04:32:32	05:00:16	18:53:01	19:20:49	19:54:30	22:28:35
30°	04:12:52	04:43:51	05:09:44	18:43:27	19:09:23	19:40:28	22:14:57
20°	04:34:47	05:02:28	05:25:55	18:27:06	18:50:36	19:18:20	21:51:47
N 10°	04:51:50	05:17:46	05:39:56	18:12:59	18:35:10	19:01:08	21:31:45
0°	05:05:59	05:31:13	05:52:56	17:59:52	18:21:36	18:46:51	21:13:05
S 10°	05:18:22	05:43:48	06:05:49	17:46:53	18:08:55	18:34:21	20:54:27
20°	05:29:49	05:56:21	06:19:27	17:33:09	17:56:15	18:22:48	20:34:32
30°	05:40:59	06:09:45	06:34:57	17:17:34	17:42:46	18:11:31	20:11:36
35°	05:46:42	06:17:07	06:43:54	17:08:33	17:35:19	18:05:44	19:58:09
40°	05:52:40	06:25:14	06:54:04	16:58:19	17:27:08	17:59:42	19:42:40
45°	05:59:02	06:34:25	07:05:58	16:46:21	17:17:54	17:53:15	19:24:14
S 50°	06:06:02	06:45:08	07:20:22	16:31:53	17:07:06	17:46:10	19:01:20
52°	06:09:04	06:50:00	07:27:06	16:25:07	17:02:11	17:43:05	18:50:21
54°	06:12:18	06:55:19	07:34:32	16:17:38	16:56:50	17:39:48	18:37:58
56°	06:15:46	07:01:08	07:42:52	16:09:17	16:50:58	17:36:18	18:23:44
58°	06:19:29	07:07:35	07:52:16	15:59:50	16:44:28	17:32:31	18:07:04
S 60°	06:23:32	07:14:49	08:03:02	15:49:01	16:37:12	17:28:25	17:46:59

May 10	SHA	Mer.pass
Venus	279° 25.6	14:07:17
Mars	29° 20.7	06:49:15
Jupiter	60° 42.4	04:43:24
Saturn	55° 45.6	05:03:07

11 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	☐
N 70°	—	—	01:19:32	22:41:20	—	—	☐
68°	—	—	02:06:29	21:50:35	—	—	☐
66°	—	00:12:43	02:36:26	21:19:24	—	—	☐
64°	—	01:31:28	02:58:43	20:56:27	22:26:33	—	01:49:33
62°	—	02:06:12	03:16:25	20:38:20	21:49:56	—	01:10:56
60°	00:11:01	02:30:48	03:31:02	20:23:25	21:24:30	—	00:43:51
N 58°	01:21:59	02:50:01	03:43:25	20:10:48	21:04:47	22:35:33	00:22:43
56°	01:53:52	03:05:47	03:54:08	19:59:55	20:48:41	22:01:58	00:05:21
54°	02:16:47	03:19:08	04:03:32	19:50:22	20:35:06	21:38:19	☐
52°	02:34:55	03:30:40	04:11:54	19:41:53	20:23:23	21:19:44	☐
50°	02:49:58	03:40:47	04:19:24	19:34:17	20:13:07	21:04:23	☐
45°	03:19:07	04:01:38	04:35:21	19:18:08	19:52:00	20:34:46	23:58:04
N 40°	03:40:48	04:18:05	04:48:22	19:04:58	19:35:21	20:12:48	23:39:44
35°	03:57:56	04:31:36	04:59:25	18:53:48	19:21:41	19:55:29	23:24:20
30°	04:12:00	04:43:05	05:09:02	18:44:05	19:10:06	19:41:16	23:10:58
20°	04:34:14	05:01:59	05:25:28	18:27:30	18:51:02	19:18:50	22:48:11
N 10°	04:51:32	05:17:30	05:39:42	18:13:09	18:35:23	19:01:23	22:28:26
0°	05:05:53	05:31:09	05:52:54	17:59:51	18:21:37	18:46:54	22:10:00
S 10°	05:18:28	05:43:56	06:05:59	17:46:40	18:08:43	18:34:12	21:51:33
20°	05:30:07	05:56:22	06:19:50	17:32:43	17:55:52	18:22:27	21:31:48
30°	05:41:32	06:10:40	06:35:34	17:16:53	17:42:08	18:10:55	21:09:00
35°	05:47:23	06:17:51	06:44:40	17:07:44	17:34:33	18:05:00	20:55:37
40°	05:53:29	06:26:07	06:55:01	16:57:20	17:26:13	17:58:50	20:40:11
45°	06:00:02	06:35:29	07:07:07	16:45:09	17:16:47	17:52:13	20:21:47
S 50°	06:07:14	06:46:26	07:21:47	16:30:25	17:05:45	17:44:55	19:58:53
52°	06:10:23	06:51:24	07:28:38	16:23:32	17:00:44	17:41:44	19:47:53
54°	06:13:43	06:56:50	07:36:13	16:15:55	16:55:16	17:38:21	19:35:27
56°	06:17:17	07:02:47	07:44:42	16:07:24	16:49:16	17:34:44	19:21:09
58°	06:21:08	07:09:24	07:54:18	15:57:45	16:42:38	17:30:50	19:04:21
S 60°	06:25:20	07:16:47	08:05:18	15:46:42	16:35:11	17:26:35	18:44:02

May 11	SHA	Mer.pass
Venus	279° 18.1	14:03:45
Mars	28° 40.5	06:48:00
Jupiter	60° 41.5	04:39:32
Saturn	55° 45.5	04:59:12

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
10	03:35	03:36	11:56:24	02:28:33	14:57:54	17(88%)
11	03:37	03:38	11:56:22	03:26:55	15:55:25	18(80%)

2020 May 12 to May. 13

12 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	■
N 70°	—	—	01:10:24	22:51:30	—	—	■
68°	—	—	02:01:13	21:55:56	—	—	■
66°	—	—	02:32:28	21:23:22	—	—	03:36:09 05:14:53
64°	—	01:25:24	02:55:28	20:59:41	22:32:54	—	02:34:26 06:16:19
62°	—	02:02:04	03:13:38	20:41:05	21:54:05	—	02:00:00 06:50:30
60°	—	02:27:32	03:28:36	20:25:49	21:27:45	—	01:34:50 07:15:25
N 58°	01:16:33	02:47:17	03:41:15	20:12:56	21:07:30	22:41:15	01:14:51 07:35:10
56°	01:50:10	03:03:26	03:52:11	20:01:49	20:51:01	22:05:42	00:58:17 07:51:32
54°	02:13:51	03:17:03	04:01:46	19:52:06	20:37:09	21:41:13	00:44:07 08:05:30
52°	02:32:28	03:28:47	04:10:17	19:43:28	20:25:13	21:22:09	00:31:47 08:17:39
50°	02:47:51	03:39:06	04:17:55	19:35:43	20:14:46	21:06:28	00:20:52 08:28:24
45°	03:17:31	04:00:17	04:34:08	19:19:19	19:53:18	20:36:19	.. .. 08:50:48
N 40°	03:39:33	04:16:59	04:47:22	19:05:55	19:36:25	20:14:01	.. .. 09:08:48
35°	03:56:55	04:30:42	04:58:35	18:54:36	19:22:33	19:56:27	.. .. 09:23:53
30°	04:11:11	04:42:21	05:08:21	18:44:44	19:10:48	19:42:03	23:59:59 09:36:57
20°	04:33:42	05:01:30	05:25:02	18:27:54	18:51:28	19:19:19	23:39:06 09:59:11
N 10°	04:51:14	05:17:14	05:39:28	18:13:21	18:35:36	19:01:39	23:20:56 10:18:24
0°	05:05:47	05:31:06	05:52:52	17:59:51	18:21:38	18:46:58	23:03:55 10:36:17
S 10°	05:18:35	05:44:05	06:06:09	17:46:28	18:08:33	18:34:04	22:46:53 10:54:08
20°	05:30:26	05:57:03	06:20:13	17:32:19	17:55:29	18:22:06	22:28:37 11:13:10
30°	05:42:04	06:10:55	06:36:12	17:16:13	17:41:31	18:10:21	22:07:33 11:35:03
35°	05:48:03	06:18:34	06:45:27	17:06:56	17:33:48	18:04:18	21:55:12 11:47:51
40°	05:54:19	06:27:00	06:55:57	16:56:22	17:25:19	17:57:59	21:40:59 12:02:32
45°	06:01:02	06:36:32	07:08:16	16:43:59	17:15:42	17:51:12	21:24:05 12:19:57
S 50°	06:08:26	06:47:43	07:23:11	16:29:00	17:04:27	17:43:42	21:03:08 12:41:28
52°	06:11:41	06:52:48	07:30:09	16:21:59	16:59:20	17:40:25	20:53:09 12:51:43
54°	06:15:07	06:58:20	07:37:53	16:14:14	16:53:45	17:36:56	20:41:53 13:03:14
56°	06:18:48	07:04:26	07:46:32	16:05:32	16:47:37	17:33:12	20:29:03 13:16:22
58°	06:22:47	07:11:11	07:56:20	15:55:43	16:40:49	17:29:10	20:14:06 13:31:36
S 60°	06:27:07	07:18:45	08:07:34	15:44:26	16:33:12	17:24:47	19:56:19 13:49:44

May 12	SHA	Mer.pass
Venus	279° 13.2	14:00:03
Mars	28° 00.4	06:46:43
Jupiter	60° 40.9	04:35:38
Saturn	55° 45.6	04:55:16

13 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	■
N 70°	—	—	01:00:14	23:03:20	—	—	■
68°	—	—	01:55:52	22:01:26	—	—	04:35:12 06:06:55
66°	—	—	02:28:29	21:27:22	—	—	03:28:40 07:12:50
64°	—	01:19:02	02:52:13	21:02:55	22:39:39	—	02:52:56 07:48:01
62°	—	01:57:54	03:10:53	20:43:49	21:58:19	—	02:27:09 08:13:17
60°	—	02:24:17	03:26:11	20:28:12	21:31:00	—	02:06:51 08:33:07
N 58°	01:10:50	02:44:35	03:39:07	20:15:02	21:10:11	22:47:18	01:50:07 08:49:25
56°	01:46:25	03:01:05	03:50:16	20:03:43	20:53:20	22:09:30	01:35:56 09:03:13
54°	02:10:56	03:14:59	04:00:01	19:53:48	20:39:12	21:44:09	01:23:37 09:15:09
52°	02:30:02	03:26:57	04:08:41	19:45:01	20:27:02	21:24:35	01:12:47 09:25:38
50°	02:45:44	03:37:26	04:16:28	19:37:09	20:16:24	21:08:33	01:03:07 09:34:59
45°	03:15:57	03:58:58	04:32:56	19:20:28	19:54:36	20:37:52	00:42:44 09:54:37
N 40°	03:38:18	04:15:54	04:46:23	19:06:53	19:37:28	20:15:14	00:26:10 10:10:31
35°	03:55:55	04:29:49	04:57:46	18:55:23	19:23:25	19:57:26	00:12:11 10:23:55
30°	04:10:22	04:41:37	05:07:41	18:45:23	19:11:30	19:42:50	.. .. 10:35:33
20°	04:33:11	05:01:02	05:24:37	18:28:18	18:51:55	19:19:49	.. .. 10:55:23
N 10°	04:50:56	05:17:00	05:39:16	18:13:32	18:35:50	19:01:55	.. .. 11:12:34
0°	05:05:42	05:31:03	05:52:51	17:59:51	18:21:40	18:47:02	23:54:15 11:28:33
S 10°	05:18:41	05:44:14	06:06:20	17:46:16	18:08:24	18:33:57	23:39:31 11:44:29
20°	05:30:45	05:57:24	06:20:36	17:31:55	17:55:08	18:21:47	23:23:45 12:01:27
30°	05:42:37	06:11:30	06:36:50	17:15:35	17:40:55	18:09:48	23:05:34 12:20:51
35°	05:48:43	06:19:17	06:46:13	17:06:09	17:33:05	18:03:38	22:54:57 12:32:08
40°	05:55:08	06:27:52	06:56:54	16:55:25	17:24:26	17:57:10	22:42:47 12:45:02
45°	06:02:01	06:37:36	07:09:24	16:42:51	17:14:38	17:50:12	22:28:23 13:00:14
S 50°	06:09:37	06:48:59	07:24:34	16:27:36	17:03:10	17:42:30	22:10:42 13:18:48
52°	06:12:57	06:54:10	07:31:40	16:20:29	16:57:57	17:39:08	22:02:20 13:27:33
54°	06:16:30	06:59:50	07:39:32	16:12:34	16:52:15	17:35:33	21:53:00 13:37:18
56°	06:20:18	07:06:03	07:48:21	16:03:43	16:46:00	17:31:43	21:42:27 13:48:18
58°	06:24:24	07:12:57	07:58:20	15:53:42	16:39:03	17:27:33	21:30:21 14:00:53
S 60°	06:28:53	07:20:42	08:09:48	15:42:11	16:31:16	17:23:02	21:16:15 14:15:30

May 13	SHA	Mer.pass
Venus	279° 10.7	13:56:10
Mars	27° 20.4	06:45:27
Jupiter	60° 40.4	04:31:44
Saturn	55° 45.7	04:51:19

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
12	03:38	03:39	11:56:21	04:23:14	16:50:14	19(71%)
13	03:39	03:39	11:56:21	05:16:20	17:41:32	20(61%)

2020 May 14 to May. 15

14 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	☐
N 70°	—	—	00:48:25	23:18:19	—	—	04:42:10
68°	—	—	01:50:23	22:07:05	—	—	03:54:38
66°	—	—	02:24:30	21:31:23	—	—	03:23:46
64°	—	01:12:19	02:49:01	21:06:08	22:46:53	—	03:00:37
62°	—	01:53:41	03:08:09	20:46:32	22:02:37	—	02:42:08
60°	—	02:21:02	03:23:49	20:30:34	21:34:16	—	02:26:49
N 58°	01:04:48	02:41:53	03:37:01	20:17:08	21:12:53	22:53:48	02:13:47
56°	01:42:38	02:58:47	03:48:23	20:05:36	20:55:39	22:13:22	02:02:30
54°	02:08:01	03:12:57	03:58:19	19:55:30	20:41:13	21:47:06	01:52:33
52°	02:27:36	03:25:08	04:07:08	19:46:34	20:28:51	21:27:00	01:43:42
50°	02:43:40	03:35:48	04:15:02	19:38:34	20:18:02	21:10:38	01:35:44
45°	03:14:25	03:57:40	04:31:47	19:21:38	19:55:53	20:39:24	01:18:45
N 40°	03:37:06	04:14:51	04:45:26	19:07:50	19:38:31	20:16:26	01:04:47
35°	03:54:57	04:28:58	04:56:59	18:56:10	19:24:16	19:58:24	00:52:55
30°	04:09:35	04:40:55	05:07:03	18:46:01	19:12:12	19:43:37	00:42:30
20°	04:32:41	05:00:36	05:24:13	18:28:42	18:52:21	19:20:19	00:24:36
N 10°	04:50:40	05:16:46	05:39:04	18:13:44	18:36:04	19:02:12	00:08:56
0°	05:05:38	05:31:01	05:52:51	17:59:51	18:21:43	18:47:07	.. ..
S 10°	05:18:48	05:44:23	06:06:31	17:46:06	18:08:15	18:33:50	.. ..
20°	05:31:04	05:57:45	06:20:59	17:31:32	17:54:47	18:21:28	.. ..
30°	05:43:09	06:12:04	06:37:27	17:14:59	17:40:21	18:09:17	.. ..
35°	05:49:23	06:20:00	06:46:59	17:05:24	17:32:23	18:02:59	23:53:37
40°	05:55:56	06:28:44	06:57:49	16:54:30	17:23:35	17:56:22	23:43:57
45°	06:02:59	06:38:38	07:10:32	16:41:44	17:13:37	17:49:15	23:32:35
S 50°	06:10:48	06:50:15	07:25:57	16:26:15	17:01:56	17:41:21	23:18:47
52°	06:14:13	06:55:32	07:33:10	16:19:00	16:56:36	17:37:53	23:12:18
54°	06:17:52	07:01:19	07:41:11	16:10:57	16:50:48	17:34:12	23:05:08
56°	06:21:46	07:07:40	07:50:09	16:01:57	16:44:24	17:30:15	22:57:06
58°	06:26:00	07:14:43	08:00:20	15:51:44	16:37:19	17:25:59	22:48:01
S 60°	06:30:37	07:22:37	08:12:02	15:39:59	16:29:22	17:21:19	22:37:35

May 14	SHA	Mer.pass
Venus	279° 10.9	13:52:08
Mars	26° 40.5	06:44:10
Jupiter	60° 40.1	04:27:49
Saturn	55° 45.9	04:47:22

15 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	04:36:32
N 70°	—	—	00:33:28	23:46:13	—	—	04:02:53
68°	—	—	01:44:46	22:12:54	—	—	03:38:27
66°	—	—	02:20:31	21:35:26	—	—	03:19:24
64°	—	01:05:06	02:45:49	21:09:22	22:54:48	—	03:03:56
62°	—	01:49:25	03:05:28	20:49:15	22:06:59	—	02:50:59
60°	—	02:17:48	03:21:29	20:32:55	21:37:33	—	02:39:56
N 58°	00:58:19	02:39:13	03:34:57	20:19:13	21:15:34	23:00:55	02:30:21
56°	01:38:47	02:56:30	03:46:32	20:07:27	20:57:57	22:17:18	02:21:54
54°	02:05:06	03:10:57	03:56:39	19:57:11	20:43:14	21:50:03	02:14:23
52°	02:25:13	03:23:21	04:05:37	19:48:06	20:30:38	21:29:26	02:07:37
50°	02:41:36	03:34:12	04:13:39	19:39:58	20:19:39	21:12:42	02:01:29
45°	03:12:54	03:56:24	04:30:39	19:22:46	19:57:10	20:40:56	01:48:17
N 40°	03:35:55	04:13:50	04:44:31	19:08:46	19:39:33	20:17:38	01:37:20
35°	03:54:00	04:28:08	04:56:14	18:56:57	19:25:07	19:59:22	01:27:57
30°	04:08:49	04:40:15	05:06:26	18:46:39	19:12:54	19:44:24	01:19:42
20°	04:32:12	05:00:10	05:23:50	18:29:06	18:52:48	19:20:50	01:05:24
N 10°	04:50:24	05:16:33	05:38:53	18:13:56	18:36:18	19:02:29	00:52:52
0°	05:05:34	05:30:59	05:52:51	17:59:52	18:21:46	18:47:12	00:41:05
S 10°	05:18:56	05:44:32	06:06:43	17:45:56	18:08:07	18:33:44	00:29:16
20°	05:31:23	05:58:06	06:21:23	17:31:10	17:54:27	18:21:11	00:16:36
30°	05:43:41	06:12:39	06:38:05	17:14:23	17:39:48	18:08:46	00:02:05
35°	05:50:03	06:20:42	06:47:44	17:04:40	17:31:42	18:02:21	.. ..
40°	05:56:45	06:29:35	06:58:45	16:53:37	17:22:46	17:55:36	.. ..
45°	06:03:57	06:39:40	07:11:39	16:40:39	17:12:37	17:48:19	.. ..
S 50°	06:11:57	06:51:29	07:27:19	16:24:55	17:00:43	17:40:14	.. ..
52°	06:15:28	06:56:53	07:34:39	16:17:33	16:55:18	17:36:41	.. ..
54°	06:19:13	07:02:46	07:42:48	16:09:22	16:49:22	17:32:54	.. ..
56°	06:23:14	07:09:15	07:51:56	16:00:12	16:42:52	17:28:50	.. ..
58°	06:27:35	07:16:27	08:02:18	15:49:48	16:35:38	17:24:27	.. ..
S 60°	06:32:20	07:24:31	08:14:14	15:37:49	16:27:30	17:19:38	23:57:29

May 15	SHA	Mer.pass
Venus	279° 13.7	13:47:55
Mars	26° 00.8	06:42:52
Jupiter	60° 40.1	04:23:53
Saturn	55° 46.2	04:43:25

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
14	03:39	03:39	11:56:21	06:05:49	18:29:15	21(51%)
15	03:39	03:38	11:56:22	06:51:54	19:13:51	22(41%)

2020 May 16 to May. 17

16 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	03:59:51 11:32:45
N 70°	—:—	—:—	00:05:38	—:—	—:—	—:—	03:41:39 11:49:05
68°	—:—	—:—	01:39:01	22:18:55	—:—	—:—	03:27:09 12:01:59
66°	—:—	—:—	02:16:31	21:39:31	—:—	—:—	03:15:15 12:12:28
64°	—:—	00:57:15	02:42:39	21:12:35	23:03:40	—:—	03:05:15 12:21:13
62°	—:—	01:45:06	03:02:49	20:51:56	22:11:27	—:—	02:56:42 12:28:40
60°	—:—	02:14:34	03:19:11	20:35:14	21:40:51	—:—	02:49:16 12:35:06
N 58°	00:51:16	02:36:35	03:32:55	20:21:16	21:18:15	23:08:54	02:42:44 12:40:43
56°	01:34:54	02:54:15	03:44:43	20:09:18	21:00:14	22:21:19	02:36:55 12:45:42
54°	02:02:11	03:08:59	03:55:01	19:58:51	20:45:14	21:53:01	02:31:42 12:50:09
52°	02:22:50	03:21:37	04:04:07	19:49:37	20:32:25	21:31:51	02:26:59 12:54:10
50°	02:39:35	03:32:38	04:12:17	19:41:22	20:21:15	21:14:46	02:22:41 12:57:49
45°	03:11:25	03:55:10	04:29:33	19:23:54	19:58:26	20:42:27	02:13:21 13:05:40
N 40°	03:34:45	04:12:50	04:43:37	19:09:42	19:40:35	20:18:50	02:05:33 13:12:11
35°	03:53:04	04:27:19	04:55:29	18:57:43	19:25:58	20:00:20	01:58:50 13:17:46
30°	04:08:05	04:39:35	05:05:50	18:47:17	19:13:35	19:45:11	01:52:54 13:22:40
20°	04:31:44	04:59:46	05:23:28	18:29:30	18:53:15	19:21:20	01:42:36 13:31:07
N 10°	04:50:10	05:16:21	05:38:43	18:14:09	18:36:33	19:02:46	01:33:32 13:38:29
0°	05:05:31	05:30:58	05:52:52	17:59:54	18:21:49	18:47:18	01:25:00 13:45:21
S 10°	05:19:04	05:44:42	06:06:54	17:45:47	18:08:00	18:33:39	01:16:26 13:52:10
20°	05:31:42	05:58:28	06:21:47	17:30:50	17:54:09	18:20:54	01:07:17 13:59:24
30°	05:44:14	06:13:14	06:38:42	17:13:49	17:39:17	18:08:17	00:56:47 14:07:34
35°	05:50:43	06:21:24	06:48:30	17:03:58	17:31:03	18:01:45	00:50:42 14:12:15
40°	05:57:32	06:30:26	06:59:39	16:52:45	17:21:58	17:54:51	00:43:47 14:17:33
45°	06:04:54	06:40:41	07:12:45	16:39:36	17:11:39	17:47:25	00:35:41 14:23:41
S 50°	06:13:06	06:52:43	07:28:40	16:23:38	16:59:33	17:39:09	00:25:55 14:30:58
52°	06:16:42	06:58:13	07:36:07	16:16:08	16:54:01	17:35:30	00:21:23 14:34:20
54°	06:20:33	07:04:13	07:44:24	16:07:49	16:47:59	17:31:38	00:16:22 14:38:00
56°	06:24:40	07:10:49	07:53:42	15:58:30	16:41:21	17:27:28	00:10:48 14:42:02
58°	06:29:08	07:18:09	08:04:15	15:47:54	16:33:58	17:22:57	00:04:34 14:46:32
S 60°	06:34:01	07:26:24	08:16:26	15:35:41	16:25:41	17:18:01	.. .. 14:51:34

May 16	SHA	Mer.pass
Venus	279° 19.2	13:43:31
Mars	25° 21.1	06:41:34
Jupiter	60° 40.2	04:19:56
Saturn	55° 46.6	04:39:28

17 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	03:35:06 13:24:03
N 70°	□	□	□	□	□	□	03:25:34 13:31:11
68°	—:—	—:—	01:33:04	22:25:11	—:—	—:—	03:17:45 13:36:59
66°	—:—	—:—	02:12:31	21:43:37	—:—	—:—	03:11:12 13:41:47
64°	—:—	00:48:27	02:39:30	21:15:47	23:14:04	—:—	03:05:36 13:45:52
62°	—:—	01:40:43	03:00:11	20:54:37	22:16:00	—:—	03:00:45 13:49:21
60°	—:—	02:11:21	03:16:56	20:37:33	21:44:09	—:—	02:56:30 13:52:24
N 58°	00:43:21	02:33:58	03:30:56	20:23:18	21:20:55	23:18:16	02:52:45 13:55:05
56°	01:30:57	02:52:02	03:42:56	20:11:07	21:02:30	22:25:26	02:49:23 13:57:28
54°	01:59:17	03:07:03	03:53:25	20:00:30	20:47:13	21:56:00	02:46:21 13:59:36
52°	02:20:29	03:19:54	04:02:40	19:51:07	20:34:10	21:34:16	02:43:35 14:01:32
50°	02:37:35	03:31:06	04:10:58	19:42:44	20:22:50	21:16:49	02:41:04 14:03:18
45°	03:09:57	03:53:58	04:28:29	19:25:02	19:59:41	20:43:57	02:35:35 14:07:07
N 40°	03:33:37	04:11:52	04:42:44	19:10:38	19:41:36	20:20:01	02:30:58 14:10:17
35°	03:52:10	04:26:32	04:54:47	18:58:29	19:26:48	20:01:17	02:26:59 14:13:00
30°	04:07:21	04:38:57	05:05:15	18:47:55	19:14:17	19:45:58	02:23:27 14:15:24
20°	04:31:17	04:59:23	05:23:08	18:29:55	18:53:42	19:21:50	02:17:19 14:19:32
N 10°	04:49:56	05:16:10	05:38:34	18:14:22	18:36:48	19:03:04	02:11:54 14:23:08
0°	05:05:28	05:30:58	05:52:54	17:59:56	18:21:54	18:47:24	02:06:49 14:26:29
S 10°	05:19:12	05:44:53	06:07:07	17:45:39	18:07:53	18:33:34	02:01:42 14:29:48
20°	05:32:02	05:58:49	06:22:10	17:30:30	17:53:51	18:20:39	01:56:15 14:33:19
30°	05:44:46	06:13:48	06:39:19	17:13:16	17:38:47	18:07:49	01:50:01 14:37:17
35°	05:51:22	06:22:06	06:49:15	17:03:17	17:30:25	18:01:10	01:46:24 14:39:33
40°	05:58:20	06:31:17	07:00:34	16:51:55	17:21:12	17:54:08	01:42:19 14:42:06
45°	06:05:51	06:41:42	07:13:51	16:38:35	17:10:43	17:46:33	01:37:33 14:45:03
S 50°	06:14:14	06:53:56	07:30:00	16:22:22	16:58:24	17:38:05	01:31:50 14:48:32
52°	06:17:55	06:59:32	07:37:34	16:14:46	16:52:47	17:34:22	01:29:11 14:50:08
54°	06:21:51	07:05:38	07:45:59	16:06:19	16:46:39	17:30:24	01:26:17 14:51:53
56°	06:26:05	07:12:22	07:55:27	15:56:50	16:39:53	17:26:08	01:23:04 14:53:48
58°	06:30:40	07:19:51	08:06:11	15:46:03	16:32:22	17:21:30	01:19:29 14:55:55
S 60°	06:35:42	07:28:15	08:18:36	15:33:36	16:23:55	17:16:26	01:15:27 14:58:17

May 17	SHA	Mer.pass
Venus	279° 27.3	13:38:57
Mars	24° 41.5	06:40:16
Jupiter	60° 40.6	04:15:59
Saturn	55° 47.1	04:35:30

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
16	03:38	03:37	11:56:23	07:35:14	19:56:08	23(32%)
17	03:36	03:35	11:56:25	08:16:40	20:36:59	24(24%)

# 2020 May 18 to May. 19

18 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	03:14:19
N 70°	□	□	□	□	□	□	03:11:31
68°	—:—	—:—	01:26:54	22:31:43	—:—	—:—	03:09:10
66°	—:—	—:—	02:08:30	21:47:45	—:—	—:—	03:07:12
64°	—:—	00:38:08	02:36:24	21:18:59	23:27:40	—:—	03:05:30
62°	—:—	01:36:15	02:57:36	20:57:16	22:20:39	—:—	03:04:02
60°	—:—	02:08:08	03:14:42	20:39:50	21:47:27	—:—	03:02:44
N 58°	00:34:03	02:31:23	03:28:59	20:25:19	21:23:35	23:30:31	03:01:35
56°	01:26:56	02:49:51	03:41:12	20:12:55	21:04:45	22:29:38	03:00:33
54°	01:56:23	03:05:10	03:51:51	20:02:08	20:49:10	21:58:59	02:59:37
52°	02:18:09	03:18:14	04:01:16	19:52:36	20:35:55	21:36:40	02:58:46
50°	02:35:37	03:29:36	04:09:40	19:44:06	20:24:23	21:18:51	02:57:59
45°	03:08:32	03:52:47	04:27:27	19:26:08	20:00:56	20:45:27	02:56:18
N 40°	03:32:32	04:10:56	04:41:54	19:11:33	19:42:37	20:21:11	02:54:52
35°	03:51:18	04:25:47	04:54:06	18:59:15	19:27:38	20:02:13	02:53:38
30°	04:06:40	04:38:21	05:04:42	18:48:33	19:14:58	19:46:44	02:52:33
20°	04:30:52	04:59:00	05:22:48	18:30:19	18:54:09	19:22:20	02:50:40
N 10°	04:49:43	05:15:59	05:38:26	18:14:35	18:37:03	19:03:21	02:49:00
0°	05:05:26	05:30:58	05:52:56	17:59:59	18:21:58	18:47:31	02:47:26
S 10°	05:19:21	05:45:03	06:07:19	17:45:31	18:07:48	18:33:31	02:45:53
20°	05:32:22	05:59:11	06:22:34	17:30:11	17:53:35	18:20:24	02:44:14
30°	05:45:18	06:14:23	06:39:56	17:12:44	17:38:18	18:07:23	02:42:21
35°	05:52:01	06:22:48	06:50:00	17:02:38	17:29:49	18:00:36	02:41:16
40°	05:59:06	06:32:07	07:01:28	16:51:07	17:20:27	17:53:27	02:40:03
45°	06:06:47	06:42:42	07:14:56	16:37:36	17:09:48	17:45:43	02:38:38
S 50°	06:15:21	06:55:09	07:31:19	16:21:09	16:57:18	17:37:04	02:36:56
52°	06:19:07	07:00:50	07:39:00	16:13:25	16:51:35	17:33:16	02:36:09
54°	06:23:09	07:07:03	07:47:33	16:04:50	16:45:20	17:29:12	02:35:18
56°	06:27:29	07:13:54	07:57:10	15:55:12	16:38:27	17:24:50	02:34:21
58°	06:32:11	07:21:31	08:08:06	15:44:14	16:30:48	17:20:05	02:33:18
S 60°	06:37:20	07:30:05	08:20:44	15:31:34	16:22:11	17:14:53	02:32:07

May 18	SHA	Mer.pass
Venus	279° 38.1	13:34:12
Mars	24° 02.1	06:38:57
Jupiter	60° 41.1	04:12:01
Saturn	55° 47.7	04:31:31

19 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	02:54:33
N 70°	□	□	□	□	□	□	02:57:59
68°	—:—	—:—	01:20:28	22:38:38	—:—	—:—	03:00:50
66°	—:—	—:—	02:04:29	21:51:55	—:—	—:—	03:03:15
64°	—:—	00:24:39	02:33:18	21:22:10	—:—	—:—	03:05:19
62°	—:—	01:31:42	02:55:04	20:59:54	22:25:25	—:—	03:07:07
60°	—:—	02:04:56	03:12:32	20:42:06	21:50:47	—:—	03:08:42
N 58°	00:21:54	02:28:50	03:27:05	20:27:18	21:26:14	—:—	03:10:07
56°	01:22:50	02:47:42	03:39:31	20:14:42	21:06:59	22:33:56	03:11:23
54°	01:53:30	03:03:18	03:50:20	20:03:44	20:51:07	22:01:59	03:12:32
52°	02:15:51	03:16:35	03:59:53	19:54:04	20:37:38	21:39:04	03:13:35
50°	02:33:41	03:28:08	04:08:25	19:45:26	20:25:56	21:20:52	03:14:32
45°	03:07:09	03:51:39	04:26:26	19:27:14	20:02:10	20:46:55	03:16:38
N 40°	03:31:27	04:10:01	04:41:05	19:12:27	19:43:37	20:22:20	03:18:24
35°	03:50:50	04:25:03	04:53:26	19:00:00	19:28:28	20:03:09	03:19:56
30°	04:05:59	04:37:46	05:04:10	18:49:11	19:15:39	19:47:30	03:21:18
20°	04:30:27	04:58:39	05:22:29	18:30:44	18:54:36	19:22:51	03:23:41
N 10°	04:49:31	05:15:50	05:38:18	18:14:49	18:37:19	19:03:39	03:25:49
0°	05:05:25	05:30:59	05:52:59	18:00:03	18:22:04	18:47:39	03:27:50
S 10°	05:19:30	05:45:14	06:07:32	17:45:24	18:07:43	18:33:28	03:29:52
20°	05:32:41	05:59:33	06:22:58	17:29:54	17:53:19	18:20:11	03:32:03
30°	05:45:49	06:14:57	06:40:33	17:12:14	17:37:50	18:06:57	03:34:34
35°	05:52:39	06:23:29	06:50:44	17:02:00	17:29:14	18:00:04	03:36:02
40°	05:59:53	06:32:56	07:02:21	16:50:20	17:19:44	17:52:47	03:37:42
45°	06:07:42	06:43:41	07:16:00	16:36:38	17:08:56	17:44:54	03:39:38
S 50°	06:16:27	06:56:20	07:32:37	16:19:57	16:56:14	17:36:05	03:41:58
52°	06:20:18	07:02:07	07:40:25	16:12:07	16:50:25	17:32:12	03:43:02
54°	06:24:25	07:08:26	07:49:06	16:03:25	16:44:04	17:28:03	03:44:13
56°	06:28:51	07:15:24	07:58:52	15:53:37	16:37:04	17:23:34	03:45:31
58°	06:33:40	07:23:09	08:09:59	15:42:28	16:29:16	17:18:43	03:46:58
S 60°	06:38:57	07:31:53	08:22:51	15:29:34	16:20:30	17:13:24	03:48:36

May 19	SHA	Mer.pass
Venus	279° 51.4	13:29:17
Mars	23° 22.7	06:37:38
Jupiter	60° 41.9	04:08:02
Saturn	55° 48.5	04:27:32

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
18	03:34	03:32	11:56:28	08:57:10	21:17:20	25(16%)
19	03:31	03:29	11:56:31	09:37:38	21:58:08	26(10%)

2020 May 20 to May. 21

20 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	02:33:32 18:50:28
N 70°	□	□	□	□	□	□	02:43:49 18:32:53
68°	—	—	01:13:42	22:45:59	—	—	02:52:15 18:19:06
66°	—	—	02:00:27	21:56:07	—	—	02:59:19 18:07:54
64°	—	—	02:30:15	21:25:20	—	—	03:05:21 17:58:35
62°	—	01:27:04	02:52:33	21:02:30	22:30:18	—	03:10:34 17:50:41
60°	—	02:01:44	03:10:24	20:44:20	21:54:06	—	03:15:08 17:43:51
N 58°	—	02:26:19	03:25:13	20:29:16	21:28:52	—	03:19:11 17:37:53
56°	01:18:39	02:45:35	03:37:51	20:16:27	21:09:11	22:38:22	03:22:48 17:32:36
54°	01:50:37	03:01:29	03:48:51	20:05:19	20:53:02	22:05:00	03:26:04 17:27:53
52°	02:13:35	03:14:59	03:58:32	19:55:31	20:39:20	21:41:27	03:29:02 17:23:38
50°	02:31:47	03:26:42	04:07:12	19:46:45	20:27:28	21:22:53	03:31:45 17:19:46
45°	03:05:47	03:50:33	04:25:28	19:28:19	20:03:22	20:48:23	03:37:40 17:11:26
N 40°	03:30:25	04:09:08	04:40:17	19:13:21	19:44:36	20:23:29	03:42:38 17:04:31
35°	03:49:38	04:24:20	04:52:48	19:00:45	19:29:17	20:04:05	03:46:57 16:58:35
30°	04:05:21	04:37:12	05:03:40	18:49:48	19:16:19	19:48:15	03:50:46 16:53:23
20°	04:30:04	04:58:19	05:22:11	18:31:09	18:55:03	19:23:21	03:57:25 16:44:23
N 10°	04:49:19	05:15:41	05:38:11	18:15:03	18:37:34	19:03:58	04:03:19 16:36:31
0°	05:05:24	05:31:00	05:53:02	18:00:07	18:22:09	18:47:46	04:08:53 16:29:10
S 10°	05:19:39	05:45:26	06:07:45	17:45:19	18:07:39	18:33:26	04:14:30 16:21:50
20°	05:33:01	05:59:55	06:23:22	17:29:37	17:53:04	18:19:59	04:20:31 16:14:03
30°	05:46:21	06:15:31	06:41:09	17:11:45	17:37:23	18:06:33	04:27:25 16:05:13
35°	05:53:18	06:24:10	06:51:28	17:01:24	17:28:41	17:59:34	04:31:25 16:00:08
40°	06:00:39	06:33:45	07:03:14	16:49:35	17:19:03	17:52:09	04:35:58 15:54:23
45°	06:08:37	06:44:40	07:17:03	16:35:43	17:08:05	17:44:07	04:41:17 15:47:43
S 50°	06:17:32	06:57:30	07:33:54	16:18:48	16:55:11	17:35:08	04:47:41 15:39:45
52°	06:21:28	07:03:23	07:41:49	16:10:51	16:49:17	17:31:10	04:50:39 15:36:06
54°	06:25:41	07:09:48	07:50:38	16:02:01	16:42:50	17:26:56	04:53:54 15:32:05
56°	06:30:13	07:16:53	08:00:33	15:52:04	16:35:43	17:22:21	04:57:30 15:27:39
58°	06:35:08	07:24:46	08:11:51	15:40:44	16:27:47	17:17:24	05:01:32 15:22:44
S 60°	06:40:32	07:33:40	08:24:57	15:27:37	16:18:52	17:11:57	05:06:05 15:17:13

May 20	SHA	Mer.pass
Venus	280°07.4	13:24:12
Mars	22°43.5	06:36:18
Jupiter	60°42.8	04:04:02
Saturn	55°49.3	04:23:33

21 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	02:08:04 21:01:36
N 70°	□	□	□	□	□	□	02:27:29 20:26:26
68°	—	—	01:06:29	22:53:57	—	—	02:42:51 20:01:39
66°	—	—	01:56:24	22:00:20	—	—	02:55:26 19:42:41
64°	—	—	02:27:14	21:28:29	—	—	03:05:59 19:27:26
62°	—	01:22:19	02:50:06	21:05:05	22:35:21	—	03:15:00 19:14:48
60°	—	01:58:33	03:08:18	20:46:32	21:57:26	—	03:22:49 19:04:06
N 58°	—	02:23:50	03:23:24	20:31:13	21:31:28	—	03:29:41 18:54:51
56°	01:14:22	02:43:31	03:36:15	20:18:11	21:11:23	22:42:56	03:35:47 18:46:45
54°	01:47:45	02:59:42	03:47:24	20:06:53	20:54:56	22:08:01	03:41:16 18:39:34
52°	02:11:20	03:13:26	03:57:14	19:56:56	20:41:01	21:43:49	03:46:13 18:33:08
50°	02:29:55	03:25:19	04:06:01	19:48:04	20:28:59	21:24:52	03:50:44 18:27:19
45°	03:04:28	03:49:28	04:24:31	19:29:23	20:04:34	20:49:50	04:00:32 18:14:53
N 40°	03:29:25	04:08:17	04:39:32	19:14:14	19:45:35	20:24:37	04:08:43 18:04:37
35°	03:48:51	04:23:39	04:52:11	19:01:29	19:30:05	20:05:00	04:15:47 17:55:52
30°	04:04:43	04:36:39	05:03:11	18:50:25	19:16:59	19:49:00	04:22:01 17:48:12
20°	04:29:42	04:58:00	05:21:55	18:31:33	18:55:30	19:23:51	04:32:53 17:35:01
N 10°	04:49:09	05:15:33	05:38:05	18:15:17	18:37:51	19:04:16	04:42:27 17:23:31
0°	05:05:24	05:31:02	05:53:06	18:00:11	18:22:16	18:47:55	04:51:29 17:12:46
S 10°	05:19:49	05:45:38	06:07:59	17:45:13	18:07:35	18:33:24	05:00:34 17:02:04
20°	05:33:21	06:00:17	06:23:46	17:29:22	17:52:51	18:19:47	05:10:19 16:50:41
30°	05:46:52	06:16:05	06:41:46	17:11:17	17:36:58	18:06:11	05:21:31 16:37:44
35°	05:53:56	06:24:51	06:52:12	17:00:49	17:28:09	17:59:04	05:28:01 16:30:15
40°	06:01:24	06:34:34	07:04:06	16:48:52	17:18:24	17:51:33	05:35:27 16:21:46
45°	06:09:31	06:45:37	07:18:06	16:34:49	17:07:17	17:43:23	05:44:09 16:11:53
S 50°	06:18:36	06:58:39	07:35:10	16:17:41	16:54:11	17:34:13	05:54:40 16:00:01
52°	06:22:37	07:04:37	07:43:12	16:09:38	16:48:12	17:30:10	05:59:34 15:54:31
54°	06:26:55	07:11:09	07:52:08	16:00:40	16:41:38	17:25:51	06:04:58 15:48:28
56°	06:31:32	07:18:21	08:02:12	15:50:34	16:34:25	17:21:11	06:11:00 15:41:45
58°	06:36:34	07:26:22	08:13:41	15:39:03	16:26:21	17:16:07	06:17:46 15:34:14
S 60°	06:42:06	07:35:25	08:27:00	15:25:42	16:17:16	17:10:33	06:25:27 15:25:43

May 21	SHA	Mer.pass
Venus	280°25.9	13:18:57
Mars	22°04.4	06:34:58
Jupiter	60°44.0	04:00:01
Saturn	55°50.2	04:19:33

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
20	03:28	03:26	11:56:34	10:18:59	22:40:15	27(5%)
21	03:24	03:22	11:56:38	11:02:04	23:24:28	28(2%)



2020 May 22 to May. 23

22 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	01:28:53
N 70°	☐	☐	☐	☐	☐	☐	02:05:29
68°	—	—	00:58:42	23:02:46	—	—	02:31:31
66°	—	—	01:52:21	22:04:35	—	—	02:51:37
64°	—	—	02:24:15	21:31:37	—	—	03:07:51
62°	—	01:17:26	02:47:41	21:07:38	22:40:34	—	03:21:22
60°	—	01:55:24	03:06:16	20:48:43	22:00:45	—	03:32:53
N 58°	—	02:21:23	03:21:37	20:33:07	21:34:04	—	03:42:53
56°	01:09:58	02:41:30	03:34:41	20:19:53	21:13:33	22:47:39	03:51:39
54°	01:44:54	02:57:58	03:46:00	20:08:25	20:56:48	22:11:02	03:59:28
52°	02:09:07	03:11:54	03:55:59	19:58:20	20:42:41	21:46:10	04:06:29
50°	02:28:06	03:23:58	04:04:53	19:49:20	20:30:28	21:26:50	04:12:51
45°	03:03:11	03:48:26	04:23:37	19:30:26	20:05:45	20:51:15	04:26:33
N 40°	03:28:26	04:07:28	04:38:48	19:15:07	19:46:33	20:25:44	04:37:54
35°	03:48:05	04:23:00	04:51:36	19:02:13	19:30:53	20:05:54	04:47:38
30°	04:04:07	04:36:08	05:02:43	18:51:01	19:17:39	19:49:45	04:56:12
20°	04:29:20	04:57:42	05:21:39	18:31:58	18:55:57	19:24:21	05:11:02
N 10°	04:48:59	05:15:26	05:38:00	18:15:31	18:38:07	19:04:35	05:24:05
0°	05:05:25	05:31:05	05:53:10	18:00:16	18:22:22	18:48:03	05:36:22
S 10°	05:19:59	05:45:50	06:08:13	17:45:09	18:07:33	18:33:24	05:48:43
20°	05:33:41	06:00:39	06:24:10	17:29:07	17:52:39	18:19:37	06:01:58
30°	05:47:23	06:16:38	06:42:22	17:10:51	17:36:35	18:05:49	06:17:13
35°	05:54:33	06:25:31	06:52:55	17:00:16	17:27:39	17:58:37	06:26:07
40°	06:02:08	06:35:22	07:04:57	16:48:10	17:17:46	17:50:58	06:36:18
45°	06:10:24	06:46:34	07:19:07	16:33:57	17:06:30	17:42:40	06:48:18
S 50°	06:19:39	06:59:47	07:36:24	16:16:37	16:53:13	17:33:20	07:02:57
52°	06:23:45	07:05:50	07:44:33	16:08:27	16:47:08	17:29:13	07:09:49
54°	06:28:07	07:12:28	07:53:37	15:59:21	16:40:29	17:24:48	07:17:27
56°	06:32:51	07:19:47	08:03:50	15:49:07	16:33:09	17:20:03	07:26:01
58°	06:37:59	07:27:56	08:15:29	15:37:25	16:24:58	17:14:53	07:35:44
S 60°	06:43:38	07:37:08	08:29:02	15:23:51	16:15:44	17:09:11	07:46:55

May 22	SHA	Mer.pass
Venus	280° 46.9	13:13:33
Mars	21° 25.4	06:33:37
Jupiter	60° 45.3	03:56:00
Saturn	55° 51.2	04:15:33

23 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	01:21:50
68°	—	—	00:50:03	23:12:59	—	—	02:15:03
66°	—	—	01:48:17	22:08:53	—	—	02:47:53
64°	—	—	02:21:18	21:34:43	—	—	03:12:08
62°	—	01:12:24	02:45:19	21:10:09	22:46:00	—	03:31:21
60°	—	01:52:15	03:04:16	20:50:52	22:04:05	—	03:47:12
N 58°	—	02:18:58	03:19:54	20:35:00	21:36:38	—	04:00:39
56°	01:05:25	02:39:31	03:33:09	20:21:33	21:15:41	22:52:34	04:12:17
54°	01:42:03	02:56:16	03:44:39	20:09:56	20:58:39	22:14:03	04:22:31
52°	02:06:57	03:10:26	03:54:45	19:59:42	20:44:18	21:48:30	04:31:37
50°	02:26:18	03:22:40	04:03:46	19:50:36	20:31:56	21:28:46	04:39:49
45°	03:01:56	03:47:26	04:22:44	19:31:28	20:06:54	20:52:39	04:57:15
N 40°	03:27:30	04:06:41	04:38:06	19:15:58	19:47:29	20:26:50	05:11:34
35°	03:47:21	04:22:23	04:51:02	19:02:56	19:31:40	20:06:48	05:23:45
30°	04:03:33	04:35:39	05:02:16	18:51:38	19:18:19	19:50:29	05:34:26
20°	04:29:01	04:57:25	05:21:25	18:32:23	18:56:24	19:24:51	05:52:50
N 10°	04:48:51	05:15:19	05:37:55	18:15:46	18:38:23	19:04:54	06:08:55
0°	05:05:26	05:31:08	05:53:15	18:00:22	18:22:30	18:48:13	06:24:03
S 10°	05:20:10	05:46:02	06:08:27	17:45:06	18:07:31	18:33:24	06:39:15
20°	05:34:02	06:01:01	06:24:34	17:28:54	17:52:27	18:19:27	06:55:34
30°	05:47:54	06:17:11	06:42:57	17:10:26	17:36:12	18:05:29	07:14:24
35°	05:55:10	06:26:11	06:53:37	16:59:44	17:27:10	17:58:11	07:25:26
40°	06:02:53	06:36:09	07:05:48	16:47:30	17:17:10	17:50:25	07:38:07
45°	06:11:16	06:47:30	07:20:08	16:33:08	17:05:45	17:41:59	07:53:08
S 50°	06:20:41	07:00:54	07:37:38	16:15:34	16:52:18	17:32:30	08:11:38
52°	06:24:51	07:07:02	07:45:53	16:07:18	16:46:08	17:28:18	08:20:25
54°	06:29:19	07:13:46	07:55:04	15:58:05	16:39:23	17:23:49	08:30:14
56°	06:34:07	07:21:11	08:05:26	15:47:42	16:31:56	17:18:58	08:41:23
58°	06:39:22	07:29:28	08:17:16	15:35:50	16:23:37	17:13:41	08:54:11
S 60°	06:45:08	07:38:49	08:31:02	15:22:02	16:14:14	17:07:53	09:09:13

May 23	SHA	Mer.pass
Venus	281° 10.3	13:07:59
Mars	20° 46.5	06:32:16
Jupiter	60° 46.9	03:51:58
Saturn	55° 52.3	04:11:33

Day	Sun			Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	Time 12 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Mer.Pass. Lower hh:mm:ss	Age
22	03:19	03:17	11:56:43	11:47:34	—	29(0%)
23	03:14	03:12	11:56:48	12:35:59	00:11:24	1(1%)

2020 May 24 to May. 25

24 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐
68°	—:—	—:—	00:40:03	23:25:53	—:—	—:—	01:27:34
66°	—:—	—:—	01:44:12	22:13:12	—:—	—:—	02:44:26
64°	—:—	—:—	02:18:23	21:37:48	—:—	—:—	03:21:39
62°	—:—	01:07:10	02:43:00	21:12:38	22:51:41	—:—	03:48:09
60°	—:—	01:49:07	03:02:19	20:52:58	22:07:25	—:—	04:08:54
N 58°	—:—	02:16:36	03:18:13	20:36:50	21:39:10	—:—	04:25:57
56°	01:00:41	02:37:34	03:31:41	20:23:12	21:17:47	22:57:44	04:40:23
54°	01:39:14	02:54:37	03:43:20	20:11:25	21:00:28	22:17:05	04:52:54
52°	02:04:49	03:08:59	03:53:35	20:01:03	20:45:54	21:50:48	05:03:54
50°	02:24:33	03:21:23	04:02:42	19:51:50	20:33:22	21:30:41	05:13:43
45°	03:00:43	03:46:28	04:21:54	19:32:29	20:08:03	20:54:02	05:34:23
N 40°	03:26:35	04:05:55	04:37:26	19:16:49	19:48:26	20:27:55	05:51:11
35°	03:46:39	04:21:47	04:50:30	19:03:39	19:32:27	20:07:41	06:05:22
30°	04:03:00	04:35:10	05:01:51	18:52:14	19:18:58	19:51:13	06:17:44
20°	04:28:42	04:57:09	05:21:11	18:32:47	18:56:51	19:25:21	06:38:56
N 10°	04:48:43	05:15:14	05:37:52	18:16:01	18:38:40	19:05:13	06:57:24
0°	05:05:28	05:31:12	05:53:20	18:00:28	18:22:37	18:48:22	07:14:43
S 10°	05:20:21	05:46:15	06:08:41	17:45:03	18:07:30	18:33:24	07:32:05
20°	05:34:22	06:01:23	06:24:58	17:28:42	17:52:17	18:19:19	07:50:44
30°	05:48:25	06:17:44	06:43:32	17:10:03	17:35:51	18:05:10	08:12:19
35°	05:55:47	06:26:50	06:54:19	16:59:14	17:26:43	17:57:46	08:24:59
40°	06:03:36	06:36:55	07:06:38	16:46:52	17:16:35	17:49:54	08:39:36
45°	06:12:07	06:48:25	07:21:08	16:32:20	17:05:02	17:41:19	08:57:01
S 50°	06:21:42	07:02:00	07:38:50	16:14:34	16:51:24	17:31:41	09:18:40
52°	06:25:56	07:08:13	07:47:11	16:06:12	16:45:09	17:27:25	09:29:01
54°	06:30:28	07:15:02	07:56:30	15:56:52	16:38:19	17:22:51	09:40:42
56°	06:35:23	07:22:34	08:07:00	15:46:20	16:30:45	17:17:55	09:54:06
58°	06:40:43	07:30:58	08:19:01	15:34:18	16:22:19	17:12:32	10:09:44
S 60°	06:46:36	07:40:28	08:33:00	15:20:17	16:12:47	17:06:37	10:28:29

May 24	SHA	Mer.pass
Venus	281°36.0	13:02:16
Mars	20°07.7	06:30:55
Jupiter	60°48.6	03:47:55
Saturn	55°53.5	04:07:32

25 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐
68°	—:—	—:—	00:27:22	23:51:29	—:—	—:—	☐
66°	—:—	—:—	01:40:06	22:17:33	—:—	—:—	02:42:15
64°	—:—	—:—	02:15:32	21:40:51	—:—	—:—	03:43:28
62°	—:—	01:01:42	02:40:44	21:15:05	22:57:41	—:—	04:17:49
60°	—:—	01:46:00	03:00:26	20:55:02	22:10:44	—:—	04:42:55
N 58°	—:—	02:14:16	03:16:35	20:38:39	21:41:41	—:—	05:02:52
56°	00:55:45	02:35:41	03:30:15	20:24:49	21:19:51	23:03:11	05:19:25
54°	01:36:25	02:53:01	03:42:04	20:12:52	21:02:15	22:20:06	05:33:34
52°	02:02:43	03:07:36	03:52:26	20:02:23	20:47:29	21:53:06	05:45:53
50°	02:22:51	03:20:10	04:01:41	19:53:03	20:34:46	21:32:34	05:56:48
45°	02:59:33	03:45:32	04:21:06	19:33:28	20:09:10	20:55:23	06:19:35
N 40°	03:25:42	04:05:11	04:36:48	19:17:39	19:49:21	20:28:59	06:37:56
35°	03:45:59	04:21:12	04:50:00	19:04:21	19:33:13	20:08:33	06:53:21
30°	04:02:29	04:34:44	05:01:28	18:52:49	19:19:36	19:51:56	07:06:44
20°	04:28:24	04:56:55	05:20:59	18:33:12	18:57:17	19:25:50	07:29:34
N 10°	04:48:36	05:15:09	05:37:49	18:16:16	18:38:57	19:05:32	07:49:24
0°	05:05:30	05:31:16	05:53:26	18:00:35	18:22:45	18:48:32	08:07:58
S 10°	05:20:32	05:46:28	06:08:55	17:45:01	18:07:29	18:33:26	08:26:33
20°	05:34:42	06:01:45	06:25:22	17:28:30	17:52:07	18:19:11	08:46:30
30°	05:48:55	06:18:17	06:44:07	17:09:41	17:35:31	18:04:53	09:09:34
35°	05:56:23	06:27:29	06:55:01	16:58:45	17:26:17	17:57:23	09:23:08
40°	06:04:19	06:37:41	07:07:27	16:46:16	17:16:02	17:49:24	09:38:48
45°	06:12:57	06:49:19	07:22:06	16:31:35	17:04:21	17:40:42	09:57:31
S 50°	06:22:41	07:03:04	07:40:01	16:13:37	16:50:33	17:30:55	10:20:53
52°	06:27:00	07:09:22	07:48:28	16:05:08	16:44:13	17:26:35	10:32:07
54°	06:31:37	07:16:17	07:57:54	15:55:41	16:37:17	17:21:56	10:44:51
56°	06:36:36	07:23:55	08:08:32	15:45:01	16:29:37	17:16:55	10:59:32
58°	06:42:03	07:32:27	08:20:43	15:32:48	16:21:04	17:11:26	11:16:50
S 60°	06:48:02	07:42:05	08:34:56	15:18:35	16:11:24	17:05:25	11:37:53

May 25	SHA	Mer.pass
Venus	282°03.8	12:56:25
Mars	19°29.1	06:29:33
Jupiter	60°50.5	03:43:51
Saturn	55°54.8	04:03:31

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
24	03:09	03:06	11:56:54	13:27:18	01:01:18	2(3%)
25	03:03	03:00	11:57:00	14:21:03	01:53:56	3(8%)

2020 May 26 to May. 27

26 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	□
N 70°	□	□	□	□	□	□	□
68°	—:—	—:—	00:02:00	—:—	—:—	—:—	□
66°	—:—	—:—	01:35:58	22:21:57	—:—	—:—	03:11:50
64°	—:—	—:—	02:12:43	21:43:52	—:—	—:—	04:31:40
62°	—:—	00:55:56	02:38:31	21:17:29	23:04:07	—:—	05:08:29
60°	—:—	01:42:55	02:58:35	20:57:04	22:14:03	—:—	05:34:45
N 58°	—:—	02:11:59	03:15:00	20:40:25	21:44:09	—:—	05:55:22
56°	00:50:31	02:33:50	03:28:52	20:26:23	21:21:53	23:09:01	06:12:24
54°	01:33:37	02:51:28	03:40:50	20:14:17	21:04:00	22:23:07	06:26:52
52°	02:00:39	03:06:15	03:51:21	20:03:40	20:49:01	21:55:21	06:39:27
50°	02:21:11	03:18:59	04:00:42	19:54:14	20:36:09	21:34:26	06:50:33
45°	02:58:25	03:44:38	04:20:19	19:34:27	20:10:16	20:56:43	07:13:42
N 40°	03:24:52	04:04:30	04:36:11	19:18:28	19:50:15	20:30:01	07:32:16
35°	03:45:20	04:20:40	04:49:31	19:05:03	19:33:58	20:09:24	07:47:50
30°	04:01:59	04:34:18	05:01:06	18:53:24	19:20:14	19:52:38	08:01:20
20°	04:28:08	04:56:41	05:20:47	18:33:36	18:57:44	19:26:20	08:24:21
N 10°	04:48:30	05:15:05	05:37:46	18:16:32	18:39:14	19:05:51	08:44:16
0°	05:05:33	05:31:21	05:53:32	18:00:42	18:22:54	18:48:43	09:02:53
S 10°	05:20:43	05:46:41	06:09:10	17:45:00	18:07:30	18:33:28	09:21:30
20°	05:35:02	06:02:07	06:25:46	17:28:20	17:51:59	18:19:04	09:41:26
30°	05:49:25	06:18:49	06:44:42	17:09:20	17:35:13	18:04:37	10:04:28
35°	05:56:59	06:28:07	06:55:41	16:58:18	17:25:53	17:57:01	10:17:58
40°	06:05:01	06:38:26	07:08:15	16:45:42	17:15:31	17:48:56	10:33:34
45°	06:13:47	06:50:12	07:23:04	16:30:51	17:03:42	17:40:07	10:52:08
S 50°	06:23:39	07:04:07	07:41:10	16:12:41	16:49:44	17:30:11	11:15:16
52°	06:28:02	07:10:30	07:49:43	16:04:07	16:43:19	17:25:47	11:26:22
54°	06:32:44	07:17:30	07:59:16	15:54:33	16:36:18	17:21:03	11:38:55
56°	06:37:48	07:25:15	08:10:03	15:43:45	16:28:32	17:15:57	11:53:20
58°	06:43:20	07:33:53	08:22:24	15:31:22	16:19:52	17:10:23	12:10:17
S 60°	06:49:26	07:43:40	08:36:49	15:16:56	16:10:03	17:04:15	12:30:47

May 26	SHA	Mer.pass
Venus	282°33.7	12:50:26
Mars	18°50.6	06:28:10
Jupiter	60°52.7	03:39:47
Saturn	55°56.2	03:59:29

27 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	□
N 70°	□	□	□	□	□	□	□
68°	□	□	□	□	□	□	□
66°	—:—	—:—	01:31:50	22:26:23	—:—	—:—	05:05:01
64°	—:—	—:—	02:09:56	21:46:51	—:—	—:—	05:52:21
62°	—:—	00:49:45	02:36:22	21:19:50	23:11:08	—:—	06:22:46
60°	—:—	01:39:51	02:56:48	20:59:03	22:17:21	—:—	06:45:41
N 58°	—:—	02:09:45	03:13:29	20:42:09	21:46:36	—:—	07:04:09
56°	00:44:56	02:32:03	03:27:32	20:27:56	21:23:53	23:15:24	07:19:35
54°	01:30:51	02:49:58	03:39:40	20:15:41	21:05:43	22:26:07	07:32:49
52°	01:58:38	03:04:57	03:50:18	20:04:56	20:50:32	21:57:34	07:44:24
50°	02:19:34	03:17:50	03:59:45	19:55:24	20:37:30	21:36:15	07:54:40
45°	02:57:20	03:43:47	04:19:35	19:35:25	20:11:20	20:58:01	08:16:08
N 40°	03:24:04	04:03:50	04:35:36	19:19:17	19:51:08	20:31:03	08:33:27
35°	03:44:43	04:20:09	04:49:04	19:05:44	19:34:42	20:10:14	08:48:00
30°	04:01:31	04:33:55	05:00:45	18:53:59	19:20:52	19:53:20	09:00:37
20°	04:27:52	04:56:29	05:20:37	18:34:00	18:58:10	19:26:49	09:22:09
N 10°	04:48:25	05:15:02	05:37:45	18:16:47	18:39:31	19:06:10	09:40:49
0°	05:05:36	05:31:26	05:53:39	18:00:49	18:23:03	18:48:54	09:58:13
S 10°	05:20:55	05:46:54	06:09:25	17:44:59	18:07:31	18:33:31	10:15:36
20°	05:35:22	06:02:29	06:26:09	17:28:11	17:51:51	18:18:59	10:34:11
30°	05:49:55	06:19:21	06:45:16	17:09:01	17:34:56	18:04:22	10:55:34
35°	05:57:34	06:28:44	06:56:22	16:57:53	17:25:30	17:56:40	11:08:03
40°	06:05:42	06:39:10	07:09:03	16:45:09	17:15:02	17:48:30	11:22:24
45°	06:14:35	06:51:04	07:24:00	16:30:10	17:03:05	17:39:33	11:39:24
S 50°	06:24:36	07:05:09	07:42:18	16:11:48	16:48:58	17:29:29	12:00:22
52°	06:29:03	07:11:37	07:50:57	16:03:08	16:42:28	17:25:01	12:10:20
54°	06:33:49	07:18:42	08:00:36	15:53:28	16:35:22	17:20:13	12:21:31
56°	06:38:59	07:26:32	08:11:31	15:42:32	16:27:30	17:15:02	12:34:15
58°	06:44:36	07:35:18	08:24:02	15:29:59	16:18:43	17:09:23	12:48:58
S 60°	06:50:48	07:45:13	08:38:40	15:15:20	16:08:46	17:03:09	13:06:23

May 27	SHA	Mer.pass
Venus	283°05.5	12:44:21
Mars	18°12.1	06:26:47
Jupiter	60°55.0	03:35:41
Saturn	55°57.7	03:55:28

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
26	02:57	02:53	11:57:07	15:16:10	02:48:31	4(14%)
27	02:50	02:46	11:57:14	16:11:23	03:43:50	5(22%)

2020 May 28 to May. 29

28 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐
68°	☐	☐	☐	☐	☐	☐	☐
66°	—	—	01:27:39	22:30:52	—	—	06:19:57
64°	—	—	02:07:14	21:49:47	—	—	07:02:41
62°	—	00:42:59	02:34:16	21:22:09	23:19:03	—	07:31:18
60°	—	01:36:48	02:55:05	21:01:00	22:20:38	—	07:53:02
N 58°	—	02:07:35	03:12:01	20:43:50	21:49:00	—	08:10:33
56°	00:38:49	02:30:19	03:26:16	20:29:26	21:25:51	23:22:36	08:25:10
54°	01:28:06	02:48:30	03:38:32	20:17:02	21:07:23	22:29:07	08:37:39
52°	01:56:40	03:03:42	03:49:17	20:06:11	20:52:00	21:59:46	08:48:32
50°	02:18:00	03:16:45	03:58:51	19:56:32	20:38:50	21:38:02	08:58:09
45°	02:56:17	03:42:58	04:18:53	19:36:21	20:12:23	20:59:18	09:06:44
N 40°	03:23:17	04:03:12	04:35:03	19:20:04	19:52:00	20:32:03	09:24:54
35°	03:44:08	04:19:40	04:48:38	19:06:24	19:35:26	20:11:03	09:39:40
30°	04:01:04	04:33:32	05:00:25	18:54:33	19:21:28	19:54:01	09:52:09
20°	04:27:38	04:56:18	05:20:28	18:34:24	18:58:36	19:27:18	10:03:01
N 10°	04:48:20	05:15:00	05:37:44	18:17:03	18:39:49	19:06:30	10:21:37
0°	05:05:40	05:31:32	05:53:46	18:00:57	18:23:12	18:49:05	10:37:46
S 10°	05:21:07	05:47:08	06:09:40	17:44:59	18:07:32	18:33:34	10:52:50
20°	05:35:42	06:02:51	06:26:33	17:28:03	17:51:45	18:18:54	11:07:51
30°	05:50:24	06:19:52	06:45:49	17:08:43	17:34:40	18:04:08	11:23:53
35°	05:58:08	06:29:21	06:57:01	16:57:29	17:25:09	17:56:22	11:42:13
40°	06:06:22	06:39:53	07:09:49	16:44:38	17:14:35	17:48:05	11:52:52
45°	06:15:23	06:51:55	07:24:55	16:29:30	17:02:30	17:39:02	12:05:03
S 50°	06:25:32	07:06:09	07:43:25	16:10:58	16:48:13	17:28:49	12:19:21
52°	06:30:03	07:12:41	07:52:09	16:02:12	16:41:39	17:24:17	12:36:47
54°	06:34:53	07:19:52	08:01:55	15:52:25	16:34:28	17:19:25	12:44:58
56°	06:40:07	07:27:48	08:12:58	15:41:21	16:26:30	17:14:10	12:54:04
58°	06:45:50	07:36:40	08:25:38	15:28:39	16:17:36	17:08:25	13:04:17
S 60°	06:52:08	07:46:43	08:40:28	15:13:48	16:07:32	17:02:05	13:15:55

May 28	SHA	Mer.pass
Venus	283°38.9	12:38:09
Mars	17°33.8	06:25:24
Jupiter	60°57.5	03:31:35
Saturn	55°59.3	03:51:25

29 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	07:16:06
N 70°	☐	☐	☐	☐	☐	☐	04:07:54
68°	☐	☐	☐	☐	☐	☐	08:04:37
66°	—	—	01:23:28	22:35:24	—	—	08:35:19
64°	—	—	02:04:34	21:52:41	—	—	08:57:53
62°	—	00:35:21	02:32:14	21:24:25	23:28:36	—	09:15:38
60°	—	01:33:47	02:53:25	21:02:54	22:23:54	—	09:30:08
N 58°	—	02:05:27	03:10:36	20:45:29	21:51:21	—	09:42:20
56°	00:31:53	02:28:38	03:25:02	20:30:54	21:27:45	23:31:16	09:52:47
54°	01:25:23	02:47:06	03:37:27	20:18:21	21:09:01	22:32:06	10:01:54
52°	01:54:45	03:02:30	03:48:20	20:07:23	20:53:27	22:01:55	10:09:57
50°	02:16:29	03:15:42	03:57:59	19:57:38	20:40:07	21:39:47	10:17:09
45°	02:55:16	03:42:11	04:18:13	19:37:15	20:13:25	21:00:32	10:23:38
N 40°	03:22:33	04:02:36	04:34:32	19:20:50	19:52:51	20:33:02	10:37:28
35°	03:43:35	04:19:12	04:48:14	19:07:03	19:36:09	20:11:51	10:48:50
30°	04:00:39	04:33:12	05:00:07	18:55:06	19:22:05	19:54:41	10:58:31
20°	04:27:26	04:56:08	05:20:20	18:34:48	18:59:02	19:27:46	11:06:59
N 10°	04:48:17	05:14:58	05:37:44	18:17:19	18:40:06	19:06:49	11:21:32
0°	05:05:45	05:31:38	05:53:54	18:01:05	18:23:22	18:49:16	11:34:11
S 10°	05:21:19	05:47:22	06:09:56	17:45:00	18:07:34	18:33:38	11:46:01
20°	05:36:03	06:03:13	06:26:56	17:27:56	17:51:39	18:18:50	11:57:48
30°	05:50:53	06:20:23	06:46:22	17:08:26	17:34:26	18:03:55	12:10:21
35°	05:58:42	06:29:57	06:57:40	16:57:07	17:24:49	17:56:04	12:24:38
40°	06:07:02	06:40:35	07:10:35	16:44:10	17:14:09	17:47:42	12:32:54
45°	06:16:09	06:52:45	07:25:49	16:28:53	17:01:57	17:38:32	12:42:16
S 50°	06:26:26	07:07:08	07:44:29	16:10:10	16:47:31	17:28:12	12:53:13
52°	06:31:01	07:13:45	07:53:19	16:01:19	16:40:53	17:23:36	13:06:23
54°	06:35:55	07:21:00	08:03:12	15:51:26	16:33:37	17:18:40	13:12:30
56°	06:41:14	07:29:01	08:14:22	15:40:14	16:25:34	17:13:20	13:19:15
58°	06:47:02	07:38:00	08:27:12	15:27:23	16:16:33	17:07:30	13:26:45
S 60°	06:53:26	07:48:11	08:42:14	15:12:19	16:06:21	17:01:05	13:35:10

May 29	SHA	Mer.pass
Venus	284°13.8	12:31:51
Mars	16°55.7	06:24:00
Jupiter	61°00.2	03:27:29
Saturn	56°01.0	03:47:23

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
28	02:42	02:39	11:57:21	17:05:40	04:38:42	6(32%)
29	02:35	02:31	11:57:29	17:58:27	05:32:15	7(43%)

30 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	10:02:02
N 70°	□	□	□	□	□	□	10:22:00
68°	□	□	□	□	□	□	10:37:28
66°	—	—	01:19:14	22:39:58	—	—	10:49:56
64°	—	—	02:01:58	21:55:31	—	—	11:00:14
62°	—	00:26:06	02:30:16	21:26:37	23:42:31	—	11:08:58
60°	—	01:30:49	02:51:49	21:04:44	22:27:09	—	11:16:28
N 58°	—	02:03:23	03:09:14	20:47:05	21:53:39	—	11:23:01
56°	00:23:30	02:27:00	03:23:51	20:32:19	21:29:37	23:43:55	11:28:48
54°	01:22:41	02:45:45	03:36:25	20:19:38	21:10:37	22:35:04	11:33:57
52°	01:52:53	03:01:21	03:47:25	20:08:33	20:54:51	22:04:01	11:38:36
50°	02:15:02	03:14:42	03:57:10	19:58:43	20:41:22	21:41:30	11:42:48
45°	02:54:19	03:41:26	04:17:35	19:38:09	20:14:25	21:01:45	11:51:52
N 40°	03:21:52	04:02:03	04:34:03	19:21:35	19:53:40	20:33:59	11:59:24
35°	03:43:04	04:18:46	04:47:52	19:07:41	19:36:50	20:12:38	12:05:50
30°	04:00:16	04:32:52	04:59:51	18:55:39	19:22:40	19:55:20	12:11:29
20°	04:27:14	04:55:58	05:20:12	18:35:12	18:59:27	19:28:14	12:21:14
N 10°	04:48:14	05:14:57	05:37:45	18:17:34	18:40:23	19:07:08	12:29:46
0°	05:05:50	05:31:44	05:54:02	18:01:14	18:23:32	18:49:28	12:37:44
S 10°	05:21:31	05:47:36	06:10:11	17:45:02	18:07:37	18:33:42	12:45:41
20°	05:36:23	06:03:35	06:27:20	17:27:49	17:51:35	18:18:47	12:54:07
30°	05:51:22	06:20:53	06:46:55	17:08:11	17:34:12	18:03:44	13:03:42
35°	05:59:16	06:30:33	06:58:18	16:56:46	17:24:31	17:55:48	13:09:13
40°	06:07:41	06:41:17	07:11:19	16:43:42	17:13:45	17:47:20	13:15:27
45°	06:16:54	06:53:33	07:26:41	16:28:18	17:01:26	17:38:05	13:22:41
S 50°	06:27:19	07:08:05	07:45:32	16:09:25	16:46:52	17:27:37	13:31:19
52°	06:31:57	07:14:46	07:54:28	16:00:28	16:40:09	17:22:57	13:35:18
54°	06:36:56	07:22:06	08:04:26	15:50:29	16:32:48	17:17:57	13:39:40
56°	06:42:19	07:30:13	08:15:44	15:39:10	16:24:40	17:12:33	13:44:29
58°	06:48:12	07:39:18	08:28:43	15:26:09	16:15:33	17:06:38	13:49:50
S 60°	06:54:41	07:49:36	08:43:57	15:10:54	16:05:13	17:00:07	13:55:50

May 30	SHA	Mer.pass
Venus	284°50.0	12:25:30
Mars	16°17.6	06:22:36
Jupiter	61°03.1	03:23:21
Saturn	56°02.8	03:43:19

31 May 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	12:20:25
N 70°	□	□	□	□	□	□	12:28:12
68°	□	□	□	□	□	□	12:34:31
66°	—	—	01:14:57	22:44:37	—	—	12:39:44
64°	—	—	01:59:26	21:58:18	—	—	12:44:09
62°	—	00:12:29	02:28:22	21:28:46	—	—	12:47:57
60°	—	01:27:52	02:50:16	21:06:32	22:30:22	—	12:51:15
N 58°	—	02:01:23	03:07:56	20:48:39	21:55:54	—	12:54:09
56°	00:11:09	02:25:27	03:22:44	20:33:42	21:31:26	—	12:56:44
54°	01:20:01	02:44:28	03:35:26	20:20:53	21:12:10	22:38:00	12:59:03
52°	01:51:05	03:00:15	03:46:32	20:09:41	20:56:12	22:06:05	13:01:09
50°	02:13:37	03:13:44	03:56:24	19:59:46	20:42:35	21:43:10	13:03:03
45°	02:53:24	03:40:44	04:17:00	19:39:01	20:15:23	21:02:56	13:07:11
N 40°	03:21:12	04:01:31	04:33:36	19:22:19	19:54:28	20:34:55	13:10:38
35°	03:42:34	04:18:22	04:47:31	19:08:19	19:37:31	20:13:24	13:13:36
30°	03:59:54	04:32:34	04:59:36	18:56:11	19:23:15	19:55:59	13:16:13
20°	04:27:03	04:55:50	05:20:06	18:35:35	18:59:52	19:28:42	13:20:45
N 10°	04:48:12	05:14:57	05:37:47	18:17:50	18:40:41	19:07:28	13:24:43
0°	05:05:55	05:31:52	05:54:10	18:01:23	18:23:43	18:49:40	13:28:27
S 10°	05:21:44	05:47:50	06:10:26	17:45:04	18:07:41	18:33:47	13:32:11
20°	05:36:42	06:03:56	06:27:43	17:27:44	17:51:31	18:18:45	13:36:08
30°	05:51:50	06:21:23	06:47:27	17:07:57	17:34:01	18:03:34	13:40:38
35°	05:59:48	06:31:08	06:58:55	16:56:27	17:24:14	17:55:33	13:43:14
40°	06:08:19	06:41:57	07:12:03	16:43:17	17:13:22	17:47:01	13:46:09
45°	06:17:38	06:54:21	07:27:33	16:27:45	17:00:57	17:37:39	13:49:32
S 50°	06:28:11	07:09:01	07:46:34	16:08:42	16:46:14	17:27:03	13:53:33
52°	06:32:52	07:15:46	07:55:34	15:59:41	16:39:28	17:22:21	13:55:23
54°	06:37:55	07:23:10	08:05:38	15:49:35	16:32:02	17:17:17	13:57:24
56°	06:43:22	07:31:23	08:17:03	15:38:09	16:23:49	17:11:49	13:59:37
58°	06:49:20	07:40:34	08:30:11	15:25:00	16:14:36	17:05:49	14:02:04
S 60°	06:55:54	07:50:59	08:45:37	15:09:33	16:04:09	16:59:13	14:04:48

May 31	SHA	Mer.pass
Venus	285°27.2	12:19:04
Mars	15°39.6	06:21:11
Jupiter	61°06.2	03:19:13
Saturn	56°04.7	03:39:16

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
	mm:ss	mm:ss	hh:mm:ss	hh:mm:ss	hh:mm:ss	
30	02:26	02:22	11:57:38	18:49:50	06:24:18	8(54%)
31	02:18	02:13	11:57:47	19:40:25	07:15:11	9(65%)

01 June 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	☐	☐	☐	☐	☐	☐	14:33:24	02:16:30
N 70°	☐	☐	☐	☐	☐	☐	14:31:44	02:14:04
68°	☐	☐	☐	☐	☐	☐	14:30:23	02:12:03
66°	—	—	01:10:38	22:49:19	—	—	14:29:15	02:10:19
64°	—	—	01:56:58	22:01:02	—	—	14:28:17	02:08:50
62°	—	—	02:26:32	21:30:51	—	—	14:27:28	02:07:33
60°	—	01:24:58	02:48:48	21:08:16	22:33:34	—	14:26:45	02:06:24
N 58°	—	01:59:27	03:06:42	20:50:09	21:58:06	—	14:26:07	02:05:23
56°	—	02:23:57	03:21:40	20:35:02	21:33:12	—	14:25:34	02:04:29
54°	01:17:24	02:43:14	03:34:30	20:22:05	21:13:40	22:40:55	14:25:04	02:03:39
52°	01:49:20	02:59:12	03:45:43	20:10:47	20:57:31	22:08:06	14:24:36	02:02:54
50°	02:12:16	03:12:50	03:55:40	20:00:46	20:43:46	21:44:47	14:24:12	02:02:12
45°	02:52:32	03:40:05	04:16:27	19:39:51	20:16:20	21:04:05	14:23:19	02:00:41
N 40°	03:20:35	04:01:01	04:33:10	19:23:02	19:55:15	20:35:49	14:22:35	01:59:23
35°	03:42:07	04:18:00	04:47:12	19:08:56	19:38:11	20:14:09	14:21:58	01:58:16
30°	03:59:34	04:32:18	04:59:22	18:56:43	19:23:49	19:56:37	14:21:26	01:57:16
20°	04:26:54	04:55:43	05:20:01	18:35:58	19:00:17	19:29:09	14:20:31	01:55:29
N 10°	04:48:11	05:14:58	05:37:49	18:18:06	18:40:58	19:07:47	14:19:44	01:53:54
0°	05:06:01	05:31:59	05:54:19	18:01:33	18:23:53	18:49:52	14:19:01	01:52:23
S 10°	05:21:57	05:48:04	06:10:42	17:45:07	18:07:45	18:33:53	14:18:20	01:50:50
20°	05:37:02	06:04:17	06:28:05	17:27:40	17:51:28	18:18:44	14:17:38	01:49:10
30°	05:52:17	06:21:53	06:47:58	17:07:45	17:33:50	18:03:25	14:16:51	01:47:13
35°	06:00:20	06:31:42	06:59:31	16:56:09	17:23:59	17:55:20	14:16:25	01:46:05
40°	06:08:56	06:42:37	07:12:45	16:42:54	17:13:02	17:46:43	14:15:56	01:44:47
45°	06:18:21	06:55:07	07:28:22	16:27:15	17:00:30	17:37:15	14:15:23	01:43:16
S 50°	06:29:01	07:09:55	07:47:33	16:08:02	16:45:39	17:26:33	14:14:44	01:41:27
52°	06:33:46	07:16:44	07:56:38	15:58:55	16:38:49	17:21:47	14:14:27	01:40:36
54°	06:38:52	07:24:13	08:06:48	15:48:44	16:31:19	17:16:40	14:14:08	01:39:40
56°	06:44:23	07:32:30	08:18:20	15:37:11	16:23:01	17:11:07	14:13:47	01:38:39
58°	06:50:25	07:41:47	08:31:37	15:23:53	16:13:42	17:05:03	14:13:24	01:37:30
S 60°	06:57:05	07:52:20	08:47:13	15:08:16	16:03:09	16:58:22	14:12:59	01:36:12

Jun 01	SHA	Mer.pass
Venus	286°05.2	12:12:36
Mars	15°01.8	06:19:46
Jupiter	61°09.5	03:15:04
Saturn	56°06.6	03:35:12

02 June 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	16:50:01	01:52:51
N 70°	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	16:38:07	01:58:08
68°	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	16:28:36	02:02:30
66°	--	--	01:06:16	22:54:06	--	--	16:20:47	02:06:12
64°	--	--	01:54:35	22:03:41	--	--	16:14:13	02:09:22
62°	--	--	02:24:47	21:32:52	--	--	16:08:37	02:12:08
60°	--	01:22:06	02:47:23	21:09:57	22:36:43	--	16:03:46	02:14:33
N 58°	--	01:57:35	03:05:32	20:51:36	22:00:14	--	15:59:30	02:16:43
56°	--	02:22:31	03:20:40	20:36:20	21:34:54	--	15:55:44	02:18:38
54°	01:14:49	02:42:04	03:33:37	20:23:15	21:15:07	22:43:48	15:52:21	02:20:23
52°	01:47:39	02:58:13	03:44:57	20:11:51	20:58:48	22:10:03	15:49:18	02:21:58
50°	02:10:59	03:11:59	03:54:58	20:01:45	20:44:55	21:46:21	15:46:31	02:23:26
45°	02:51:43	03:39:27	04:15:56	19:40:40	20:17:14	21:05:11	15:40:33	02:26:36
N 40°	03:20:00	04:00:33	04:32:47	19:23:44	19:56:01	20:36:41	15:35:35	02:29:16
35°	03:41:42	04:17:39	04:46:55	19:09:31	19:38:50	20:14:52	15:31:20	02:31:34
30°	03:59:15	04:32:03	04:59:09	18:57:14	19:24:22	19:57:13	15:27:36	02:33:37
20°	04:26:46	04:55:38	05:19:57	18:36:21	19:00:42	19:29:36	15:21:11	02:37:10
N 10°	04:48:10	05:15:00	05:37:52	18:18:22	18:41:16	19:08:06	15:15:37	02:40:17
0°	05:06:08	05:32:07	05:54:28	18:01:42	18:24:04	18:50:05	15:10:26	02:43:13
S 10°	05:22:10	05:48:18	06:10:58	17:45:10	18:07:50	18:33:59	15:05:18	02:46:09
20°	05:37:22	06:04:39	06:28:28	17:27:37	17:51:27	18:18:44	14:59:54	02:49:16
30°	05:52:44	06:22:21	06:48:29	17:07:34	17:33:41	18:03:18	14:53:48	02:52:49
35°	06:00:52	06:32:15	07:00:07	16:55:54	17:23:45	17:55:09	14:50:19	02:54:51
40°	06:09:32	06:43:15	07:13:26	16:42:32	17:12:43	17:46:26	14:46:24	02:57:10
45°	06:19:03	06:55:51	07:29:11	16:26:46	17:00:05	17:36:53	14:41:52	02:59:52
S 50°	06:29:49	07:10:47	07:48:31	16:07:24	16:45:07	17:26:04	14:36:31	03:03:05
52°	06:34:37	07:17:40	07:57:41	15:58:13	16:38:13	17:21:15	14:34:03	03:04:35
54°	06:39:47	07:25:13	08:07:56	15:47:56	16:30:39	17:16:05	14:31:22	03:06:12
56°	06:45:22	07:33:35	08:19:35	15:36:17	16:22:16	17:10:28	14:28:26	03:08:01
58°	06:51:29	07:42:58	08:33:00	15:22:51	16:12:52	17:04:20	14:25:10	03:10:01
S 60°	06:58:14	07:53:37	08:48:47	15:07:02	16:02:11	16:57:34	14:21:31	03:12:17

Jun 02	SHA	Mer.pass
Venus	286°43.8	12:06:06
Mars	14°24.1	06:18:20
Jupiter	61°12.9	03:10:54
Saturn	56°08.7	03:31:08

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
	mm:ss	mm:ss	hh:mm:ss	hh:mm:ss	hh:mm:ss	
01	02:09	02:04	11:57:56	20:31:05	08:05:41	10(76%)
02	01:59	01:55	11:58:05	21:22:51	08:56:46	11(85%)

2020 June 03 to Jun. 04

03 June 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	19:22:07
N 70°	□	□	□	□	□	□	18:53:50
68°	□	□	□	□	□	□	18:32:58
66°	—	—	01:01:50	22:58:59	—	—	18:16:36
64°	—	—	01:52:17	22:06:15	—	—	18:03:19
62°	—	—	02:23:07	21:34:49	—	—	17:52:12
60°	—	01:19:18	02:46:03	21:11:34	22:39:49	—	17:42:44
N 58°	—	01:55:47	03:04:25	20:53:00	22:02:19	—	17:34:32
56°	—	02:21:09	03:19:42	20:37:34	21:36:33	—	17:27:20
54°	01:12:16	02:40:57	03:32:48	20:24:23	21:16:31	22:46:38	17:20:56
52°	01:46:01	02:57:17	03:44:13	20:12:53	21:00:02	22:11:57	17:15:12
50°	02:09:45	03:11:11	03:54:20	20:02:42	20:46:01	21:47:52	17:10:01
45°	02:50:56	03:38:53	04:15:27	19:41:28	20:18:07	21:06:15	16:58:53
N 40°	03:19:28	04:00:08	04:32:25	19:24:24	19:56:45	20:37:32	16:49:43
35°	03:41:18	04:17:21	04:46:39	19:10:06	19:39:28	20:15:35	16:41:54
30°	03:58:59	04:31:50	04:58:58	18:57:44	19:24:54	19:57:49	16:35:03
20°	04:26:39	04:55:33	05:19:54	18:36:44	19:01:06	19:30:02	16:23:19
N 10°	04:48:11	05:15:02	05:37:55	18:18:39	18:41:33	19:08:25	16:13:07
0°	05:06:15	05:32:16	05:54:38	18:01:53	18:24:16	18:50:17	16:03:37
S 10°	05:22:23	05:48:33	06:11:13	17:45:15	18:07:56	18:34:06	15:54:12
20°	05:37:41	06:04:59	06:28:50	17:27:35	17:51:26	18:18:44	15:44:14
30°	05:53:11	06:22:50	06:48:58	17:07:24	17:33:33	18:03:11	15:32:58
35°	06:01:22	06:32:48	07:00:41	16:55:39	17:23:33	17:54:58	15:26:29
40°	06:10:07	06:43:53	07:14:06	16:42:13	17:12:26	17:46:11	15:19:10
45°	06:19:44	06:56:35	07:29:58	16:26:20	16:59:42	17:36:33	15:10:41
S 50°	06:30:36	07:11:38	07:49:27	16:06:49	16:44:37	17:25:38	15:00:33
52°	06:35:27	07:18:34	07:58:41	15:57:34	16:37:40	17:20:46	14:55:53
54°	06:40:40	07:26:11	08:09:02	15:47:12	16:30:02	17:15:32	14:50:45
56°	06:46:19	07:34:38	08:20:47	15:35:26	16:21:34	17:09:52	14:45:06
58°	06:52:30	07:44:06	08:34:20	15:21:52	16:12:04	17:03:40	14:38:47
S 60°	06:59:20	07:54:52	08:50:17	15:05:53	16:01:18	16:56:49	14:31:42

Jun 03	SHA	Mer.pass
Venus	287°22.6	11:59:36
Mars	13°46.5	06:16:54
Jupiter	61°16.6	03:06:43
Saturn	56°10.8	03:27:04

04 June 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	00:46:59
N 70°	□	□	□	□	□	□	21:37:25
68°	□	□	□	□	□	□	20:48:57
66°	—	—	00:57:19	23:03:58	—	—	20:18:13
64°	—	—	01:50:03	22:08:45	—	—	19:55:26
62°	—	—	02:21:31	21:36:42	—	—	19:37:23
60°	—	01:16:33	02:44:48	21:13:07	22:42:52	—	19:22:31
N 58°	—	01:54:04	03:03:22	20:54:21	22:04:19	—	19:09:56
56°	—	02:19:51	03:18:49	20:38:46	21:38:08	—	18:59:04
54°	01:09:47	02:39:54	03:32:01	20:25:28	21:17:51	22:49:26	18:49:33
52°	01:44:28	02:56:24	03:43:32	20:13:52	21:01:13	22:13:47	18:41:06
50°	02:08:35	03:10:25	03:53:44	20:03:37	20:47:04	21:49:19	18:33:30
45°	02:50:13	03:38:21	04:15:00	19:42:13	20:18:58	21:07:17	18:17:25
N 40°	03:18:57	03:59:44	04:32:06	19:25:03	19:57:28	20:38:21	18:04:16
35°	03:40:57	04:17:04	04:46:25	19:10:40	19:40:04	20:16:15	17:53:09
30°	03:58:43	04:31:38	04:58:49	18:58:13	19:25:26	19:58:24	17:43:27
20°	04:26:33	04:55:29	05:19:52	18:37:06	19:01:30	19:30:28	17:26:52
N 10°	04:48:12	05:15:05	05:37:59	18:18:55	18:41:50	19:08:44	17:12:31
0°	05:06:22	05:32:24	05:54:48	18:02:03	18:24:27	18:50:30	16:59:09
S 10°	05:22:36	05:48:47	06:11:29	17:45:19	18:08:02	18:34:13	16:45:52
20°	05:38:01	06:05:20	06:29:12	17:27:34	17:51:26	18:18:46	16:31:47
30°	05:53:37	06:23:17	06:49:28	17:07:15	17:33:26	18:03:06	16:15:45
35°	06:01:52	06:33:19	07:01:15	16:55:27	17:23:22	17:54:50	16:06:30
40°	06:10:42	06:44:29	07:14:45	16:41:55	17:12:11	17:45:58	15:55:59
45°	06:20:23	06:57:17	07:30:43	16:25:56	16:59:22	17:36:15	15:43:42
S 50°	06:31:22	07:12:27	07:50:20	16:06:16	16:44:09	17:25:14	15:28:52
52°	06:36:15	07:19:27	07:59:39	15:56:57	16:37:09	17:20:19	15:21:57
54°	06:41:31	07:27:07	08:10:05	15:46:30	16:29:27	17:15:02	15:14:20
56°	06:47:14	07:35:39	08:21:56	15:34:38	16:20:55	17:09:19	15:05:49
58°	06:53:29	07:45:12	08:35:36	15:20:57	16:11:20	17:03:03	14:56:14
S 60°	07:00:23	07:56:04	08:51:44	15:04:48	16:00:28	16:56:07	14:45:19

Jun 04	SHA	Mer.pass
Venus	288°01.5	11:53:06
Mars	13°09.0	06:15:27
Jupiter	61°20.4	03:02:32
Saturn	56°13.1	03:22:59

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
03	01:50	01:45	11:58:15	22:16:35	09:49:26	12(93%)
04	01:40	01:34	11:58:26	23:12:42	10:44:20	13(98%)

05 June 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	■
N 70°	□	□	□	□	□	□	■ 00:31:16
68°	□	□	□	□	□	□	■ 01:20:54
66°	—	—	00:52:41	23:09:07	—	—	22:26:02 01:52:41
64°	—	—	01:47:55	22:11:10	—	—	21:46:54 02:16:24
62°	—	—	02:20:00	21:38:30	—	—	21:19:43 02:35:18
60°	—	01:13:52	02:43:36	21:14:36	22:45:52	—	20:58:42 02:50:56
N 58°	—	01:52:26	03:02:23	20:55:39	22:06:14	—	20:41:34 03:04:14
56°	—	02:18:37	03:17:59	20:39:55	21:39:40	—	20:27:07 03:15:45
54°	01:07:21	02:38:55	03:31:18	20:26:30	21:19:09	22:52:10	20:14:40 03:25:53
52°	01:43:00	02:55:35	03:42:55	20:14:49	21:02:21	22:15:34	20:03:45 03:34:54
50°	02:07:29	03:09:43	03:53:11	20:04:29	20:48:06	21:50:43	19:54:03 03:43:02
45°	02:49:32	03:37:51	04:14:36	19:42:58	20:19:48	21:08:17	19:33:42 04:00:20
N 40°	03:18:30	03:59:23	04:31:48	19:25:41	19:58:09	20:39:09	19:17:16 04:14:33
35°	03:40:37	04:16:48	04:46:12	19:11:13	19:40:39	20:16:55	19:03:27 04:26:39
30°	03:58:30	04:31:28	04:58:40	18:58:42	19:25:57	19:58:57	18:51:27 04:37:15
20°	04:26:28	04:55:27	05:19:51	18:37:28	19:01:53	19:30:53	18:31:02 04:55:30
N 10°	04:48:14	05:15:08	05:38:04	18:19:11	18:42:08	19:09:03	18:13:22 05:11:27
0°	05:06:30	05:32:34	05:54:58	18:02:14	18:24:39	18:50:43	17:56:56 05:26:24
S 10°	05:22:50	05:49:02	06:11:45	17:45:25	18:08:08	18:34:21	17:40:35 05:41:24
20°	05:38:20	06:05:41	06:29:34	17:27:33	17:51:27	18:18:48	17:23:10 05:57:29
30°	05:54:03	06:23:44	06:49:56	17:07:09	17:33:21	18:03:02	17:03:16 06:16:00
35°	06:02:21	06:33:50	07:01:48	16:55:16	17:23:13	17:54:42	16:51:41 06:26:49
40°	06:11:15	06:45:04	07:15:23	16:41:39	17:11:57	17:45:47	16:38:27 06:39:15
45°	06:21:01	06:57:57	07:31:27	16:25:34	16:59:03	17:35:59	16:22:51 06:53:57
S 50°	06:32:06	07:13:14	07:51:12	16:05:47	16:43:44	17:24:52	16:03:47 07:12:01
52°	06:37:02	07:20:17	08:00:35	15:56:23	16:36:40	17:19:55	15:54:47 07:20:34
54°	06:42:21	07:28:01	08:11:06	15:45:51	16:28:55	17:14:35	15:44:45 07:30:08
56°	06:48:07	07:36:37	08:23:02	15:33:54	16:20:19	17:08:48	15:33:25 07:40:57
58°	06:54:25	07:46:15	08:36:50	15:20:05	16:10:39	17:02:29	15:20:28 07:53:23
S 60°	07:01:24	07:57:12	08:53:07	15:03:47	15:59:41	16:55:29	15:05:22 08:07:54

Jun 05	SHA	Mer.pass
Venus	288°40.1	11:46:38
Mars	12°31.7	06:14:00
Jupiter	61°24.4	02:58:20
Saturn	56°15.4	03:18:54

06 June 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	■
N 70°	□	□	□	□	□	□	■
68°	□	□	□	□	□	□	■
66°	—	—	00:47:56	23:14:26	—	—	.. .. 01:46:37
64°	—	—	01:45:53	22:13:30	—	—	23:26:01 02:26:20
62°	—	—	02:18:35	21:40:13	—	—	22:49:08 02:54:01
60°	—	01:11:14	02:42:29	21:16:02	22:48:47	—	22:22:52 03:15:31
N 58°	—	01:50:53	03:01:28	20:56:53	22:08:05	—	22:02:15 03:33:06
56°	—	02:17:28	03:17:12	20:41:01	21:41:07	—	21:45:15 03:47:57
54°	01:04:58	02:38:00	03:30:38	20:27:30	21:20:23	22:54:51	21:30:48 04:00:46
52°	01:41:36	02:54:49	03:42:20	20:15:44	21:03:26	22:17:16	21:18:15 04:12:03
50°	02:06:27	03:09:05	03:52:41	20:05:20	20:49:04	21:52:04	21:07:11 04:22:05
45°	02:48:55	03:37:24	04:14:14	19:43:40	20:20:35	21:09:14	20:44:08 04:43:12
N 40°	03:18:04	03:59:04	04:31:32	19:26:17	19:58:49	20:39:54	20:25:40 05:00:19
35°	03:40:19	04:16:35	04:46:01	19:11:45	19:41:14	20:17:33	20:10:12 05:14:46
30°	03:58:18	04:31:19	04:58:34	18:59:10	19:26:27	19:59:30	19:56:48 05:27:20
20°	04:26:25	04:55:25	05:19:50	18:37:49	19:02:16	19:31:18	19:34:02 05:48:51
N 10°	04:48:17	05:15:13	05:38:10	18:19:27	18:42:25	19:09:21	19:14:21 06:07:33
0°	05:06:39	05:32:43	05:55:09	18:02:25	18:24:51	18:50:57	18:56:02 06:25:03
S 10°	05:23:03	05:49:17	06:12:01	17:45:31	18:08:15	18:34:29	18:37:46 06:42:34
20°	05:38:39	06:06:01	06:29:55	17:27:34	17:51:29	18:18:51	18:18:16 07:01:21
30°	05:54:27	06:24:11	06:50:24	17:07:03	17:33:17	18:03:00	17:55:51 07:23:01
35°	06:02:50	06:34:20	07:02:19	16:55:06	17:23:06	17:54:36	17:42:44 07:35:44
40°	06:11:47	06:45:39	07:15:59	16:41:25	17:11:46	17:45:37	17:27:39 07:50:22
45°	06:21:37	06:58:36	07:32:09	16:25:14	16:58:46	17:35:45	17:09:45 08:07:48
S 50°	06:32:48	07:13:59	07:52:02	16:05:19	16:43:21	17:24:33	16:47:36 08:29:25
52°	06:37:47	07:21:05	08:01:28	15:55:52	16:36:15	17:19:33	16:37:01 08:39:46
54°	06:43:08	07:28:53	08:12:04	15:45:16	16:28:26	17:14:10	16:25:07 08:51:26
56°	06:48:57	07:37:33	08:24:06	15:33:13	16:19:46	17:08:20	16:11:30 09:04:47
58°	06:55:19	07:47:15	08:38:01	15:19:17	16:10:02	17:01:57	15:55:39 09:20:21
S 60°	07:02:22	07:58:18	08:54:27	15:02:50	15:58:58	16:54:53	15:36:43 09:38:59

Jun 06	SHA	Mer.pass
Venus	289°18.2	11:40:12
Mars	11°54.4	06:12:32
Jupiter	61°28.6	02:54:08
Saturn	56°17.8	03:14:48

Day	Sun			Moon		
	Eqn.of Time	Mer.	Mer.Pass.	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss	Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	
05	01:29	01:24	11:58:36	—	11:41:37	14(100%)
06	01:19	01:13	11:58:47	00:10:57	12:40:33	15(99%)



2020 June 07 to Jun. 08

07 June 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	■
N 70°	☐	☐	☐	☐	☐	☐	■
68°	☐	☐	☐	☐	☐	☐	■
66°	—	—	00:42:59	23:20:02	—	—	00:46:56
64°	—	—	01:43:57	22:15:43	—	—	.. ..
62°	—	—	02:17:15	21:41:51	—	—	23:53:08
60°	—	01:08:42	02:41:27	21:17:23	22:51:38	—	23:26:08
N 58°	—	01:49:25	03:00:37	20:58:03	22:09:51	—	23:05:02
56°	—	02:16:24	03:16:30	20:42:03	21:42:30	—	22:47:41
54°	01:02:41	02:37:09	03:30:02	20:28:26	21:21:33	22:57:28	22:32:56
52°	01:40:17	02:54:07	03:41:49	20:16:36	21:04:28	22:18:53	22:20:08
50°	02:05:29	03:08:29	03:52:13	20:06:08	20:50:00	21:53:21	22:08:50
45°	02:48:21	03:37:00	04:13:54	19:44:21	20:21:20	21:10:08	21:45:20
N 40°	03:17:42	03:58:47	04:31:18	19:26:53	19:59:27	20:40:38	21:26:30
35°	03:40:04	04:16:23	04:45:52	19:12:16	19:41:47	20:18:10	21:10:42
30°	03:58:08	04:31:12	04:58:28	18:59:37	19:26:55	20:00:02	20:57:01
20°	04:26:23	04:55:25	05:19:51	18:38:10	19:02:38	19:31:42	20:33:44
N 10°	04:48:21	05:15:18	05:38:16	18:19:43	18:42:42	19:09:39	20:13:35
0°	05:06:47	05:32:53	05:55:20	18:02:36	18:25:04	18:51:10	19:54:48
S 10°	05:23:17	05:49:32	06:12:16	17:45:38	18:08:23	18:34:38	19:36:01
20°	05:38:57	06:06:20	06:30:16	17:27:36	17:51:32	18:18:55	19:15:56
30°	05:54:52	06:24:36	06:50:51	17:06:59	17:33:14	18:02:58	18:52:45
35°	06:03:17	06:34:49	07:02:50	16:54:58	17:23:00	17:54:32	18:39:09
40°	06:12:18	06:46:11	07:16:34	16:41:13	17:11:36	17:45:29	18:23:28
45°	06:22:13	06:59:14	07:32:49	16:24:57	16:58:32	17:35:33	18:04:45
S 50°	06:33:28	07:14:43	07:52:49	16:04:55	16:43:01	17:24:16	17:41:28
52°	06:38:29	07:21:52	08:02:19	15:55:24	16:35:52	17:19:13	17:30:17
54°	06:43:54	07:29:43	08:12:59	15:44:44	16:28:00	17:13:48	17:17:37
56°	06:49:45	07:38:26	08:25:06	15:32:36	16:19:16	17:07:56	17:03:03
58°	06:56:11	07:48:13	08:39:08	15:18:34	16:09:28	17:01:29	16:45:56
S 60°	07:03:17	07:59:21	08:55:43	15:01:58	15:58:19	16:54:22	16:25:10

Jun 07	SHA	Mer.pass
Venus	289°55.5	11:33:49
Mars	11°17.3	06:11:04
Jupiter	61°32.9	02:49:54
Saturn	56°20.3	03:10:42

08 June 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	■
N 70°	☐	☐	☐	☐	☐	☐	■
68°	☐	☐	☐	☐	☐	☐	■
66°	—	—	00:37:48	23:26:00	—	—	■
64°	—	—	01:42:08	22:17:50	—	—	00:31:28
62°	—	—	02:16:00	21:43:24	—	—	.. ..
60°	—	01:06:15	02:40:30	21:18:40	22:54:23	—	.. ..
N 58°	—	01:48:03	02:59:51	20:59:09	22:11:31	—	23:48:41
56°	—	02:15:24	03:15:51	20:43:03	21:43:49	—	23:33:09
54°	01:00:28	02:36:22	03:29:29	20:29:20	21:22:40	22:59:59	23:19:47
52°	01:39:03	02:53:28	03:41:20	20:17:25	21:05:27	22:20:25	23:08:04
50°	02:04:36	03:07:57	03:51:49	20:06:54	20:50:53	21:54:33	22:57:40
45°	02:47:50	03:36:38	04:13:37	19:45:00	20:22:03	21:11:00	22:35:52
N 40°	03:17:21	03:58:32	04:31:06	19:27:26	20:00:04	20:41:20	22:18:15
35°	03:39:50	04:16:13	04:45:45	19:12:45	19:42:19	20:18:45	22:03:25
30°	03:57:59	04:31:06	04:58:24	19:00:03	19:27:23	20:00:32	21:50:30
20°	04:26:21	04:55:25	05:19:53	18:38:31	19:03:00	19:32:05	21:28:28
N 10°	04:48:25	05:15:23	05:38:23	18:19:59	18:42:59	19:09:58	21:09:20
0°	05:06:57	05:33:04	05:55:31	18:02:48	18:25:16	18:51:24	20:51:26
S 10°	05:23:31	05:49:46	06:12:32	17:45:45	18:08:31	18:34:47	20:33:31
20°	05:39:16	06:06:40	06:30:37	17:27:39	17:51:35	18:19:00	20:14:20
30°	05:55:15	06:25:01	06:51:17	17:06:56	17:33:12	18:02:58	19:52:10
35°	06:03:44	06:35:17	07:03:20	16:54:52	17:22:55	17:54:28	19:39:10
40°	06:12:48	06:46:43	07:17:08	16:41:03	17:11:28	17:45:23	19:24:11
45°	06:22:47	06:59:50	07:33:28	16:24:42	16:58:19	17:35:22	19:06:19
S 50°	06:34:07	07:15:25	07:53:35	16:04:33	16:42:43	17:24:01	18:44:08
52°	06:39:10	07:22:36	08:03:08	15:54:59	16:35:31	17:18:56	18:33:30
54°	06:44:37	07:30:30	08:13:52	15:44:15	16:27:36	17:13:29	18:21:29
56°	06:50:32	07:39:16	08:26:04	15:32:02	16:18:49	17:07:33	18:07:42
58°	06:57:00	07:49:08	08:40:12	15:17:54	16:08:57	17:01:04	17:51:35
S 60°	07:04:10	08:00:21	08:56:55	15:01:10	15:57:43	16:53:53	17:32:11

Jun 08	SHA	Mer.pass
Venus	290°31.9	11:27:31
Mars	10°40.3	06:09:35
Jupiter	61°37.5	02:45:40
Saturn	56°22.9	03:06:36

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
07	01:08	01:02	11:58:58	01:10:11	13:39:36	16(96%)
08	00:56	00:50	11:59:10	02:08:36	14:36:58	17(91%)

2020 June 09 to Jun. 10

09 June 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	■
N 70°	☐	☐	☐	☐	☐	☐	■
68°	☐	☐	☐	☐	☐	☐	■
66°	—	—	00:32:14	23:32:37	—	—	01:46:31
64°	—	—	01:40:25	22:19:50	—	—	01:00:21
62°	—	—	02:14:52	21:44:52	—	—	00:30:09
60°	—	01:03:54	02:39:37	21:19:52	22:57:02	—	00:07:14
N 58°	—	01:46:47	02:59:08	21:00:12	22:13:06	—	.. ..
56°	—	02:14:30	03:15:16	20:43:59	21:45:03	—	.. ..
54°	00:58:20	02:35:39	03:28:59	20:30:11	21:23:43	23:02:25	23:53:51
52°	01:37:55	02:52:53	03:40:55	20:18:12	21:06:22	22:21:53	23:44:01
50°	02:03:47	03:07:28	03:51:27	20:07:37	20:51:43	21:55:42	23:35:12
45°	02:47:22	03:36:18	04:13:22	19:45:37	20:22:44	21:11:49	23:16:31
N 40°	03:17:03	03:58:19	04:30:56	19:27:59	20:00:39	20:41:59	23:01:15
35°	03:39:39	04:16:05	04:45:39	19:13:14	19:42:49	20:19:18	22:48:18
30°	03:57:53	04:31:02	04:58:22	19:00:29	19:27:50	20:01:01	22:36:58
20°	04:26:21	04:55:27	05:19:56	18:38:51	19:03:21	19:32:28	22:17:32
N 10°	04:48:31	05:15:30	05:38:30	18:20:15	18:43:15	19:10:16	22:00:34
0°	05:07:06	05:33:14	05:55:43	18:03:00	18:25:29	18:51:37	21:44:40
S 10°	05:23:45	05:50:01	06:12:48	17:45:53	18:08:40	18:34:57	21:28:45
20°	05:39:34	06:06:59	06:30:57	17:27:42	17:51:40	18:19:05	21:11:40
30°	05:55:38	06:25:25	06:51:43	17:06:54	17:33:12	18:02:59	20:51:59
35°	06:04:09	06:35:44	07:03:48	16:54:48	17:22:52	17:54:26	20:40:28
40°	06:13:17	06:47:14	07:17:40	16:40:55	17:11:21	17:45:18	20:27:14
45°	06:23:19	07:00:24	07:34:05	16:24:29	16:58:09	17:35:14	20:11:32
S 50°	06:34:44	07:16:04	07:54:18	16:04:15	16:42:28	17:23:48	19:52:10
52°	06:39:49	07:23:18	08:03:54	15:54:37	16:35:14	17:18:42	19:42:58
54°	06:45:18	07:31:15	08:14:42	15:43:49	16:27:16	17:13:12	19:32:39
56°	06:51:15	07:40:04	08:26:59	15:31:32	16:18:26	17:07:14	19:20:56
58°	06:57:47	07:49:59	08:41:12	15:17:18	16:08:30	17:00:42	19:07:24
S 60°	07:05:00	08:01:17	08:58:03	15:00:26	15:57:12	16:53:28	18:51:28

Jun 09	SHA	Mer.pass
Venus	291°07.0	11:21:18
Mars	10°03.4	06:08:06
Jupiter	61°42.2	02:41:26
Saturn	56°25.5	03:02:30

10 June 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	■
N 70°	☐	☐	☐	☐	☐	☐	■
68°	☐	☐	☐	☐	☐	☐	■
66°	—	—	00:26:02	23:40:28	—	—	01:39:52
64°	—	—	01:38:50	22:21:42	—	—	01:11:41
62°	—	—	02:13:49	21:46:14	—	—	00:50:00
60°	—	01:01:40	02:38:50	21:21:00	22:59:33	—	00:32:24
N 58°	—	01:45:37	02:58:30	21:01:11	22:14:35	—	00:17:37
56°	—	02:13:40	03:14:44	20:44:51	21:46:13	—	00:04:56
54°	00:56:19	02:35:01	03:28:33	20:30:59	21:24:42	23:04:45	.. ..
52°	01:36:52	02:52:22	03:40:32	20:18:56	21:07:14	22:23:15	.. ..
50°	02:03:03	03:07:02	03:51:08	20:08:18	20:52:30	21:56:47	.. ..
45°	02:46:57	03:36:02	04:13:09	19:46:12	20:23:23	21:12:35	23:49:20
N 40°	03:16:48	03:58:08	04:30:48	19:28:29	20:01:12	20:42:37	23:37:00
35°	03:39:30	04:15:59	04:45:34	19:13:41	19:43:18	20:19:51	23:26:28
30°	03:57:48	04:30:59	04:58:20	19:00:53	19:28:16	20:01:29	23:17:13
20°	04:26:23	04:55:29	05:20:00	18:39:11	19:03:42	19:32:50	23:01:14
N 10°	04:48:37	05:15:37	05:38:38	18:20:31	18:43:32	19:10:33	22:47:15
0°	05:07:16	05:33:25	05:55:55	18:03:12	18:25:42	18:51:51	22:34:06
S 10°	05:23:59	05:50:16	06:13:03	17:46:01	18:08:49	18:35:07	22:20:55
20°	05:39:52	06:07:18	06:31:16	17:27:47	17:51:45	18:19:11	22:06:47
30°	05:56:01	06:25:49	06:52:07	17:06:54	17:33:13	18:03:01	21:50:33
35°	06:04:34	06:36:10	07:04:16	16:54:45	17:22:50	17:54:26	21:41:05
40°	06:13:45	06:47:43	07:18:11	16:40:48	17:11:16	17:45:15	21:30:15
45°	06:23:50	07:00:57	07:34:40	16:24:18	16:58:01	17:35:08	21:17:28
S 50°	06:35:19	07:16:42	07:54:59	16:03:58	16:42:15	17:23:38	21:01:52
52°	06:40:26	07:23:58	08:04:38	15:54:18	16:34:59	17:18:30	20:54:32
54°	06:45:57	07:31:57	08:15:29	15:43:27	16:26:58	17:12:58	20:46:23
56°	06:51:57	07:40:50	08:27:50	15:31:05	16:18:05	17:06:58	20:37:12
58°	06:58:31	07:50:48	08:42:09	15:16:46	16:08:06	17:00:23	20:26:46
S 60°	07:05:47	08:02:10	08:59:07	14:59:47	15:56:44	16:53:06	20:14:43

Jun 10	SHA	Mer.pass
Venus	291°40.8	11:15:11
Mars	9°26.7	06:06:37
Jupiter	61°47.0	02:37:10
Saturn	56°28.3	02:58:23

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
09	00:45	00:39	11:59:21	03:04:32	15:31:11	18(84%)
10	00:33	00:27	11:59:33	03:56:53	16:21:37	19(76%)

# 2020 June 11 to Jun. 12

11 June 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	03:18:42
N 70°	☐	☐	☐	☐	☐	☐	02:29:46
68°	☐	☐	☐	☐	☐	☐	01:58:16
66°	—	—	00:18:37	23:52:51	—	—	01:34:52
64°	—	—	01:37:23	22:23:27	—	—	01:16:21
62°	—	—	02:12:52	21:47:30	—	—	01:01:08
60°	—	00:59:34	02:38:07	21:22:03	23:01:57	—	00:48:16
N 58°	—	01:44:33	02:57:57	21:02:06	22:15:57	—	00:37:11
56°	—	02:12:56	03:14:17	20:45:41	21:47:17	—	00:27:30
54°	00:54:25	02:34:27	03:28:10	20:31:44	21:25:38	23:06:57	00:18:54
52°	01:35:55	02:51:55	03:40:13	20:19:38	21:08:03	22:24:31	00:11:12
50°	02:02:23	03:06:40	03:50:52	20:08:57	20:53:15	21:57:47	00:04:15
45°	02:46:36	03:35:48	04:12:59	19:46:45	20:24:00	21:13:19	.. ..
N 40°	03:16:35	03:58:00	04:30:42	19:28:59	20:01:44	20:43:12	.. ..
35°	03:39:22	04:15:55	04:45:32	19:14:07	19:43:46	20:20:21	23:59:29
30°	03:57:44	04:30:57	04:58:20	19:01:17	19:28:41	20:01:56	23:52:33
20°	04:26:25	04:55:33	05:20:04	18:39:30	19:04:02	19:33:11	23:40:31
N 10°	04:48:43	05:15:45	05:38:46	18:20:46	18:43:48	19:10:50	23:29:57
0°	05:07:27	05:33:37	05:56:07	18:03:24	18:25:55	18:52:05	23:19:59
S 10°	05:24:13	05:50:31	06:13:19	17:46:10	18:08:59	18:35:17	23:10:00
20°	05:40:10	06:07:36	06:31:36	17:27:52	17:51:51	18:19:18	22:59:19
30°	05:56:22	06:26:11	06:52:31	17:06:55	17:33:15	18:03:04	22:47:04
35°	06:04:58	06:36:35	07:04:42	16:54:43	17:22:50	17:54:27	22:39:57
40°	06:14:11	06:48:11	07:18:41	16:40:44	17:11:14	17:45:13	22:31:51
45°	06:24:20	07:01:29	07:35:13	16:24:10	16:57:55	17:35:03	22:22:21
S 50°	06:35:52	07:17:17	07:55:37	16:03:45	16:42:05	17:23:30	22:10:50
52°	06:41:01	07:24:35	08:05:20	15:54:02	16:34:46	17:18:20	22:05:28
54°	06:46:34	07:32:37	08:16:14	15:43:08	16:26:44	17:12:46	21:59:33
56°	06:52:36	07:41:33	08:28:38	15:30:42	16:17:48	17:06:44	21:52:57
58°	06:59:13	07:51:34	08:43:02	15:16:18	16:07:46	17:00:07	21:45:31
S 60°	07:06:32	08:03:00	09:00:06	14:59:13	15:56:19	16:52:47	21:37:03

Jun 11	SHA	Mer.pass
Venus	292°12.9	11:09:11
Mars	8°50.1	06:05:07
Jupiter	61°52.1	02:32:54
Saturn	56°31.1	02:54:16

12 June 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	02:26:23
N 70°	☐	☐	☐	☐	☐	☐	02:03:05
68°	☐	☐	☐	☐	☐	☐	01:44:59
66°	—	—	00:06:40	—	—	—	01:30:22
64°	—	—	01:36:04	22:25:04	—	—	01:18:13
62°	—	—	02:12:02	21:48:40	—	—	01:07:55
60°	—	00:57:36	02:37:30	21:23:01	23:04:11	—	00:59:01
N 58°	—	01:43:36	02:57:27	21:02:57	22:17:14	—	00:51:13
56°	—	02:12:16	03:13:53	20:46:26	21:48:17	—	00:44:19
54°	00:52:38	02:33:57	03:27:50	20:32:26	21:26:29	23:09:00	00:38:08
52°	01:35:04	02:51:32	03:39:57	20:20:16	21:08:49	22:25:42	00:32:33
50°	02:01:49	03:06:21	03:50:38	20:09:33	20:53:56	21:58:42	00:27:29
45°	02:46:18	03:35:37	04:12:51	19:47:16	20:24:34	21:13:59	00:16:30
N 40°	03:16:25	03:57:53	04:30:38	19:29:27	20:02:13	20:43:46	00:07:21
35°	03:39:17	04:15:52	04:45:31	19:14:32	19:44:12	20:20:50	.. ..
30°	03:57:43	04:30:58	04:58:22	19:01:39	19:29:05	20:02:22	.. ..
20°	04:26:28	04:55:38	05:20:10	18:39:49	19:04:22	19:33:32	.. ..
N 10°	04:48:51	05:15:53	05:38:55	18:21:02	18:44:05	19:11:07	.. ..
0°	05:07:38	05:33:48	05:56:19	18:03:37	18:26:08	18:52:19	.. ..
S 10°	05:24:27	05:50:45	06:13:34	17:46:20	18:09:09	18:35:28	23:56:33
20°	05:40:27	06:07:54	06:31:55	17:27:58	17:51:58	18:19:26	23:49:34
30°	05:56:43	06:26:33	06:52:54	17:06:58	17:33:18	18:03:08	23:41:34
35°	06:05:21	06:36:59	07:05:07	16:54:43	17:22:51	17:54:29	23:36:56
40°	06:14:37	06:48:37	07:19:09	16:40:41	17:11:12	17:45:13	23:31:41
45°	06:24:48	07:01:58	07:35:45	16:24:04	16:57:50	17:35:00	23:25:33
S 50°	06:36:24	07:17:51	07:56:14	16:03:34	16:41:57	17:23:24	23:18:10
52°	06:41:35	07:25:11	08:05:58	15:53:49	16:34:36	17:18:13	23:14:45
54°	06:47:09	07:33:15	08:16:55	15:42:52	16:26:32	17:12:37	23:10:59
56°	06:53:13	07:42:13	08:29:23	15:30:23	16:17:34	17:06:33	23:06:49
58°	06:59:51	07:52:17	08:43:51	15:15:55	16:07:29	16:59:54	23:02:10
S 60°	07:07:13	08:03:46	09:01:02	14:58:44	15:55:59	16:52:32	22:56:55

Jun 12	SHA	Mer.pass
Venus	292°43.2	11:03:18
Mars	8°13.6	06:03:36
Jupiter	61°57.3	02:28:38
Saturn	56°34.0	02:50:08

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
11	00:21	00:15	11:59:45	04:45:25	17:08:23	20(67%)
12	00:08	00:02	11:59:58	05:30:35	17:52:08	21(57%)

13 June 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	01:57:44
N 70°	☐	☐	☐	☐	☐	☐	01:45:02
68°	☐	☐	☐	☐	☐	☐	01:34:42
66°	☐	☐	☐	☐	☐	☐	01:26:05
64°	—:—	—:—	01:34:54	22:26:32	—:—	—:—	01:18:46
62°	—:—	—:—	02:11:18	21:49:44	—:—	—:—	01:12:28
60°	—:—	00:55:48	02:36:58	21:23:54	23:06:15	—:—	01:06:57
N 58°	—:—	01:42:46	02:57:03	21:03:43	22:18:23	—:—	01:02:05
56°	—:—	02:11:43	03:13:33	20:47:08	21:49:12	—:—	00:57:44
54°	00:51:00	02:33:32	03:27:34	20:33:04	21:27:16	23:10:54	00:53:49
52°	01:34:19	02:51:12	03:39:44	20:20:52	21:09:31	22:26:46	00:50:16
50°	02:01:19	03:06:05	03:50:28	20:10:07	20:54:34	21:59:33	00:47:01
45°	02:46:03	03:35:28	04:12:46	19:47:46	20:25:06	21:14:36	00:39:58
N 40°	03:16:17	03:57:49	04:30:36	19:29:53	20:02:41	20:44:17	00:34:03
35°	03:39:14	04:15:51	04:45:31	19:14:56	19:44:37	20:21:17	00:28:56
30°	03:57:42	04:30:59	04:58:25	19:02:01	19:29:27	20:02:46	00:24:25
20°	04:26:33	04:55:44	05:20:16	18:40:07	19:04:41	19:33:52	00:16:33
N 10°	04:48:59	05:16:02	05:39:05	18:21:17	18:44:21	19:11:24	00:09:37
0°	05:07:49	05:34:00	05:56:31	18:03:49	18:26:21	18:52:32	00:03:06
S 10°	05:24:41	05:51:00	06:13:49	17:46:30	18:09:19	18:35:39	.. ..
20°	05:40:44	06:08:12	06:32:13	17:28:05	17:52:06	18:19:35	.. ..
30°	05:57:04	06:26:54	06:53:15	17:07:02	17:33:23	18:03:14	.. ..
35°	06:05:43	06:37:22	07:05:31	16:54:45	17:22:54	17:54:33	.. ..
40°	06:15:01	06:49:03	07:19:35	16:40:40	17:11:13	17:45:15	.. ..
45°	06:25:15	07:02:26	07:36:15	16:24:00	16:57:48	17:35:00	.. ..
S 50°	06:36:53	07:18:22	07:56:48	16:03:26	16:41:51	17:23:20	.. ..
52°	06:42:06	07:25:44	08:06:34	15:53:39	16:34:29	17:18:08	.. ..
54°	06:47:42	07:33:50	08:17:34	15:42:39	16:26:23	17:12:31	.. ..
56°	06:53:47	07:42:50	08:30:05	15:30:08	16:17:23	17:06:25	.. ..
58°	07:00:28	07:52:57	08:44:37	15:15:35	16:07:15	16:59:44	.. ..
S 60°	07:07:51	08:04:29	09:01:53	14:58:19	15:55:42	16:52:20	.. ..

Jun 13	SHA	Mer.pass
Venus	293°11.6	10:57:33
Mars	7°37.2	06:02:05
Jupiter	62°02.6	02:24:20
Saturn	56°37.0	02:46:00

14 June 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	01:35:31
N 70°	☐	☐	☐	☐	☐	☐	01:30:08
68°	☐	☐	☐	☐	☐	☐	01:25:41
66°	☐	☐	☐	☐	☐	☐	01:21:55
64°	—:—	—:—	01:33:53	22:27:50	—:—	—:—	01:18:42
62°	—:—	—:—	02:10:40	21:50:42	—:—	—:—	01:15:54
60°	—:—	00:54:10	02:36:31	21:24:42	23:08:08	—:—	01:13:26
N 58°	—:—	01:42:03	02:56:42	21:04:26	22:19:26	—:—	01:11:15
56°	—:—	02:11:14	03:13:18	20:47:47	21:50:01	—:—	01:09:17
54°	00:49:32	02:33:11	03:27:22	20:33:40	21:27:58	23:12:38	01:07:31
52°	01:33:41	02:50:56	03:39:35	20:21:25	21:10:09	22:27:45	01:05:55
50°	02:00:54	03:05:53	03:50:21	20:10:38	20:55:09	22:00:20	01:04:26
45°	02:45:52	03:35:22	04:12:42	19:48:13	20:25:36	21:15:11	01:01:14
N 40°	03:16:12	03:57:47	04:30:36	19:30:17	20:03:08	20:44:45	00:58:31
35°	03:39:12	04:15:52	04:45:33	19:15:18	19:45:01	20:21:42	00:56:11
30°	03:57:44	04:31:02	04:58:29	19:02:22	19:29:49	20:03:09	00:54:07
20°	04:26:39	04:55:50	05:20:24	18:40:25	19:04:59	19:34:11	00:50:31
N 10°	04:49:08	05:16:11	05:39:15	18:21:32	18:44:36	19:11:40	00:47:21
0°	05:08:00	05:34:12	05:56:44	18:04:02	18:26:34	18:52:46	00:44:22
S 10°	05:24:55	05:51:15	06:14:05	17:46:40	18:09:31	18:35:51	00:41:23
20°	05:41:00	06:08:29	06:32:31	17:28:13	17:52:15	18:19:44	00:38:12
30°	05:57:23	06:27:14	06:53:36	17:07:07	17:33:29	18:03:20	00:34:34
35°	06:06:05	06:37:44	07:05:54	16:54:48	17:22:58	17:54:38	00:32:28
40°	06:15:24	06:49:27	07:20:00	16:40:42	17:11:15	17:45:18	00:30:06
45°	06:25:40	07:02:53	07:36:42	16:23:59	16:57:48	17:35:01	00:27:20
S 50°	06:37:21	07:18:52	07:57:19	16:03:21	16:41:48	17:23:19	00:24:02
52°	06:42:35	07:26:15	08:07:08	15:53:32	16:34:25	17:18:05	00:22:30
54°	06:48:12	07:34:22	08:18:09	15:42:30	16:26:17	17:12:27	00:20:50
56°	06:54:19	07:43:24	08:30:44	15:29:56	16:17:15	17:06:20	00:18:59
58°	07:01:01	07:53:34	08:45:19	15:15:20	16:07:05	16:59:37	00:16:56
S 60°	07:08:27	08:05:08	09:02:39	14:57:59	15:55:30	16:52:11	00:14:37

Jun 14	SHA	Mer.pass
Venus	293°38.0	10:51:56
Mars	7°01.0	06:00:33
Jupiter	62°08.1	02:20:02
Saturn	56°40.0	02:41:52

Day	Sun		Moon		
	Eqn. of Time	Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	
13	00:04	00:10	12:00:10	06:13:09	22(48%)
14	00:17	00:23	12:00:23	06:54:08	23(38%)

15 June 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	☐	☐	☐	☐	☐	☐	01:15:26	14:27:26
N 70°	☐	☐	☐	☐	☐	☐	01:16:22	14:22:36
68°	☐	☐	☐	☐	☐	☐	01:17:10	14:18:40
66°	☐	☐	☐	☐	☐	☐	01:17:50	14:15:23
64°	☐	☐	01:33:01	22:29:00	☐	☐	01:18:24	14:12:36
62°	☐	☐	02:10:10	21:51:33	☐	☐	01:18:54	14:10:12
60°	☐	00:52:44	02:36:10	21:25:25	23:09:48	☐	01:19:21	14:08:07
N 58°	☐	01:41:27	02:56:27	21:05:04	22:20:21	☐	01:19:44	14:06:16
56°	☐	02:10:51	03:13:06	20:48:21	21:50:46	☐	01:20:05	14:04:38
54°	00:48:15	02:32:55	03:27:13	20:34:12	21:28:36	23:14:10	01:20:25	14:03:09
52°	01:33:09	02:50:45	03:39:28	20:21:55	21:10:43	22:28:36	01:20:42	14:01:49
50°	02:00:34	03:05:45	03:50:16	20:11:06	20:55:41	22:01:01	01:20:58	14:00:36
45°	02:45:44	03:35:19	04:12:41	19:48:38	20:26:03	21:15:42	01:21:34	13:57:57
N 40°	03:16:09	03:57:47	04:30:38	19:30:40	20:03:32	20:45:12	01:22:04	13:55:44
35°	03:39:13	04:15:55	04:45:37	19:15:39	19:45:23	20:22:06	01:22:30	13:53:50
30°	03:57:47	04:31:07	04:58:34	19:02:41	19:30:09	20:03:30	01:22:54	13:52:10
20°	04:26:46	04:55:58	05:20:32	18:40:42	19:05:16	19:34:29	01:23:35	13:49:15
N 10°	04:49:17	05:16:22	05:39:26	18:21:47	18:44:52	19:11:56	01:24:13	13:46:42
0°	05:08:12	05:34:24	05:56:57	18:04:15	18:26:48	18:53:00	01:24:49	13:44:18
S 10°	05:25:09	05:51:29	06:14:19	17:46:51	18:09:42	18:36:03	01:25:25	13:41:54
20°	05:41:17	06:08:46	06:32:48	17:28:22	17:52:24	18:19:54	01:26:05	13:39:21
30°	05:57:42	06:27:33	06:53:56	17:07:13	17:33:36	18:03:28	01:26:52	13:36:27
35°	06:06:25	06:38:05	07:06:16	16:54:53	17:23:04	17:54:44	01:27:19	13:34:47
40°	06:15:46	06:49:49	07:20:24	16:40:44	17:11:19	17:45:23	01:27:50	13:32:54
45°	06:26:04	07:03:17	07:37:08	16:23:59	16:57:50	17:35:04	01:28:26	13:30:43
S 50°	06:37:47	07:19:19	07:57:48	16:03:19	16:41:48	17:23:20	01:29:10	13:28:08
52°	06:43:01	07:26:43	08:07:38	15:53:28	16:34:23	17:18:05	01:29:30	13:26:57
54°	06:48:40	07:34:52	08:18:42	15:42:24	16:26:14	17:12:26	01:29:53	13:25:39
56°	06:54:48	07:43:56	08:31:18	15:29:48	16:17:10	17:06:17	01:30:17	13:24:14
58°	07:01:32	07:54:07	08:45:57	15:15:09	16:06:59	16:59:33	01:30:45	13:22:39
S 60°	07:08:59	08:05:44	09:03:21	14:57:44	15:55:21	16:52:05	01:31:16	13:20:53

Jun 15	SHA	Mer.pass
Venus	294°02.2	10:46:28
Mars	6°24.9	05:59:01
Jupiter	62°13.8	02:15:44
Saturn	56°43.1	02:37:44

16 June 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	☐	☐	☐	☐	☐	☐	00:55:04	16:17:18
N 70°	☐	☐	☐	☐	☐	☐	01:02:30	16:03:59
68°	☐	☐	☐	☐	☐	☐	01:08:38	15:53:20
66°	☐	☐	☐	☐	☐	☐	01:13:47	15:44:36
64°	—:—	—:—	01:32:18	22:30:00	—:—	—:—	01:18:13	15:37:16
62°	—:—	—:—	02:09:46	21:52:17	—:—	—:—	01:22:03	15:31:01
60°	—:—	00:51:32	02:35:54	21:26:03	23:11:13	—:—	01:25:25	15:25:35
N 58°	—:—	01:40:59	02:56:15	21:05:37	22:21:09	—:—	01:28:24	15:20:50
56°	—:—	02:10:34	03:12:58	20:48:52	21:51:24	—:—	01:31:05	15:16:36
54°	00:47:10	02:32:44	03:27:08	20:34:41	21:29:10	23:15:30	01:33:30	15:12:49
52°	01:32:44	02:50:37	03:39:25	20:22:22	21:11:14	22:29:21	01:35:42	15:09:25
50°	02:00:20	03:05:40	03:50:14	20:11:32	20:56:09	22:01:37	01:37:43	15:06:18
45°	02:45:39	03:35:18	04:12:43	19:49:01	20:26:27	21:16:10	01:42:07	14:59:36
N 40°	03:16:09	03:57:50	04:30:41	19:31:01	20:03:54	20:45:36	01:45:49	14:54:01
35°	03:39:16	04:15:59	04:45:42	19:15:59	19:45:44	20:22:28	01:49:02	14:49:13
30°	03:57:52	04:31:13	04:58:41	19:03:00	19:30:28	20:03:50	01:51:53	14:45:00
20°	04:26:54	04:56:07	05:20:41	18:40:58	19:05:33	19:34:47	01:56:52	14:37:43
N 10°	04:49:27	05:16:32	05:39:37	18:22:02	18:45:07	19:12:12	02:01:16	14:31:20
0°	05:08:24	05:34:37	05:57:09	18:04:28	18:27:01	18:53:14	02:05:27	14:25:22
S 10°	05:25:22	05:51:43	06:14:34	17:47:03	18:09:54	18:36:15	02:09:39	14:19:25
20°	05:41:32	06:09:02	06:33:04	17:28:32	17:52:34	18:20:04	02:14:09	14:13:06
30°	05:57:59	06:27:52	06:54:15	17:07:20	17:33:44	18:03:36	02:19:20	14:05:56
35°	06:06:44	06:38:25	07:06:36	16:54:59	17:23:11	17:54:52	02:22:20	14:01:49
40°	06:16:06	06:50:10	07:20:45	16:40:49	17:11:25	17:45:29	02:25:45	13:57:09
45°	06:26:25	07:03:40	07:37:32	16:24:02	16:57:54	17:35:09	02:29:43	13:51:46
S 50°	06:38:11	07:19:44	07:58:15	16:03:19	16:41:50	17:23:23	02:34:30	13:45:20
52°	06:43:26	07:27:09	08:08:06	15:53:27	16:34:24	17:18:07	02:36:43	13:42:23
54°	06:49:06	07:35:19	08:19:11	15:42:22	16:26:14	17:12:27	02:39:08	13:39:09
56°	06:55:15	07:44:24	08:31:50	15:29:43	16:17:09	17:06:18	02:41:50	13:35:36
58°	07:02:00	07:54:37	08:46:31	15:15:02	16:06:55	16:59:32	02:44:50	13:31:39
S 60°	07:09:29	08:06:16	09:03:58	14:57:34	15:55:16	16:52:03	02:48:12	13:27:14

Jun 16	SHA	Mer.pass
Venus	294°24.2	10:41:09
Mars	5°48.9	05:57:28
Jupiter	62°19.6	02:11:25
Saturn	56°46.4	02:33:35

Day	Sun		Moon		
	Eqn. of Time	Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	
15	00:29	00:36	12:00:36	07:34:32 19:54:50	24(29%)
16	00:42	00:49	12:00:49	08:15:22 20:36:15	25(21%)

2020 June 17 to Jun. 18

17 June 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	☐	☐	☐	☐	☐	☐	00:31:49	18:19:02
N 70°	☐	☐	☐	☐	☐	☐	00:47:10	17:52:43
68°	☐	☐	☐	☐	☐	☐	00:59:33	17:33:01
66°	☐	☐	☐	☐	☐	☐	01:09:48	17:17:27
64°	—:—	—:—	01:31:46	22:30:49	—:—	—:—	01:18:28	17:04:45
62°	—:—	—:—	02:09:29	21:52:55	—:—	—:—	01:25:54	16:54:05
60°	—:—	00:50:33	02:35:44	21:26:35	23:12:24	—:—	01:32:24	16:44:58
N 58°	—:—	01:40:38	02:56:09	21:06:07	22:21:49	—:—	01:38:07	16:37:03
56°	—:—	02:10:23	03:12:54	20:49:19	21:51:57	—:—	01:43:13	16:30:06
54°	00:46:17	02:32:37	03:27:06	20:35:06	21:29:40	23:16:35	01:47:49	16:23:54
52°	01:32:26	02:50:33	03:39:25	20:22:47	21:11:41	22:29:59	01:51:58	16:18:20
50°	02:00:10	03:05:38	03:50:15	20:11:55	20:56:34	22:02:09	01:55:46	16:13:18
45°	02:45:38	03:35:20	04:12:46	19:49:22	20:26:50	21:16:35	02:04:02	16:02:28
N 40°	03:16:12	03:57:54	04:30:47	19:31:21	20:04:15	20:45:58	02:10:57	15:53:31
35°	03:39:21	04:16:05	04:45:49	19:16:18	19:46:02	20:22:48	02:16:55	15:45:52
30°	03:57:59	04:31:21	04:58:49	19:03:17	19:30:46	20:04:09	02:22:13	15:39:09
20°	04:27:03	04:56:16	05:20:51	18:41:14	19:05:49	19:35:03	02:31:26	15:27:35
N 10°	04:49:38	05:16:43	05:39:48	18:22:16	18:45:21	19:12:27	02:39:34	15:17:30
0°	05:08:37	05:34:50	05:57:22	18:04:41	18:27:14	18:53:28	02:47:15	15:08:04
S 10°	05:25:36	05:51:58	06:14:49	17:47:15	18:10:06	18:36:27	02:54:59	14:58:40
20°	05:41:48	06:09:18	06:33:20	17:28:42	17:52:45	18:20:15	03:03:17	14:48:41
30°	05:58:16	06:28:09	06:54:33	17:07:29	17:33:53	18:03:46	03:12:48	14:37:19
35°	06:07:02	06:38:43	07:06:55	16:55:07	17:23:19	17:55:00	03:18:19	14:30:47
40°	06:16:25	06:50:30	07:21:06	16:40:56	17:11:32	17:45:37	03:24:37	14:23:22
45°	06:26:46	07:04:01	07:37:54	16:24:07	16:58:00	17:35:15	03:31:59	14:14:45
S 50°	06:38:33	07:20:07	07:58:38	16:03:22	16:41:54	17:23:28	03:40:52	14:04:25
52°	06:43:49	07:27:33	08:08:31	15:53:29	16:34:28	17:18:12	03:45:00	13:59:39
54°	06:49:29	07:35:44	08:19:38	15:42:23	16:26:16	17:12:31	03:49:33	13:54:25
56°	06:55:39	07:44:50	08:32:18	15:29:42	16:17:10	17:06:21	03:54:36	13:48:37
58°	07:02:25	07:55:04	08:47:01	15:14:59	16:06:56	16:59:35	04:00:16	13:42:09
S 60°	07:09:55	08:06:45	09:04:31	14:57:29	15:55:15	16:52:04	04:06:40	13:34:51

Jun 17	SHA	Mer.pass
Venus	294°43.9	10:35:59
Mars	5°13.1	05:55:55
Jupiter	62°25.6	02:07:05
Saturn	56°49.6	02:29:26

18 June 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	00:00:05 22:43:27	21:11:09
N 70°	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	00:28:00 23:57:14	19:58:35
68°	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	00:49:05	19:21:42
66°	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	01:05:51	18:55:51
64°	<div></div>	<div></div>	01:31:24	22:31:28	<div></div>	<div></div>	01:19:39	18:35:59
62°	<div></div>	<div></div>	02:09:19	21:53:25	<div></div>	<div></div>	01:31:18	18:19:56
60°	<div></div>	00:49:50	02:35:39	21:27:02	23:13:19	<div></div>	01:41:17	18:06:33
N 58°	<div></div>	01:40:25	02:56:07	21:06:31	22:22:22	<div></div>	01:50:00	17:55:08
56°	<div></div>	02:10:17	03:12:54	20:49:43	21:52:25	<div></div>	01:57:43	17:45:13
54°	00:45:39	02:32:35	03:27:08	20:35:28	21:30:04	23:17:26	02:04:35	17:36:29
52°	01:32:15	02:50:33	03:39:28	20:23:08	21:12:04	22:30:30	02:10:47	17:28:42
50°	02:00:06	03:05:40	03:50:19	20:12:15	20:56:56	22:02:35	02:16:26	17:21:41
45°	02:45:40	03:35:25	04:12:52	19:49:41	20:27:09	21:16:56	02:28:35	17:06:46
N 40°	03:16:17	03:58:00	04:30:54	19:31:39	20:04:33	20:46:18	02:38:42	16:54:32
35°	03:39:28	04:16:13	04:45:58	19:16:35	19:46:20	20:23:06	02:47:24	16:44:09
30°	03:58:07	04:31:29	04:58:58	19:03:33	19:31:03	20:04:26	02:55:05	16:35:04
20°	04:27:12	04:56:27	05:21:02	18:41:29	19:06:05	19:35:19	03:08:23	16:19:28
N 10°	04:49:50	05:16:55	05:40:00	18:22:30	18:45:35	19:12:41	03:20:06	16:05:54
0°	05:08:49	05:35:02	05:57:36	18:04:55	18:27:28	18:53:41	03:31:08	15:53:14
S 10°	05:25:50	05:52:12	06:15:03	17:47:27	18:10:18	18:36:40	03:42:15	15:40:36
20°	05:42:03	06:09:33	06:33:36	17:28:54	17:52:56	18:20:27	03:54:09	15:27:10
30°	05:58:33	06:28:26	06:54:50	17:07:39	17:34:03	18:03:56	04:07:52	15:11:50
35°	06:07:18	06:39:00	07:07:12	16:55:16	17:23:29	17:55:10	04:15:51	15:02:57
40°	06:16:42	06:50:48	07:21:24	16:41:04	17:11:41	17:45:46	04:24:58	14:52:52
45°	06:27:04	07:04:20	07:38:14	16:24:15	16:58:08	17:35:24	04:35:42	14:41:04
S 50°	06:38:52	07:20:27	07:59:00	16:03:28	16:42:01	17:23:36	04:48:44	14:26:49
52°	06:44:09	07:27:54	08:08:53	15:53:34	16:34:34	17:18:19	04:54:50	14:20:10
54°	06:49:50	07:36:06	08:20:01	15:42:27	16:26:22	17:12:38	05:01:35	14:12:50
56°	06:56:01	07:45:12	08:32:42	15:29:45	16:17:15	17:06:27	05:09:08	14:04:40
58°	07:02:47	07:55:28	08:47:26	15:15:01	16:07:00	16:59:40	05:17:40	13:55:28
S 60°	07:10:18	08:07:10	09:04:59	14:57:28	15:55:18	16:52:09	05:27:26	13:44:58

Jun 18	SHA	Mer.pass
Venus	295°01.2	10:30:58
Mars	4°37.4	05:54:21
Jupiter	62°31.7	02:02:45
Saturn	56°53.0	02:25:17

Day	Sun		Moon		
	Eqn.of Time	Mer.	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	
17	00:55	01:02	08:57:36	21:19:31	26(14%)
18	01:08	01:15	09:42:06	22:05:26	27(8%)

# 2020 June 19 to Jun. 20

19 June 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	☐	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐	☐
68°	☐	☐	☐	☐	☐	☐	00:35:11	21:29:41
66°	☐	☐	☐	☐	☐	☐	01:02:00	20:41:04
64°	—:—	—:—	01:31:12	22:31:57	—:—	—:—	01:22:44	20:10:16
62°	—:—	—:—	02:09:15	21:53:49	—:—	—:—	01:39:33	19:47:17
60°	—:—	00:49:22	02:35:39	21:27:23	23:13:57	—:—	01:53:39	19:28:56
N 58°	—:—	01:40:19	02:56:10	21:06:52	22:22:46	—:—	02:05:43	19:13:42
56°	—:—	02:10:17	03:12:59	20:50:02	21:52:46	—:—	02:16:14	19:00:43
54°	00:45:15	02:32:37	03:27:13	20:35:47	21:30:25	23:18:02	02:25:31	18:49:27
52°	01:32:12	02:50:38	03:39:34	20:23:26	21:12:23	22:30:54	02:33:49	18:39:30
50°	02:00:07	03:05:45	03:50:26	20:12:33	20:57:15	22:02:56	02:41:18	18:30:37
45°	02:45:45	03:35:32	04:13:00	19:49:58	20:27:27	21:17:15	02:57:19	18:11:53
N 40°	03:16:24	03:58:09	04:31:03	19:31:55	20:04:49	20:46:34	03:10:32	17:56:41
35°	03:39:36	04:16:22	04:46:08	19:16:50	19:46:36	20:23:22	03:21:48	17:43:50
30°	03:58:17	04:31:40	04:59:09	19:03:48	19:31:18	20:04:41	03:31:42	17:32:39
20°	04:27:23	04:56:38	05:21:14	18:41:43	19:06:19	19:35:34	03:48:47	17:13:32
N 10°	04:50:01	05:17:07	05:40:13	18:22:44	18:45:49	19:12:55	04:03:46	16:56:57
0°	05:09:02	05:35:15	05:57:49	18:05:08	18:27:41	18:53:55	04:17:51	16:41:28
S 10°	05:26:03	05:52:25	06:15:17	17:47:40	18:10:31	18:36:53	04:32:01	16:26:02
20°	05:42:17	06:09:47	06:33:50	17:29:06	17:53:09	18:20:39	04:47:13	16:09:34
30°	05:58:48	06:28:41	06:55:05	17:07:51	17:34:15	18:04:08	05:04:45	15:50:42
35°	06:07:34	06:39:16	07:07:28	16:55:27	17:23:40	17:55:22	05:15:00	15:39:44
40°	06:16:59	06:51:04	07:21:41	16:41:14	17:11:51	17:45:57	05:26:46	15:27:11
45°	06:27:21	07:04:37	07:38:31	16:24:24	16:58:18	17:35:34	05:40:41	15:12:25
S 50°	06:39:10	07:20:45	07:59:18	16:03:37	16:42:10	17:23:45	05:57:45	14:54:23
52°	06:44:27	07:28:12	08:09:13	15:53:42	16:34:43	17:18:28	06:05:49	14:45:53
54°	06:50:08	07:36:25	08:20:21	15:42:34	16:26:30	17:12:47	06:14:49	14:36:26
56°	06:56:20	07:45:32	08:33:03	15:29:52	16:17:23	17:06:35	06:24:58	14:25:48
58°	07:03:07	07:55:48	08:47:48	15:15:07	16:07:07	16:59:48	06:36:36	14:13:39
S 60°	07:10:38	08:07:31	09:05:22	14:57:33	15:55:24	16:52:16	06:50:07	13:59:34

Jun 19	SHA	Mer.pass
Venus	295°16.1	10:26:07
Mars	4°01.9	05:52:46
Jupiter	62°38.0	01:58:24
Saturn	56°56.4	02:21:07

20 June 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	☐	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐	☐
68°	☐	☐	☐	☐	☐	☐	00:08:59	☐
66°	☐	☐	☐	☐	☐	☐	00:58:18	22:32:57
64°	☐	☐	01:31:11	22:32:15	☐	☐	01:29:43	21:42:42
62°	☐	☐	02:09:19	21:54:06	☐	☐	01:53:16	21:11:20
60°	☐	00:49:12	02:35:45	21:27:39	23:14:18	☐	02:12:07	20:47:54
N 58°	☐	01:40:22	02:56:17	21:07:07	22:23:03	☐	02:27:50	20:29:06
56°	☐	02:10:22	03:13:07	20:50:17	21:53:02	☐	02:41:15	20:13:25
54°	00:45:07	02:32:44	03:27:22	20:36:02	21:30:40	23:18:22	02:52:56	19:59:59
52°	01:32:15	02:50:46	03:39:43	20:23:41	21:12:38	22:31:10	03:03:15	19:48:15
50°	02:00:13	03:05:54	03:50:36	20:12:48	20:57:30	22:03:12	03:12:30	19:37:51
45°	02:45:54	03:35:42	04:13:11	19:50:12	20:27:41	21:17:30	03:32:03	19:16:07
N 40°	03:16:34	03:58:20	04:31:14	19:32:09	20:05:04	20:46:49	03:47:59	18:58:37
35°	03:39:47	04:16:33	04:46:19	19:17:04	19:46:50	20:23:36	04:01:29	18:43:54
30°	03:58:28	04:31:51	04:59:21	19:04:02	19:31:32	20:04:55	04:13:17	18:31:09
20°	04:27:35	04:56:50	05:21:26	18:41:57	19:06:33	19:35:47	04:33:33	18:09:24
N 10°	04:50:14	05:17:20	05:40:26	18:22:57	18:46:03	19:13:09	04:51:13	17:50:33
0°	05:09:15	05:35:28	05:58:02	18:05:21	18:27:54	18:54:08	05:07:49	17:32:58
S 10°	05:26:17	05:52:39	06:15:30	17:47:52	18:10:44	18:37:06	05:24:28	17:15:25
20°	05:42:31	06:10:01	06:34:04	17:29:18	17:53:21	18:20:52	05:42:22	16:56:38
30°	05:59:02	06:28:55	06:55:20	17:08:03	17:34:27	18:04:21	06:03:03	16:35:02
35°	06:07:49	06:39:31	07:07:43	16:55:39	17:23:52	17:55:34	06:15:11	16:22:24
40°	06:17:14	06:51:19	07:21:56	16:41:26	17:12:03	17:46:09	06:29:10	16:07:54
45°	06:27:36	07:04:53	07:38:47	16:24:36	16:58:30	17:35:46	06:45:48	15:50:41
S 50°	06:39:25	07:21:01	07:59:35	16:03:48	16:42:22	17:23:57	07:06:24	15:29:25
52°	06:44:43	07:28:28	08:09:29	15:53:53	16:34:54	17:18:40	07:16:14	15:19:18
54°	06:50:24	07:36:41	08:20:37	15:42:45	16:26:41	17:12:58	07:27:17	15:07:56
56°	06:56:36	07:45:49	08:33:20	15:30:02	16:17:34	17:06:46	07:39:55	14:54:59
58°	07:03:23	07:56:05	08:48:06	15:15:17	16:07:17	16:59:59	07:54:35	14:39:58
S 60°	07:10:55	08:07:48	09:05:40	14:57:42	15:55:34	16:52:27	08:12:02	14:22:09

Jun 20	SHA	Mer.pass
Venus	295°28.7	10:21:26
Mars	3°26.6	05:51:11
Jupiter	62°44.4	01:54:03
Saturn	56°59.9	02:16:57

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
19	01:22	01:28	12:01:28	10:29:34	22:54:32	28(3%)
20	01:35	01:41	12:01:41	11:20:19	23:46:51	29(1%)

21 June 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	☐	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐	☐
68°	☐	☐	☐	☐	☐	☐	☐	☐
66°	☐	☐	☐	☐	☐	☐	00:55:10	.. ..
64°	☐	☐	01:31:21	22:32:23	☐	☐	01:45:47	22:59:38
62°	☐	☐	02:09:30	21:54:15	☐	☐	02:17:27	22:22:31
60°	☐	00:49:18	02:35:57	21:27:50	23:14:21	☐	02:41:11	21:56:07
N 58°	☐	01:40:33	02:56:29	21:07:18	22:23:12	☐	03:00:15	21:35:24
56°	☐	02:10:33	03:13:19	20:50:28	21:53:13	☐	03:16:11	21:18:19
54°	00:45:14	02:32:56	03:27:34	20:36:13	21:30:51	23:18:27	03:29:51	21:03:47
52°	01:32:26	02:50:58	03:39:55	20:23:52	21:12:50	22:31:19	03:41:48	20:51:10
50°	02:00:24	03:06:06	03:50:48	20:12:59	20:57:41	22:03:22	03:52:25	20:40:01
45°	02:46:06	03:35:55	04:13:23	19:50:25	20:27:53	21:17:41	04:14:37	20:16:49
N 40°	03:16:47	03:58:32	04:31:27	19:32:21	20:05:16	20:47:01	04:32:32	19:58:11
35°	03:40:00	04:16:46	04:46:32	19:17:17	19:47:02	20:23:48	04:47:38	19:42:33
30°	03:58:41	04:32:04	04:59:34	19:04:15	19:31:45	20:05:08	05:00:45	19:29:01
20°	04:27:48	04:57:03	05:21:39	18:42:10	19:06:46	19:36:00	05:23:10	19:05:57
N 10°	04:50:27	05:17:33	05:40:39	18:23:10	18:46:16	19:13:22	05:42:39	18:45:57
0°	05:09:28	05:35:42	05:58:15	18:05:34	18:28:07	18:54:21	06:00:54	18:27:17
S 10°	05:26:30	05:52:52	06:15:43	17:48:06	18:10:57	18:37:19	06:19:12	18:08:36
20°	05:42:44	06:10:15	06:34:18	17:29:32	17:53:35	18:21:05	06:38:50	17:48:36
30°	05:59:15	06:29:09	06:55:33	17:08:16	17:34:41	18:04:34	07:01:33	17:25:29
35°	06:08:02	06:39:44	07:07:56	16:55:53	17:24:05	17:55:47	07:14:55	17:11:55
40°	06:17:27	06:51:32	07:22:09	16:41:40	17:12:17	17:46:22	07:30:20	16:56:16
45°	06:27:50	07:05:06	07:39:00	16:24:49	16:58:44	17:36:00	07:48:46	16:37:36
S 50°	06:39:39	07:21:14	07:59:48	16:04:02	16:42:35	17:24:11	08:11:44	16:14:21
52°	06:44:56	07:28:42	08:09:42	15:54:07	16:35:08	17:18:54	08:22:46	16:03:12
54°	06:50:38	07:36:54	08:20:51	15:42:59	16:26:55	17:13:12	08:35:17	15:50:34
56°	06:56:49	07:46:02	08:33:33	15:30:16	16:17:48	17:07:00	08:49:40	15:36:02
58°	07:03:37	07:56:18	08:48:19	15:15:31	16:07:32	17:00:13	09:06:36	15:18:57
S 60°	07:11:08	08:08:01	09:05:53	14:57:56	15:55:48	16:52:41	09:27:09	14:58:16

Jun 21	SHA	Mer.pass
Venus	295°38.8	10:16:54
Mars	2°51.4	05:49:36
Jupiter	62°50.9	01:49:41
Saturn	57°03.5	02:12:47

22 June 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	☐	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐	☐
68°	☐	☐	☐	☐	☐	☐	☐	☐
66°	☐	☐	☐	☐	☐	☐	00:59:44	00:23:07
64°	☐	☐	01:31:41	22:32:20	☐	☐	02:23:16	23:45:24
62°	☐	☐	02:09:48	21:54:18	☐	☐	03:00:25	23:11:52
60°	☐	00:49:42	02:36:14	21:27:55	23:14:07	☐	03:26:51	22:47:09
N 58°	☐	01:40:51	02:56:45	21:07:24	22:23:13	☐	03:47:36	22:27:27
56°	☐	02:10:51	03:13:35	20:50:36	21:53:17	☐	04:04:43	22:11:03
54°	00:45:37	02:33:12	03:27:50	20:36:21	21:30:57	23:18:15	04:19:17	21:57:02
52°	01:32:44	02:51:14	03:40:11	20:24:01	21:12:57	22:31:22	04:31:56	21:44:48
50°	02:00:41	03:06:22	03:51:04	20:13:09	20:57:49	22:03:27	04:43:06	21:33:57
45°	02:46:22	03:36:10	04:13:38	19:50:35	20:28:03	21:17:49	05:06:22	21:11:18
N 40°	03:17:02	03:58:47	04:31:41	19:32:32	20:05:26	20:47:10	05:25:04	20:53:03
35°	03:40:14	04:17:01	04:46:46	19:17:28	19:47:13	20:23:59	05:40:44	20:37:42
30°	03:58:55	04:32:18	04:59:48	19:04:26	19:31:56	20:05:19	05:54:19	20:24:22
20°	04:28:02	04:57:17	05:21:53	18:42:22	19:06:58	19:36:12	06:17:29	20:01:36
N 10°	04:50:41	05:17:47	05:40:52	18:23:23	18:46:28	19:13:34	06:37:33	19:41:49
0°	05:09:41	05:35:55	05:58:28	18:05:47	18:28:20	18:54:34	06:56:19	19:23:19
S 10°	05:26:43	05:53:05	06:15:56	17:48:19	18:11:11	18:37:32	07:15:05	19:04:46
20°	05:42:57	06:10:27	06:34:30	17:29:46	17:53:49	18:21:19	07:35:13	18:44:51
30°	05:59:28	06:29:21	06:55:45	17:08:31	17:34:55	18:04:48	07:58:28	18:21:49
35°	06:08:14	06:39:56	07:08:08	16:56:08	17:24:20	17:56:02	08:12:08	18:08:16
40°	06:17:39	06:51:44	07:22:21	16:41:55	17:12:32	17:46:37	08:27:55	17:52:38
45°	06:28:01	07:05:17	07:39:11	16:25:05	16:58:59	17:36:15	08:46:45	17:33:56
S 50°	06:39:50	07:21:25	07:59:59	16:04:18	16:42:51	17:24:27	09:10:13	17:10:37
52°	06:45:07	07:28:52	08:09:53	15:54:24	16:35:24	17:19:10	09:21:31	16:59:23
54°	06:50:49	07:37:05	08:21:01	15:43:16	16:27:12	17:13:28	09:34:18	16:46:40
56°	06:57:00	07:46:12	08:33:43	15:30:34	16:18:05	17:07:17	09:49:02	16:32:01
58°	07:03:47	07:56:28	08:48:28	15:15:49	16:07:49	17:00:30	10:06:23	16:14:44
S 60°	07:11:19	08:08:11	09:06:02	14:58:15	15:56:06	16:52:59	10:27:29	15:53:44

Jun 22	SHA	Mer.pass
Venus	295°46.4	10:12:31
Mars	2°16.3	05:47:59
Jupiter	62°57.6	01:45:18
Saturn	57°07.1	02:08:37

Day	Sun			Moon		Age
	Eqn.of Time		Mer.	Mer.Pass.		
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss	Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	
21	01:48	01:55	12:01:55	12:14:02	—:—	0(0%)
22	02:01	02:08	12:02:08	13:09:48	00:41:45	1(2%)



2020 June 23 to Jun. 24

23 June 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	☐	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐	☐
68°	☐	☐	☐	☐	☐	☐	☐	☐
66°	☐	☐	☐	☐	☐	☐	02:37:54	00:42:45
64°	☐	☐	01:32:11	22:32:06	☐	☐	03:34:58	☐
62°	☐	☐	02:10:13	21:54:13	☐	☐	04:08:15	23:40:53
60°	☐	00:50:23	02:36:36	21:27:54	23:13:37	☐	04:32:44	23:21:03
N 58°	☐	01:41:17	02:57:06	21:07:26	22:23:07	☐	04:52:13	23:04:38
56°	☐	02:11:13	03:13:55	20:50:39	21:53:16	☐	05:08:25	22:50:40
54°	00:46:15	02:33:33	03:28:09	20:36:26	21:30:59	23:17:48	05:22:15	22:38:33
52°	01:33:09	02:51:33	03:40:29	20:24:06	21:13:00	22:31:16	05:34:18	22:27:51
50°	02:01:03	03:06:41	03:51:22	20:13:15	20:57:54	22:03:27	05:44:58	22:18:17
45°	02:46:41	03:36:27	04:13:55	19:50:42	20:28:09	21:17:54	06:07:15	21:58:06
N 40°	03:17:19	03:59:04	04:31:58	19:32:41	20:05:34	20:47:17	06:25:10	21:41:40
35°	03:40:31	04:17:16	04:47:02	19:17:37	19:47:22	20:24:07	06:40:12	21:27:45
30°	03:59:11	04:32:33	05:00:03	19:04:37	19:32:06	20:05:28	06:53:15	21:15:37
20°	04:28:17	04:57:31	05:22:07	18:42:33	19:07:09	19:36:23	07:15:28	20:54:47
N 10°	04:50:55	05:18:00	05:41:06	18:23:35	18:46:40	19:13:46	07:34:43	20:36:37
0°	05:09:55	05:36:08	05:58:41	18:06:00	18:28:33	18:54:46	07:52:42	20:19:34
S 10°	05:26:56	05:53:17	06:16:09	17:48:33	18:11:24	18:37:46	08:10:39	20:02:27
20°	05:43:09	06:10:39	06:34:42	17:30:00	17:54:03	18:21:33	08:29:51	19:44:04
30°	05:59:39	06:29:32	06:55:56	17:08:47	17:35:11	18:05:04	08:51:58	19:22:47
35°	06:08:25	06:40:07	07:08:19	16:56:24	17:24:36	17:56:18	09:04:55	19:10:17
40°	06:17:49	06:51:54	07:22:31	16:42:12	17:12:49	17:46:54	09:19:49	18:55:53
45°	06:28:11	07:05:27	07:39:20	16:25:23	16:59:17	17:36:32	09:37:31	18:38:43
S 50°	06:39:59	07:21:34	08:00:06	16:04:37	16:43:10	17:24:44	09:59:25	18:17:25
52°	06:45:16	07:29:01	08:10:00	15:54:44	16:35:43	17:19:28	10:09:52	18:07:13
54°	06:50:57	07:37:13	08:21:07	15:43:36	16:27:31	17:13:47	10:21:38	17:55:44
56°	06:57:08	07:46:19	08:33:49	15:30:55	16:18:25	17:07:36	10:35:04	17:42:35
58°	07:03:55	07:56:35	08:48:33	15:16:11	16:08:10	17:00:50	10:50:42	17:27:16
S 60°	07:11:26	08:08:17	09:06:05	14:58:39	15:56:28	16:53:19	11:09:21	17:08:57

Jun 23	SHA	Mer.pass
Venus	295°51.7	10:08:18
Mars	1°41.4	05:46:22
Jupiter	63°04.3	01:40:55
Saturn	57°10.8	02:04:26

24 June 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	☐	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐	☐
68°	☐	☐	☐	☐	☐	☐	03:40:18	01:38:22
66°	☐	☐	☐	☐	☐	☐	04:37:59	00:40:00
64°	☐	☐	☐	☐	☐	☐	05:11:29	00:05:54
62°	☐	☐	☐	☐	☐	☐	05:35:56	23:57:24
60°	☐	☐	☐	☐	☐	☐	05:55:16	23:42:51
N 58°	☐	☐	☐	☐	☐	☐	☐	☐
56°	☐	☐	☐	☐	☐	☐	☐	☐
54°	☐	☐	☐	☐	☐	☐	☐	☐
52°	☐	☐	☐	☐	☐	☐	☐	☐
50°	☐	☐	☐	☐	☐	☐	☐	☐
45°	☐	☐	☐	☐	☐	☐	☐	☐
N 40°	☐	☐	☐	☐	☐	☐	☐	☐
35°	☐	☐	☐	☐	☐	☐	☐	☐
30°	☐	☐	☐	☐	☐	☐	☐	☐
20°	☐	☐	☐	☐	☐	☐	☐	☐
N 10°	☐	☐	☐	☐	☐	☐	☐	☐
0°	☐	☐	☐	☐	☐	☐	☐	☐
S 10°	☐	☐	☐	☐	☐	☐	☐	☐
20°	☐	☐	☐	☐	☐	☐	☐	☐
30°	☐	☐	☐	☐	☐	☐	☐	☐
35°	☐	☐	☐	☐	☐	☐	☐	☐
40°	☐	☐	☐	☐	☐	☐	☐	☐
45°	☐	☐	☐	☐	☐	☐	☐	☐
S 50°	☐	☐	☐	☐	☐	☐	☐	☐
52°	☐	☐	☐	☐	☐	☐	☐	☐
54°	☐	☐	☐	☐	☐	☐	☐	☐
56°	☐	☐	☐	☐	☐	☐	☐	☐
58°	☐	☐	☐	☐	☐	☐	☐	☐
S 60°	☐	☐	☐	☐	☐	☐	☐	☐

Jun 24	SHA	Mer.pass
Venus	295°54.7	10:04:15
Mars	1°06.7	05:44:44
Jupiter	63°11.2	01:36:32
Saturn	57°14.5	02:00:16

Day	Sun		Mer. Pass hh:mm:ss	Moon		Age
	Eqn. of Time			Mer.Pass.		
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
23	02:14	02:21	12:02:21	14:06:10	01:38:00	2(6%)
24	02:27	02:34	12:02:34	15:01:42	02:34:06	3(12%)

25 June 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	03:52:51
N 70°	□	□	□	□	□	□	05:29:20
68°	□	□	□	□	□	□	06:08:39
66°	□	□	□	□	□	□	06:35:41
64°	—:—	—:—	01:33:44	22:31:07	—:—	—:—	06:56:17
62°	—:—	—:—	02:11:23	21:53:43	—:—	—:—	07:12:52
60°	—:—	00:52:34	02:37:37	21:27:36	23:11:49	—:—	07:26:38
N 58°	—:—	01:42:32	02:58:01	21:07:15	22:22:30	—:—	07:38:22
56°	—:—	02:12:15	03:14:46	20:50:33	21:52:56	—:—	07:48:32
54°	00:48:17	02:34:28	03:28:57	20:36:24	21:30:47	23:16:12	07:57:29
52°	01:34:20	02:52:24	03:41:15	20:24:08	21:12:55	22:30:45	08:05:27
50°	02:02:02	03:07:29	03:52:06	20:13:18	20:57:52	22:03:11	08:12:37
45°	02:47:28	03:37:10	04:14:36	19:50:50	20:28:15	21:17:53	08:27:51
N 40°	03:18:01	03:59:43	04:32:35	19:32:52	20:05:44	20:47:24	08:40:20
35°	03:41:09	04:17:53	04:47:37	19:17:51	19:47:35	20:24:17	08:50:57
30°	03:59:46	04:33:08	05:00:37	19:04:53	19:32:21	20:05:42	09:00:13
20°	04:28:49	04:58:03	05:22:38	18:42:53	19:07:28	19:36:41	09:16:06
N 10°	04:51:24	05:18:29	05:41:34	18:23:58	18:47:02	19:14:07	09:29:55
0°	05:10:21	05:36:34	05:59:07	18:06:26	18:28:58	18:55:11	09:42:50
S 10°	05:27:20	05:53:41	06:16:32	17:49:01	18:11:52	18:38:13	09:55:42
20°	05:43:31	06:11:01	06:35:03	17:30:31	17:54:34	18:22:03	10:09:24
30°	05:59:58	06:29:51	06:56:14	17:09:21	17:35:44	18:05:36	10:25:01
35°	06:08:43	06:40:24	07:08:35	16:57:01	17:25:12	17:56:53	10:34:04
40°	06:18:05	06:52:09	07:22:45	16:42:51	17:13:26	17:47:31	10:44:21
45°	06:28:25	07:05:40	07:39:31	16:26:05	16:59:57	17:37:11	10:56:22
S 50°	06:40:11	07:21:44	08:00:14	16:05:23	16:43:53	17:25:26	11:10:54
52°	06:45:26	07:29:09	08:10:06	15:55:31	16:36:28	17:20:11	11:17:40
54°	06:51:06	07:37:19	08:21:11	15:44:26	16:28:18	17:14:31	11:25:09
56°	06:57:15	07:46:24	08:33:49	15:31:48	16:19:13	17:08:22	11:33:29
58°	07:04:01	07:56:37	08:48:30	15:17:08	16:09:01	17:01:38	11:42:53
S 60°	07:11:30	08:08:16	09:05:57	14:59:41	15:57:22	16:54:09	11:53:36

Jun 25	SHA	Mer.pass
Venus	295°55.3	10:00:20
Mars	0°32.1	05:43:06
Jupiter	63°18.2	01:32:08
Saturn	57°18.3	01:56:04

26 June 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	07:29:43
N 70°	□	□	□	□	□	□	07:55:01
68°	□	□	□	□	□	□	08:14:04
66°	□	□	□	□	□	□	08:29:09
64°	—:—	—:—	01:34:45	22:30:23	—:—	—:—	08:41:30
62°	—:—	—:—	02:12:09	21:53:18	—:—	—:—	08:51:52
60°	—:—	00:54:02	02:38:15	21:27:19	23:10:34	—:—	09:00:43
N 58°	—:—	01:43:21	02:58:36	21:07:03	22:22:00	—:—	09:08:26
56°	—:—	02:12:55	03:15:17	20:50:25	21:52:37	—:—	09:15:12
54°	00:49:38	02:35:03	03:29:26	20:36:18	21:30:35	23:15:04	09:21:14
52°	01:35:05	02:52:55	03:41:43	20:24:03	21:12:46	22:30:18	09:26:39
50°	02:02:39	03:07:57	03:52:32	20:13:16	20:57:46	22:02:55	09:31:34
45°	02:47:56	03:37:35	04:14:59	19:50:51	20:28:13	21:17:48	09:42:06
N 40°	03:18:25	04:00:05	04:32:56	19:32:55	20:05:45	20:47:23	09:50:50
35°	03:41:31	04:18:14	04:47:57	19:17:56	19:47:38	20:24:19	09:58:17
30°	04:00:06	04:33:27	05:00:55	19:04:59	19:32:26	20:05:46	10:04:49
20°	04:29:06	04:58:19	05:22:54	18:43:02	19:07:36	19:36:48	10:16:05
N 10°	04:51:39	05:18:44	05:41:48	18:24:09	18:47:13	19:14:17	10:25:55
0°	05:10:35	05:36:47	05:59:20	18:06:38	18:29:10	18:55:22	10:35:07
S 10°	05:27:32	05:53:53	06:16:43	17:49:16	18:12:06	18:38:26	10:44:16
20°	05:43:41	06:11:10	06:35:12	17:30:48	17:54:49	18:22:19	10:54:00
30°	06:00:06	06:29:58	06:56:21	17:09:40	17:36:02	18:05:54	11:05:04
35°	06:08:50	06:40:30	07:08:41	16:57:21	17:25:31	17:57:11	11:11:27
40°	06:18:11	06:52:14	07:22:49	16:43:13	17:13:47	17:47:51	11:18:40
45°	06:28:29	07:05:43	07:39:34	16:26:29	17:00:19	17:37:33	11:27:02
S 50°	06:40:13	07:21:45	08:00:14	16:05:49	16:44:18	17:25:50	11:37:04
52°	06:45:28	07:29:09	08:10:04	15:55:59	16:36:54	17:20:36	11:41:42
54°	06:51:07	07:37:18	08:21:07	15:44:56	16:28:45	17:14:57	11:46:47
56°	06:57:15	07:46:22	08:33:44	15:32:20	16:19:42	17:08:49	11:52:24
58°	07:03:59	07:56:33	08:48:22	15:17:42	16:09:31	17:02:06	11:58:39
S 60°	07:11:27	08:08:10	09:05:46	15:00:18	15:57:54	16:54:39	12:05:42

Jun 26	SHA	Mer.pass
Venus	295°53.5	09:56:35
Mars	359°57.7	05:41:27
Jupiter	63°25.4	01:27:44
Saturn	57°22.2	01:51:53

Day	Sun		Moon		
	Eqn. of Time	Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	
25	02:40	02:46	12:02:46	15:55:28	4(20%)
26	02:53	02:59	12:02:59	16:47:16	5(30%)

2020 June 27 to Jun. 28

27 June 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	09:51:38
N 70°	☐	☐	☐	☐	☐	☐	10:02:40
68°	☐	☐	☐	☐	☐	☐	10:11:31
66°	☐	☐	☐	☐	☐	☐	10:18:49
64°	—:—	—:—	01:35:56	22:29:29	—:—	—:—	10:24:58
62°	—:—	—:—	02:13:00	21:52:45	—:—	—:—	10:30:13
60°	—:—	00:55:44	02:38:59	21:26:56	23:09:05	—:—	10:34:47
N 58°	—:—	01:44:17	02:59:14	21:06:46	22:21:22	—:—	10:38:47
56°	—:—	02:13:39	03:15:52	20:50:12	21:52:13	—:—	10:42:20
54°	00:51:12	02:35:41	03:29:59	20:36:08	21:30:18	23:13:45	10:45:32
52°	01:35:58	02:53:30	03:42:13	20:23:56	21:12:33	22:29:45	10:48:25
50°	02:03:21	03:08:29	03:53:00	20:13:10	20:57:37	22:02:34	10:51:02
45°	02:48:27	03:38:02	04:15:24	19:50:49	20:28:09	21:17:39	10:56:42
N 40°	03:18:52	04:00:29	04:33:19	19:32:56	20:05:45	20:47:19	11:01:25
35°	03:41:54	04:18:35	04:48:18	19:17:59	19:47:40	20:24:20	11:05:28
30°	04:00:28	04:33:47	05:01:14	19:05:04	19:32:30	20:05:48	11:09:03
20°	04:29:25	04:58:37	05:23:11	18:43:09	19:07:43	19:36:54	11:15:13
N 10°	04:51:55	05:18:59	05:42:03	18:24:19	18:47:22	19:14:26	11:20:38
0°	05:10:48	05:37:00	05:59:32	18:06:50	18:29:22	18:55:34	11:25:42
S 10°	05:27:44	05:54:04	06:16:54	17:49:30	18:12:20	18:38:40	11:30:45
20°	05:43:50	06:11:19	06:35:20	17:31:05	17:55:06	18:22:35	11:36:07
30°	06:00:13	06:30:05	06:56:27	17:09:59	17:36:21	18:06:12	11:42:13
35°	06:08:55	06:40:35	07:08:45	16:57:42	17:25:52	17:57:31	11:45:44
40°	06:18:15	06:52:18	07:22:51	16:43:36	17:14:10	17:48:12	11:49:41
45°	06:28:32	07:05:44	07:39:34	16:26:54	17:00:44	17:37:56	11:54:16
S 50°	06:40:13	07:21:43	08:00:10	16:06:18	16:44:45	17:26:16	11:59:42
52°	06:45:27	07:29:07	08:09:59	15:56:30	16:37:23	17:21:03	12:02:13
54°	06:51:05	07:37:14	08:21:01	15:45:29	16:29:15	17:15:25	12:04:57
56°	06:57:12	07:46:16	08:33:35	15:32:55	16:20:14	17:09:19	12:07:57
58°	07:03:54	07:56:26	08:48:10	15:18:20	16:10:05	17:02:37	12:11:17
S 60°	07:11:20	08:08:00	09:05:30	15:01:01	15:58:30	16:55:11	12:15:00

Jun 27	SHA	Mer.pass
Venus	295°49.6	09:52:58
Mars	359°23.5	05:39:47
Jupiter	63°32.6	01:23:19
Saturn	57°26.1	01:47:42

28 June 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	12:03:03
N 70°	☐	☐	☐	☐	☐	☐	12:04:24
68°	☐	☐	☐	☐	☐	☐	12:05:29
66°	☐	☐	☐	☐	☐	☐	12:06:24
64°	—:—	—:—	01:37:16	22:28:25	—:—	—:—	12:07:10
62°	—:—	—:—	02:13:59	21:52:06	—:—	—:—	12:07:51
60°	—:—	00:57:38	02:39:47	21:26:28	23:07:25	—:—	12:08:26
N 58°	—:—	01:45:21	02:59:57	21:06:25	22:20:37	—:—	12:08:57
56°	—:—	02:14:29	03:16:31	20:49:55	21:51:43	—:—	12:09:24
54°	00:52:57	02:36:24	03:30:34	20:35:54	21:29:56	23:12:15	12:09:49
52°	01:36:56	02:54:09	03:42:46	20:23:45	21:12:16	22:29:05	12:10:12
50°	02:04:07	03:09:04	03:53:31	20:13:02	20:57:24	22:02:08	12:10:33
45°	02:49:02	03:38:32	04:15:51	19:50:45	20:28:02	21:17:26	12:11:18
N 40°	03:19:21	04:00:55	04:33:44	19:32:55	20:05:42	20:47:13	12:11:56
35°	03:42:20	04:18:59	04:48:40	19:18:00	19:47:40	20:24:17	12:12:29
30°	04:00:50	04:34:08	05:01:35	19:05:07	19:32:33	20:05:49	12:12:59
20°	04:29:43	04:58:54	05:23:28	18:43:16	19:07:49	19:36:59	12:13:50
N 10°	04:52:11	05:19:14	05:42:18	18:24:28	18:47:31	19:14:34	12:14:37
0°	05:11:02	05:37:13	05:59:45	18:07:03	18:29:34	18:55:45	12:15:21
S 10°	05:27:55	05:54:14	06:17:04	17:49:45	18:12:34	18:38:53	12:16:06
20°	05:43:59	06:11:27	06:35:28	17:31:22	17:55:23	18:22:51	12:16:55
30°	06:00:19	06:30:10	06:56:31	17:10:20	17:36:41	18:06:32	12:17:52
35°	06:09:00	06:40:38	07:08:47	16:58:04	17:26:13	17:57:52	12:18:25
40°	06:18:18	06:52:19	07:22:52	16:44:01	17:14:33	17:48:35	12:19:02
45°	06:28:32	07:05:43	07:39:31	16:27:22	17:01:10	17:38:21	12:19:45
S 50°	06:40:11	07:21:40	08:00:04	16:06:50	16:45:15	17:26:43	12:20:37
52°	06:45:24	07:29:01	08:09:51	15:57:03	16:37:53	17:21:31	12:21:01
54°	06:51:00	07:37:07	08:20:50	15:46:04	16:29:48	17:15:55	12:21:28
56°	06:57:06	07:46:07	08:33:22	15:33:33	16:20:48	17:09:50	12:21:56
58°	07:03:46	07:56:15	08:47:53	15:19:02	16:10:42	17:03:10	12:22:28
S 60°	07:11:10	08:07:47	09:05:09	15:01:48	15:59:10	16:55:47	12:23:04

Jun 28	SHA	Mer.pass
Venus	295°43.4	09:49:31
Mars	358°49.4	05:38:07
Jupiter	63°39.9	01:18:54
Saturn	57°30.1	01:43:30

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
27	03:05	03:11	12:03:11	17:37:32	05:12:33	6(40%)
28	03:18	03:24	12:03:24	18:27:06	06:02:20	7(52%)

2020 June 29 to Jun. 30

29 June 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	14:14:08	00:13:42 23:49:00
N 70°	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	14:06:07	00:16:20 23:59:50
68°	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	13:59:38	00:18:31
66°	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	13:54:16	00:20:22
64°	—:—	—:—	01:38:45	22:27:13	—:—	—:—	13:49:44	00:21:58
62°	—:—	—:—	02:15:03	21:51:20	—:—	—:—	13:45:51	00:23:21
60°	—:—	00:59:43	02:40:41	21:25:55	23:05:35	—:—	13:42:29	00:24:34
N 58°	—:—	01:46:31	03:00:44	21:05:59	22:19:45	—:—	13:39:31	00:25:39
56°	—:—	02:15:24	03:17:13	20:49:34	21:51:08	—:—	13:36:53	00:26:38
54°	00:54:52	02:37:12	03:31:13	20:35:37	21:29:29	23:10:35	13:34:31	00:27:30
52°	01:38:02	02:54:50	03:43:22	20:23:31	21:11:56	22:28:19	13:32:23	00:28:18
50°	02:04:59	03:09:43	03:54:05	20:12:50	20:57:07	22:01:37	13:30:26	00:29:02
45°	02:49:39	03:39:03	04:16:21	19:50:38	20:27:53	21:17:10	13:26:15	00:30:37
N 40°	03:19:52	04:01:23	04:34:10	19:32:52	20:05:37	20:47:04	13:22:46	00:31:57
35°	03:42:47	04:19:24	04:49:04	19:18:00	19:47:39	20:24:13	13:19:47	00:33:07
30°	04:01:14	04:34:31	05:01:56	19:05:09	19:32:34	20:05:48	13:17:09	00:34:08
20°	04:30:03	04:59:13	05:23:46	18:43:22	19:07:54	19:37:03	13:12:39	00:35:54
N 10°	04:52:27	05:19:30	05:42:32	18:24:37	18:47:40	19:14:42	13:08:44	00:37:26
0°	05:11:15	05:37:26	05:59:57	18:07:14	18:29:45	18:55:55	13:05:06	00:38:53
S 10°	05:28:05	05:54:24	06:17:13	17:49:59	18:12:48	18:39:07	13:01:30	00:40:18
20°	05:44:07	06:11:34	06:35:34	17:31:40	17:55:40	18:23:07	12:57:43	00:41:49
30°	06:00:24	06:30:14	06:56:34	17:10:41	17:37:02	18:06:51	12:53:27	00:43:32
35°	06:09:03	06:40:40	07:08:48	16:58:28	17:26:36	17:58:14	12:51:01	00:44:30
40°	06:18:18	06:52:19	07:22:50	16:44:27	17:14:58	17:48:59	12:48:17	00:45:37
45°	06:28:31	07:05:40	07:39:27	16:27:51	17:01:38	17:38:48	12:45:09	00:46:54
S 50°	06:40:07	07:21:33	07:59:55	16:07:24	16:45:46	17:27:13	12:41:25	00:48:26
52°	06:45:18	07:28:53	08:09:40	15:57:39	16:38:26	17:22:02	12:39:43	00:49:08
54°	06:50:53	07:36:57	08:20:37	15:46:43	16:30:23	17:16:28	12:37:51	00:49:54
56°	06:56:57	07:45:55	08:33:05	15:34:15	16:21:25	17:10:25	12:35:49	00:50:45
58°	07:03:35	07:56:00	08:47:33	15:19:48	16:11:21	17:03:46	12:33:33	00:51:42
S 60°	07:10:57	08:07:29	09:04:43	15:02:39	15:59:53	16:56:25	12:31:02	00:52:46

Jun 29	SHA	Mer.pass
Venus	295° 35.1	09:46:11
Mars	358° 15.5	05:36:26
Jupiter	63° 47.3	01:14:29
Saturn	57° 34.1	01:39:18

30 June 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	☐	☐	☐	☐	☐	☐	16:34:04	23:17:12
N 70°	☐	☐	☐	☐	☐	☐	16:13:32	23:39:50
68°	☐	☐	☐	☐	☐	☐	15:57:40	00:08:44 23:57:30
66°	—:—	—:—	00:13:55	23:43:24	—:—	—:—	15:44:56	00:16:10
64°	—:—	—:—	01:40:22	22:25:52	—:—	—:—	15:34:24	00:22:31
62°	—:—	—:—	02:16:14	21:50:28	—:—	—:—	15:25:30	00:28:01
60°	—:—	01:01:58	02:41:39	21:25:16	23:03:35	—:—	15:17:52	00:32:49
N 58°	—:—	01:47:48	03:01:34	21:05:28	22:18:47	—:—	15:11:13	00:37:05
56°	—:—	02:16:24	03:17:59	20:49:09	21:50:27	—:—	15:05:20	00:40:53
54°	00:56:57	02:38:03	03:31:55	20:35:17	21:28:58	23:08:46	15:00:06	00:44:19
52°	01:39:13	02:55:36	03:44:00	20:23:14	21:11:31	22:27:26	14:55:23	00:47:27
50°	02:05:54	03:10:24	03:54:41	20:12:36	20:56:47	22:01:00	14:51:07	00:50:18
45°	02:50:20	03:39:38	04:16:52	19:50:30	20:27:40	21:16:51	14:41:56	00:56:31
N 40°	03:20:25	04:01:53	04:34:37	19:32:47	20:05:29	20:46:53	14:34:21	01:01:44
35°	03:43:15	04:19:50	04:49:28	19:17:58	19:47:35	20:24:07	14:27:52	01:06:14
30°	04:01:39	04:34:54	05:02:18	19:05:10	19:32:33	20:05:46	14:22:10	01:10:14
20°	04:30:23	04:59:32	05:24:04	18:43:27	19:07:58	19:37:06	14:12:24	01:17:11
N 10°	04:52:43	05:19:45	05:42:47	18:24:46	18:47:47	19:14:48	14:03:54	01:23:18
0°	05:11:28	05:37:38	06:00:09	18:07:26	18:29:56	18:56:05	13:56:00	01:29:03
S 10°	05:28:15	05:54:34	06:17:22	17:50:14	18:13:02	18:39:20	13:48:09	01:34:50
20°	05:44:14	06:11:40	06:35:40	17:31:58	17:55:57	18:23:24	13:39:51	01:41:00
30°	06:00:28	06:30:16	06:56:36	17:11:04	17:37:23	18:07:12	13:30:29	01:48:02
35°	06:09:04	06:40:41	07:08:48	16:58:53	17:26:59	17:58:36	13:25:07	01:52:07
40°	06:18:18	06:52:17	07:22:46	16:44:55	17:15:24	17:49:24	13:19:03	01:56:45
45°	06:28:27	07:05:35	07:39:20	16:28:23	17:02:07	17:39:15	13:12:02	02:02:09
S 50°	06:40:00	07:21:24	07:59:44	16:08:00	16:46:19	17:27:44	13:03:41	02:08:38
52°	06:45:09	07:28:43	08:09:26	15:58:18	16:39:01	17:22:35	12:59:50	02:11:38
54°	06:50:43	07:36:45	08:20:20	15:47:24	16:31:00	17:17:02	12:55:38	02:14:56
56°	06:56:45	07:45:40	08:32:45	15:35:00	16:22:05	17:11:01	12:51:00	02:18:36
58°	07:03:21	07:55:42	08:47:08	15:20:38	16:12:04	17:04:25	12:45:50	02:22:41
S 60°	07:10:41	08:07:07	09:04:12	15:03:34	16:00:39	16:57:06	12:40:04	02:27:17

Jun 30	SHA	Mer.pass
Venus	295° 24.6	09:43:00
Mars	357° 41.8	05:34:44
Jupiter	63° 54.8	01:10:03
Saturn	57° 38.2	01:35:06

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss	Mer. Pass.		Age
			Upper hh:mm:ss	Lower hh:mm:ss	
29	03:30	03:36	12:03:36	19:17:02	8(63%)
30	03:42	03:47	12:03:47	20:08:21	9(74%)

01 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	19:30:26
N 70°	□	□	□	□	□	□	18:36:35
68°	□	□	□	□	□	□	18:04:05
66°	—	—	00:24:36	23:36:17	—	—	17:40:31
64°	—	—	01:42:08	22:24:23	—	—	17:22:08
62°	—	—	02:17:30	21:49:30	—	—	17:07:10
60°	—	01:04:23	02:42:42	21:24:32	23:01:27	—	16:54:37
N 58°	—	01:49:11	03:02:29	21:04:53	22:17:41	—	16:43:53
56°	—	02:17:29	03:18:48	20:48:40	21:49:41	—	16:34:32
54°	00:59:10	02:38:58	03:32:40	20:34:53	21:28:23	23:06:50	16:26:18
52°	01:40:29	02:56:25	03:44:42	20:22:54	21:11:02	22:26:27	16:18:57
50°	02:06:55	03:11:08	03:55:19	20:12:19	20:56:24	22:00:19	16:12:19
45°	02:51:03	03:40:14	04:17:25	19:50:18	20:27:25	21:16:29	15:58:13
N 40°	03:21:00	04:02:24	04:35:06	19:32:40	20:05:20	20:46:39	15:46:39
35°	03:43:45	04:20:17	04:49:54	19:17:55	19:47:30	20:23:59	15:36:49
30°	04:02:06	04:35:18	05:02:41	19:05:09	19:32:31	20:05:41	15:28:14
20°	04:30:44	04:59:52	05:24:23	18:43:31	19:08:01	19:37:07	15:13:32
N 10°	04:53:00	05:20:01	05:43:02	18:24:53	18:47:54	19:14:54	15:00:47
0°	05:11:42	05:37:51	06:00:20	18:07:37	18:30:07	18:56:15	14:48:54
S 10°	05:28:25	05:54:43	06:17:30	17:50:29	18:13:16	18:39:34	14:37:07
20°	05:44:20	06:11:46	06:35:44	17:32:17	17:56:15	18:23:41	14:24:37
30°	06:00:30	06:30:18	06:56:36	17:11:27	17:37:45	18:07:33	14:10:26
35°	06:09:04	06:40:40	07:08:45	16:59:19	17:27:24	17:59:00	14:02:15
40°	06:18:15	06:52:13	07:22:41	16:45:24	17:15:52	17:49:50	13:52:59
45°	06:28:22	07:05:28	07:39:10	16:28:56	17:02:38	17:39:45	13:42:11
S 50°	06:39:51	07:21:13	07:59:29	16:08:38	16:46:54	17:28:17	13:29:13
52°	06:44:59	07:28:29	08:09:09	15:58:59	16:39:39	17:23:10	13:23:11
54°	06:50:30	07:36:29	08:20:00	15:48:09	16:31:40	17:17:39	13:16:34
56°	06:56:30	07:45:22	08:32:21	15:35:48	16:22:48	17:11:40	13:09:12
58°	07:03:04	07:55:20	08:46:39	15:21:31	16:12:50	17:05:06	13:00:57
S 60°	07:10:21	08:06:42	09:03:36	15:04:34	16:01:29	16:57:51	12:51:36

Jul 01	SHA	Mer.pass
Venus	295°12.1	09:39:58
Mars	357°08.3	05:33:02
Jupiter	64°02.4	01:05:37
Saturn	57°42.3	01:30:54

02 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	■
N 70°	□	□	□	□	□	□	■
68°	□	□	□	□	□	□	■
66°	—	—	00:32:07	23:30:14	—	—	20:30:30
64°	—	—	01:44:01	22:22:46	—	—	19:42:18
62°	—	—	02:18:53	21:48:26	—	—	19:11:38
60°	—	01:06:55	02:43:50	21:23:43	22:59:11	—	18:48:44
N 58°	—	01:50:40	03:03:28	21:04:14	22:16:29	—	18:30:27
56°	—	02:18:39	03:19:40	20:48:07	21:48:50	—	18:15:16
54°	01:01:29	02:39:57	03:33:27	20:34:25	21:27:43	23:04:47	18:02:20
52°	01:41:51	02:57:17	03:45:26	20:22:30	21:10:30	22:25:23	17:51:06
50°	02:07:59	03:11:55	03:56:00	20:11:59	20:55:57	21:59:34	17:41:12
45°	02:51:49	03:40:52	04:17:59	19:50:04	20:27:07	21:16:03	17:32:21
N 40°	03:21:37	04:02:57	04:35:37	19:32:31	20:05:08	20:46:23	17:13:43
35°	03:44:17	04:20:46	04:50:21	19:17:49	19:47:22	20:23:48	16:58:36
30°	04:02:33	04:35:44	05:03:05	19:05:07	19:32:27	20:05:35	16:45:51
20°	04:31:05	05:00:12	05:24:42	18:43:34	19:08:03	19:37:08	16:34:46
N 10°	04:53:17	05:20:17	05:43:18	18:25:00	18:48:00	19:14:59	16:15:51
0°	05:11:55	05:38:03	06:00:32	18:07:48	18:30:17	18:56:24	15:59:29
S 10°	05:28:34	05:54:51	06:17:38	17:50:44	18:13:30	18:39:47	15:44:15
20°	05:44:25	06:11:50	06:35:48	17:32:36	17:56:33	18:23:58	15:29:06
30°	06:00:31	06:30:18	06:56:35	17:11:51	17:38:08	18:07:55	15:13:00
35°	06:09:03	06:40:37	07:08:41	16:59:45	17:27:50	17:59:24	14:54:37
40°	06:18:11	06:52:07	07:22:34	16:45:54	17:16:21	17:50:17	14:43:57
45°	06:28:14	07:05:19	07:38:59	16:29:30	17:03:11	17:40:15	14:31:48
S 50°	06:39:39	07:20:59	07:59:12	16:09:18	16:47:32	17:28:52	14:17:32
52°	06:44:45	07:28:13	08:08:49	15:59:42	16:40:18	17:23:46	14:00:10
54°	06:50:15	07:36:10	08:19:36	15:48:56	16:32:22	17:18:18	13:52:02
56°	06:56:12	07:45:00	08:31:53	15:36:39	16:23:33	17:12:21	13:42:59
58°	07:02:44	07:54:55	08:46:06	15:22:27	16:13:38	17:05:50	13:32:50
S 60°	07:09:58	08:06:13	09:02:56	15:05:38	16:02:22	16:58:37	13:21:18

Jul 02	SHA	Mer.pass
Venus	294°57.5	09:37:03
Mars	356°34.9	05:31:19
Jupiter	64°10.1	01:01:11
Saturn	57°46.5	01:26:41

Day	Sun		Moon		
	Eqn. of Time	Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	
01	03:53	03:59	12:03:59	21:01:51	10(83%)
02	04:05	04:10	12:04:10	21:57:47	11(91%)

03 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐
68°	☐	☐	☐	☐	☐	☐	☐
66°	—	—	00:38:34	23:24:45	—	—	00:01:55 23:53:49
64°	—	—	01:46:01	22:21:02	—	—	00:33:17
62°	—	—	02:20:20	21:47:15	—	—	00:56:51
60°	—	01:09:34	02:45:02	21:22:49	22:56:49	—	01:15:44
N 58°	—	01:52:15	03:04:31	21:03:30	22:15:12	—	01:31:27
56°	—	02:19:53	03:20:36	20:47:31	21:47:54	—	01:44:54
54°	01:03:55	02:41:00	03:34:18	20:33:54	21:26:59	23:02:38	01:56:36
52°	01:43:19	02:58:12	03:46:12	20:22:03	21:09:54	22:24:13	02:06:57
50°	02:09:08	03:12:45	03:56:43	20:11:36	20:55:26	21:58:43	02:16:13
45°	02:52:38	03:41:33	04:18:36	19:49:48	20:26:47	21:15:34	02:35:47
N 40°	03:22:16	04:03:31	04:36:08	19:32:20	20:04:54	20:46:04	02:51:45
35°	03:44:50	04:21:16	04:50:49	19:17:42	19:47:13	20:23:36	03:05:16
30°	04:03:02	04:36:10	05:03:30	19:05:03	19:32:22	20:05:27	03:17:04
20°	04:31:28	05:00:33	05:25:01	18:43:35	19:08:03	19:37:07	03:37:18
N 10°	04:53:34	05:20:33	05:43:33	18:25:07	18:48:06	19:15:04	03:54:56
0°	05:12:07	05:38:15	06:00:43	18:07:59	18:30:27	18:56:33	04:11:27
S 10°	05:28:43	05:54:59	06:17:45	17:50:59	18:13:45	18:40:00	04:28:00
20°	05:44:30	06:11:54	06:35:51	17:32:55	17:56:52	18:24:16	04:45:44
30°	06:00:31	06:30:16	06:56:33	17:12:15	17:38:32	18:08:17	05:06:12
35°	06:09:00	06:40:33	07:08:36	17:00:13	17:28:16	17:59:49	05:18:11
40°	06:18:05	06:52:00	07:22:24	16:46:26	17:16:51	17:50:45	05:31:58
45°	06:28:05	07:05:07	07:38:45	16:30:07	17:03:45	17:40:47	05:48:20
S 50°	06:39:26	07:20:42	07:58:52	16:10:01	16:48:11	17:29:28	06:08:35
52°	06:44:30	07:27:54	08:08:26	16:00:28	16:41:00	17:24:25	06:18:13
54°	06:49:57	07:35:48	08:19:09	15:49:45	16:33:06	17:18:59	06:29:03
56°	06:55:52	07:44:35	08:31:21	15:37:34	16:24:20	17:13:04	06:41:24
58°	07:02:21	07:54:26	08:45:29	15:23:21	16:14:30	17:06:36	06:55:42
S 60°	07:09:31	08:05:40	09:02:11	15:06:45	16:03:18	16:59:27	07:12:38

Jul 03	SHA	Mer.pass
Venus	294°41.0	09:34:16
Mars	356°01.7	05:29:35
Jupiter	64°17.8	00:56:44
Saturn	57°50.7	01:22:28

04 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐
68°	☐	☐	☐	☐	☐	☐	☐
66°	—	—	00:44:26	23:19:36	—	—	☐
64°	—	—	01:48:08	22:19:11	—	—	00:49:21
62°	—	—	02:21:53	21:45:59	—	—	01:22:27
60°	—	01:12:19	02:46:19	21:21:50	22:54:20	—	01:46:57
N 58°	—	01:53:55	03:05:37	21:02:42	22:13:48	—	02:06:31
56°	—	02:21:12	03:21:35	20:46:51	21:46:53	—	02:22:49
54°	01:06:26	02:42:06	03:35:11	20:33:19	21:26:10	23:00:24	02:36:46
52°	01:44:51	02:59:11	03:47:01	20:21:34	21:09:14	22:22:58	02:48:57
50°	02:10:20	03:13:37	03:57:29	20:11:10	20:54:53	21:57:49	02:59:44
45°	02:53:29	03:42:15	04:19:14	19:49:30	20:26:24	21:15:01	03:22:18
N 40°	03:22:57	04:04:07	04:36:41	19:32:07	20:04:38	20:45:42	03:40:28
35°	03:45:24	04:21:47	04:51:18	19:17:34	19:47:02	20:23:21	03:55:45
30°	04:03:32	04:36:37	05:03:55	19:04:58	19:32:15	20:05:18	04:09:00
20°	04:31:50	05:00:54	05:25:21	18:43:36	19:08:03	19:37:05	04:31:38
N 10°	04:53:52	05:20:49	05:43:48	18:25:13	18:48:11	19:15:07	04:51:16
0°	05:12:20	05:38:26	06:00:54	18:08:09	18:30:36	18:56:42	05:09:35
S 10°	05:28:52	05:55:06	06:17:51	17:51:14	18:13:58	18:40:13	05:27:56
20°	05:44:34	06:11:57	06:35:53	17:33:15	17:57:10	18:24:33	05:47:34
30°	06:00:30	06:30:14	06:56:29	17:12:41	17:38:56	18:08:40	06:10:15
35°	06:08:56	06:40:27	07:08:28	17:00:42	17:28:43	18:00:15	06:23:33
40°	06:17:58	06:51:51	07:22:13	16:46:59	17:17:22	17:51:15	06:38:54
45°	06:27:53	07:04:54	07:38:28	16:30:45	17:04:20	17:41:21	06:57:12
S 50°	06:39:10	07:20:24	07:58:29	16:10:46	16:48:52	17:30:06	07:19:59
52°	06:44:11	07:27:32	08:07:59	16:01:16	16:41:44	17:25:05	07:30:55
54°	06:49:36	07:35:24	08:18:39	15:50:37	16:33:53	17:19:41	07:43:16
56°	06:55:28	07:44:07	08:30:46	15:38:31	16:25:11	17:13:50	07:57:29
58°	07:01:54	07:53:54	08:44:47	15:24:31	16:15:24	17:07:25	08:14:09
S 60°	07:09:01	08:05:03	09:01:22	15:07:57	16:04:17	17:00:19	08:34:18

Jul 04	SHA	Mer.pass
Venus	294°22.6	09:31:36
Mars	355°28.7	05:27:50
Jupiter	64°25.6	00:52:17
Saturn	57°54.9	01:18:16

Day	Sun		Mer. Pass hh:mm:ss	Moon		Age
	Eqn.of Time	12h		Upper	Lower	
	mm:ss	mm:ss		hh:mm:ss	hh:mm:ss	
03	04:16	04:21	12:04:21	22:55:37	10:26:32	12(96%)
04	04:26	04:32	12:04:32	23:54:00	11:24:51	13(99%)

05 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐
68°	☐	☐	☐	☐	☐	☐	☐
66°	---	---	00:49:57	23:14:42	---	---	☐
64°	---	---	01:50:21	22:17:13	---	---	☐
62°	---	---	02:23:31	21:44:38	---	---	☐
60°	---	01:15:09	02:47:40	21:20:46	22:51:47	---	☐
N 58°	---	01:55:40	03:06:47	21:01:49	22:12:19	---	☐
56°	---	02:22:35	03:22:37	20:46:06	21:45:47	---	☐
54°	01:09:02	02:43:16	03:36:08	20:32:42	21:25:18	22:58:05	☐
52°	01:46:28	03:00:12	03:47:53	20:21:01	21:08:30	22:21:37	☐
50°	02:11:37	03:14:33	03:58:16	20:10:41	20:54:16	21:56:50	☐
45°	02:54:23	03:43:00	04:19:54	19:49:09	20:25:58	21:14:26	☐
N 40°	03:23:40	04:04:45	04:37:16	19:31:52	20:04:20	20:45:18	☐
35°	03:46:00	04:22:19	04:51:48	19:17:23	19:46:50	20:23:04	☐
30°	04:04:02	04:37:05	05:04:22	19:04:52	19:32:06	20:05:07	☐
20°	04:32:14	05:01:15	05:25:42	18:43:36	19:08:01	19:37:01	☐
N 10°	04:54:09	05:21:05	05:44:03	18:25:18	18:48:15	19:15:10	☐
0°	05:12:33	05:38:38	06:01:04	18:08:19	18:30:45	18:56:49	☐
S 10°	05:28:59	05:55:13	06:17:57	17:51:28	18:14:12	18:40:26	☐
20°	05:44:37	06:11:59	06:35:53	17:33:35	17:57:29	18:24:51	☐
30°	06:00:27	06:30:10	06:56:23	17:13:07	17:39:20	18:09:03	☐
35°	06:08:50	06:40:20	07:08:20	17:01:12	17:29:12	18:00:42	☐
40°	06:17:48	06:51:40	07:22:00	16:47:33	17:17:54	17:51:45	☐
45°	06:27:40	07:04:38	07:38:10	16:31:25	17:04:57	17:41:55	☐
S 50°	06:38:51	07:20:02	07:58:03	16:11:33	16:49:35	17:30:46	☐
52°	06:43:51	07:27:08	08:07:30	16:02:07	16:42:29	17:25:47	☐
54°	06:49:13	07:34:56	08:18:06	15:51:32	16:34:42	17:20:26	☐
56°	06:55:02	07:43:36	08:30:08	15:39:31	16:26:03	17:14:38	☐
58°	07:01:25	07:53:19	08:44:02	15:25:37	16:16:21	17:08:16	☐
S 60°	07:08:28	08:04:22	09:00:28	15:09:12	16:05:19	17:01:14	☐

Jul 05	SHA	Mer.pass
Venus	294°02.4	09:29:04
Mars	354°55.9	05:26:05
Jupiter	64°33.5	00:47:50
Saturn	57°59.2	01:14:03

06 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐
68°	☐	☐	☐	☐	☐	☐	☐
66°	---	---	00:55:12	23:09:58	---	---	☐
64°	---	---	01:52:40	22:15:09	---	---	☐
62°	---	---	02:25:14	21:43:11	---	---	☐
60°	---	01:18:04	02:49:05	21:19:38	22:49:08	---	☐
N 58°	---	01:57:31	03:08:00	21:00:53	22:10:44	---	☐
56°	---	02:24:01	03:23:43	20:45:19	21:44:37	---	☐
54°	01:11:42	02:44:30	03:37:07	20:32:00	21:24:21	22:55:42	☐
52°	01:48:10	03:01:17	03:48:47	20:20:25	21:07:43	22:20:12	☐
50°	02:12:57	03:15:30	03:59:06	20:10:09	20:53:36	21:55:46	☐
45°	02:55:19	03:43:46	04:20:36	19:48:46	20:25:30	21:13:47	☐
N 40°	03:24:25	04:05:24	04:37:52	19:31:35	20:03:59	20:44:52	☐
35°	03:46:38	04:22:52	04:52:19	19:17:11	19:46:35	20:22:46	☐
30°	04:04:34	04:37:34	05:04:49	19:04:44	19:31:56	20:04:54	☐
20°	04:32:37	05:01:37	05:26:02	18:43:35	19:07:59	19:36:57	☐
N 10°	04:54:27	05:21:21	05:44:18	18:25:22	18:48:18	19:15:12	☐
0°	05:12:45	05:38:49	06:01:14	18:08:29	18:30:54	18:56:57	☐
S 10°	05:29:07	05:55:19	06:18:02	17:51:43	18:14:26	18:40:38	☐
20°	05:44:39	06:11:59	06:35:53	17:33:55	17:57:48	18:25:09	☐
30°	06:00:23	06:30:05	06:56:17	17:13:34	17:39:46	18:09:27	☐
35°	06:08:43	06:40:11	07:08:09	17:01:43	17:29:41	18:01:09	☐
40°	06:17:37	06:51:27	07:21:45	16:48:09	17:18:27	17:52:16	☐
45°	06:27:25	07:04:20	07:37:49	16:32:06	17:05:35	17:42:31	☐
S 50°	06:38:31	07:19:38	07:57:35	16:12:22	16:50:19	17:31:27	☐
52°	06:43:27	07:26:41	08:06:58	16:03:00	16:43:17	17:26:31	☐
54°	06:48:47	07:34:26	08:17:29	15:52:30	16:35:33	17:21:13	☐
56°	06:54:33	07:43:02	08:29:26	15:40:34	16:26:58	17:15:28	☐
58°	07:00:52	07:52:40	08:43:13	15:26:47	16:17:21	17:09:10	☐
S 60°	07:07:51	08:03:38	08:59:30	15:10:31	16:06:24	17:02:12	☐

Jul 06	SHA	Mer.pass
Venus	293°40.3	09:26:38
Mars	354°23.3	05:24:19
Jupiter	64°41.4	00:43:22
Saturn	58°03.5	01:09:50

Day	Sun		Mer. Pass hh:mm:ss	Moon		Age
	Eqn.of Time	12h		Upper	Lower	
	00h mm:ss	mm:ss		hh:mm:ss	hh:mm:ss	
05	04:37	04:42	12:04:42	---	12:22:51	14(100%)
06	04:47	04:52	12:04:52	00:51:09	13:18:46	15(98%)

07 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐
68°	☐	☐	☐	☐	☐	☐	☐
66°	—	—	01:00:17	23:05:22	—	—	23:48:52
64°	—	—	01:55:04	22:13:00	—	—	23:26:39
62°	—	—	02:27:02	21:41:38	—	—	23:08:48
60°	—	01:21:02	02:50:33	21:18:25	22:46:26	—	22:53:56
N 58°	—	01:59:26	03:09:17	20:59:53	22:09:05	—	22:41:16
56°	—	02:25:32	03:24:51	20:44:27	21:43:22	—	22:30:16
54°	01:14:26	02:45:47	03:38:08	20:31:16	21:23:21	22:53:15	22:20:34
52°	01:49:55	03:02:24	03:49:43	20:19:46	21:06:53	22:18:42	22:11:55
50°	02:14:20	03:16:31	03:59:58	20:09:35	20:52:52	21:54:39	22:04:07
45°	02:56:18	03:44:35	04:21:19	19:48:20	20:24:59	21:13:05	21:47:29
N 40°	03:25:12	04:06:04	04:38:29	19:31:16	20:03:37	20:44:23	21:33:48
35°	03:47:16	04:23:27	04:52:51	19:16:58	19:46:18	20:22:25	21:22:08
30°	04:05:07	04:38:04	05:05:17	19:04:34	19:31:45	20:04:39	21:11:55
20°	04:33:02	05:01:59	05:26:23	18:43:33	19:07:55	19:36:51	20:54:20
N 10°	04:54:44	05:21:38	05:44:33	18:25:26	18:48:21	19:15:13	20:38:56
0°	05:12:57	05:39:00	06:01:24	18:08:38	18:31:02	18:57:04	20:24:30
S 10°	05:29:13	05:55:25	06:18:07	17:51:58	18:14:40	18:40:51	20:10:01
20°	05:44:40	06:11:59	06:35:52	17:34:16	17:58:08	18:25:27	19:54:30
30°	06:00:18	06:29:58	06:56:09	17:14:01	17:40:12	18:09:52	19:36:39
35°	06:08:34	06:40:01	07:07:57	17:02:15	17:30:10	18:01:37	19:26:12
40°	06:17:25	06:51:12	07:21:28	16:48:45	17:19:01	17:52:49	19:14:14
45°	06:27:07	07:04:00	07:37:26	16:32:49	17:06:15	17:43:08	19:00:06
S 50°	06:38:08	07:19:12	07:57:04	16:13:13	16:51:05	17:32:10	18:42:45
52°	06:43:02	07:26:12	08:06:23	16:03:55	16:44:06	17:27:17	18:34:33
54°	06:48:18	07:33:53	08:16:49	15:53:29	16:36:26	17:22:01	18:25:24
56°	06:54:01	07:42:24	08:28:40	15:41:39	16:27:56	17:16:19	18:15:05
58°	07:00:17	07:51:58	08:42:20	15:28:00	16:18:23	17:10:05	18:03:15
S 60°	07:07:12	08:02:50	08:58:28	15:11:54	16:07:32	17:03:12	17:49:29

Jul 07	SHA	Mer.pass
Venus	293°16.5	09:24:20
Mars	353°50.9	05:22:32
Jupiter	64°49.4	00:38:55
Saturn	58°07.9	01:05:36

08 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐
68°	☐	☐	☐	☐	☐	☐	☐
66°	—	—	01:05:13	23:00:51	—	—	23:44:11
64°	—	—	01:57:33	22:10:45	—	—	23:29:33
62°	—	—	02:28:54	21:40:01	—	—	23:17:16
60°	—	01:24:04	02:52:06	21:17:08	22:43:40	—	23:06:45
N 58°	—	02:01:25	03:10:37	20:58:48	22:07:20	—	22:57:36
56°	—	02:27:07	03:26:02	20:43:32	21:42:03	—	22:49:31
54°	01:17:12	02:47:07	03:39:12	20:30:28	21:22:17	22:50:44	22:42:19
52°	01:51:45	03:03:34	03:50:41	20:19:04	21:05:59	22:17:08	22:35:50
50°	02:15:47	03:17:34	04:00:51	20:08:58	20:52:06	21:53:28	22:29:57
45°	02:57:19	03:45:25	04:22:04	19:47:52	20:24:26	21:12:21	22:17:17
N 40°	03:26:00	04:06:46	04:39:07	19:30:55	20:03:12	20:43:51	22:06:45
35°	03:47:56	04:24:03	04:53:24	19:16:42	19:46:00	20:22:02	21:57:43
30°	04:05:41	04:38:35	05:05:45	19:04:24	19:31:32	20:04:23	21:49:45
20°	04:33:26	05:02:22	05:26:44	18:43:29	19:07:50	19:36:44	21:35:59
N 10°	04:55:02	05:21:54	05:44:48	18:25:29	18:48:22	19:15:13	21:23:54
0°	05:13:09	05:39:10	06:01:33	18:08:47	18:31:09	18:57:10	21:12:31
S 10°	05:29:19	05:55:30	06:18:11	17:52:13	18:14:53	18:41:03	21:01:07
20°	05:44:40	06:11:58	06:35:49	17:34:37	17:58:27	18:25:45	20:48:54
30°	06:00:12	06:29:50	06:55:59	17:14:30	17:40:38	18:10:17	20:34:53
35°	06:08:24	06:39:49	07:07:43	17:02:47	17:30:41	18:02:06	20:26:44
40°	06:17:11	06:50:56	07:21:09	16:49:23	17:19:37	17:53:22	20:17:25
45°	06:26:48	07:03:38	07:37:01	16:33:33	17:06:56	17:43:46	20:06:29
S 50°	06:37:42	07:18:43	07:56:30	16:14:05	16:51:53	17:32:54	19:53:11
52°	06:42:34	07:25:39	08:05:45	16:04:52	16:44:58	17:28:04	19:46:58
54°	06:47:47	07:33:17	08:16:06	15:54:32	16:37:21	17:22:52	19:40:05
56°	06:53:27	07:41:44	08:27:51	15:42:48	16:28:55	17:17:13	19:32:23
58°	06:59:38	07:51:13	08:41:24	15:29:16	16:19:28	17:11:03	19:23:40
S 60°	07:06:29	08:01:58	08:57:21	15:13:20	16:08:43	17:04:14	19:13:42

Jul 08	SHA	Mer.pass
Venus	292°51.0	09:22:08
Mars	353°18.7	05:20:44
Jupiter	64°57.4	00:34:27
Saturn	58°12.3	01:01:23

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
07	04:56	05:01	12:05:01	01:45:33	14:11:25	16(94%)
08	05:06	05:10	12:05:10	02:36:21	15:00:23	17(88%)



09 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	00:55:18
N 70°	☐	☐	☐	☐	☐	☐	00:24:45
68°	☐	☐	☐	☐	☐	☐	00:02:03 23:50:42
66°	—:—	—:—	01:10:03	22:56:26	—:—	—:—	23:39:47
64°	—:—	—:—	02:00:07	22:08:26	—:—	—:—	23:30:35
62°	—:—	—:—	02:30:50	21:38:19	—:—	—:—	23:22:41
60°	—:—	01:27:09	02:53:42	21:15:46	22:40:51	—:—	23:15:49
N 58°	—:—	02:03:28	03:12:00	20:57:40	22:05:31	—:—	23:09:46
56°	—:—	02:28:44	03:27:15	20:42:34	21:40:39	—:—	23:04:22
54°	01:20:02	02:48:30	03:40:19	20:29:37	21:21:09	22:48:11	22:59:32
52°	01:53:38	03:04:47	03:51:42	20:18:19	21:05:01	22:15:29	22:55:08
50°	02:17:17	03:18:39	04:01:47	20:08:18	20:51:16	21:52:13	22:51:08
45°	02:58:22	03:46:17	04:22:50	19:47:22	20:23:50	21:11:33	22:42:27
N 40°	03:26:50	04:07:29	04:39:46	19:30:32	20:02:45	20:43:17	22:35:11
35°	03:48:37	04:24:39	04:53:57	19:16:25	19:45:40	20:21:37	22:28:55
30°	04:06:15	04:39:06	05:06:14	19:04:11	19:31:17	20:04:04	22:23:23
20°	04:33:51	05:02:45	05:27:06	18:43:25	19:07:44	19:36:36	22:13:46
N 10°	04:55:20	05:22:10	05:45:03	18:25:31	18:48:23	19:15:12	22:05:18
0°	05:13:20	05:39:20	06:01:42	18:08:55	18:31:17	18:57:16	21:57:19
S 10°	05:29:25	05:55:34	06:18:14	17:52:27	18:15:06	18:41:15	21:49:19
20°	05:44:39	06:11:56	06:35:46	17:34:58	17:58:47	18:26:04	21:40:46
30°	06:00:04	06:29:41	06:55:48	17:14:58	17:41:05	18:10:42	21:30:58
35°	06:08:13	06:39:36	07:07:27	17:03:21	17:31:12	18:02:35	21:25:17
40°	06:16:55	06:50:37	07:20:48	16:50:02	17:20:13	17:53:56	21:18:50
45°	06:26:27	07:03:14	07:36:33	16:34:19	17:07:38	17:44:26	21:11:17
S 50°	06:37:15	07:18:11	07:55:54	16:15:00	16:52:43	17:33:40	21:02:11
52°	06:42:03	07:25:05	08:05:04	16:05:51	16:45:51	17:28:53	20:57:58
54°	06:47:13	07:32:38	08:15:20	15:55:36	16:38:19	17:23:44	20:53:18
56°	06:52:49	07:41:01	08:26:58	15:43:59	16:29:57	17:18:09	20:48:08
58°	06:58:57	07:50:24	08:40:23	15:30:35	16:20:35	17:12:03	20:42:21
S 60°	07:05:43	08:01:03	08:56:10	15:14:49	16:09:57	17:05:19	20:35:47

Jul 09	SHA	Mer.pass
Venus	292°23.9	09:20:03
Mars	352°46.7	05:18:55
Jupiter	65°05.5	00:29:59
Saturn	58°16.7	00:57:09

10 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	00:20:24 23:56:04
N 70°	☐	☐	☐	☐	☐	☐	00:03:55 23:47:55
68°	☐	☐	☐	☐	☐	☐	23:41:11
66°	—:—	—:—	01:14:47	22:52:04	—:—	—:—	23:35:32
64°	—:—	—:—	02:02:45	22:06:01	—:—	—:—	23:30:43
62°	—:—	—:—	02:32:50	21:36:33	—:—	—:—	23:26:31
60°	—:—	01:30:17	02:55:22	21:14:21	22:37:59	—:—	23:22:51
N 58°	—:—	02:05:35	03:13:27	20:56:28	22:03:38	—:—	23:19:36
56°	—:—	02:30:26	03:28:32	20:41:32	21:39:12	—:—	23:16:41
54°	01:22:53	02:49:56	03:41:28	20:28:43	21:19:57	22:45:35	23:14:03
52°	01:55:34	03:06:02	03:52:45	20:17:31	21:04:00	22:13:47	23:11:39
50°	02:18:50	03:19:46	04:02:45	20:07:35	20:50:24	21:50:54	23:09:28
45°	02:59:27	03:47:11	04:23:38	19:46:50	20:23:11	21:10:42	23:04:42
N 40°	03:27:41	04:08:13	04:40:27	19:30:07	20:02:16	20:42:41	23:00:42
35°	03:49:20	04:25:17	04:54:32	19:16:06	19:45:18	20:21:10	22:57:14
30°	04:06:51	04:39:38	05:06:44	19:03:58	19:31:01	20:03:45	22:54:10
20°	04:34:17	05:03:08	05:27:27	18:43:20	19:07:37	19:36:26	22:48:49
N 10°	04:55:38	05:22:26	05:45:18	18:25:33	18:48:23	19:15:11	22:44:07
0°	05:13:32	05:39:30	06:01:51	18:09:03	18:31:23	18:57:21	22:39:41
S 10°	05:29:30	05:55:37	06:18:16	17:52:42	18:15:20	18:41:27	22:35:15
20°	05:44:38	06:11:53	06:35:41	17:35:19	17:59:07	18:26:22	22:30:30
30°	05:59:56	06:29:31	06:55:36	17:15:28	17:41:33	18:11:08	22:25:06
35°	06:08:00	06:39:21	07:07:10	17:03:55	17:31:44	18:03:06	22:21:58
40°	06:16:37	06:50:17	07:20:25	16:50:42	17:20:50	17:54:31	22:18:25
45°	06:26:04	07:02:48	07:36:03	16:35:06	17:08:21	17:45:06	22:14:17
S 50°	06:36:45	07:17:38	07:55:15	16:15:56	16:53:34	17:34:28	22:09:20
52°	06:41:30	07:24:27	08:04:20	16:06:52	16:46:46	17:29:43	22:07:03
54°	06:46:37	07:31:56	08:14:31	15:56:43	16:39:18	17:24:38	22:04:32
56°	06:52:09	07:40:14	08:26:03	15:45:12	16:31:01	17:19:07	22:01:45
58°	06:58:12	07:49:32	08:39:19	15:31:56	16:21:45	17:13:06	21:58:39
S 60°	07:04:53	08:00:05	08:54:56	15:16:22	16:11:13	17:06:26	21:55:10

Jul 10	SHA	Mer.pass
Venus	291°55.1	09:18:04
Mars	352°14.9	05:17:06
Jupiter	65°13.6	00:25:31
Saturn	58°21.2	00:52:56

Day	Sun		Mer. Pass hh:mm:ss	Moon		Age
	Eqn.of Time	Mer.Pass.		Upper	Lower	
	00 <sup>h</sup> mm:ss					
09	05:15	05:19	12:05:19	03:23:33	15:45:57	18(81%)
10	05:23	05:27	12:05:27	04:07:41	16:28:52	19(73%)

# 2020 July 11 to Jul. 12

11 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	23:35:18
N 70°	□	□	□	□	□	□	23:33:45
68°	□	□	□	□	□	□	23:32:28
66°	—	—	01:19:26	22:47:46	—	—	23:31:23
64°	—	—	02:05:27	22:03:32	—	—	23:30:27
62°	—	—	02:34:54	21:34:42	—	—	23:29:38
60°	—	01:33:26	02:57:05	21:12:51	22:35:04	—	23:28:56
N 58°	—	02:07:46	03:14:56	20:55:13	22:01:41	—	23:28:18
56°	—	02:32:10	03:29:51	20:40:27	21:37:41	—	23:27:44
54°	01:25:46	02:51:24	03:42:39	20:27:46	21:18:42	22:42:57	23:27:13
52°	01:57:33	03:07:20	03:53:50	20:16:40	21:02:56	22:12:01	23:26:45
50°	02:20:25	03:20:56	04:03:44	20:06:50	20:49:28	21:49:31	23:26:19
45°	03:00:35	03:48:06	04:24:28	19:46:15	20:22:30	21:09:49	23:25:24
N 40°	03:28:34	04:08:59	04:41:08	19:29:41	20:01:45	20:42:03	23:24:37
35°	03:50:03	04:25:55	04:55:07	19:15:46	19:44:55	20:20:42	23:23:57
30°	04:07:27	04:40:11	05:07:14	19:03:42	19:30:43	20:03:23	23:23:21
20°	04:34:43	05:03:32	05:27:49	18:43:13	19:07:29	19:36:16	23:22:20
N 10°	04:55:56	05:22:43	05:45:33	18:25:34	18:48:23	19:15:08	23:21:26
0°	05:13:43	05:39:40	06:01:59	18:09:11	18:31:30	18:57:26	23:20:36
S 10°	05:29:34	05:55:40	06:18:18	17:52:56	18:15:33	18:41:38	23:19:46
20°	05:44:35	06:11:49	06:35:36	17:35:41	17:59:27	18:26:41	23:18:54
30°	05:59:45	06:29:19	06:55:22	17:15:58	17:42:01	18:11:34	23:17:55
35°	06:07:45	06:39:04	07:06:52	17:04:30	17:32:17	18:03:36	23:17:21
40°	06:16:17	06:49:55	07:20:00	16:51:23	17:21:28	17:55:07	23:16:42
45°	06:25:38	07:02:20	07:35:31	16:35:54	17:09:06	17:45:48	23:15:58
S 50°	06:36:13	07:17:01	07:54:33	16:16:55	16:54:27	17:35:16	23:15:05
52°	06:40:55	07:23:47	08:03:34	16:07:55	16:47:43	17:30:36	23:14:41
54°	06:45:58	07:31:12	08:13:39	15:57:52	16:40:19	17:25:34	23:14:14
56°	06:51:26	07:39:25	08:25:04	15:46:28	16:32:07	17:20:07	23:13:45
58°	06:57:25	07:48:37	08:38:12	15:33:21	16:22:57	17:14:10	23:13:12
S 60°	07:04:01	07:59:03	08:53:37	15:17:57	16:12:32	17:07:36	23:12:36

Jul 11	SHA	Mer.pass
Venus	291°24.9	09:16:11
Mars	351°43.4	05:15:15
Jupiter	65°21.7	00:21:02
Saturn	58°25.6	00:48:42

12 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	23:15:14
N 70°	□	□	□	□	□	□	23:20:00
68°	□	□	□	□	□	□	23:23:57
66°	—	—	01:24:01	22:43:30	—	—	23:27:17
64°	—	—	02:08:12	22:00:59	—	—	23:30:09
62°	—	00:23:20	02:37:01	21:32:47	23:35:51	—	23:32:38
60°	—	01:36:37	02:58:51	21:11:17	22:32:07	—	23:34:50
N 58°	—	02:09:59	03:16:28	20:53:53	21:59:39	—	23:36:47
56°	00:21:42	02:33:58	03:31:13	20:39:18	21:36:06	23:38:35	23:38:31
54°	01:28:40	02:52:56	03:43:52	20:26:45	21:17:23	22:40:16	23:40:06
52°	01:59:36	03:08:40	03:54:57	20:15:47	21:01:49	22:10:11	23:41:32
50°	02:22:04	03:22:08	04:04:46	20:06:02	20:48:29	21:48:06	23:42:51
45°	03:01:44	03:49:03	04:25:18	19:45:38	20:21:47	21:08:53	23:45:44
N 40°	03:29:29	04:09:46	04:41:51	19:29:12	20:01:12	20:41:22	23:48:10
35°	03:50:48	04:26:35	04:55:44	19:15:24	19:44:29	20:20:11	23:50:16
30°	04:08:05	04:40:44	05:07:45	19:03:26	19:30:24	20:03:00	23:52:09
20°	04:35:09	05:03:56	05:28:11	18:43:06	19:07:19	19:36:04	23:55:25
N 10°	04:56:14	05:22:59	05:45:48	18:25:34	18:48:22	19:15:05	23:58:20
0°	05:13:53	05:39:49	06:02:07	18:09:18	18:31:35	18:57:30	.. ..
S 10°	05:29:38	05:55:43	06:18:19	17:53:10	18:15:45	18:41:49	.. ..
20°	05:44:32	06:11:44	06:35:30	17:36:02	17:59:47	18:26:59	.. ..
30°	05:59:34	06:29:06	06:55:07	17:16:28	17:42:30	18:12:01	.. ..
35°	06:07:29	06:38:46	07:06:31	17:05:06	17:32:51	18:04:08	.. ..
40°	06:15:56	06:49:32	07:19:34	16:52:05	17:22:08	17:55:43	.. ..
45°	06:25:11	07:01:50	07:34:57	16:36:44	17:09:52	17:46:31	.. ..
S 50°	06:35:38	07:16:23	07:53:49	16:17:55	16:55:22	17:36:07	.. ..
52°	06:40:17	07:23:04	08:02:45	16:09:00	16:48:41	17:31:29	.. ..
54°	06:45:17	07:30:25	08:12:43	15:59:03	16:41:22	17:26:31	.. ..
56°	06:50:41	07:38:33	08:24:01	15:47:46	16:33:15	17:21:09	.. ..
58°	06:56:34	07:47:38	08:37:01	15:34:48	16:24:11	17:15:16	.. ..
S 60°	07:03:05	07:57:57	08:52:14	15:19:35	16:13:54	17:08:48	.. ..

Jul 12	SHA	Mer.pass
Venus	290°53.1	09:14:23
Mars	351°12.0	05:13:24
Jupiter	65°29.9	00:16:34
Saturn	58°30.2	00:44:28

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
11	05:31	05:35	12:05:35	04:49:38	20(64%)
12	05:39	05:43	12:05:43	05:30:21	21(55%)

13 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	22:53:33
N 70°	☐	☐	☐	☐	☐	☐	23:05:26
68°	☐	☐	☐	☐	☐	☐	23:15:08
66°	—	—	01:28:32	22:39:17	—	—	23:23:14
64°	—	—	02:11:01	21:58:23	—	—	23:30:08
62°	—	00:36:06	02:39:12	21:30:48	23:26:55	—	23:36:05
60°	—	01:39:50	03:00:40	21:09:40	22:29:07	—	23:41:17
N 58°	—	02:12:16	03:18:02	20:52:31	21:57:34	—	23:45:53
56°	00:33:19	02:35:48	03:32:37	20:38:06	21:34:27	23:30:28	23:50:00
54°	01:31:36	02:54:30	03:45:08	20:25:42	21:16:01	22:37:34	23:53:43
52°	02:01:40	03:10:03	03:56:05	20:14:50	21:00:38	22:08:18	23:57:05
50°	02:23:45	03:23:21	04:05:49	20:05:12	20:47:28	21:46:37	.. ..
45°	03:02:56	03:50:02	04:26:10	19:44:59	20:21:01	21:07:54	.. ..
N 40°	03:30:25	04:10:34	04:42:35	19:28:41	20:00:37	20:40:39	.. ..
35°	03:51:33	04:27:15	04:56:21	19:15:00	19:44:02	20:19:38	.. ..
30°	04:08:43	04:41:19	05:08:17	19:03:08	19:30:03	20:02:35	.. ..
20°	04:35:36	05:04:20	05:28:34	18:42:57	19:07:09	19:35:50	.. ..
N 10°	04:56:32	05:23:15	05:46:02	18:25:33	18:48:19	19:15:01	.. ..
0°	05:14:04	05:39:58	06:02:14	18:09:25	18:31:41	18:57:34	00:01:05
S 10°	05:29:41	05:55:44	06:18:19	17:53:24	18:15:58	18:42:00	00:03:52
20°	05:44:28	06:11:38	06:35:22	17:36:24	18:00:07	18:27:18	00:06:51
30°	05:59:21	06:28:51	06:54:50	17:16:59	17:42:59	18:12:28	00:10:16
35°	06:07:12	06:38:27	07:06:09	17:05:42	17:33:25	18:04:40	00:12:15
40°	06:15:34	06:49:06	07:19:05	16:52:48	17:22:48	17:56:21	00:14:31
45°	06:24:42	07:01:17	07:34:21	16:37:35	17:10:39	17:47:15	00:17:09
S 50°	06:35:02	07:15:42	07:53:02	16:18:56	16:56:17	17:36:58	00:20:19
52°	06:39:37	07:22:19	08:01:53	16:10:07	16:49:41	17:32:24	00:21:47
54°	06:44:32	07:29:35	08:11:45	16:00:15	16:42:27	17:27:30	00:23:23
56°	06:49:52	07:37:37	08:22:56	15:49:06	16:34:26	17:22:12	00:25:09
58°	06:55:41	07:46:37	08:35:46	15:36:17	16:25:27	17:16:25	00:27:08
S 60°	07:02:06	07:56:48	08:50:48	15:21:17	16:15:18	17:10:02	00:29:21

Jul 13	SHA	Mer.pass
Venus	290°19.9	09:12:42
Mars	350°40.9	05:11:32
Jupiter	65°38.1	00:12:05
Saturn	58°34.7	00:40:14

14 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	22:26:28
N 70°	☐	☐	☐	☐	☐	☐	22:48:18
68°	☐	☐	☐	☐	☐	☐	23:05:22
66°	—	—	01:33:00	22:35:05	—	—	23:19:15
64°	—	—	02:13:53	21:55:42	—	—	23:30:49
62°	—	00:45:17	02:41:26	21:28:44	23:19:26	—	23:40:39
60°	—	01:43:04	03:02:32	21:07:59	22:26:06	—	23:49:10
N 58°	—	02:14:35	03:19:40	20:51:04	21:55:26	—	23:56:38
56°	00:41:39	02:37:41	03:34:03	20:36:51	21:32:45	23:23:41	.. ..
54°	01:34:32	02:56:06	03:46:26	20:24:36	21:14:35	22:34:50	.. ..
52°	02:03:48	03:11:28	03:57:16	20:13:51	20:59:25	22:06:22	.. ..
50°	02:25:28	03:24:37	04:06:54	20:04:19	20:46:24	21:45:05	00:00:10
45°	03:04:09	03:51:02	04:27:04	19:44:18	20:20:13	21:06:52	00:06:52
N 40°	03:31:22	04:11:24	04:43:19	19:28:09	20:00:00	20:39:53	00:12:30
35°	03:52:20	04:27:56	04:56:59	19:14:34	19:43:33	20:19:04	00:17:22
30°	04:09:21	04:41:53	05:08:49	19:02:48	19:29:41	20:02:09	00:21:41
20°	04:36:03	05:04:44	05:28:56	18:42:47	19:06:57	19:35:36	00:29:13
N 10°	04:56:50	05:23:31	05:46:16	18:25:32	18:48:16	19:14:56	00:35:52
0°	05:14:14	05:40:06	06:02:21	18:09:31	18:31:45	18:57:37	00:42:09
S 10°	05:29:44	05:55:45	06:18:18	17:53:38	18:16:10	18:42:11	00:48:29
20°	05:44:22	06:11:31	06:35:13	17:36:46	18:00:28	18:27:36	00:55:16
30°	05:59:08	06:28:35	06:54:32	17:17:31	17:43:28	18:12:55	01:03:04
35°	06:06:53	06:38:06	07:05:45	17:06:20	17:34:00	18:05:12	01:07:35
40°	06:15:09	06:48:39	07:18:35	16:53:32	17:23:28	17:56:59	01:12:43
45°	06:24:11	07:00:43	07:33:42	16:38:28	17:11:27	17:47:59	01:18:44
S 50°	06:34:23	07:14:58	07:52:13	16:19:59	16:57:15	17:37:51	01:25:58
52°	06:38:54	07:21:32	08:00:58	16:11:16	16:50:43	17:33:21	01:29:19
54°	06:43:46	07:28:43	08:10:44	16:01:30	16:43:33	17:28:31	01:33:00
56°	06:49:01	07:36:39	08:21:47	15:50:29	16:35:38	17:23:17	01:37:05
58°	06:54:45	07:45:32	08:34:28	15:37:49	16:26:46	17:17:35	01:41:40
S 60°	07:01:04	07:55:36	08:49:18	15:23:01	16:16:44	17:11:18	01:46:49

Jul 14	SHA	Mer.pass
Venus	289°45.4	09:11:06
Mars	350°10.1	05:09:39
Jupiter	65°46.3	00:07:37
Saturn	58°39.2	00:36:00

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
13	05:46	05:50	12:05:50	06:10:53	22(45%)
14	05:53	05:56	12:05:56	06:52:15	23(36%)

15 July 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	☐	☐	☐	☐	☐	☐	21:41:07	17:57:07
N 70°	☐	☐	☐	☐	☐	☐	22:24:12	17:15:24
68°	☐	☐	☐	☐	☐	☐	22:53:19	16:47:29
66°	—	—	01:37:26	22:30:56	—	—	23:15:19	16:26:32
64°	—	—	02:16:47	21:52:59	—	—	23:32:53	16:09:54
62°	—	00:53:00	02:43:43	21:26:38	23:12:47	—	23:47:26	15:56:13
60°	—	01:46:18	03:04:27	21:06:14	22:23:03	—	23:59:45	15:44:41
N 58°	—	02:16:57	03:21:19	20:49:35	21:53:14	—	.. ..	15:34:45
56°	00:48:40	02:39:37	03:35:31	20:35:33	21:31:00	23:17:40	00:03:15	15:26:04
54°	01:37:30	02:57:45	03:47:45	20:23:27	21:13:07	22:32:05	00:09:11	15:18:23
52°	02:05:57	03:12:54	03:58:29	20:12:50	20:58:09	22:04:23	00:14:33	15:11:31
50°	02:27:13	03:25:55	04:08:00	20:03:23	20:45:17	21:43:29	00:19:26	15:05:19
45°	03:05:24	03:52:03	04:27:58	19:43:34	20:19:22	21:05:48	00:30:00	14:52:04
N 40°	03:32:20	04:12:14	04:44:05	19:27:34	19:59:20	20:39:06	00:38:50	14:41:09
35°	03:53:08	04:28:38	04:57:37	19:14:07	19:43:02	20:18:27	00:46:26	14:31:52
30°	04:10:01	04:42:28	05:09:21	19:02:27	19:29:17	20:01:41	00:53:09	14:23:44
20°	04:36:30	05:05:09	05:29:19	18:42:36	19:06:44	19:35:21	01:04:49	14:09:45
N 10°	04:57:07	05:23:46	05:46:31	18:25:29	18:48:12	19:14:50	01:15:07	13:57:34
0°	05:14:23	05:40:14	06:02:28	18:09:37	18:31:50	18:57:39	01:24:49	13:46:11
S 10°	05:29:45	05:55:45	06:18:17	17:53:51	18:16:22	18:42:21	01:34:34	13:34:51
20°	05:44:16	06:11:23	06:35:04	17:37:08	18:00:48	18:27:55	01:45:03	13:22:47
30°	05:58:52	06:28:18	06:54:13	17:18:03	17:43:58	18:13:23	01:57:04	13:09:02
35°	06:06:33	06:37:43	07:05:20	17:06:58	17:34:35	18:05:45	02:04:04	13:01:06
40°	06:14:43	06:48:10	07:18:03	16:54:17	17:24:10	17:57:38	02:12:04	12:52:05
45°	06:23:38	07:00:06	07:33:01	16:39:21	17:12:17	17:48:45	02:21:25	12:41:35
S 50°	06:33:42	07:14:13	07:51:21	16:21:04	16:58:13	17:38:45	02:32:46	12:28:56
52°	06:38:10	07:20:41	08:00:01	16:12:26	16:51:46	17:34:19	02:38:04	12:23:04
54°	06:42:57	07:27:47	08:09:41	16:02:47	16:44:41	17:29:33	02:43:54	12:16:35
56°	06:48:07	07:35:38	08:20:36	15:51:53	16:36:52	17:24:24	02:50:25	12:09:24
58°	06:53:46	07:44:25	08:33:07	15:39:23	16:28:07	17:18:47	02:57:46	12:01:21
S 60°	06:59:59	07:54:21	08:47:45	15:24:47	16:18:13	17:12:36	03:06:07	11:52:13

Jul 15	SHA	Mer.pass
Venus	289°09.4	09:09:35
Mars	349°39.4	05:07:45
Jupiter	65°54.5	00:03:08
Saturn	58°43.8	00:31:46

16 July 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	☐	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	21:24:30	19:53:34
68°	☐	☐	☐	☐	☐	☐	22:34:41	18:44:16
66°	—	—	01:41:48	22:26:47	—	—	23:11:31	18:08:14
64°	—	—	02:19:43	21:50:12	—	—	23:37:49	17:42:39
62°	—	00:59:52	02:46:02	21:24:27	23:06:40	—	23:58:22	17:22:45
60°	—	01:49:34	03:06:24	21:04:26	22:19:59	—	.. ..	17:06:33
N 58°	—	02:19:21	03:23:01	20:48:02	21:50:59	—	00:10:23	16:52:55
56°	00:54:54	02:41:34	03:37:02	20:34:12	21:29:11	23:12:07	00:19:43	16:41:13
54°	01:40:28	02:59:26	03:49:07	20:22:15	21:11:35	22:29:18	00:28:01	16:30:59
52°	02:08:08	03:14:23	03:59:43	20:11:45	20:56:50	22:02:21	00:35:27	16:21:55
50°	02:29:01	03:27:14	04:09:08	20:02:25	20:44:07	21:41:51	00:42:10	16:13:47
45°	03:06:40	03:53:06	04:28:54	19:42:49	20:18:30	21:04:41	00:56:37	15:56:35
N 40°	03:33:20	04:13:05	04:44:51	19:26:58	19:58:39	20:38:16	01:08:35	15:42:33
35°	03:53:56	04:29:21	04:58:16	19:13:39	19:42:30	20:17:49	01:18:49	15:30:40
30°	04:10:41	04:43:04	05:09:54	19:02:05	19:28:52	20:01:11	01:27:50	15:20:19
20°	04:36:58	05:05:33	05:29:41	18:42:25	19:06:30	19:35:04	01:43:24	15:02:35
N 10°	04:57:25	05:24:02	05:46:44	18:25:26	18:48:08	19:14:43	01:57:05	14:47:11
0°	05:14:32	05:40:21	06:02:33	18:09:42	18:31:53	18:57:41	02:09:58	14:32:48
S 10°	05:29:47	05:55:45	06:18:15	17:54:04	18:16:34	18:42:31	02:22:55	14:18:27
20°	05:44:09	06:11:14	06:34:53	17:37:30	18:01:08	18:28:13	02:36:49	14:03:11
30°	05:58:36	06:27:59	06:53:52	17:18:35	17:44:28	18:13:51	02:52:50	13:45:43
35°	06:06:11	06:37:19	07:04:53	17:07:36	17:35:11	18:06:19	03:02:11	13:35:34
40°	06:14:15	06:47:39	07:17:29	16:55:03	17:24:52	17:58:17	03:12:53	13:24:00
45°	06:23:03	06:59:28	07:32:19	16:40:16	17:13:07	17:49:32	03:25:31	13:10:25
S 50°	06:32:58	07:13:25	07:50:27	16:22:10	16:59:13	17:39:40	03:40:57	12:53:55
52°	06:37:22	07:19:49	07:59:01	16:13:38	16:52:50	17:35:18	03:48:12	12:46:11
54°	06:42:05	07:26:50	08:08:34	16:04:06	16:45:51	17:30:37	03:56:17	12:37:36
56°	06:47:11	07:34:35	08:19:21	15:53:20	16:38:07	17:25:33	04:05:22	12:27:59
58°	06:52:44	07:43:14	08:31:43	15:41:00	16:29:29	17:20:01	04:15:41	12:17:05
S 60°	06:58:51	07:53:02	08:46:08	15:26:36	16:19:44	17:13:56	04:27:37	12:04:32

Jul 16	SHA	Mer.pass
Venus	288°32.2	09:08:09
Mars	349°09.1	05:05:49
Jupiter	66°02.7	23:54:11
Saturn	58°48.4	00:27:32

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Mer.Pass. Upper Lower hh:mm:ss hh:mm:ss		Age
15	05:59	06:02	12:06:02	07:35:25 19:57:58	24(27%)
16	06:05	06:08	12:06:08	08:21:17 20:45:26	25(19%)

17 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐
68°	—:—	—:—	00:17:47	23:34:17	—:—	—:—	☐
66°	—:—	—:—	01:46:08	22:22:40	—:—	—:—	23:08:04 19:57:15
64°	—:—	—:—	02:22:42	21:47:22	—:—	—:—	23:49:07 19:16:40
62°	—:—	01:06:11	02:48:24	21:22:14	23:00:56	—:—	.. .. 18:48:52
60°	—:—	01:52:50	03:08:24	21:02:34	22:16:53	—:—	00:15:10 18:27:28
N 58°	—:—	02:21:48	03:24:46	20:46:26	21:48:42	—:—	00:29:20 18:10:04
56°	01:00:38	02:43:35	03:38:35	20:32:48	21:27:20	23:06:57	00:41:33 17:55:25
54°	01:43:26	03:01:09	03:50:30	20:21:00	21:10:01	22:26:30	00:52:15 17:42:47
52°	02:10:22	03:15:54	04:00:59	20:10:38	20:55:27	22:00:17	01:01:46 17:31:44
50°	02:30:50	03:28:35	04:10:18	20:01:24	20:42:55	21:40:11	01:10:18 17:21:54
45°	03:07:58	03:54:10	04:29:51	19:42:01	20:17:34	21:03:32	01:28:27 17:01:16
N 40°	03:34:21	04:13:58	04:45:39	19:26:20	19:57:56	20:37:24	01:43:19 16:44:37
35°	03:54:45	04:30:05	04:58:56	19:13:08	19:41:56	20:17:09	01:55:57 16:30:35
30°	04:11:22	04:43:40	05:10:27	19:01:41	19:28:25	20:00:40	02:07:01 16:18:24
20°	04:37:25	05:05:58	05:30:04	18:42:12	19:06:15	19:34:46	02:26:03 15:57:37
N 10°	04:57:43	05:24:17	05:46:58	18:25:23	18:48:02	19:14:35	02:42:41 15:39:36
0°	05:14:41	05:40:28	06:02:39	18:09:46	18:31:56	18:57:42	02:58:19 15:22:48
S 10°	05:29:47	05:55:43	06:18:12	17:54:18	18:16:45	18:42:41	03:14:01 15:06:01
20°	05:44:01	06:11:04	06:34:41	17:37:52	18:01:29	18:28:32	03:30:53 14:48:06
30°	05:58:18	06:27:39	06:53:30	17:19:08	17:44:58	18:14:19	03:50:22 14:27:31
35°	06:05:48	06:36:53	07:04:25	17:08:15	17:35:47	18:06:52	04:01:46 14:15:30
40°	06:13:45	06:47:07	07:16:53	16:55:49	17:25:36	17:58:57	04:14:54 14:01:44
45°	06:22:27	06:58:47	07:31:34	16:41:11	17:13:58	17:50:19	04:30:29 13:45:26
S 50°	06:32:13	07:12:34	07:49:30	16:23:18	17:00:14	17:40:37	04:49:43 13:25:25
52°	06:36:33	07:18:54	07:57:58	16:14:51	16:53:56	17:36:18	04:58:51 13:15:56
54°	06:41:11	07:25:49	08:07:25	16:05:26	16:47:02	17:31:42	05:09:06 13:05:19
56°	06:46:12	07:33:28	08:18:04	15:54:48	16:39:25	17:26:43	05:20:44 12:53:17
58°	06:51:40	07:42:01	08:30:15	15:42:38	16:30:54	17:21:17	05:34:11 12:39:25
S 60°	06:57:40	07:51:40	08:44:28	15:28:27	16:21:17	17:15:19	05:50:00 12:23:08

Jul 17	SHA	Mer.pass
Venus	287°53.8	09:06:49
Mars	348°39.0	05:03:53
Jupiter	66°10.9	23:49:43
Saturn	58°53.0	00:23:18

18 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐
68°	—:—	—:—	00:38:51	23:22:04	—:—	—:—	☐
66°	—:—	—:—	01:50:26	22:18:34	—:—	—:—	23:06:44 21:51:35
64°	—:—	—:—	02:25:42	21:44:30	—:—	—:—	.. .. 20:42:35
62°	—:—	01:12:05	02:50:48	21:19:57	22:55:31	—:—	00:17:20 20:07:01
60°	—:—	01:56:06	03:10:26	21:00:39	22:13:46	—:—	00:39:07 19:41:22
N 58°	—:—	02:24:16	03:26:32	20:44:47	21:46:21	—:—	00:56:54 19:21:08
56°	01:05:59	02:45:37	03:40:09	20:31:21	21:25:25	23:02:02	01:11:52 19:04:24
54°	01:46:24	03:02:54	03:51:55	20:19:42	21:08:24	22:23:41	01:24:48 18:50:09
52°	02:12:36	03:17:26	04:02:16	20:09:28	20:54:03	21:58:10	01:36:09 18:37:45
50°	02:32:41	03:29:58	04:11:28	20:00:21	20:41:40	21:38:27	01:46:16 18:26:48
45°	03:09:17	03:55:15	04:30:49	19:41:11	20:16:37	21:02:20	02:07:31 18:03:58
N 40°	03:35:23	04:14:51	04:46:27	19:25:40	19:57:11	20:36:30	02:24:44 17:45:38
35°	03:55:36	04:30:49	04:59:36	19:12:37	19:41:20	20:16:27	02:39:16 17:30:15
30°	04:12:03	04:44:17	05:11:01	19:01:16	19:27:57	20:00:07	02:51:55 17:16:55
20°	04:37:53	05:06:23	05:30:27	18:41:58	19:05:59	19:34:27	03:13:36 16:54:12
N 10°	04:58:00	05:24:32	05:47:12	18:25:18	18:47:56	19:14:27	03:32:28 16:34:32
0°	05:14:50	05:40:34	06:02:44	18:09:51	18:31:59	18:57:43	03:50:08 16:16:10
S 10°	05:29:47	05:55:41	06:18:08	17:54:30	18:16:57	18:42:50	04:07:53 15:57:49
20°	05:43:52	06:10:53	06:34:28	17:38:14	18:01:49	18:28:50	04:26:56 15:38:09
30°	05:57:59	06:27:18	06:53:06	17:19:41	17:45:29	18:14:48	04:48:58 15:15:30
35°	06:05:23	06:36:25	07:03:55	17:08:55	17:36:24	18:07:27	05:01:55 15:02:12
40°	06:13:14	06:46:33	07:16:15	16:56:37	17:26:19	17:59:38	05:16:52 14:46:54
45°	06:21:48	06:58:05	07:30:47	16:42:08	17:14:50	17:51:08	05:34:41 14:28:41
S 50°	06:31:25	07:11:42	07:48:31	16:24:26	17:01:17	17:41:34	05:56:52 14:06:03
52°	06:35:41	07:17:56	07:56:53	16:16:06	16:55:04	17:37:20	06:07:30 13:55:13
54°	06:40:15	07:24:46	08:06:12	16:06:48	16:48:15	17:32:48	06:19:31 13:43:00
56°	06:45:10	07:32:19	08:16:43	15:56:19	16:40:44	17:27:55	06:33:19 13:28:59
58°	06:50:32	07:40:44	08:28:45	15:44:19	16:32:20	17:22:35	06:49:29 13:12:35
S 60°	06:56:26	07:50:15	08:42:45	15:30:21	16:22:52	17:16:43	07:08:57 12:52:52

Jul 18	SHA	Mer.pass
Venus	287°14.1	09:05:33
Mars	348°09.2	05:01:56
Jupiter	66°19.1	23:45:14
Saturn	58°57.6	00:19:04

Day	Sun		Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Mer.Pass. Upper Lower hh:mm:ss hh:mm:ss		Age
17	06:10	06:13	12:06:13	09:10:28 21:36:21	26(11%)
18	06:15	06:17	12:06:17	10:03:04 22:30:32	27(6%)

19 July 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	☐	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐	☐
68°	—:—	—:—	00:51:15	23:12:16	—:—	—:—	☐	☐
66°	—:—	—:—	01:54:42	22:14:29	—:—	—:—	☐	☐
64°	—:—	—:—	02:28:44	21:41:35	—:—	—:—	00:15:54	21:42:24
62°	—:—	01:17:40	02:53:15	21:17:37	22:50:19	—:—	00:51:38	21:06:22
60°	—:—	01:59:23	03:12:30	20:58:42	22:10:38	—:—	01:17:25	20:40:26
N 58°	—:—	02:26:46	03:28:21	20:43:05	21:43:58	—:—	01:37:48	20:19:57
56°	01:11:03	02:47:40	03:41:46	20:29:51	21:23:28	22:57:20	01:54:39	20:03:02
54°	01:49:23	03:04:40	03:53:22	20:18:22	21:06:43	22:20:51	02:09:02	19:48:36
52°	02:14:52	03:19:00	04:03:35	20:08:16	20:52:35	21:56:00	02:21:32	19:36:03
50°	02:34:34	03:31:22	04:12:41	19:59:16	20:40:22	21:36:41	02:32:36	19:24:58
45°	03:10:38	03:56:21	04:31:48	19:40:19	20:15:38	21:01:06	02:55:40	19:01:50
N 40°	03:36:26	04:15:45	04:47:16	19:24:58	19:56:24	20:35:34	03:14:13	18:43:14
35°	03:56:26	04:31:33	05:00:17	19:12:03	19:40:43	20:15:43	03:29:47	18:27:37
30°	04:12:44	04:44:54	05:11:35	19:00:50	19:27:27	19:59:33	03:43:18	18:14:04
20°	04:38:21	05:06:48	05:30:49	18:41:43	19:05:42	19:34:06	04:06:22	17:50:58
N 10°	04:58:17	05:24:47	05:47:25	18:25:13	18:47:49	19:14:17	04:26:22	17:30:56
0°	05:14:58	05:40:40	06:02:48	18:09:54	18:32:01	18:57:43	04:45:04	17:12:12
S 10°	05:29:46	05:55:38	06:18:04	17:54:43	18:17:08	18:43:00	05:03:48	16:53:26
20°	05:43:41	06:10:41	06:34:14	17:38:36	18:02:09	18:29:09	05:23:54	16:33:18
30°	05:57:38	06:26:55	06:52:41	17:20:14	17:46:00	18:15:17	05:47:09	16:10:01
35°	06:04:56	06:35:57	07:03:23	17:09:35	17:37:01	18:08:02	06:00:49	15:56:19
40°	06:12:41	06:45:57	07:15:36	16:57:25	17:27:04	18:00:20	06:16:36	15:40:31
45°	06:21:07	06:57:20	07:29:58	16:43:06	17:15:43	17:51:57	06:35:28	15:21:38
S 50°	06:30:35	07:10:47	07:47:30	16:25:37	17:02:20	17:42:33	06:59:00	14:58:04
52°	06:34:46	07:16:56	07:55:45	16:17:22	16:56:12	17:38:23	07:10:20	14:46:44
54°	06:39:16	07:23:41	08:04:58	16:08:12	16:49:30	17:33:56	07:23:11	14:33:53
56°	06:44:06	07:31:07	08:15:20	15:57:51	16:42:05	17:29:08	07:37:59	14:19:03
58°	06:49:22	07:39:25	08:27:11	15:46:01	16:33:49	17:23:54	07:55:27	14:01:34
S 60°	06:55:09	07:48:47	08:40:58	15:32:16	16:24:29	17:18:09	08:16:44	13:40:17

Jul 19	SHA	Mer.pass
Venus	286°33.2	09:04:21
Mars	347°39.6	04:59:57
Jupiter	66°27.2	23:40:46
Saturn	59°02.2	00:14:49

20 July 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	☐	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐	☐
68°	—:—	—:—	01:01:11	23:03:45	—:—	—:—	☐	☐
66°	—:—	—:—	01:58:55	22:10:25	—:—	—:—	00:03:04	22:52:41
64°	—:—	—:—	02:31:48	21:38:37	—:—	—:—	01:14:07	22:11:30
62°	—:—	01:23:00	02:55:43	21:15:14	22:45:18	—:—	01:50:02	21:43:11
60°	—:—	02:02:39	03:14:36	20:56:41	22:07:28	—:—	02:15:51	21:21:19
N 58°	—:—	02:29:17	03:30:11	20:41:21	21:41:33	—:—	02:36:12	21:03:29
56°	01:15:53	02:49:46	03:43:24	20:28:18	21:21:28	22:52:48	02:53:01	20:48:26
54°	01:52:21	03:06:29	03:54:51	20:17:00	21:05:01	22:18:00	03:07:21	20:35:28
52°	02:17:10	03:20:36	04:04:55	20:07:02	20:51:05	21:53:49	03:19:48	20:24:04
50°	02:36:28	03:32:47	04:13:54	19:58:08	20:39:02	21:34:53	03:30:48	20:13:55
45°	03:12:00	03:57:29	04:32:48	19:39:25	20:14:36	20:59:50	03:53:44	19:52:35
N 40°	03:37:30	04:16:40	04:48:06	19:24:15	19:55:35	20:34:36	04:12:09	19:35:17
35°	03:57:18	04:32:19	05:00:59	19:11:28	19:40:04	20:14:58	04:27:36	19:20:42
30°	04:13:27	04:45:32	05:12:10	19:00:21	19:26:56	19:58:57	04:40:59	19:07:59
20°	04:38:49	05:07:13	05:31:12	18:41:26	19:05:23	19:33:45	05:03:48	18:46:13
N 10°	04:58:34	05:25:02	05:47:38	18:25:06	18:47:41	19:14:07	05:23:33	18:27:15
0°	05:15:05	05:40:46	06:02:52	18:09:57	18:32:02	18:57:42	05:42:00	18:09:29
S 10°	05:29:44	05:55:35	06:17:58	17:54:55	18:17:18	18:43:08	06:00:27	17:51:39
20°	05:43:30	06:10:28	06:33:59	17:38:59	18:02:29	18:29:27	06:20:12	17:32:30
30°	05:57:17	06:26:31	06:52:15	17:20:48	17:46:31	18:15:46	06:42:59	17:10:19
35°	06:04:29	06:35:26	07:02:50	17:10:15	17:37:39	18:08:37	06:56:20	16:57:18
40°	06:12:07	06:45:19	07:14:54	16:58:13	17:27:49	18:01:02	07:11:44	16:42:15
45°	06:20:25	06:56:34	07:29:06	16:44:04	17:16:37	17:52:47	07:30:04	16:24:18
S 50°	06:29:43	07:09:50	07:46:26	16:26:48	17:03:25	17:43:33	07:52:51	16:01:58
52°	06:33:50	07:15:54	07:54:35	16:18:40	16:57:22	17:39:28	08:03:45	15:51:14
54°	06:38:14	07:22:33	08:03:40	16:09:37	16:50:45	17:35:05	08:16:04	15:39:07
56°	06:42:59	07:29:53	08:13:54	15:59:24	16:43:27	17:30:22	08:30:12	15:25:12
58°	06:48:09	07:38:03	08:25:35	15:47:46	16:35:19	17:25:15	08:46:45	15:08:53
S 60°	06:53:50	07:47:16	08:39:08	15:34:14	16:26:07	17:19:36	09:06:40	14:49:13

Jul 20	SHA	Mer.pass
Venus	285°51.2	09:03:15
Mars	347°10.4	04:57:58
Jupiter	66°35.4	23:36:18
Saturn	59°06.8	00:10:35

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
19	06:19	06:21	12:06:21	10:58:35	23:27:04	28(2%)
20	06:23	06:25	12:06:25	11:55:45	—:—	29(0%)

21 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐
68°	—:—	—:—	01:09:50	22:56:02	—:—	—:—	☐
66°	—:—	—:—	02:03:07	22:06:22	—:—	—:—	02:04:14 22:49:16
64°	—:—	—:—	02:34:53	21:35:37	—:—	—:—	02:44:55 22:23:57
62°	—:—	01:28:08	02:58:14	21:12:48	22:40:26	—:—	03:12:47 22:04:00
60°	—:—	02:05:56	03:16:44	20:54:37	22:04:18	—:—	03:34:15 21:47:36
N 58°	—:—	02:31:50	03:32:03	20:39:33	21:39:05	—:—	03:51:42 21:33:43
56°	01:20:32	02:51:53	03:45:04	20:26:43	21:19:25	22:48:25	04:06:23 21:21:44
54°	01:55:19	03:08:19	03:56:21	20:15:34	21:03:15	22:15:08	04:19:02 21:11:13
52°	02:19:28	03:22:13	04:06:17	20:05:45	20:49:33	21:51:36	04:30:08 21:01:51
50°	02:38:23	03:34:14	04:15:09	19:56:58	20:37:40	21:33:02	04:39:59 20:53:26
45°	03:13:23	03:58:37	04:33:49	19:38:29	20:13:32	20:58:32	05:00:39 20:35:31
N 40°	03:38:34	04:17:36	04:48:56	19:23:30	19:54:44	20:33:36	05:17:21 20:20:49
35°	03:58:10	04:33:05	05:01:40	19:10:51	19:39:23	20:14:11	05:31:25 20:08:19
30°	04:14:09	04:46:10	05:12:44	18:59:52	19:26:24	19:58:19	05:43:37 19:57:21
20°	04:39:17	05:07:38	05:31:35	18:41:09	19:05:04	19:33:22	06:04:27 19:38:29
N 10°	04:58:51	05:25:17	05:47:50	18:24:59	18:47:32	19:13:55	06:22:31 19:21:58
0°	05:15:12	05:40:51	06:02:55	18:10:00	18:32:03	18:57:41	06:39:21 19:06:25
S 10°	05:29:42	05:55:31	06:17:52	17:55:07	18:17:28	18:43:16	06:56:11 18:50:48
20°	05:43:18	06:10:14	06:33:43	17:39:21	18:02:50	18:29:45	07:14:08 18:34:01
30°	05:56:54	06:26:06	06:51:47	17:21:22	17:47:03	18:16:15	07:34:46 18:14:38
35°	06:03:59	06:34:54	07:02:15	17:10:56	17:38:17	18:09:12	07:46:48 18:03:15
40°	06:11:30	06:44:39	07:14:11	16:59:03	17:28:35	18:01:44	08:00:36 17:50:10
45°	06:19:40	06:55:46	07:28:13	16:45:04	17:17:32	17:53:38	08:16:55 17:34:38
S 50°	06:28:49	07:08:50	07:45:20	16:28:00	17:04:31	17:44:34	08:36:58 17:15:28
52°	06:32:51	07:14:49	07:53:23	16:19:59	16:58:33	17:40:33	08:46:28 17:06:21
54°	06:37:10	07:21:22	08:02:20	16:11:03	16:52:02	17:36:16	08:57:05 16:56:08
56°	06:41:50	07:28:36	08:12:25	16:01:00	16:44:51	17:31:38	09:09:08 16:44:32
58°	06:46:54	07:36:38	08:23:56	15:49:31	16:36:50	17:26:37	09:23:00 16:31:08
S 60°	06:52:27	07:45:43	08:37:16	15:36:13	16:27:48	17:21:06	09:39:16 16:15:22

Jul 21	SHA	Mer.pass
Venus	285°08.1	09:02:12
Mars	346°41.4	04:55:57
Jupiter	66°43.5	23:31:50
Saturn	59°11.5	00:06:21

22 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	☐
N 70°	☐	☐	☐	☐	☐	☐	☐
68°	—:—	—:—	01:17:39	22:48:54	—:—	—:—	03:32:13 23:05:08
66°	—:—	—:—	02:07:16	22:02:20	—:—	—:—	04:06:02 22:45:27
64°	—:—	—:—	02:37:59	21:32:36	—:—	—:—	04:30:31 22:29:29
62°	—:—	01:33:06	03:00:46	21:10:20	22:35:42	—:—	04:49:42 22:16:09
60°	—:—	02:09:12	03:18:54	20:52:31	22:01:07	—:—	05:05:24 22:04:46
N 58°	—:—	02:34:23	03:33:57	20:37:43	21:36:35	—:—	05:18:38 21:54:53
56°	01:25:01	02:54:02	03:46:45	20:25:05	21:17:20	22:44:08	05:30:02 21:46:10
54°	01:58:17	03:10:10	03:57:52	20:14:06	21:01:27	22:12:15	05:40:01 21:38:25
52°	02:21:48	03:23:51	04:07:40	20:04:25	20:47:58	21:49:20	05:48:52 21:31:27
50°	02:40:20	03:35:42	04:16:25	19:55:46	20:36:15	21:31:09	05:56:48 21:25:08
45°	03:14:47	03:59:47	04:34:50	19:37:31	20:12:26	20:57:11	06:13:37 21:11:31
N 40°	03:39:40	04:18:32	04:49:47	19:22:42	19:53:52	20:32:34	06:27:20 21:00:12
35°	03:59:03	04:33:51	05:02:23	19:10:13	19:38:40	20:13:22	06:38:58 20:50:30
30°	04:14:52	04:46:48	05:13:19	18:59:21	19:25:49	19:57:40	06:49:06 20:41:57
20°	04:39:45	05:08:03	05:31:58	18:40:51	19:04:43	19:32:58	07:06:28 20:27:07
N 10°	04:59:08	05:25:31	05:48:03	18:24:52	18:47:22	19:13:43	07:21:33 20:14:05
0°	05:15:18	05:40:55	06:02:58	18:10:01	18:32:03	18:57:39	07:35:38 20:01:46
S 10°	05:29:38	05:55:25	06:17:45	17:55:19	18:17:38	18:43:24	07:49:41 19:49:23
20°	05:43:05	06:09:59	06:33:26	17:39:43	18:03:10	18:30:03	08:04:38 19:36:04
30°	05:56:29	06:25:39	06:51:18	17:21:56	17:47:35	18:16:44	08:21:44 19:20:44
35°	06:03:29	06:34:21	07:01:38	17:11:38	17:38:55	18:09:48	08:31:39 19:11:46
40°	06:10:52	06:43:58	07:13:27	16:59:53	17:29:21	18:02:28	08:42:56 19:01:30
45°	06:18:54	06:54:55	07:27:18	16:46:04	17:18:27	17:54:30	08:56:11 18:49:23
S 50°	06:27:52	07:07:49	07:44:12	16:29:14	17:05:38	17:45:35	09:12:15 18:34:37
52°	06:31:50	07:13:43	07:52:08	16:21:19	16:59:46	17:41:40	09:19:46 18:27:40
54°	06:36:04	07:20:09	08:00:58	16:12:31	16:53:21	17:37:27	09:28:05 18:19:57
56°	06:40:38	07:27:16	08:10:54	16:02:36	16:46:16	17:32:56	09:37:24 18:11:17
58°	06:45:35	07:35:11	08:22:14	15:51:19	16:38:23	17:28:01	09:47:57 18:01:26
S 60°	06:51:02	07:44:06	08:35:20	15:38:14	16:29:30	17:22:37	10:00:03 17:50:06

Jul 22	SHA	Mer.pass
Venus	284°24.0	09:01:14
Mars	346°12.7	04:53:55
Jupiter	66°51.6	23:27:22
Saturn	59°16.1	00:02:06

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
21	06:26	06:27	12:06:27	12:52:56	00:24:26	1(1%)
22	06:29	06:30	12:06:30	13:48:46	01:21:05	2(4%)

23 July 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	04:48:24	00:05:34 23:23:21
N 70°	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	05:21:47	23:06:22
68°	<div></div>	<div></div>	01:24:53	22:42:10	<div></div>	<div></div>	05:45:36	22:52:45
66°	<div></div>	<div></div>	02:11:24	21:58:18	<div></div>	<div></div>	06:03:57	22:41:30
64°	<div></div>	<div></div>	02:41:05	21:29:32	<div></div>	<div></div>	06:18:44	22:32:01
62°	<div></div>	01:37:55	03:03:19	21:07:49	22:31:04	<div></div>	06:31:00	22:23:52
60°	<div></div>	02:12:28	03:21:06	20:50:22	21:57:55	<div></div>	06:41:25	22:16:46
N 58°	<div></div>	02:36:58	03:35:52	20:35:50	21:34:03	<div></div>	06:50:25	22:10:31
56°	01:29:23	02:56:12	03:48:27	20:23:25	21:15:12	22:39:58	06:58:19	22:04:57
54°	02:01:14	03:12:03	03:59:24	20:12:36	20:59:37	22:09:22	07:05:18	21:59:56
52°	02:24:08	03:25:30	04:09:04	20:03:03	20:46:21	21:47:03	07:11:35	21:55:24
50°	02:42:17	03:37:12	04:17:42	19:54:32	20:34:49	21:29:14	07:17:15	21:51:15
45°	03:16:12	04:00:57	04:35:53	19:36:31	20:11:19	20:55:48	07:29:23	21:42:15
N 40°	03:40:46	04:19:29	04:50:39	19:21:54	19:52:57	20:31:30	07:39:23	21:34:42
35°	03:59:56	04:34:38	05:03:05	19:09:33	19:37:56	20:12:31	07:47:55	21:28:10
30°	04:15:35	04:47:26	05:13:54	18:58:49	19:25:14	19:57:00	07:55:24	21:22:23
20°	04:40:13	05:08:28	05:32:20	18:40:31	19:04:21	19:32:33	08:08:15	21:12:19
N 10°	04:59:24	05:25:45	05:48:15	18:24:43	18:47:11	19:13:30	08:19:28	21:03:25
0°	05:15:24	05:40:59	06:03:00	18:10:03	18:32:03	18:57:36	08:29:57	20:55:00
S 10°	05:29:34	05:55:19	06:17:38	17:55:30	18:17:48	18:43:32	08:40:23	20:46:30
20°	05:42:51	06:09:42	06:33:08	17:40:04	18:03:30	18:30:21	08:51:29	20:37:23
30°	05:56:03	06:25:11	06:50:47	17:22:30	17:48:06	18:17:14	09:04:07	20:26:54
35°	06:02:56	06:33:46	07:01:01	17:12:20	17:39:34	18:10:24	09:11:24	20:20:47
40°	06:10:13	06:43:15	07:12:40	17:00:43	17:30:08	18:03:11	09:19:39	20:13:49
45°	06:18:05	06:54:03	07:26:21	16:47:05	17:19:23	17:55:22	09:29:16	20:05:39
S 50°	06:26:54	07:06:45	07:43:01	16:30:29	17:06:46	17:46:38	09:40:48	19:55:46
52°	06:30:47	07:12:33	07:50:51	16:22:40	17:00:59	17:42:47	09:46:08	19:51:10
54°	06:34:56	07:18:54	07:59:33	16:14:00	16:54:40	17:38:40	09:52:00	19:46:06
56°	06:39:24	07:25:54	08:09:20	16:04:15	16:47:43	17:34:15	09:58:30	19:40:27
58°	06:44:14	07:33:41	08:20:29	15:53:08	16:39:58	17:29:26	10:05:46	19:34:06
S 60°	06:49:33	07:42:26	08:33:22	15:40:17	16:31:14	17:24:10	10:13:58	19:26:53

Jul 23	SHA	Mer.pass
Venus	283° 38.8	09:00:19
Mars	345° 44.4	04:51:52
Jupiter	66° 59.6	23:22:54
Saturn	59° 20.7	23:53:38

24 July 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	☐	☐	☐	☐	☐	☐	07:21:35	22:55:45
N 70°	☐	☐	☐	☐	☐	☐	07:36:12	22:48:30
68°	—	—	01:31:40	22:35:46	—	—	07:47:47	22:42:31
66°	—	—	02:15:30	21:54:17	—	—	07:57:16	22:37:27
64°	—	00:36:12	02:44:13	21:26:26	23:24:21	—	08:05:11	22:33:07
62°	—	01:42:37	03:05:54	21:05:15	22:26:32	—	08:11:56	22:29:21
60°	—	02:15:44	03:23:18	20:48:10	21:54:43	—	08:17:47	22:26:03
N 58°	00:33:16	02:39:34	03:37:48	20:33:54	21:31:29	23:28:28	08:22:53	22:23:06
56°	01:33:37	02:58:23	03:50:12	20:21:42	21:13:03	22:35:52	08:27:25	22:20:28
54°	02:04:11	03:13:56	04:00:58	20:11:04	20:57:45	22:06:28	08:31:29	22:18:04
52°	02:26:28	03:27:11	04:10:29	20:01:39	20:44:41	21:44:44	08:35:08	22:15:54
50°	02:44:16	03:38:42	04:19:00	19:53:15	20:33:19	21:27:17	08:38:28	22:13:55
45°	03:17:38	04:02:08	04:36:56	19:35:29	20:10:09	20:54:23	08:45:38	22:09:34
N 40°	03:41:53	04:20:27	04:51:31	19:21:03	19:52:01	20:30:25	08:51:36	22:05:53
35°	04:00:50	04:35:25	05:03:48	19:08:52	19:37:11	20:11:39	08:56:43	22:02:42
30°	04:16:19	04:48:05	05:14:30	18:58:15	19:24:37	19:56:18	09:01:13	21:59:52
20°	04:40:42	05:08:53	05:32:43	18:40:11	19:03:58	19:32:06	09:08:59	21:54:55
N 10°	04:59:40	05:25:58	05:48:26	18:24:33	18:47:00	19:13:16	09:15:47	21:50:30
0°	05:15:30	05:41:02	06:03:02	18:10:03	18:32:01	18:57:33	09:22:09	21:46:19
S 10°	05:29:30	05:55:13	06:17:29	17:55:41	18:17:57	18:43:39	09:28:30	21:42:05
20°	05:42:35	06:09:25	06:32:49	17:40:26	18:03:49	18:30:39	09:35:14	21:37:33
30°	05:55:36	06:24:41	06:50:15	17:23:05	17:48:38	18:17:43	09:42:54	21:32:19
35°	06:02:23	06:33:09	07:00:21	17:13:02	17:40:13	18:11:00	09:47:18	21:29:16
40°	06:09:31	06:42:31	07:11:52	17:01:34	17:30:55	18:03:55	09:52:16	21:25:48
45°	06:17:15	06:53:09	07:25:22	16:48:07	17:20:20	17:56:15	09:58:01	21:21:45
S 50°	06:25:53	07:05:39	07:41:48	16:31:44	17:07:54	17:47:42	10:04:52	21:16:53
52°	06:29:41	07:11:22	07:49:31	16:24:03	17:02:13	17:43:56	10:08:01	21:14:38
54°	06:33:45	07:17:36	07:58:06	16:15:30	16:56:01	17:39:54	10:11:28	21:12:09
56°	06:38:07	07:24:29	08:07:44	16:05:54	16:49:10	17:35:35	10:15:16	21:09:24
58°	06:42:51	07:32:08	08:18:41	15:54:58	16:41:34	17:30:53	10:19:29	21:06:21
S 60°	06:48:02	07:40:44	08:31:21	15:42:21	16:33:00	17:25:44	10:24:12	21:02:53

Jul 24	SHA	Mer.pass
Venus	282° 52.6	08:59:29
Mars	345° 16.3	04:49:47
Jupiter	67° 07.6	23:18:27
Saturn	59° 25.3	23:49:23

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
23	06:31	06:31	12:06:31	14:42:32	02:15:56	3(10%)
24	06:32	06:33	12:06:33	15:34:17	03:08:38	4(18%)



25 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	09:37:03
N 70°	☐	☐	☐	☐	☐	☐	09:41:03
68°	—:—	—:—	01:38:07	22:29:38	—:—	—:—	09:44:18
66°	—:—	—:—	02:19:34	21:50:16	—:—	—:—	09:47:01
64°	—:—	00:49:25	02:47:21	21:23:19	23:14:09	—:—	09:49:19
62°	—:—	01:47:11	03:08:30	21:02:39	22:22:05	—:—	09:51:18
60°	—:—	02:18:59	03:25:33	20:45:56	21:51:29	—:—	09:53:01
N 58°	00:45:10	02:42:10	03:39:46	20:31:56	21:28:53	23:19:18	09:54:33
56°	01:37:44	03:00:35	03:51:57	20:19:56	21:10:51	22:31:51	09:55:54
54°	02:07:07	03:15:51	04:02:33	20:09:29	20:55:50	22:03:34	09:57:07
52°	02:28:50	03:28:53	04:11:56	20:00:13	20:42:59	21:42:23	09:58:13
50°	02:46:15	03:40:13	04:20:18	19:51:56	20:31:48	21:25:18	09:59:14
45°	03:19:05	04:03:20	04:38:00	19:34:26	20:08:57	20:52:57	10:01:25
N 40°	03:43:01	04:21:25	04:52:23	19:20:11	19:51:03	20:29:17	10:03:14
35°	04:01:44	04:36:13	05:04:32	19:08:09	19:36:24	20:10:45	10:04:49
30°	04:17:03	04:48:44	05:15:05	18:57:41	19:23:59	19:55:34	10:06:12
20°	04:41:10	05:09:18	05:33:05	18:39:49	19:03:34	19:31:39	10:08:37
N 10°	04:59:56	05:26:11	05:48:37	18:24:23	18:46:47	19:13:01	10:10:45
0°	05:15:35	05:41:05	06:03:02	18:10:03	18:32:00	18:57:29	10:12:46
S 10°	05:29:24	05:55:05	06:17:20	17:55:51	18:18:05	18:43:46	10:14:47
20°	05:42:19	06:09:07	06:32:28	17:40:48	18:04:09	18:30:56	10:16:56
30°	05:55:08	06:24:11	06:49:42	17:23:40	17:49:11	18:18:13	10:19:23
35°	06:01:47	06:32:31	06:59:40	17:13:44	17:40:53	18:11:37	10:20:48
40°	06:08:48	06:41:45	07:11:02	17:02:25	17:31:43	18:04:40	10:22:24
45°	06:16:23	06:52:13	07:24:21	16:49:09	17:21:18	17:57:09	10:24:15
S 50°	06:24:50	07:04:31	07:40:34	16:33:01	17:09:04	17:48:46	10:26:27
52°	06:28:34	07:10:08	07:48:10	16:25:26	17:03:29	17:45:05	10:27:28
54°	06:32:32	07:16:17	07:56:36	16:17:01	16:57:23	17:41:09	10:28:34
56°	06:36:47	07:23:02	08:06:05	16:07:35	16:50:39	17:36:56	10:29:46
58°	06:41:25	07:30:32	08:16:51	15:56:50	16:43:11	17:32:21	10:31:07
S 60°	06:46:29	07:38:59	08:29:17	15:44:26	16:34:47	17:27:20	10:32:37

Jul 25	SHA	Mer.pass
Venus	282°05.5	08:58:42
Mars	344°48.6	04:47:42
Jupiter	67°15.6	23:13:59
Saturn	59°29.9	23:45:09

26 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	11:48:19
N 70°	☐	☐	☐	☐	☐	☐	11:43:05
68°	—:—	—:—	01:44:17	22:23:43	—:—	—:—	11:38:49
66°	—:—	—:—	02:23:36	21:46:16	—:—	—:—	11:35:17
64°	—:—	00:59:38	02:50:30	21:20:10	23:05:27	—:—	11:32:18
62°	—:—	01:51:40	03:11:07	21:00:01	22:17:42	—:—	11:29:43
60°	—:—	02:22:13	03:27:48	20:43:39	21:48:16	—:—	11:27:29
N 58°	00:54:22	02:44:47	03:41:46	20:29:56	21:26:16	23:11:27	11:25:31
56°	01:41:46	03:02:48	03:53:43	20:18:09	21:08:37	22:27:54	11:23:46
54°	02:10:02	03:17:47	04:04:09	20:07:51	20:53:53	22:00:39	11:22:12
52°	02:31:11	03:30:36	04:13:23	19:58:45	20:41:16	21:40:01	11:20:47
50°	02:48:15	03:41:46	04:21:38	19:50:35	20:30:15	21:23:17	11:19:30
45°	03:20:33	04:04:33	04:39:05	19:33:20	20:07:43	20:51:28	11:16:43
N 40°	03:44:09	04:22:24	04:53:17	19:19:17	19:50:03	20:28:08	11:14:24
35°	04:02:39	04:37:01	05:05:15	19:07:24	19:35:35	20:09:49	11:12:25
30°	04:17:47	04:49:23	05:15:41	18:57:04	19:23:19	19:54:50	11:10:40
20°	04:41:38	05:09:42	05:33:27	18:39:26	19:03:09	19:31:10	11:07:41
N 10°	05:00:11	05:26:24	05:48:48	18:24:12	18:46:34	19:12:45	11:05:06
0°	05:15:39	05:41:07	06:03:03	18:10:03	18:31:57	18:57:24	11:02:42
S 10°	05:29:18	05:54:57	06:17:10	17:56:01	18:18:13	18:43:52	11:00:19
20°	05:42:02	06:08:47	06:32:07	17:41:09	18:04:28	18:31:14	10:57:50
30°	05:54:38	06:23:39	06:49:07	17:24:14	17:49:43	18:18:43	10:55:03
35°	06:01:11	06:31:52	06:58:57	17:14:27	17:41:32	18:12:14	10:53:28
40°	06:08:04	06:40:57	07:10:10	17:03:17	17:32:31	18:05:25	10:51:41
45°	06:15:30	06:51:15	07:23:19	16:50:12	17:22:16	17:58:03	10:49:38
S 50°	06:23:46	07:03:21	07:39:17	16:34:18	17:10:14	17:49:51	10:47:13
52°	06:27:24	07:08:53	07:46:46	16:26:51	17:04:45	17:46:16	10:46:07
54°	06:31:16	07:14:54	07:55:04	16:18:34	16:58:45	17:42:25	10:44:54
56°	06:35:26	07:21:32	08:04:24	16:09:16	16:52:09	17:38:18	10:43:35
58°	06:39:56	07:28:55	08:14:59	15:58:43	16:44:49	17:33:50	10:42:08
S 60°	06:44:52	07:37:12	08:27:11	15:46:33	16:36:35	17:28:57	10:40:30

Jul 26	SHA	Mer.pass
Venus	281°17.4	08:57:59
Mars	344°21.2	04:45:35
Jupiter	67°23.5	23:09:32
Saturn	59°34.6	23:40:55

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
25	06:33	06:33	12:06:33	16:24:38	5(28%)
26	06:33	06:33	12:06:33	17:14:33	6(38%)

27 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	14:03:59
N 70°	—:—	—:—	00:18:41	23:28:59	—:—	—:—	21:39:25
68°	—:—	—:—	01:50:12	22:17:58	—:—	—:—	13:47:44
66°	—:—	—:—	02:27:36	21:42:16	—:—	—:—	21:57:55
64°	—:—	01:08:21	02:53:39	21:16:59	22:57:38	—:—	13:34:55
62°	—:—	01:56:03	03:13:45	20:57:21	22:13:23	—:—	13:24:31
60°	—:—	02:25:27	03:30:05	20:41:21	21:45:01	—:—	22:24:47
N 58°	01:02:12	02:47:25	03:43:46	20:27:53	21:23:37	23:04:26	13:15:50
56°	01:45:43	03:05:02	03:55:31	20:16:19	21:06:21	22:24:01	22:34:57
54°	02:12:57	03:19:44	04:05:46	20:06:12	20:51:54	21:57:44	13:08:27
52°	02:33:33	03:32:19	04:14:51	19:57:14	20:39:30	21:37:38	13:02:06
50°	02:50:16	03:43:19	04:22:59	19:49:12	20:28:39	21:21:14	22:51:15
45°	03:22:01	04:05:47	04:40:10	19:32:12	20:06:28	20:49:58	12:56:32
N 40°	03:45:18	04:23:23	04:54:10	19:18:21	19:49:02	20:26:57	22:57:54
35°	04:03:34	04:37:49	05:05:59	19:06:38	19:34:45	20:08:52	12:51:36
30°	04:18:31	04:50:02	05:16:17	18:56:27	19:22:38	19:54:03	23:03:50
20°	04:42:06	05:10:07	05:33:49	18:39:02	19:02:42	19:30:41	12:47:12
N 10°	05:00:26	05:26:37	05:48:59	18:24:00	18:46:20	19:12:29	23:09:09
0°	05:15:42	05:41:09	06:03:02	18:10:02	18:31:54	18:57:19	12:43:15
S 10°	05:29:10	05:54:47	06:16:59	17:56:11	18:18:21	18:43:58	23:13:58
20°	05:41:43	06:08:27	06:31:44	17:41:31	18:04:48	18:31:31	12:39:39
30°	05:54:07	06:23:05	06:48:31	17:24:49	17:50:15	18:19:13	23:18:21
35°	06:00:33	06:31:11	06:58:13	17:15:10	17:42:12	18:12:51	12:31:54
40°	06:07:17	06:40:07	07:09:17	17:04:10	17:33:19	18:06:10	23:27:52
45°	06:14:34	06:50:16	07:22:14	16:51:16	17:23:15	17:58:58	12:25:29
S 50°	06:22:39	07:02:09	07:37:58	16:35:36	17:11:26	17:50:58	23:35:50
52°	06:26:12	07:07:35	07:45:20	16:28:16	17:06:02	17:47:27	12:19:59
54°	06:29:58	07:13:30	07:53:30	16:20:07	17:00:09	17:43:42	23:42:42
56°	06:34:02	07:20:00	08:02:40	16:10:59	16:53:41	17:39:42	12:15:10
58°	06:38:25	07:27:14	08:13:04	16:00:37	16:46:29	17:35:21	23:48:45
S 60°	06:43:13	07:35:21	08:25:03	15:48:41	16:38:25	17:30:36	23:59:17

Jul 27	SHA	Mer.pass
Venus	280°28.5	08:57:20
Mars	343°54.1	04:43:26
Jupiter	67°31.3	23:05:06
Saturn	59°39.2	23:36:41

28 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	16:39:59
N 70°	—:—	—:—	00:44:59	23:14:13	—:—	—:—	20:52:51
68°	—:—	—:—	01:55:56	22:12:23	—:—	—:—	16:02:34
66°	—:—	—:—	02:31:35	21:38:17	—:—	—:—	21:31:55
64°	—:—	01:16:08	02:56:49	21:13:47	22:50:28	—:—	15:36:40
62°	—:—	02:00:21	03:16:24	20:54:39	22:09:07	—:—	21:59:15
60°	—:—	02:28:40	03:32:22	20:38:59	21:41:47	—:—	15:17:00
N 58°	01:09:12	02:50:02	03:45:48	20:25:48	21:20:56	22:57:59	15:01:16
56°	01:49:35	03:07:16	03:57:20	20:14:27	21:04:03	22:20:11	14:48:17
54°	02:15:50	03:21:42	04:07:24	20:04:30	20:49:53	21:54:48	22:51:04
52°	02:35:55	03:34:04	04:16:20	19:55:42	20:37:42	21:35:13	14:37:18
50°	02:52:17	03:44:52	04:24:20	19:47:47	20:27:02	21:19:10	23:02:59
45°	03:23:30	04:07:01	04:41:16	19:31:03	20:05:10	20:48:25	14:27:50
N 40°	03:46:27	04:24:23	04:55:04	19:17:24	19:47:59	20:25:45	14:19:33
35°	04:04:29	04:38:37	05:06:44	19:05:51	19:33:53	20:07:54	23:22:22
30°	04:19:16	04:50:41	05:16:52	18:55:48	19:21:55	19:53:16	14:12:14
20°	04:42:33	05:10:31	05:34:11	18:38:37	19:02:15	19:30:10	23:30:25
N 10°	05:00:41	05:26:49	05:49:09	18:23:47	18:46:05	19:12:11	14:05:40
0°	05:15:46	05:41:10	06:03:01	18:10:00	18:31:51	18:57:13	23:37:39
S 10°	05:29:02	05:54:37	06:16:47	17:56:20	18:18:29	18:44:03	13:59:45
20°	05:41:24	06:08:05	06:31:20	17:41:52	18:05:07	18:31:48	23:44:13
30°	05:53:35	06:22:30	06:47:53	17:25:24	17:50:47	18:19:43	23:58:17
35°	05:59:53	06:30:29	06:57:28	17:15:53	17:42:52	18:13:28	13:36:41
40°	06:06:30	06:39:16	07:08:22	17:05:02	17:34:08	18:06:55	13:27:50
45°	06:13:37	06:49:14	07:21:07	16:52:20	17:24:14	17:59:53	13:20:05
S 50°	06:21:30	07:00:55	07:36:37	16:36:55	17:12:38	17:52:04	13:06:48
52°	06:24:58	07:06:15	07:43:52	16:29:42	17:07:20	17:48:39	12:55:16
54°	06:28:38	07:12:03	07:51:54	16:21:42	17:01:34	17:45:01	00:08:33
56°	06:32:35	07:18:26	08:00:54	16:12:43	16:55:13	17:41:06	12:44:32
58°	06:36:52	07:25:31	08:11:07	16:02:33	16:48:10	17:36:53	00:26:01
S 60°	06:41:32	07:33:29	08:22:52	15:50:50	16:40:16	17:32:16	00:35:22

Jul 28	SHA	Mer.pass
Venus	279°38.6	08:56:44
Mars	343°27.4	04:41:17
Jupiter	67°39.0	23:00:39
Saturn	59°43.7	23:32:27

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
27	06:33	06:32	12:06:32	18:05:04	7(50%)
28	06:32	06:31	12:06:31	18:57:04	8(61%)

29 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	■
N 70°	—	—	00:59:43	23:02:31	—	—	19:05:42
68°	—	—	02:01:30	22:06:55	—	—	17:51:18
66°	—	—	02:35:32	21:34:18	—	—	17:14:27
64°	—	01:23:16	02:59:58	21:10:34	22:43:46	—	16:48:28
62°	—	02:04:34	03:19:04	20:51:55	22:04:54	—	16:28:20
60°	—	02:31:52	03:34:41	20:36:36	21:38:31	—	16:11:58
N 58°	01:15:36	02:52:40	03:47:50	20:23:41	21:18:14	22:51:58	15:58:14
56°	01:53:22	03:09:32	03:59:09	20:12:32	21:01:43	22:16:23	15:46:26
54°	02:18:43	03:23:40	04:09:03	20:02:47	20:47:50	21:51:53	15:36:08
52°	02:38:17	03:35:49	04:17:50	19:54:07	20:35:52	21:32:47	15:27:01
50°	02:54:18	03:46:27	04:25:43	19:46:21	20:25:23	21:17:04	15:18:51
45°	03:24:59	04:08:15	04:42:23	19:29:52	20:03:51	20:46:51	15:01:35
N 40°	03:47:37	04:25:23	04:55:58	19:16:25	19:46:54	20:24:30	14:47:31
35°	04:05:25	04:39:26	05:07:28	19:05:02	19:33:00	20:06:54	14:35:38
30°	04:20:00	04:51:21	05:17:28	18:55:07	19:21:11	19:52:27	14:25:17
20°	04:43:01	05:10:56	05:34:33	18:38:11	19:01:47	19:29:38	14:07:36
N 10°	05:00:55	05:27:01	05:49:18	18:23:33	18:45:49	19:11:53	13:52:17
0°	05:15:48	05:41:10	06:03:00	18:09:57	18:31:46	18:57:07	13:38:02
S 10°	05:28:54	05:54:27	06:16:34	17:56:29	18:18:36	18:44:08	13:23:51
20°	05:41:03	06:07:42	06:30:55	17:42:13	18:05:25	18:32:04	13:08:48
30°	05:53:02	06:21:54	06:47:15	17:25:59	17:51:20	18:20:13	12:51:39
35°	05:59:12	06:29:45	06:56:41	17:16:36	17:43:32	18:14:06	12:41:43
40°	06:05:40	06:38:24	07:07:25	17:05:55	17:34:57	18:07:41	12:30:25
45°	06:12:37	06:48:11	07:19:59	16:53:25	17:25:14	18:00:49	12:17:10
S 50°	06:20:19	06:59:39	07:35:14	16:38:15	17:13:50	17:53:12	12:01:08
52°	06:23:41	07:04:53	07:42:21	16:31:09	17:08:39	17:49:52	11:53:38
54°	06:27:16	07:10:34	07:50:16	16:23:17	17:03:00	17:46:19	11:45:20
56°	06:31:07	07:16:50	07:59:06	16:14:28	16:56:46	17:42:32	11:36:03
58°	06:35:16	07:23:46	08:09:08	16:04:29	16:49:52	17:38:26	11:25:33
S 60°	06:39:48	07:31:33	08:20:38	15:53:01	16:42:08	17:33:57	11:13:30

Jul 29	SHA	Mer.pass
Venus	278°47.9	08:56:12
Mars	343°01.0	04:39:05
Jupiter	67°46.7	22:56:13
Saturn	59°48.3	23:28:13

30 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	□	□	□	□	□	□	■
N 70°	—	—	01:11:22	22:52:24	—	—	19:05:42
68°	—	—	02:06:54	22:01:34	—	—	17:51:18
66°	—	—	02:39:27	21:30:19	—	—	17:14:27
64°	—	01:29:54	03:03:08	21:07:19	22:37:25	—	16:48:28
62°	—	02:08:43	03:21:44	20:49:09	22:00:44	—	16:28:20
60°	—	02:35:04	03:37:00	20:34:11	21:35:16	—	16:11:58
N 58°	01:21:33	02:55:19	03:49:53	20:21:32	21:15:30	22:46:16	15:58:14
56°	01:57:06	03:11:47	04:01:00	20:10:36	20:59:22	22:12:38	15:46:26
54°	02:21:35	03:25:39	04:10:43	20:01:01	20:45:45	21:48:56	15:36:08
52°	02:40:39	03:37:35	04:19:21	19:52:30	20:34:00	21:30:20	15:27:01
50°	02:56:20	03:48:02	04:27:05	19:44:52	20:23:42	21:14:57	15:18:51
45°	03:26:29	04:09:30	04:43:30	19:28:39	20:02:30	20:45:16	15:01:35
N 40°	03:48:47	04:26:23	04:56:53	19:15:24	19:45:48	20:23:15	14:47:31
35°	04:06:21	04:40:15	05:08:13	19:04:12	19:32:05	20:05:52	14:35:38
30°	04:20:45	04:52:00	05:18:04	18:54:26	19:20:26	19:51:36	14:25:17
20°	04:43:29	05:11:20	05:34:55	18:37:44	19:01:17	19:29:05	14:07:36
N 10°	05:01:09	05:27:12	05:49:28	18:23:18	18:45:33	19:11:33	13:52:17
0°	05:15:50	05:41:10	06:02:58	18:09:54	18:31:41	18:57:00	13:38:02
S 10°	05:28:44	05:54:15	06:16:20	17:56:37	18:18:42	18:44:12	13:23:51
20°	05:40:42	06:07:19	06:30:30	17:42:33	18:05:44	18:32:21	13:08:48
30°	05:52:27	06:21:17	06:46:35	17:26:34	17:51:52	18:20:42	12:51:39
35°	05:58:30	06:29:00	06:55:53	17:17:20	17:44:13	18:14:43	12:41:43
40°	06:04:49	06:37:29	07:06:27	17:06:49	17:35:47	18:08:28	12:30:25
45°	06:11:36	06:47:06	07:18:49	16:54:30	17:26:14	18:01:45	12:17:10
S 50°	06:19:06	06:58:21	07:33:49	16:39:35	17:15:04	17:54:20	12:01:08
52°	06:22:23	07:03:28	07:40:49	16:32:37	17:09:59	17:51:06	11:53:38
54°	06:25:52	07:09:03	07:48:35	16:24:53	17:04:26	17:47:39	11:45:20
56°	06:29:36	07:15:11	07:57:16	16:16:14	16:58:21	17:43:58	11:36:03
58°	06:33:38	07:21:59	08:07:06	16:06:26	16:51:35	17:40:00	11:25:33
S 60°	06:38:01	07:29:36	08:18:23	15:55:12	16:44:01	17:35:39	11:13:30

Jul 30	SHA	Mer.pass
Venus	277°56.4	08:55:43
Mars	342°35.0	04:36:53
Jupiter	67°54.3	22:51:47
Saturn	59°52.8	23:23:59

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
29	06:30	06:29	12:06:29	19:51:06	9(72%)
30	06:27	06:26	12:06:26	20:47:03	10(81%)

# 2020 July 31 to Aug. 01

31 July 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	■
N 70°	—	—	01:21:24	22:43:18	—	—	■
68°	—	—	02:12:10	21:56:19	—	—	■
66°	—	—	02:43:21	21:26:21	—	—	■
64°	—	01:36:10	03:06:18	21:04:04	22:31:22	—	20:04:32
62°	—	02:12:48	03:24:25	20:46:21	21:56:36	—	19:26:26
60°	—	02:38:14	03:39:20	20:31:44	21:32:00	—	18:59:36
N 58°	01:27:10	02:57:57	03:51:57	20:19:20	21:12:46	22:40:50	18:38:39
56°	02:00:46	03:14:03	04:02:51	20:08:38	20:56:59	22:08:56	18:21:24
54°	02:24:26	03:27:38	04:12:24	19:59:13	20:43:38	21:46:00	18:06:47
52°	02:43:01	03:39:22	04:20:52	19:50:52	20:32:06	21:27:51	17:54:05
50°	02:58:22	03:49:38	04:28:29	19:43:21	20:21:59	21:12:48	17:42:53
45°	03:27:59	04:10:46	04:44:37	19:27:25	20:01:08	20:43:39	17:19:36
N 40°	03:49:57	04:27:24	04:57:48	19:14:23	19:44:41	20:21:57	17:00:56
35°	04:07:17	04:41:04	05:08:57	19:03:20	19:31:09	20:04:49	16:45:19
30°	04:21:30	04:52:40	05:18:40	18:53:43	19:19:40	19:50:45	16:31:48
20°	04:43:56	05:11:44	05:35:16	18:37:16	19:00:46	19:28:31	16:08:48
N 10°	05:01:23	05:27:23	05:49:36	18:23:03	18:45:15	19:11:13	15:48:56
0°	05:15:51	05:41:09	06:02:55	18:09:51	18:31:36	18:56:52	15:30:25
S 10°	05:28:34	05:54:02	06:16:06	17:56:45	18:18:48	18:44:16	15:11:58
20°	05:40:19	06:06:54	06:30:03	17:42:54	18:06:02	18:32:37	14:52:14
30°	05:51:51	06:20:38	06:45:54	17:27:09	17:52:24	18:21:12	14:29:32
35°	05:57:46	06:28:13	06:55:03	17:18:03	17:44:53	18:15:21	14:16:15
40°	06:03:57	06:36:33	07:05:27	17:07:43	17:36:37	18:09:14	14:00:57
45°	06:10:34	06:46:00	07:17:37	16:55:36	17:27:15	18:02:42	13:42:46
S 50°	06:17:52	06:57:01	07:32:22	16:40:56	17:16:18	17:55:29	13:20:13
52°	06:21:03	07:02:02	07:39:15	16:34:05	17:11:19	17:52:20	13:09:26
54°	06:24:26	07:07:30	07:46:52	16:26:30	17:05:53	17:49:00	12:57:17
56°	06:28:03	07:13:30	07:55:24	16:18:00	16:59:56	17:45:26	12:43:21
58°	06:31:57	07:20:09	08:05:02	16:08:24	16:53:19	17:41:35	12:27:04
S 60°	06:36:12	07:27:36	08:16:05	15:57:24	16:45:56	17:37:23	12:07:32

Jul 31	SHA	Mer.pass
Venus	277°04.0	08:55:17
Mars	342°09.3	04:34:39
Jupiter	68°01.8	22:47:22
Saturn	59°57.4	23:19:45

01 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	■
N 70°	—	—	01:30:24	22:34:55	—	—	■
68°	—	—	02:17:19	21:51:09	—	—	■
66°	—	00:22:52	02:47:13	21:22:23	23:28:27	—	22:31:37
64°	—	01:42:07	03:09:27	21:00:47	22:25:33	—	21:01:32
62°	—	02:16:49	03:27:07	20:43:32	21:52:31	—	20:24:03
60°	00:21:05	02:41:24	03:41:41	20:29:15	21:28:43	23:32:25	19:57:27
N 58°	01:32:29	03:00:35	03:54:02	20:17:07	21:10:00	22:35:37	19:36:34
56°	02:04:22	03:16:20	04:04:43	20:06:37	20:54:35	22:05:16	19:19:22
54°	02:27:16	03:29:38	04:14:05	19:57:24	20:41:30	21:43:04	19:04:45
52°	02:45:23	03:41:09	04:22:24	19:49:11	20:30:11	21:25:22	18:52:03
50°	03:00:24	03:51:14	04:29:53	19:41:49	20:20:14	21:10:38	18:40:49
45°	03:29:30	04:12:02	04:45:45	19:26:08	19:59:43	20:42:00	18:17:28
N 40°	03:51:08	04:28:25	04:58:43	19:13:19	19:43:31	20:20:38	17:58:43
35°	04:08:13	04:41:53	05:09:42	19:02:27	19:30:11	20:03:45	17:43:00
30°	04:22:14	04:53:19	05:19:16	18:52:59	19:18:52	19:49:52	17:29:22
20°	04:44:23	05:12:07	05:35:37	18:36:47	19:00:15	19:27:56	17:06:11
N 10°	05:01:36	05:27:33	05:49:45	18:22:47	18:44:57	19:10:52	16:46:06
0°	05:15:52	05:41:07	06:02:51	18:09:46	18:31:29	18:56:43	16:27:22
S 10°	05:28:22	05:53:49	06:15:51	17:56:53	18:18:54	18:44:20	16:08:38
20°	05:39:56	06:06:28	06:29:35	17:43:14	18:06:21	18:32:53	15:48:35
30°	05:51:13	06:19:59	06:45:11	17:27:44	17:52:57	18:21:42	15:25:27
35°	05:57:00	06:27:25	06:54:12	17:18:47	17:45:34	18:15:59	15:11:52
40°	06:03:02	06:35:36	07:04:26	17:08:36	17:37:27	18:10:01	14:56:12
45°	06:09:29	06:44:51	07:16:24	16:56:42	17:28:16	18:03:39	14:37:31
S 50°	06:16:35	06:55:39	07:30:53	16:42:18	17:17:33	17:56:39	14:14:15
52°	06:19:40	07:00:34	07:37:39	16:35:34	17:12:40	17:53:36	14:03:04
54°	06:22:57	07:05:55	07:45:08	16:28:07	17:07:21	17:50:22	13:50:24
56°	06:26:27	07:11:47	07:53:30	16:19:48	17:01:32	17:46:54	13:35:50
58°	06:30:14	07:18:17	08:02:57	16:10:23	16:55:05	17:43:11	13:18:42
S 60°	06:34:20	07:25:34	08:13:46	15:59:36	16:47:51	17:39:08	12:57:54

Aug 01	SHA	Mer.pass
Venus	276°10.9	08:54:54
Mars	341°44.1	04:32:23
Jupiter	68°09.2	22:42:57
Saturn	60°01.9	23:15:31

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time	Mer. Pass		Upper	Lower	
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		hh:mm:ss	hh:mm:ss	
31	06:25	06:23	12:06:23	21:44:07	09:15:32	11(89%)
01	06:21	06:19	12:06:19	22:40:51	10:12:37	12(95%)

# 2020 August 02 to Aug. 03

02 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	■
N 70°	—:—	—:—	01:38:40	22:27:04	—:—	—:—	■
68°	—:—	—:—	02:22:22	21:46:03	—:—	—:—	■
66°	—:—	00:44:57	02:51:04	21:18:25	23:14:46	—:—	22:08:49
64°	—:—	01:47:48	03:12:37	20:57:29	22:19:56	—:—	21:26:10
62°	—:—	02:20:47	03:29:49	20:40:41	21:48:28	—:—	20:57:18
60°	00:40:49	02:44:32	03:44:03	20:26:44	21:25:27	23:20:12	20:35:08
N 58°	01:37:34	03:03:13	03:56:08	20:14:52	21:07:13	22:30:35	20:17:06
56°	02:07:54	03:18:36	04:06:35	20:04:35	20:52:09	22:01:37	20:01:56
54°	02:30:04	03:31:39	04:15:47	19:55:32	20:39:20	21:40:07	19:48:51
52°	02:47:44	03:42:56	04:23:57	19:47:29	20:28:14	21:22:52	19:37:23
50°	03:02:27	03:52:51	04:31:18	19:40:14	20:18:28	21:08:27	19:27:11
45°	03:31:01	04:13:18	04:46:54	19:24:51	19:58:18	20:40:20	19:05:46
N 40°	03:52:19	04:29:26	04:59:39	19:12:14	19:42:21	20:19:18	18:48:26
35°	04:09:09	04:42:43	05:10:27	19:01:33	19:29:13	20:02:39	18:33:49
30°	04:22:59	04:53:59	05:19:52	18:52:13	19:18:04	19:48:58	18:21:06
20°	04:44:50	05:12:31	05:35:58	18:36:17	18:59:42	19:27:20	17:59:22
N 10°	05:01:48	05:27:43	05:49:53	18:22:30	18:44:38	19:10:30	17:40:28
0°	05:15:52	05:41:05	06:02:47	18:09:41	18:31:23	18:56:34	17:22:48
S 10°	05:28:10	05:53:35	06:15:35	17:57:00	18:18:59	18:44:23	17:05:07
20°	05:39:31	06:06:02	06:29:06	17:43:34	18:06:39	18:33:09	16:46:10
30°	05:50:35	06:19:18	06:44:27	17:28:19	17:53:29	18:22:12	16:24:17
35°	05:56:14	06:26:36	06:53:19	17:19:31	17:46:15	18:16:37	16:11:27
40°	06:02:07	06:34:37	07:03:23	17:09:31	17:38:17	18:10:48	15:56:39
45°	06:08:23	06:43:41	07:15:09	16:57:49	17:29:18	18:04:37	15:39:02
S 50°	06:15:16	06:54:16	07:29:23	16:43:40	17:18:48	17:57:49	15:17:09
52°	06:18:16	06:59:04	07:36:01	16:37:04	17:14:02	17:54:52	15:06:40
54°	06:21:27	07:04:18	07:43:21	16:29:45	17:08:50	17:51:44	14:54:51
56°	06:24:50	07:10:02	07:51:33	16:21:36	17:03:09	17:48:24	14:41:18
58°	06:28:29	07:16:23	08:00:49	16:12:23	16:56:50	17:44:48	14:25:29
S 60°	06:32:26	07:23:29	08:11:24	16:01:50	16:49:47	17:40:54	14:06:29

Aug 02	SHA	Mer.pass
Venus	275° 17.0	08:54:34
Mars	341° 19.2	04:30:06
Jupiter	68° 16.5	22:38:33
Saturn	60° 06.4	23:11:18

03 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	☐	☐	☐	☐	☐	☐	■
N 70°	—:—	—:—	01:46:23	22:19:38	—:—	—:—	23:50:50
68°	—:—	—:—	02:27:19	21:41:02	—:—	—:—	22:39:25
66°	—:—	00:58:29	02:54:53	21:14:28	23:03:47	—:—	22:02:23
64°	—:—	01:53:16	03:15:46	20:54:10	22:14:29	—:—	21:35:58
62°	—:—	02:24:42	03:32:31	20:37:49	21:44:26	—:—	21:15:22
60°	00:52:54	02:47:40	03:46:25	20:24:12	21:22:10	23:10:23	20:58:31
N 58°	01:42:27	03:05:52	03:58:14	20:12:35	21:04:25	22:25:43	20:44:19
56°	02:11:24	03:20:53	04:08:29	20:02:31	20:49:42	21:58:01	20:32:04
54°	02:32:52	03:33:40	04:17:29	19:53:39	20:37:09	21:37:10	20:21:21
52°	02:50:05	03:44:44	04:25:30	19:45:45	20:26:16	21:20:21	20:11:50
50°	03:04:29	03:54:28	04:32:43	19:38:39	20:16:40	21:06:14	20:03:17
45°	03:32:32	04:14:34	04:48:02	19:23:31	19:56:50	20:38:38	19:45:07
N 40°	03:53:30	04:30:28	05:00:35	19:11:08	19:41:09	20:17:57	19:30:16
35°	04:10:05	04:43:32	05:11:12	19:00:37	19:28:13	20:01:33	19:17:38
30°	04:23:44	04:54:38	05:20:28	18:51:27	19:17:14	19:48:02	19:06:36
20°	04:45:17	05:12:54	05:36:19	18:35:46	18:59:08	19:26:42	18:47:37
N 10°	05:02:01	05:27:53	05:50:00	18:22:12	18:44:18	19:10:08	18:31:03
0°	05:15:52	05:41:02	06:02:43	18:09:36	18:31:15	18:56:25	18:15:31
S 10°	05:27:58	05:53:20	06:15:18	17:57:07	18:19:04	18:44:26	17:59:57
20°	05:39:05	06:05:34	06:28:36	17:43:54	18:06:56	18:33:24	17:43:16
30°	05:49:55	06:18:35	06:43:42	17:28:54	17:54:02	18:22:42	17:24:02
35°	05:55:26	06:25:45	06:52:25	17:20:15	17:46:56	18:17:15	17:12:47
40°	06:01:10	06:33:37	07:02:19	17:10:25	17:39:08	18:11:36	16:59:51
45°	06:07:16	06:42:29	07:13:52	16:58:56	17:30:20	18:05:35	16:44:33
S 50°	06:13:56	06:52:50	07:27:50	16:45:02	17:20:04	17:59:00	16:25:41
52°	06:16:50	06:57:32	07:34:21	16:38:34	17:15:24	17:56:09	16:16:44
54°	06:19:54	07:02:39	07:41:33	16:31:24	17:10:20	17:53:07	16:06:43
56°	06:23:10	07:08:15	07:49:35	16:23:24	17:04:46	17:49:54	15:55:21
58°	06:26:41	07:14:27	07:58:39	16:14:23	16:58:37	17:46:26	15:42:16
S 60°	06:30:30	07:21:23	08:09:01	16:04:04	16:51:45	17:42:41	15:26:53

Aug 03	SHA	Mer.pass
Venus	274° 22.4	08:54:17
Mars	340° 54.7	04:27:48
Jupiter	68° 23.7	22:34:08
Saturn	60° 10.8	23:07:04

Day	Sun		Moon		
	Eqn.of Time	Mer.	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	
02	06:17	06:14	12:06:14	23:35:44	13(98%)
03	06:12	06:09	12:06:09	—:—	14(100%)

# 2020 August 04 to Aug. 05

04 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	00:12:34	00:00:48	—:—	—:—	■
N 70°	—:—	—:—	01:53:39	22:12:32	—:—	—:—	22:47:28 01:18:00
68°	—:—	—:—	02:32:10	21:36:05	—:—	—:—	22:18:57 02:28:29
66°	—:—	01:09:18	02:58:41	21:10:31	22:54:16	—:—	21:57:19 03:04:41
64°	—:—	01:58:33	03:18:55	20:50:50	22:09:11	—:—	21:40:00 03:30:21
62°	—:—	02:28:33	03:35:13	20:34:55	21:40:27	—:—	21:25:39 03:50:16
60°	01:02:32	02:50:47	03:48:47	20:21:38	21:18:53	23:01:53	21:13:29 04:06:29
N 58°	01:47:10	03:08:29	04:00:21	20:10:17	21:01:36	22:20:58	21:02:58 04:20:07
56°	02:14:50	03:23:11	04:10:23	20:00:25	20:47:13	21:54:26	20:53:44 04:31:50
54°	02:35:39	03:35:41	04:19:12	19:51:44	20:34:56	21:34:13	20:45:33 04:42:04
52°	02:52:26	03:46:32	04:27:04	19:43:59	20:24:16	21:17:49	20:38:12 04:51:07
50°	03:06:31	03:56:06	04:34:09	19:37:01	20:14:51	21:04:01	20:31:32 04:59:14
45°	03:34:03	04:15:51	04:49:11	19:22:10	19:55:22	20:36:55	20:17:15 05:16:25
N 40°	03:54:41	04:31:29	05:01:31	19:10:00	19:39:55	20:16:34	20:05:26 05:30:24
35°	04:11:02	04:44:22	05:11:58	18:59:40	19:27:11	20:00:24	19:55:19 05:42:14
30°	04:24:29	04:55:18	05:21:04	18:50:39	19:16:22	19:47:06	19:46:25 05:52:33
20°	04:45:43	05:13:17	05:36:39	18:35:14	18:58:34	19:26:04	19:31:03 06:10:10
N 10°	05:02:12	05:28:02	05:50:07	18:21:53	18:43:57	19:09:44	19:17:34 06:25:26
0°	05:15:50	05:40:59	06:02:37	18:09:30	18:31:07	18:56:14	19:04:55 06:39:40
S 10°	05:27:44	05:53:04	06:15:00	17:57:13	18:19:08	18:44:28	18:52:13 06:53:49
20°	05:38:39	06:05:05	06:28:05	17:44:14	18:07:14	18:33:40	18:38:37 07:08:52
30°	05:49:14	06:17:52	06:42:56	17:29:30	17:54:34	18:23:12	18:22:59 07:26:02
35°	05:54:37	06:24:53	06:51:30	17:20:59	17:47:37	18:17:54	18:13:52 07:35:58
40°	06:00:11	06:32:35	07:01:13	17:11:20	17:39:59	18:12:23	18:03:27 07:47:18
45°	06:06:06	06:41:16	07:12:34	17:00:03	17:31:22	18:06:33	17:51:11 08:00:33
S 50°	06:12:34	06:51:23	07:26:16	16:46:26	17:21:20	18:00:12	17:36:13 08:16:39
52°	06:15:22	06:55:59	07:32:40	16:40:05	17:16:47	17:57:26	17:29:11 08:24:10
54°	06:18:19	07:00:58	07:39:43	16:33:03	17:11:50	17:54:31	17:21:23 08:32:30
56°	06:21:29	07:06:26	07:47:35	16:25:14	17:06:25	17:51:25	17:12:37 08:41:50
58°	06:24:52	07:12:29	07:56:28	16:16:24	17:00:25	17:48:06	17:02:40 08:52:24
S 60°	06:28:32	07:19:14	08:06:35	16:06:19	16:53:43	17:44:29	16:51:12 09:04:31

Aug 04	SHA	Mer.pass
Venus	273° 27.1	08:54:02
Mars	340° 30.5	04:25:28
Jupiter	68° 30.8	22:29:45
Saturn	60° 15.2	23:02:51

05 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	00:47:56	23:08:04	—:—	—:—	22:43:27 03:22:01
N 70°	—:—	—:—	02:00:35	22:05:42	—:—	—:—	22:22:32 04:02:16
68°	—:—	—:—	02:36:57	21:31:11	—:—	—:—	22:06:06 04:29:31
66°	—:—	01:18:38	03:02:27	21:06:34	22:45:42	—:—	21:52:43 04:50:02
64°	—:—	02:03:40	03:22:04	20:47:29	22:04:01	—:—	21:41:32 05:06:22
62°	—:—	02:32:21	03:37:56	20:32:00	21:36:29	—:—	21:32:00 05:19:49
60°	01:10:51	02:53:53	03:51:10	20:19:02	21:15:36	22:54:15	21:23:45 05:31:10
N 58°	01:51:43	03:11:07	04:02:28	20:07:57	20:58:46	22:16:21	21:16:30 05:40:57
56°	02:18:13	03:25:28	04:12:17	19:58:18	20:44:43	21:50:53	21:10:05 05:49:29
54°	02:38:24	03:37:42	04:20:56	19:49:48	20:32:42	21:31:16	21:04:19 05:57:03
52°	02:54:47	03:48:21	04:28:38	19:42:12	20:22:14	21:15:16	20:59:07 06:03:48
50°	03:08:33	03:57:44	04:35:35	19:35:22	20:13:00	21:01:46	20:54:22 06:09:54
45°	03:35:35	04:17:09	04:50:21	19:20:48	19:53:51	20:35:11	20:44:07 06:22:56
N 40°	03:55:52	04:32:31	05:02:27	19:08:51	19:38:40	20:15:09	20:35:32 06:33:40
35°	04:11:58	04:45:12	05:12:43	18:58:42	19:26:09	19:59:15	20:28:10 06:42:47
30°	04:25:13	04:55:57	05:21:40	18:49:50	19:15:30	19:46:08	20:21:39 06:50:46
20°	04:46:09	05:13:40	05:36:59	18:34:41	18:57:58	19:25:25	20:10:22 07:04:28
N 10°	05:02:24	05:28:11	05:50:14	18:21:34	18:43:36	19:09:20	20:00:25 07:16:23
0°	05:15:49	05:40:55	06:02:32	18:09:23	18:30:59	18:56:03	19:51:04 07:27:29
S 10°	05:27:30	05:52:48	06:14:42	17:57:19	18:19:12	18:44:30	19:41:41 07:38:31
20°	05:38:11	06:04:36	06:27:34	17:44:33	18:07:31	18:33:55	19:31:39 07:50:13
30°	05:48:32	06:17:07	06:42:09	17:30:05	17:55:06	18:23:42	19:20:09 08:03:30
35°	05:53:46	06:23:59	06:50:33	17:21:43	17:48:18	18:18:32	19:13:28 08:11:10
40°	05:59:11	06:31:32	07:00:06	17:12:15	17:40:50	18:13:11	19:05:52 08:19:51
45°	06:04:55	06:40:01	07:11:14	17:01:11	17:32:25	18:07:32	18:56:57 08:29:57
S 50°	06:11:10	06:49:54	07:24:41	16:47:49	17:22:37	18:01:24	18:46:11 08:42:06
52°	06:13:52	06:54:23	07:30:56	16:41:36	17:18:11	17:58:44	18:41:11 08:47:43
54°	06:16:43	06:59:15	07:37:51	16:34:43	17:13:21	17:55:56	18:35:38 08:53:54
56°	06:19:45	07:04:35	07:45:33	16:27:03	17:08:04	17:52:57	18:29:29 09:00:46
58°	06:23:00	07:10:29	07:54:14	16:18:25	17:02:13	17:49:46	18:22:33 09:08:27
S 60°	06:26:31	07:17:03	08:04:08	16:08:34	16:55:42	17:46:19	18:14:41 09:17:09

Aug 05	SHA	Mer.pass
Venus	272° 31.1	08:53:51
Mars	340° 06.9	04:23:06
Jupiter	68° 37.8	22:25:21
Saturn	60° 19.6	22:58:38

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time	Mer. Pass		Upper	Lower	
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		hh:mm:ss	hh:mm:ss	
04	06:07	06:04	12:06:04	00:27:41	12:52:24	15(99%)
05	06:01	05:57	12:05:57	01:16:17	13:39:22	16(96%)

# 2020 August 06 to Aug. 07

06 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	01:04:56	22:54:36	—:—	—:—	22:16:00
N 70°	—:—	—:—	02:07:12	21:59:07	—:—	—:—	22:04:56
68°	—:—	—:—	02:41:39	21:26:20	—:—	—:—	21:55:53
66°	—:—	01:27:00	03:06:11	21:02:37	22:37:48	—:—	21:48:18
64°	—:—	02:08:38	03:25:13	20:44:08	21:58:57	—:—	21:41:51
62°	—:—	02:36:07	03:40:39	20:29:03	21:32:33	—:—	21:36:17
60°	01:18:17	02:56:57	03:53:33	20:16:25	21:12:19	22:47:12	21:31:24
N 58°	01:56:08	03:13:44	04:04:36	20:05:35	20:55:56	22:11:49	21:27:05
56°	02:21:34	03:27:45	04:14:12	19:56:09	20:42:12	21:47:21	21:23:14
54°	02:41:08	03:39:44	04:22:40	19:47:49	20:30:27	21:28:19	21:19:45
52°	02:57:06	03:50:10	04:30:13	19:40:23	20:20:12	21:12:43	21:16:36
50°	03:10:35	03:59:22	04:37:01	19:33:41	20:11:08	20:59:30	21:13:42
45°	03:37:06	04:18:26	04:51:30	19:19:24	19:52:20	20:33:25	21:07:26
N 40°	03:57:04	04:33:33	05:03:23	19:07:40	19:37:24	20:13:44	21:02:09
35°	04:12:55	04:46:01	05:13:28	18:57:42	19:25:05	19:58:04	20:57:36
30°	04:25:58	04:56:37	05:22:16	18:49:00	19:14:36	19:45:10	20:53:34
20°	04:46:35	05:14:02	05:37:19	18:34:07	18:57:22	19:24:45	20:46:33
N 10°	05:02:35	05:28:19	05:50:20	18:21:14	18:43:13	19:08:56	20:40:22
0°	05:15:46	05:40:50	06:02:25	18:09:16	18:30:49	18:55:52	20:34:33
S 10°	05:27:14	05:52:31	06:14:23	17:57:24	18:19:16	18:44:31	20:28:42
20°	05:37:43	06:04:05	06:27:01	17:44:52	18:07:48	18:34:10	20:22:28
30°	05:47:48	06:16:21	06:41:20	17:30:39	17:55:39	18:24:12	20:15:21
35°	05:52:54	06:23:05	06:49:36	17:22:28	17:48:59	18:19:11	20:11:13
40°	05:58:10	06:30:27	06:58:58	17:13:10	17:41:41	18:14:00	20:06:32
45°	06:03:43	06:38:45	07:09:53	17:02:19	17:33:28	18:08:32	20:01:04
S 50°	06:09:44	06:48:24	07:23:04	16:49:13	17:23:55	18:02:36	19:54:31
52°	06:12:20	06:52:46	07:29:11	16:43:07	17:19:35	18:00:03	19:51:28
54°	06:15:04	06:57:31	07:35:58	16:36:24	17:14:53	17:57:22	19:48:08
56°	06:17:59	07:02:42	07:43:30	16:28:54	17:09:44	17:54:30	19:44:26
58°	06:21:06	07:08:26	07:51:59	16:20:27	17:04:03	17:51:27	19:40:19
S 60°	06:24:28	07:14:50	08:01:39	16:10:50	16:57:42	17:48:09	19:35:40

Aug 06	SHA	Mer.pass
Venus	271° 34.4	08:53:42
Mars	339° 43.6	04:20:42
Jupiter	68° 44.7	22:20:58
Saturn	60° 24.0	22:54:24

07 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	01:18:11	22:43:04	—:—	—:—	21:54:03
N 70°	—:—	—:—	02:13:35	21:52:43	—:—	—:—	21:50:04
68°	—:—	—:—	02:46:17	21:21:31	—:—	—:—	21:46:47
66°	—:—	01:34:41	03:09:55	20:58:41	22:30:25	—:—	21:44:00
64°	—:—	02:13:28	03:28:21	20:40:45	21:53:59	—:—	21:41:37
62°	—:—	02:39:50	03:43:22	20:26:06	21:28:38	—:—	21:39:32
60°	01:25:05	03:00:01	03:55:57	20:13:46	21:09:01	22:40:37	21:37:42
N 58°	02:00:26	03:16:21	04:06:44	20:03:12	20:53:04	22:07:23	21:36:05
56°	02:24:52	03:30:02	04:16:07	19:53:58	20:39:40	21:43:51	21:34:38
54°	02:43:52	03:41:46	04:24:24	19:45:50	20:28:10	21:25:22	21:33:19
52°	02:59:26	03:51:59	04:31:48	19:38:33	20:18:07	21:10:09	21:32:08
50°	03:12:37	04:01:00	04:38:28	19:31:59	20:09:14	20:57:14	21:31:02
45°	03:38:38	04:19:44	04:52:40	19:17:59	19:50:47	20:31:39	21:28:39
N 40°	03:58:15	04:34:36	05:04:20	19:06:28	19:36:07	20:12:17	21:26:39
35°	04:13:51	04:46:51	05:14:14	18:56:42	19:24:00	19:56:53	21:24:55
30°	04:26:43	04:57:16	05:22:52	18:48:09	19:13:42	19:44:10	21:23:22
20°	04:47:01	05:14:24	05:37:39	18:33:32	18:56:45	19:24:05	21:20:42
N 10°	05:02:45	05:28:27	05:50:26	18:20:53	18:42:50	19:08:30	21:18:21
0°	05:15:43	05:40:45	06:02:18	18:09:08	18:30:40	18:55:40	21:16:09
S 10°	05:26:58	05:52:13	06:14:03	17:57:29	18:19:19	18:44:32	21:13:56
20°	05:37:13	06:03:33	06:26:27	17:45:11	18:08:05	18:34:25	21:11:35
30°	05:47:04	06:15:34	06:40:31	17:31:14	17:56:11	18:24:42	21:08:55
35°	05:52:01	06:22:09	06:48:37	17:23:12	17:49:40	18:19:49	21:07:22
40°	05:57:07	06:29:21	06:57:48	17:14:05	17:42:32	18:14:48	21:05:37
45°	06:02:29	06:37:27	07:08:31	17:03:27	17:34:31	18:09:31	21:03:36
S 50°	06:08:17	06:46:51	07:21:25	16:50:38	17:25:12	18:03:49	21:01:10
52°	06:10:47	06:51:07	07:27:25	16:44:40	17:20:59	18:01:22	21:00:03
54°	06:13:24	06:55:44	07:34:02	16:38:05	17:16:25	17:58:48	20:58:49
56°	06:16:11	07:00:48	07:41:25	16:30:45	17:11:24	17:56:04	20:57:28
58°	06:19:10	07:06:22	07:49:42	16:22:30	17:05:53	17:53:09	20:55:57
S 60°	06:22:23	07:12:36	07:59:09	16:13:07	16:59:43	17:50:00	20:54:16

Aug 07	SHA	Mer.pass
Venus	270° 37.0	08:53:36
Mars	339° 20.8	04:18:17
Jupiter	68° 51.4	22:16:36
Saturn	60° 28.3	22:50:12

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
06	05:54	05:50	12:05:50	02:01:44	14:23:29	17(92%)
07	05:47	05:43	12:05:43	02:44:41	15:05:29	18(86%)

# 2020 August 08 to Aug. 09

08 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	01:29:29	22:32:44	—:—	—:—	21:33:45
N 70°	—:—	—:—	02:19:44	21:46:29	—:—	—:—	21:36:07
68°	—:—	—:—	02:50:51	21:16:46	—:—	—:—	21:38:05
66°	—:—	01:41:49	03:13:37	20:54:45	22:23:25	—:—	21:39:45
64°	—:—	02:18:11	03:31:28	20:37:22	21:49:07	—:—	21:41:10
62°	—:—	02:43:30	03:46:05	20:23:07	21:24:44	—:—	21:42:25
60°	01:31:25	03:03:04	03:58:21	20:11:06	21:05:44	22:34:24	21:43:31
N 58°	02:04:37	03:18:58	04:08:52	20:00:47	20:50:12	22:03:02	21:44:30
56°	02:28:07	03:32:19	04:18:03	19:51:46	20:37:07	21:40:22	21:45:22
54°	02:46:34	03:43:47	04:26:09	19:43:48	20:25:52	21:22:25	21:46:10
52°	03:01:45	03:53:48	04:33:24	19:36:41	20:16:02	21:07:35	21:46:53
50°	03:14:38	04:02:39	04:39:55	19:30:15	20:07:19	20:54:56	21:47:33
45°	03:40:09	04:21:02	04:53:51	19:16:32	19:49:13	20:29:51	21:49:00
N 40°	03:59:27	04:35:38	05:05:17	19:05:15	19:34:48	20:10:50	21:50:13
35°	04:14:48	04:47:41	05:14:59	18:55:40	19:22:54	19:55:40	21:51:17
30°	04:27:27	04:57:55	05:23:28	18:47:17	19:12:46	19:43:09	21:52:14
20°	04:47:27	05:14:46	05:37:58	18:32:56	18:56:06	19:23:23	21:53:54
N 10°	05:02:56	05:28:35	05:50:32	18:20:31	18:42:27	19:08:04	21:55:23
0°	05:15:40	05:40:40	06:02:11	18:08:59	18:30:29	18:55:27	21:56:48
S 10°	05:26:42	05:51:54	06:13:42	17:57:34	18:19:22	18:44:33	21:58:13
20°	05:36:43	06:03:01	06:25:53	17:45:30	18:08:21	18:34:39	21:59:46
30°	05:46:18	06:14:46	06:39:40	17:31:49	17:56:43	18:25:12	22:01:32
35°	05:51:06	06:21:12	06:47:37	17:23:56	17:50:22	18:20:28	22:02:34
40°	05:56:02	06:28:14	06:56:37	17:15:00	17:43:24	18:15:37	22:03:44
45°	06:01:13	06:36:08	07:07:07	17:04:35	17:35:35	18:10:32	22:05:07
S 50°	06:06:48	06:45:18	07:19:45	16:52:02	17:26:31	18:05:03	22:06:45
52°	06:09:11	06:49:26	07:25:37	16:46:12	17:22:25	18:02:43	22:07:31
54°	06:11:42	06:53:56	07:32:06	16:39:46	17:17:57	18:00:15	22:08:21
56°	06:14:22	06:58:51	07:39:18	16:32:36	17:13:05	17:57:38	22:09:16
58°	06:17:12	07:04:17	07:47:24	16:24:33	17:07:43	17:54:52	22:10:18
S 60°	06:20:15	07:10:19	07:56:37	16:15:23	17:01:44	17:51:53	22:11:27

Aug 08	SHA	Mer.pass
Venus	269° 39.0	08:53:32
Mars	338° 58.4	04:15:50
Jupiter	68° 58.1	22:12:14
Saturn	60° 32.6	22:45:59

09 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	01:39:33	22:23:15	—:—	—:—	21:12:48
N 70°	—:—	—:—	02:25:42	21:40:24	—:—	—:—	21:21:50
68°	—:—	00:39:52	02:55:21	21:12:02	23:14:40	—:—	21:29:17
66°	—:—	01:48:33	03:17:17	20:50:49	22:16:45	—:—	21:35:32
64°	—:—	02:22:48	03:34:36	20:33:58	21:44:19	—:—	21:40:52
62°	00:35:53	02:47:08	03:48:48	20:20:07	21:20:51	23:20:26	21:45:29
60°	01:37:23	03:06:05	04:00:45	20:08:25	21:02:26	22:28:28	21:49:32
N 58°	02:08:42	03:21:34	04:11:01	19:58:21	20:47:19	21:58:46	21:53:08
56°	02:31:20	03:34:36	04:19:59	19:49:33	20:34:33	21:36:54	21:56:21
54°	02:49:14	03:45:49	04:27:55	19:41:45	20:23:33	21:19:28	21:59:16
52°	03:04:03	03:55:37	04:35:00	19:34:48	20:13:55	21:05:00	22:01:54
50°	03:16:40	04:04:18	04:41:23	19:28:30	20:05:23	20:52:38	22:04:19
45°	03:41:41	04:22:20	04:55:01	19:15:04	19:47:37	20:28:02	22:09:35
N 40°	04:00:38	04:36:40	05:06:13	19:04:01	19:33:28	20:09:21	22:14:01
35°	04:15:44	04:48:31	05:15:45	18:54:37	19:21:47	19:54:26	22:17:52
30°	04:28:11	04:58:34	05:24:04	18:46:24	19:11:50	19:42:08	22:21:16
20°	04:47:52	05:15:08	05:38:18	18:32:20	18:55:27	19:22:40	22:27:13
N 10°	05:03:05	05:28:42	05:50:37	18:20:09	18:42:02	19:07:37	22:32:29
0°	05:15:36	05:40:33	06:02:02	18:08:50	18:30:18	18:55:14	22:37:28
S 10°	05:26:24	05:51:34	06:13:21	17:57:38	18:19:24	18:44:33	22:42:29
20°	05:36:12	06:02:27	06:25:17	17:45:48	18:08:38	18:34:53	22:47:51
30°	05:45:31	06:13:57	06:38:48	17:32:24	17:57:16	18:25:42	22:54:01
35°	05:50:11	06:20:14	06:46:35	17:24:41	17:51:03	18:21:07	22:57:36
40°	05:54:57	06:27:05	06:55:25	17:15:56	17:44:16	18:16:26	23:01:40
45°	05:59:56	06:34:47	07:05:41	17:05:44	17:36:39	18:11:32	23:06:25
S 50°	06:05:17	06:43:42	07:18:03	16:53:27	17:27:50	18:06:18	23:12:07
52°	06:07:34	06:47:44	07:23:47	16:47:45	17:23:50	18:04:03	23:14:45
54°	06:09:58	06:52:06	07:30:07	16:41:28	17:19:31	18:01:42	23:17:39
56°	06:12:30	06:56:53	07:37:10	16:34:28	17:14:47	17:59:14	23:20:52
58°	06:15:12	07:02:09	07:45:04	16:26:36	17:09:34	17:56:36	23:24:27
S 60°	06:18:06	07:08:01	07:54:03	16:17:40	17:03:46	17:53:46	23:28:30

Aug 09	SHA	Mer.pass
Venus	268° 40.4	08:53:31
Mars	338° 36.5	04:13:21
Jupiter	69° 04.6	22:07:53
Saturn	60° 36.8	22:41:46

Day	Sun		Moon		
	Eqn. of Time	Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup> mm:ss	mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	
08	05:39	05:35	12:05:35	03:25:59	19(79%)
09	05:31	05:26	12:05:26	04:06:33	20(70%)



# 2020 August 10 to Aug. 11

10 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	01:48:46	22:14:23	—:—	—:—	20:48:15
N 70°	—:—	—:—	02:31:31	21:34:27	—:—	—:—	21:05:47
68°	—:—	00:57:05	02:59:47	21:07:21	23:01:32	—:—	21:19:47
66°	—:—	01:54:56	03:20:56	20:46:53	22:10:21	—:—	21:31:19
64°	—:—	02:27:19	03:37:43	20:30:34	21:39:36	—:—	21:41:01
62°	00:51:06	02:50:43	03:51:31	20:17:06	21:17:00	23:08:48	21:49:20
60°	01:43:01	03:09:06	04:03:09	20:05:42	20:59:08	22:22:47	21:56:33
N 58°	02:12:41	03:24:10	04:13:10	19:55:53	20:44:25	21:54:33	22:02:55
56°	02:34:31	03:36:53	04:21:55	19:47:18	20:31:58	21:33:27	22:08:34
54°	02:51:54	03:47:51	04:29:40	19:39:41	20:21:13	21:16:32	22:13:39
52°	03:06:21	03:57:27	04:36:36	19:32:53	20:11:47	21:02:24	22:18:16
50°	03:18:41	04:05:57	04:42:51	19:26:44	20:03:26	20:50:19	22:22:28
45°	03:43:12	04:23:38	04:56:12	19:13:35	19:46:00	20:26:12	22:31:34
N 40°	04:01:49	04:37:43	05:07:10	19:02:45	19:32:07	20:07:51	22:39:12
35°	04:16:40	04:49:20	05:16:30	18:53:33	19:20:38	19:53:11	22:45:47
30°	04:28:55	04:59:14	05:24:39	18:45:30	19:10:52	19:41:05	22:51:36
20°	04:48:17	05:15:30	05:38:37	18:31:42	18:54:47	19:21:57	23:01:44
N 10°	05:03:15	05:28:48	05:50:41	18:19:46	18:41:37	19:07:09	23:10:40
0°	05:15:31	05:40:26	06:01:54	18:08:41	18:30:07	18:55:01	23:19:07
S 10°	05:26:06	05:51:14	06:12:59	17:57:42	18:19:26	18:44:33	23:27:36
20°	05:35:40	06:01:53	06:24:41	17:46:06	18:08:54	18:35:07	23:36:42
30°	05:44:43	06:13:07	06:37:56	17:32:59	17:57:48	18:26:12	23:47:09
35°	05:49:14	06:19:14	06:45:33	17:25:25	17:51:45	18:21:46	23:53:14
40°	05:53:50	06:25:55	06:54:11	17:16:51	17:45:08	18:17:15	.. ..
45°	05:58:37	06:33:25	07:04:14	17:06:53	17:37:43	18:12:33	.. ..
S 50°	06:03:44	06:42:05	07:16:20	16:54:53	17:29:09	18:07:32	.. ..
52°	06:05:55	06:46:00	07:21:56	16:49:18	17:25:16	18:05:24	.. ..
54°	06:08:12	06:50:15	07:28:07	16:43:10	17:21:04	18:03:11	.. ..
56°	06:10:37	06:54:53	07:35:00	16:36:20	17:16:29	18:00:50	.. ..
58°	06:13:10	06:59:59	07:42:43	16:28:40	17:11:26	17:58:20	.. ..
S 60°	06:15:54	07:05:40	07:51:28	16:19:58	17:05:49	17:55:40	.. ..



Aug 10	SHA	Mer.pass
Venus	267° 41.3	08:53:32
Mars	338° 15.1	04:10:50
Jupiter	69° 10.9	22:03:32
Saturn	60° 41.0	22:37:34

11 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	01:57:20	22:06:01	—:—	—:—	20:12:58
N 70°	—:—	—:—	02:37:10	21:28:37	—:—	—:—	20:45:03
68°	—:—	01:09:56	03:04:11	21:02:42	22:50:26	—:—	21:08:38
66°	—:—	02:01:02	03:24:34	20:42:58	22:04:11	—:—	21:27:06
64°	—:—	02:31:44	03:40:49	20:27:09	21:34:56	—:—	21:42:10
62°	01:02:26	02:54:16	03:54:14	20:14:04	21:13:10	22:59:00	21:54:47
60°	01:48:24	03:12:05	04:05:34	20:02:59	20:55:51	22:17:18	22:05:35
N 58°	02:16:35	03:26:45	04:15:20	19:53:24	20:41:31	21:50:24	22:14:59
56°	02:37:39	03:39:10	04:23:52	19:45:01	20:29:22	21:30:02	22:23:15
54°	02:54:32	03:49:53	04:31:26	19:37:36	20:18:51	21:13:35	22:30:37
52°	03:08:38	03:59:16	04:38:12	19:30:57	20:09:38	20:59:48	22:37:16
50°	03:20:41	04:07:36	04:44:19	19:24:56	20:01:27	20:47:59	22:43:17
45°	03:44:44	04:24:56	04:57:23	19:12:04	19:44:22	20:24:21	22:56:15
N 40°	04:03:01	04:38:45	05:08:07	19:01:29	19:30:45	20:06:20	23:07:02
35°	04:17:37	04:50:10	05:17:16	18:52:28	19:19:29	19:51:55	23:16:17
30°	04:29:39	04:59:53	05:25:15	18:44:35	19:09:53	19:40:01	23:24:26
20°	04:48:41	05:15:51	05:38:55	18:31:04	18:54:06	19:21:13	23:38:33
N 10°	05:03:23	05:28:55	05:50:46	18:19:22	18:41:12	19:06:41	23:50:58
0°	05:15:26	05:40:19	06:01:44	18:08:30	18:29:55	18:54:47	.. ..
S 10°	05:25:47	05:50:53	06:12:36	17:57:45	18:19:28	18:44:33	.. ..
20°	05:35:06	06:01:18	06:24:04	17:46:24	18:09:10	18:35:21	.. ..
30°	05:43:54	06:12:16	06:37:02	17:33:33	17:58:20	18:26:42	.. ..
35°	05:48:16	06:18:14	06:44:29	17:26:10	17:52:26	18:22:25	.. ..
40°	05:52:42	06:24:44	06:52:56	17:17:47	17:46:00	18:18:04	00:00:09
45°	05:57:17	06:32:01	07:02:46	17:08:02	17:38:48	18:13:34	00:08:15
S 50°	06:02:10	06:40:27	07:14:35	16:56:19	17:30:28	18:08:48	00:18:03
52°	06:04:15	06:44:15	07:20:04	16:50:52	17:26:43	18:06:46	00:22:36
54°	06:06:25	06:48:22	07:26:06	16:44:52	17:22:39	18:04:40	00:27:37
56°	06:08:41	06:52:52	07:32:48	16:38:13	17:18:12	18:02:27	00:33:12
58°	06:11:06	06:57:48	07:40:20	16:30:44	17:13:19	18:00:06	00:39:28
S 60°	06:13:41	07:03:18	07:48:52	16:22:16	17:07:53	17:57:35	00:46:35





Aug 11	SHA	Mer.pass
Venus	266° 41.5	08:53:35
Mars	337° 54.1	04:08:17
Jupiter	69° 17.2	21:59:12
Saturn	60° 45.2	22:33:21

Day	Sun		Moon		
	Eqn. of Time	Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	
10	05:22	05:17	12:05:17	04:47:22	21(61%)
11	05:12	05:07	12:05:07	05:29:24	22(52%)

# 2020 August 12 to Aug. 13

12 August 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	—:—	—:—	02:05:23	21:58:03	—:—	—:—		
N 70°	—:—	—:—	02:42:42	21:22:52	—:—	—:—	20:08:50	16:50:21
68°	—:—	01:20:42	03:08:31	20:58:04	22:40:37	—:—	20:53:12	16:06:59
66°	—:—	02:06:53	03:28:11	20:39:02	21:58:12	—:—	21:22:52	15:38:13
64°	—:—	02:36:04	03:43:55	20:23:43	21:30:21	—:—	21:45:19	15:16:34
62°	01:11:55	02:57:47	03:56:56	20:11:01	21:09:21	22:50:19	22:03:20	14:59:16
60°	01:53:33	03:15:04	04:07:58	20:00:14	20:52:33	22:12:00	22:18:19	14:44:57
N 58°	02:20:25	03:29:20	04:17:29	19:50:54	20:38:36	21:46:19	22:31:04	14:32:48
56°	02:40:45	03:41:27	04:25:49	19:42:44	20:26:45	21:26:38	22:42:09	14:22:16
54°	02:57:10	03:51:55	04:33:12	19:35:29	20:16:29	21:10:38	22:51:55	14:13:02
52°	03:10:54	04:01:06	04:39:49	19:28:59	20:07:28	20:57:12	23:00:38	14:04:48
50°	03:22:41	04:09:15	04:45:47	19:23:07	19:59:27	20:45:38	23:08:29	13:57:25
45°	03:46:15	04:26:14	04:58:34	19:10:32	19:42:43	20:22:29	23:25:13	13:41:42
N 40°	04:04:12	04:39:48	05:09:05	19:00:11	19:29:22	20:04:48	23:39:00	13:28:51
35°	04:18:33	04:51:00	05:18:01	18:51:21	19:18:18	19:50:38	23:50:45	13:17:56
30°	04:30:23	05:00:31	05:25:50	18:43:38	19:08:54	19:38:57	.. ..	13:08:24
20°	04:49:06	05:16:12	05:39:14	18:30:25	18:53:25	19:20:28	.. ..	12:52:04
N 10°	05:03:32	05:29:00	05:50:49	18:18:58	18:40:45	19:06:12	.. ..	12:37:51
0°	05:15:20	05:40:11	06:01:34	18:08:20	18:29:42	18:54:32	00:02:41	12:24:35
S 10°	05:25:28	05:50:32	06:12:12	17:57:48	18:19:29	18:44:32	00:14:27	12:11:21
20°	05:34:32	06:00:42	06:23:26	17:46:42	18:09:25	18:35:35	00:27:04	11:57:16
30°	05:43:04	06:11:23	06:36:07	17:34:08	17:58:52	18:27:12	00:41:35	11:41:12
35°	05:47:17	06:17:12	06:43:25	17:26:54	17:53:08	18:23:04	00:50:04	11:31:53
40°	05:51:32	06:23:32	06:51:40	17:18:43	17:46:52	18:18:53	00:59:45	11:21:16
45°	05:55:56	06:30:37	07:01:17	17:09:11	17:39:53	18:14:36	01:11:08	11:08:51
S 50°	06:00:35	06:38:47	07:12:49	16:57:45	17:31:48	18:10:03	01:25:01	10:53:50
52°	06:02:33	06:42:28	07:18:10	16:52:26	17:28:10	18:08:09	01:31:31	10:46:49
54°	06:04:35	06:46:27	07:24:03	16:46:35	17:24:14	18:06:09	01:38:44	10:39:03
56°	06:06:44	06:50:48	07:30:36	16:40:06	17:19:56	18:04:04	01:46:49	10:30:23
58°	06:09:00	06:55:36	07:37:55	16:32:49	17:15:12	18:01:52	01:55:58	10:20:36
S 60°	06:11:25	07:00:54	07:46:14	16:24:34	17:09:57	17:59:31	02:06:28	10:09:25




Aug 12	SHA	Mer.pass
Venus	265° 41.2	08:53:41
Mars	337° 33.7	04:05:42
Jupiter	69° 23.3	21:54:53
Saturn	60° 49.3	22:29:09

13 August 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	—:—	—:—	02:13:01	21:50:25	—:—	—:—		
N 70°	—:—	—:—	02:48:06	21:17:14	—:—	—:—		
68°	—:—	01:30:12	03:12:49	20:53:28	22:31:39	—:—	20:19:23	18:21:45
66°	—:—	02:12:32	03:31:46	20:35:07	21:52:24	—:—	21:18:31	17:23:15
64°	—:—	02:40:20	03:47:00	20:20:17	21:25:48	—:—	21:52:44	16:49:37
62°	01:20:16	03:01:16	03:59:39	20:07:57	21:05:33	22:42:24	22:17:46	16:25:06
60°	01:58:31	03:18:01	04:10:23	19:57:28	20:49:15	22:06:51	22:37:35	16:05:45
N 58°	02:24:10	03:31:54	04:19:39	19:48:23	20:35:41	21:42:17	22:53:59	15:49:47
56°	02:43:49	03:43:43	04:27:46	19:40:25	20:24:08	21:23:14	23:07:55	15:36:15
54°	02:59:46	03:53:57	04:34:59	19:33:21	20:14:06	21:07:42	23:20:02	15:24:31
52°	03:13:10	04:02:55	04:41:26	19:27:00	20:05:17	20:54:35	23:30:43	15:14:11
50°	03:24:41	04:10:54	04:47:16	19:21:16	19:57:26	20:43:17	23:40:15	15:04:59
45°	03:47:46	04:27:33	04:59:45	19:08:59	19:41:03	20:20:36	.. ..	14:45:36
N 40°	04:05:23	04:40:50	05:10:02	18:58:52	19:27:57	20:03:15	.. ..	14:29:53
35°	04:19:29	04:51:49	05:18:47	18:50:14	19:17:07	19:49:21	.. ..	14:16:38
30°	04:31:07	05:01:10	05:26:26	18:42:41	19:07:53	19:37:51	00:01:03	14:05:07
20°	04:49:30	05:16:32	05:39:32	18:29:45	18:52:42	19:19:42	00:18:48	13:45:25
N 10°	05:03:40	05:29:06	05:50:53	18:18:33	18:40:18	19:05:42	00:34:21	13:28:20
0°	05:15:14	05:40:02	06:01:24	18:08:09	18:29:29	18:54:17	00:48:59	13:12:24
S 10°	05:25:07	05:50:09	06:11:48	17:57:51	18:19:30	18:44:31	01:03:40	12:56:30
20°	05:33:57	06:00:05	06:22:47	17:46:59	18:09:41	18:35:48	01:19:26	12:39:32
30°	05:42:13	06:10:30	06:35:11	17:34:42	17:59:24	18:27:41	01:37:38	12:20:05
35°	05:46:16	06:16:09	06:42:19	17:27:39	17:53:49	18:23:43	01:48:17	12:08:45
40°	05:50:21	06:22:18	06:50:23	17:19:39	17:47:45	18:19:43	02:00:31	11:55:48
45°	05:54:33	06:29:10	06:59:46	17:10:21	17:40:58	18:15:37	02:15:00	11:40:31
S 50°	05:58:57	06:37:06	07:11:02	16:59:11	17:33:09	18:11:20	02:32:48	11:21:49
52°	06:00:49	06:40:40	07:16:15	16:54:00	17:29:37	18:09:32	02:41:13	11:12:59
54°	06:02:44	06:44:31	07:21:59	16:48:18	17:25:49	18:07:39	02:50:38	11:03:09
56°	06:04:45	06:48:44	07:28:22	16:41:59	17:21:40	18:05:42	03:01:18	10:52:03
58°	06:06:53	06:53:21	07:35:30	16:34:54	17:17:06	18:03:39	03:13:31	10:39:20
S 60°	06:09:08	06:58:29	07:43:35	16:26:52	17:12:01	18:01:28	03:27:47	10:24:33





Aug 13	SHA	Mer.pass
Venus	264° 40.4	08:53:48
Mars	337° 13.8	04:03:05
Jupiter	69° 29.2	21:50:34
Saturn	60° 53.4	22:24:57

Day	Sun		Mer. Pass hh:mm:ss	Moon		Age
	Eqn. of Time			Mer. Pass.		
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
12	05:02	04:57	12:04:57	06:13:33	18:36:40	23(42%)
13	04:52	04:46	12:04:46	07:00:36	19:25:22	24(33%)

# 2020 August 14 to Aug. 15

14 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	02:20:19	21:43:02	—:—	—:—	
N 70°	—:—	—:—	02:53:24	21:11:40	—:—	—:—	
68°	—:—	01:38:49	03:17:03	20:48:54	22:23:19	—:—	
66°	—:—	02:17:59	03:35:20	20:31:12	21:46:44	—:—	21:13:46 19:16:22
64°	—:—	02:44:31	03:50:05	20:16:51	21:21:19	—:—	22:10:22 18:20:04
62°	01:27:49	03:04:43	04:02:22	20:04:52	21:01:46	22:35:03	22:43:41 17:47:02
60°	02:03:19	03:20:57	04:12:47	19:54:40	20:45:57	22:01:50	23:08:17 17:22:41
N 58°	02:27:50	03:34:28	04:21:49	19:45:50	20:32:45	21:38:17	23:27:55 17:03:18
56°	02:46:50	03:45:59	04:29:44	19:38:05	20:21:29	21:19:52	23:44:15 16:47:11
54°	03:02:21	03:55:58	04:36:45	19:31:11	20:11:42	21:04:45	23:58:13 16:33:25
52°	03:15:25	04:04:45	04:43:03	19:25:00	20:03:05	20:51:58	.. .. 16:21:24
50°	03:26:41	04:12:33	04:48:45	19:19:25	19:55:24	20:40:56	.. .. 16:10:47
45°	03:49:17	04:28:51	05:00:56	19:07:25	19:39:22	20:18:43	00:00:23 15:48:36
N 40°	04:06:35	04:41:52	05:10:59	18:57:31	19:26:32	20:01:41	00:16:47 15:30:46
35°	04:20:25	04:52:39	05:19:32	18:49:06	19:15:55	19:48:02	00:30:39 15:15:47
30°	04:31:51	05:01:49	05:27:01	18:41:43	19:06:52	19:36:45	00:42:45 15:02:48
20°	04:49:53	05:16:53	05:39:50	18:29:04	18:51:59	19:18:56	01:03:30 14:40:40
N 10°	05:03:47	05:29:11	05:50:56	18:18:07	18:39:50	19:05:12	01:21:36 14:21:30
0°	05:15:07	05:39:53	06:01:13	18:07:57	18:29:16	18:54:01	01:38:34 14:03:37
S 10°	05:24:46	05:49:46	06:11:23	17:57:53	18:19:30	18:44:30	01:55:37 13:45:45
20°	05:33:22	05:59:27	06:22:07	17:47:17	18:09:56	18:36:02	02:13:55 13:26:39
30°	05:41:21	06:09:36	06:34:14	17:35:17	17:59:56	18:28:11	02:35:04 13:04:39
35°	05:45:15	06:15:05	06:41:12	17:28:23	17:54:31	18:24:22	02:47:30 12:51:46
40°	05:49:09	06:21:03	06:49:05	17:20:35	17:48:37	18:20:33	03:01:49 12:36:58
45°	05:53:08	06:27:43	06:58:14	17:11:30	17:42:03	18:16:40	03:18:53 12:19:22
S 50°	05:57:19	06:35:23	07:09:13	17:00:37	17:34:29	18:12:37	03:40:02 11:57:37
52°	05:59:03	06:38:50	07:14:18	16:55:35	17:31:05	18:10:55	03:50:09 11:47:14
54°	06:00:52	06:42:34	07:19:54	16:50:02	17:27:24	18:09:10	04:01:33 11:35:34
56°	06:02:45	06:46:37	07:26:06	16:43:52	17:23:24	18:07:21	04:14:36 11:22:13
58°	06:04:43	06:51:05	07:33:03	16:36:59	17:19:00	18:05:27	04:29:47 11:06:43
S 60°	06:06:48	06:56:02	07:40:54	16:29:11	17:14:07	18:03:26	04:47:56 10:48:14




Aug 14	SHA	Mer.pass
Venus	263° 39.0	08:53:58
Mars	336° 54.4	04:00:26
Jupiter	69° 35.0	21:46:15
Saturn	60° 57.4	22:20:46

15 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	02:27:20	21:35:54	—:—	—:—	
N 70°	—:—	00:18:45	02:58:35	21:06:11	23:21:05	—:—	
68°	—:—	01:46:46	03:21:16	20:44:21	22:15:29	—:—	
66°	—:—	02:23:17	03:38:53	20:27:17	21:41:12	—:—	
64°	00:16:55	02:48:38	03:53:10	20:13:23	21:16:52	23:26:24	22:52:20 19:33:04
62°	01:34:47	03:08:07	04:05:04	20:01:47	20:58:00	22:28:09	23:30:10 18:55:14
60°	02:07:57	03:23:52	04:15:12	19:51:52	20:42:40	21:56:57	23:56:55 18:28:29
N 58°	02:31:27	03:37:01	04:23:59	19:43:17	20:29:49	21:34:21	.. .. 18:07:33
56°	02:49:50	03:48:15	04:31:41	19:35:44	20:18:50	21:16:31	.. .. 17:50:18
54°	03:04:54	03:58:00	04:38:32	19:29:01	20:09:17	21:01:49	.. .. 17:35:39
52°	03:17:39	04:06:34	04:44:40	19:22:59	20:00:52	20:49:21	00:10:25 17:22:55
50°	03:28:40	04:14:12	04:50:14	19:17:32	19:53:22	20:38:34	00:21:13 17:11:41
45°	03:50:48	04:30:10	05:02:08	19:05:50	19:37:40	20:16:48	00:43:49 16:48:19
N 40°	04:07:45	04:42:55	05:11:56	18:56:10	19:25:06	20:00:06	01:02:01 16:29:33
35°	04:21:20	04:53:28	05:20:18	18:47:56	19:14:41	19:46:42	01:17:20 16:13:49
30°	04:32:34	05:02:27	05:27:36	18:40:44	19:05:50	19:35:38	01:30:38 16:00:11
20°	04:50:17	05:17:13	05:40:08	18:28:23	18:51:15	19:18:08	01:53:21 15:36:58
N 10°	05:03:54	05:29:15	05:50:58	18:17:40	18:39:22	19:04:41	02:13:05 15:16:50
0°	05:14:59	05:39:43	06:01:02	18:07:45	18:29:02	18:53:45	02:31:33 14:58:02
S 10°	05:24:24	05:49:22	06:10:58	17:57:55	18:19:30	18:44:28	02:50:04 14:39:13
20°	05:32:45	05:58:49	06:21:27	17:47:33	18:10:11	18:36:15	03:09:56 14:19:03
30°	05:40:28	06:08:40	06:33:17	17:35:51	18:00:28	18:28:41	03:32:56 13:55:45
35°	05:44:12	06:14:00	06:40:04	17:29:07	17:55:12	18:25:02	03:46:28 13:42:03
40°	05:47:56	06:19:47	06:47:46	17:21:31	17:49:30	18:21:23	04:02:05 13:26:16
45°	05:51:43	06:26:14	06:56:41	17:12:40	17:43:09	18:17:42	04:20:45 13:07:24
S 50°	05:55:38	06:33:39	07:07:23	17:02:04	17:35:50	18:13:54	04:44:03 12:43:53
52°	05:57:16	06:36:59	07:12:20	16:57:09	17:32:33	18:12:19	04:55:15 12:32:35
54°	05:58:57	06:40:34	07:17:47	16:51:45	17:29:01	18:10:42	05:07:57 12:19:47
56°	06:00:42	06:44:29	07:23:49	16:45:46	17:25:09	18:09:01	05:22:36 12:05:02
58°	06:02:32	06:48:47	07:30:35	16:39:04	17:20:54	18:07:15	05:39:52 11:47:39
S 60°	06:04:27	06:53:33	07:38:13	16:31:29	17:16:13	18:05:25	06:00:52 11:26:31




Aug 15	SHA	Mer.pass
Venus	262° 37.2	08:54:09
Mars	336° 35.6	03:57:44
Jupiter	69° 40.6	21:41:57
Saturn	61° 01.3	22:16:34

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper Mer.Pass. hh:mm:ss	Lower Mer.Pass. hh:mm:ss	Age
14	04:41	04:35	12:04:35	07:51:00 20:17:29	25(24%)
15	04:29	04:23	12:04:23	08:44:43 21:12:37	26(16%)

# 2020 August 16 to Aug. 17

16 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	02:34:05	21:28:58	—:—	—:—	
N 70°	—:—	00:48:41	03:03:42	21:00:46	23:04:05	—:—	
68°	—:—	01:54:12	03:25:25	20:39:50	22:08:04	—:—	
66°	—:—	02:28:25	03:42:25	20:23:22	21:35:47	—:—	23:17:18 21:07:48
64°	00:43:06	02:52:41	03:56:14	20:09:56	21:12:28	23:11:30	.. .. 20:13:59
62°	01:41:17	03:11:30	04:07:46	19:58:40	20:54:15	22:21:37	.. .. 19:41:20
60°	02:12:27	03:26:46	04:17:37	19:49:03	20:39:22	21:52:09	.. .. 19:17:03
N 58°	02:35:00	03:39:34	04:26:09	19:40:42	20:26:53	21:30:27	00:17:51 18:57:38
56°	02:52:47	03:50:30	04:33:39	19:33:21	20:16:10	21:13:11	00:35:06 18:41:25
54°	03:07:27	04:00:01	04:40:19	19:26:49	20:06:51	20:58:53	00:49:45 18:27:33
52°	03:19:53	04:08:24	04:46:18	19:20:57	19:58:38	20:46:43	01:02:28 18:15:25
50°	03:30:38	04:15:51	04:51:43	19:15:38	19:51:18	20:36:11	01:13:42 18:04:40
45°	03:52:18	04:31:28	05:03:19	19:04:13	19:35:56	20:14:53	01:37:05 17:42:11
N 40°	04:08:56	04:43:57	05:12:54	18:54:48	19:23:39	19:58:30	01:55:51 17:24:03
35°	04:22:16	04:54:18	05:21:03	18:46:46	19:13:27	19:45:22	02:11:34 17:08:47
30°	04:33:17	05:03:05	05:28:11	18:39:44	19:04:47	19:34:30	02:25:12 16:55:31
20°	04:50:40	05:17:33	05:40:25	18:27:40	18:50:31	19:17:21	02:48:26 16:32:51
N 10°	05:04:01	05:29:19	05:51:01	18:17:13	18:38:53	19:04:10	03:08:33 16:13:10
0°	05:14:51	05:39:33	06:00:50	18:07:32	18:28:47	18:53:29	03:27:21 15:54:43
S 10°	05:24:02	05:48:58	06:10:32	17:57:57	18:19:30	18:44:26	03:46:10 15:36:14
20°	05:32:08	05:58:10	06:20:45	17:47:50	18:10:26	18:36:28	04:06:20 15:16:23
30°	05:39:33	06:07:44	06:32:18	17:36:25	18:01:00	18:29:11	04:29:38 14:53:24
35°	05:43:08	06:12:54	06:38:56	17:29:52	17:55:54	18:25:41	04:43:19 14:39:54
40°	05:46:41	06:18:30	06:46:25	17:22:27	17:50:23	18:22:13	04:59:07 14:24:17
45°	05:50:16	06:24:44	06:55:07	17:13:50	17:44:14	18:18:45	05:17:58 14:05:38
S 50°	05:53:57	06:31:53	07:05:32	17:03:31	17:37:12	18:15:11	05:41:28 13:42:21
52°	05:55:28	06:35:06	07:10:21	16:58:44	17:34:02	18:13:44	05:52:46 13:31:09
54°	05:57:02	06:38:34	07:15:39	16:53:29	17:30:37	18:12:14	06:05:34 13:18:28
56°	05:58:38	06:42:20	07:21:31	16:47:40	17:26:54	18:10:41	06:20:18 13:03:50
58°	06:00:19	06:46:28	07:28:05	16:41:09	17:22:50	18:09:05	06:37:39 12:46:36
S 60°	06:02:04	06:51:03	07:35:30	16:33:48	17:18:19	18:07:24	06:58:45 12:25:38

Aug 16	SHA	Mer.pass
Venus	261° 34.9	08:54:23
Mars	336° 17.3	03:55:01
Jupiter	69° 46.1	21:37:40
Saturn	61° 05.2	22:12:23

17 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	02:40:37	21:22:12	—:—	—:—	
N 70°	—:—	01:05:18	03:08:43	20:55:24	22:50:38	—:—	
68°	—:—	02:01:14	03:29:33	20:35:20	22:00:57	—:—	
66°	—:—	02:33:26	03:45:55	20:19:27	21:30:28	—:—	.. .. 21:03:04
64°	00:57:35	02:56:41	03:59:17	20:06:28	21:08:06	22:59:44	00:10:46 20:31:36
62°	01:47:25	03:14:51	04:10:28	19:55:33	20:50:30	22:15:22	00:43:07 20:07:59
60°	02:16:50	03:29:40	04:20:01	19:46:13	20:36:05	21:47:28	01:07:06 19:49:03
N 58°	02:38:29	03:42:06	04:28:19	19:38:06	20:23:56	21:26:35	01:26:16 19:33:17
56°	02:55:43	03:52:45	04:35:37	19:30:58	20:13:30	21:09:51	01:42:14 19:19:48
54°	03:09:58	04:02:02	04:42:06	19:24:36	20:04:25	20:55:57	01:55:53 19:08:04
52°	03:22:06	04:10:13	04:47:56	19:18:53	19:56:23	20:44:05	02:07:48 18:57:41
50°	03:32:36	04:17:30	04:53:12	19:13:43	19:49:13	20:33:48	02:18:20 18:48:23
45°	03:53:48	04:32:46	05:04:31	19:02:36	19:34:12	20:12:57	02:40:22 18:28:44
N 40°	04:10:07	04:45:00	05:13:51	18:53:25	19:22:10	19:56:54	02:58:06 18:12:42
35°	04:23:11	04:55:07	05:21:48	18:45:35	19:12:12	19:44:01	03:12:59 17:59:06
30°	04:34:00	05:03:43	05:28:46	18:38:43	19:03:43	19:33:21	03:25:54 17:47:13
20°	04:51:02	05:17:52	05:40:42	18:26:57	18:49:46	19:16:32	03:47:54 17:26:49
N 10°	05:04:07	05:29:23	05:51:02	18:16:46	18:38:24	19:03:38	04:06:58 17:09:00
0°	05:14:42	05:39:22	06:00:37	18:07:19	18:28:32	18:53:12	04:24:45 16:52:16
S 10°	05:23:39	05:48:33	06:10:05	17:57:58	18:19:29	18:44:23	04:42:32 16:35:28
20°	05:31:29	05:57:29	06:20:03	17:48:07	18:10:40	18:36:41	05:01:32 16:17:24
30°	05:38:38	06:06:47	06:31:18	17:36:59	18:01:31	18:29:41	05:23:24 15:56:30
35°	05:42:03	06:11:47	06:37:46	17:30:36	17:56:36	18:26:21	05:36:12 15:44:14
40°	05:45:25	06:17:12	06:45:04	17:23:23	17:51:16	18:23:04	05:50:54 15:30:05
45°	05:48:48	06:23:13	06:53:32	17:15:00	17:45:20	18:19:48	06:08:21 15:13:15
S 50°	05:52:13	06:30:07	07:03:40	17:04:58	17:38:33	18:16:30	06:29:56 14:52:22
52°	05:53:38	06:33:12	07:08:21	17:00:19	17:35:31	18:15:09	06:40:12 14:42:24
54°	05:55:04	06:36:32	07:13:30	16:55:13	17:32:14	18:13:46	06:51:45 14:31:10
56°	05:56:32	06:40:09	07:19:12	16:49:34	17:28:40	18:12:22	07:04:56 14:18:20
58°	05:58:04	06:44:08	07:25:35	16:43:15	17:24:45	18:10:55	07:20:14 14:03:24
S 60°	05:59:39	06:48:32	07:32:46	16:36:07	17:20:26	18:09:25	07:38:25 13:45:36

Aug 17	SHA	Mer.pass
Venus	260° 32.2	08:54:38
Mars	335° 59.6	03:52:15
Jupiter	69° 51.4	21:33:24
Saturn	61° 09.1	22:08:12

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
16	04:17	04:11	12:04:11	09:41:01 22:09:43	27(9%)
17	04:04	03:58	12:03:58	10:38:32 23:07:16	28(4%)

# 2020 August 18 to Aug. 19

18 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	02:46:58	21:15:36	—:—	—:—	☐ 22:53:42
N 70°	—:—	01:18:19	03:13:39	20:50:06	22:39:05	—:—	☐ 21:57:40
68°	—:—	02:07:55	03:33:38	20:30:51	21:54:08	—:—	☐ 00:34:12
66°	—:—	02:38:19	03:49:25	20:15:33	21:25:15	—:—	☐ 01:22:37
64°	01:08:55	03:00:37	04:02:19	20:02:59	21:03:47	22:49:38	☐ 01:53:24
62°	01:53:15	03:18:09	04:13:10	19:52:26	20:46:46	22:09:22	☐ 02:16:23
60°	02:21:05	03:32:32	04:22:26	19:43:22	20:32:47	21:42:52	☐ 02:34:44
N 58°	02:41:56	03:44:37	04:30:29	19:35:30	20:20:59	21:22:45	☐ 02:49:58
56°	02:58:36	03:55:00	04:37:35	19:28:33	20:10:49	21:06:33	☐ 03:02:57
54°	03:12:28	04:04:03	04:43:53	19:22:22	20:01:57	20:53:01	☐ 03:14:14
52°	03:24:18	04:12:02	04:49:33	19:16:49	19:54:07	20:41:27	☐ 03:24:11
50°	03:34:33	04:19:09	04:54:41	19:11:47	19:47:08	20:31:24	☐ 03:33:04
45°	03:55:18	04:34:05	05:05:42	19:00:57	19:32:27	20:11:01	☐ 03:51:48
N 40°	04:11:17	04:46:02	05:14:48	18:52:01	19:20:41	19:55:17	☐ 04:07:01
35°	04:24:06	04:55:56	05:22:34	18:44:23	19:10:56	19:42:39	☐ 04:19:52
30°	04:34:42	05:04:21	05:29:21	18:37:42	19:02:38	19:32:12	☐ 04:31:03
20°	04:51:25	05:18:11	05:40:59	18:26:14	18:49:00	19:15:43	☐ 04:50:10
N 10°	05:04:13	05:29:27	05:51:04	18:16:18	18:37:54	19:03:05	☐ 05:06:45
0°	05:14:33	05:39:11	06:00:24	18:07:05	18:28:17	18:52:54	☐ 05:22:14
S 10°	05:23:15	05:48:07	06:09:38	17:57:58	18:19:28	18:44:21	☐ 05:37:40
20°	05:30:50	05:56:49	06:19:21	17:48:23	18:10:55	18:36:53	☐ 05:54:07
30°	05:37:42	06:05:49	06:30:18	17:37:33	18:02:03	18:30:10	☐ 06:12:59
35°	05:40:57	06:10:39	06:36:35	17:31:20	17:57:17	18:27:00	☐ 06:23:56
40°	05:44:09	06:15:53	06:43:41	17:24:19	17:52:09	18:23:55	☐ 06:36:28
45°	05:47:18	06:21:41	06:51:55	17:16:10	17:46:26	18:20:51	☐ 06:51:12
S 50°	05:50:29	06:28:18	07:01:46	17:06:25	17:39:55	18:17:48	☐ 07:09:11
52°	05:51:46	06:31:17	07:06:20	17:01:54	17:37:00	18:16:34	☐ 07:17:39
54°	05:53:05	06:34:29	07:11:20	16:56:57	17:33:51	18:15:19	☐ 07:27:04
56°	05:54:25	06:37:57	07:16:52	16:51:28	17:30:26	18:14:03	☐ 07:37:39
58°	05:55:47	06:41:46	07:23:03	16:45:21	17:26:41	18:12:46	☐ 07:49:43
S 60°	05:57:12	06:45:58	07:30:01	16:38:26	17:22:33	18:11:26	☐ 08:03:43

Aug 18	SHA	Mer.pass
Venus	259° 29.0	08:54:54
Mars	335° 42.5	03:49:27
Jupiter	69° 56.6	21:29:08
Saturn	61° 12.9	22:04:01

19 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	02:53:09	21:09:08	—:—	—:—	☐ 01:34:20
N 70°	—:—	01:29:26	03:18:31	20:44:51	22:28:44	—:—	☐ 02:28:51
68°	—:—	02:14:18	03:37:40	20:26:23	21:47:32	—:—	☐ 03:01:35
66°	—:—	02:43:06	03:52:53	20:11:38	21:20:07	—:—	☐ 03:25:17
64°	01:18:35	03:04:30	04:05:22	19:59:31	20:59:30	22:40:36	☐ 03:43:47
62°	01:58:48	03:21:27	04:15:51	19:49:17	20:43:04	22:03:34	☐ 03:58:50
60°	02:25:15	03:35:22	04:24:50	19:40:31	20:29:30	21:38:20	☐ 04:11:27
N 58°	02:45:18	03:47:08	04:32:39	19:32:52	20:18:01	21:18:58	☐ 04:22:15
56°	03:01:28	03:57:14	04:39:32	19:26:08	20:08:08	21:03:15	☐ 04:31:39
54°	03:14:57	04:06:03	04:45:40	19:20:07	19:59:29	20:50:06	☐ 04:39:57
52°	03:26:29	04:13:51	04:51:11	19:14:43	19:51:51	20:38:49	☐ 04:47:21
50°	03:36:30	04:20:48	04:56:11	19:09:49	19:45:01	20:29:00	☐ 04:54:01
45°	03:56:48	04:35:23	05:06:54	18:59:18	19:30:41	20:09:04	☐ 05:08:14
N 40°	04:12:27	04:47:04	05:15:46	18:50:36	19:19:11	19:53:39	☐ 05:19:54
35°	04:25:01	04:56:45	05:23:19	18:43:10	19:09:39	19:41:16	☐ 05:29:50
30°	04:35:25	05:04:59	05:29:56	18:36:39	19:01:32	19:31:02	☐ 05:38:31
20°	04:51:47	05:18:30	05:41:16	18:25:29	18:48:13	19:14:53	☐ 05:53:25
N 10°	05:04:18	05:29:29	05:51:05	18:15:49	18:37:23	19:02:32	☐ 06:06:23
0°	05:14:23	05:38:59	06:00:11	18:06:51	18:28:01	18:52:36	☐ 06:18:30
S 10°	05:22:50	05:47:41	06:09:10	17:57:59	18:19:27	18:44:17	☐ 06:30:34
20°	05:30:10	05:56:07	06:18:37	17:48:39	18:11:09	18:37:06	☐ 06:43:24
30°	05:36:45	06:04:50	06:29:17	17:38:07	18:02:35	18:30:40	☐ 06:58:02
35°	05:39:50	06:09:30	06:35:24	17:32:04	17:57:59	18:27:40	☐ 07:06:30
40°	05:42:50	06:14:32	06:42:18	17:25:15	17:53:02	18:24:45	☐ 07:16:06
45°	05:45:47	06:20:07	06:50:18	17:17:20	17:47:33	18:21:55	☐ 07:27:19
S 50°	05:48:43	06:26:29	06:59:52	17:07:52	17:41:17	18:19:07	☐ 07:40:50
52°	05:49:53	06:29:20	07:04:17	17:03:30	17:38:29	18:18:00	☐ 07:47:06
54°	05:51:04	06:32:24	07:09:08	16:58:42	17:35:29	18:16:53	☐ 07:54:02
56°	05:52:16	06:35:44	07:14:30	16:53:23	17:32:13	18:15:45	☐ 08:01:43
58°	05:53:29	06:39:22	07:20:30	16:47:27	17:28:38	18:14:37	☐ 08:10:22
S 60°	05:54:43	06:43:24	07:27:15	16:40:45	17:24:41	18:13:28	☐ 08:20:11

Aug 19	SHA	Mer.pass
Venus	258° 25.4	08:55:13
Mars	335° 26.0	03:46:36
Jupiter	70° 01.6	21:24:53
Saturn	61° 16.6	21:59:51

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
18	03:51	03:45	12:03:45	11:35:46	—:—	29(1%)
19	03:38	03:31	12:03:31	12:31:36	00:03:55	0(0%)

# 2020 August 20 to Aug. 21

20 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	02:59:10	21:02:47	—:—	—:—	04:35:08
N 70°	—:—	01:39:20	03:23:19	20:39:39	22:19:15	—:—	04:55:29
68°	—:—	02:20:27	03:41:41	20:21:56	21:41:08	—:—	05:11:13
66°	—:—	02:47:47	03:56:20	20:07:44	21:15:04	—:—	05:23:53
64°	01:27:09	03:08:20	04:08:23	19:56:01	20:55:15	22:32:20	05:34:20
62°	02:04:08	03:24:42	04:18:32	19:46:08	20:39:22	21:57:58	05:43:11
60°	02:29:19	03:38:12	04:27:14	19:37:38	20:26:12	21:33:53	05:50:47
N 58°	02:48:38	03:49:38	04:34:49	19:30:14	20:15:03	21:15:12	05:57:25
56°	03:04:18	03:59:28	04:41:30	19:23:41	20:05:26	20:59:59	06:03:16
54°	03:17:25	04:08:04	04:47:28	19:17:52	19:57:01	20:47:11	06:08:29
52°	03:28:39	04:15:39	04:52:49	19:12:37	19:49:34	20:36:11	06:13:11
50°	03:38:26	04:22:27	04:57:40	19:07:51	19:42:54	20:26:36	06:17:27
45°	03:58:17	04:36:41	05:08:06	18:57:38	19:28:55	20:07:06	06:26:37
N 40°	04:13:37	04:48:06	05:16:43	18:49:10	19:17:41	19:52:01	06:34:13
35°	04:25:56	04:57:34	05:24:04	18:41:56	19:08:22	19:39:53	06:40:43
30°	04:36:07	05:05:37	05:30:30	18:35:36	19:00:26	19:29:51	06:46:26
20°	04:52:08	05:18:49	05:41:32	18:24:44	18:47:25	19:14:03	06:56:17
N 10°	05:04:23	05:29:32	05:51:06	18:15:19	18:36:52	19:01:59	07:04:53
0°	05:14:13	05:38:47	05:59:57	18:06:36	18:27:45	18:52:18	07:12:56
S 10°	05:22:25	05:47:14	06:08:41	17:57:59	18:19:25	18:44:14	07:20:58
20°	05:29:30	05:55:24	06:17:53	17:48:54	18:11:23	18:37:18	07:29:29
30°	05:35:47	06:03:50	06:28:15	17:38:40	18:03:06	18:31:10	07:39:10
35°	05:38:42	06:08:20	06:34:11	17:32:49	17:58:41	18:28:19	07:44:44
40°	05:41:31	06:13:11	06:40:53	17:26:11	17:53:55	18:25:36	07:51:02
45°	05:44:15	06:18:32	06:48:39	17:18:30	17:48:39	18:22:59	07:58:20
S 50°	05:46:55	06:24:39	06:57:56	17:09:20	17:42:40	18:20:27	08:07:03
52°	05:47:59	06:27:22	07:02:14	17:05:05	17:39:59	18:19:27	08:11:04
54°	05:49:02	06:30:18	07:06:56	17:00:26	17:37:07	18:18:27	08:15:28
56°	05:50:06	06:33:29	07:12:08	16:55:17	17:33:59	18:17:28	08:20:19
58°	05:51:09	06:36:58	07:17:56	16:49:32	17:30:35	18:16:29	08:25:43
S 60°	05:52:13	06:40:48	07:24:28	16:43:04	17:26:49	18:15:31	08:31:47

Aug 20	SHA	Mer.pass
Venus	257° 21.5	08:55:33
Mars	335° 10.2	03:43:43
Jupiter	70° 06.4	21:20:38
Saturn	61° 20.3	21:55:41

21 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	—:—	03:05:03	20:56:32	—:—	—:—	06:59:53
N 70°	—:—	01:48:21	03:28:03	20:34:30	22:10:24	—:—	07:07:24
68°	—:—	02:26:22	03:45:40	20:17:30	21:34:56	—:—	07:13:30
66°	—:—	02:52:21	03:59:46	20:03:50	21:10:05	—:—	07:18:33
64°	01:34:57	03:12:06	04:11:24	19:52:32	20:51:01	22:24:38	07:22:49
62°	02:09:15	03:27:55	04:21:13	19:42:58	20:35:40	21:52:32	07:26:29
60°	02:33:17	03:41:01	04:29:39	19:34:45	20:22:55	21:29:30	07:29:41
N 58°	02:51:55	03:52:07	04:36:59	19:27:34	20:12:05	21:11:29	07:32:29
56°	03:07:06	04:01:41	04:43:28	19:21:14	20:02:43	20:56:43	07:34:59
54°	03:19:51	04:10:03	04:49:15	19:15:35	19:54:32	20:44:16	07:37:13
52°	03:30:48	04:17:28	04:54:27	19:10:29	19:47:16	20:33:33	07:39:15
50°	03:40:21	04:24:05	04:59:10	19:05:52	19:40:46	20:24:11	07:41:06
45°	03:59:46	04:37:59	05:09:17	18:55:56	19:27:07	20:05:07	07:45:06
N 40°	04:14:47	04:49:08	05:17:40	18:47:43	19:16:09	19:50:22	07:48:26
35°	04:26:50	04:58:22	05:24:49	18:40:41	19:07:03	19:38:29	07:51:18
30°	04:36:49	05:06:14	05:31:05	18:34:32	18:59:19	19:28:40	07:53:50
20°	04:52:30	05:19:07	05:41:49	18:23:58	18:46:38	19:13:12	07:58:13
N 10°	05:04:27	05:29:34	05:51:06	18:14:49	18:36:20	19:01:25	08:02:03
0°	05:14:02	05:38:34	05:59:42	18:06:21	18:27:28	18:51:59	08:05:40
S 10°	05:21:59	05:46:46	06:08:12	17:57:58	18:19:24	18:44:10	08:09:16
20°	05:28:48	05:54:41	06:17:08	17:49:10	18:11:37	18:37:30	08:13:06
30°	05:34:48	06:02:49	06:27:12	17:39:14	18:03:38	18:31:39	08:17:28
35°	05:37:33	06:07:09	06:32:58	17:33:33	17:59:22	18:28:59	08:19:58
40°	05:40:11	06:11:49	06:39:28	17:27:07	17:54:48	18:26:27	08:22:48
45°	05:42:42	06:16:57	06:47:00	17:19:41	17:49:46	18:24:03	08:26:05
S 50°	05:45:07	06:22:47	06:56:00	17:10:47	17:44:02	18:21:46	08:29:58
52°	05:46:03	06:25:23	07:00:09	17:06:41	17:41:29	18:20:53	08:31:45
54°	05:46:59	06:28:11	07:04:42	17:02:11	17:38:45	18:20:02	08:33:42
56°	05:47:54	06:31:13	07:09:44	16:57:12	17:35:47	18:19:11	08:35:50
58°	05:48:48	06:34:32	07:15:21	16:51:38	17:32:32	18:18:22	08:38:13
S 60°	05:49:41	06:38:11	07:21:40	16:45:23	17:28:57	18:17:34	08:40:51

Aug 21	SHA	Mer.pass
Venus	256° 17.1	08:55:54
Mars	334° 54.9	03:40:47
Jupiter	70° 11.0	21:16:25
Saturn	61° 23.9	21:51:31

Day	Sun		Moon		
	Eqn. of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Mer. Pass. Upper Lower hh:mm:ss hh:mm:ss		Age
20	03:24	03:16	12:03:16	13:25:35 00:58:49	1(3%)
21	03:09	03:02	12:03:02	14:17:57 01:51:56	2(8%)

# 2020 August 22 to Aug. 23

22 August 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	—:—	00:46:55	03:10:49	20:50:24	23:00:42	—:—	09:16:15	20:26:41
N 70°	—:—	01:56:42	03:32:43	20:29:23	22:02:04	—:—	09:14:04	20:32:26
68°	—:—	02:32:05	03:49:37	20:13:05	21:28:52	—:—	09:12:17	20:37:13
66°	00:40:51	02:56:51	04:03:11	19:59:56	21:05:10	23:09:05	09:10:48	20:41:15
64°	01:42:10	03:15:50	04:14:24	19:49:02	20:46:50	22:17:22	09:09:32	20:44:42
62°	02:14:12	03:31:07	04:23:53	19:39:48	20:32:00	21:47:13	09:08:28	20:47:43
60°	02:37:10	03:43:49	04:32:03	19:31:51	20:19:38	21:25:11	09:07:31	20:50:21
N 58°	02:55:09	03:54:35	04:39:09	19:24:54	20:09:07	21:07:47	09:06:42	20:52:42
56°	03:09:52	04:03:54	04:45:26	19:18:46	20:00:01	20:53:28	09:05:58	20:54:49
54°	03:22:17	04:12:03	04:51:02	19:13:17	19:52:02	20:41:21	09:05:18	20:56:43
52°	03:32:57	04:19:16	04:56:05	19:08:21	19:44:57	20:30:54	09:04:43	20:58:27
50°	03:42:16	04:25:43	05:00:39	19:03:52	19:38:38	20:21:47	09:04:10	21:00:02
45°	04:01:15	04:39:17	05:10:29	18:54:14	19:25:19	20:03:09	09:03:00	21:03:29
N 40°	04:15:56	04:50:10	05:18:37	18:46:15	19:14:37	19:48:42	09:02:03	21:06:24
35°	04:27:44	04:59:11	05:25:34	18:39:26	19:05:44	19:37:04	09:01:13	21:08:55
30°	04:37:30	05:06:51	05:31:39	18:33:27	18:58:11	19:27:27	09:00:31	21:11:08
20°	04:52:51	05:19:25	05:42:04	18:23:12	18:45:49	19:12:20	08:59:17	21:15:01
N 10°	05:04:31	05:29:36	05:51:06	18:14:19	18:35:48	19:00:50	08:58:15	21:18:25
0°	05:13:50	05:38:21	05:59:27	18:06:05	18:27:11	18:51:40	08:57:17	21:21:37
S 10°	05:21:32	05:46:18	06:07:42	17:57:58	18:19:21	18:44:07	08:56:21	21:24:49
20°	05:28:06	05:53:57	06:16:22	17:49:25	18:11:50	18:37:42	08:55:24	21:28:13
30°	05:33:48	06:01:47	06:26:08	17:39:47	18:04:09	18:32:09	08:54:20	21:32:06
35°	05:36:23	06:05:57	06:31:43	17:34:16	18:00:04	18:29:39	08:53:44	21:34:20
40°	05:38:50	06:10:25	06:38:02	17:28:03	17:55:41	18:27:19	08:53:03	21:36:53
45°	05:41:07	06:15:20	06:45:20	17:20:51	17:50:52	18:25:08	08:52:18	21:39:50
S 50°	05:43:17	06:20:54	06:54:02	17:12:15	17:45:25	18:23:06	08:51:24	21:43:21
52°	05:44:06	06:23:23	06:58:03	17:08:16	17:43:00	18:22:21	08:50:59	21:44:59
54°	05:44:54	06:26:03	07:02:28	17:03:55	17:40:23	18:21:37	08:50:32	21:46:47
56°	05:45:40	06:28:56	07:07:20	16:59:06	17:37:34	18:20:55	08:50:03	21:48:45
58°	05:46:25	06:32:04	07:12:45	16:53:44	17:34:30	18:20:16	08:49:31	21:50:57
S 60°	05:47:07	06:35:32	07:18:52	16:47:42	17:31:06	18:19:38	08:48:55	21:53:26

Aug 22	SHA	Mer.pass
Venus	255° 12.4	08:56:17
Mars	334° 40.3	03:37:49
Jupiter	70° 15.5	21:12:12
Saturn	61° 27.4	21:47:21

23 August 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	—:—	01:06:01	03:16:28	20:44:20	22:45:38	—:—	11:33:40	19:59:07
N 70°	—:—	02:04:32	03:37:21	20:24:18	21:54:09	—:—	11:21:04	20:14:15
68°	—:—	02:37:39	03:53:32	20:08:41	21:22:57	—:—	11:11:00	20:26:29
66°	00:57:16	03:01:16	04:06:35	19:56:02	21:00:19	22:56:04	11:02:44	20:36:38
64°	01:48:55	03:19:31	04:17:24	19:45:32	20:42:40	22:10:29	10:55:49	20:45:13
62°	02:19:00	03:34:18	04:26:33	19:36:37	20:28:20	21:42:03	10:49:55	20:52:36
60°	02:40:59	03:46:35	04:34:26	19:28:56	20:16:21	21:20:55	10:44:48	20:59:03
N 58°	02:58:20	03:57:03	04:41:19	19:22:13	20:06:08	21:04:07	10:40:18	21:04:44
56°	03:12:37	04:06:06	04:47:24	19:16:17	19:57:17	20:50:13	10:36:20	21:09:49
54°	03:24:41	04:14:02	04:52:50	19:10:58	19:49:31	20:38:26	10:32:46	21:14:22
52°	03:35:05	04:21:04	04:57:43	19:06:12	19:42:38	20:28:16	10:29:34	21:18:31
50°	03:44:10	04:27:21	05:02:09	19:01:51	19:36:28	20:19:21	10:26:39	21:22:17
45°	04:02:43	04:40:34	05:11:41	18:52:31	19:23:30	20:01:09	10:20:22	21:30:30
N 40°	04:17:05	04:51:11	05:19:34	18:44:46	19:13:04	19:47:01	10:15:08	21:37:23
35°	04:28:38	04:59:59	05:26:19	18:38:09	19:04:25	19:35:39	10:10:41	21:43:19
30°	04:38:11	05:07:28	05:32:13	18:32:21	18:57:03	19:26:15	10:06:45	21:48:34
20°	04:53:11	05:19:43	05:42:20	18:22:25	18:45:00	19:11:28	10:00:01	21:57:41
N 10°	05:04:35	05:29:37	05:51:05	18:13:48	18:35:15	19:00:15	09:54:09	22:05:43
0°	05:13:38	05:38:07	05:59:12	18:05:49	18:26:53	18:51:21	09:48:42	22:13:17
S 10°	05:21:05	05:45:50	06:07:12	17:57:57	18:19:19	18:44:02	09:43:18	22:20:53
20°	05:27:23	05:53:13	06:15:36	17:49:40	18:12:03	18:37:53	09:37:36	22:29:00
30°	05:32:47	06:00:45	06:25:04	17:40:21	18:04:40	18:32:39	09:31:11	22:38:17
35°	05:35:12	06:04:44	06:30:28	17:35:00	18:00:45	18:30:19	09:27:31	22:43:40
40°	05:37:27	06:09:01	06:36:35	17:28:59	17:56:34	18:28:10	09:23:23	22:49:47
45°	05:39:32	06:13:42	06:43:38	17:22:01	17:51:59	18:26:12	09:18:38	22:56:56
S 50°	05:41:25	06:19:00	06:52:04	17:13:42	17:46:48	18:24:27	09:12:59	23:05:33
52°	05:42:07	06:21:22	06:55:57	17:09:52	17:44:30	18:23:49	09:10:23	23:09:34
54°	05:42:47	06:23:53	07:00:12	17:05:40	17:42:02	18:23:13	09:07:33	23:13:58
56°	05:43:25	06:26:37	07:04:54	17:01:01	17:39:22	18:22:40	09:04:27	23:18:52
58°	05:44:00	06:29:36	07:10:08	16:55:50	17:36:28	18:22:10	09:01:00	23:24:21
S 60°	05:44:32	06:32:52	07:16:02	16:50:01	17:33:16	18:21:44	08:57:10	23:30:33

Aug 23	SHA	Mer.pass
Venus	254° 07.4	08:56:41
Mars	334° 26.4	03:34:49
Jupiter	70° 19.8	21:07:59
Saturn	61° 30.9	21:43:11

Day	Sun		Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Mer.Pass. Upper Lower hh:mm:ss hh:mm:ss		Age
22	02:54	02:46	12:02:46	15:09:27 02:43:46	3(16%)
23	02:39	02:31	12:02:31	16:00:58 03:35:09	4(25%)

# 2020 August 24 to Aug. 25

24 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	01:20:34	03:22:00	20:38:22	22:32:50	—:—	14:04:17
N 70°	—:—	02:11:57	03:41:54	20:19:16	21:46:34	—:—	13:34:56
68°	—:—	02:43:03	03:57:25	20:04:17	21:17:09	—:—	13:13:25
66°	01:09:46	03:05:36	04:09:58	19:52:08	20:55:31	22:45:01	12:56:37
64°	01:55:17	03:23:10	04:20:23	19:42:01	20:38:32	22:03:54	12:42:59
62°	02:23:39	03:37:26	04:29:13	19:33:26	20:24:40	21:37:00	12:31:37
60°	02:44:43	03:49:21	04:36:50	19:26:01	20:13:04	21:16:43	12:21:57
N 58°	03:01:29	03:59:30	04:43:29	19:19:31	20:03:10	21:00:29	12:13:34
56°	03:15:20	04:08:18	04:49:22	19:13:47	19:54:34	20:47:00	12:06:12
54°	03:27:04	04:16:01	04:54:37	19:08:39	19:47:01	20:35:32	11:59:40
52°	03:37:12	04:22:52	04:59:21	19:04:01	19:40:18	20:25:38	11:53:49
50°	03:46:04	04:28:59	05:03:38	18:59:49	19:34:18	20:16:56	11:48:31
45°	04:04:11	04:41:52	05:12:52	18:50:47	19:21:40	19:59:09	11:37:11
N 40°	04:18:14	04:52:13	05:20:31	18:43:17	19:11:30	19:45:21	11:27:49
35°	04:29:32	05:00:47	05:27:03	18:36:52	19:03:04	19:34:13	11:19:51
30°	04:38:52	05:08:05	05:32:47	18:31:15	18:55:54	19:25:02	11:12:52
20°	04:53:32	05:20:00	05:42:35	18:21:37	18:44:10	19:10:36	11:00:53
N 10°	05:04:38	05:29:38	05:51:05	18:13:16	18:34:42	18:59:40	10:50:29
0°	05:13:26	05:37:53	05:58:56	18:05:33	18:26:35	18:51:01	10:40:48
S 10°	05:20:38	05:45:20	06:06:41	17:57:55	18:19:16	18:43:58	10:31:11
20°	05:26:39	05:52:28	06:14:49	17:49:54	18:12:16	18:38:05	10:21:01
30°	05:31:45	05:59:42	06:23:58	17:40:54	18:05:11	18:33:08	10:09:30
35°	05:34:00	06:03:31	06:29:13	17:35:44	18:01:27	18:30:59	10:02:53
40°	05:36:04	06:07:36	06:35:07	17:29:55	17:57:28	18:29:02	09:55:24
45°	05:37:55	06:12:03	06:41:56	17:23:11	17:53:06	18:27:17	09:46:44
S 50°	05:39:33	06:17:05	06:50:04	17:15:10	17:48:12	18:25:48	09:36:22
52°	05:40:08	06:19:19	06:53:49	17:11:28	17:46:01	18:25:17	09:31:35
54°	05:40:39	06:21:42	06:57:56	17:07:24	17:43:41	18:24:49	09:26:20
56°	05:41:08	06:24:17	07:02:28	17:02:56	17:41:10	18:24:25	09:20:32
58°	05:41:34	06:27:06	07:07:31	16:57:57	17:38:26	18:24:05	09:14:04
S 60°	05:41:55	06:30:11	07:13:11	16:52:20	17:35:25	18:23:49	09:06:47

Aug 24	SHA	Mer.pass
Venus	253° 02.1	08:57:06
Mars	334° 13.1	03:31:45
Jupiter	70° 23.9	21:03:48
Saturn	61° 34.3	21:39:02

25 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	01:32:51	03:27:27	20:32:28	22:21:26	—:—	16:14:39
N 70°	—:—	02:19:00	03:46:25	20:14:15	21:39:16	—:—	15:25:19
68°	—:—	02:48:19	04:01:17	19:59:55	21:11:28	—:—	15:13:25
66°	01:20:16	03:09:52	04:13:20	19:48:15	20:50:46	22:35:13	14:54:18
64°	02:01:20	03:26:46	04:23:22	19:38:31	20:34:25	21:57:34	14:31:21
62°	02:28:10	03:40:33	04:31:52	19:30:14	20:21:02	21:32:02	14:13:12
60°	02:48:23	03:52:06	04:39:13	19:23:05	20:09:48	21:12:34	13:58:15
N 58°	03:04:35	04:01:57	04:45:39	19:16:49	20:00:11	20:56:52	13:45:37
56°	03:18:01	04:10:30	04:51:19	19:11:16	19:51:50	20:43:47	13:34:42
54°	03:29:25	04:18:00	04:56:24	19:06:19	19:44:29	20:32:38	13:25:08
52°	03:39:18	04:24:39	05:00:58	19:01:50	19:37:58	20:22:59	13:16:39
50°	03:47:57	04:30:37	05:05:08	18:57:47	19:32:08	20:14:31	13:09:01
45°	04:05:38	04:43:09	05:14:04	18:49:02	19:19:49	19:57:09	12:52:52
N 40°	04:19:22	04:53:14	05:21:28	18:41:46	19:09:55	19:43:39	12:39:40
35°	04:30:25	05:01:35	05:27:48	18:35:34	19:01:43	19:32:47	12:28:30
30°	04:39:33	05:08:41	05:33:20	18:30:08	18:54:44	19:23:48	12:18:46
20°	04:53:52	05:20:17	05:42:50	18:20:49	18:43:20	19:09:42	12:02:07
N 10°	05:04:40	05:29:38	05:51:04	18:12:44	18:34:08	18:59:04	11:47:41
0°	05:13:12	05:37:38	05:58:40	18:05:16	18:26:17	18:50:41	11:34:15
S 10°	05:20:09	05:44:50	06:06:10	17:57:53	18:19:13	18:43:53	11:20:54
20°	05:25:55	05:51:42	06:14:02	17:50:09	18:12:29	18:38:17	11:06:44
30°	05:30:43	05:58:38	06:22:53	17:41:27	18:05:42	18:33:38	10:50:37
35°	05:32:48	06:02:16	06:27:56	17:36:28	18:02:08	18:31:39	10:41:18
40°	05:34:39	06:06:09	06:33:38	17:30:51	17:58:21	18:29:53	10:30:43
45°	05:36:17	06:10:23	06:40:13	17:24:22	17:54:13	18:28:23	10:18:21
S 50°	05:37:39	06:15:09	06:48:04	17:16:37	17:49:35	18:27:09	10:03:24
52°	05:38:06	06:17:15	06:51:41	17:13:04	17:47:32	18:26:46	09:56:27
54°	05:38:30	06:19:31	06:55:38	17:09:09	17:45:20	18:26:26	09:48:45
56°	05:38:50	06:21:56	07:00:00	17:04:51	17:42:59	18:26:11	09:40:10
58°	05:39:06	06:24:35	07:04:52	17:00:03	17:40:24	18:26:00	09:30:30
S 60°	05:39:16	06:27:28	07:10:20	16:54:39	17:37:35	18:25:56	09:19:27

Aug 25	SHA	Mer.pass
Venus	251° 56.4	08:57:33
Mars	334° 00.5	03:28:39
Jupiter	70° 27.8	20:59:37
Saturn	61° 37.6	21:34:53

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
24	02:23	02:14	12:02:14	16:53:22	04:27:01	5(36%)
25	02:06	01:58	12:01:58	17:47:13	05:20:06	6(47%)



# 2020 August 26 to Aug. 27

26 August 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	--	01:43:42	03:32:49	20:26:38	22:11:02	--	■	■
N 70°	--	02:25:45	03:50:53	20:09:16	21:32:13	--	■	■
68°	--	02:53:27	04:05:07	19:55:33	21:05:54	--	■	■
66°	01:29:32	03:14:04	04:16:41	19:44:21	20:46:04	22:26:15	16:57:22	20:18:42
64°	02:07:06	03:30:20	04:26:19	19:35:00	20:30:20	21:51:28	16:18:29	20:58:09
62°	02:32:34	03:43:39	04:34:31	19:27:01	20:17:24	21:27:11	15:51:27	21:25:42
60°	02:52:00	03:54:49	04:41:36	19:20:08	20:06:31	21:08:27	15:30:31	21:47:06
N 58°	03:07:38	04:04:23	04:47:48	19:14:06	19:57:12	20:53:16	15:13:27	22:04:37
56°	03:20:40	04:12:40	04:53:17	19:08:45	19:49:05	20:40:35	14:59:03	22:19:24
54°	03:31:46	04:19:58	04:58:11	19:03:57	19:41:58	20:29:45	14:46:39	22:32:11
52°	03:41:23	04:26:26	05:02:36	18:59:39	19:35:37	20:20:21	14:35:46	22:43:25
50°	03:49:49	04:32:14	05:06:37	18:55:43	19:29:57	20:12:05	14:26:06	22:53:26
45°	04:07:05	04:44:26	05:15:15	18:47:16	19:17:58	19:55:08	14:05:48	23:14:28
N 40°	04:20:30	04:54:15	05:22:25	18:40:15	19:08:20	19:41:57	13:49:25	23:31:32
35°	04:31:18	05:02:23	05:28:32	18:34:16	19:00:21	19:31:20	13:35:38	23:45:56
30°	04:40:13	05:09:17	05:33:54	18:29:01	18:53:34	19:22:33	13:23:41	23:58:28
20°	04:54:11	05:20:34	05:43:05	18:20:00	18:42:29	19:08:49	13:03:18	.. ..
N 10°	05:04:43	05:29:38	05:51:02	18:12:12	18:33:34	18:58:28	12:45:40	.. ..
0°	05:12:59	05:37:23	05:58:23	18:04:58	18:25:58	18:50:21	12:29:16	00:00:18
S 10°	05:19:40	05:44:20	06:05:38	17:57:51	18:19:09	18:43:48	12:12:57	00:15:19
20°	05:29:09	05:50:55	06:13:14	17:50:23	18:12:42	18:38:28	11:55:34	00:31:24
30°	05:25:40	05:57:33	06:21:46	17:41:59	18:06:13	18:34:07	11:35:41	00:49:55
35°	05:31:34	06:01:01	06:26:39	17:37:11	18:02:50	18:32:19	11:24:07	01:00:45
40°	05:33:14	06:04:42	06:32:08	17:31:47	17:59:14	18:30:45	11:10:54	01:13:11
45°	05:34:38	06:08:43	06:38:29	17:25:32	17:55:20	18:29:28	10:55:19	01:27:54
S 50°	05:35:44	06:13:12	06:46:03	17:18:05	17:50:59	18:28:31	10:36:16	01:45:59
52°	05:36:04	06:15:11	06:49:31	17:14:39	17:49:03	18:28:15	10:27:16	01:54:33
54°	05:36:20	06:17:18	06:53:20	17:10:54	17:47:00	18:28:03	10:17:14	02:04:07
56°	05:36:31	06:19:34	06:57:32	17:06:45	17:44:47	18:27:57	10:05:55	02:14:57
58°	05:36:37	06:22:02	07:02:13	17:02:09	17:42:23	18:27:57	09:52:57	02:27:24
S 60°	05:36:36	06:24:45	07:07:28	16:56:58	17:39:46	18:28:03	09:37:51	02:41:56

Aug 26	SHA	Mer.pass
Venus	250° 50.5	08:58:00
Mars	333° 48.6	03:25:30
Jupiter	70° 31.5	20:55:27
Saturn	61° 40.8	21:30:45

27 August 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	--	01:53:32	03:38:05	20:20:52	22:01:22	--	■	■
N 70°	--	02:32:14	03:55:19	20:04:19	21:25:23	--	■	■
68°	00:14:19	02:58:28	04:08:55	19:51:12	21:00:25	23:18:41	■	■
66°	01:37:55	03:18:12	04:20:01	19:40:28	20:41:25	22:17:57	19:19:40	19:54:22
64°	02:12:39	03:33:51	04:29:17	19:31:28	20:26:16	21:45:33	17:55:32	21:18:44
62°	02:36:52	03:46:43	04:37:10	19:23:49	20:13:47	21:22:25	17:18:30	21:55:59
60°	02:55:32	03:57:32	04:43:59	19:17:11	20:03:15	21:04:23	16:52:11	22:22:30
N 58°	03:10:40	04:06:48	04:49:57	19:11:22	19:54:13	20:49:42	16:31:33	22:43:19
56°	03:23:18	04:14:51	04:55:15	19:06:12	19:46:21	20:37:24	16:14:32	23:00:29
54°	03:34:05	04:21:55	04:59:58	19:01:36	19:39:25	20:26:52	16:00:06	23:15:05
52°	03:43:27	04:28:13	05:04:14	18:57:26	19:33:16	20:17:42	15:47:33	23:27:47
50°	03:51:40	04:33:51	05:08:06	18:53:39	19:27:45	20:09:39	15:36:29	23:39:00
45°	04:08:32	04:45:43	05:16:27	18:45:30	19:16:07	19:53:07	15:13:27	.. ..
N 40°	04:21:38	04:55:16	05:23:22	18:38:44	19:06:45	19:40:15	14:54:59	.. ..
35°	04:32:11	05:03:10	05:29:17	18:32:57	18:58:59	19:29:53	14:39:32	.. ..
30°	04:40:53	05:09:53	05:34:27	18:27:52	18:52:23	19:21:19	14:26:09	.. ..
20°	04:54:30	05:20:50	05:43:20	18:19:10	18:41:37	19:07:55	14:03:24	00:19:56
N 10°	05:04:44	05:29:38	05:51:00	18:11:38	18:32:59	18:57:51	13:43:45	00:38:35
0°	05:12:45	05:37:07	05:58:06	18:04:41	18:25:39	18:50:00	13:25:27	00:56:02
S 10°	05:19:10	05:43:49	06:05:05	17:57:49	18:19:05	18:43:43	13:07:12	01:13:31
20°	05:24:24	05:50:08	06:12:25	17:50:37	18:12:54	18:38:39	12:47:43	01:32:15
30°	05:28:35	05:56:27	06:20:39	17:42:32	18:06:44	18:34:37	12:25:19	01:53:52
35°	05:30:19	05:59:45	06:25:20	17:37:55	18:03:31	18:32:59	12:12:13	02:06:33
40°	05:31:47	06:03:14	06:30:38	17:32:43	18:00:08	18:31:37	11:57:10	02:21:10
45°	05:32:58	06:07:01	06:36:44	17:26:42	17:56:28	18:30:34	11:39:17	02:38:34
S 50°	05:33:47	06:11:14	06:44:00	17:19:33	17:52:23	18:29:53	11:17:09	03:00:09
52°	05:34:00	06:13:05	06:47:21	17:16:15	17:50:35	18:29:44	11:06:35	03:10:29
54°	05:34:08	06:15:04	06:51:01	17:12:39	17:48:40	18:29:41	10:54:41	03:22:08
56°	05:34:10	06:17:11	06:55:03	17:08:40	17:46:36	18:29:44	10:41:05	03:35:27
58°	05:34:06	06:19:29	06:59:32	17:04:15	17:44:23	18:29:53	10:25:14	03:51:00
S 60°	05:33:54	06:22:00	07:04:35	16:59:17	17:41:57	18:30:11	10:06:19	04:09:37

Aug 27	SHA	Mer.pass
Venus	249° 44.3	08:58:29
Mars	333° 37.3	03:22:19
Jupiter	70° 35.0	20:51:18
Saturn	61° 44.0	21:26:37

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
26	01:49	01:41	12:01:41	18:42:37	06:14:45	7(58%)
27	01:32	01:23	12:01:23	19:38:58	07:10:44	8(69%)

# 2020 August 28 to Aug. 29

28 August 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	--	02:02:38	03:43:18	20:15:09	21:52:17	--	■	■
N 70°	--	02:38:30	03:59:42	19:59:24	21:18:44	--	■	■
68°	00:45:00	03:03:22	04:12:42	19:46:51	20:55:01	23:01:37	■	■
66°	01:45:39	03:22:16	04:23:20	19:36:34	20:36:49	22:10:09	■	■
64°	02:17:59	03:37:21	04:32:14	19:27:57	20:22:14	21:39:49	19:03:19	22:08:20
62°	02:41:03	03:49:46	04:39:48	19:20:35	20:10:10	21:17:43	18:23:12	22:48:22
60°	02:59:01	04:00:13	04:46:22	19:14:13	19:59:59	21:00:22	17:55:28	23:16:01
N 58°	03:13:39	04:09:12	04:52:07	19:08:37	19:51:14	20:46:10	17:33:56	23:37:29
56°	03:25:54	04:17:00	04:57:12	19:03:40	19:43:36	20:34:13	17:16:17	23:55:05
54°	03:36:24	04:23:53	05:01:45	18:59:13	19:36:53	20:23:59	17:01:19	.. ..
52°	03:45:30	04:29:59	05:05:52	18:55:13	19:30:54	20:15:04	16:48:21	.. ..
50°	03:53:31	04:35:28	05:09:36	18:51:34	19:25:33	20:07:13	16:36:55	.. ..
45°	04:09:58	04:47:00	05:17:38	18:43:43	19:14:14	19:51:06	16:13:11	00:02:21
N 40°	04:22:45	04:56:16	05:24:19	18:37:11	19:05:08	19:38:32	15:54:09	00:21:05
35°	04:33:03	05:03:57	05:30:01	18:31:37	18:57:36	19:28:25	15:38:14	00:36:48
30°	04:41:33	05:10:29	05:35:00	18:26:43	18:51:12	19:20:03	15:24:27	00:50:26
20°	04:54:49	05:21:07	05:43:34	18:18:20	18:40:46	19:07:00	15:00:59	01:13:39
N 10°	05:04:46	05:29:38	05:50:58	18:11:05	18:32:24	18:57:14	14:40:42	01:33:44
0°	05:12:30	05:36:51	05:57:49	18:04:22	18:25:20	18:49:39	14:21:47	01:52:30
S 10°	05:18:40	05:43:17	06:04:32	17:57:46	18:19:01	18:43:38	14:02:53	02:11:15
20°	05:23:37	05:49:20	06:11:36	17:50:51	18:13:07	18:38:50	13:42:40	02:31:20
30°	05:27:30	05:55:21	06:19:31	17:43:04	18:07:15	18:35:07	13:19:20	02:54:32
35°	05:29:04	05:58:28	06:24:02	17:38:38	18:04:13	18:33:39	13:05:38	03:08:08
40°	05:30:20	06:01:45	06:29:07	17:33:38	18:01:01	18:32:29	12:49:51	03:23:51
45°	05:31:17	06:05:18	06:34:59	17:27:52	17:57:35	18:31:40	12:31:01	03:42:36
S 50°	05:31:50	06:09:14	06:41:58	17:21:00	17:53:47	18:31:16	12:07:33	04:05:58
52°	05:31:55	06:10:58	06:45:10	17:17:51	17:52:06	18:31:14	11:56:16	04:17:12
54°	05:31:55	06:12:48	06:48:41	17:14:24	17:50:20	18:31:19	11:43:30	04:29:55
56°	05:31:48	06:14:47	06:52:33	17:10:35	17:48:26	18:31:31	11:28:47	04:44:35
58°	05:31:34	06:16:55	06:56:51	17:06:21	17:46:22	18:31:51	11:11:28	05:01:51
S 60°	05:31:10	06:19:14	07:01:41	17:01:35	17:44:08	18:32:20	10:50:26	05:22:49

Aug 28	SHA	Mer.pass
Venus	248° 37.8	08:58:59
Mars	333° 26.8	03:19:04
Jupiter	70° 38.4	20:47:09
Saturn	61° 47.1	21:22:29

29 August 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	--	02:11:09	03:48:26	20:09:30	21:43:39	--	■	■
N 70°	--	02:44:34	04:04:03	19:54:30	21:12:16	--	■	■
68°	01:01:28	03:08:11	04:16:28	19:42:31	20:49:41	22:48:12	■	■
66°	01:52:52	03:26:17	04:26:38	19:32:41	20:32:15	22:02:46	20:27:53	22:38:12
64°	02:23:07	03:40:48	04:35:10	19:24:25	20:18:12	21:34:14	19:34:34	23:31:07
62°	02:45:09	03:52:47	04:42:26	19:17:22	20:06:34	21:13:06	19:02:07	.. ..
60°	03:02:27	04:02:54	04:48:44	19:11:15	19:56:43	20:56:23	18:37:58	.. ..
N 58°	03:16:36	04:11:36	04:54:16	19:05:52	19:48:14	20:42:39	18:18:38	.. ..
56°	03:28:29	04:19:10	04:59:09	19:01:06	19:40:51	20:31:04	18:02:30	.. ..
54°	03:38:41	04:25:50	05:03:32	18:56:50	19:34:20	20:21:07	17:48:42	00:09:59
52°	03:47:33	04:31:45	05:07:30	18:52:59	19:28:32	20:12:26	17:36:38	00:22:53
50°	03:55:21	04:37:04	05:11:05	18:49:29	19:23:20	20:04:48	17:25:56	00:34:16
45°	04:11:23	04:48:16	05:18:50	18:41:55	19:12:22	19:49:04	17:03:34	00:57:54
N 40°	04:23:52	04:57:17	05:25:15	18:35:38	19:03:32	19:36:49	16:45:32	01:16:48
35°	04:33:55	05:04:45	05:30:45	18:30:16	18:56:13	19:26:57	16:30:22	01:32:38
30°	04:42:12	05:11:04	05:35:33	18:25:34	18:50:00	19:18:48	16:17:11	01:46:20
20°	04:55:08	05:21:23	05:43:48	18:17:30	18:39:53	19:06:06	15:54:42	02:09:37
N 10°	05:04:47	05:29:37	05:50:56	18:10:31	18:31:49	18:56:37	15:35:12	02:29:44
0°	05:12:15	05:36:34	05:57:31	18:04:04	18:25:00	18:49:18	15:16:58	02:48:29
S 10°	05:18:10	05:42:45	06:03:59	17:57:43	18:18:57	18:43:32	14:58:43	03:07:12
20°	05:22:50	05:48:32	06:10:46	17:51:04	18:13:19	18:39:01	14:39:10	03:27:12
30°	05:26:25	05:54:14	06:18:22	17:43:37	18:07:46	18:35:36	14:16:35	03:50:15
35°	05:27:47	05:57:11	06:22:42	17:39:21	18:04:54	18:34:19	14:03:20	04:03:45
40°	05:28:52	06:00:16	06:27:35	17:34:34	18:01:55	18:33:22	13:48:03	04:19:19
45°	05:29:35	06:03:35	06:33:13	17:29:03	17:58:43	18:32:46	13:29:49	04:37:50
S 50°	05:29:51	06:07:14	06:39:54	17:22:28	17:55:11	18:32:38	13:07:07	05:00:52
52°	05:29:49	06:08:50	06:42:58	17:19:27	17:53:38	18:32:45	12:56:13	05:11:54
54°	05:29:40	06:10:32	06:46:20	17:16:08	17:52:00	18:32:58	12:43:54	05:24:23
56°	05:29:24	06:12:21	06:50:03	17:12:30	17:50:15	18:33:19	12:29:44	05:38:42
58°	05:29:00	06:14:19	06:54:10	17:08:27	17:48:22	18:33:49	12:13:07	05:55:30
S 60°	05:28:25	06:16:27	06:58:47	17:03:54	17:46:19	18:34:30	11:53:01	06:15:47

Aug 29	SHA	Mer.pass
Venus	247° 31.1	08:59:29
Mars	333° 17.0	03:15:47
Jupiter	70° 41.5	20:43:02
Saturn	61° 50.1	21:18:21

Day	Sun		Moon		
	Eqn. of Time	Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup> mm:ss	mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	
28	01:15	01:06	12:01:06	20:35:10	9(78%)
29	00:57	00:47	12:00:47	21:29:54	10(86%)

# 2020 August 30 to Aug. 31

30 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	02:19:11	03:53:30	20:03:53	21:35:24	—:—	■
N 70°	—:—	02:50:27	04:08:21	19:49:37	21:05:56	—:—	■
68°	01:14:18	03:12:55	04:20:12	19:38:12	20:44:26	22:36:42	21:06:18
66°	01:59:39	03:30:15	04:29:56	19:28:48	20:27:43	21:55:42	20:17:45
64°	02:28:06	03:44:13	04:38:05	19:20:54	20:14:12	21:28:47	19:46:36
62°	02:49:10	03:55:47	04:45:04	19:14:08	20:02:59	21:08:34	19:23:12
60°	03:05:49	04:05:34	04:51:06	19:08:16	19:53:27	20:52:27	19:04:27
N 58°	03:19:30	04:13:58	04:56:24	19:03:07	19:45:15	20:39:09	18:48:49
56°	03:31:03	04:21:18	05:01:07	18:58:32	19:38:06	20:27:55	18:35:28
54°	03:40:57	04:27:46	05:05:19	18:54:26	19:31:47	20:18:14	18:23:50
52°	03:49:35	04:33:31	05:09:07	18:50:44	19:26:10	20:09:48	18:13:33
50°	03:57:11	04:38:40	05:12:34	18:47:22	19:21:07	20:02:22	18:04:21
45°	04:12:48	04:49:33	05:20:01	18:40:07	19:10:28	19:47:02	17:44:54
N 40°	04:24:59	04:58:17	05:26:12	18:34:05	19:01:54	19:35:05	17:29:02
35°	04:34:46	05:05:31	05:31:29	18:28:55	18:54:49	19:25:28	17:15:36
30°	04:42:51	05:11:40	05:36:06	18:24:24	18:48:48	19:17:32	17:03:53
20°	04:55:26	05:21:38	05:44:02	18:16:39	18:39:01	19:05:10	16:43:46
N 10°	05:04:47	05:29:35	05:50:53	18:09:57	18:31:13	18:56:00	16:26:14
0°	05:12:00	05:36:17	05:57:12	18:03:45	18:24:40	18:48:56	16:09:49
S 10°	05:17:38	05:42:13	06:03:25	17:57:40	18:18:53	18:43:27	15:53:22
20°	05:22:02	05:47:43	06:09:56	17:51:18	18:13:31	18:39:12	15:35:44
30°	05:25:18	05:53:07	06:17:13	17:44:09	18:08:16	18:36:06	15:15:23
35°	05:26:30	05:55:52	06:21:22	17:40:05	18:05:36	18:35:00	15:03:28
40°	05:27:23	05:58:46	06:26:02	17:35:30	18:02:48	18:34:14	14:49:45
45°	05:27:52	06:01:50	06:31:26	17:30:13	17:59:50	18:33:53	14:33:28
S 50°	05:27:52	06:05:13	06:37:50	17:23:56	17:56:35	18:34:02	14:13:21
52°	05:27:42	06:06:42	06:40:46	17:21:03	17:55:10	18:34:16	14:03:46
54°	05:27:25	06:08:15	06:43:59	17:17:53	17:53:41	18:34:38	13:53:00
56°	05:26:59	06:09:55	06:47:31	17:14:25	17:52:05	18:35:08	13:40:44
58°	05:26:25	06:11:43	06:51:27	17:10:33	17:50:22	18:35:48	13:26:32
S 60°	05:25:39	06:13:39	06:55:52	17:06:13	17:48:31	18:36:41	13:09:43

Aug 30	SHA	Mer.pass
Venus	246° 24.1	09:00:01
Mars	333° 08.0	03:12:26
Jupiter	70° 44.4	20:38:55
Saturn	61° 53.0	21:14:14

31 August 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	02:26:49	03:58:31	19:58:19	21:27:29	—:—	■
N 70°	—:—	02:56:10	04:12:37	19:44:46	20:59:45	—:—	■
68°	01:25:11	03:17:33	04:23:55	19:33:53	20:39:16	22:26:26	20:37:26
66°	02:06:05	03:34:10	04:33:12	19:24:55	20:23:14	21:48:57	20:11:31
64°	02:32:57	03:47:36	04:41:01	19:17:22	20:10:14	21:23:27	19:51:21
62°	02:53:06	03:58:45	04:47:41	19:10:54	19:59:24	21:04:05	19:34:55
60°	03:09:09	04:08:12	04:53:28	19:05:17	19:50:12	20:48:33	19:21:08
N 58°	03:22:23	04:16:21	04:58:33	19:00:21	19:42:16	20:35:41	19:09:19
56°	03:33:34	04:23:27	05:03:04	18:55:58	19:35:21	20:24:47	18:59:01
54°	03:43:12	04:29:42	05:07:06	18:52:02	19:29:14	20:15:23	18:49:54
52°	03:51:35	04:35:16	05:10:45	18:48:29	19:23:47	20:07:10	18:41:45
50°	03:58:59	04:40:16	05:14:04	18:45:15	19:18:54	19:59:56	18:34:23
45°	04:14:13	04:50:49	05:21:13	18:38:18	19:08:35	19:45:00	18:18:39
N 40°	04:26:05	04:59:17	05:27:08	18:32:30	19:00:17	19:33:22	18:05:41
35°	04:35:38	05:06:18	05:32:13	18:27:34	18:53:24	19:23:59	17:54:37
30°	04:43:30	05:12:15	05:36:39	18:23:13	18:47:35	19:16:15	17:44:53
20°	04:55:43	05:21:54	05:44:16	18:15:47	18:38:08	19:04:15	17:28:08
N 10°	05:04:47	05:29:34	05:50:50	18:09:22	18:30:37	18:55:22	17:13:28
0°	05:11:44	05:36:00	05:56:54	18:03:26	18:24:20	18:48:35	16:59:41
S 10°	05:17:07	05:41:40	06:02:51	17:57:37	18:18:48	18:43:21	16:45:52
20°	05:21:14	05:46:53	06:09:05	17:51:31	18:13:43	18:39:23	16:31:04
30°	05:24:11	05:51:58	06:16:03	17:44:41	18:08:47	18:36:36	16:14:03
35°	05:25:12	05:54:34	06:20:02	17:40:48	18:06:17	18:35:40	16:04:06
40°	05:25:53	05:57:15	06:24:29	17:36:25	18:03:42	18:35:07	15:52:43
45°	05:26:08	06:00:05	06:29:38	17:31:23	18:00:58	18:34:59	15:39:16
S 50°	05:25:51	06:03:12	06:35:44	17:25:24	17:58:00	18:35:25	15:22:49
52°	05:25:33	06:04:32	06:38:33	17:22:39	17:56:43	18:35:47	15:15:04
54°	05:25:08	06:05:57	06:41:37	17:19:38	17:55:22	18:36:18	15:06:26
56°	05:24:33	06:07:28	06:44:59	17:16:19	17:53:55	18:36:57	14:56:42
58°	05:23:48	06:09:05	06:48:44	17:12:39	17:52:23	18:37:48	14:45:35
S 60°	05:22:51	06:10:50	06:52:56	17:08:31	17:50:43	18:38:52	14:32:43

Aug 31	SHA	Mer.pass
Venus	245° 17.0	09:00:33
Mars	332° 59.7	03:09:03
Jupiter	70° 47.2	20:34:48
Saturn	61° 55.9	21:10:07

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
30	00:38	00:29	12:00:29	22:22:05	09:56:21	11(93%)
31	00:19	00:10	12:00:10	23:11:13	10:47:03	12(97%)

# 2020 September 01 to Sep. 02

01 September 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	—:—	02:34:07	04:03:28	19:52:47	21:19:51	—:—	21:08:24	00:21:26
N 70°	—:—	03:01:44	04:16:52	19:39:56	20:53:40	—:—	20:42:14	01:24:43
68°	01:34:49	03:22:07	04:27:37	19:29:35	20:34:09	22:17:03	20:22:15	01:59:45
66°	02:12:14	03:38:02	04:36:28	19:21:02	20:18:47	21:42:26	20:06:16	02:24:39
64°	02:37:39	03:50:58	04:43:55	19:13:50	20:06:16	21:18:14	19:53:04	02:43:55
62°	02:56:57	04:01:43	04:50:18	19:07:39	19:55:50	20:59:40	19:41:54	02:59:32
60°	03:12:25	04:10:50	04:55:50	19:02:17	19:46:57	20:44:41	19:32:18	03:12:34
N 58°	03:25:14	04:18:42	05:00:42	18:57:34	19:39:17	20:32:14	19:23:55	03:23:42
56°	03:36:05	04:25:34	05:05:01	18:53:23	19:32:35	20:21:39	19:16:30	03:33:23
54°	03:45:26	04:31:38	05:08:53	18:49:37	19:26:40	20:12:32	19:09:52	03:41:55
52°	03:53:35	04:37:01	05:12:22	18:46:13	19:21:24	20:04:33	19:03:53	03:49:31
50°	04:00:48	04:41:52	05:15:33	18:43:08	19:16:40	19:57:30	18:58:27	03:56:21
45°	04:15:37	04:52:05	05:22:24	18:36:28	19:06:41	19:42:58	18:46:43	04:10:56
N 40°	04:27:11	05:00:17	05:28:05	18:30:56	18:58:38	19:31:38	18:36:57	04:22:53
35°	04:36:29	05:07:05	05:32:56	18:26:12	18:51:59	19:22:30	18:28:34	04:33:02
30°	04:44:08	05:12:50	05:37:12	18:22:02	18:46:22	19:14:59	18:21:10	04:41:54
20°	04:56:01	05:22:09	05:44:29	18:14:55	18:37:14	19:03:19	18:08:21	04:57:05
N 10°	05:04:47	05:29:32	05:50:47	18:08:47	18:30:01	18:54:44	17:57:05	05:10:16
0°	05:11:27	05:35:42	05:56:35	18:03:07	18:23:59	18:48:13	17:46:30	05:22:34
S 10°	05:16:34	05:41:06	06:02:17	17:57:33	18:18:43	18:43:15	17:35:52	05:34:47
20°	05:20:25	05:46:03	06:08:14	17:51:44	18:13:55	18:39:34	17:24:29	05:47:46
30°	05:23:03	05:50:50	06:14:53	17:45:13	18:09:18	18:37:05	17:11:26	06:02:31
35°	05:23:54	05:53:14	06:18:40	17:41:31	18:06:59	18:36:21	17:03:51	06:11:03
40°	05:24:22	05:55:43	06:22:56	17:37:21	18:04:36	18:36:00	16:55:11	06:20:43
45°	05:24:23	05:58:19	06:27:50	17:32:33	18:02:06	18:36:07	16:45:02	06:32:00
S 50°	05:23:49	06:01:09	06:33:39	17:26:52	17:59:25	18:36:50	16:32:43	06:45:36
52°	05:23:24	06:02:22	06:36:19	17:24:15	17:58:16	18:37:19	16:26:58	06:51:55
54°	05:22:50	06:03:39	06:39:14	17:21:23	17:57:03	18:37:58	16:20:37	06:58:54
56°	05:22:06	06:05:00	06:42:27	17:18:14	17:55:46	18:38:47	16:13:31	07:06:39
58°	05:21:11	06:06:27	06:46:00	17:14:45	17:54:24	18:39:48	16:05:30	07:15:22
S 60°	05:20:02	06:08:00	06:50:00	17:10:50	17:52:56	18:41:04	15:56:22	07:25:16

Sep 01	SHA	Mer.pass
Venus	244°09.6	09:01:06
Mars	332°52.1	03:05:37
Jupiter	70°49.7	20:30:43
Saturn	61°58.7	21:06:00

02 September 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	—:—	02:41:08	04:08:22	19:47:18	21:12:27	—:—	20:36:30	03:07:12
N 70°	00:31:13	03:07:11	04:21:04	19:35:07	20:47:43	23:06:14	20:22:22	03:31:41
68°	01:43:34	03:26:36	04:31:17	19:25:17	20:29:05	22:08:20	20:10:55	03:50:11
66°	02:18:07	03:41:52	04:39:43	19:17:09	20:14:21	21:36:08	20:01:25	04:04:53
64°	02:42:13	03:54:17	04:46:50	19:10:17	20:02:20	21:13:08	19:53:22	04:16:57
62°	03:00:44	04:04:39	04:52:55	19:04:24	19:52:16	20:55:18	19:46:26	04:27:05
60°	03:15:39	04:13:27	04:58:12	18:59:17	19:43:42	20:40:51	19:40:23	04:35:45
N 58°	03:28:03	04:21:03	05:02:50	18:54:47	19:36:18	20:28:48	19:35:02	04:43:17
56°	03:38:34	04:27:41	05:06:58	18:50:47	19:29:50	20:18:33	19:30:16	04:49:56
54°	03:47:39	04:33:33	05:10:40	18:47:12	19:24:07	20:09:41	19:25:59	04:55:50
52°	03:55:35	04:38:46	05:14:00	18:43:57	19:19:01	20:01:56	19:22:06	05:01:09
50°	04:02:35	04:43:27	05:17:02	18:41:00	19:14:26	19:55:04	19:18:33	05:05:58
45°	04:17:01	04:53:20	05:23:35	18:34:38	19:04:46	19:40:56	19:10:50	05:16:17
N 40°	04:28:16	05:01:17	05:29:01	18:29:20	18:57:00	19:29:53	19:04:22	05:24:50
35°	04:37:20	05:07:51	05:33:40	18:24:49	18:50:34	19:21:00	18:58:48	05:32:08
30°	04:44:46	05:13:24	05:37:44	18:20:51	18:45:08	19:13:42	18:53:52	05:38:31
20°	04:56:18	05:22:24	05:44:43	18:14:03	18:36:20	19:02:23	18:45:17	05:49:31
N 10°	05:04:47	05:29:30	05:50:43	18:08:11	18:29:24	18:54:05	18:37:44	05:59:06
0°	05:11:11	05:35:24	05:56:16	18:02:47	18:23:38	18:47:51	18:30:37	06:08:01
S 10°	05:16:02	05:40:32	06:01:42	17:57:29	18:18:38	18:43:09	18:23:28	06:16:53
20°	05:19:35	05:45:13	06:07:22	17:51:57	18:14:06	18:39:45	18:15:51	06:26:17
30°	05:21:55	05:49:40	06:13:42	17:45:45	18:09:49	18:37:35	18:07:07	06:36:56
35°	05:22:34	05:51:54	06:17:19	17:42:14	18:07:40	18:37:02	18:02:03	06:43:03
40°	05:22:50	05:54:10	06:21:21	17:38:17	18:05:30	18:36:53	17:56:18	06:49:59
45°	05:22:37	05:56:33	06:26:01	17:33:44	18:03:14	18:37:14	17:49:36	06:58:00
S 50°	05:21:46	05:59:05	06:31:32	17:28:19	18:00:50	18:38:14	17:41:31	07:07:36
52°	05:21:13	06:00:11	06:34:04	17:25:51	17:59:48	18:38:52	17:37:46	07:12:01
54°	05:20:31	06:01:19	06:36:51	17:23:08	17:58:44	18:39:39	17:33:39	07:16:52
56°	05:19:37	06:02:31	06:39:53	17:20:09	17:57:37	18:40:38	17:29:04	07:22:14
58°	05:18:32	06:03:47	06:43:16	17:16:51	17:56:25	18:41:50	17:23:57	07:28:12
S 60°	05:17:11	06:05:09	06:47:03	17:13:08	17:55:09	18:43:17	17:18:10	07:34:55

Sep 02	SHA	Mer.pass
Venus	243°02.0	09:01:40
Mars	332°45.4	03:02:08
Jupiter	70°52.1	20:26:38
Saturn	62°01.4	21:01:54

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time	12h		Upper	Lower	
	mm:ss	mm:ss	hh:mm:ss	hh:mm:ss	hh:mm:ss	
01	00:00	00:09	11:59:51	23:57:20	11:34:38	13(99%)
02	00:19	00:29	11:59:31	--	12:19:23	14(100%)

# 2020 September 03 to Sep. 04

03 September 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	—:—	02:47:54	04:13:14	19:41:51	21:05:15	—:—	20:12:44	05:09:50
N 70°	00:53:51	03:12:30	04:25:15	19:30:19	20:41:51	22:50:02	20:06:24	05:21:49
68°	01:51:39	03:31:01	04:34:57	19:21:00	20:24:05	22:00:08	20:01:09	05:31:20
66°	02:23:46	03:45:39	04:42:58	19:13:17	20:09:58	21:30:01	19:56:44	05:39:20
64°	02:46:41	03:57:35	04:49:43	19:06:45	19:58:24	21:08:07	19:52:57	05:45:59
62°	03:04:27	04:07:34	04:55:31	19:01:09	19:48:43	20:50:59	19:49:40	05:51:39
60°	03:18:50	04:16:03	05:00:33	18:56:17	19:40:28	20:37:03	19:46:47	05:56:35
N 58°	03:30:50	04:23:23	05:04:59	18:52:00	19:33:19	20:25:23	19:44:13	06:00:54
56°	03:41:02	04:29:48	05:08:55	18:48:11	19:27:04	20:15:27	19:41:55	06:04:45
54°	03:49:51	04:35:28	05:12:26	18:44:46	19:21:33	20:06:51	19:39:51	06:08:11
52°	03:57:33	04:40:31	05:15:37	18:41:40	19:16:37	19:59:19	19:37:58	06:11:17
50°	04:04:22	04:45:02	05:18:31	18:38:52	19:12:12	19:52:39	19:36:14	06:14:06
45°	04:18:24	04:54:36	05:24:46	18:32:47	19:02:51	19:38:53	19:32:28	06:20:12
N 40°	04:29:22	05:02:17	05:29:58	18:27:45	18:55:21	19:28:09	19:29:19	06:25:16
35°	04:38:10	05:08:37	05:34:24	18:23:26	18:49:09	19:19:31	19:26:34	06:29:36
30°	04:45:24	05:13:59	05:38:17	18:19:39	18:43:54	19:12:25	19:24:09	06:33:25
20°	04:56:35	05:22:38	05:44:56	18:13:11	18:35:26	19:01:27	19:19:56	06:40:00
N 10°	05:04:46	05:29:27	05:50:40	18:07:36	18:28:47	18:53:27	19:16:13	06:45:44
0°	05:10:53	05:35:06	05:55:56	18:02:27	18:23:17	18:47:29	19:12:43	06:51:05
S 10°	05:15:28	05:39:58	06:01:06	17:57:25	18:18:33	18:43:03	19:09:12	06:56:23
20°	05:18:45	05:44:22	06:06:30	17:52:09	18:14:18	18:39:55	19:05:28	07:02:00
30°	05:20:46	05:48:30	06:12:31	17:46:17	18:10:19	18:38:05	19:01:12	07:08:20
35°	05:21:14	05:50:33	06:15:56	17:42:57	18:08:22	18:37:43	18:58:44	07:11:58
40°	05:21:18	05:52:37	06:19:47	17:39:12	18:06:24	18:37:46	18:55:57	07:16:04
45°	05:20:50	05:54:46	06:24:12	17:34:54	18:04:23	18:38:22	18:52:42	07:20:48
S 50°	05:19:43	05:57:01	06:29:25	17:29:47	18:02:15	18:39:39	18:48:48	07:26:25
52°	05:19:01	05:57:59	06:31:49	17:27:27	18:01:22	18:40:25	18:47:00	07:29:00
54°	05:18:10	05:58:58	06:34:27	17:24:53	18:00:26	18:41:21	18:45:02	07:31:49
56°	05:17:08	06:00:01	06:37:20	17:22:04	17:59:28	18:42:29	18:42:51	07:34:55
58°	05:15:51	06:01:07	06:40:31	17:18:57	17:58:27	18:43:52	18:40:26	07:38:21
S 60°	05:14:19	06:02:17	06:44:06	17:15:27	17:57:22	18:45:31	18:37:42	07:42:12

Sep 03	SHA	Mer.pass
Venus	241°54.3	09:02:15
Mars	332°39.4	02:58:35
Jupiter	70°54.3	20:22:35
Saturn	62°04.0	20:57:48

04 September 2020								
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise	Moonset
	Naut.	Civil			Civil	Naut.		
N 72°	—:—	02:54:27	04:18:03	19:36:25	20:58:15	—:—	19:51:43	07:01:02
N 70°	01:09:23	03:17:43	04:29:25	19:25:32	20:36:05	22:36:44	19:51:53	07:04:36
68°	01:59:12	03:35:22	04:38:36	19:16:43	20:19:08	21:52:21	19:52:01	07:07:30
66°	02:29:14	03:49:23	04:46:12	19:09:24	20:05:36	21:24:05	19:52:09	07:09:55
64°	02:51:03	04:00:51	04:52:37	19:03:13	19:54:30	21:03:11	19:52:15	07:11:58
62°	03:08:07	04:10:28	04:58:07	18:57:54	19:45:11	20:46:44	19:52:21	07:13:44
60°	03:21:59	04:18:39	05:02:54	18:53:16	19:37:14	20:33:17	19:52:26	07:15:16
N 58°	03:33:35	04:25:43	05:07:07	18:49:12	19:30:20	20:22:00	19:52:30	07:16:38
56°	03:43:28	04:31:55	05:10:52	18:45:34	19:24:19	20:12:22	19:52:34	07:17:50
54°	03:52:01	04:37:23	05:14:13	18:42:19	19:18:59	20:04:01	19:52:38	07:18:55
52°	03:59:31	04:42:15	05:17:15	18:39:23	19:14:14	19:56:42	19:52:41	07:19:54
50°	04:06:08	04:46:37	05:20:00	18:36:43	19:09:57	19:50:13	19:52:44	07:20:48
45°	04:19:47	04:55:51	05:25:57	18:30:56	19:00:56	19:36:51	19:52:52	07:22:44
N 40°	04:30:27	05:03:16	05:30:54	18:26:08	18:53:42	19:26:24	19:52:58	07:24:20
35°	04:39:00	05:09:23	05:35:07	18:22:02	18:47:43	19:18:01	19:53:03	07:25:43
30°	04:46:02	05:14:33	05:38:49	18:18:27	18:42:40	19:11:07	19:53:08	07:26:55
20°	04:56:52	05:22:53	05:45:09	18:12:18	18:34:32	19:00:30	19:53:18	07:29:01
N 10°	05:04:45	05:29:24	05:50:36	18:07:00	18:28:10	18:52:48	19:53:27	07:30:49
0°	05:10:36	05:34:47	05:55:36	18:02:07	18:22:56	18:47:06	19:53:36	07:32:30
S 10°	05:14:55	05:39:23	06:00:31	17:57:20	18:18:28	18:42:56	19:53:46	07:34:10
20°	05:17:55	05:43:30	06:05:38	17:52:22	18:14:30	18:40:06	19:53:57	07:35:55
30°	05:19:36	05:47:20	06:11:19	17:46:49	18:10:50	18:38:35	19:54:11	07:37:53
35°	05:19:54	05:49:12	06:14:34	17:43:40	18:09:04	18:38:24	19:54:19	07:39:01
40°	05:19:44	05:51:04	06:18:11	17:40:08	18:07:18	18:38:40	19:54:28	07:40:16
45°	05:19:02	05:52:58	06:22:22	17:36:04	18:05:31	18:39:30	19:54:40	07:41:43
S 50°	05:17:38	05:54:56	06:27:18	17:31:15	18:03:41	18:41:05	19:54:53	07:43:26
52°	05:16:49	05:55:46	06:29:34	17:29:03	18:02:55	18:41:58	19:55:00	07:44:14
54°	05:15:49	05:56:37	06:32:02	17:26:38	18:02:08	18:43:03	19:55:07	07:45:05
56°	05:14:37	05:57:30	06:34:45	17:23:59	18:01:20	18:44:21	19:55:15	07:46:01
58°	05:13:10	05:58:26	06:37:46	17:21:03	18:00:29	18:45:54	19:55:24	07:47:04
S 60°	05:11:25	05:59:24	06:41:08	17:17:45	17:59:36	18:47:46	19:55:34	07:48:13

Sep 04	SHA	Mer.pass
Venus	240°46.4	09:02:50
Mars	332°34.2	02:54:59
Jupiter	70°56.2	20:18:32
Saturn	62°06.5	20:53:42

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
03	00:38	00:48	11:59:12	00:40:54	13:01:57	15(98%)
04	00:58	01:08	11:58:52	01:22:38	13:43:04	16(95%)

# 2020 September 05 to Sep. 06

05 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	—:—	03:00:48	04:22:49	19:31:02	20:51:25	—:—	19:30:46
N 70°	01:22:02	03:22:50	04:33:33	19:20:46	20:30:24	22:25:07	19:37:26
68°	02:06:19	03:39:40	04:42:13	19:12:27	20:14:13	21:44:56	19:42:56
66°	02:34:30	03:53:05	04:49:25	19:05:32	20:01:16	21:18:17	19:47:34
64°	02:55:19	04:04:06	04:55:30	18:59:40	19:50:37	20:58:20	19:51:32
62°	03:11:42	04:13:20	05:00:43	18:54:38	19:41:39	20:42:31	19:54:59
60°	03:25:06	04:21:13	05:05:16	18:50:15	19:34:00	20:29:32	19:58:01
N 58°	03:36:19	04:28:02	05:09:15	18:46:24	19:27:22	20:18:38	20:00:43
56°	03:45:54	04:34:00	05:12:49	18:42:58	19:21:33	20:09:17	20:03:08
54°	03:54:11	04:39:17	05:16:00	18:39:53	19:16:25	20:01:12	20:05:19
52°	04:01:28	04:43:59	05:18:52	18:37:06	19:11:50	19:54:05	20:07:18
50°	04:07:54	04:48:12	05:21:30	18:34:33	19:07:43	19:47:48	20:09:07
45°	04:21:10	04:57:06	05:27:09	18:29:05	18:59:01	19:34:48	20:13:05
N 40°	04:31:31	05:04:15	05:31:50	18:24:32	18:52:02	19:24:39	20:16:25
35°	04:39:50	05:10:09	05:35:51	18:20:38	18:46:16	19:16:30	20:19:19
30°	04:46:39	05:15:08	05:39:21	18:17:14	18:41:25	19:09:49	20:21:54
20°	04:57:08	05:23:07	05:45:22	18:11:24	18:33:37	18:59:34	20:26:23
N 10°	05:04:43	05:29:22	05:50:32	18:06:23	18:27:32	18:52:09	20:30:23
0°	05:10:18	05:34:28	05:55:16	18:01:47	18:22:35	18:46:44	20:34:09
S 10°	05:14:21	05:38:49	05:59:55	17:57:16	18:18:22	18:42:50	20:37:57
20°	05:17:04	05:42:39	06:04:45	17:52:34	18:14:41	18:40:17	20:42:02
30°	05:18:26	05:46:09	06:10:07	17:47:21	18:11:21	18:39:06	20:46:42
35°	05:18:32	05:47:50	06:13:10	17:44:23	18:09:45	18:39:05	20:49:25
40°	05:18:11	05:49:29	06:16:36	17:41:04	18:08:12	18:39:34	20:52:30
45°	05:17:14	05:51:09	06:20:31	17:37:15	18:06:40	18:40:39	20:56:06
S 50°	05:15:32	05:52:50	06:25:10	17:32:43	18:05:07	18:42:31	21:00:25
52°	05:14:35	05:53:32	06:27:18	17:30:39	18:04:29	18:43:33	21:02:25
54°	05:13:26	05:54:15	06:29:37	17:28:23	18:03:50	18:44:46	21:04:37
56°	05:12:04	05:54:59	06:32:10	17:25:54	18:03:11	18:46:14	21:07:02
58°	05:10:27	05:55:44	06:35:00	17:23:09	18:02:31	18:47:58	21:09:45
S 60°	05:08:30	05:56:31	06:38:10	17:20:04	18:01:50	18:50:02	21:12:47

Sep 05	SHA	Mer.pass
Venus	239°38.4	09:03:26
Mars	332°29.8	02:51:21
Jupiter	70°58.0	20:14:29
Saturn	62°08.9	20:49:37

06 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	00:11:45	03:06:59	04:27:34	19:25:40	20:44:43	23:45:47	19:07:22
N 70°	01:33:00	03:27:51	04:37:39	19:16:01	20:24:48	22:14:38	19:21:43
68°	02:13:05	03:43:55	04:45:50	19:08:11	20:09:22	21:37:49	19:33:19
66°	02:39:38	03:56:45	04:52:38	19:01:39	19:56:58	21:12:38	19:42:57
64°	02:59:30	04:07:19	04:58:23	18:56:08	19:46:45	20:53:34	19:51:07
62°	03:15:15	04:16:12	05:03:19	18:51:23	19:38:08	20:38:21	19:58:08
60°	03:28:10	04:23:47	05:07:37	18:47:14	19:30:46	20:25:50	20:04:16
N 58°	03:39:01	04:30:21	05:11:24	18:43:35	19:24:23	20:15:16	20:09:40
56°	03:48:18	04:36:06	05:14:45	18:40:20	19:18:47	20:06:14	20:14:30
54°	03:56:20	04:41:11	05:17:46	18:37:26	19:13:51	19:58:23	20:18:51
52°	04:03:24	04:45:43	05:20:30	18:34:48	19:09:26	19:51:29	20:22:47
50°	04:09:39	04:49:47	05:22:59	18:32:24	19:05:28	19:45:23	20:26:23
45°	04:22:32	04:58:21	05:28:20	18:27:13	18:57:05	19:32:46	20:34:12
N 40°	04:32:36	05:05:15	05:32:47	18:22:55	18:50:22	19:22:54	20:40:46
35°	04:40:40	05:10:55	05:36:34	18:19:14	18:44:50	19:15:00	20:46:26
30°	04:47:16	05:15:42	05:39:54	18:16:01	18:40:10	19:08:32	20:51:27
20°	04:57:24	05:23:21	05:45:34	18:10:31	18:32:42	18:58:37	21:00:12
N 10°	05:04:42	05:29:18	05:50:27	18:05:47	18:26:55	18:51:30	21:07:56
0°	05:10:00	05:34:09	05:54:56	18:01:26	18:22:13	18:46:21	21:15:13
S 10°	05:13:46	05:38:13	05:59:19	17:57:11	18:18:17	18:42:44	21:22:34
20°	05:16:12	05:41:46	06:03:52	17:52:47	18:14:53	18:40:28	21:30:26
30°	05:17:15	05:44:58	06:08:55	17:47:53	18:11:51	18:39:36	21:39:28
35°	05:17:10	05:46:27	06:11:47	17:45:06	18:10:27	18:39:47	21:44:43
40°	05:16:36	05:47:54	06:14:59	17:41:59	18:09:07	18:40:28	21:50:41
45°	05:15:25	05:49:20	06:18:40	17:38:25	18:07:49	18:41:48	21:57:40
S 50°	05:13:25	05:50:44	06:23:02	17:34:11	18:06:33	18:43:57	22:06:05
52°	05:12:20	05:51:18	06:25:01	17:32:15	18:06:03	18:45:07	22:10:00
54°	05:11:03	05:51:52	06:27:12	17:30:08	18:05:33	18:46:30	22:14:18
56°	05:09:31	05:52:26	06:29:35	17:27:49	18:05:04	18:48:07	22:19:05
58°	05:07:43	05:53:01	06:32:14	17:25:15	18:04:34	18:50:03	22:24:26
S 60°	05:05:34	05:53:36	06:35:11	17:22:23	18:04:05	18:52:19	22:30:29

Sep 06	SHA	Mer.pass
Venus	238°30.2	09:04:02
Mars	332°26.2	02:47:39
Jupiter	70°59.5	20:10:28
Saturn	62°11.3	20:45:32

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
	mm:ss	mm:ss	hh:mm:ss	hh:mm:ss	hh:mm:ss	
05	01:18	01:28	11:58:32	02:03:22	14:23:38	17(90%)
06	01:39	01:49	11:58:11	02:43:58	15:04:29	18(84%)

# 2020 September 07 to Sep. 08

07 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	00:11:46	03:13:00	04:32:16	19:20:20	20:38:10	23:09:50	18:36:32
N 70°	01:42:48	03:32:48	04:41:44	19:11:17	20:19:16	22:04:58	19:02:30
68°	02:19:31	03:48:06	04:49:26	19:03:55	20:04:33	21:30:57	19:22:20
66°	02:44:37	04:00:23	04:55:50	18:57:47	19:52:42	21:07:06	19:38:14
64°	03:03:36	04:10:31	05:01:15	18:52:35	19:42:53	20:48:52	19:51:21
62°	03:18:44	04:19:03	05:05:54	18:48:07	19:34:38	20:34:14	20:02:27
60°	03:31:12	04:26:20	05:09:57	18:44:13	19:27:33	20:22:09	20:12:00
N 58°	03:41:41	04:32:39	05:13:32	18:40:46	19:21:25	20:11:56	20:20:21
56°	03:50:41	04:38:11	05:16:42	18:37:43	19:16:02	20:03:11	20:27:44
54°	03:58:29	04:43:04	05:19:33	18:34:58	19:11:16	19:55:34	20:34:20
52°	04:05:19	04:47:26	05:22:07	18:32:29	19:07:01	19:48:53	20:40:18
50°	04:11:23	04:51:21	05:24:28	18:30:14	19:03:13	19:42:58	20:45:43
45°	04:23:54	04:59:36	05:29:31	18:25:21	18:55:10	19:30:43	20:57:24
N 40°	04:33:40	05:06:14	05:33:43	18:21:17	18:48:42	19:21:10	21:07:09
35°	04:41:29	05:11:41	05:37:18	18:17:50	18:43:23	19:13:30	21:15:31
30°	04:47:53	05:16:16	05:40:26	18:14:48	18:38:55	19:07:14	21:22:55
20°	04:57:40	05:23:35	05:45:47	18:09:37	18:31:47	18:57:40	21:35:45
N 10°	05:04:40	05:29:15	05:50:23	18:05:10	18:26:17	18:50:51	21:47:02
0°	05:09:42	05:33:49	05:54:36	18:01:05	18:21:52	18:45:59	21:57:41
S 10°	05:13:12	05:37:38	05:58:42	17:57:07	18:18:12	18:42:38	22:08:23
20°	05:15:20	05:40:54	06:02:58	17:52:59	18:15:04	18:40:39	22:19:52
30°	05:16:03	05:43:46	06:07:42	17:48:25	18:12:22	18:40:06	22:33:05
35°	05:15:48	05:45:04	06:10:23	17:45:49	18:11:09	18:40:29	22:40:46
40°	05:15:01	05:46:19	06:13:23	17:42:55	18:10:01	18:41:23	22:49:33
45°	05:13:35	05:47:30	06:16:49	17:39:35	18:08:58	18:42:57	22:59:52
S 50°	05:11:18	05:48:37	06:20:53	17:35:40	18:07:59	18:45:24	23:12:23
52°	05:10:05	05:49:03	06:22:44	17:33:52	18:07:37	18:46:42	23:18:14
54°	05:08:38	05:49:28	06:24:46	17:31:54	18:07:16	18:48:14	23:24:43
56°	05:06:57	05:49:53	06:26:59	17:29:44	18:06:56	18:50:02	23:31:57
58°	05:04:57	05:50:17	06:29:27	17:27:21	18:06:38	18:52:08	23:40:07
S 60°	05:02:36	05:50:41	06:32:12	17:24:41	18:06:20	18:54:37	23:49:27

Sep 07	SHA	Mer.pass
Venus	237°21.9	09:04:39
Mars	332°23.5	02:43:53
Jupiter	71°00.8	20:06:28
Saturn	62°13.5	20:41:27

08 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	00:47:03	03:18:53	04:36:56	19:15:01	20:31:44	22:50:28	17:34:11
N 70°	01:51:47	03:37:39	04:45:49	19:06:34	20:13:48	21:55:57	18:33:18
68°	02:25:42	03:52:14	04:53:02	18:59:40	19:59:47	21:24:19	19:08:05
66°	02:49:27	04:03:59	04:59:02	18:53:55	19:48:26	21:01:41	19:33:15
64°	03:07:37	04:13:42	05:04:07	18:49:02	19:39:03	20:44:13	19:52:57
62°	03:22:11	04:21:53	05:08:30	18:44:51	19:31:08	20:30:09	20:09:02
60°	03:34:12	04:28:52	05:12:18	18:41:11	19:24:20	20:18:29	20:22:33
N 58°	03:44:20	04:34:56	05:15:40	18:37:57	19:18:27	20:08:38	20:34:10
56°	03:53:02	04:40:15	05:18:39	18:35:05	19:13:17	20:00:09	20:44:18
54°	04:00:36	04:44:57	05:21:20	18:32:30	19:08:42	19:52:47	20:53:16
52°	04:07:14	04:49:09	05:23:45	18:30:10	19:04:37	19:46:18	21:01:17
50°	04:13:07	04:52:55	05:25:57	18:28:03	19:00:57	19:40:33	21:08:32
45°	04:25:15	05:00:51	05:30:42	18:23:28	18:53:14	19:28:40	21:24:04
N 40°	04:34:43	05:07:13	05:34:39	18:19:40	18:47:02	19:19:25	21:36:52
35°	04:42:18	05:12:26	05:38:01	18:16:25	18:41:56	19:11:59	21:47:49
30°	04:48:30	05:16:49	05:40:58	18:13:34	18:37:40	19:05:56	21:57:26
20°	04:57:56	05:23:49	05:46:00	18:08:43	18:30:52	18:56:43	22:14:03
N 10°	05:04:37	05:29:11	05:50:18	18:04:33	18:25:39	18:50:12	22:28:37
0°	05:09:23	05:33:29	05:54:15	18:00:44	18:21:30	18:45:36	22:42:19
S 10°	05:12:37	05:37:02	05:58:06	17:57:02	18:18:06	18:42:31	22:56:05
20°	05:14:28	05:40:01	06:02:05	17:53:12	18:15:16	18:40:50	23:10:52
30°	05:14:51	05:42:33	06:06:29	17:48:56	18:12:53	18:40:37	23:27:54
35°	05:14:24	05:43:41	06:08:59	17:46:32	18:11:51	18:41:11	23:37:52
40°	05:13:25	05:44:43	06:11:46	17:43:51	18:10:56	18:42:17	23:49:17
45°	05:11:44	05:45:39	06:14:57	17:40:46	18:10:07	18:44:07	.. ..
S 50°	05:09:09	05:46:29	06:18:43	17:37:08	18:09:26	18:46:52	.. ..
52°	05:07:48	05:46:47	06:20:27	17:35:28	18:09:12	18:48:18	.. ..
54°	05:06:13	05:47:04	06:22:19	17:33:39	18:09:00	18:49:59	.. ..
56°	05:04:21	05:47:19	06:24:23	17:31:40	18:08:49	18:51:57	.. ..
58°	05:02:11	05:47:33	06:26:40	17:29:27	18:08:41	18:54:14	.. ..
S 60°	04:59:37	05:47:44	06:29:13	17:27:00	18:08:36	18:56:56	.. ..

Sep 08	SHA	Mer.pass
Venus	236°13.5	09:05:16
Mars	332°21.6	02:40:04
Jupiter	71°02.0	20:02:28
Saturn	62°15.7	20:37:23

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
07	01:59	02:09	11:57:51	03:25:18	15:46:31	19(76%)
08	02:20	02:30	11:57:30	04:08:13	16:30:31	20(68%)

# 2020 September 09 to Sep. 10

09 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	01:05:44	03:24:39	04:41:35	19:09:44	20:25:25	22:35:15	☐ ☐
N 70°	02:00:07	03:42:26	04:49:52	19:01:51	20:08:24	21:47:27	☐ ☐
68°	02:31:39	03:56:20	04:56:36	18:55:25	19:55:02	21:17:53	18:43:11 15:40:12
66°	02:54:11	04:07:34	05:02:13	18:50:03	19:44:13	20:56:23	19:27:41 14:56:25
64°	03:11:34	04:16:51	05:06:59	18:45:30	19:35:14	20:39:39	19:57:21 14:27:24
62°	03:25:34	04:24:41	05:11:05	18:41:34	19:27:38	20:26:07	20:19:53 14:05:27
60°	03:37:10	04:31:24	05:14:39	18:38:09	19:21:08	20:14:52	20:38:05 13:47:48
N 58°	03:46:58	04:37:13	05:17:48	18:35:08	19:15:29	20:05:20	20:53:17 13:33:06
56°	03:55:23	04:42:20	05:20:36	18:32:27	19:10:31	19:57:08	21:06:19 13:20:32
54°	04:02:42	04:46:50	05:23:06	18:30:02	19:06:08	19:50:00	21:17:41 13:09:36
52°	04:09:08	04:50:52	05:25:22	18:27:51	19:02:13	19:43:43	21:27:45 12:59:56
50°	04:14:50	04:54:29	05:27:26	18:25:52	18:58:42	19:38:09	21:36:46 12:51:17
45°	04:26:36	05:02:06	05:31:54	18:21:35	18:51:17	19:26:38	21:55:51 12:33:03
N 40°	04:35:47	05:08:11	05:35:35	18:18:02	18:45:21	19:17:40	22:11:27 12:18:13
35°	04:43:07	05:13:12	05:38:45	18:14:59	18:40:29	19:10:29	22:24:41 12:05:41
30°	04:49:06	05:17:23	05:41:30	18:12:20	18:36:24	19:04:38	22:36:14 11:54:47
20°	04:58:11	05:24:03	05:46:12	18:07:49	18:29:56	18:55:46	22:56:06 11:36:07
N 10°	05:04:35	05:29:08	05:50:14	18:03:56	18:25:01	18:49:33	23:13:27 11:19:54
0°	05:09:04	05:33:09	05:53:55	18:00:23	18:21:08	18:45:13	23:29:44 11:04:47
S 10°	05:12:01	05:36:26	05:57:29	17:56:57	18:18:00	18:42:25	23:46:05 10:49:43
20°	05:13:35	05:39:08	06:01:11	17:53:24	18:15:27	18:41:01	.. .. 10:33:38
30°	05:13:39	05:41:21	06:05:16	17:49:28	18:13:24	18:41:08	.. .. 10:15:14
35°	05:13:01	05:42:17	06:07:34	17:47:15	18:12:34	18:41:53	.. .. 10:04:32
40°	05:11:48	05:43:07	06:10:08	17:44:47	18:11:51	18:43:13	.. .. 09:52:19
45°	05:09:53	05:43:49	06:13:05	17:41:57	18:11:16	18:45:17	00:02:47 09:37:56
S 50°	05:07:00	05:44:21	06:16:34	17:38:36	18:10:53	18:48:20	00:19:18 09:20:25
52°	05:05:30	05:44:31	06:18:09	17:37:05	18:10:47	18:49:55	00:27:06 09:12:11
54°	05:03:46	05:44:39	06:19:53	17:35:25	18:10:44	18:51:45	00:35:48 09:03:01
56°	05:01:45	05:44:45	06:21:46	17:33:35	18:10:43	18:53:52	00:45:36 08:52:44
58°	04:59:23	05:44:48	06:23:52	17:31:34	18:10:46	18:56:21	00:56:47 08:41:00
S 60°	04:56:36	05:44:47	06:26:13	17:29:19	18:10:52	18:59:16	01:09:46 08:27:26

Sep 09	SHA	Mer.pass
Venus	235°05.0	09:05:54
Mars	332°20.5	02:36:12
Jupiter	71°02.9	19:58:29
Saturn	62°17.8	20:33:19

10 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	01:20:15	03:30:17	04:46:12	19:04:28	20:19:12	22:22:15	☐ ☐
N 70°	02:07:56	03:47:09	04:53:54	18:57:09	20:03:04	21:39:22	☐ ☐
68°	02:37:24	04:00:23	05:00:10	18:51:10	19:50:20	21:11:38	☐ ☐
66°	02:58:49	04:11:06	05:05:24	18:46:11	19:40:00	20:51:10	19:20:06 16:47:05
64°	03:15:27	04:19:59	05:09:51	18:41:57	19:31:25	20:35:08	20:08:15 15:59:21
62°	03:28:55	04:27:29	05:13:40	18:38:18	19:24:10	20:22:07	20:39:07 15:28:51
60°	03:40:06	04:33:55	05:17:00	18:35:07	19:17:56	20:11:16	21:02:24 15:05:54
N 58°	03:49:34	04:39:30	05:19:56	18:32:18	19:12:31	20:02:03	21:21:11 14:47:27
56°	03:57:43	04:44:23	05:22:32	18:29:48	19:07:46	19:54:07	21:36:54 14:32:01
54°	04:04:48	04:48:43	05:24:53	18:27:34	19:03:34	19:47:13	21:50:24 14:18:47
52°	04:11:01	04:52:35	05:27:00	18:25:32	18:59:49	19:41:08	22:02:13 14:07:13
50°	04:16:33	04:56:02	05:28:56	18:23:41	18:56:27	19:35:45	22:12:43 13:56:58
45°	04:27:57	05:03:20	05:33:05	18:19:42	18:49:21	19:24:36	22:34:43 13:35:31
N 40°	04:36:50	05:09:10	05:36:32	18:16:23	18:43:41	19:15:55	22:52:30 13:18:14
35°	04:43:56	05:13:57	05:39:28	18:13:34	18:39:02	19:08:58	23:07:28 13:03:43
30°	04:49:43	05:17:57	05:42:02	18:11:06	18:35:09	19:03:19	23:20:29 12:51:07
20°	04:58:27	05:24:16	05:46:25	18:06:54	18:29:01	18:54:48	23:42:45 12:29:38
N 10°	05:04:32	05:29:04	05:50:09	18:03:19	18:24:23	18:48:53	.. .. 12:11:01
0°	05:08:44	05:32:49	05:53:34	18:00:02	18:20:46	18:44:51	.. .. 11:53:40
S 10°	05:11:25	05:35:49	05:56:52	17:56:52	18:17:55	18:42:19	.. .. 11:36:20
20°	05:12:42	05:38:14	06:00:16	17:53:36	18:15:39	18:41:12	00:03:38 11:17:49
30°	05:12:26	05:40:08	06:04:02	17:50:00	18:13:55	18:41:39	00:23:56 10:56:31
35°	05:11:37	05:40:53	06:06:09	17:47:58	18:13:16	18:42:35	00:35:50 10:44:05
40°	05:10:11	05:41:30	06:08:31	17:45:43	18:12:46	18:44:08	00:49:32 10:29:48
45°	05:08:01	05:41:57	06:11:13	17:43:07	18:12:26	18:46:27	01:05:50 10:12:52
S 50°	05:04:50	05:42:12	06:14:23	17:40:05	18:12:20	18:49:49	01:25:59 09:52:00
52°	05:03:12	05:42:14	06:15:51	17:38:41	18:12:22	18:51:32	01:35:36 09:42:04
54°	05:01:19	05:42:13	06:17:25	17:37:10	18:12:28	18:53:31	01:46:24 09:30:56
56°	04:59:07	05:42:09	06:19:09	17:35:31	18:12:37	18:55:49	01:58:42 09:18:17
58°	04:56:34	05:42:02	06:21:04	17:33:40	18:12:50	18:58:29	02:12:58 09:03:37
S 60°	04:53:35	05:41:49	06:23:13	17:31:37	18:13:09	19:01:37	02:29:54 08:46:18

Sep 10	SHA	Mer.pass
Venus	233°56.4	09:06:32
Mars	332°20.3	02:32:17
Jupiter	71°03.6	19:54:31
Saturn	62°19.7	20:29:16

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
09	02:41	02:51	11:57:09	04:53:28	17:17:09	21(59%)
10	03:01	03:12	11:56:48	05:41:37	18:06:51	22(49%)



# 2020 September 11 to Sep. 12

11 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	01:32:34	03:35:49	04:50:48	18:59:13	20:13:04	22:10:39	☐ ☐
N 70°	02:15:20	03:51:48	04:57:55	18:52:28	19:57:47	21:31:38	☐ ☐
68°	02:42:58	04:04:24	05:03:44	18:46:56	19:45:41	21:05:32	☐ ☐
66°	03:03:20	04:14:37	05:08:35	18:42:19	19:35:50	20:46:03	☐ ☐
64°	03:19:16	04:23:06	05:12:42	18:38:24	19:27:38	20:30:41	20:35:42 17:21:30
62°	03:32:13	04:30:17	05:16:15	18:35:02	19:20:41	20:18:09	21:14:18 16:43:02
60°	03:43:00	04:36:26	05:19:20	18:32:05	19:14:44	20:07:41	21:41:24 16:16:02
N 58°	03:52:09	04:41:46	05:22:04	18:29:29	19:09:33	19:58:48	22:02:34 15:54:59
56°	04:00:01	04:46:27	05:24:29	18:27:10	19:05:01	19:51:08	22:19:58 15:37:40
54°	04:06:52	04:50:35	05:26:40	18:25:05	19:01:00	19:44:27	22:34:45 15:22:59
52°	04:12:54	04:54:17	05:28:38	18:23:12	18:57:25	19:38:34	22:47:35 15:10:14
50°	04:18:15	04:57:36	05:30:25	18:21:30	18:54:11	19:33:21	22:58:54 14:58:59
45°	04:29:17	05:04:35	05:34:16	18:17:48	18:47:25	19:22:34	23:22:28 14:35:36
N 40°	04:37:53	05:10:09	05:37:28	18:14:45	18:42:00	19:14:10	23:41:23 14:16:51
35°	04:44:45	05:14:42	05:40:12	18:12:08	18:37:34	19:07:28	23:57:14 14:01:09
30°	04:50:19	05:18:30	05:42:34	18:09:52	18:33:53	19:02:01	.. .. 13:47:33
20°	04:58:42	05:24:30	05:46:37	18:05:59	18:28:05	18:53:51	.. .. 13:24:23
N 10°	05:04:29	05:29:00	05:50:04	18:02:41	18:23:45	18:48:14	00:02:07 13:04:19
0°	05:08:25	05:32:29	05:53:13	17:59:41	18:20:25	18:44:28	00:20:15 12:45:36
S 10°	05:10:49	05:35:13	05:56:15	17:56:47	18:17:49	18:42:13	00:38:26 12:26:53
20°	05:11:48	05:37:20	05:59:22	17:53:48	18:15:51	18:41:24	00:57:58 12:06:50
30°	05:11:13	05:38:55	06:02:48	17:50:32	18:14:27	18:42:10	01:20:34 11:43:42
35°	05:10:12	05:39:29	06:04:44	17:48:41	18:13:58	18:43:18	01:33:52 11:30:07
40°	05:08:34	05:39:53	06:06:53	17:46:39	18:13:41	18:45:04	01:49:13 11:14:28
45°	05:06:08	05:40:05	06:09:20	17:44:18	18:13:36	18:47:38	02:07:33 10:55:48
S 50°	05:02:39	05:40:03	06:12:13	17:41:33	18:13:48	18:51:18	02:30:25 10:32:33
52°	05:00:53	05:39:57	06:13:32	17:40:18	18:13:58	18:53:10	02:41:24 10:21:24
54°	04:58:50	05:39:47	06:14:58	17:38:56	18:14:12	18:55:18	02:53:51 10:08:47
56°	04:56:28	05:39:34	06:16:32	17:37:26	18:14:31	18:57:47	03:08:11 09:54:16
58°	04:53:44	05:39:15	06:18:16	17:35:47	18:14:55	19:00:38	03:25:02 09:37:13
S 60°	04:50:32	05:38:51	06:20:12	17:33:56	18:15:26	19:03:59	03:45:28 09:16:33

Sep 11	SHA	Mer.pass
Venus	232°47.8	09:07:10
Mars	332°20.9	02:28:18
Jupiter	71°04.2	19:50:33
Saturn	62°21.6	20:25:13

12 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	01:43:29	03:41:16	04:55:22	18:53:59	20:07:02	22:00:03	☐ ☐
N 70°	02:22:22	03:56:24	05:01:55	18:47:47	19:52:33	21:24:13	☐ ☐
68°	02:48:22	04:08:22	05:07:17	18:42:42	19:41:03	20:59:35	☐ ☐
66°	03:07:45	04:18:06	05:11:45	18:38:28	19:31:40	20:41:00	20:05:48 19:46:39
64°	03:23:02	04:26:12	05:15:33	18:34:51	19:23:51	20:26:17	21:36:50 18:15:26
62°	03:35:29	04:33:03	05:18:50	18:31:45	19:17:14	20:14:13	22:14:14 17:37:52
60°	03:45:53	04:38:55	05:21:41	18:29:02	19:11:33	20:04:08	22:40:45 17:11:13
N 58°	03:54:42	04:44:02	05:24:12	18:26:39	19:06:36	19:55:33	23:01:31 16:50:18
56°	04:02:19	04:48:30	05:26:26	18:24:31	19:02:16	19:48:09	23:18:38 16:33:04
54°	04:08:56	04:52:28	05:28:26	18:22:36	18:58:26	19:41:41	23:33:10 16:18:24
52°	04:14:46	04:55:59	05:30:15	18:20:53	18:55:00	19:36:00	23:45:47 16:05:40
50°	04:19:57	04:59:09	05:31:54	18:19:18	18:51:56	19:30:57	23:56:56 15:54:25
45°	04:30:37	05:05:49	05:35:28	18:15:55	18:45:28	19:20:32	.. .. 15:30:59
N 40°	04:38:56	05:11:07	05:38:25	18:13:06	18:40:19	19:12:25	.. .. 15:12:10
35°	04:45:33	05:15:28	05:40:55	18:10:42	18:36:07	19:05:57	.. .. 14:56:23
30°	04:50:55	05:19:04	05:43:07	18:08:37	18:32:37	19:00:43	00:10:59 14:42:41
20°	04:58:57	05:24:43	05:46:50	18:05:05	18:27:09	18:52:54	00:34:24 14:19:20
N 10°	05:04:26	05:28:56	05:49:59	18:02:04	18:23:07	18:47:35	00:54:42 13:59:05
0°	05:08:05	05:32:08	05:52:52	17:59:20	18:20:03	18:44:06	01:13:41 13:40:09
S 10°	05:10:13	05:34:36	05:55:37	17:56:42	18:17:44	18:42:07	01:32:41 13:21:11
20°	05:10:55	05:36:26	05:58:28	17:54:01	18:16:02	18:41:35	01:53:05 13:00:50
30°	05:09:59	05:37:41	06:01:34	17:51:04	18:14:58	18:42:42	02:16:40 12:37:17
35°	05:08:47	05:38:04	06:03:18	17:49:25	18:14:41	18:44:01	02:30:32 12:23:26
40°	05:06:55	05:38:15	06:05:14	17:47:35	18:14:36	18:46:00	02:46:34 12:07:26
45°	05:04:15	05:38:13	06:07:27	17:45:29	18:14:47	18:48:50	03:05:44 11:48:17
S 50°	05:00:28	05:37:53	06:10:02	17:43:02	18:15:16	18:52:48	03:29:41 11:24:21
52°	04:58:33	05:37:39	06:11:13	17:41:55	18:15:34	18:54:48	03:41:13 11:12:49
54°	04:56:21	05:37:21	06:12:30	17:40:42	18:15:57	18:57:06	03:54:20 10:59:44
56°	04:53:49	05:36:57	06:13:54	17:39:22	18:16:26	18:59:45	04:09:28 10:44:36
58°	04:50:52	05:36:28	06:15:28	17:37:54	18:17:01	19:02:49	04:27:23 10:26:42
S 60°	04:47:27	05:35:52	06:17:11	17:36:16	18:17:44	19:06:22	04:49:18 10:04:48

Sep 12	SHA	Mer.pass
Venus	231°39.1	09:07:49
Mars	332°22.5	02:24:16
Jupiter	71°04.5	19:46:37
Saturn	62°23.4	20:21:10

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
11	03:23	03:33	11:56:27	06:32:51	18:59:33	23(39%)
12	03:44	03:54	11:56:06	07:26:52	19:54:40	24(29%)

# 2020 September 13 to Sep. 14

13 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	01:53:23	03:46:36	04:59:55	18:48:45	20:01:05	21:50:12	<div><div></div></div>
N 70°	02:29:05	04:00:56	05:05:55	18:43:06	19:47:22	21:17:03	<div><div></div></div>
68°	02:53:37	04:12:18	05:10:50	18:38:29	19:36:27	20:53:46	<div><div></div></div>
66°	03:12:06	04:21:34	05:14:56	18:34:36	19:27:32	20:36:03	22:29:16 19:21:31
64°	03:26:44	04:29:17	05:18:24	18:31:19	19:20:05	20:21:55	23:10:35 18:39:41
62°	03:38:43	04:35:48	05:21:24	18:28:28	19:13:47	20:10:20	23:38:42 18:11:06
60°	03:48:43	04:41:25	05:24:01	18:26:00	19:08:22	20:00:37	.. .. 17:49:04
N 58°	03:57:15	04:46:17	05:26:20	18:23:49	19:03:39	19:52:20	.. .. 17:31:07
56°	04:04:35	04:50:33	05:28:23	18:21:52	18:59:31	19:45:11	.. .. 17:16:00
54°	04:11:00	04:54:19	05:30:13	18:20:07	18:55:52	19:38:57	.. .. 17:02:57
52°	04:16:38	04:57:41	05:31:53	18:18:33	18:52:36	19:33:27	.. .. 16:51:30
50°	04:21:38	05:00:42	05:33:24	18:17:07	18:49:41	19:28:34	.. .. 16:41:18
45°	04:31:57	05:07:03	05:36:39	18:14:01	18:43:32	19:18:30	00:20:07 16:19:52
N 40°	04:39:58	05:12:06	05:39:21	18:11:27	18:38:38	19:10:40	00:38:43 16:02:30
35°	04:46:21	05:16:13	05:41:39	18:09:16	18:34:39	19:04:27	00:54:18 15:47:51
30°	04:51:30	05:19:37	05:43:39	18:07:23	18:31:21	18:59:25	01:07:49 15:35:05
20°	04:59:12	05:24:57	05:47:02	18:04:10	18:26:14	18:51:57	01:30:48 15:13:13
N 10°	05:04:23	05:28:52	05:49:55	18:01:26	18:22:28	18:46:56	01:50:43 14:54:11
0°	05:07:45	05:31:48	05:52:30	17:58:58	18:19:41	18:43:43	02:09:18 14:36:20
S 10°	05:09:37	05:33:59	05:55:00	17:56:37	18:17:38	18:42:01	02:27:53 14:18:26
20°	05:10:41	05:35:32	05:57:33	17:54:13	18:16:14	18:41:47	02:47:46 13:59:11
30°	05:08:45	05:36:27	06:00:19	17:51:36	18:15:30	18:43:14	03:10:43 13:36:54
35°	05:07:21	05:36:39	06:01:53	17:50:08	18:15:24	18:44:45	03:24:10 13:23:48
40°	05:05:17	05:36:37	06:03:36	17:48:31	18:15:32	18:46:57	03:39:41 13:08:41
45°	05:02:21	05:36:20	06:05:33	17:46:40	18:15:57	18:50:02	03:58:09 12:50:37
S 50°	04:58:15	05:35:43	06:07:51	17:44:31	18:16:44	18:54:19	04:21:07 12:28:08
52°	04:56:12	05:35:20	06:08:54	17:43:32	18:17:11	18:56:27	04:32:07 12:17:20
54°	04:53:50	05:34:53	06:10:02	17:42:28	18:17:43	18:58:55	04:44:33 12:05:06
56°	04:51:08	05:34:20	06:11:17	17:41:18	18:18:21	19:01:44	04:58:49 11:51:04
58°	04:48:00	05:33:40	06:12:39	17:40:01	18:19:07	19:05:00	05:15:33 11:34:35
S 60°	04:44:22	05:32:51	06:14:10	17:38:35	18:20:03	19:08:47	05:35:44 11:14:40

Sep 13	SHA	Mer.pass
Venus	230°30.3	09:08:27
Mars	332°24.8	02:20:10
Jupiter	71°04.6	19:42:41
Saturn	62°25.1	20:17:08

14 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	02:02:32	03:51:53	05:04:27	18:43:33	19:55:12	21:40:57	<div><div></div></div>
N 70°	02:35:33	04:05:26	05:09:54	18:38:27	19:42:14	21:10:07	23:05:11 20:46:05
68°	02:58:43	04:16:12	05:14:22	18:34:15	19:31:53	20:48:05	<div><div></div></div> 19:48:43
66°	03:16:21	04:25:00	05:18:05	18:30:45	19:23:25	20:31:09	.. .. 19:14:31
64°	03:30:23	04:32:21	05:21:15	18:27:46	19:16:21	20:17:37	.. .. 18:49:29
62°	03:41:54	04:38:33	05:23:59	18:25:12	19:10:21	20:06:28	.. .. 18:29:43
60°	03:51:33	04:43:53	05:26:22	18:22:57	19:05:12	19:57:07	00:00:17 18:13:26
N 58°	03:59:46	04:48:32	05:28:28	18:20:59	19:00:43	19:49:08	00:17:50 17:59:39
56°	04:06:51	04:52:35	05:30:20	18:19:13	18:56:47	19:42:14	00:32:35 17:47:44
54°	04:13:02	04:56:11	05:32:00	18:17:38	18:53:18	19:36:13	00:45:17 17:37:16
52°	04:18:29	04:59:23	05:33:31	18:16:13	18:50:12	19:30:54	00:56:25 17:27:57
50°	04:23:18	05:02:15	05:34:53	18:14:55	18:47:25	19:26:12	01:06:19 17:19:34
45°	04:33:16	05:08:17	05:37:51	18:12:07	18:41:35	19:16:28	01:27:02 17:01:44
N 40°	04:41:01	05:13:04	05:40:18	18:09:48	18:36:57	19:08:56	01:43:47 16:47:06
35°	04:47:09	05:16:58	05:42:22	18:07:50	18:33:12	19:02:56	01:57:52 16:34:38
30°	04:52:06	05:20:11	05:44:11	18:06:08	18:30:05	18:58:07	02:10:06 16:23:43
20°	04:59:26	05:25:10	05:47:15	18:03:15	18:25:18	18:50:59	02:30:58 16:04:54
N 10°	05:04:20	05:28:47	05:49:50	18:00:48	18:21:50	18:46:17	02:49:04 15:48:25
0°	05:07:25	05:31:27	05:52:09	17:58:37	18:19:19	18:43:21	03:05:56 15:32:56
S 10°	05:09:00	05:33:22	05:54:23	17:56:32	18:17:33	18:41:55	03:22:46 15:17:21
20°	05:09:06	05:34:38	05:56:38	17:54:25	18:16:26	18:41:59	03:40:45 15:00:36
30°	05:07:31	05:35:13	05:59:05	17:52:08	18:16:01	18:43:46	04:01:24 14:41:14
35°	05:05:55	05:35:13	06:00:27	17:50:51	18:16:07	18:45:28	04:13:27 14:29:53
40°	05:03:38	05:34:59	06:01:57	17:49:27	18:16:28	18:47:54	04:27:16 14:16:49
45°	05:00:26	05:34:27	06:03:40	17:47:52	18:17:08	18:51:14	04:43:35 14:01:19
S 50°	04:56:02	05:33:32	06:05:40	17:46:00	18:18:13	18:55:50	05:03:39 13:42:11
52°	04:53:50	05:33:02	06:06:34	17:45:09	18:18:48	18:58:07	05:13:09 13:33:05
54°	04:51:19	05:32:25	06:07:34	17:44:14	18:19:29	19:00:44	05:23:47 13:22:52
56°	04:48:26	05:31:42	06:08:38	17:43:14	18:20:17	19:03:44	05:35:50 13:11:17
58°	04:45:06	05:30:51	06:09:50	17:42:08	18:21:14	19:07:12	05:49:42 12:57:55
S 60°	04:41:15	05:29:51	06:11:09	17:40:54	18:22:22	19:11:13	06:05:58 12:42:09

Sep 14	SHA	Mer.pass
Venus	229°21.5	09:09:06
Mars	332°28.1	02:16:01
Jupiter	71°04.5	19:38:46
Saturn	62°26.7	20:13:06

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
13	04:05	04:16	11:55:44	08:22:49	20:51:07	25(20%)
14	04:26	04:37	11:55:23	09:19:27	21:47:40	26(12%)

# 2020 September 15 to Sep. 16

15 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	02:11:05	03:57:04	05:08:58	18:38:22	19:49:23	21:32:12	☐
N 70°	02:41:47	04:09:52	05:13:53	18:33:47	19:37:08	21:03:24	☐
68°	03:03:43	04:20:05	05:17:54	18:30:02	19:27:21	20:42:30	☐
66°	03:20:32	04:28:26	05:21:15	18:26:54	19:19:19	20:26:20	☐
64°	03:33:59	04:35:23	05:24:06	18:24:13	19:12:37	20:13:21	☐
62°	03:45:03	04:41:17	05:26:34	18:21:55	19:06:55	20:02:39	☐
60°	03:54:20	04:46:22	05:28:42	18:19:55	19:02:02	19:53:38	☐
N 58°	04:02:15	04:50:46	05:30:36	18:18:08	18:57:47	19:45:57	☐
56°	04:09:06	04:54:38	05:32:17	18:16:34	18:54:03	19:39:18	☐
54°	04:15:04	04:58:02	05:33:47	18:15:09	18:50:45	19:33:29	☐
52°	04:20:19	05:01:05	05:35:09	18:13:52	18:47:48	19:28:22	☐
50°	04:24:59	05:03:48	05:36:23	18:12:43	18:45:10	19:23:49	☐
45°	04:34:36	05:09:31	05:39:02	18:10:13	18:39:39	19:14:27	☐
N 40°	04:42:03	05:14:03	05:41:14	18:08:09	18:35:17	19:07:11	☐
35°	04:47:57	05:17:43	05:43:06	18:06:24	18:31:44	19:01:26	☐
30°	04:52:41	05:20:44	05:44:43	18:04:53	18:28:50	18:56:49	☐
20°	04:59:41	05:25:23	05:47:27	18:02:19	18:24:22	18:50:02	☐
N 10°	05:04:16	05:28:43	05:49:45	18:00:11	18:21:12	18:45:37	☐
0°	05:07:05	05:31:06	05:51:48	17:58:16	18:18:57	18:42:58	☐
S 10°	05:08:23	05:32:45	05:53:45	17:56:27	18:17:27	18:41:50	☐
20°	05:08:12	05:33:43	05:55:43	17:54:37	18:16:38	18:42:11	☐
30°	05:06:16	05:33:59	05:57:50	17:52:40	18:16:33	18:44:18	☐
35°	05:04:29	05:33:47	05:59:01	17:51:35	18:16:50	18:46:12	☐
40°	05:01:58	05:33:20	06:00:18	17:50:24	18:17:24	18:48:51	☐
45°	04:58:31	05:32:34	06:01:46	17:49:03	18:18:19	18:52:27	☐
S 50°	04:53:48	05:31:21	06:03:28	17:47:29	18:19:42	18:57:21	☐
52°	04:51:28	05:30:42	06:04:15	17:46:47	18:20:25	18:59:48	☐
54°	04:48:47	05:29:57	06:05:05	17:46:01	18:21:15	19:02:34	☐
56°	04:45:43	05:29:04	06:06:00	17:45:10	18:22:13	19:05:45	☐
58°	04:42:12	05:28:02	06:07:00	17:44:15	18:23:21	19:09:25	☐
S 60°	04:38:06	05:26:49	06:08:07	17:43:14	18:24:41	19:13:40	☐

Sep 15	SHA	Mer.pass
Venus	228°12.6	09:09:45
Mars	332°32.2	02:11:48
Jupiter	71°04.2	19:34:52
Saturn	62°28.2	20:09:04

16 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	02:19:09	04:02:11	05:13:29	18:33:11	19:43:38	21:23:50	01:24:57
N 70°	02:47:49	04:14:16	05:17:51	18:29:08	19:32:05	20:56:51	01:56:16
68°	03:08:36	04:23:55	05:21:25	18:25:49	19:22:50	20:37:01	02:18:55
66°	03:24:39	04:31:49	05:24:25	18:23:02	19:15:14	20:21:35	02:36:30
64°	03:37:33	04:38:25	05:26:57	18:20:41	19:08:54	20:09:09	02:50:42
62°	03:48:10	04:44:01	05:29:09	18:18:38	19:03:30	19:58:51	03:02:32
60°	03:57:06	04:48:49	05:31:03	18:16:52	18:58:52	19:50:11	03:12:35
N 58°	04:04:44	04:53:00	05:32:44	18:15:18	18:54:51	19:42:47	03:21:17
56°	04:11:20	04:56:39	05:34:14	18:13:54	18:51:19	19:36:22	03:28:55
54°	04:17:05	04:59:54	05:35:34	18:12:39	18:48:11	19:30:46	03:35:41
52°	04:22:09	05:02:46	05:36:47	18:11:32	18:45:25	19:25:50	03:41:45
50°	04:26:38	05:05:21	05:37:52	18:10:30	18:42:55	19:21:28	03:47:15
45°	04:35:54	05:10:45	05:40:14	18:08:18	18:37:43	19:12:26	03:59:00
N 40°	04:43:04	05:15:01	05:42:11	18:06:30	18:33:36	19:05:27	04:08:43
35°	04:48:44	05:18:28	05:43:50	18:04:58	18:30:17	18:59:56	04:16:59
30°	04:53:17	05:21:18	05:45:16	18:03:38	18:27:34	18:55:31	04:24:15
20°	04:59:55	05:25:36	05:47:39	18:01:24	18:23:26	18:49:05	04:36:44
N 10°	05:04:12	05:28:38	05:49:40	17:59:33	18:20:33	18:44:58	04:47:37
0°	05:06:44	05:30:45	05:51:27	17:57:54	18:18:35	18:42:36	04:57:47
S 10°	05:07:46	05:32:08	05:53:07	17:56:22	18:17:22	18:41:44	05:07:55
20°	05:07:17	05:32:48	05:54:48	17:54:50	18:16:50	18:42:23	05:18:41
30°	05:05:01	05:32:44	05:56:35	17:53:12	18:17:05	18:44:51	05:30:56
35°	05:03:02	05:32:22	05:57:35	17:52:19	18:17:34	18:46:57	05:38:00
40°	05:00:18	05:31:42	05:58:39	17:51:20	18:18:21	18:49:49	05:46:00
45°	04:56:35	05:30:40	05:59:52	17:50:14	18:19:31	18:53:41	05:55:18
S 50°	04:51:34	05:29:09	06:01:17	17:48:59	18:21:11	18:58:54	06:06:27
52°	04:49:05	05:28:22	06:01:55	17:48:24	18:22:03	19:01:29	06:11:37
54°	04:46:14	05:27:28	06:02:36	17:47:47	18:23:02	19:04:25	06:17:17
56°	04:43:00	05:26:25	06:03:21	17:47:07	18:24:10	19:07:47	06:23:33
58°	04:39:16	05:25:12	06:04:11	17:46:23	18:25:29	19:11:39	06:30:34
S 60°	04:34:57	05:23:47	06:05:06	17:45:34	18:27:02	19:16:08	06:38:28

Sep 16	SHA	Mer.pass
Venus	227°03.8	09:10:24
Mars	332°37.2	02:07:32
Jupiter	71°03.6	19:30:59
Saturn	62°29.6	20:05:03

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
15	04:48	04:58	11:55:02	10:15:40	22:43:22	27(6%)
16	05:09	05:20	11:54:40	11:10:44	23:37:49	28(2%)

# 2020 September 17 to Sep. 18

17 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	02:26:48	04:07:15	05:17:58	18:28:01	19:37:57	21:15:50	04:03:13
N 70°	02:53:39	04:18:37	05:21:48	18:24:30	19:27:04	20:50:28	04:16:13
68°	03:13:22	04:27:44	05:24:57	18:21:36	19:18:21	20:31:38	04:26:36
66°	03:28:42	04:35:12	05:27:34	18:19:11	19:11:11	20:16:54	04:35:06
64°	03:41:03	04:41:26	05:29:48	18:17:08	19:05:11	20:04:58	04:42:14
62°	03:51:16	04:46:44	05:31:43	18:15:22	19:00:06	19:55:06	04:48:19
60°	03:59:51	04:51:17	05:33:24	18:13:49	18:55:43	19:46:46	04:53:35
N 58°	04:07:12	04:55:13	05:34:52	18:12:28	18:51:55	19:39:38	04:58:13
56°	04:13:33	04:58:41	05:36:11	18:11:15	18:48:35	19:33:28	05:02:19
54°	04:19:05	05:01:44	05:37:21	18:10:10	18:45:38	19:28:04	05:05:59
52°	04:23:58	05:04:28	05:38:25	18:09:11	18:43:01	19:23:19	05:09:17
50°	04:28:18	05:06:54	05:39:22	18:08:18	18:40:40	19:19:06	05:12:18
45°	04:37:13	05:11:59	05:41:26	18:06:24	18:35:46	19:10:25	05:18:48
N 40°	04:44:06	05:15:59	05:43:08	18:04:50	18:31:55	19:03:43	05:24:13
35°	04:49:32	05:19:13	05:44:34	18:03:31	18:28:49	18:58:26	05:28:51
30°	04:53:52	05:21:51	05:45:48	18:02:23	18:26:18	18:54:13	05:32:56
20°	05:00:09	05:25:49	05:47:52	18:00:29	18:22:30	18:48:08	05:40:00
N 10°	05:04:09	05:28:34	05:49:35	17:58:55	18:19:55	18:44:20	05:46:10
0°	05:06:24	05:30:24	05:51:05	17:57:33	18:18:14	18:42:14	05:51:57
S 10°	05:07:09	05:31:30	05:52:30	17:56:17	18:17:17	18:41:39	05:57:43
20°	05:06:22	05:31:54	05:53:53	17:55:02	18:17:03	18:42:36	06:03:51
30°	05:03:46	05:31:29	05:55:21	17:53:44	18:17:37	18:45:23	06:10:48
35°	05:01:35	05:30:55	05:56:08	17:53:02	18:18:18	18:47:41	06:14:48
40°	04:58:37	05:30:02	05:57:00	17:52:17	18:19:17	18:50:47	06:19:19
45°	04:54:39	05:28:46	05:57:58	17:51:26	18:20:42	18:54:55	06:24:33
S 50°	04:49:19	05:26:57	05:59:05	17:50:28	18:22:41	19:00:27	06:30:45
52°	04:46:41	05:26:02	05:59:35	17:50:02	18:23:41	19:03:11	06:33:37
54°	04:43:41	05:24:59	06:00:07	17:49:34	18:24:49	19:06:17	06:36:44
56°	04:40:15	05:23:46	06:00:42	17:49:04	18:26:07	19:09:50	06:40:10
58°	04:36:19	05:22:22	06:01:21	17:48:30	18:27:38	19:13:55	06:43:59
S 60°	04:31:46	05:20:45	06:02:04	17:47:53	18:29:23	19:18:38	06:48:14

Sep 17	SHA	Mer.pass
Venus	225°54.9	09:11:03
Mars	332°43.0	02:03:13
Jupiter	71°02.9	19:27:07
Saturn	62°30.9	20:01:02

18 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	02:34:07	04:12:14	05:22:27	18:22:51	19:32:19	21:08:07	06:26:19
N 70°	02:59:20	04:22:56	05:25:45	18:19:52	19:22:06	20:44:15	06:28:24
68°	03:18:03	04:31:31	05:28:28	18:17:24	19:13:54	20:26:21	06:30:06
66°	03:32:41	04:38:33	05:30:44	18:15:20	19:07:09	20:12:16	06:31:31
64°	03:44:31	04:44:26	05:32:39	18:13:36	19:01:30	20:00:51	06:32:43
62°	03:54:19	04:49:26	05:34:18	18:12:05	18:56:42	19:51:22	06:33:45
60°	04:02:35	04:53:43	05:35:44	18:10:46	18:52:35	19:43:21	06:34:40
N 58°	04:09:38	04:57:27	05:37:00	18:09:37	18:49:00	19:36:30	06:35:28
56°	04:15:45	05:00:42	05:38:08	18:08:36	18:45:52	19:30:34	06:36:10
54°	04:21:05	05:03:35	05:39:08	18:07:41	18:43:05	19:25:23	06:36:49
52°	04:25:47	05:06:09	05:40:03	18:06:51	18:40:38	19:20:48	06:37:24
50°	04:29:56	05:08:26	05:40:52	18:06:06	18:38:26	19:16:45	06:37:56
45°	04:38:31	05:13:13	05:42:38	18:04:30	18:33:50	19:08:25	06:39:05
N 40°	04:45:07	05:16:58	05:44:05	18:03:11	18:30:14	19:01:59	06:40:03
35°	04:50:19	05:19:58	05:45:18	18:02:05	18:27:22	18:56:56	06:40:54
30°	04:54:27	05:22:24	05:46:20	18:01:08	18:25:02	18:52:56	06:41:38
20°	05:00:24	05:26:02	05:48:05	17:59:34	18:21:35	18:47:12	06:42:57
N 10°	05:04:05	05:28:29	05:49:30	17:58:17	18:19:17	18:43:41	06:44:06
0°	05:06:03	05:30:03	05:50:44	17:57:12	18:17:52	18:41:52	06:45:12
S 10°	05:06:31	05:30:53	05:51:52	17:56:12	18:17:11	18:41:34	06:46:19
20°	05:05:26	05:30:59	05:52:58	17:55:15	18:17:15	18:42:48	06:47:32
30°	05:02:30	05:30:14	05:54:06	17:54:17	18:18:10	18:45:57	06:48:55
35°	05:00:07	05:29:29	05:54:42	17:53:46	18:19:01	18:48:26	06:49:43
40°	04:56:57	05:28:23	05:55:21	17:53:14	18:20:14	18:51:45	06:50:37
45°	04:52:43	05:26:51	05:56:04	17:52:38	18:21:55	18:56:09	06:51:41
S 50°	04:47:03	05:24:45	05:56:53	17:51:58	18:24:11	19:02:01	06:52:56
52°	04:44:16	05:23:41	05:57:15	17:51:40	18:25:19	19:04:54	06:53:31
54°	04:41:06	05:22:29	05:57:38	17:51:21	18:26:37	19:08:10	06:54:09
56°	04:37:30	05:21:06	05:58:04	17:51:00	18:28:05	19:11:54	06:54:50
58°	04:33:21	05:19:31	05:58:31	17:50:38	18:29:47	19:16:11	06:55:36
S 60°	04:28:34	05:17:41	05:59:02	17:50:14	18:31:44	19:21:09	06:56:28

Sep 18	SHA	Mer.pass
Venus	224°46.1	09:11:42
Mars	332°49.7	01:58:50
Jupiter	71°02.0	19:23:15
Saturn	62°32.1	19:57:02

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
17	05:30	05:41	11:54:19	12:04:37	--	0(0%)
18	05:52	06:02	11:53:58	12:57:44	00:31:14	1(2%)

19 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	02:41:08	04:17:11	05:26:56	18:17:42	19:26:44	21:00:40	08:47:35
N 70°	03:04:52	04:27:13	05:29:42	18:15:14	19:17:10	20:38:09	08:39:30
68°	03:22:38	04:35:16	05:31:59	18:13:12	19:09:28	20:21:08	08:32:58
66°	03:36:37	04:41:53	05:33:53	18:11:30	19:03:08	20:07:42	08:27:33
64°	03:47:57	04:47:26	05:35:29	18:10:03	18:57:50	19:56:45	08:23:00
62°	03:57:21	04:52:07	05:36:53	18:08:49	18:53:19	19:47:40	08:19:06
60°	04:05:17	04:56:09	05:38:05	18:07:44	18:49:27	19:39:58	08:15:42
N 58°	04:12:04	04:59:40	05:39:09	18:06:47	18:46:05	19:33:23	08:12:43
56°	04:17:56	05:02:43	05:40:05	18:05:56	18:43:09	19:27:41	08:10:04
54°	04:23:04	05:05:26	05:40:56	18:05:11	18:40:33	19:22:42	08:07:42
52°	04:27:35	05:07:50	05:41:41	18:04:30	18:38:15	19:18:19	08:05:33
50°	04:31:35	05:09:58	05:42:22	18:03:54	18:36:11	19:14:25	08:03:36
45°	04:39:49	05:14:26	05:43:50	18:02:35	18:31:54	19:06:25	07:59:24
N 40°	04:46:08	05:17:56	05:45:02	18:01:31	18:28:34	19:00:16	07:55:54
35°	04:51:06	05:20:43	05:46:02	18:00:38	18:25:54	18:55:27	07:52:55
30°	04:55:02	05:22:57	05:46:53	17:59:53	18:23:46	18:51:38	07:50:17
20°	05:00:38	05:26:16	05:48:17	17:58:39	18:20:39	18:46:15	07:45:47
N 10°	05:04:01	05:28:25	05:49:25	17:57:40	18:18:39	18:43:02	07:41:52
0°	05:05:42	05:29:42	05:50:23	17:56:50	18:17:30	18:41:30	07:38:14
S 10°	05:05:54	05:30:15	05:51:14	17:56:07	18:17:06	18:41:29	07:34:39
20°	05:04:31	05:30:03	05:52:03	17:55:27	18:17:28	18:43:01	07:30:53
30°	05:01:14	05:28:59	05:52:51	17:54:49	18:18:42	18:46:30	07:26:39
35°	04:58:40	05:28:02	05:53:15	17:54:30	18:19:46	18:49:12	07:24:14
40°	04:55:15	05:26:44	05:53:42	17:54:10	18:21:12	18:52:44	07:21:31
45°	04:50:46	05:24:57	05:54:10	17:53:50	18:23:07	18:57:24	07:18:23
S 50°	04:44:47	05:22:32	05:54:41	17:53:28	18:25:42	19:03:35	07:14:42
52°	04:41:51	05:21:20	05:54:54	17:53:18	18:26:58	19:06:37	07:13:00
54°	04:38:31	05:19:59	05:55:09	17:53:08	18:28:25	19:10:04	07:11:10
56°	04:34:43	05:18:26	05:55:24	17:52:57	18:30:03	19:13:59	07:09:08
58°	04:30:22	05:16:40	05:55:41	17:52:46	18:31:56	19:18:29	07:06:54
S 60°	04:25:20	05:14:37	05:55:59	17:52:34	18:34:06	19:23:41	07:04:25

Sep 19	SHA	Mer.pass
Venus	223° 37.2	09:12:20
Mars	332° 57.3	01:54:24
Jupiter	71° 00.8	19:19:25
Saturn	62° 33.2	19:53:02

20 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	02:47:53	04:22:04	05:31:24	18:12:34	19:21:12	20:53:27	11:17:26
N 70°	03:10:15	04:31:27	05:33:39	18:10:36	19:12:16	20:32:12	10:55:32
68°	03:27:09	04:39:00	05:35:30	18:09:00	19:05:04	20:16:01	10:38:45
66°	03:40:29	04:45:13	05:37:02	18:07:39	18:59:08	20:03:11	10:25:20
64°	03:51:20	04:50:24	05:38:20	18:06:31	18:54:10	19:52:42	10:14:16
62°	04:00:20	04:54:48	05:39:27	18:05:32	18:49:57	19:43:59	10:04:57
60°	04:07:57	04:58:35	05:40:26	18:04:41	18:46:19	19:36:37	09:56:58
N 58°	04:14:28	05:01:52	05:41:17	18:03:56	18:43:11	19:30:18	09:50:01
56°	04:20:07	05:04:44	05:42:02	18:03:17	18:40:26	19:24:49	09:43:53
54°	04:25:02	05:07:16	05:42:43	18:02:41	18:38:01	19:20:02	09:38:25
52°	04:29:22	05:09:31	05:43:19	18:02:10	18:35:52	19:15:49	09:33:31
50°	04:33:13	05:11:31	05:43:52	18:01:41	18:33:57	19:12:05	09:29:04
45°	04:41:06	05:15:40	05:45:02	18:00:41	18:29:58	19:04:25	09:19:31
N 40°	04:47:09	05:18:54	05:45:59	17:59:52	18:26:53	18:58:33	09:11:38
35°	04:51:53	05:21:28	05:46:46	17:59:12	18:24:27	18:53:58	09:04:54
30°	04:55:37	05:23:31	05:47:25	17:58:38	18:22:30	18:50:21	08:58:59
20°	05:00:52	05:26:29	05:48:30	17:57:43	18:19:43	18:45:19	08:48:51
N 10°	05:03:57	05:28:20	05:49:20	17:57:02	18:18:01	18:42:24	08:40:03
0°	05:05:21	05:29:21	05:50:01	17:56:29	18:17:09	18:41:09	08:31:51
S 10°	05:05:16	05:29:38	05:50:37	17:56:02	18:17:02	18:41:24	08:23:43
20°	05:03:36	05:29:08	05:51:07	17:55:40	18:17:40	18:43:15	08:15:08
30°	04:59:58	05:27:44	05:51:36	17:55:22	18:19:15	18:47:04	08:05:27
35°	04:57:12	05:26:36	05:51:49	17:55:14	18:20:30	18:49:57	07:59:53
40°	04:53:34	05:25:04	05:52:02	17:55:08	18:22:09	18:53:44	07:53:37
45°	04:48:48	05:23:02	05:52:15	17:55:02	18:24:20	18:58:40	07:46:22
S 50°	04:42:30	05:20:19	05:52:29	17:54:58	18:27:13	19:05:10	07:37:43
52°	04:39:25	05:18:59	05:52:34	17:54:56	18:28:38	19:08:22	07:33:45
54°	04:35:55	05:17:29	05:52:40	17:54:55	18:30:13	19:11:58	07:29:23
56°	04:31:56	05:15:46	05:52:45	17:54:55	18:32:02	19:16:05	07:24:36
58°	04:27:22	05:13:48	05:52:51	17:54:54	18:34:07	19:20:48	07:19:16
S 60°	04:22:06	05:11:33	05:52:57	17:54:54	18:36:29	19:26:15	07:13:17

Sep 20	SHA	Mer.pass
Venus	222° 28.4	09:12:59
Mars	333° 05.6	01:49:55
Jupiter	70° 59.5	19:15:35
Saturn	62° 34.2	19:49:03

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
19	06:13	06:24	11:53:36	13:50:50	01:24:14	2(6%)
20	06:34	06:45	11:53:15	14:44:43	02:17:38	3(13%)

# 2020 September 21 to Sep. 22

21 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	02:54:24	04:26:54	05:35:52	18:07:26	19:15:44	20:46:26	14:38:22
N 70°	03:15:31	04:35:40	05:37:36	18:05:59	19:07:24	20:26:21	13:28:44
68°	03:31:35	04:42:43	05:39:01	18:04:48	19:00:41	20:10:57	12:52:20
66°	03:44:18	04:48:31	05:40:11	18:03:48	18:55:09	19:58:42	12:26:45
64°	03:54:41	04:53:22	05:41:11	18:02:58	18:50:31	19:48:42	12:07:03
62°	04:03:19	04:57:29	05:42:02	18:02:15	18:46:35	19:40:21	11:51:09
60°	04:10:37	05:01:01	05:42:47	18:01:38	18:43:13	19:33:17	11:37:53
N 58°	04:16:52	05:04:04	05:43:26	18:01:06	18:40:17	19:27:13	11:26:35
56°	04:22:16	05:06:45	05:44:00	18:00:37	18:37:44	19:21:58	11:16:46
54°	04:27:00	05:09:06	05:44:30	18:00:12	18:35:29	19:17:23	11:08:07
52°	04:31:09	05:11:11	05:44:58	17:59:49	18:33:29	19:13:20	11:00:25
50°	04:34:50	05:13:03	05:45:22	17:59:29	18:31:43	19:09:46	10:53:30
45°	04:42:23	05:16:53	05:46:14	17:58:46	18:28:03	19:02:26	10:38:46
N 40°	04:48:10	05:19:52	05:46:56	17:58:12	18:25:13	18:56:50	10:26:42
35°	04:52:40	05:22:13	05:47:30	17:57:45	18:23:00	18:52:29	10:16:28
30°	04:56:11	05:24:04	05:47:58	17:57:23	18:21:15	18:49:04	10:07:32
20°	05:01:05	05:26:42	05:48:43	17:56:48	18:18:48	18:44:23	09:52:15
N 10°	05:03:53	05:28:16	05:49:15	17:56:24	18:17:23	18:41:46	09:39:00
0°	05:05:00	05:29:00	05:49:40	17:56:08	18:16:48	18:40:48	09:26:40
S 10°	05:04:38	05:29:00	05:49:59	17:55:57	18:16:57	18:41:19	09:14:25
20°	05:02:40	05:28:13	05:50:12	17:55:53	18:17:53	18:43:28	09:01:27
30°	04:58:42	05:26:29	05:50:21	17:55:55	18:19:48	18:47:38	08:46:42
35°	04:55:44	05:25:09	05:50:23	17:55:58	18:21:15	18:50:43	08:38:13
40°	04:51:52	05:23:24	05:50:23	17:56:05	18:23:07	18:54:44	08:28:34
45°	04:46:50	05:21:07	05:50:21	17:56:14	18:25:33	18:59:56	08:17:21
S 50°	04:40:12	05:18:06	05:50:16	17:56:28	18:28:44	19:06:46	08:03:50
52°	04:36:58	05:16:37	05:50:14	17:56:35	18:30:17	19:10:07	07:57:34
54°	04:33:18	05:14:58	05:50:10	17:56:43	18:32:02	19:13:54	07:50:39
56°	04:29:07	05:13:05	05:50:06	17:56:52	18:34:02	19:18:12	07:42:59
58°	04:24:21	05:10:56	05:50:01	17:57:03	18:36:17	19:23:08	07:34:21
S 60°	04:18:50	05:08:28	05:49:55	17:57:15	18:38:53	19:28:50	07:24:34

Sep 21	SHA	Mer.pass
Venus	221°19.6	09:13:38
Mars	333°14.8	01:45:22
Jupiter	70°57.9	19:11:46
Saturn	62°35.1	19:45:03

22 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	03:00:44	04:31:42	05:40:20	18:02:18	19:10:18	20:39:36	■ ■
N 70°	03:20:40	04:39:51	05:41:32	18:01:22	19:02:34	20:20:37	■ ■
68°	03:35:56	04:46:24	05:42:31	18:00:36	18:56:19	20:05:59	15:33:20
66°	03:48:05	04:51:48	05:43:20	17:59:58	18:51:11	19:54:17	14:33:42
64°	03:58:00	04:56:19	05:44:02	17:59:26	18:46:53	19:44:43	13:59:46
62°	04:06:15	05:00:09	05:44:37	17:58:59	18:43:14	19:36:44	13:35:07
60°	04:13:15	05:03:26	05:45:08	17:58:36	18:40:06	19:29:58	13:15:40
N 58°	04:19:14	05:06:16	05:45:34	17:58:16	18:37:24	19:24:09	12:59:40
56°	04:24:25	05:08:45	05:45:57	17:57:58	18:35:02	19:19:08	12:46:05
54°	04:28:57	05:10:56	05:46:18	17:57:43	18:32:57	19:14:44	12:34:20
52°	04:32:56	05:12:52	05:46:36	17:57:29	18:31:07	19:10:52	12:24:00
50°	04:36:27	05:14:35	05:46:53	17:57:17	18:29:29	19:07:27	12:14:48
45°	04:43:40	05:18:07	05:47:27	17:56:52	18:26:07	19:00:27	11:55:26
N 40°	04:49:11	05:20:50	05:47:53	17:56:33	18:23:33	18:55:07	11:39:45
35°	04:53:27	05:22:57	05:48:14	17:56:19	18:21:33	18:51:00	11:26:33
30°	04:56:46	05:24:37	05:48:31	17:56:08	18:19:59	18:47:48	11:15:05
20°	05:01:19	05:26:55	05:48:55	17:55:53	18:17:53	18:43:27	10:55:32
N 10°	05:03:48	05:28:11	05:49:11	17:55:47	18:16:46	18:41:08	10:38:37
0°	05:04:39	05:28:39	05:49:19	17:55:47	18:16:27	18:40:26	10:22:54
S 10°	05:04:00	05:28:22	05:49:21	17:55:53	18:16:52	18:41:15	10:07:15
20°	05:01:44	05:27:18	05:49:17	17:56:06	18:18:06	18:43:42	09:50:37
30°	04:57:26	05:25:14	05:49:06	17:56:28	18:20:21	18:48:12	09:31:37
35°	04:54:15	05:23:42	05:48:56	17:56:43	18:21:59	18:51:30	09:20:35
40°	04:50:10	05:21:44	05:48:43	17:57:02	18:24:05	18:55:44	09:08:00
45°	04:44:52	05:19:11	05:48:27	17:57:27	18:26:46	19:01:12	08:53:12
S 50°	04:37:54	05:15:52	05:48:04	17:57:58	18:30:16	19:08:23	08:35:10
52°	04:34:31	05:14:15	05:47:53	17:58:13	18:31:58	19:11:53	08:26:42
54°	04:30:40	05:12:26	05:47:41	17:58:30	18:33:52	19:15:50	08:17:16
56°	04:26:18	05:10:23	05:47:27	17:58:50	18:36:02	19:20:20	08:06:40
58°	04:21:18	05:08:03	05:47:11	17:59:11	18:38:29	19:25:29	07:54:36
S 60°	04:15:32	05:05:22	05:46:52	17:59:36	18:41:18	19:31:27	07:40:37

Sep 22	SHA	Mer.pass
Venus	220°10.8	09:14:16
Mars	333°24.7	01:40:46
Jupiter	70°56.2	19:07:58
Saturn	62°35.9	19:41:05

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
21	06:55	07:06	11:52:54	15:39:54	03:12:08	4(23%)
22	07:17	07:27	11:52:33	16:36:28	04:08:02	5(33%)

23 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	03:06:52	04:36:27	05:44:47	17:57:10	19:04:54	20:32:56	■ ■
N 70°	03:25:43	04:44:00	05:45:29	17:56:45	18:57:45	20:14:58	■ ■
68°	03:40:13	04:50:05	05:46:02	17:56:24	18:51:59	20:01:04	■ ■
66°	03:51:48	04:55:05	05:46:30	17:56:08	18:47:14	19:49:55	16:57:03 18:05:02
64°	04:01:16	04:59:16	05:46:53	17:55:54	18:43:16	19:40:47	15:45:40 19:16:45
62°	04:09:10	05:02:48	05:47:12	17:55:43	18:39:54	19:33:09	15:09:50 19:52:53
60°	04:15:52	05:05:50	05:47:29	17:55:33	18:37:01	19:26:40	14:44:06 20:18:54
N 58°	04:21:36	05:08:28	05:47:43	17:55:25	18:34:31	19:21:07	14:23:50 20:39:26
56°	04:26:34	05:10:45	05:47:55	17:55:19	18:32:20	19:16:18	14:07:06 20:56:25
54°	04:30:54	05:12:46	05:48:06	17:55:13	18:30:26	19:12:07	13:52:52 21:10:53
52°	04:34:42	05:14:32	05:48:15	17:55:09	18:28:45	19:08:25	13:40:29 21:23:28
50°	04:38:04	05:16:07	05:48:23	17:55:05	18:27:15	19:05:09	13:29:33 21:34:36
45°	04:44:57	05:19:20	05:48:39	17:54:58	18:24:12	18:58:29	13:06:49 21:57:48
N 40°	04:50:11	05:21:48	05:48:50	17:54:54	18:21:53	18:53:25	12:48:34 22:16:27
35°	04:54:13	05:23:42	05:48:59	17:54:52	18:20:06	18:49:31	12:33:18 22:32:06
30°	04:57:21	05:25:10	05:49:04	17:54:53	18:18:44	18:46:31	12:20:05 22:45:40
20°	05:01:33	05:27:08	05:49:08	17:54:58	18:16:58	18:42:31	11:57:36 23:08:49
N 10°	05:03:44	05:28:07	05:49:06	17:55:09	18:16:08	18:40:30	11:38:12 23:28:52
0°	05:04:18	05:28:18	05:48:58	17:55:26	18:16:06	18:40:06	11:20:08 23:47:35
S 10°	05:03:22	05:27:45	05:48:44	17:55:48	18:16:48	18:41:11	11:02:08 .. ..
20°	05:00:48	05:26:23	05:48:22	17:56:19	18:18:20	18:43:56	10:42:56 .. ..
30°	04:56:09	05:23:58	05:47:51	17:57:01	18:20:55	18:48:47	10:20:52 .. ..
35°	04:52:47	05:22:15	05:47:30	17:57:27	18:22:44	18:52:17	10:08:00 .. ..
40°	04:48:27	05:20:04	05:47:04	17:58:00	18:25:03	18:56:45	09:53:12 00:13:02
45°	04:42:53	05:17:16	05:46:32	17:58:39	18:28:00	19:02:29	09:35:40 00:29:57
S 50°	04:35:36	05:13:39	05:45:52	17:59:29	18:31:48	19:10:00	09:14:00 00:50:55
52°	04:32:03	05:11:53	05:45:33	17:59:52	18:33:38	19:13:39	09:03:42 01:00:55
54°	04:28:02	05:09:55	05:45:11	18:00:18	18:35:42	19:17:47	08:52:06 01:12:11
56°	04:23:28	05:07:41	05:44:47	18:00:47	18:38:02	19:22:29	08:38:53 01:25:03
58°	04:18:15	05:05:09	05:44:20	18:01:20	18:40:41	19:27:52	08:23:33 01:40:01
S 60°	04:12:14	05:02:16	05:43:49	18:01:57	18:43:43	19:34:05	08:05:19 01:57:51

Sep 23	SHA	Mer.pass
Venus	219°02.1	09:14:55
Mars	333°35.4	01:36:08
Jupiter	70°54.2	19:04:10
Saturn	62°36.6	19:37:06

24 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	03:12:51	04:41:10	05:49:15	17:52:03	18:59:33	20:26:25	■ ■
N 70°	03:30:40	04:48:07	05:49:25	17:52:08	18:52:59	20:09:26	■ ■
68°	03:44:27	04:53:44	05:49:33	17:52:13	18:47:41	19:56:13	■ ■
66°	03:55:29	04:58:20	05:49:39	17:52:18	18:43:19	19:45:36	■ ■
64°	04:04:31	05:02:11	05:49:44	17:52:22	18:39:40	19:36:53	17:06:36 19:55:10
62°	04:12:04	05:05:27	05:49:47	17:52:27	18:36:34	19:29:35	16:23:32 20:38:13
60°	04:18:28	05:08:15	05:49:50	17:52:31	18:33:56	19:23:24	15:54:37 21:07:08
N 58°	04:23:57	05:10:39	05:49:52	17:52:35	18:31:39	19:18:06	15:32:25 21:29:20
56°	04:28:41	05:12:45	05:49:53	17:52:40	18:29:39	19:13:30	15:14:18 21:47:27
54°	04:32:49	05:14:35	05:49:53	17:52:44	18:27:55	19:09:30	14:59:01 22:02:44
52°	04:36:28	05:16:12	05:49:54	17:52:48	18:26:23	19:05:58	14:45:47 22:15:58
50°	04:39:40	05:17:38	05:49:54	17:52:53	18:25:02	19:02:52	14:34:09 22:27:36
45°	04:46:14	05:20:34	05:49:52	17:53:04	18:22:17	18:56:31	14:10:01 22:51:44
N 40°	04:51:11	05:22:46	05:49:48	17:53:15	18:20:13	18:51:43	13:50:44 23:11:01
35°	04:55:00	05:24:27	05:49:43	17:53:26	18:18:39	18:48:03	13:34:36 23:27:09
30°	04:57:55	05:25:44	05:49:37	17:53:38	18:17:29	18:45:15	13:20:39 23:41:06
20°	05:01:47	05:27:21	05:49:21	17:54:04	18:16:03	18:41:35	12:56:57 .. ..
N 10°	05:03:40	05:28:02	05:49:02	17:54:32	18:15:31	18:39:53	12:36:27 .. ..
0°	05:03:57	05:27:57	05:48:37	17:55:05	18:15:45	18:39:45	12:17:22 .. ..
S 10°	05:02:44	05:27:07	05:48:06	17:55:44	18:16:44	18:41:07	11:58:18 00:06:19
20°	04:59:52	05:25:27	05:47:27	17:56:32	18:18:33	18:44:10	11:37:55 00:26:23
30°	04:54:52	05:22:43	05:46:36	17:57:34	18:21:28	18:49:22	11:14:24 00:49:33
35°	04:51:18	05:20:48	05:46:03	17:58:12	18:23:30	18:53:04	11:00:36 01:03:10
40°	04:46:45	05:18:24	05:45:25	17:58:57	18:26:02	18:57:46	10:44:42 01:18:53
45°	04:40:54	05:15:21	05:44:38	17:59:52	18:29:14	19:03:47	10:25:44 01:37:39
S 50°	04:33:17	05:11:25	05:43:40	18:00:59	18:33:21	19:11:38	10:02:05 02:01:04
52°	04:29:34	05:09:31	05:43:12	18:01:31	18:35:20	19:15:27	09:50:44 02:12:19
54°	04:25:23	05:07:23	05:42:42	18:02:06	18:37:33	19:19:46	09:37:52 02:25:05
56°	04:20:37	05:04:59	05:42:08	18:02:46	18:40:03	19:24:40	09:23:02 02:39:47
58°	04:15:11	05:02:16	05:41:30	18:03:29	18:42:54	19:30:16	09:05:35 02:57:07
S 60°	04:08:54	04:59:09	05:40:47	18:04:19	18:46:09	19:36:45	08:44:22 03:18:12

Sep 24	SHA	Mer.pass
Venus	217°53.4	09:15:33
Mars	333°46.9	01:31:26
Jupiter	70°52.0	19:00:24
Saturn	62°37.2	19:33:09

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
	mm:ss	mm:ss	hh:mm:ss	hh:mm:ss	hh:mm:ss	
23	07:38	07:48	11:52:12	17:33:51	05:05:07	6(44%)
24	07:59	08:09	11:51:51	18:30:56	06:02:31	7(55%)

25 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	03:18:41	04:45:50	05:53:42	17:46:56	18:54:14	20:20:03	■ ■
N 70°	03:35:31	04:52:13	05:53:22	17:47:31	18:48:14	20:03:59	■ ■
68°	03:48:37	04:57:21	05:53:04	17:48:02	18:43:23	19:51:25	■ ■
66°	03:59:07	05:01:35	05:52:49	17:48:28	18:39:24	19:41:19	19:04:09 19:53:35
64°	04:07:44	05:05:07	05:52:35	17:48:50	18:36:04	19:33:00	17:45:51 21:11:35
62°	04:14:56	05:08:06	05:52:23	17:49:11	18:33:15	19:26:03	17:09:03 21:48:06
60°	04:21:03	05:10:38	05:52:11	17:49:29	18:30:51	19:20:09	16:42:46 22:14:08
N 58°	04:26:16	05:12:50	05:52:01	17:49:45	18:28:47	19:15:06	16:22:04 22:34:35
56°	04:30:48	05:14:45	05:51:51	17:50:01	18:26:59	19:10:43	16:04:59 22:51:27
54°	04:34:45	05:16:25	05:51:41	17:50:15	18:25:25	19:06:54	15:50:27 23:05:47
52°	04:38:13	05:17:53	05:51:33	17:50:28	18:24:02	19:03:33	15:37:48 23:18:14
50°	04:41:16	05:19:10	05:51:24	17:50:41	18:22:50	19:00:35	15:26:37 23:29:14
45°	04:47:30	05:21:47	05:51:04	17:51:10	18:20:23	18:54:34	15:03:20 23:52:05
N 40°	04:52:12	05:23:45	05:50:46	17:51:36	18:18:34	18:50:02	14:44:38 .. ..
35°	04:55:46	05:25:12	05:50:28	17:52:00	18:17:13	18:46:36	14:28:56 .. ..
30°	04:58:29	05:26:17	05:50:10	17:52:23	18:16:15	18:44:00	14:15:20 .. ..
20°	05:02:01	05:27:35	05:49:35	17:53:09	18:15:08	18:40:40	13:52:09 00:04:49
N 10°	05:03:36	05:27:58	05:48:57	17:53:55	18:14:54	18:39:15	13:32:03 00:25:19
0°	05:03:36	05:27:36	05:48:16	17:54:44	18:15:25	18:39:25	13:13:18 00:44:25
S 10°	05:02:07	05:26:30	05:47:29	17:55:40	18:16:40	18:41:04	12:54:32 01:03:29
20°	04:58:56	05:24:32	05:46:32	17:56:45	18:18:47	18:44:25	12:34:25 01:23:53
30°	04:53:36	05:21:28	05:45:21	17:58:07	18:22:02	18:49:58	12:11:12 01:47:25
35°	04:49:49	05:19:21	05:44:37	17:58:57	18:24:16	18:53:52	11:57:33 02:01:14
40°	04:45:02	05:16:44	05:43:46	17:59:55	18:27:01	18:58:48	11:41:48 02:17:09
45°	04:38:55	05:13:25	05:42:44	18:01:05	18:30:28	19:05:05	11:23:00 02:36:09
S 50°	04:30:57	05:09:11	05:41:28	18:02:30	18:34:54	19:13:17	10:59:32 02:59:50
52°	04:27:05	05:07:08	05:40:52	18:03:10	18:37:01	19:17:15	10:48:14 03:11:13
54°	04:22:43	05:04:51	05:40:12	18:03:55	18:39:24	19:21:45	10:35:26 03:24:07
56°	04:17:46	05:02:17	05:39:29	18:04:44	18:42:05	19:26:51	10:20:41 03:38:59
58°	04:12:05	04:59:22	05:38:39	18:05:39	18:45:07	19:32:41	10:03:16 03:56:30
S 60°	04:05:32	04:56:02	05:37:44	18:06:41	18:48:36	19:39:27	09:42:05 04:17:49

Sep 25	SHA	Mer.pass
Venus	216°44.7	09:16:11
Mars	333°59.1	01:26:42
Jupiter	70°49.6	18:56:38
Saturn	62°37.6	19:29:11

26 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	03:24:22	04:50:29	05:58:10	17:41:49	18:48:58	20:13:49	■ ■
N 70°	03:40:18	04:56:17	05:57:19	17:42:55	18:43:31	19:58:36	■ ■
68°	03:52:43	05:00:58	05:56:35	17:43:50	18:39:07	19:46:41	19:55:19 20:52:57
66°	04:02:43	05:04:49	05:55:58	17:44:38	18:35:30	19:37:05	18:37:11 22:10:27
64°	04:10:55	05:08:01	05:55:26	17:45:19	18:32:30	19:29:10	17:59:50 22:47:13
62°	04:17:47	05:10:44	05:54:58	17:45:55	18:29:57	19:22:33	17:33:15 23:13:15
60°	04:23:36	05:13:02	05:54:33	17:46:27	18:27:47	19:16:56	17:12:28 23:33:33
N 58°	04:28:35	05:15:01	05:54:10	17:46:56	18:25:56	19:12:07	16:55:23 23:50:11
56°	04:32:54	05:16:44	05:53:49	17:47:22	18:24:19	19:07:57	16:40:55 .. ..
54°	04:36:40	05:18:14	05:53:30	17:47:46	18:22:55	19:04:19	16:28:24 .. ..
52°	04:39:57	05:19:33	05:53:12	17:48:08	18:21:42	19:01:07	16:17:23 .. ..
50°	04:42:52	05:20:42	05:52:55	17:48:29	18:20:37	18:58:19	16:07:34 .. ..
45°	04:48:46	05:23:01	05:52:17	17:49:16	18:18:28	18:52:37	15:46:53 .. ..
N 40°	04:53:11	05:24:43	05:51:43	17:49:57	18:16:55	18:48:21	15:30:05 00:10:25
35°	04:56:32	05:25:57	05:51:12	17:50:34	18:15:47	18:45:09	15:15:55 00:25:46
30°	04:59:04	05:26:51	05:50:43	17:51:09	18:15:00	18:42:44	15:03:33 00:39:03
20°	05:02:14	05:27:48	05:49:48	17:52:14	18:14:13	18:39:46	14:42:24 01:01:39
N 10°	05:03:32	05:27:54	05:48:53	17:53:18	18:14:17	18:38:39	14:24:00 01:21:10
0°	05:03:15	05:27:15	05:47:56	17:54:24	18:15:04	18:39:05	14:06:46 01:39:20
S 10°	05:01:29	05:25:52	05:46:52	17:55:36	18:16:36	18:41:01	13:49:31 01:57:26
20°	04:58:00	05:23:37	05:45:38	17:56:59	18:19:01	18:44:40	13:31:01 02:16:46
30°	04:52:19	05:20:12	05:44:06	17:58:41	18:22:37	18:50:34	13:09:39 02:39:00
35°	04:48:20	05:17:54	05:43:11	17:59:42	18:25:01	18:54:40	12:57:07 02:51:59
40°	04:43:19	05:15:03	05:42:06	18:00:53	18:28:00	18:59:50	12:42:41 03:06:55
45°	04:36:55	05:11:29	05:40:49	18:02:18	18:31:43	19:06:24	12:25:31 03:24:38
S 50°	04:28:37	05:06:56	05:39:15	18:04:02	18:36:27	19:14:56	12:04:12 03:46:33
52°	04:24:35	05:04:45	05:38:32	18:04:50	18:38:43	19:19:05	11:54:01 03:57:00
54°	04:20:03	05:02:19	05:37:43	18:05:43	18:41:16	19:23:45	11:42:32 04:08:45
56°	04:14:53	04:59:34	05:36:49	18:06:42	18:44:07	19:29:04	11:29:25 04:22:11
58°	04:08:59	04:56:27	05:35:49	18:07:49	18:47:21	19:35:08	11:14:07 04:37:49
S 60°	04:02:10	04:52:54	05:34:41	18:09:03	18:51:03	19:42:10	10:55:50 04:56:27

Sep 26	SHA	Mer.pass
Venus	215°36.1	09:16:49
Mars	334°11.9	01:21:54
Jupiter	70°47.0	18:52:53
Saturn	62°38.0	19:25:14

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
25	08:19	08:30	11:51:30	19:26:23	06:58:56	8(65%)
26	08:40	08:50	11:51:10	20:19:10	07:53:09	9(74%)



27 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	03:29:57	04:55:06	06:02:38	17:36:41	18:43:43	20:07:41	■
N 70°	03:45:00	05:00:21	06:01:16	17:38:19	18:38:49	19:53:19	19:48:00
68°	03:56:47	05:04:34	06:00:07	17:39:39	18:34:52	19:42:01	18:59:27
66°	04:06:16	05:08:02	05:59:08	17:40:48	18:31:38	19:32:53	18:28:10
64°	04:14:05	05:10:55	05:58:18	17:41:47	18:28:56	19:25:22	18:04:48
62°	04:20:37	05:13:21	05:57:33	17:42:39	18:26:40	19:19:04	17:46:09
60°	04:26:09	05:15:25	05:56:54	17:43:25	18:24:44	19:13:44	17:30:43
N 58°	04:30:54	05:17:12	05:56:19	17:44:06	18:23:05	19:09:09	17:17:35
56°	04:35:00	05:18:43	05:55:47	17:44:43	18:21:39	19:05:11	17:06:13
54°	04:38:34	05:20:03	05:55:18	17:45:17	18:20:26	19:01:44	16:56:13
52°	04:41:42	05:21:12	05:54:51	17:45:49	18:19:21	18:58:43	16:47:18
50°	04:44:27	05:22:13	05:54:26	17:46:18	18:18:25	18:56:04	16:39:16
45°	04:50:02	05:24:14	05:53:30	17:47:22	18:16:34	18:50:41	16:22:11
N 40°	04:54:11	05:25:41	05:52:41	17:48:18	18:15:16	18:46:41	16:08:08
35°	04:57:19	05:26:42	05:51:57	17:49:09	18:14:21	18:43:42	15:56:11
30°	04:59:38	05:27:24	05:51:17	17:49:55	18:13:46	18:41:30	15:45:42
20°	05:02:28	05:28:01	05:50:01	17:51:20	18:13:19	18:38:51	15:27:41
N 10°	05:03:27	05:27:50	05:48:49	17:52:41	18:13:40	18:38:02	15:11:56
0°	05:02:54	05:26:55	05:47:35	17:54:04	18:14:44	18:38:45	14:57:08
S 10°	05:00:51	05:25:15	05:46:15	17:55:32	18:16:33	18:40:58	14:42:19
20°	04:57:04	05:22:42	05:44:43	17:57:13	18:19:15	18:44:55	14:26:26
30°	04:51:02	05:18:57	05:42:52	17:59:14	18:23:11	18:51:10	14:08:08
35°	04:46:51	05:16:27	05:41:45	18:00:27	18:25:48	18:55:29	13:57:26
40°	04:41:36	05:13:23	05:40:27	18:01:52	18:29:00	19:00:53	13:45:09
45°	04:34:55	05:09:34	05:38:56	18:03:32	18:32:58	19:07:44	13:30:38
S 50°	04:26:17	05:04:42	05:37:04	18:05:33	18:38:01	19:16:36	13:12:47
52°	04:22:05	05:02:22	05:36:11	18:06:30	18:40:26	19:20:55	13:04:21
54°	04:17:22	04:59:46	05:35:14	18:07:32	18:43:08	19:25:46	12:54:55
56°	04:12:00	04:56:51	05:34:10	18:08:41	18:46:10	19:31:17	12:44:15
58°	04:05:51	04:53:32	05:32:59	18:09:59	18:49:36	19:37:36	12:32:01
S 60°	03:58:45	04:49:46	05:31:39	18:11:26	18:53:32	19:44:55	12:17:43

Sep 27	SHA	Mer.pass
Venus	214°27.6	09:17:26
Mars	334°25.5	01:17:04
Jupiter	70°44.2	18:49:09
Saturn	62°38.3	19:21:17

28 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	03:35:24	04:59:41	06:07:07	17:31:34	18:38:31	20:01:41	19:37:37
N 70°	03:49:37	05:04:23	06:05:13	17:33:42	18:34:09	19:48:06	19:04:36
68°	04:00:47	05:08:09	06:03:38	17:35:29	18:30:38	19:37:24	18:40:29
66°	04:09:48	05:11:15	06:02:18	17:36:59	18:27:46	19:28:44	18:21:39
64°	04:17:13	05:13:49	06:01:09	17:38:16	18:25:23	19:21:36	18:06:20
62°	04:23:25	05:15:58	06:00:09	17:39:24	18:23:23	19:15:37	17:53:30
60°	04:28:41	05:17:48	05:59:16	17:40:23	18:21:41	19:10:33	17:42:33
N 58°	04:33:11	05:19:22	05:58:28	17:41:17	18:20:15	19:06:12	17:33:01
56°	04:37:05	05:20:43	05:57:45	17:42:05	18:19:01	19:02:27	17:24:38
54°	04:40:28	05:21:52	05:57:06	17:42:49	18:17:57	18:59:11	17:17:10
52°	04:43:25	05:22:52	05:56:30	17:43:29	18:17:01	18:56:20	17:10:27
50°	04:46:02	05:23:45	05:55:57	17:44:06	18:16:14	18:53:49	17:04:21
45°	04:51:17	05:25:27	05:54:43	17:45:29	18:14:41	18:48:46	16:51:14
N 40°	04:55:11	05:26:39	05:53:40	17:46:40	18:13:37	18:45:01	16:40:20
35°	04:58:05	05:27:28	05:52:43	17:47:43	18:12:56	18:42:16	16:31:00
30°	05:00:12	05:27:58	05:51:50	17:48:41	18:12:32	18:40:15	16:22:47
20°	05:02:42	05:28:15	05:50:15	17:50:26	18:12:25	18:37:57	16:08:34
N 10°	05:03:23	05:27:46	05:48:45	17:52:05	18:13:04	18:37:26	15:56:05
0°	05:02:33	05:26:34	05:47:15	17:53:43	18:14:24	18:38:25	15:44:21
S 10°	05:00:13	05:24:38	05:45:38	17:55:28	18:16:30	18:40:55	15:32:34
20°	04:56:08	05:21:47	05:43:49	17:57:27	18:19:30	18:45:11	15:19:58
30°	04:49:45	05:17:42	05:41:38	17:59:48	18:23:46	18:51:47	15:05:29
35°	04:45:22	05:15:01	05:40:19	18:01:13	18:26:34	18:56:18	14:57:03
40°	04:39:52	05:11:43	05:38:49	18:02:50	18:30:00	19:01:56	14:47:25
45°	04:32:55	05:07:38	05:37:02	18:04:45	18:34:14	19:09:04	14:36:06
S 50°	04:23:56	05:02:28	05:34:52	18:07:05	18:39:36	19:18:18	14:22:20
52°	04:19:35	04:59:59	05:33:51	18:08:10	18:42:09	19:22:46	14:15:53
54°	04:14:40	04:57:14	05:32:45	18:09:21	18:45:01	19:27:49	14:08:44
56°	04:09:05	04:54:08	05:31:31	18:10:41	18:48:14	19:33:32	14:00:43
58°	04:02:43	04:50:37	05:30:09	18:12:09	18:51:52	19:40:06	13:51:40
S 60°	03:55:20	04:46:37	05:28:36	18:13:48	18:56:01	19:47:42	13:41:16

Sep 28	SHA	Mer.pass
Venus	213°19.1	09:18:03
Mars	334°39.6	01:12:12
Jupiter	70°41.3	18:45:25
Saturn	62°38.5	19:17:21

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
27	09:01	09:11	11:50:49	21:08:46	08:44:22	10(83%)
28	09:21	09:31	11:50:29	21:55:16	09:32:23	11(90%)

29 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	03:40:45	05:04:14	06:11:36	17:26:27	18:33:20	19:55:46	18:58:59
N 70°	03:54:11	05:08:24	06:09:11	17:29:06	18:29:30	19:42:57	18:41:29
68°	04:04:45	05:11:44	06:07:10	17:31:18	18:26:26	19:32:50	18:27:31
66°	04:13:17	05:14:27	06:05:29	17:33:09	18:23:56	19:24:38	18:16:01
64°	04:20:19	05:16:42	06:04:01	17:34:45	18:21:51	19:17:52	18:06:20
62°	04:26:12	05:18:35	06:02:45	17:36:08	18:20:07	19:12:12	17:58:02
60°	04:31:12	05:20:11	06:01:38	17:37:22	18:18:40	19:07:23	17:50:50
N 58°	04:35:28	05:21:32	06:00:38	17:38:28	18:17:25	19:03:17	17:44:29
56°	04:39:09	05:22:42	05:59:44	17:39:27	18:16:22	18:59:44	17:38:50
54°	04:42:21	05:23:41	05:58:55	17:40:21	18:15:28	18:56:39	17:33:46
52°	04:45:09	05:24:32	05:58:10	17:41:10	18:14:42	18:53:57	17:29:10
50°	04:47:36	05:25:16	05:57:28	17:41:55	18:14:03	18:51:35	17:24:59
45°	04:52:33	05:26:41	05:55:57	17:43:36	18:12:48	18:46:51	17:15:55
N 40°	04:56:11	05:27:37	05:54:38	17:45:02	18:11:59	18:43:22	17:08:19
35°	04:58:51	05:28:13	05:53:28	17:46:18	18:11:31	18:40:50	17:01:46
30°	05:00:46	05:28:31	05:52:24	17:47:27	18:11:19	18:39:01	16:55:59
20°	05:02:56	05:28:29	05:50:29	17:49:32	18:11:32	18:37:03	16:45:56
N 10°	05:03:19	05:27:42	05:48:42	17:51:28	18:12:28	18:36:50	16:37:05
0°	05:02:12	05:26:14	05:46:55	17:53:24	18:14:05	18:38:06	16:28:46
S 10°	04:59:35	05:24:01	05:45:02	17:55:25	18:16:27	18:40:53	16:20:24
20°	04:55:12	05:20:53	05:42:55	17:57:41	18:19:45	18:45:27	16:11:28
30°	04:48:28	05:16:27	05:40:24	18:00:22	18:24:21	18:52:24	16:01:14
35°	04:43:52	05:13:34	05:38:54	18:01:58	18:27:21	18:57:07	15:55:18
40°	04:38:09	05:10:03	05:37:10	18:03:49	18:31:00	19:03:00	15:48:32
45°	04:30:55	05:05:42	05:35:08	18:05:59	18:35:30	19:10:25	15:40:39
S 50°	04:21:35	05:00:13	05:32:40	18:08:37	18:41:11	19:19:59	15:31:07
52°	04:17:04	04:57:36	05:31:31	18:09:50	18:43:53	19:24:38	15:26:41
54°	04:11:58	04:54:41	05:30:16	18:11:11	18:46:54	19:29:52	15:21:48
56°	04:06:10	04:51:24	05:28:52	18:12:40	18:50:18	19:35:49	15:16:23
58°	03:59:33	04:47:42	05:27:19	18:14:20	18:54:08	19:42:37	15:10:18
S 60°	03:51:53	04:43:28	05:25:34	18:16:12	18:58:31	19:50:31	15:03:24

Sep 29	SHA	Mer.pass
Venus	212°10.6	09:18:41
Mars	334°54.4	01:07:17
Jupiter	70°38.1	18:41:43
Saturn	62°38.5	19:13:25

30 September 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	03:46:01	05:08:47	06:16:06	17:21:20	18:28:11	19:49:57	18:32:45
N 70°	03:58:40	05:12:24	06:13:09	17:24:30	18:24:53	19:37:52	18:24:00
68°	04:08:40	05:15:17	06:10:43	17:27:07	18:22:15	19:28:19	18:16:48
66°	04:16:44	05:17:39	06:08:40	17:29:20	18:20:06	19:20:34	18:10:45
64°	04:23:24	05:19:35	06:06:54	17:31:14	18:18:20	19:14:10	18:05:35
62°	04:28:58	05:21:12	06:05:22	17:32:53	18:16:52	19:08:48	18:01:06
60°	04:33:42	05:22:33	06:04:00	17:34:21	18:15:39	19:04:15	17:57:10
N 58°	04:37:44	05:23:42	06:02:48	17:35:39	18:14:37	19:00:22	17:53:41
56°	04:41:13	05:24:40	06:01:43	17:36:49	18:13:45	18:57:01	17:50:35
54°	04:44:14	05:25:30	06:00:44	17:37:53	18:13:01	18:54:07	17:47:46
52°	04:46:52	05:26:12	05:59:50	17:38:51	18:12:24	18:51:35	17:45:13
50°	04:49:10	05:26:48	05:59:00	17:39:45	18:11:52	18:49:22	17:42:52
45°	04:53:48	05:27:54	05:57:10	17:41:43	18:10:55	18:44:57	17:37:47
N 40°	04:57:10	05:28:36	05:55:36	17:43:24	18:10:22	18:41:44	17:33:30
35°	04:59:37	05:28:58	05:54:13	17:44:53	18:10:06	18:39:25	17:29:48
30°	05:01:21	05:29:05	05:52:58	17:46:14	18:10:05	18:37:48	17:26:31
20°	05:03:10	05:28:42	05:50:43	17:48:39	18:10:39	18:36:10	17:20:49
N 10°	05:03:15	05:27:38	05:48:38	17:50:52	18:11:53	18:36:15	17:15:47
0°	05:01:52	05:25:53	05:46:35	17:53:04	18:13:46	18:37:48	17:11:03
S 10°	04:58:57	05:23:24	05:44:25	17:55:22	18:16:24	18:40:52	17:06:18
20°	04:54:16	05:19:58	05:42:01	17:57:55	18:20:00	18:45:43	17:01:14
30°	04:47:11	05:15:12	05:39:10	18:00:57	18:24:57	18:53:01	16:55:27
35°	04:42:23	05:12:07	05:37:28	18:02:44	18:28:09	18:57:57	16:52:06
40°	04:36:25	05:08:23	05:35:32	18:04:48	18:32:01	19:04:04	16:48:18
45°	04:28:54	05:03:47	05:33:15	18:07:13	18:36:46	19:11:46	16:43:53
S 50°	04:19:13	04:57:59	05:30:29	18:10:09	18:42:46	19:21:42	16:38:34
52°	04:14:32	04:55:13	05:29:12	18:11:31	18:45:37	19:26:31	16:36:07
54°	04:09:15	04:52:08	05:27:47	18:13:00	18:48:49	19:31:56	16:33:25
56°	04:03:15	04:48:40	05:26:13	18:14:40	18:52:23	19:38:06	16:30:27
58°	03:56:22	04:44:46	05:24:29	18:16:31	18:56:26	19:45:10	16:27:07
S 60°	03:48:25	04:40:19	05:22:32	18:18:35	19:01:02	19:53:21	16:23:23

Sep 30	SHA	Mer.pass
Venus	211°02.3	09:19:17
Mars	335°09.8	01:02:20
Jupiter	70°34.7	18:38:01
Saturn	62°38.5	19:09:30

Day	Sun			Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
29	09:41	09:51	11:50:09	22:39:06	10:17:28	12(95%)
30	10:01	10:11	11:49:49	23:21:01	11:00:15	13(98%)

# 2020 October 01 to Oct. 02

01 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	03:51:11	05:13:18	06:20:36	17:16:12	18:23:04	19:44:14	18:10:36
N 70°	04:03:06	05:16:23	06:17:08	17:19:53	18:20:18	19:32:52	18:08:39
68°	04:12:32	05:18:50	06:14:16	17:22:57	18:18:05	19:23:51	18:07:02
66°	04:20:10	05:20:50	06:11:51	17:25:31	18:16:18	19:16:32	18:05:40
64°	04:26:27	05:22:27	06:09:46	17:27:43	18:14:50	19:10:29	18:04:29
62°	04:31:43	05:23:48	06:07:58	17:29:39	18:13:38	19:05:26	18:03:28
60°	04:36:11	05:24:56	06:06:23	17:31:20	18:12:38	19:01:09	18:02:34
N 58°	04:39:59	05:25:52	06:04:58	17:32:51	18:11:49	18:57:29	18:01:46
56°	04:43:16	05:26:39	06:03:42	17:34:12	18:11:08	18:54:20	18:01:03
54°	04:46:06	05:27:19	06:02:33	17:35:25	18:10:34	18:51:37	18:00:24
52°	04:48:35	05:27:52	06:01:30	17:36:33	18:10:05	18:49:14	17:59:49
50°	04:50:44	05:28:19	06:00:32	17:37:35	18:09:42	18:47:10	17:59:17
45°	04:55:03	05:29:08	05:58:24	17:39:51	18:09:03	18:43:03	17:58:07
N 40°	04:58:10	05:29:34	05:56:35	17:41:47	18:08:45	18:40:06	17:57:08
35°	05:00:23	05:29:44	05:54:59	17:43:29	18:08:42	18:38:00	17:56:17
30°	05:01:55	05:29:39	05:53:33	17:45:01	18:08:53	18:36:35	17:55:31
20°	05:03:24	05:28:57	05:50:58	17:47:46	18:09:46	18:35:18	17:54:13
N 10°	05:03:11	05:27:34	05:48:35	17:50:17	18:11:17	18:35:40	17:53:05
0°	05:01:31	05:25:33	05:46:15	17:52:45	18:13:27	18:37:30	17:52:01
S 10°	04:58:20	05:22:47	05:43:49	17:55:19	18:16:22	18:40:50	17:50:57
20°	04:53:21	05:19:04	05:41:07	17:58:10	18:20:15	18:46:00	17:49:50
30°	04:45:55	05:13:58	05:37:56	18:01:32	18:25:33	18:53:39	17:48:33
35°	04:40:54	05:10:41	05:36:04	18:03:31	18:28:56	18:58:48	17:47:49
40°	04:34:42	05:06:43	05:33:54	18:05:47	18:33:02	19:05:09	17:47:00
45°	04:26:54	05:01:51	05:31:22	18:08:28	18:38:03	19:13:09	17:46:02
S 50°	04:16:51	04:55:44	05:28:18	18:11:42	18:44:22	19:23:26	17:44:53
52°	04:12:00	04:52:50	05:26:52	18:13:12	18:47:22	19:28:25	17:44:22
54°	04:06:31	04:49:35	05:25:19	18:14:51	18:50:43	19:34:02	17:43:47
56°	04:00:18	04:45:57	05:23:35	18:16:40	18:54:29	19:40:25	17:43:09
58°	03:53:11	04:41:50	05:21:39	18:18:42	18:58:44	19:47:45	17:42:26
S 60°	03:44:55	04:37:09	05:19:29	18:20:59	19:03:35	19:56:14	17:41:39

Oct 01	SHA	Mer.pass
Venus	209°53.9	09:19:54
Mars	335°25.7	00:57:21
Jupiter	70°31.1	18:34:20
Saturn	62°38.3	19:05:35

02 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	03:56:16	05:17:47	06:25:08	17:11:04	18:17:59	19:38:36	17:49:17
N 70°	04:07:29	05:20:21	06:21:07	17:15:17	18:15:43	19:27:55	17:53:46
68°	04:16:22	05:22:22	06:17:49	17:18:46	18:13:56	19:19:25	17:57:29
66°	04:23:34	05:24:00	06:15:02	17:21:42	18:12:30	19:12:32	18:00:37
64°	04:29:30	05:25:20	06:12:39	17:24:13	18:11:21	19:06:51	18:03:19
62°	04:34:27	05:26:25	06:10:35	17:26:24	18:10:25	19:02:05	18:05:39
60°	04:38:39	05:27:18	06:08:46	17:28:20	18:09:39	18:58:03	18:07:43
N 58°	04:42:14	05:28:02	06:07:09	17:30:02	18:09:02	18:54:37	18:09:33
56°	04:45:19	05:28:38	06:05:41	17:31:35	18:08:31	18:51:40	18:11:12
54°	04:47:58	05:29:08	06:04:22	17:32:58	18:08:07	18:49:07	18:12:41
52°	04:50:17	05:29:31	06:03:10	17:34:14	18:07:48	18:46:54	18:14:02
50°	04:52:18	05:29:51	06:02:04	17:35:25	18:07:33	18:44:59	18:15:17
45°	04:56:18	05:30:21	05:59:38	17:37:58	18:07:12	18:41:10	18:17:59
N 40°	04:59:09	05:30:33	05:57:34	17:40:10	18:07:08	18:38:28	18:20:17
35°	05:01:09	05:30:29	05:55:45	17:42:05	18:07:19	18:36:36	18:22:16
30°	05:02:29	05:30:13	05:54:07	17:43:48	18:07:41	18:35:22	18:24:02
20°	05:03:38	05:29:11	05:51:12	17:46:53	18:08:54	18:34:25	18:27:07
N 10°	05:03:08	05:27:31	05:48:32	17:49:41	18:10:42	18:35:05	18:29:52
0°	05:01:11	05:25:13	05:45:56	17:52:26	18:13:09	18:37:12	18:32:28
S 10°	04:57:43	05:22:11	05:43:13	17:55:17	18:16:20	18:40:50	18:35:05
20°	04:52:25	05:18:10	05:40:14	17:58:25	18:20:31	18:46:18	18:37:54
30°	04:44:38	05:12:43	05:36:43	18:02:07	18:26:09	18:54:18	18:41:08
35°	04:39:25	05:09:15	05:34:39	18:04:17	18:29:44	18:59:39	18:43:01
40°	04:32:59	05:05:04	05:32:16	18:06:47	18:34:03	19:06:15	18:45:09
45°	04:24:53	04:59:56	05:29:29	18:09:42	18:39:21	19:14:32	18:47:38
S 50°	04:14:29	04:53:30	05:26:07	18:13:14	18:45:59	19:25:11	18:50:37
52°	04:09:27	04:50:26	05:24:33	18:14:53	18:49:08	19:30:20	18:52:00
54°	04:03:47	04:47:02	05:22:50	18:16:41	18:52:39	19:36:09	18:53:31
56°	03:57:21	04:43:13	05:20:57	18:18:41	18:56:35	19:42:46	18:55:11
58°	03:49:58	04:38:53	05:18:50	18:20:54	19:01:03	19:50:21	18:57:03
S 60°	03:41:24	04:33:58	05:16:27	18:23:24	19:06:08	19:59:09	18:59:09

Oct 02	SHA	Mer.pass
Venus	208°45.7	09:20:31
Mars	335°42.2	00:52:19
Jupiter	70°27.3	18:30:39
Saturn	62°38.1	19:01:40

Day	Sun			Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
01	10:20	10:30	11:49:30	--	11:41:29	14(100%)
02	10:40	10:49	11:49:11	00:01:46	12:21:59	15(99%)

03 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	04:01:17	05:22:16	06:29:40	17:05:56	18:12:55	19:33:03	17:26:21
N 70°	04:11:49	05:24:18	06:25:08	17:10:41	18:11:10	19:23:01	17:38:01
68°	04:20:10	05:25:54	06:21:23	17:14:36	18:09:48	19:15:03	17:47:33
66°	04:26:56	05:27:10	06:18:14	17:17:54	18:08:44	19:08:34	17:55:31
64°	04:32:30	05:28:11	06:15:33	17:20:43	18:07:53	19:03:14	18:02:17
62°	04:37:10	05:29:00	06:13:12	17:23:10	18:07:12	18:58:46	18:08:08
60°	04:41:07	05:29:40	06:11:09	17:25:20	18:06:40	18:55:00	18:13:16
N 58°	04:44:28	05:30:12	06:09:19	17:27:15	18:06:15	18:51:47	18:17:48
56°	04:47:21	05:30:37	06:07:41	17:28:58	18:05:56	18:49:01	18:21:51
54°	04:49:50	05:30:56	06:06:12	17:30:31	18:05:41	18:46:39	18:25:30
52°	04:51:59	05:31:11	06:04:51	17:31:57	18:05:31	18:44:35	18:28:49
50°	04:53:52	05:31:22	06:03:36	17:33:15	18:05:24	18:42:48	18:31:51
45°	04:57:33	05:31:35	06:00:52	17:36:07	18:05:21	18:39:18	18:38:27
N 40°	05:00:08	05:31:31	05:58:33	17:38:33	18:05:32	18:36:52	18:44:00
35°	05:01:55	05:31:15	05:56:31	17:40:41	18:05:56	18:35:12	18:48:48
30°	05:03:04	05:30:48	05:54:42	17:42:36	18:06:29	18:34:10	18:53:03
20°	05:03:52	05:29:25	05:51:27	17:46:00	18:08:02	18:33:34	19:00:28
N 10°	05:03:04	05:27:28	05:48:30	17:49:06	18:10:08	18:34:31	19:07:01
0°	05:00:50	05:24:54	05:45:37	17:52:07	18:12:51	18:36:55	19:13:13
S 10°	04:57:06	05:21:35	05:42:38	17:55:15	18:16:19	18:40:49	19:19:28
20°	04:51:30	05:17:16	05:39:21	17:58:40	18:20:47	18:46:35	19:26:09
30°	04:43:21	05:11:29	05:35:30	18:02:42	18:26:45	18:54:57	19:33:50
35°	04:37:56	05:07:49	05:33:15	18:05:04	18:30:33	19:00:30	19:38:17
40°	04:31:15	05:03:24	05:30:39	18:07:46	18:35:05	19:07:21	19:43:21
45°	04:22:52	04:58:01	05:27:37	18:10:57	18:40:38	19:15:55	19:49:16
S 50°	04:12:07	04:51:16	05:23:56	18:14:48	18:47:36	19:26:56	19:56:23
52°	04:06:55	04:48:03	05:22:14	18:16:34	18:50:54	19:32:16	19:59:41
54°	04:01:03	04:44:29	05:20:22	18:18:32	18:54:35	19:38:17	20:03:20
56°	03:54:23	04:40:29	05:18:18	18:20:41	18:58:43	19:45:08	20:07:21
58°	03:46:44	04:35:57	05:16:00	18:23:06	19:03:23	19:52:59	20:11:51
S 60°	03:37:52	04:30:47	05:13:25	18:25:49	19:08:42	20:02:06	20:16:56

Oct 03	SHA	Mer.pass
Venus	207° 37.5	09:21:07
Mars	335° 59.1	00:47:16
Jupiter	70° 23.4	18:27:00
Saturn	62° 37.7	18:57:46

04 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	04:06:14	05:26:44	06:34:13	17:00:47	18:07:53	19:27:35	16:57:51
N 70°	04:16:06	05:28:15	06:29:09	17:06:04	18:06:39	19:18:11	17:19:29
68°	04:23:55	05:29:25	06:24:58	17:10:25	18:05:42	19:10:43	17:36:26
66°	04:30:16	05:30:20	06:21:27	17:14:05	18:04:58	19:04:39	17:50:13
64°	04:35:30	05:31:03	06:18:26	17:17:13	18:04:25	18:59:39	18:01:42
62°	04:39:52	05:31:36	06:15:50	17:19:56	18:04:00	18:55:29	18:11:29
60°	04:43:33	05:32:02	06:13:32	17:22:20	18:03:42	18:51:57	18:19:57
N 58°	04:46:42	05:32:21	06:11:30	17:24:27	18:03:29	18:48:57	18:27:22
56°	04:49:23	05:32:35	06:09:41	17:26:22	18:03:21	18:46:23	18:33:57
54°	04:51:41	05:32:45	06:08:02	17:28:05	18:03:16	18:44:11	18:39:51
52°	04:53:41	05:32:51	06:06:31	17:29:39	18:03:15	18:42:17	18:45:11
50°	04:55:25	05:32:54	06:05:09	17:31:06	18:03:16	18:40:39	18:50:03
45°	04:58:47	05:32:49	06:02:07	17:34:16	18:03:31	18:37:27	19:00:34
N 40°	05:01:08	05:32:30	05:59:33	17:36:57	18:03:57	18:35:16	19:09:21
35°	05:02:41	05:32:01	05:57:18	17:39:18	18:04:33	18:33:50	19:16:54
30°	05:03:38	05:31:22	05:55:17	17:41:24	18:05:18	18:32:59	19:23:35
20°	05:04:06	05:29:40	05:51:42	17:45:08	18:07:10	18:32:42	19:35:12
N 10°	05:03:01	05:27:25	05:48:27	17:48:32	18:09:34	18:33:58	19:45:26
0°	05:00:30	05:24:35	05:45:18	17:51:49	18:12:33	18:36:38	19:55:05
S 10°	04:56:29	05:20:59	05:42:03	17:55:13	18:16:18	18:40:49	20:04:48
20°	04:50:35	05:16:22	05:38:29	17:58:56	18:21:04	18:46:54	20:15:13
30°	04:42:05	05:10:16	05:34:18	18:03:17	18:27:22	18:55:36	20:27:10
35°	04:36:27	05:06:23	05:31:51	18:05:51	18:31:22	19:01:22	20:34:08
40°	04:29:32	05:01:45	05:29:02	18:08:47	18:36:08	19:08:28	20:42:05
45°	04:20:52	04:56:06	05:25:44	18:12:13	18:41:57	19:17:20	20:51:23
S 50°	04:09:44	04:49:02	05:21:46	18:16:21	18:49:13	19:28:43	21:02:40
52°	04:04:21	04:45:40	05:19:56	18:18:16	18:52:41	19:34:13	21:07:56
54°	03:58:17	04:41:56	05:17:55	18:20:23	18:56:32	19:40:26	21:13:45
56°	03:51:24	04:37:44	05:15:41	18:22:43	19:00:51	19:47:31	21:20:13
58°	03:43:29	04:33:00	05:13:11	18:25:19	19:05:43	19:55:38	21:27:31
S 60°	03:34:18	04:27:36	05:10:24	18:28:14	19:11:17	20:05:06	21:35:49

Oct 04	SHA	Mer.pass
Venus	206° 29.4	09:21:43
Mars	336° 16.4	00:42:11
Jupiter	70° 19.2	18:23:21
Saturn	62° 37.3	18:53:52

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
	mm:ss	mm:ss	hh:mm:ss	hh:mm:ss	hh:mm:ss	
03	10:59	11:08	11:48:52	00:42:14	13:02:36	16(98%)
04	11:17	11:26	11:48:34	01:23:11	13:44:06	17(94%)

# 2020 October 05 to Oct. 06

05 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	04:11:06	05:31:11	06:38:48	16:55:38	18:02:52	19:22:11	16:10:40
N 70°	04:20:20	05:32:11	06:33:11	17:01:27	18:02:08	19:13:25	16:53:33
68°	04:27:39	05:32:56	06:28:33	17:06:15	18:01:36	19:06:26	17:22:34
66°	04:33:35	05:33:30	06:24:40	17:10:17	18:01:14	19:00:46	17:44:30
64°	04:38:29	05:33:54	06:21:20	17:13:44	18:00:59	18:56:06	18:02:02
62°	04:42:33	05:34:12	06:18:28	17:16:43	18:00:50	18:52:13	18:16:32
60°	04:46:00	05:34:24	06:15:56	17:19:21	18:00:45	18:48:56	18:28:49
N 58°	04:48:55	05:34:31	06:13:42	17:21:40	18:00:44	18:46:09	18:39:27
56°	04:51:24	05:34:34	06:11:41	17:23:46	18:00:47	18:43:47	18:48:45
54°	04:53:32	05:34:34	06:09:52	17:25:39	18:00:52	18:41:45	18:57:01
52°	04:55:23	05:34:31	06:08:12	17:27:23	18:00:59	18:40:00	19:04:26
50°	04:56:58	05:34:25	06:06:41	17:28:57	18:01:09	18:38:30	19:11:09
45°	05:00:02	05:34:03	06:03:22	17:32:25	18:01:41	18:35:37	19:25:34
N 40°	05:02:07	05:33:29	06:00:33	17:35:21	18:02:22	18:33:41	19:37:30
35°	05:03:28	05:32:47	05:58:05	17:37:55	18:03:11	18:32:28	19:47:43
30°	05:04:13	05:31:57	05:55:52	17:40:13	18:04:07	18:31:49	19:56:43
20°	05:04:21	05:29:55	05:51:58	17:44:17	18:06:19	18:31:52	20:12:16
N 10°	05:02:58	05:27:23	05:48:25	17:47:58	18:09:00	18:33:25	20:25:55
0°	05:00:10	05:24:16	05:45:00	17:51:31	18:12:16	18:36:22	20:38:46
S 10°	04:55:52	05:20:24	05:41:28	17:55:11	18:16:17	18:40:50	20:51:41
20°	04:49:40	05:15:29	05:37:37	17:59:12	18:21:21	18:47:12	21:05:33
30°	04:40:49	05:09:02	05:33:06	18:03:53	18:28:00	18:56:17	21:21:31
35°	04:34:59	05:04:58	05:30:27	18:06:38	18:32:11	19:02:15	21:30:51
40°	04:27:49	05:00:07	05:27:26	18:09:47	18:37:10	19:09:35	21:41:31
45°	04:18:51	04:54:11	05:23:53	18:13:28	18:43:16	19:18:45	21:54:07
S 50°	04:07:21	04:46:48	05:19:37	18:17:55	18:50:52	19:30:30	22:09:30
52°	04:01:48	04:43:17	05:17:38	18:19:59	18:54:28	19:36:12	22:16:44
54°	03:55:32	04:39:23	05:15:27	18:22:14	18:58:29	19:42:37	22:24:48
56°	03:48:24	04:35:00	05:13:03	18:24:45	19:03:00	19:49:56	22:33:51
58°	03:40:13	04:30:03	05:10:23	18:27:32	19:08:05	19:58:20	22:44:08
S 60°	03:30:42	04:24:25	05:07:22	18:30:40	19:13:54	20:08:07	22:56:01

Oct 05	SHA	Mer.pass
Venus	205°21.3	09:22:18
Mars	336°34.1	00:37:05
Jupiter	70°14.9	18:19:43
Saturn	62°36.7	18:49:59

06 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	04:15:55	05:35:37	06:43:24	16:50:28	17:57:53	19:16:51	☐ ☐
N 70°	04:24:31	05:36:07	06:37:13	16:56:50	17:57:39	19:08:41	15:49:32
68°	04:31:21	05:36:27	06:32:09	17:02:05	17:57:32	19:02:11	17:00:52
66°	04:36:53	05:36:39	06:27:53	17:06:29	17:57:31	18:56:55	17:37:51
64°	04:41:26	05:36:45	06:24:15	17:10:14	17:57:34	18:52:35	18:04:13
62°	04:45:14	05:36:47	06:21:06	17:13:30	17:57:40	18:48:58	18:24:48
60°	04:48:25	05:36:45	06:18:20	17:16:22	17:57:49	18:45:56	18:41:37
N 58°	04:51:07	05:36:40	06:15:53	17:18:54	17:58:00	18:43:22	18:55:48
56°	04:53:25	05:36:32	06:13:41	17:21:10	17:58:13	18:41:11	19:08:02
54°	04:55:23	05:36:23	06:11:42	17:23:14	17:58:28	18:39:20	19:18:44
52°	04:57:04	05:36:11	06:09:54	17:25:06	17:58:45	18:37:44	19:28:15
50°	04:58:31	05:35:57	06:08:14	17:26:49	17:59:02	18:36:22	19:36:48
45°	05:01:17	05:35:17	06:04:37	17:30:35	17:59:52	18:33:47	19:54:57
N 40°	05:03:07	05:34:28	06:01:33	17:33:46	18:00:48	18:32:06	20:09:49
35°	05:04:14	05:33:33	05:58:52	17:36:32	18:01:49	18:31:06	20:22:27
30°	05:04:48	05:32:32	05:56:28	17:39:02	18:02:57	18:30:39	20:33:31
20°	05:04:36	05:30:10	05:52:14	17:43:26	18:05:29	18:31:02	20:52:33
N 10°	05:02:55	05:27:20	05:48:24	17:47:24	18:08:27	18:32:53	21:09:11
0°	04:59:51	05:23:57	05:44:42	17:51:14	18:11:59	18:36:06	21:24:49
S 10°	04:55:16	05:19:48	05:40:54	17:55:10	18:16:17	18:40:51	21:40:31
20°	04:48:45	05:14:36	05:36:45	17:59:28	18:21:39	18:47:32	21:57:23
30°	04:39:33	05:07:49	05:31:54	18:04:30	18:28:38	18:56:57	22:16:51
35°	04:33:30	05:03:33	05:29:04	18:07:26	18:33:01	19:03:08	22:28:16
40°	04:26:05	04:58:28	05:25:49	18:10:48	18:38:14	19:10:43	22:41:23
45°	04:16:50	04:52:17	05:22:02	18:14:44	18:44:35	19:20:11	22:56:58
S 50°	04:04:58	04:44:34	05:17:27	18:19:29	18:52:31	19:32:19	23:16:12
52°	03:59:14	04:40:54	05:15:20	18:21:41	18:56:16	19:38:11	23:25:20
54°	03:52:46	04:36:50	05:13:01	18:24:06	19:00:27	19:44:49	23:35:35
56°	03:45:24	04:32:16	05:10:26	18:26:47	19:05:09	19:52:22	23:47:14
58°	03:36:56	04:27:06	05:07:34	18:29:46	19:10:28	20:01:04	.. ..
S 60°	03:27:05	04:21:13	05:04:21	18:33:07	19:16:31	20:11:12	.. ..

Oct 06	SHA	Mer.pass
Venus	204°13.3	09:22:54
Mars	336°52.2	00:31:57
Jupiter	70°10.3	18:16:06
Saturn	62°36.0	18:46:06

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
05	11:35	11:44	11:48:16	02:05:26	14:27:15	18(89%)
06	11:53	12:02	11:47:58	02:49:39	15:12:39	19(82%)

# 2020 October 07 to Oct. 08

07 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	04:20:41	05:40:03	06:48:02	16:45:17	17:52:55	19:11:35	<div><div></div></div>
N 70°	04:28:40	05:40:02	06:41:17	16:52:13	17:53:11	19:04:01	<div><div></div></div>
68°	04:35:01	05:39:57	06:35:46	16:57:55	17:53:29	18:57:59	<div><div></div></div>
66°	04:40:09	05:39:48	06:31:08	17:02:41	17:53:49	18:53:06	17:28:24 14:25:05
64°	04:44:23	05:39:36	06:27:10	17:06:45	17:54:09	18:49:06	18:10:36 13:43:22
62°	04:47:53	05:39:22	06:23:45	17:10:17	17:54:31	18:45:46	18:39:16 13:15:09
60°	04:50:50	05:39:07	06:20:45	17:13:23	17:54:54	18:42:58	19:01:19 12:53:30
N 58°	04:53:19	05:38:50	06:18:05	17:16:08	17:55:17	18:40:37	19:19:16 12:35:56
56°	04:55:26	05:38:31	06:15:42	17:18:36	17:55:41	18:38:37	19:34:23 12:21:11
54°	04:57:13	05:38:11	06:13:33	17:20:49	17:56:05	18:36:56	19:47:24 12:08:29
52°	04:58:45	05:37:51	06:11:35	17:22:50	17:56:31	18:35:29	19:58:51 11:57:21
50°	05:00:04	05:37:29	06:09:48	17:24:42	17:56:56	18:34:16	20:09:01 11:47:28
45°	05:02:31	05:36:31	06:05:52	17:28:45	17:58:04	18:31:59	20:30:24 11:26:45
N 40°	05:04:06	05:35:28	06:02:33	17:32:11	17:59:14	18:30:33	20:47:43 11:10:01
35°	05:05:00	05:34:20	05:59:39	17:35:11	18:00:29	18:29:45	21:02:20 10:55:57
30°	05:05:23	05:33:07	05:57:04	17:37:51	18:01:47	18:29:30	21:15:03 10:43:44
20°	05:04:51	05:30:25	05:52:30	17:42:35	18:04:39	18:30:13	21:36:50 10:22:53
N 10°	05:02:52	05:27:18	05:48:23	17:46:50	18:07:55	18:32:21	21:55:47 10:04:50
0°	04:59:32	05:23:39	05:44:25	17:50:57	18:11:43	18:35:51	22:13:34 09:47:59
S 10°	04:54:40	05:19:14	05:40:20	17:55:10	18:16:17	18:40:52	22:31:23 09:31:11
20°	04:47:51	05:13:44	05:35:54	17:59:45	18:21:57	18:47:52	22:50:32 09:13:14
30°	04:38:18	05:06:36	05:30:43	18:05:06	18:29:16	18:57:38	23:12:41 08:52:37
35°	04:32:02	05:02:08	05:27:41	18:08:14	18:33:51	19:04:02	23:25:43 08:40:36
40°	04:24:23	04:56:50	05:24:14	18:11:49	18:39:18	19:11:52	23:40:45 08:26:49
45°	04:14:49	04:50:23	05:20:11	18:16:01	18:45:55	19:21:37	23:58:42 08:10:30
S 50°	04:02:35	04:42:20	05:15:18	18:21:04	18:54:10	19:34:08	.. .. 07:50:28
52°	03:56:40	04:38:31	05:13:03	18:23:24	18:58:05	19:40:12	.. .. 07:40:58
54°	03:49:59	04:34:17	05:10:34	18:25:59	19:02:26	19:47:02	.. .. 07:30:21
56°	03:42:23	04:29:31	05:07:49	18:28:49	19:07:20	19:54:50	.. .. 07:18:17
58°	03:33:38	04:24:09	05:04:46	18:32:00	19:12:52	20:03:49	00:00:41 07:04:25
S 60°	03:23:26	04:18:01	05:01:20	18:35:34	19:19:10	20:14:18	00:16:31 06:48:06

Oct 07	SHA	Mer.pass
Venus	203°05.3	09:23:29
Mars	337°10.6	00:26:48
Jupiter	70°05.6	18:12:29
Saturn	62°35.3	18:42:14

08 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	04:25:23	05:44:29	06:52:41	16:40:06	17:47:58	19:06:24	<div><div></div></div>
N 70°	04:32:47	05:43:57	06:45:22	16:47:36	17:48:44	18:59:24	<div><div></div></div>
68°	04:38:39	05:43:27	06:39:23	16:53:44	17:49:27	18:53:50	<div><div></div></div>
66°	04:43:24	05:42:57	06:34:22	16:58:53	17:50:07	18:49:20	<div><div></div></div>
64°	04:47:18	05:42:27	06:30:06	17:03:17	17:50:46	18:45:38	18:27:46 15:11:26
62°	04:50:32	05:41:58	06:26:24	17:07:05	17:51:23	18:42:35	19:05:57 14:33:27
60°	04:53:14	05:41:28	06:23:10	17:10:25	17:51:59	18:40:02	19:32:53 14:06:44
N 58°	04:55:31	05:40:59	06:20:18	17:13:22	17:52:34	18:37:53	19:53:57 13:45:51
56°	04:57:26	05:40:30	06:17:43	17:16:01	17:53:09	18:36:04	20:11:18 13:28:40
54°	04:59:03	05:40:00	06:15:24	17:18:25	17:53:43	18:34:33	20:26:02 13:14:05
52°	05:00:26	05:39:31	06:13:17	17:20:35	17:54:18	18:33:15	20:38:50 13:01:26
50°	05:01:36	05:39:01	06:11:21	17:22:35	17:54:51	18:32:10	20:50:08 12:50:17
45°	05:03:46	05:37:45	06:07:08	17:26:56	17:56:16	18:30:11	21:13:40 12:27:04
N 40°	05:05:05	05:36:27	06:03:34	17:30:37	17:57:41	18:29:00	21:32:33 12:08:28
35°	05:05:47	05:35:06	06:00:27	17:33:49	17:59:08	18:28:26	21:48:24 11:52:53
30°	05:05:58	05:33:42	05:57:40	17:36:41	18:00:38	18:28:21	22:02:08 11:39:23
20°	05:05:06	05:30:41	05:52:46	17:41:45	18:03:49	18:29:24	22:25:34 11:16:25
N 10°	05:02:50	05:27:17	05:48:22	17:46:18	18:07:23	18:31:50	22:45:54 10:56:32
0°	04:59:13	05:23:21	05:44:07	17:50:40	18:11:27	18:35:36	23:04:54 10:38:00
S 10°	04:54:04	05:18:39	05:39:47	17:55:09	18:16:18	18:40:55	23:23:57 10:19:28
20°	04:46:57	05:12:52	05:35:03	18:00:02	18:22:15	18:48:12	23:44:23 09:59:38
30°	04:37:02	05:05:24	05:29:33	18:05:43	18:29:55	18:58:20	.. .. 09:36:46
35°	04:30:34	05:00:44	05:26:19	18:09:03	18:34:41	19:04:57	.. .. 09:23:21
40°	04:22:40	04:55:12	05:22:39	18:12:51	18:40:22	19:13:01	.. .. 09:07:55
45°	04:12:49	04:48:29	05:18:21	18:17:17	18:47:15	19:23:05	.. .. 08:49:31
S 50°	04:00:12	04:40:07	05:13:10	18:22:39	18:55:50	19:35:58	00:21:03 08:26:40
52°	03:54:05	04:36:09	05:10:46	18:25:08	18:59:54	19:42:13	00:31:47 08:15:43
54°	03:47:12	04:31:44	05:08:08	18:27:51	19:04:26	19:49:17	00:43:55 08:03:21
56°	03:39:21	04:26:47	05:05:13	18:30:52	19:09:31	19:57:20	00:57:51 07:49:09
58°	03:30:18	04:21:11	05:01:58	18:34:14	19:15:16	20:06:37	01:14:13 07:32:32
S 60°	03:19:45	04:14:49	04:58:19	18:38:01	19:21:50	20:17:28	01:33:59 07:12:29

Oct 08	SHA	Mer.pass
Venus	201°57.5	09:24:04
Mars	337°29.3	00:21:38
Jupiter	70°00.7	18:08:53
Saturn	62°34.4	18:38:22

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
07	12:11	12:19	11:47:41	03:36:20	16:00:41	20(74%)
08	12:28	12:36	11:47:24	04:25:42	16:51:22	21(65%)



09 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	04:30:03	05:48:54	06:57:21	16:34:54	17:43:02	19:01:15	☐ ☐
N 70°	04:36:52	05:47:52	06:49:29	16:42:58	17:44:19	18:54:49	☐ ☐
68°	04:42:16	05:46:56	06:43:02	16:49:34	17:45:26	18:49:43	☐ ☐
66°	04:46:38	05:46:05	06:37:38	16:55:06	17:46:27	18:45:35	☐ ☐
64°	04:50:13	05:45:18	06:33:02	16:59:49	17:47:24	18:42:13	19:12:02 16:17:29
62°	04:53:10	05:44:33	06:29:04	17:03:53	17:48:16	18:39:25	19:53:55 15:35:33
60°	04:55:38	05:43:50	06:25:35	17:07:28	17:49:06	18:37:06	20:22:21 15:07:05
N 58°	04:57:42	05:43:08	06:22:30	17:10:38	17:49:53	18:35:10	20:44:17 14:45:07
56°	04:59:26	05:42:28	06:19:45	17:13:27	17:50:38	18:33:33	21:02:12 14:27:10
54°	05:00:53	05:41:49	06:17:16	17:16:01	17:51:22	18:32:11	21:17:20 14:11:59
52°	05:02:07	05:41:11	06:15:00	17:18:20	17:52:05	18:31:03	21:30:27 13:58:50
50°	05:03:09	05:40:33	06:12:55	17:20:28	17:52:47	18:30:06	21:42:00 13:47:16
45°	05:05:00	05:38:59	06:08:24	17:25:08	17:54:29	18:28:24	22:05:58 13:23:13
N 40°	05:06:05	05:37:27	06:04:35	17:29:03	17:56:09	18:27:28	22:25:09 13:03:59
35°	05:06:33	05:35:53	06:01:15	17:32:29	17:57:49	18:27:06	22:41:12 12:47:52
30°	05:06:33	05:34:18	05:58:17	17:35:32	17:59:30	18:27:13	22:55:06 12:33:55
20°	05:05:21	05:30:57	05:53:03	17:40:55	18:03:01	18:28:36	23:18:45 12:10:10
N 10°	05:02:48	05:27:16	05:48:22	17:45:45	18:06:51	18:31:19	23:39:13 11:49:36
0°	04:58:54	05:23:03	05:43:51	17:50:24	18:11:12	18:35:22	23:58:20 11:30:23
S 10°	04:53:28	05:18:05	05:39:14	17:55:09	18:16:19	18:40:57	.. .. 11:11:10
20°	04:46:04	05:12:00	05:34:12	18:00:20	18:22:34	18:48:33	.. .. 10:50:32
30°	04:35:48	05:04:12	05:28:22	18:06:21	18:30:34	18:59:02	00:08:03 10:26:41
35°	04:29:06	04:59:20	05:24:58	18:09:52	18:35:33	19:05:52	00:21:58 10:12:40
40°	04:20:57	04:53:35	05:21:04	18:13:52	18:41:27	19:14:11	00:38:04 09:56:27
45°	04:10:48	04:46:36	05:16:31	18:18:34	18:48:36	19:24:33	00:57:21 09:37:03
S 50°	03:57:48	04:37:54	05:11:02	18:24:14	18:57:31	19:37:50	01:21:28 09:12:48
52°	03:51:31	04:33:47	05:08:30	18:26:52	19:01:44	19:44:16	01:33:06 09:01:06
54°	03:44:24	04:29:11	05:05:42	18:29:45	19:06:27	19:51:33	01:46:20 08:47:49
56°	03:36:18	04:24:03	05:02:37	18:32:56	19:11:44	19:59:51	02:01:39 08:32:26
58°	03:26:58	04:18:14	04:59:11	18:36:30	19:17:42	20:09:26	02:19:48 08:14:13
S 60°	03:16:03	04:11:36	04:55:19	18:40:30	19:24:31	20:20:40	02:42:06 07:51:50

Oct 09	SHA	Mer.pass
Venus	200°49.6	09:24:38
Mars	337°48.2	00:16:27
Jupiter	69°55.6	18:05:18
Saturn	62°33.4	18:34:30

10 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	04:34:39	05:53:18	07:02:04	16:29:41	17:38:08	18:56:11	☐ ☐
N 70°	04:40:54	05:51:46	06:53:36	16:38:20	17:39:54	18:50:18	☐ ☐
68°	04:45:51	05:50:26	06:46:41	16:45:24	17:41:26	18:45:38	☐ ☐
66°	04:49:51	05:49:14	06:40:54	16:51:19	17:42:48	18:41:53	19:33:17 17:50:09
64°	04:53:06	05:48:08	06:35:59	16:56:21	17:44:02	18:38:49	20:33:30 16:49:34
62°	04:55:47	05:47:08	06:31:44	17:00:42	17:45:10	18:36:18	21:07:26 16:15:18
60°	04:58:01	05:46:11	06:28:01	17:04:31	17:46:13	18:34:13	21:32:14 15:50:12
N 58°	04:59:52	05:45:18	06:24:43	17:07:53	17:47:12	18:32:29	21:51:55 15:30:15
56°	05:01:25	05:44:27	06:21:47	17:10:54	17:48:09	18:31:02	22:08:14 15:13:40
54°	05:02:43	05:43:38	06:19:07	17:13:38	17:49:02	18:29:50	22:22:09 14:59:30
52°	05:03:47	05:42:51	06:16:42	17:16:06	17:49:54	18:28:51	22:34:16 14:47:09
50°	05:04:41	05:42:05	06:14:30	17:18:23	17:50:44	18:28:02	22:45:00 14:36:13
45°	05:06:15	05:40:14	06:09:40	17:23:20	17:52:43	18:26:38	23:07:22 14:13:22
N 40°	05:07:04	05:38:27	06:05:36	17:27:31	17:54:38	18:25:57	23:25:20 13:54:57
35°	05:07:20	05:36:41	06:02:04	17:31:09	17:56:30	18:25:48	23:40:24 13:39:29
30°	05:07:08	05:34:54	05:58:54	17:34:23	17:58:22	18:26:06	23:53:28 13:26:02
20°	05:05:37	05:31:14	05:53:21	17:40:06	18:02:13	18:27:49	.. .. 13:03:04
N 10°	05:02:46	05:27:15	05:48:22	17:45:13	18:06:20	18:30:49	.. .. 12:43:08
0°	04:58:36	05:22:46	05:43:35	17:50:09	18:10:58	18:35:09	.. .. 12:24:27
S 10°	04:52:53	05:17:32	05:38:41	17:55:10	18:16:21	18:41:01	00:17:27 12:05:44
20°	04:45:10	05:11:09	05:33:23	18:00:38	18:22:53	18:48:54	00:37:57 11:45:38
30°	04:34:33	05:03:01	05:27:13	18:06:58	18:31:14	18:59:45	01:01:37 11:22:21
35°	04:27:39	04:57:57	05:23:37	18:10:41	18:36:24	19:06:48	01:15:32 11:08:39
40°	04:19:15	04:51:58	05:19:30	18:14:55	18:42:32	19:15:22	01:31:36 10:52:48
45°	04:08:48	04:44:43	05:14:42	18:19:52	18:49:58	19:26:02	01:50:48 10:33:51
S 50°	03:55:25	04:35:41	05:08:55	18:25:50	18:59:12	19:39:42	02:14:46 10:10:10
52°	03:48:56	04:31:24	05:06:14	18:28:36	19:03:35	19:46:20	02:26:18 09:58:45
54°	03:41:36	04:26:39	05:03:17	18:31:38	19:08:28	19:53:50	02:39:24 09:45:47
56°	03:33:15	04:21:19	05:00:02	18:35:00	19:13:57	20:02:24	02:54:31 09:30:48
58°	03:23:36	04:15:16	04:56:24	18:38:45	19:20:09	20:12:18	03:12:22 09:13:05
S 60°	03:12:19	04:08:23	04:52:19	18:42:59	19:27:14	20:23:55	03:34:11 08:51:25

Oct 10	SHA	Mer.pass
Venus	199°41.9	09:25:13
Mars	338°07.3	00:11:15
Jupiter	69°50.3	18:01:44
Saturn	62°32.3	18:30:39

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
09	12:44	12:53	11:47:07	05:17:36	17:44:18	22(55%)
10	13:01	13:09	11:46:51	06:11:23	18:38:41	23(45%)

11 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	04:39:13	05:57:43	07:06:49	16:24:27	17:33:15	18:51:10	
N 70°	04:44:55	05:55:41	06:57:45	16:33:41	17:35:31	18:45:49	
68°	04:49:25	05:53:55	06:50:22	16:41:14	17:37:28	18:41:36	20:51:54
66°	04:53:02	05:52:22	06:44:11	16:47:32	17:39:10	18:38:12	21:43:55
64°	04:55:59	05:50:59	06:38:57	16:52:53	17:40:42	18:35:27	22:15:49
62°	04:58:24	05:49:43	06:34:25	16:57:31	17:42:05	18:33:12	22:39:25
60°	05:00:23	05:48:33	06:30:27	17:01:34	17:43:22	18:31:20	22:58:10
N 58°	05:02:02	05:47:27	06:26:57	17:05:09	17:44:33	18:29:49	23:13:41
56°	05:03:24	05:46:26	06:23:49	17:08:22	17:45:40	18:28:33	23:26:54
54°	05:04:32	05:45:27	06:20:59	17:11:15	17:46:43	18:27:31	23:38:21
52°	05:05:28	05:44:31	06:18:25	17:13:53	17:47:43	18:26:40	23:48:27
50°	05:06:13	05:43:37	06:16:04	17:16:18	17:48:41	18:26:00	23:57:27
45°	05:07:29	05:41:29	06:10:57	17:21:33	17:50:58	18:24:53	.. ..
N 40°	05:08:04	05:39:27	06:06:38	17:25:58	17:53:07	18:24:27	.. ..
35°	05:08:07	05:37:28	06:02:52	17:29:49	17:55:12	18:24:31	.. ..
30°	05:07:44	05:35:30	05:59:32	17:33:15	17:57:16	18:25:00	.. ..
20°	05:05:53	05:31:30	05:53:38	17:39:18	18:01:25	18:27:02	00:15:44
N 10°	05:02:45	05:27:14	05:48:22	17:44:42	18:05:50	18:30:20	00:35:00
0°	04:58:18	05:22:29	05:43:19	17:49:53	18:10:44	18:34:56	00:52:58
S 10°	04:52:19	05:16:59	05:38:09	17:55:11	18:16:23	18:41:05	01:10:55
20°	04:44:18	05:10:19	05:32:34	18:00:56	18:23:13	18:49:16	01:30:07
30°	04:33:19	05:01:50	05:26:04	18:07:36	18:31:54	19:00:29	01:52:12
35°	04:26:12	04:56:34	05:22:17	18:11:30	18:37:16	19:07:44	02:05:08
40°	04:17:33	04:50:21	05:17:57	18:15:57	18:43:38	19:16:33	02:20:00
45°	04:06:48	04:42:50	05:12:53	18:21:10	18:51:20	19:27:32	02:37:39
S 50°	03:53:01	04:33:29	05:06:48	18:27:26	19:00:54	19:41:36	02:59:29
52°	03:46:21	04:29:03	05:03:59	18:30:21	19:05:27	19:48:26	03:09:53
54°	03:38:48	04:24:07	05:00:53	18:33:32	19:10:30	19:56:09	03:21:36
56°	03:30:11	04:18:34	04:57:27	18:37:05	19:16:11	20:04:59	03:34:58
58°	03:20:13	04:12:19	04:53:38	18:41:01	19:22:36	20:15:12	03:50:31
S 60°	03:08:33	04:05:09	04:49:20	18:45:28	19:29:58	20:27:13	04:09:03

Oct 11	SHA	Mer.pass
Venus	198° 34.2	09:25:47
Mars	338° 26.4	00:06:03
Jupiter	69° 44.8	17:58:11
Saturn	62° 31.1	18:26:48

12 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	04:43:44	06:02:07	07:11:35	16:19:12	17:28:23	18:46:12	21:47:44
N 70°	04:48:54	05:59:35	07:01:55	16:29:03	17:31:09	18:41:24	22:47:14
68°	04:52:57	05:57:24	06:54:03	16:37:04	17:33:30	18:37:36	23:21:22
66°	04:56:13	05:55:31	06:47:29	16:43:45	17:35:34	18:34:34	23:45:50
64°	04:58:51	05:53:49	06:41:55	16:49:26	17:37:23	18:32:07	.. ..
62°	05:01:00	05:52:18	06:37:06	16:54:21	17:39:01	18:30:07	.. ..
60°	05:02:46	05:50:54	06:32:54	16:58:38	17:40:31	18:28:30	.. ..
N 58°	05:04:12	05:49:37	06:29:11	17:02:26	17:41:54	18:27:10	.. ..
56°	05:05:23	05:48:25	06:25:51	17:05:50	17:43:12	18:26:05	.. ..
54°	05:06:21	05:47:16	06:22:52	17:08:54	17:44:25	18:25:13	.. ..
52°	05:07:08	05:46:12	06:20:09	17:11:40	17:45:33	18:24:31	.. ..
50°	05:07:45	05:45:10	06:17:39	17:14:13	17:46:39	18:23:59	.. ..
45°	05:08:44	05:42:44	06:12:14	17:19:46	17:49:13	18:23:10	00:16:26
N 40°	05:09:04	05:40:27	06:07:40	17:24:27	17:51:37	18:22:58	00:31:50
35°	05:08:54	05:38:16	06:03:41	17:28:31	17:53:55	18:23:14	00:44:49
30°	05:08:20	05:36:07	06:00:09	17:32:08	17:56:09	18:23:55	00:56:08
20°	05:06:09	05:31:47	05:53:57	17:38:30	18:00:38	18:26:16	01:15:27
N 10°	05:02:43	05:27:14	05:48:23	17:44:12	18:05:20	18:29:51	01:32:12
0°	04:58:00	05:22:13	05:43:04	17:49:39	18:10:30	18:34:44	01:47:50
S 10°	04:51:45	05:16:26	05:37:38	17:55:13	18:16:26	18:41:09	02:03:25
20°	04:43:25	05:09:28	05:31:45	18:01:15	18:23:33	18:49:39	02:20:03
30°	04:32:05	05:00:39	05:24:56	18:08:15	18:32:34	19:01:13	02:39:05
35°	04:24:46	04:55:12	05:20:57	18:12:20	18:38:09	19:08:41	02:50:10
40°	04:15:52	04:48:45	05:16:24	18:17:00	18:44:44	19:17:45	03:02:49
45°	04:04:48	04:40:58	05:11:06	18:22:28	18:52:42	19:29:02	03:17:44
S 50°	03:50:37	04:31:16	05:04:42	18:29:03	19:02:37	19:43:31	03:35:55
52°	03:43:45	04:26:41	05:01:44	18:32:06	19:07:19	19:50:32	03:44:29
54°	03:35:59	04:21:34	04:58:29	18:35:27	19:12:33	19:58:29	03:54:01
56°	03:27:06	04:15:50	04:54:53	18:39:10	19:18:26	20:07:35	04:04:45
58°	03:16:49	04:09:21	04:50:52	18:43:18	19:25:05	20:18:09	04:17:00
S 60°	03:04:45	04:01:56	04:46:21	18:47:58	19:32:43	20:30:34	04:31:12

Oct 12	SHA	Mer.pass
Venus	197° 26.5	09:26:21
Mars	338° 45.7	00:00:51
Jupiter	69° 39.2	17:54:38
Saturn	62° 29.8	18:22:57

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
11	13:16	13:24	11:46:36	07:06:07	19:33:32	24(35%)
12	13:31	13:39	11:46:21	08:00:52	20:28:01	25(25%)



13 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	04:48:13	06:06:31	07:16:24	16:13:56	17:23:32	18:41:18	.. ..
N 70°	04:52:51	06:03:29	07:06:07	16:24:23	17:26:48	18:37:01	.. ..
68°	04:56:28	06:00:53	06:57:46	16:32:54	17:29:34	18:33:38	.. ..
66°	04:59:22	05:58:39	06:50:48	16:39:59	17:31:58	18:30:58	.. ..
64°	05:01:42	05:56:40	06:44:54	16:46:00	17:34:05	18:28:49	00:04:48
62°	05:03:35	05:54:53	06:39:48	16:51:11	17:35:59	18:27:05	00:20:13
60°	05:05:07	05:53:16	06:35:21	16:55:43	17:37:42	18:25:41	00:33:05
N 58°	05:06:22	05:51:46	06:31:25	16:59:44	17:39:17	18:24:33	00:44:06
56°	05:07:22	05:50:23	06:27:54	17:03:19	17:40:45	18:23:39	00:53:41
54°	05:08:10	05:49:06	06:24:45	17:06:33	17:42:07	18:22:56	01:02:07
52°	05:08:48	05:47:52	06:21:52	17:09:28	17:43:25	18:22:23	01:09:39
50°	05:09:17	05:46:42	06:19:15	17:12:10	17:44:39	18:21:58	01:16:26
45°	05:09:58	05:43:59	06:13:31	17:18:00	17:47:30	18:21:27	01:30:53
N 40°	05:10:04	05:41:28	06:08:42	17:22:56	17:50:08	18:21:29	01:42:44
35°	05:09:41	05:39:04	06:04:31	17:27:13	17:52:38	18:21:59	01:52:49
30°	05:08:56	05:36:44	06:00:47	17:31:01	17:55:04	18:22:50	02:01:37
20°	05:06:26	05:32:05	05:54:15	17:37:42	17:59:52	18:25:31	02:16:45
N 10°	05:02:43	05:27:15	05:48:24	17:43:41	18:04:51	18:29:23	02:29:54
0°	04:57:43	05:21:57	05:42:49	17:49:25	18:10:17	18:34:32	02:42:11
S 10°	04:51:11	05:15:54	05:37:07	17:55:15	18:16:29	18:41:14	02:54:26
20°	04:42:33	05:08:39	05:30:57	18:01:34	18:23:54	18:50:02	03:07:27
30°	04:30:52	04:59:29	05:23:48	18:08:54	18:33:16	19:01:58	03:22:17
35°	04:23:19	04:53:50	05:19:38	18:13:11	18:39:02	19:09:38	03:30:52
40°	04:14:10	04:47:10	05:14:52	18:18:04	18:45:51	19:18:58	03:40:37
45°	04:02:48	04:39:06	05:09:18	18:23:47	18:54:05	19:30:34	03:52:00
S 50°	03:48:14	04:29:05	05:02:36	18:30:40	19:04:20	19:45:26	04:05:42
52°	03:41:10	04:24:20	04:59:30	18:33:51	19:09:12	19:52:40	04:12:05
54°	03:33:10	04:19:03	04:56:06	18:37:22	19:14:37	20:00:51	04:19:07
56°	03:24:00	04:13:07	04:52:19	18:41:15	19:20:42	20:10:14	04:26:57
58°	03:13:24	04:06:23	04:48:06	18:45:35	19:27:35	20:21:07	04:35:44
S 60°	03:00:55	03:58:42	04:43:22	18:50:29	19:35:29	20:33:59	04:45:44

Oct 13	SHA	Mer.pass
Venus	196°18.9	09:26:55
Mars	339°05.0	23:50:25
Jupiter	69°33.4	17:51:05
Saturn	62°28.4	18:19:07

14 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	04:52:40	06:10:55	07:21:15	16:08:39	17:18:42	18:36:27	00:54:13
N 70°	04:56:46	06:07:23	07:10:21	16:19:43	17:22:28	18:32:40	01:15:13
68°	04:59:58	06:04:22	07:01:29	16:28:43	17:25:39	18:29:43	01:31:24
66°	05:02:31	06:01:47	06:54:07	16:36:13	17:28:23	18:27:23	01:44:23
64°	05:04:32	05:59:30	06:47:53	16:42:33	17:30:48	18:25:32	01:55:07
62°	05:06:10	05:57:28	06:42:30	16:48:02	17:32:57	18:24:04	02:04:10
60°	05:07:28	05:55:37	06:37:49	16:52:49	17:34:54	18:22:53	02:11:56
N 58°	05:08:31	05:53:56	06:33:40	16:57:02	17:36:40	18:21:57	02:18:43
56°	05:09:20	05:52:22	06:29:58	17:00:48	17:38:19	18:21:14	02:24:42
54°	05:09:59	05:50:55	06:26:38	17:04:12	17:39:51	18:20:41	02:30:02
52°	05:10:28	05:49:33	06:23:36	17:07:17	17:41:17	18:20:16	02:34:49
50°	05:10:49	05:48:15	06:20:50	17:10:07	17:42:39	18:20:00	02:39:10
45°	05:11:13	05:45:14	06:14:49	17:16:15	17:45:47	18:19:45	02:48:32
N 40°	05:11:04	05:42:29	06:09:45	17:21:26	17:48:40	18:20:02	02:56:17
35°	05:10:29	05:39:52	06:05:21	17:25:55	17:51:23	18:20:44	03:02:55
30°	05:09:32	05:37:21	06:01:26	17:29:55	17:53:59	18:21:47	03:08:45
20°	05:06:42	05:32:23	05:54:34	17:36:56	17:59:07	18:24:47	03:18:47
N 10°	05:02:42	05:27:15	05:48:26	17:43:12	18:04:23	18:28:56	03:27:33
0°	04:57:26	05:21:42	05:42:35	17:49:11	18:10:05	18:34:21	03:35:45
S 10°	04:50:37	05:15:23	05:36:37	17:55:17	18:16:33	18:41:20	03:43:55
20°	04:41:42	05:07:50	05:30:10	18:01:54	18:24:16	18:50:26	03:52:36
30°	04:29:39	04:58:20	05:22:41	18:09:33	18:33:57	19:02:43	04:02:28
35°	04:21:54	04:52:29	05:18:19	18:14:01	18:39:55	19:10:37	04:08:08
40°	04:12:29	04:45:35	05:13:21	18:19:07	18:46:58	19:20:12	04:14:33
45°	04:00:48	04:37:15	05:07:32	18:25:06	18:55:29	19:32:06	04:21:59
S 50°	03:45:50	04:26:54	05:00:32	18:32:17	19:06:04	19:47:23	04:30:52
52°	03:38:34	04:21:59	04:57:17	18:35:37	19:11:06	19:54:49	04:34:58
54°	03:30:20	04:16:31	04:53:43	18:39:17	19:16:41	20:03:14	04:39:27
56°	03:20:54	04:10:23	04:49:46	18:43:21	19:22:59	20:12:54	04:44:23
58°	03:09:58	04:03:26	04:45:21	18:47:53	19:30:06	20:24:08	04:49:54
S 60°	02:57:02	03:55:28	04:40:24	18:53:00	19:38:17	20:37:27	04:56:05

Oct 14	SHA	Mer.pass
Venus	195°11.3	09:27:28
Mars	339°24.3	23:45:13
Jupiter	69°27.3	17:47:34
Saturn	62°26.9	18:15:18

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
13	13:46	13:53	11:46:07	08:54:59	21:21:45	26(16%)
14	14:00	14:07	11:45:53	09:48:21	22:14:50	27(8%)

# 2020 October 15 to Oct. 16

15 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	04:57:05	06:15:20	07:26:09	16:03:20	17:13:54	18:31:39	03:22:15
N 70°	05:00:40	06:11:16	07:14:36	16:15:03	17:18:09	18:28:23	03:29:52
68°	05:03:27	06:07:51	07:05:14	16:24:33	17:21:45	18:25:50	03:36:03
66°	05:05:38	06:04:55	06:57:28	16:32:27	17:24:50	18:23:51	03:41:10
64°	05:07:22	06:02:20	06:50:53	16:39:08	17:27:32	18:22:18	03:45:29
62°	05:08:44	06:00:03	06:45:13	16:44:53	17:29:57	18:21:04	03:49:12
60°	05:09:49	05:57:59	06:40:17	16:49:55	17:32:07	18:20:07	03:52:25
N 58°	05:10:39	05:56:06	06:35:55	16:54:21	17:34:05	18:19:23	03:55:16
56°	05:11:18	05:54:21	06:32:01	16:58:19	17:35:54	18:18:50	03:57:47
54°	05:11:47	05:52:44	06:28:31	17:01:53	17:37:36	18:18:27	04:00:03
52°	05:12:07	05:51:13	06:25:21	17:05:07	17:39:10	18:18:11	04:02:06
50°	05:12:21	05:49:47	06:22:26	17:08:05	17:40:40	18:18:02	04:03:58
45°	05:12:27	05:46:30	06:16:07	17:14:31	17:44:06	18:18:05	04:08:00
N 40°	05:12:04	05:43:30	06:10:48	17:19:57	17:47:13	18:18:36	04:11:23
35°	05:11:16	05:40:40	06:06:11	17:24:39	17:50:08	18:19:30	04:14:16
30°	05:10:08	05:37:58	06:02:05	17:28:50	17:52:56	18:20:44	04:16:50
20°	05:06:59	05:32:41	05:54:54	17:36:10	17:58:23	18:24:03	04:21:15
N 10°	05:02:42	05:27:17	05:48:29	17:42:43	18:03:55	18:28:30	04:25:08
0°	04:57:10	05:21:27	05:42:21	17:48:59	18:09:53	18:34:11	04:28:47
S 10°	04:50:05	05:14:52	05:36:07	17:55:21	18:16:38	18:41:26	04:32:25
20°	04:40:51	05:07:01	05:29:23	18:02:14	18:24:38	18:50:51	04:36:18
30°	04:28:27	05:07:12	05:21:35	18:10:13	18:34:39	19:03:29	04:40:42
35°	04:20:29	04:51:09	05:17:02	18:14:53	18:40:50	19:11:36	04:43:14
40°	04:10:49	04:44:01	05:11:50	18:20:12	18:48:06	19:21:26	04:46:05
45°	03:58:49	04:35:25	05:05:46	18:26:25	18:56:53	19:33:39	04:49:24
S 50°	03:43:27	04:24:43	04:58:28	18:33:55	19:07:49	19:49:21	04:53:19
52°	03:35:58	04:19:39	04:55:04	18:37:23	19:13:00	19:56:59	04:55:07
54°	03:27:30	04:14:00	04:51:21	18:41:13	19:18:47	20:05:39	04:57:05
56°	03:17:47	04:07:39	04:47:13	18:45:27	19:25:16	20:15:36	04:59:15
58°	03:06:30	04:00:28	04:42:37	18:50:12	19:32:39	20:27:12	05:01:38
S 60°	02:53:08	03:52:14	04:37:26	18:55:32	19:41:06	20:40:58	05:04:19

Oct 15	SHA	Mer.pass
Venus	194°03.8	09:28:02
Mars	339°43.5	23:40:01
Jupiter	69°21.2	17:44:03
Saturn	62°25.3	18:11:29

16 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	05:01:28	06:19:44	07:31:06	15:57:59	17:09:06	18:26:54	05:44:35
N 70°	05:04:32	06:15:10	07:18:53	16:10:22	17:13:52	18:24:08	05:41:58
68°	05:06:54	06:11:20	07:09:00	16:20:23	17:17:52	18:22:00	05:39:50
66°	05:08:44	06:08:03	07:00:49	16:28:41	17:21:18	18:20:21	05:38:03
64°	05:10:11	06:05:11	06:53:54	16:35:43	17:24:18	18:19:05	05:36:33
62°	05:11:17	06:02:38	06:47:57	16:41:45	17:26:57	18:18:07	05:35:16
60°	05:12:09	06:00:20	06:42:45	16:47:02	17:29:21	18:17:23	05:34:08
N 58°	05:12:48	05:58:15	06:38:10	16:51:41	17:31:31	18:16:51	05:33:09
56°	05:13:16	05:56:20	06:34:05	16:55:50	17:33:31	18:16:28	05:32:17
54°	05:13:35	05:54:34	06:30:25	16:59:34	17:35:21	18:16:14	05:31:29
52°	05:13:47	05:52:54	06:27:05	17:02:58	17:37:05	18:16:07	05:30:47
50°	05:13:52	05:51:20	06:24:02	17:06:03	17:38:42	18:16:06	05:30:08
45°	05:13:42	05:47:45	06:17:25	17:12:48	17:42:25	18:16:25	05:28:45
N 40°	05:13:04	05:44:31	06:11:51	17:18:28	17:45:47	18:17:11	05:27:36
35°	05:12:04	05:41:29	06:07:02	17:23:23	17:48:54	18:18:18	05:26:37
30°	05:10:45	05:38:36	06:02:44	17:27:45	17:51:53	18:19:42	05:25:46
20°	05:07:17	05:32:59	05:55:14	17:35:25	17:57:39	18:23:21	05:24:18
N 10°	05:02:43	05:27:18	05:48:32	17:42:15	18:03:28	18:28:04	05:23:03
0°	04:56:54	05:21:13	05:42:08	17:48:46	18:09:42	18:34:02	05:21:54
S 10°	04:49:32	05:14:21	05:35:38	17:55:24	18:16:43	18:41:33	05:20:47
20°	04:40:01	05:06:14	05:28:37	18:02:35	18:25:00	18:51:16	05:19:38
30°	04:27:15	04:56:04	05:20:29	18:10:53	18:35:22	19:04:15	05:18:21
35°	04:19:04	04:49:49	05:15:45	18:15:44	18:41:44	19:12:35	05:17:37
40°	04:09:09	04:42:27	05:10:20	18:21:16	18:49:14	19:22:41	05:16:49
45°	03:56:51	04:33:35	05:04:01	18:27:45	18:58:18	19:35:13	05:15:53
S 50°	03:41:03	04:22:33	04:56:24	18:35:33	19:09:34	19:51:20	05:14:48
52°	03:33:22	04:17:19	04:52:52	18:39:10	19:14:55	19:59:11	05:14:18
54°	03:24:39	04:11:29	04:49:00	18:43:09	19:20:53	20:08:05	05:13:46
56°	03:14:39	04:04:56	04:44:42	18:47:34	19:27:35	20:18:21	05:13:11
58°	03:03:00	03:57:30	04:39:53	18:52:30	19:35:12	20:30:18	05:12:32
S 60°	02:49:11	03:48:59	04:34:29	18:58:04	19:43:57	20:44:33	05:11:49

Oct 16	SHA	Mer.pass
Venus	192°56.4	09:28:35
Mars	340°02.6	23:34:50
Jupiter	69°14.8	17:40:33
Saturn	62°23.6	18:07:40

Day	Sun			Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
15	14:14	14:20	11:45:40	10:41:18	23:07:51	28(3%)
16	14:27	14:33	11:45:27	11:34:34	--:--	29(0%)

# 2020 October 17 to Oct. 18

17 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:05:48	06:24:09	07:36:05	15:52:37	17:04:19	18:22:12	08:11:55
N 70°	05:08:23	06:19:04	07:23:11	16:05:40	17:09:35	18:19:55	07:57:45
68°	05:10:20	06:14:49	07:12:47	16:16:12	17:14:00	18:18:12	07:46:30
66°	05:11:50	06:11:11	07:04:11	16:24:56	17:17:47	18:16:53	07:37:19
64°	05:12:59	06:08:01	06:56:55	16:32:18	17:21:04	18:15:54	07:29:38
62°	05:13:50	06:05:13	06:50:41	16:38:38	17:23:59	18:15:11	07:23:06
60°	05:14:28	06:02:42	06:45:14	16:44:09	17:26:36	18:14:40	07:17:27
N 58°	05:14:55	06:00:25	06:40:26	16:49:01	17:28:58	18:14:20	07:12:30
56°	05:15:13	05:58:19	06:36:10	16:53:22	17:31:08	18:14:07	07:08:07
54°	05:15:23	05:56:23	06:32:19	16:57:16	17:33:08	18:14:03	07:04:12
52°	05:15:26	05:54:35	06:28:50	17:00:49	17:35:00	18:14:04	07:00:41
50°	05:15:24	05:52:53	06:25:39	17:04:03	17:36:46	18:14:11	06:57:28
45°	05:14:56	05:49:01	06:18:44	17:11:06	17:40:46	18:14:47	06:50:34
N 40°	05:14:04	05:45:32	06:12:55	17:17:01	17:44:21	18:15:47	06:44:51
35°	05:12:52	05:42:18	06:07:52	17:22:08	17:47:41	18:17:06	06:39:58
30°	05:11:22	05:39:14	06:03:24	17:26:42	17:50:51	18:18:42	06:35:40
20°	05:07:35	05:33:19	05:55:34	17:34:40	17:56:56	18:22:39	06:28:18
N 10°	05:02:44	05:27:21	05:48:35	17:41:47	18:03:02	18:27:39	06:21:53
0°	04:56:39	05:20:59	05:41:56	17:48:35	18:09:32	18:33:53	06:15:56
S 10°	04:49:01	05:13:51	05:35:10	17:55:28	18:16:48	18:41:41	06:10:03
20°	04:39:11	05:05:26	05:27:51	18:02:56	18:25:23	18:51:41	06:03:50
30°	04:26:04	04:54:56	05:19:24	18:11:34	18:36:05	19:05:02	05:56:50
35°	04:17:40	04:48:30	05:14:29	18:16:36	18:42:39	19:13:35	05:52:50
40°	04:07:30	04:40:55	05:08:51	18:22:21	18:50:23	19:23:56	05:48:20
45°	03:54:52	04:31:45	05:02:17	18:29:05	18:59:43	19:36:48	05:43:08
S 50°	03:38:40	04:20:23	04:54:22	18:37:11	19:11:20	19:53:20	05:36:59
52°	03:30:46	04:14:59	04:50:41	18:40:57	19:16:51	20:01:23	05:34:09
54°	03:21:49	04:08:59	04:46:39	18:45:06	19:22:59	20:10:33	05:31:04
56°	03:11:31	04:02:13	04:42:10	18:49:42	19:29:55	20:21:07	05:27:41
58°	02:59:30	03:54:33	04:37:10	18:54:50	19:37:46	20:33:27	05:23:55
S 60°	02:45:12	03:45:44	04:31:32	19:00:38	19:46:49	20:48:12	05:19:44

Oct 17	SHA	Mer.pass
Venus	191°49.0	09:29:08
Mars	340°21.5	23:29:40
Jupiter	69°08.3	17:37:04
Saturn	62°21.8	18:03:51

18 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:10:07	06:28:34	07:41:08	15:47:13	16:59:33	18:17:33	11:01:52
N 70°	05:12:12	06:22:58	07:27:32	16:00:58	17:05:20	18:15:45	10:25:42
68°	05:13:45	06:18:18	07:16:36	16:12:02	17:10:10	18:14:26	10:00:26
66°	05:14:55	06:14:19	07:07:34	16:21:11	17:14:17	18:13:27	09:41:11
64°	05:15:46	06:10:51	06:59:57	16:28:54	17:17:52	18:12:46	09:25:47
62°	05:16:22	06:07:48	06:53:25	16:35:31	17:21:02	18:12:17	09:13:02
60°	05:16:47	06:05:03	06:47:44	16:41:18	17:23:52	18:11:59	09:02:15
N 58°	05:17:03	06:02:34	06:42:43	16:46:23	17:26:26	18:11:50	08:52:57
56°	05:17:10	06:00:18	06:38:15	16:50:55	17:28:47	18:11:48	08:44:49
54°	05:17:11	05:58:13	06:34:14	16:54:59	17:30:56	18:11:53	08:37:38
52°	05:17:06	05:56:16	06:30:35	16:58:41	17:32:57	18:12:02	08:31:11
50°	05:16:55	05:54:26	06:27:16	17:02:04	17:34:50	18:12:17	08:25:22
45°	05:16:11	05:50:17	06:20:03	17:09:24	17:39:07	18:13:10	08:12:57
N 40°	05:15:04	05:46:34	06:13:59	17:15:34	17:42:57	18:14:24	08:02:44
35°	05:13:40	05:43:08	06:08:44	17:20:54	17:46:29	18:15:55	07:54:02
30°	05:11:59	05:39:52	06:04:04	17:25:39	17:49:50	18:17:42	07:46:26
20°	05:07:53	05:33:38	05:55:55	17:33:57	17:56:13	18:21:58	07:33:25
N 10°	05:02:45	05:27:23	05:48:39	17:41:20	18:02:37	18:27:15	07:22:07
0°	04:56:24	05:20:46	05:41:44	17:48:24	18:09:22	18:33:45	07:11:36
S 10°	04:48:29	05:13:22	05:34:42	17:55:33	18:16:55	18:41:49	07:01:10
20°	04:38:22	05:04:40	05:27:07	18:03:18	18:25:47	18:52:08	06:50:09
30°	04:24:53	04:53:50	05:18:20	18:12:15	18:36:49	19:05:50	06:37:40
35°	04:16:16	04:47:11	05:13:13	18:17:29	18:43:35	19:14:36	06:30:29
40°	04:05:51	04:39:22	05:07:23	18:23:26	18:51:32	19:25:12	06:22:22
45°	03:52:54	04:29:57	05:00:34	18:30:25	19:01:09	19:38:23	06:12:57
S 50°	03:36:16	04:18:14	04:52:20	18:38:50	19:13:06	19:55:21	06:01:40
52°	03:28:10	04:12:41	04:48:31	18:42:45	19:18:47	20:03:37	05:56:28
54°	03:18:58	04:06:29	04:44:19	18:47:03	19:25:07	20:13:03	05:50:45
56°	03:08:21	03:59:30	04:39:40	18:51:49	19:32:15	20:23:55	05:44:25
58°	02:55:58	03:51:35	04:34:28	18:57:10	19:40:22	20:36:39	05:37:21
S 60°	02:41:10	03:42:29	04:28:36	19:03:11	19:49:42	20:51:54	05:29:24

Oct 18	SHA	Mer.pass
Venus	190°41.6	09:29:41
Mars	340°40.1	23:24:31
Jupiter	69°01.6	17:33:35
Saturn	62°19.9	18:00:03

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
17	14:39	14:45	11:45:15	12:28:56	00:01:33	1(1%)
18	14:51	14:56	11:45:04	13:25:05	00:56:45	2(4%)

19 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	05:14:25	06:32:59	07:46:13	15:41:47	16:54:48	18:12:57	■ ■
N 70°	05:16:00	06:26:53	07:31:55	15:56:15	17:01:06	18:11:38	■ ■
68°	05:17:09	06:21:47	07:20:26	16:07:52	17:06:20	18:10:42	12:31:31 15:59:46
66°	05:17:58	06:17:27	07:10:58	16:17:26	17:10:49	18:10:04	11:51:45 16:40:31
64°	05:18:32	06:13:41	07:03:00	16:25:30	17:14:41	18:09:39	11:24:25 17:08:44
62°	05:18:54	06:10:22	06:56:10	16:32:25	17:18:07	18:09:25	11:03:28 17:30:30
60°	05:19:06	06:07:25	06:50:13	16:38:27	17:21:10	18:09:20	10:46:32 17:48:10
N 58°	05:19:10	06:04:44	06:44:59	16:43:45	17:23:55	18:09:22	10:32:22 18:03:01
56°	05:19:07	06:02:18	06:40:20	16:48:29	17:26:27	18:09:31	10:20:14 18:15:47
54°	05:18:58	06:00:02	06:36:08	16:52:43	17:28:46	18:09:44	10:09:39 18:26:57
52°	05:18:45	05:57:57	06:32:21	16:56:34	17:30:55	18:10:02	10:00:18 18:36:50
50°	05:18:27	05:56:00	06:28:53	17:00:05	17:32:56	18:10:24	09:51:57 18:45:43
45°	05:17:25	05:51:34	06:21:22	17:07:44	17:37:30	18:11:35	09:34:17 19:04:33
N 40°	05:16:05	05:47:36	06:15:03	17:14:08	17:41:34	18:13:03	09:19:56 19:19:57
35°	05:14:28	05:43:57	06:09:35	17:19:41	17:45:18	18:14:46	09:07:49 19:33:00
30°	05:12:36	05:40:31	06:04:45	17:24:37	17:48:49	18:16:43	08:57:16 19:44:26
20°	05:08:11	05:33:58	05:56:16	17:33:14	17:55:32	18:21:18	08:39:16 20:04:03
N 10°	05:02:47	05:27:26	05:48:44	17:40:54	18:02:12	18:26:52	08:23:42 20:21:10
0°	04:56:10	05:20:33	05:41:33	17:48:13	18:09:13	18:33:38	08:09:13 20:37:14
S 10°	04:47:59	05:12:54	05:34:15	17:55:38	18:17:02	18:41:58	07:54:50 20:53:19
20°	04:37:33	05:03:54	05:26:23	18:03:40	18:26:11	18:52:35	07:39:34 21:10:35
30°	04:23:43	04:52:44	05:17:17	18:12:57	18:37:33	19:06:38	07:22:10 21:30:29
35°	04:14:53	04:45:54	05:11:59	18:18:21	18:44:31	19:15:37	07:12:06 21:42:08
40°	04:04:12	04:37:51	05:05:56	18:24:32	18:52:42	19:26:29	07:00:39 21:55:33
45°	03:50:56	04:28:09	04:58:51	18:31:46	19:02:35	19:40:00	06:47:15 22:11:27
S 50°	03:33:53	04:16:05	04:50:19	18:40:29	19:14:54	19:57:23	06:31:00 22:31:06
52°	03:25:34	04:10:22	04:46:22	18:44:33	19:20:44	20:05:53	06:23:25 22:40:27
54°	03:16:06	04:03:59	04:42:00	18:49:00	19:27:15	20:15:34	06:15:00 22:50:56
56°	03:05:11	03:56:48	04:37:11	18:53:58	19:34:36	20:26:45	06:05:36 23:02:52
58°	02:52:24	03:48:38	04:31:46	18:59:30	19:42:58	20:39:53	05:54:58 23:16:39
S 60°	02:37:05	03:39:14	04:25:40	19:05:46	19:52:37	20:55:41	05:42:46 23:32:56

Oct 19	SHA	Mer.pass
Venus	189°34.3	09:30:14
Mars	340°58.5	23:19:23
Jupiter	68°54.7	17:30:07
Saturn	62°17.8	17:56:16

20 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	05:18:40	06:37:24	07:51:23	15:36:19	16:50:04	18:08:24	■ ■
N 70°	05:19:47	06:30:47	07:36:19	15:51:31	16:56:52	18:07:33	■ ■
68°	05:20:32	06:25:16	07:24:17	16:03:41	17:02:32	18:07:01	■ ■
66°	05:21:01	06:20:35	07:14:23	16:13:42	17:07:21	18:06:42	14:15:14 16:21:48
64°	05:21:18	06:16:31	07:06:03	16:22:07	17:11:32	18:06:34	13:21:05 17:16:26
62°	05:21:25	06:12:57	06:58:55	16:29:20	17:15:12	18:06:35	12:48:37 17:49:21
60°	05:21:24	06:09:46	06:52:43	16:35:37	17:18:29	18:06:43	12:24:36 18:13:48
N 58°	05:21:17	06:06:54	06:47:16	16:41:08	17:21:26	18:06:56	12:05:26 18:33:21
56°	05:21:04	06:04:17	06:42:25	16:46:03	17:24:08	18:07:15	11:49:30 18:49:39
54°	05:20:46	06:01:52	06:38:03	16:50:28	17:26:36	18:07:37	11:35:53 19:03:36
52°	05:20:24	05:59:38	06:34:07	16:54:29	17:28:54	18:08:04	11:24:00 19:15:47
50°	05:19:58	05:57:33	06:30:30	16:58:08	17:31:03	18:08:33	11:13:30 19:26:36
45°	05:18:40	05:52:50	06:22:41	17:06:04	17:35:53	18:10:00	10:51:35 19:49:12
N 40°	05:17:05	05:48:38	06:16:08	17:12:43	17:40:11	18:11:42	10:33:58 20:07:25
35°	05:15:16	05:44:47	06:10:27	17:18:29	17:44:08	18:13:37	10:19:12 20:22:44
30°	05:13:14	05:41:10	06:05:26	17:23:35	17:47:50	18:15:45	10:06:25 20:36:03
20°	05:08:30	05:34:18	05:56:38	17:32:32	17:54:51	18:20:39	09:44:40 20:58:46
N 10°	05:02:49	05:27:30	05:48:49	17:40:29	18:01:48	18:26:30	09:25:53 21:18:28
0°	04:55:56	05:20:21	05:41:22	17:48:03	18:09:05	18:33:31	09:08:25 21:36:54
S 10°	04:47:29	05:12:26	05:33:49	17:55:44	18:17:09	18:42:08	08:51:02 21:55:21
20°	04:36:45	05:03:09	05:25:40	18:04:03	18:26:35	18:53:02	08:32:31 22:15:07
30°	04:22:34	04:51:39	05:16:15	18:13:39	18:38:18	19:07:27	08:11:18 22:37:58
35°	04:13:31	04:44:37	05:10:45	18:19:14	18:45:27	19:16:39	07:58:56 22:51:23
40°	04:02:35	04:36:20	05:04:29	18:25:38	18:53:52	19:27:47	07:44:46 23:06:52
45°	03:48:59	04:26:22	04:57:10	18:33:07	19:04:02	19:41:36	07:28:01 23:25:22
S 50°	03:31:30	04:13:58	04:48:20	18:42:09	19:16:41	19:59:26	07:07:26 23:48:24
52°	03:22:58	04:08:04	04:44:13	18:46:21	19:22:42	20:08:09	06:57:41 23:59:29
54°	03:13:14	04:01:30	04:39:42	18:50:58	19:29:25	20:18:06	06:46:45 .. ..
56°	03:02:01	03:54:06	04:34:42	18:56:06	19:36:59	20:29:37	06:34:22 .. ..
58°	02:48:49	03:45:41	04:29:06	19:01:51	19:45:36	20:43:11	06:20:04 .. ..
S 60°	02:32:58	03:35:59	04:22:46	19:08:21	19:55:33	20:59:33	06:03:15 .. ..

Oct 20	SHA	Mer.pass
Venus	188°26.9	09:30:46
Mars	341°16.6	23:14:17
Jupiter	68°47.6	17:26:40
Saturn	62°15.7	17:52:29

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
19	15:02	15:07	11:44:53	14:23:10	01:53:54	3(11%)
20	15:12	15:17	11:44:43	15:22:39	02:52:48	4(19%)

21 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	05:22:54	06:41:50	07:56:35	15:30:49	16:45:21	18:03:54	■ ■
N 70°	05:23:32	06:34:41	07:40:46	15:46:46	16:52:40	18:03:31	■ ■
68°	05:23:54	06:28:45	07:28:10	15:59:30	16:58:45	18:03:22	■ ■
66°	05:24:03	06:23:43	07:17:49	16:09:58	17:03:56	18:03:22	■ ■
64°	05:24:03	06:19:21	07:09:07	16:18:45	17:08:24	18:03:31	15:00:57 17:41:19
62°	05:23:56	06:15:32	07:01:41	16:26:16	17:12:19	18:03:46	14:16:14 18:26:09
60°	05:23:42	06:12:07	06:55:14	16:32:48	17:15:49	18:04:07	13:46:43 18:55:46
N 58°	05:23:23	06:09:03	06:49:33	16:38:33	17:18:58	18:04:32	13:24:10 19:18:24
56°	05:23:00	06:06:16	06:44:31	16:43:39	17:21:50	18:05:00	13:05:51 19:36:50
54°	05:22:33	06:03:42	06:39:59	16:48:15	17:24:28	18:05:32	12:50:24 19:52:21
52°	05:22:02	06:01:19	06:35:53	16:52:24	17:26:54	18:06:07	12:37:04 20:05:46
50°	05:21:29	05:59:06	06:32:08	16:56:11	17:29:11	18:06:44	12:25:20 20:17:35
45°	05:19:54	05:54:06	06:24:01	17:04:25	17:34:18	18:08:27	12:01:03 20:42:02
N 40°	05:18:06	05:49:40	06:17:13	17:11:19	17:38:50	18:10:23	11:41:39 21:01:35
35°	05:16:05	05:45:37	06:11:20	17:17:18	17:42:59	18:12:30	11:25:28 21:17:56
30°	05:13:52	05:41:50	06:06:07	17:22:35	17:46:52	18:14:48	11:11:27 21:32:04
20°	05:08:49	05:34:39	05:57:00	17:31:50	17:54:12	18:20:01	10:47:41 21:56:06
N 10°	05:02:51	05:27:34	05:48:54	17:40:04	18:01:25	18:26:08	10:27:09 22:16:52
0°	04:55:43	05:20:10	05:41:12	17:47:54	18:08:57	18:33:25	10:08:03 22:36:14
S 10°	04:46:59	05:11:58	05:33:23	17:55:51	18:17:17	18:42:18	09:48:59 22:55:35
20°	04:35:58	05:02:25	05:24:57	18:04:26	18:27:01	18:53:30	09:28:37 23:16:18
30°	04:21:25	04:50:34	05:15:13	18:14:21	18:39:03	19:08:17	09:05:10 23:40:13
35°	04:12:10	04:43:21	05:09:33	18:20:08	18:46:24	19:17:41	08:51:25 23:54:16
40°	04:00:58	04:34:51	05:03:04	18:26:44	18:55:03	19:29:05	08:35:34 .. ..
45°	03:47:03	04:24:36	04:55:29	18:34:28	19:05:29	19:43:14	08:16:42 .. ..
S 50°	03:29:08	04:11:51	04:46:21	18:43:49	19:18:29	20:01:30	07:53:13 .. ..
52°	03:20:22	04:05:47	04:42:06	18:48:09	19:24:40	20:10:27	07:41:57 .. ..
54°	03:10:22	03:59:02	04:37:25	18:52:56	19:31:34	20:20:40	07:29:12 00:12:02
56°	02:58:49	03:51:24	04:32:14	18:58:15	19:39:22	20:32:31	07:14:33 00:26:29
58°	02:45:12	03:42:44	04:26:25	19:04:12	19:48:15	20:46:31	06:57:20 00:43:28
S 60°	02:28:47	03:32:43	04:19:52	19:10:56	19:58:31	21:03:29	06:36:28 01:04:05

Oct 21	SHA	Mer.pass
Venus	187°19.6	09:31:19
Mars	341°34.3	23:09:12
Jupiter	68°40.4	17:23:13
Saturn	62°13.5	17:48:42

22 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	05:27:06	06:46:16	08:01:52	15:25:15	16:40:39	17:59:27	■ ■
N 70°	05:27:16	06:38:36	07:45:15	15:42:01	16:48:30	17:59:32	■ ■
68°	05:27:14	06:32:14	07:32:04	15:55:19	16:55:00	17:59:45	■ ■
66°	05:27:04	06:26:51	07:21:16	16:06:14	17:00:31	18:00:05	■ ■
64°	05:26:48	06:22:11	07:12:12	16:15:23	17:05:17	18:00:30	15:56:08 18:47:18
62°	05:26:26	06:18:07	07:04:28	16:23:12	17:09:28	18:01:00	15:13:27 19:29:47
60°	05:25:59	06:14:29	06:57:45	16:30:00	17:13:11	18:01:33	14:44:38 19:58:25
N 58°	05:25:29	06:11:13	06:51:51	16:35:58	17:16:31	18:02:09	14:22:27 20:20:26
56°	05:24:56	06:08:15	06:46:37	16:41:16	17:19:34	18:02:47	14:04:20 20:38:24
54°	05:24:19	06:05:32	06:41:54	16:46:02	17:22:21	18:03:28	13:49:02 20:53:33
52°	05:23:41	06:03:00	06:37:39	16:50:20	17:24:56	18:04:11	13:35:47 21:06:40
50°	05:23:00	06:00:40	06:33:46	16:54:16	17:27:20	18:04:56	13:24:07 21:18:13
45°	05:21:09	05:55:23	06:25:21	17:02:48	17:32:44	18:06:55	12:59:54 21:42:08
N 40°	05:19:07	05:50:43	06:18:18	17:09:57	17:37:30	18:09:04	12:40:31 22:01:15
35°	05:16:54	05:46:28	06:12:13	17:16:07	17:41:51	18:11:24	12:24:19 22:17:13
30°	05:14:30	05:42:29	06:06:49	17:21:36	17:45:54	18:13:53	12:10:17 22:31:02
20°	05:09:09	05:35:00	05:57:23	17:31:10	17:53:33	18:19:24	11:46:24 22:54:29
N 10°	05:02:54	05:27:39	05:49:00	17:39:40	18:01:02	18:25:47	11:25:45 23:14:44
0°	04:55:30	05:19:59	05:41:03	17:47:46	18:08:50	18:33:20	11:06:29 23:33:35
S 10°	04:46:30	05:11:32	05:32:58	17:55:58	18:17:26	18:42:29	10:47:13 23:52:23
20°	04:35:12	05:01:41	05:24:16	18:04:49	18:27:26	18:53:59	10:26:36 .. ..
30°	04:20:18	04:49:31	05:14:12	18:15:04	18:39:48	19:09:07	10:02:46 .. ..
35°	04:10:49	04:42:05	05:08:21	18:21:02	18:47:21	19:18:45	09:48:46 .. ..
40°	03:59:21	04:33:22	05:01:39	18:27:51	18:56:14	19:30:23	09:32:35 00:10:30
45°	03:45:07	04:22:50	04:53:50	18:35:50	19:06:57	19:44:53	09:13:16 00:29:53
S 50°	03:26:45	04:09:44	04:44:23	18:45:29	19:20:18	20:03:35	08:49:06 00:54:07
52°	03:17:46	04:03:31	04:39:59	18:49:58	19:26:39	20:12:46	08:37:27 01:05:48
54°	03:07:30	03:56:34	04:35:09	18:54:55	19:33:45	20:23:16	08:24:13 01:19:03
56°	02:55:36	03:48:43	04:29:47	19:00:25	19:41:46	20:35:28	08:08:55 01:34:23
58°	02:41:34	03:39:47	04:23:46	19:06:34	19:50:55	20:49:54	07:50:49 01:52:31
S 60°	02:24:33	03:29:28	04:16:58	19:13:32	20:01:30	21:07:30	07:28:37 02:14:46

Oct 22	SHA	Mer.pass
Venus	186°12.4	09:31:51
Mars	341°51.6	23:04:09
Jupiter	68°33.0	17:19:47
Saturn	62°11.2	17:44:56

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
21	15:22	15:27	11:44:33	16:22:11	03:52:31	5(29%)
22	15:32	15:36	11:44:24	17:20:07	04:51:27	6(39%)

23 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:31:17	06:50:43	08:07:13	15:19:40	16:35:57	17:55:02	■ ■
N 70°	05:30:59	06:42:30	07:49:47	15:37:14	16:44:20	17:55:34	■ ■
68°	05:30:34	06:35:43	07:35:59	15:51:08	16:51:16	17:56:11	■ ■
66°	05:30:05	06:29:59	07:24:43	16:02:31	16:57:08	17:56:50	17:02:15 19:36:02
64°	05:29:31	06:25:01	07:15:17	16:12:02	17:02:12	17:57:32	16:14:11 20:23:34
62°	05:28:55	06:20:41	07:07:15	16:20:10	17:06:38	17:58:15	15:43:20 20:53:58
60°	05:28:16	06:16:50	07:00:16	16:27:12	17:10:34	17:59:01	15:20:01 21:16:51
N 58°	05:27:34	06:13:22	06:54:09	16:33:24	17:14:06	17:59:48	15:01:14 21:35:15
56°	05:26:51	06:10:14	06:48:43	16:38:54	17:17:19	18:00:36	14:45:29 21:50:37
54°	05:26:06	06:07:21	06:43:50	16:43:50	17:20:15	18:01:26	14:31:58 22:03:48
52°	05:25:19	06:04:42	06:39:25	16:48:18	17:22:58	18:02:17	14:20:08 22:15:19
50°	05:24:31	06:02:13	06:35:24	16:52:22	17:25:30	18:03:09	14:09:38 22:25:31
45°	05:22:23	05:56:40	06:26:41	17:01:11	17:31:11	18:05:25	13:47:37 22:46:51
N 40°	05:20:07	05:51:46	06:19:24	17:08:35	17:36:11	18:07:48	13:29:50 23:04:01
35°	05:17:42	05:47:19	06:13:06	17:14:58	17:40:44	18:10:18	13:14:51 23:18:26
30°	05:15:08	05:43:09	06:07:31	17:20:37	17:44:58	18:12:58	13:01:50 23:30:56
20°	05:09:29	05:35:21	05:57:46	17:30:30	17:52:55	18:18:47	12:39:35 23:52:12
N 10°	05:02:58	05:27:44	05:49:07	17:39:17	18:00:40	18:25:27	12:20:16 .. ..
0°	04:55:18	05:19:49	05:40:54	17:47:38	18:08:44	18:33:16	12:02:12 .. ..
S 10°	04:46:02	05:11:06	05:32:34	17:56:05	18:17:35	18:42:41	11:44:07 .. ..
20°	04:34:26	05:00:58	05:23:35	18:05:13	18:27:53	18:54:28	11:24:43 00:12:28
30°	04:19:10	04:48:28	05:13:13	18:15:47	18:40:34	19:09:57	11:02:18 00:35:36
35°	04:09:29	04:40:51	05:07:10	18:21:56	18:48:19	19:19:48	10:49:09 00:49:08
40°	03:57:45	04:31:53	05:00:16	18:28:58	18:57:26	19:31:43	10:33:58 01:04:44
45°	03:43:11	04:21:05	04:52:11	18:37:12	19:08:25	19:46:32	10:15:51 01:23:18
S 50°	03:24:23	04:07:39	04:42:26	18:47:09	19:22:07	20:05:41	09:53:18 01:46:21
52°	03:15:10	04:01:15	04:37:54	18:51:47	19:28:39	20:15:06	09:42:28 01:57:23
54°	03:04:38	03:54:06	04:32:54	18:56:54	19:35:56	20:25:53	09:30:14 02:09:52
56°	02:52:23	03:46:02	04:27:21	19:02:34	19:44:11	20:38:26	09:16:09 02:24:11
58°	02:37:54	03:36:50	04:21:08	19:08:56	19:53:36	20:53:21	08:59:39 02:40:57
S 60°	02:20:15	03:26:12	04:14:06	19:16:09	20:04:30	21:11:36	08:39:41 03:01:11

Oct 23	SHA	Mer.pass
Venus	185°05.1	09:32:24
Mars	342°08.4	22:59:08
Jupiter	68°25.5	17:16:21
Saturn	62°08.7	17:41:10

24 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:35:26	06:55:10	08:12:38	15:14:01	16:31:17	17:50:40	■ ■
N 70°	05:34:40	06:46:25	07:54:21	15:32:26	16:40:11	17:51:40	■ ■
68°	05:33:53	06:39:12	07:39:56	15:46:57	16:47:33	17:52:39	17:27:03 20:58:20
66°	05:33:04	06:33:06	07:28:12	15:58:48	16:53:46	17:53:37	16:47:20 21:37:12
64°	05:32:14	06:27:51	07:18:23	16:08:42	16:59:08	17:54:35	16:19:40 22:04:05
62°	05:31:23	06:23:16	07:10:02	16:17:08	17:03:49	17:55:33	15:58:18 22:24:46
60°	05:30:32	06:19:11	07:02:48	16:24:26	17:07:59	17:56:30	15:40:54 22:41:32
N 58°	05:29:39	06:15:32	06:56:27	16:30:51	17:11:42	17:57:28	15:26:17 22:55:34
56°	05:28:46	06:12:13	06:50:49	16:36:33	17:15:05	17:58:27	15:13:43 23:07:35
54°	05:27:52	06:09:11	06:45:46	16:41:39	17:18:11	17:59:25	15:02:44 23:18:04
52°	05:26:57	06:06:23	06:41:12	16:46:16	17:21:03	18:00:24	14:52:59 23:27:21
50°	05:26:01	06:03:47	06:37:03	16:50:29	17:23:42	18:01:24	14:44:14 23:35:39
45°	05:23:38	05:57:57	06:28:02	16:59:36	17:29:39	18:03:55	14:25:41 23:53:12
N 40°	05:21:08	05:52:49	06:20:29	17:07:14	17:34:53	18:06:32	14:10:31 .. ..
35°	05:18:32	05:48:10	06:13:59	17:13:49	17:39:38	18:09:15	13:57:38 .. ..
30°	05:15:47	05:43:50	06:08:13	17:19:40	17:44:03	18:12:05	13:46:23 .. ..
20°	05:09:49	05:35:43	05:58:10	17:29:52	17:52:18	18:18:12	13:27:02 .. ..
N 10°	05:03:02	05:27:50	05:49:14	17:38:54	18:00:20	18:25:08	13:10:10 00:10:35
0°	04:55:07	05:19:39	05:40:46	17:47:31	18:08:38	18:33:12	12:54:20 00:27:41
S 10°	04:45:35	05:10:41	05:32:11	17:56:14	18:17:45	18:42:53	12:38:28 00:44:44
20°	04:33:41	05:00:16	05:22:55	18:05:38	18:28:19	18:54:58	12:21:28 01:02:53
30°	04:18:04	04:47:27	05:12:14	18:16:30	18:41:21	19:10:48	12:01:51 01:23:42
35°	04:08:09	04:39:37	05:06:00	18:22:51	18:49:18	19:20:52	11:50:22 01:35:50
40°	03:56:10	04:30:26	04:58:53	18:30:05	18:58:38	19:33:03	11:37:10 01:49:43
45°	03:41:17	04:19:22	04:50:34	18:38:34	19:09:54	19:48:12	11:21:31 02:06:08
S 50°	03:22:02	04:05:34	04:40:30	18:48:50	19:23:57	20:07:49	11:02:12 02:26:18
52°	03:12:34	03:59:00	04:35:49	18:53:37	19:30:39	20:17:28	10:53:01 02:35:52
54°	03:01:45	03:51:40	04:30:40	18:58:53	19:38:08	20:28:32	10:42:44 02:46:33
56°	02:49:09	03:43:22	04:24:56	19:04:44	19:46:36	20:41:27	10:31:02 02:58:40
58°	02:34:12	03:33:54	04:18:30	19:11:19	19:56:18	20:56:51	10:17:32 03:12:37
S 60°	02:15:54	03:22:56	04:11:14	19:18:46	20:07:32	21:15:47	10:01:38 03:29:01

Oct 24	SHA	Mer.pass
Venus	183°57.9	09:32:56
Mars	342°24.8	22:54:09
Jupiter	68°17.8	17:12:57
Saturn	62°06.2	17:37:24

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
23	15:40	15:44	11:44:16	18:15:03	05:48:01	7(50%)
24	15:48	15:52	11:44:08	19:06:18	06:41:09	8(60%)

25 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:39:34	06:59:38	08:18:08	15:08:18	16:26:37	17:46:21	18:15:24
N 70°	05:38:20	06:50:20	07:58:57	15:27:37	16:36:04	17:47:48	17:30:56
68°	05:37:10	06:42:41	07:43:55	15:42:46	16:43:52	17:49:09	17:01:13
66°	05:36:02	06:36:14	07:31:42	15:55:05	16:50:26	17:50:26	16:38:51
64°	05:34:56	06:30:41	07:21:30	16:05:22	16:56:05	17:51:40	16:21:02
62°	05:33:52	06:25:50	07:12:50	16:14:07	17:01:02	17:52:52	16:06:18
60°	05:32:48	06:21:32	07:05:20	16:21:41	17:05:25	17:54:02	15:53:50
N 58°	05:31:44	06:17:41	06:58:46	16:28:20	17:09:20	17:55:11	15:43:05
56°	05:30:41	06:14:12	06:52:56	16:34:13	17:12:53	17:56:19	15:33:39
54°	05:29:38	06:11:01	06:47:42	16:39:30	17:16:08	17:57:26	15:25:17
52°	05:28:35	06:08:04	06:42:59	16:44:16	17:19:08	17:58:33	15:17:46
50°	05:27:32	06:05:20	06:38:41	16:48:37	17:21:55	17:59:40	15:10:59
45°	05:24:52	05:59:14	06:29:23	16:58:02	17:28:09	18:02:28	14:56:25
N 40°	05:22:09	05:53:52	06:21:36	17:05:54	17:33:37	18:05:18	14:44:22
35°	05:19:21	05:49:01	06:14:53	17:12:42	17:38:33	18:08:12	14:34:04
30°	05:16:26	05:44:31	06:08:56	17:18:43	17:43:08	18:11:12	14:25:00
20°	05:10:10	05:36:06	05:58:34	17:29:14	17:51:42	18:17:38	14:09:21
N 10°	05:03:06	05:27:56	05:49:22	17:38:33	18:00:00	18:24:50	13:55:38
0°	04:54:56	05:19:30	05:40:39	17:47:24	18:08:34	18:33:09	13:42:45
S 10°	04:45:08	05:10:16	05:31:48	17:56:22	18:17:56	18:43:06	13:29:49
20°	04:32:56	04:59:35	05:22:16	18:06:03	18:28:47	18:55:29	13:15:58
30°	04:16:59	04:46:26	05:11:16	18:17:14	18:42:08	19:11:40	13:00:03
35°	04:06:51	04:38:25	05:04:51	18:23:46	18:50:16	19:21:57	12:50:46
40°	03:54:36	04:29:00	04:57:32	18:31:13	18:59:50	19:34:23	12:40:08
45°	03:39:22	04:17:39	04:48:57	18:39:57	19:11:23	19:49:52	12:27:37
S 50°	03:19:40	04:03:30	04:38:35	18:50:31	19:25:47	20:09:57	12:12:20
52°	03:09:59	03:56:46	04:33:46	18:55:26	19:32:39	20:19:50	12:05:09
54°	02:58:52	03:49:14	04:28:27	19:00:52	19:40:21	20:31:13	11:57:10
56°	02:45:54	03:40:42	04:22:32	19:06:55	19:49:03	20:44:31	11:48:12
58°	02:30:28	03:30:58	04:15:54	19:13:42	19:59:01	21:00:25	11:38:00
S 60°	02:11:28	03:19:40	04:08:23	19:21:24	20:10:36	21:20:05	11:26:14

Oct 25	SHA	Mer.pass
Venus	182°50.6	09:33:29
Mars	342°40.7	22:49:13
Jupiter	68°09.9	17:09:32
Saturn	62°03.6	17:33:39

26 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:43:40	07:04:06	08:23:43	15:02:32	16:21:58	17:42:05	17:24:24
N 70°	05:41:59	06:54:16	08:03:36	15:22:47	16:31:58	17:43:59	17:02:49
68°	05:40:27	06:46:10	07:47:55	15:38:35	16:40:11	17:45:42	16:45:55
66°	05:39:00	06:39:21	07:35:12	15:51:23	16:47:07	17:47:18	16:32:10
64°	05:37:38	06:33:30	07:24:37	16:02:03	16:53:04	17:48:48	16:20:43
62°	05:36:19	06:28:24	07:15:38	16:11:07	16:58:16	17:50:14	16:10:57
60°	05:35:03	06:23:53	07:07:52	16:18:57	17:02:52	17:51:36	16:02:30
N 58°	05:33:48	06:19:50	07:01:04	16:25:49	17:06:59	17:52:55	15:55:06
56°	05:32:36	06:16:11	06:55:03	16:31:54	17:10:43	17:54:13	15:48:32
54°	05:31:24	06:12:50	06:49:39	16:37:22	17:14:07	17:55:29	15:42:39
52°	05:30:13	06:09:45	06:44:46	16:42:17	17:17:15	17:56:44	15:37:20
50°	05:29:02	06:06:54	06:40:20	16:46:46	17:20:10	17:57:58	15:32:29
45°	05:26:07	06:00:31	06:30:44	16:56:29	17:26:40	18:01:01	15:22:00
N 40°	05:23:10	05:54:55	06:22:42	17:04:36	17:32:22	18:04:05	15:13:16
35°	05:20:10	05:49:52	06:15:47	17:11:36	17:37:30	18:07:10	15:05:44
30°	05:17:05	05:45:12	06:09:39	17:17:48	17:42:15	18:10:21	14:59:06
20°	05:10:31	05:36:29	05:58:59	17:28:37	17:51:07	18:17:04	14:47:34
N 10°	05:03:11	05:28:03	05:49:31	17:38:12	17:59:41	18:24:32	14:37:26
0°	04:54:45	05:19:22	05:40:32	17:47:18	18:08:30	18:33:07	14:27:54
S 10°	04:44:42	05:09:52	05:31:26	17:56:32	18:18:07	18:43:20	14:18:19
20°	04:32:13	04:58:55	05:21:38	18:06:29	18:29:15	18:56:00	14:08:05
30°	04:15:54	04:45:26	05:10:19	18:17:58	18:42:55	19:12:32	13:56:20
35°	04:05:33	04:37:13	05:03:43	18:24:41	18:51:15	19:23:02	13:49:31
40°	03:53:03	04:27:35	04:56:11	18:32:21	19:01:03	19:35:44	13:41:45
45°	03:37:29	04:15:57	04:47:22	18:41:20	19:12:53	19:51:33	13:32:39
S 50°	03:17:19	04:01:27	04:36:42	18:52:12	19:27:38	20:12:06	13:21:38
52°	03:07:23	03:54:33	04:31:43	18:57:16	19:34:41	20:22:14	13:16:30
54°	02:55:59	03:46:48	04:26:15	19:02:52	19:42:34	20:33:55	13:10:50
56°	02:42:38	03:38:03	04:20:09	19:09:06	19:51:30	20:47:36	13:04:32
58°	02:26:41	03:28:02	04:13:18	19:16:05	20:01:45	21:04:02	12:57:26
S 60°	02:06:58	03:16:24	04:05:33	19:24:02	20:13:41	21:24:29	12:49:22

Oct 26	SHA	Mer.pass
Venus	181°43.3	09:34:01
Mars	342°56.0	22:44:18
Jupiter	68°01.9	17:06:09
Saturn	62°00.8	17:29:54

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
25	15:55	15:59	11:44:01	19:53:53	07:30:31	9(69%)
26	16:02	16:05	11:43:55	20:38:21	08:16:27	10(78%)

27 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:47:45	07:08:35	08:29:23	14:56:42	16:17:20	17:37:52	16:54:44
N 70°	05:45:37	06:58:11	08:08:19	15:17:55	16:27:53	17:40:12	16:43:20
68°	05:43:42	06:49:39	07:51:57	15:34:23	16:36:33	17:42:18	16:34:02
66°	05:41:57	06:42:29	07:38:44	15:47:42	16:43:50	17:44:12	16:26:14
64°	05:40:18	06:36:20	07:27:45	15:58:45	16:50:05	17:45:58	16:19:37
62°	05:38:46	06:30:58	07:18:27	16:08:08	16:55:32	17:47:37	16:13:53
60°	05:37:17	06:26:14	07:10:25	16:16:15	17:00:21	17:49:11	16:08:53
N 58°	05:35:52	06:22:00	07:03:23	16:23:20	17:04:40	17:50:42	16:04:27
56°	05:34:30	06:18:10	06:57:10	16:29:37	17:08:34	17:52:09	16:00:29
54°	05:33:09	06:14:40	06:51:35	16:35:15	17:12:07	17:53:33	15:56:55
52°	05:31:50	06:11:27	06:46:34	16:40:19	17:15:24	17:54:56	15:53:40
50°	05:30:32	06:08:27	06:41:59	16:44:57	17:18:26	17:56:18	15:50:42
45°	05:27:21	06:01:48	06:32:05	16:54:57	17:25:12	17:59:37	15:44:16
N 40°	05:24:11	05:55:59	06:23:49	17:03:19	17:31:07	18:02:53	15:38:51
35°	05:21:00	05:50:44	06:16:41	17:10:31	17:36:27	18:06:10	15:34:11
30°	05:17:44	05:45:53	06:10:23	17:16:54	17:41:23	18:09:31	15:30:02
20°	05:10:53	05:36:52	05:59:24	17:28:01	17:50:33	18:16:32	15:22:51
N 10°	05:03:17	05:28:10	05:49:40	17:37:52	17:59:22	18:24:16	15:16:30
0°	04:54:36	05:19:14	05:40:26	17:47:13	18:08:26	18:33:06	15:10:31
S 10°	04:44:16	05:09:30	05:31:05	17:56:42	18:18:19	18:43:34	15:04:32
20°	04:31:30	04:58:15	05:21:01	18:06:55	18:29:43	18:56:32	14:58:07
30°	04:14:50	04:44:27	05:09:23	18:18:43	18:43:43	19:13:25	14:50:48
35°	04:04:17	04:36:03	05:02:37	18:25:36	18:52:15	19:24:08	14:46:34
40°	03:51:31	04:26:11	04:54:52	18:33:29	19:02:16	19:37:06	14:41:45
45°	03:35:37	04:14:16	04:45:48	18:42:43	19:14:22	19:53:15	14:36:08
S 50°	03:14:59	03:59:25	04:34:49	18:53:54	19:29:29	20:14:16	14:29:24
52°	03:04:48	03:52:20	04:29:42	18:59:06	19:36:42	20:24:40	14:26:16
54°	02:53:05	03:44:24	04:24:04	19:04:52	19:44:48	20:36:39	14:22:50
56°	02:39:22	03:35:25	04:17:47	19:11:17	19:53:58	20:50:44	14:19:02
58°	02:22:53	03:25:07	04:10:44	19:18:29	20:04:30	21:07:43	14:14:47
S 60°	02:02:23	03:13:08	04:02:44	19:26:40	20:16:47	21:29:00	14:10:00

Oct 27	SHA	Mer.pass
Venus	180°36.1	09:34:34
Mars	343°10.7	22:39:26
Jupiter	67°53.7	17:02:46
Saturn	61°58.0	17:26:10

28 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:51:49	07:13:04	08:35:10	14:50:48	16:12:43	17:33:41	16:31:08
N 70°	05:49:14	07:02:07	08:13:04	15:13:01	16:23:49	17:36:28	16:26:59
68°	05:46:57	06:53:08	07:56:00	15:30:11	16:32:56	17:38:55	16:23:33
66°	05:44:53	06:45:36	07:42:16	15:44:01	16:40:35	17:41:08	16:20:38
64°	05:42:58	06:39:09	07:30:54	15:55:28	16:47:08	17:43:10	16:18:09
62°	05:41:12	06:33:32	07:21:16	16:05:11	16:52:50	17:45:03	16:15:59
60°	05:39:31	06:28:34	07:12:58	16:13:33	16:57:52	17:46:49	16:14:04
N 58°	05:37:55	06:24:09	07:05:42	16:20:52	17:02:22	17:48:30	16:12:23
56°	05:36:23	06:20:08	06:59:17	16:27:21	17:06:26	17:50:06	16:10:51
54°	05:34:54	06:16:29	06:53:32	16:33:09	17:10:09	17:51:40	16:09:29
52°	05:33:27	06:13:08	06:48:21	16:38:23	17:13:34	17:53:10	16:08:14
50°	05:32:03	06:10:01	06:43:38	16:43:09	17:16:43	17:54:39	16:07:06
45°	05:28:36	06:03:05	06:33:26	16:53:27	17:23:46	17:58:13	16:04:36
N 40°	05:25:13	05:57:02	06:24:56	17:02:03	17:29:55	18:01:43	16:02:30
35°	05:21:50	05:51:36	06:17:36	17:09:27	17:35:26	18:05:11	16:00:42
30°	05:18:24	05:46:35	06:11:07	17:16:00	17:40:32	18:08:42	15:59:05
20°	05:11:14	05:37:16	05:59:50	17:27:26	17:50:00	18:16:01	15:56:18
N 10°	05:03:23	05:28:18	05:49:50	17:37:33	17:59:05	18:24:01	15:53:50
0°	04:54:27	05:19:07	05:40:21	17:47:09	18:08:24	18:33:06	15:51:31
S 10°	04:43:52	05:09:08	05:30:45	17:56:52	18:18:32	18:43:49	15:49:13
20°	04:30:48	04:57:37	05:20:25	18:07:22	18:30:12	18:57:04	15:46:45
30°	04:13:48	04:43:29	05:08:29	18:19:28	18:44:32	19:14:18	15:43:57
35°	04:03:01	04:34:53	05:01:31	18:26:32	18:53:15	19:25:14	15:42:19
40°	03:49:59	04:24:48	04:53:34	18:34:37	19:03:30	19:38:28	15:40:29
45°	03:33:45	04:12:37	04:44:15	18:44:06	19:15:53	19:54:58	15:38:22
S 50°	03:12:39	03:57:24	04:32:58	18:55:35	19:31:21	20:16:27	15:35:49
52°	03:02:13	03:50:09	04:27:42	19:00:57	19:38:45	20:27:06	15:34:38
54°	02:50:12	03:42:00	04:21:54	19:06:52	19:47:02	20:39:24	15:33:21
56°	02:36:04	03:32:47	04:15:27	19:13:28	19:56:27	20:53:54	15:31:56
58°	02:19:03	03:22:12	04:08:11	19:20:53	20:07:17	21:11:27	15:30:21
S 60°	01:57:42	03:09:52	03:59:56	19:29:19	20:19:56	21:33:38	15:28:34

Oct 28	SHA	Mer.pass
Venus	179°28.8	09:35:07
Mars	343°24.8	22:34:36
Jupiter	67°45.4	16:59:24
Saturn	61°55.1	17:22:26

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
27	16:08	16:10	11:43:50	21:20:30	08:59:40	11(85%)
28	16:13	16:15	11:43:45	22:01:16	09:41:00	12(91%)



29 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:55:51	07:17:34	08:41:02	14:44:49	16:08:07	17:29:33	16:09:20
N 70°	05:52:50	07:06:03	08:17:52	15:08:06	16:19:47	17:32:47	16:11:38
68°	05:50:10	06:56:37	08:00:05	15:26:00	16:29:20	17:35:36	16:13:33
66°	05:47:48	06:48:44	07:45:50	15:40:20	16:37:21	17:38:07	16:15:10
64°	05:45:38	06:41:58	07:34:03	15:52:12	16:44:12	17:40:24	16:16:34
62°	05:43:37	06:36:06	07:24:05	16:02:14	16:50:09	17:42:30	16:17:47
60°	05:41:45	06:30:55	07:15:31	16:10:53	16:55:25	17:44:29	16:18:51
N 58°	05:39:58	06:26:17	07:08:02	16:18:26	17:00:06	17:46:20	16:19:48
56°	05:38:17	06:22:07	07:01:24	16:25:06	17:04:21	17:48:06	16:20:39
54°	05:36:39	06:18:19	06:55:29	16:31:05	17:08:12	17:49:48	16:21:26
52°	05:35:05	06:14:49	06:50:09	16:36:28	17:11:45	17:51:26	16:22:08
50°	05:33:32	06:11:35	06:45:17	16:41:22	17:15:02	17:53:02	16:22:47
45°	05:29:50	06:04:23	06:34:48	16:51:58	17:22:21	17:56:52	16:24:12
N 40°	05:26:14	05:58:06	06:26:03	17:00:48	17:28:43	18:00:34	16:25:23
35°	05:22:40	05:52:28	06:18:31	17:08:24	17:34:26	18:04:14	16:26:26
30°	05:19:04	05:47:17	06:11:51	17:15:08	17:39:43	18:07:54	16:27:21
20°	05:11:37	05:37:40	06:00:16	17:26:52	17:49:28	18:15:31	16:28:59
N 10°	05:03:30	05:28:27	05:50:00	17:37:15	17:58:48	18:23:46	16:30:26
0°	04:54:18	05:19:01	05:40:16	17:47:06	18:08:22	18:33:06	16:31:48
S 10°	04:43:28	05:08:46	05:30:26	17:57:04	18:18:45	18:44:05	16:33:12
20°	04:30:07	04:56:59	05:19:50	18:07:49	18:30:42	18:57:37	16:34:42
30°	04:12:46	04:42:32	05:07:35	18:20:14	18:45:21	19:15:12	16:36:26
35°	04:01:46	04:33:45	05:00:27	18:27:29	18:54:15	19:26:21	16:37:27
40°	03:48:28	04:23:26	04:52:17	18:35:46	19:04:44	19:39:50	16:38:35
45°	03:31:54	04:10:58	04:42:43	18:45:30	19:17:23	19:56:41	16:39:56
S 50°	03:10:20	03:55:24	04:31:08	18:57:17	19:33:13	20:18:39	16:41:32
52°	02:59:39	03:47:58	04:25:44	19:02:47	19:40:47	20:29:34	16:42:17
54°	02:47:18	03:39:38	04:19:46	19:08:52	19:49:18	20:42:11	16:43:05
56°	02:32:46	03:30:10	04:13:07	19:15:39	19:58:57	20:57:07	16:44:00
58°	02:15:10	03:19:18	04:05:39	19:23:17	20:10:04	21:15:16	16:45:00
S 60°	01:52:56	03:06:36	03:57:09	19:31:59	20:23:05	21:38:25	16:46:08

Oct 29	SHA	Mer.pass
Venus	178°21.4	09:35:40
Mars	343°38.3	22:29:49
Jupiter	67°36.9	16:56:02
Saturn	61°52.1	17:18:42

30 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	05:59:52	07:22:05	08:47:02	14:38:44	16:03:31	17:25:28	15:46:42
N 70°	05:56:24	07:09:59	08:22:44	15:03:10	16:15:46	17:29:08	15:55:50
68°	05:53:23	07:00:06	08:04:12	15:21:47	16:25:46	17:32:19	16:03:21
66°	05:50:42	06:51:51	07:49:25	15:36:40	16:34:08	17:35:08	16:09:40
64°	05:48:16	06:44:47	07:37:13	15:48:57	16:41:17	17:37:40	16:15:04
62°	05:46:02	06:38:39	07:26:55	15:59:19	16:47:30	17:40:00	16:19:44
60°	05:43:58	06:33:15	07:18:04	16:08:14	16:52:59	17:42:10	16:23:50
N 58°	05:42:01	06:28:26	07:10:21	16:16:01	16:57:52	17:44:12	16:27:28
56°	05:40:10	06:24:05	07:03:32	16:22:53	17:02:17	17:46:08	16:30:43
54°	05:38:24	06:20:08	06:57:26	16:29:02	17:06:17	17:47:58	16:33:39
52°	05:36:41	06:16:30	06:51:56	16:34:35	17:09:58	17:49:44	16:36:19
50°	05:35:02	06:13:08	06:46:57	16:39:37	17:13:23	17:51:26	16:38:46
45°	05:31:04	06:05:40	06:36:10	16:50:30	17:20:58	17:55:31	16:44:05
N 40°	05:27:15	05:59:10	06:27:10	16:59:34	17:27:33	17:59:27	16:48:34
35°	05:23:30	05:53:21	06:19:26	17:07:23	17:33:28	18:03:18	16:52:27
30°	05:19:44	05:47:59	06:12:36	17:14:17	17:38:54	18:07:08	16:55:53
20°	05:12:00	05:38:05	06:00:42	17:26:19	17:48:57	18:15:02	17:01:54
N 10°	05:03:37	05:28:36	05:50:11	17:36:57	17:58:33	18:23:33	17:07:13
0°	04:54:11	05:18:55	05:40:13	17:47:03	18:08:21	18:33:07	17:12:15
S 10°	04:43:05	05:08:26	05:30:07	17:57:16	18:18:59	18:44:22	17:17:19
20°	04:29:27	04:56:22	05:19:15	18:08:17	18:31:12	18:58:10	17:22:45
30°	04:11:45	04:41:36	05:06:43	18:21:00	18:46:10	19:16:07	17:28:59
35°	04:00:32	04:32:38	04:59:24	18:28:25	18:55:16	19:27:28	17:32:36
40°	03:46:59	04:22:05	04:51:02	18:36:55	19:05:58	19:41:14	17:36:43
45°	03:30:04	04:09:21	04:41:13	18:46:53	19:18:54	19:58:25	17:41:31
S 50°	03:08:01	03:53:25	04:29:20	18:58:59	19:35:06	20:20:52	17:47:17
52°	02:57:04	03:45:49	04:23:47	19:04:38	19:42:50	20:32:02	17:49:57
54°	02:44:24	03:37:16	04:17:39	19:10:53	19:51:33	20:45:00	17:52:53
56°	02:29:26	03:27:34	04:10:49	19:17:51	20:01:28	21:00:22	17:56:08
58°	02:11:14	03:16:24	04:03:08	19:25:42	20:12:53	21:19:10	17:59:46
S 60°	01:48:02	03:03:19	03:54:23	19:34:39	20:26:17	21:43:21	18:03:51

Oct 30	SHA	Mer.pass
Venus	177°14.1	09:36:13
Mars	343°51.2	22:25:04
Jupiter	67°28.3	16:52:41
Saturn	61°49.0	17:14:59

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
29	16:17	16:19	11:43:41	22:41:31	10:21:24	13(96%)
30	16:21	16:22	11:43:38	23:22:07	11:01:43	14(99%)

31 October 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:03:52	07:26:37	08:53:10	14:32:33	15:58:56	17:21:26	15:19:59
N 70°	05:59:57	07:13:55	08:27:39	14:58:11	16:11:46	17:25:32	15:37:55
68°	05:56:34	07:03:35	08:08:21	15:17:35	16:22:14	17:29:04	15:52:13
66°	05:53:35	06:54:58	07:53:00	15:33:01	16:30:58	17:32:11	16:03:58
64°	05:50:54	06:47:36	07:40:23	15:45:43	16:38:25	17:34:59	16:13:52
62°	05:48:26	06:41:13	07:29:45	15:56:25	16:44:53	17:37:33	16:22:20
60°	05:46:10	06:35:35	07:20:38	16:05:36	16:50:35	17:39:54	16:29:41
N 58°	05:44:03	06:30:35	07:12:41	16:13:37	16:55:40	17:42:06	16:36:10
56°	05:42:02	06:26:04	07:05:39	16:20:42	17:00:14	17:44:11	16:41:56
54°	05:40:08	06:21:57	06:59:23	16:27:01	17:04:24	17:46:10	16:47:06
52°	05:38:18	06:18:11	06:53:44	16:32:42	17:08:13	17:48:03	16:51:47
50°	05:36:32	06:14:42	06:48:36	16:37:53	17:11:45	17:49:53	16:56:04
45°	05:32:19	06:06:58	06:37:32	16:49:03	17:19:36	17:54:13	17:05:20
N 40°	05:28:17	06:00:15	06:28:18	16:58:22	17:26:25	17:58:21	17:13:05
35°	05:24:20	05:54:14	06:20:22	17:06:23	17:32:30	18:02:23	17:19:47
30°	05:20:25	05:48:42	06:13:21	17:13:28	17:38:07	18:06:23	17:25:42
20°	05:12:23	05:38:30	06:01:10	17:25:47	17:48:27	18:14:34	17:36:00
N 10°	05:03:45	05:28:46	05:50:23	17:36:41	17:58:18	18:23:20	17:45:06
0°	04:54:04	05:18:51	05:40:10	17:47:01	18:08:21	18:33:09	17:53:41
S 10°	04:42:43	05:08:06	05:29:50	17:57:28	18:19:14	18:44:39	18:02:19
20°	04:28:48	04:55:47	05:18:42	18:08:45	18:31:43	18:58:45	18:11:34
30°	04:10:45	04:40:42	05:05:51	18:21:46	18:47:00	19:17:01	18:22:12
35°	03:59:20	04:31:31	04:58:22	18:29:22	18:56:17	19:28:36	18:28:23
40°	03:45:30	04:20:45	04:49:48	18:38:04	19:07:13	19:42:37	18:35:26
45°	03:28:15	04:07:44	04:39:44	18:48:17	19:20:25	20:00:09	18:43:40
S 50°	03:05:43	03:51:28	04:27:32	19:00:41	19:36:58	20:23:06	18:53:38
52°	02:54:30	03:43:40	04:21:51	19:06:29	19:44:54	20:34:32	18:58:17
54°	02:41:30	03:34:55	04:15:33	19:12:54	19:53:49	20:47:51	19:03:24
56°	02:26:06	03:24:58	04:08:32	19:20:03	20:03:59	21:03:40	19:09:05
58°	02:07:15	03:13:30	04:00:38	19:28:07	20:15:42	21:23:08	19:15:29
S 60°	01:43:02	03:00:03	03:51:38	19:37:19	20:29:29	21:48:27	19:22:44

Oct 31	SHA	Mer.pass
Venus	176°06.7	09:36:46
Mars	344°03.3	22:20:23
Jupiter	67°19.5	16:49:20
Saturn	61°45.8	17:11:16

01 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:07:50	07:31:10	08:59:26	14:26:15	15:54:22	17:17:27	14:40:43
N 70°	06:03:29	07:17:52	08:32:38	14:53:10	16:07:48	17:21:59	15:14:20
68°	05:59:45	07:07:04	08:12:32	15:13:22	16:18:43	17:25:52	15:38:47
66°	05:56:27	06:58:04	07:56:37	15:29:22	16:27:49	17:29:17	15:57:50
64°	05:53:31	06:50:24	07:43:34	15:42:30	16:35:34	17:32:21	16:13:19
62°	05:50:50	06:43:46	07:32:36	15:53:32	16:42:18	17:35:07	16:26:16
60°	05:48:22	06:37:55	07:23:12	16:03:00	16:48:13	17:37:40	16:37:19
N 58°	05:46:04	06:32:43	07:15:00	16:11:15	16:53:29	17:40:03	16:46:56
56°	05:43:55	06:28:02	07:07:47	16:18:31	16:58:14	17:42:17	16:55:24
54°	05:41:52	06:23:46	07:01:20	16:25:01	17:02:32	17:44:23	17:02:56
52°	05:39:54	06:19:52	06:55:32	16:30:52	17:06:30	17:46:24	17:09:43
50°	05:38:01	06:16:15	06:50:16	16:36:11	17:10:09	17:48:21	17:15:52
45°	05:33:33	06:08:15	06:38:54	16:47:39	17:18:16	17:52:56	17:29:06
N 40°	05:29:18	06:01:19	06:29:26	16:57:11	17:25:17	17:57:17	17:40:06
35°	05:25:11	05:55:07	06:21:18	17:05:24	17:31:35	18:01:29	17:49:32
30°	05:21:06	05:49:25	06:14:07	17:12:39	17:37:21	18:05:39	17:57:50
20°	05:12:47	05:38:56	06:01:37	17:25:16	17:47:58	18:14:07	18:12:14
N 10°	05:03:53	05:28:56	05:50:35	17:36:26	17:58:05	18:23:08	18:24:53
0°	04:53:58	05:18:47	05:40:08	17:47:00	18:08:22	18:33:12	18:36:49
S 10°	04:42:22	05:07:48	05:29:33	17:57:42	18:19:29	18:44:57	18:48:48
20°	04:28:10	04:55:12	05:18:10	18:09:14	18:32:14	18:59:19	19:01:40
30°	04:09:46	04:39:48	05:05:01	18:22:33	18:47:50	19:17:57	19:16:28
35°	03:58:08	04:30:26	04:57:21	18:30:20	18:57:19	19:29:44	19:25:06
40°	03:44:03	04:19:27	04:48:35	18:39:14	19:08:28	19:44:01	19:34:59
45°	03:26:27	04:06:09	04:38:17	18:49:41	19:21:57	20:01:54	19:46:37
S 50°	03:03:26	03:49:31	04:25:47	19:02:24	19:38:52	20:25:20	20:00:47
52°	02:51:57	03:41:33	04:19:57	19:08:20	19:46:58	20:37:03	20:07:26
54°	02:38:36	03:32:36	04:13:29	19:14:55	19:56:06	20:50:43	20:14:48
56°	02:22:44	03:22:24	04:06:17	19:22:15	20:06:31	21:07:01	20:23:05
58°	02:03:14	03:10:37	03:58:10	19:30:32	20:18:33	21:27:11	20:32:27
S 60°	01:37:52	02:56:47	03:48:54	19:40:00	20:32:44	21:53:44	20:43:13

Nov 01	SHA	Mer.pass
Venus	174°59.2	09:37:19
Mars	344°14.8	22:15:44
Jupiter	67°10.6	16:46:00
Saturn	61°42.5	17:07:33

Day	Sun			Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
31	16:24	16:25	11:43:35	--	11:42:49	15(100%)
01	16:26	16:26	11:43:34	00:03:54	12:25:27	16(99%)




02 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:11:47	07:35:43	09:05:51	14:19:49	15:49:49	17:13:30	☐ ☐
N 70°	06:07:00	07:21:49	08:37:41	14:48:07	16:03:51	17:18:28	14:30:41 11:35:23
68°	06:02:54	07:10:33	08:16:44	15:09:09	16:15:14	17:22:43	15:19:22 10:47:42
66°	05:59:19	07:01:11	08:00:14	15:25:44	16:24:42	17:26:26	15:50:40 10:17:18
64°	05:56:07	06:53:12	07:46:45	15:39:18	16:32:46	17:29:44	16:14:04 09:54:43
62°	05:53:13	06:46:18	07:35:27	15:50:40	16:39:45	17:32:44	16:32:43 09:36:47
60°	05:50:33	06:40:15	07:25:46	16:00:25	16:45:53	17:35:29	16:48:10 09:22:00
N 58°	05:48:05	06:34:51	07:17:20	16:08:54	16:51:20	17:38:01	17:01:18 09:09:29
56°	05:45:46	06:30:00	07:09:55	16:16:23	16:56:15	17:40:24	17:12:41 08:58:40
54°	05:43:35	06:25:35	07:03:17	16:23:03	17:00:43	17:42:39	17:22:42 08:49:11
52°	05:41:30	06:21:33	06:57:20	16:29:03	17:04:48	17:44:48	17:31:37 08:40:45
50°	05:39:30	06:17:49	06:51:55	16:34:30	17:08:35	17:46:51	17:39:39 08:33:11
45°	05:34:47	06:09:33	06:40:16	16:46:15	17:16:57	17:51:41	17:56:46 08:17:07
N 40°	05:30:20	06:02:23	06:30:34	16:56:02	17:24:12	17:56:14	18:10:51 08:03:58
35°	05:26:02	05:56:00	06:22:14	17:04:26	17:30:40	18:00:37	18:22:50 07:52:50
30°	05:21:47	05:50:08	06:14:53	17:11:52	17:36:36	18:04:57	18:33:20 07:43:06
20°	05:13:11	05:39:22	06:02:06	17:24:46	17:47:30	18:13:42	18:51:27 07:26:26
N 10°	05:04:03	05:29:08	05:50:48	17:36:11	17:57:52	18:22:58	19:07:18 07:11:56
0°	04:53:52	05:18:43	05:40:06	17:47:00	18:08:24	18:33:16	19:22:12 06:58:25
S 10°	04:42:01	05:07:30	05:29:18	17:57:56	18:19:45	18:45:16	19:37:11 06:44:56
20°	04:27:33	04:54:38	05:17:39	18:09:43	18:32:46	18:59:55	19:53:15 06:30:35
30°	04:08:49	04:38:56	05:04:12	18:23:20	18:48:40	19:18:53	20:11:49 06:14:12
35°	03:56:58	04:29:23	04:56:21	18:31:17	18:58:21	19:30:53	20:22:40 06:04:42
40°	03:42:37	04:18:10	04:47:23	18:40:23	19:09:43	19:45:26	20:35:10 05:53:53
45°	03:24:40	04:04:36	04:36:50	18:51:06	19:23:29	20:03:39	20:49:57 05:41:13
S 50°	03:01:09	03:47:36	04:24:03	19:04:06	19:40:45	20:27:36	21:08:09 05:25:53
52°	02:49:24	03:39:27	04:18:04	19:10:11	19:49:02	20:39:36	21:16:47 05:18:43
54°	02:35:42	03:30:17	04:11:27	19:16:56	19:58:23	20:53:37	21:26:26 05:10:47
56°	02:19:21	03:19:50	04:04:03	19:24:27	20:09:03	21:10:25	21:37:22 05:01:55
58°	01:59:09	03:07:45	03:55:43	19:32:58	20:21:24	21:31:19	21:49:56 04:51:54
S 60°	01:32:33	02:53:31	03:46:12	19:42:41	20:36:00	21:59:14	22:04:40 04:40:27

Nov 02	SHA	Mer.pass
Venus	173° 51.7	09:37:53
Mars	344° 25.6	22:11:07
Jupiter	67° 01.6	16:42:40
Saturn	61° 39.1	17:03:51





03 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:15:43	07:40:17	09:12:27	14:13:15	15:45:17	17:09:37	☐ ☐
N 70°	06:10:30	07:25:46	08:42:48	14:43:01	15:59:56	17:15:00	☐ ☐
68°	06:06:02	07:14:02	08:20:59	15:04:56	16:11:46	17:19:36	14:26:10 13:19:01
66°	06:02:09	07:04:17	08:03:53	15:22:07	16:21:37	17:23:37	15:40:44 12:05:05
64°	05:58:42	06:56:00	07:49:57	15:36:07	16:29:59	17:27:10	16:17:40 11:28:44
62°	05:55:35	06:48:51	07:38:18	15:47:50	16:37:13	17:30:23	16:44:01 11:02:54
60°	05:52:44	06:42:34	07:28:20	15:57:52	16:43:34	17:33:19	17:04:41 10:42:43
N 58°	05:50:06	06:36:59	07:19:40	16:06:35	16:49:13	17:36:02	17:21:40 10:26:10
56°	05:47:38	06:31:57	07:12:02	16:14:16	16:54:18	17:38:34	17:36:04 10:12:11
54°	05:45:18	06:27:24	07:05:15	16:21:06	16:58:55	17:40:57	17:48:32 10:00:06
52°	05:43:06	06:23:13	06:59:08	16:27:16	17:03:08	17:43:13	17:59:31 09:49:29
50°	05:40:59	06:19:22	06:53:35	16:32:51	17:07:02	17:45:22	18:09:18 09:40:01
45°	05:36:01	06:10:50	06:41:38	16:44:53	17:15:40	17:50:27	18:29:56 09:20:10
N 40°	05:31:22	06:03:28	06:31:42	16:54:54	17:23:07	17:55:13	18:46:42 09:04:05
35°	05:26:53	05:56:53	06:23:11	17:03:30	17:29:47	17:59:47	19:00:52 08:50:33
30°	05:22:28	05:50:52	06:15:39	17:11:06	17:35:53	18:04:16	19:13:13 08:38:46
20°	05:13:35	05:39:49	06:02:35	17:24:18	17:47:04	18:13:17	19:34:23 08:18:41
N 10°	05:04:12	05:29:19	05:51:02	17:35:57	17:57:40	18:22:48	19:52:50 08:01:16
0°	04:53:47	05:18:41	05:40:06	17:47:00	18:08:26	18:33:21	20:10:09 07:45:01
S 10°	04:41:42	05:07:13	05:29:03	17:58:10	18:20:02	18:45:35	20:27:31 07:28:49
20°	04:26:57	04:54:06	05:17:09	18:10:13	18:33:18	19:00:31	20:46:10 07:11:32
30°	04:07:52	04:38:04	05:03:25	18:24:08	18:49:31	19:19:49	21:07:45 06:51:42
35°	03:55:48	04:28:20	04:55:23	18:32:15	18:59:23	19:32:02	21:20:26 06:40:09
40°	03:41:12	04:16:54	04:46:13	18:41:33	19:10:59	19:46:51	21:35:04 06:26:56
45°	03:22:54	04:03:04	04:35:26	18:52:30	19:25:01	20:05:25	21:52:31 06:11:20
S 50°	02:58:53	03:45:42	04:22:20	19:05:49	19:42:39	20:29:52	22:14:12 05:52:13
52°	02:46:51	03:37:23	04:16:12	19:12:02	19:51:07	20:42:09	22:24:35 05:43:11
54°	02:32:48	03:28:00	04:09:25	19:18:57	20:00:41	20:56:33	22:36:19 05:33:06
56°	02:15:58	03:17:17	04:01:51	19:26:40	20:11:36	21:13:51	22:49:46 05:21:42
58°	01:55:00	03:04:53	03:53:18	19:35:23	20:24:17	21:35:33	23:05:29 05:08:39
S 60°	01:27:03	02:50:15	03:43:31	19:45:22	20:39:17	22:04:59	23:24:21 04:53:24

Nov 03	SHA	Mer.pass
Venus	172° 44.1	09:38:27
Mars	344° 35.7	22:06:34
Jupiter	66° 52.4	16:39:22
Saturn	61° 35.6	17:00:09

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
02	16:27	16:27	11:43:33	00:47:33	13:10:14	17(97%)
03	16:27	16:27	11:43:33	01:33:32	13:57:30	18(93%)





04 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	06:19:37	07:44:52	09:19:15	14:06:30	15:40:45	17:05:46	
N 70°	06:13:58	07:29:43	08:47:59	14:37:52	15:56:02	17:11:36	
68°	06:09:09	07:17:31	08:25:15	15:00:42	16:08:21	17:16:33	
66°	06:04:59	07:07:23	08:07:33	15:18:30	16:18:34	17:20:51	15:13:08 14:16:12
64°	06:01:16	06:58:48	07:53:10	15:32:57	16:27:14	17:24:39	16:28:28 13:01:11
62°	05:57:56	06:51:23	07:41:09	15:45:02	16:34:44	17:28:05	17:04:57 12:25:00
60°	05:54:54	06:44:53	07:30:54	15:55:20	16:41:18	17:31:12	17:31:05 11:59:07
N 58°	05:52:05	06:39:06	07:22:00	16:04:18	16:47:08	17:34:05	17:51:41 11:38:47
56°	05:49:29	06:33:55	07:14:10	16:12:10	16:52:23	17:36:45	18:08:43 11:21:59
54°	05:47:01	06:29:12	07:07:12	16:19:11	16:57:09	17:39:17	18:23:12 11:07:42
52°	05:44:41	06:24:54	07:00:56	16:25:30	17:01:30	17:41:40	18:35:49 10:55:18
50°	05:42:28	06:20:55	06:55:15	16:31:14	17:05:31	17:43:56	18:46:58 10:44:20
45°	05:37:15	06:12:08	06:43:01	16:43:33	17:14:24	17:49:15	19:10:13 10:21:32
N 40°	05:32:23	06:04:33	06:32:51	16:53:48	17:22:05	17:54:13	19:28:55 10:03:13
35°	05:27:44	05:57:47	06:24:07	17:02:35	17:28:55	17:58:58	19:44:37 09:47:53
30°	05:23:10	05:51:36	06:16:26	17:10:21	17:35:11	18:03:36	19:58:14 09:34:36
20°	05:14:01	05:40:16	06:03:04	17:23:50	17:46:38	18:12:54	20:21:29 09:11:59
N 10°	05:04:23	05:29:32	05:51:16	17:35:45	17:57:30	18:22:40	20:41:40 08:52:25
0°	04:53:44	05:18:39	05:40:06	17:47:02	18:08:29	18:33:27	21:00:32 08:34:10
S 10°	04:41:23	05:06:57	05:28:49	17:58:26	18:20:19	18:45:56	21:19:27 08:15:57
20°	04:26:22	04:53:35	05:16:40	18:10:43	18:33:51	19:01:07	21:39:46 07:56:27
30°	04:06:57	04:37:15	05:02:38	18:24:55	18:50:23	19:20:46	22:03:18 07:34:00
35°	03:54:41	04:27:19	04:54:27	18:33:13	19:00:26	19:33:12	22:17:09 07:20:51
40°	03:39:48	04:15:40	04:45:04	18:42:44	19:12:15	19:48:16	22:33:11 07:05:44
45°	03:21:10	04:01:33	04:34:03	18:53:55	19:26:33	20:07:11	22:52:21 06:47:44
S 50°	02:56:38	03:43:50	04:20:39	19:07:31	19:44:33	20:32:09	23:16:21 06:25:27
52°	02:44:19	03:35:19	04:14:23	19:13:54	19:53:12	20:44:44	23:27:56 06:14:47
54°	02:29:53	03:25:43	04:07:26	19:20:58	20:02:59	20:59:30	23:41:06 06:02:46
56°	02:12:32	03:14:46	03:59:40	19:28:52	20:14:10	21:17:20	23:56:21 05:49:02
58°	01:50:48	03:02:02	03:50:54	19:37:49	20:27:10	21:39:53	.. .. 05:32:59
S 60°	01:21:20	02:46:59	03:40:51	19:48:04	20:42:36	22:11:01	.. .. 05:13:46

Nov 04	SHA	Mer.pass
Venus	171° 36.4	09:39:01
Mars	344° 45.1	22:02:04
Jupiter	66° 43.0	16:36:03
Saturn	61° 32.1	16:56:28




05 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	06:23:30	07:49:28	09:26:16	13:59:34	15:36:14	17:01:59	
N 70°	06:17:25	07:33:40	08:53:16	14:32:41	15:52:09	17:08:14	
68°	06:12:16	07:20:59	08:29:34	14:56:28	16:04:57	17:13:32	
66°	06:07:47	07:10:29	08:11:13	15:14:54	16:15:33	17:18:07	
64°	06:03:50	07:01:35	07:56:22	15:29:48	16:24:32	17:22:10	16:59:36 14:18:01
62°	06:00:17	06:53:55	07:44:00	15:42:15	16:32:17	17:25:49	17:43:54 13:33:45
60°	05:57:03	06:47:11	07:33:28	15:52:51	16:39:04	17:29:07	18:13:17 13:04:25
N 58°	05:54:05	06:41:13	07:24:20	16:02:02	16:45:05	17:32:10	18:35:46 12:41:59
56°	05:51:19	06:35:52	07:16:18	16:10:07	16:50:30	17:34:59	18:54:03 12:23:43
54°	05:48:43	06:31:01	07:09:09	16:17:18	16:55:24	17:37:38	19:09:29 12:08:19
52°	05:46:16	06:26:34	07:02:44	16:23:46	16:59:54	17:40:09	19:22:50 11:55:01
50°	05:43:56	06:22:29	06:56:54	16:29:38	17:04:02	17:42:32	19:34:34 11:43:18
45°	05:38:29	06:13:26	06:44:23	16:42:14	17:13:11	17:48:05	19:58:54 11:19:02
N 40°	05:33:25	06:05:38	06:34:00	16:52:43	17:21:04	17:53:15	20:18:21 10:59:38
35°	05:28:35	05:58:41	06:25:05	17:01:42	17:28:05	17:58:10	20:34:38 10:43:25
30°	05:23:52	05:52:20	06:17:13	17:09:38	17:34:30	18:02:58	20:48:43 10:29:23
20°	05:14:26	05:40:44	06:03:34	17:23:24	17:46:14	18:12:32	21:12:42 10:05:30
N 10°	05:04:34	05:29:45	05:51:31	17:35:33	17:57:20	18:22:32	21:33:27 09:44:50
0°	04:53:40	05:18:39	05:40:07	17:47:04	18:08:33	18:33:33	21:52:50 09:25:33
S 10°	04:41:06	05:06:42	05:28:36	17:58:42	18:20:38	18:46:16	22:12:14 09:06:15
20°	04:25:48	04:53:04	05:16:12	18:11:14	18:34:25	19:01:44	22:33:02 08:45:35
30°	04:06:03	04:36:26	05:01:53	18:25:44	18:51:15	19:21:43	22:57:06 08:21:41
35°	03:53:34	04:26:19	04:53:31	18:34:12	19:01:28	19:34:21	23:11:16 08:07:38
40°	03:38:26	04:14:27	04:43:57	18:43:54	19:13:31	19:49:42	23:27:38 07:51:24
45°	03:19:27	04:00:04	04:32:41	18:55:19	19:28:06	20:08:58	23:47:13 07:31:59
S 50°	02:54:24	03:41:59	04:18:59	19:09:14	19:46:27	20:34:26	.. .. 07:07:44
52°	02:41:48	03:33:17	04:12:34	19:15:45	19:55:17	20:47:19	.. .. 06:56:02
54°	02:26:59	03:23:29	04:05:28	19:22:59	20:05:17	21:02:29	.. .. 06:42:45
56°	02:09:06	03:12:15	03:57:31	19:31:05	20:16:44	21:20:53	.. .. 06:27:23
58°	01:46:31	02:59:12	03:48:31	19:40:15	20:30:04	21:44:20	00:14:24 06:09:11
S 60°	01:15:21	02:43:43	03:38:13	19:50:45	20:45:57	22:17:24	00:36:35 05:46:51

Nov 05	SHA	Mer.pass
Venus	170° 28.7	09:39:36
Mars	344° 53.7	21:57:36
Jupiter	66° 33.6	16:32:45
Saturn	61° 28.4	16:52:47

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
04	16:27	16:26	11:43:34	02:22:06	14:47:17	19(87%)
05	16:26	16:25	11:43:35	03:13:00	15:39:09	20(80%)

06 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	06:27:22	07:54:05	09:33:33	13:52:24	15:31:44	16:58:15	
N 70°	06:20:51	07:37:38	08:58:37	14:27:25	15:48:18	17:04:55	
68°	06:15:20	07:24:27	08:33:55	14:52:13	16:01:35	17:10:33	
66°	06:10:34	07:13:34	08:14:55	15:11:18	16:12:34	17:15:26	
64°	06:06:22	07:04:22	07:59:36	15:26:41	16:21:51	17:19:44	18:08:44 14:59:43
62°	06:02:36	06:56:26	07:46:52	15:39:29	16:29:51	17:23:35	18:47:59 14:20:14
60°	05:59:12	06:49:29	07:36:02	15:50:22	16:36:52	17:27:05	19:15:16 13:52:44
N 58°	05:56:03	06:43:20	07:26:39	15:59:48	16:43:05	17:30:17	19:36:30 13:31:19
56°	05:53:09	06:37:49	07:18:25	16:08:05	16:48:39	17:33:15	19:53:55 13:13:43
54°	05:50:25	06:32:49	07:11:06	16:15:27	16:53:42	17:36:02	20:08:41 12:58:48
52°	05:47:51	06:28:14	07:04:31	16:22:04	16:58:19	17:38:40	20:21:28 12:45:51
50°	05:45:24	06:24:02	06:58:34	16:28:04	17:02:35	17:41:09	20:32:45 12:34:25
45°	05:39:43	06:14:43	06:45:46	16:40:57	17:11:58	17:46:57	20:56:12 12:10:39
N 40°	05:34:27	06:06:43	06:35:08	16:51:39	17:20:04	17:52:19	21:14:58 11:51:34
35°	05:29:26	05:59:35	06:26:02	17:00:50	17:27:16	17:57:24	21:30:41 11:35:35
30°	05:24:34	05:53:05	06:18:00	17:08:56	17:33:50	18:02:21	21:44:17 11:21:43
20°	05:14:52	05:41:12	06:04:04	17:22:59	17:45:51	18:12:11	22:07:27 10:58:05
N 10°	05:04:45	05:29:59	05:51:47	17:35:23	17:57:11	18:22:26	22:27:28 10:37:35
0°	04:53:38	05:18:39	05:40:09	17:47:07	18:08:39	18:33:40	22:46:09 10:18:25
S 10°	04:40:49	05:06:28	05:28:25	17:58:59	18:20:56	18:46:38	23:04:49 09:59:13
20°	04:25:15	04:52:35	05:15:46	18:11:46	18:34:59	19:02:22	23:24:48 09:38:36
30°	04:05:10	04:35:39	05:01:09	18:26:32	18:52:07	19:22:40	23:47:51 09:14:43
35°	03:52:28	04:25:21	04:52:37	18:35:11	19:02:32	19:35:32	.. .. 09:00:39
40°	03:37:05	04:13:15	04:42:51	18:45:04	19:14:47	19:51:07	.. .. 08:44:24
45°	03:17:45	03:58:36	04:31:21	18:56:44	19:29:38	20:10:45	.. .. 08:24:55
S 50°	02:52:11	03:40:09	04:17:22	19:10:56	19:48:21	20:36:45	00:11:45 08:00:31
52°	02:39:17	03:31:17	04:10:48	19:17:36	19:57:23	20:49:55	00:23:36 07:48:44
54°	02:24:05	03:21:15	04:03:32	19:25:00	20:07:36	21:05:29	00:37:05 07:35:19
56°	02:05:39	03:09:46	03:55:23	19:33:17	20:19:19	21:24:28	00:52:41 07:19:46
58°	01:42:09	02:56:23	03:46:10	19:42:40	20:32:59	21:48:53	01:11:14 07:01:18
S 60°	01:09:03	02:40:27	03:35:37	19:53:27	20:49:19	22:24:12	01:34:04 06:38:31

Nov 06	SHA	Mer.pass
Venus	169° 20.8	09:40:11
Mars	345° 01.6	21:53:11
Jupiter	66° 24.0	16:29:28
Saturn	61° 24.6	16:49:06

07 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	06:31:12	07:58:43	09:41:07	13:44:58	15:27:15	16:54:33	
N 70°	06:24:16	07:41:35	09:04:04	14:22:06	15:44:29	17:01:39	
68°	06:18:24	07:27:55	08:38:18	14:47:58	15:58:16	17:07:38	
66°	06:13:21	07:16:39	08:18:37	15:07:44	16:09:37	17:12:48	19:03:33 15:56:50
64°	06:08:54	07:07:08	08:02:49	15:23:36	16:19:13	17:17:21	19:44:51 15:15:00
62°	06:04:55	06:58:57	07:49:43	15:36:45	16:27:28	17:21:24	20:12:55 14:46:25
60°	06:01:19	06:51:47	07:38:36	15:47:56	16:34:42	17:25:05	20:34:28 14:24:25
N 58°	05:58:01	06:45:26	07:28:59	15:57:36	16:41:06	17:28:27	20:51:59 14:06:29
56°	05:54:58	06:39:45	07:20:32	16:06:05	16:46:50	17:31:34	21:06:42 13:51:22
54°	05:52:07	06:34:36	07:13:03	16:13:38	16:52:02	17:34:28	21:19:22 13:38:20
52°	05:49:25	06:29:54	07:06:19	16:20:24	16:56:47	17:37:13	21:30:28 13:26:53
50°	05:46:52	06:25:34	07:00:14	16:26:32	17:01:09	17:39:49	21:40:20 13:16:42
45°	05:40:57	06:16:01	06:47:08	16:39:42	17:10:48	17:45:51	22:01:00 12:55:17
N 40°	05:35:29	06:07:48	06:36:17	16:50:38	17:19:06	17:51:24	22:17:41 12:37:56
35°	05:30:18	06:00:30	06:26:59	17:00:00	17:26:29	17:56:40	22:31:44 12:23:17
30°	05:25:17	05:53:50	06:18:48	17:08:15	17:33:13	18:01:46	22:43:55 12:10:31
20°	05:15:19	05:41:41	06:04:35	17:22:35	17:45:29	18:11:51	23:04:43 11:48:41
N 10°	05:04:57	05:30:13	05:52:03	17:35:13	17:57:04	18:22:20	23:22:44 11:29:39
0°	04:53:37	05:18:40	05:40:12	17:47:11	18:08:44	18:33:49	23:39:32 11:11:49
S 10°	04:40:33	05:06:16	05:28:14	17:59:16	18:21:16	18:47:00	23:56:18 10:53:55
20°	04:24:43	04:52:07	05:15:20	18:12:18	18:35:33	19:03:00	.. .. 10:34:40
30°	04:04:19	04:34:53	05:00:27	18:27:21	18:52:59	19:23:38	.. .. 10:12:24
35°	03:51:24	04:24:24	04:51:45	18:36:10	19:03:35	19:36:42	00:01:22 09:59:18
40°	03:35:45	04:12:05	04:41:47	18:46:15	19:16:03	19:52:34	00:16:56 09:44:10
45°	03:16:04	03:57:09	04:30:03	18:58:08	19:31:11	20:12:32	00:35:29 09:26:06
S 50°	02:49:59	03:38:22	04:15:46	19:12:39	19:50:16	20:39:04	00:58:32 09:03:35
52°	02:36:47	03:29:18	04:09:03	19:19:27	19:59:29	20:52:33	01:09:35 08:52:46
54°	02:21:11	03:19:03	04:01:37	19:27:01	20:09:55	21:08:32	01:22:04 08:40:31
56°	02:02:10	03:07:17	03:53:18	19:35:29	20:21:54	21:28:07	01:36:25 08:26:26
58°	01:37:42	02:53:34	03:43:51	19:45:06	20:35:55	21:53:35	01:53:14 08:09:54
S 60°	01:02:22	02:37:12	03:33:01	19:56:09	20:52:43	22:31:31	02:13:32 07:49:54

Nov 07	SHA	Mer.pass
Venus	168° 12.9	09:40:46
Mars	345° 08.7	21:48:50
Jupiter	66° 14.2	16:26:11
Saturn	61° 20.8	16:45:26

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
06	16:23	16:22	11:43:38	04:05:36	16:32:16	21(71%)
07	16:20	16:19	11:43:41	04:59:00	17:25:41	22(61%)

# 2020 November 08 to Nov. 09

08 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:35:01	08:03:21	09:49:03	13:37:12	15:22:46	16:50:55	☐ ☐
N 70°	06:27:39	07:45:33	09:09:37	14:16:43	15:40:42	16:58:26	19:37:42 17:15:12
68°	06:21:26	07:31:22	08:42:43	14:43:43	15:54:58	17:04:46	20:32:55 16:18:54
66°	06:16:06	07:19:43	08:22:20	15:04:10	16:06:43	17:10:13	21:05:48 15:45:03
64°	06:11:24	07:09:53	08:06:03	15:20:31	16:16:37	17:15:00	21:29:45 15:20:14
62°	06:07:13	07:01:27	07:52:35	15:34:03	16:25:08	17:19:16	21:48:35 15:00:36
60°	06:03:26	06:54:04	07:41:10	15:45:32	16:32:34	17:23:07	22:04:02 14:44:26
N 58°	05:59:59	06:47:32	07:31:18	15:55:26	16:39:09	17:26:39	22:17:04 14:30:44
56°	05:56:47	06:41:41	07:22:40	16:04:07	16:45:03	17:29:54	22:28:18 14:18:54
54°	05:53:48	06:36:24	07:14:59	16:11:50	16:50:24	17:32:57	22:38:08 14:08:29
52°	05:50:59	06:31:34	07:08:07	16:18:45	16:55:16	17:35:48	22:46:52 13:59:14
50°	05:48:20	06:27:07	07:01:53	16:25:01	16:59:46	17:38:31	22:54:41 13:50:54
45°	05:42:10	06:17:19	06:48:31	16:38:28	17:09:40	17:44:46	23:11:17 13:33:10
N 40°	05:36:31	06:08:53	06:37:26	16:49:37	17:18:10	17:50:31	23:24:50 13:18:37
35°	05:31:10	06:01:24	06:27:57	16:59:11	17:25:43	17:55:57	23:36:18 13:06:13
30°	05:25:59	05:54:35	06:19:36	17:07:36	17:32:36	18:01:12	23:46:19 12:55:22
20°	05:15:46	05:42:10	06:05:07	17:22:12	17:45:09	18:11:33	.. .. 12:36:39
N 10°	05:05:10	05:30:28	05:52:20	17:35:05	17:56:57	18:22:16	.. .. 12:20:16
0°	04:53:36	05:18:41	05:40:16	17:47:16	18:08:51	18:33:58	.. .. 12:04:52
S 10°	04:40:19	05:06:04	05:28:04	17:59:34	18:21:36	18:47:24	.. .. 11:49:23
20°	04:24:13	04:51:40	05:14:56	18:12:50	18:36:09	19:03:39	00:14:12 11:32:44
30°	04:03:29	04:34:08	04:59:46	18:28:10	18:53:52	19:24:37	00:34:45 11:13:30
35°	03:50:22	04:23:29	04:50:54	18:37:09	19:04:39	19:37:53	00:46:44 11:02:13
40°	03:34:27	04:10:57	04:40:44	18:47:26	19:17:20	19:54:00	01:00:28 10:49:15
45°	03:14:25	03:55:45	04:28:46	18:59:33	19:32:44	20:14:19	01:16:42 10:33:51
S 50°	02:47:48	03:36:35	04:14:11	19:14:21	19:52:10	20:41:23	01:36:37 10:14:51
52°	02:34:17	03:27:21	04:07:21	19:21:18	20:01:34	20:55:11	01:46:04 10:05:50
54°	02:18:17	03:16:52	03:59:45	19:29:01	20:12:14	21:11:36	01:56:37 09:55:42
56°	01:58:39	03:04:51	03:51:14	19:37:41	20:24:29	21:31:49	02:08:35 09:44:13
58°	01:33:09	02:50:47	03:41:34	19:47:31	20:38:52	21:58:25	02:22:20 09:30:57
S 60°	00:55:10	02:33:56	03:30:28	19:58:51	20:56:08	22:39:34	02:38:29 09:15:21

Nov 08	SHA	Mer.pass
Venus	167° 04.8	09:41:22
Mars	345° 15.1	21:44:31
Jupiter	66° 04.4	16:22:55
Saturn	61° 16.9	16:41:46

09 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:38:48	08:08:01	09:57:24	13:29:03	15:18:19	16:47:20	21:49:55 16:54:05
N 70°	06:31:00	07:49:30	09:15:17	14:11:15	15:36:56	16:55:17	22:21:32 16:20:40
68°	06:24:28	07:34:49	08:47:11	14:39:26	15:51:43	17:01:57	22:44:22 15:56:17
66°	06:18:50	07:22:47	08:26:04	15:00:37	16:03:51	17:07:41	23:02:04 15:37:13
64°	06:13:54	07:12:38	08:09:17	15:17:29	16:14:03	17:12:42	23:16:22 15:21:42
62°	06:09:30	07:03:56	07:55:26	15:31:23	16:22:50	17:17:10	23:28:15 15:08:43
60°	06:05:33	06:56:21	07:43:43	15:43:09	16:30:29	17:21:12	23:38:22 14:57:36
N 58°	06:01:56	06:49:38	07:33:37	15:53:18	16:37:15	17:24:54	23:47:06 14:47:57
56°	05:58:35	06:43:37	07:24:46	16:02:12	16:43:19	17:28:17	23:54:46 14:39:27
54°	05:55:28	06:38:11	07:16:56	16:10:05	16:48:48	17:31:27	.. .. 14:31:52
52°	05:52:33	06:33:13	07:09:54	16:17:09	16:53:48	17:34:26	.. .. 14:25:02
50°	05:49:47	06:28:39	07:03:32	16:23:33	16:58:24	17:37:14	.. .. 14:18:51
45°	05:43:24	06:18:36	06:49:53	16:37:17	17:08:33	17:43:44	.. .. 14:05:30
N 40°	05:37:33	06:09:58	06:38:36	16:48:39	17:17:16	17:49:40	.. .. 13:54:25
35°	05:32:02	06:02:19	06:28:55	16:58:23	17:24:59	17:55:16	.. .. 13:44:54
30°	05:26:42	05:55:21	06:20:24	17:06:58	17:32:01	18:00:39	.. .. 13:36:30
20°	05:16:13	05:42:40	06:05:38	17:21:50	17:44:49	18:11:16	00:03:28 13:21:57
N 10°	05:05:24	05:30:44	05:52:38	17:34:57	17:56:52	18:22:13	00:18:22 13:09:09
0°	04:53:36	05:18:44	05:40:20	17:47:21	18:08:59	18:34:08	00:32:16 12:57:04
S 10°	04:40:05	05:05:53	05:27:55	17:59:53	18:21:57	18:47:47	00:46:07 12:44:54
20°	04:23:44	04:51:15	05:14:33	18:13:23	18:36:44	19:04:19	01:00:52 12:31:50
30°	04:02:40	04:33:25	04:59:06	18:29:00	18:54:45	19:25:35	01:17:43 12:16:46
35°	03:49:21	04:22:35	04:50:04	18:38:08	19:05:43	19:39:04	01:27:30 12:07:58
40°	03:33:10	04:09:50	04:39:43	18:48:36	19:18:37	19:55:27	01:38:37 11:57:54
45°	03:12:47	03:54:22	04:27:32	19:00:58	19:34:17	20:16:07	01:51:40 11:46:02
S 50°	02:45:39	03:34:51	04:12:39	19:16:03	19:54:05	20:43:43	02:07:28 11:31:32
52°	02:31:49	03:25:25	04:05:40	19:23:09	20:03:40	20:57:51	02:14:51 11:24:44
54°	02:15:22	03:14:43	03:57:54	19:31:02	20:14:33	21:14:41	02:23:02 11:17:11
56°	01:55:07	03:02:25	03:49:12	19:39:53	20:27:05	21:35:35	02:32:11 11:08:42
58°	01:28:29	02:48:00	03:39:19	19:49:57	20:41:49	22:03:25	02:42:32 10:59:04
S 60°	00:47:18	02:30:41	03:27:56	20:01:33	20:59:35	22:48:36	02:54:23 10:47:59

Nov 09	SHA	Mer.pass
Venus	165° 56.6	09:41:58
Mars	345° 20.7	21:40:16
Jupiter	65° 54.4	16:19:39
Saturn	61° 12.8	16:38:06

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
08	16:17	16:14	11:43:46	05:52:14	18:18:35	23(51%)
09	16:12	16:09	11:43:51	06:44:42	19:10:35	24(40%)

10 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:42:34	08:12:41	10:06:17	13:20:23	15:13:52	16:43:49	16:10:18
N 70°	06:34:21	07:53:28	09:21:04	14:05:42	15:33:12	16:52:10	15:54:15
68°	06:27:27	07:38:16	08:51:41	14:35:10	15:48:29	16:59:11	15:41:19
66°	06:21:33	07:25:50	08:29:49	14:57:06	16:01:01	17:05:11	15:30:37
64°	06:16:22	07:15:23	08:12:31	15:14:28	16:11:32	17:10:27	15:21:34
62°	06:11:47	07:06:25	07:58:17	15:28:45	16:20:34	17:15:08	15:13:47
60°	06:07:38	06:58:37	07:46:16	15:40:49	16:28:26	17:19:20	15:07:00
N 58°	06:03:51	06:51:42	07:35:56	15:51:12	16:35:23	17:23:11	15:01:00
56°	06:00:23	06:45:32	07:26:53	16:00:18	16:41:37	17:26:43	14:55:40
54°	05:57:08	06:39:57	07:18:52	16:08:21	16:47:14	17:30:00	00:01:35
52°	05:54:06	06:34:52	07:11:41	16:15:35	16:52:22	17:33:05	00:07:41
50°	05:51:14	06:30:11	07:05:11	16:22:06	16:57:05	17:36:00	00:13:12
45°	05:44:37	06:19:53	06:51:16	16:36:07	17:07:28	17:42:43	00:25:01
N 40°	05:38:35	06:11:03	06:39:45	16:47:42	17:16:23	17:48:51	00:34:46
35°	05:32:54	06:03:14	06:29:53	16:57:37	17:24:16	17:54:36	00:43:05
30°	05:27:26	05:56:07	06:21:13	17:06:22	17:31:27	18:00:08	00:50:23
20°	05:16:41	05:43:10	06:06:11	17:21:30	17:44:31	18:11:00	01:02:55
N 10°	05:05:38	05:31:01	05:52:57	17:34:51	17:56:47	18:22:10	01:13:51
0°	04:53:37	05:18:47	05:40:26	17:47:28	18:09:07	18:34:19	01:24:04
S 10°	04:39:52	05:05:43	05:27:48	18:00:12	18:22:19	18:48:12	01:34:15
20°	04:23:16	04:50:50	05:14:12	18:13:57	18:37:20	19:04:58	01:45:04
30°	04:01:53	04:32:43	04:58:28	18:29:50	18:55:39	19:26:34	01:57:22
35°	03:48:21	04:21:42	04:49:16	18:39:08	19:06:47	19:40:15	02:04:28
40°	03:31:55	04:08:45	04:38:44	18:49:47	19:19:53	19:56:53	02:12:30
45°	03:11:11	03:53:01	04:26:19	19:02:22	19:35:49	20:17:55	02:21:51
S 50°	02:43:30	03:33:08	04:11:09	19:17:45	19:55:59	20:46:04	02:33:04
52°	02:29:21	03:23:31	04:04:01	19:24:59	20:05:46	21:00:31	02:38:15
54°	02:12:29	03:12:36	03:56:05	19:33:02	20:16:52	21:17:49	02:43:57
56°	01:51:33	03:00:01	03:47:12	19:42:05	20:29:41	21:39:24	02:50:15
58°	01:23:41	02:45:15	03:37:05	19:52:22	20:44:47	22:08:35	02:57:18
S 60°	00:38:28	02:27:26	03:25:26	20:04:15	21:03:04	22:59:13	03:05:15

Nov 10	SHA	Mer.pass
Venus	164° 48.3	09:42:35
Mars	345° 25.6	21:36:03
Jupiter	65° 44.2	16:16:24
Saturn	61° 08.7	16:34:27

11 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:46:18	08:17:22	10:15:51	13:11:04	15:09:26	16:40:21	00:22:24
N 70°	06:37:39	07:57:25	09:26:58	14:00:02	15:29:30	16:49:07	00:35:58
68°	06:30:26	07:41:42	08:56:13	14:30:52	15:45:19	16:56:28	00:46:45
66°	06:24:14	07:28:52	08:33:35	14:53:35	15:58:13	17:02:45	00:55:36
64°	06:18:50	07:18:06	08:15:45	15:11:28	16:09:03	17:08:15	01:03:00
62°	06:14:02	07:08:53	08:01:08	15:26:09	16:18:20	17:13:07	01:09:19
60°	06:09:43	07:00:52	07:48:49	15:38:30	16:26:25	17:17:31	01:14:47
N 58°	06:05:47	06:53:47	07:38:14	15:49:08	16:33:34	17:21:30	01:19:35
56°	06:02:09	06:47:27	07:28:59	15:58:26	16:39:57	17:25:11	01:23:50
54°	05:58:48	06:41:43	07:20:48	16:06:40	16:45:42	17:28:35	01:27:38
52°	05:55:39	06:36:30	07:13:28	16:14:02	16:50:58	17:31:47	01:31:04
50°	05:52:40	06:31:43	07:06:50	16:20:42	16:55:48	17:34:48	01:34:11
45°	05:45:50	06:21:11	06:52:38	16:34:59	17:06:25	17:41:44	01:40:55
N 40°	05:39:37	06:12:09	06:40:54	16:46:47	17:15:32	17:48:03	01:46:31
35°	05:33:46	06:04:09	06:30:52	16:56:53	17:23:35	17:53:58	01:51:20
30°	05:28:09	05:56:53	06:22:02	17:05:47	17:30:55	17:59:39	01:55:33
20°	05:17:10	05:43:41	06:06:44	17:21:11	17:44:14	18:10:46	02:02:52
N 10°	05:05:53	05:31:18	05:53:16	17:34:45	17:56:44	18:22:09	02:09:15
0°	04:53:39	05:18:52	05:40:32	17:47:35	18:09:17	18:34:30	02:15:14
S 10°	04:39:41	05:05:34	05:27:41	18:00:33	18:22:41	18:48:37	02:21:12
20°	04:22:49	04:50:27	05:13:51	18:14:31	18:37:57	19:05:39	02:27:32
30°	04:01:07	04:32:02	04:57:51	18:30:40	18:56:33	19:27:33	02:34:44
35°	03:47:23	04:20:51	04:48:30	18:40:07	19:07:51	19:41:27	02:38:52
40°	03:30:41	04:07:41	04:37:47	18:50:58	19:21:10	19:58:20	02:43:32
45°	03:09:36	03:51:41	04:25:07	19:03:47	19:37:22	20:19:43	02:48:56
S 50°	02:41:23	03:31:27	04:09:40	19:19:27	19:57:54	20:48:24	02:55:22
52°	02:26:55	03:21:39	04:02:24	19:26:49	20:07:51	21:03:11	02:58:19
54°	02:09:35	03:10:30	03:54:19	19:35:02	20:19:11	21:20:57	03:01:33
56°	01:47:57	02:57:39	03:45:13	19:44:16	20:32:17	21:43:17	03:05:06
58°	01:18:44	02:42:30	03:34:54	19:54:47	20:47:45	22:13:58	03:09:03
S 60°	00:28:04	02:24:11	03:22:58	20:06:56	21:06:34	23:13:00	03:13:28

Nov 11	SHA	Mer.pass
Venus	163° 39.9	09:43:13
Mars	345° 29.7	21:31:54
Jupiter	65° 34.0	16:13:09
Saturn	61° 04.6	16:30:48

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
10	16:06	16:03	11:43:57	07:36:16	20:01:50	25(29%)
11	16:00	15:56	11:44:04	08:27:20	20:52:54	26(19%)

12 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:50:00	08:22:04	10:26:21	13:00:51	15:05:01	16:36:56	02:41:57
N 70°	06:40:56	08:01:22	09:33:01	13:54:16	15:25:50	16:46:07	02:44:40
68°	06:33:22	07:45:07	09:00:48	14:26:34	15:42:10	16:53:48	02:46:53
66°	06:26:54	07:31:54	08:37:21	14:50:05	15:55:29	17:00:22	02:48:44
64°	06:21:16	07:20:49	08:18:59	15:08:31	16:06:37	17:06:06	02:50:18
62°	06:16:16	07:11:21	08:03:59	15:23:34	16:16:09	17:11:10	02:51:39
60°	06:11:46	07:03:06	07:51:22	15:36:14	16:24:27	17:15:44	02:52:50
N 58°	06:07:41	06:55:50	07:40:32	15:47:07	16:31:46	17:19:52	02:53:52
56°	06:03:56	06:49:21	07:31:05	15:56:37	16:38:19	17:23:41	02:54:48
54°	06:00:27	06:43:29	07:22:43	16:05:01	16:44:13	17:27:13	02:55:38
52°	05:57:11	06:38:09	07:15:14	16:12:32	16:49:36	17:30:31	02:56:23
50°	05:54:06	06:33:14	07:08:28	16:19:20	16:54:33	17:33:38	02:57:04
45°	05:47:03	06:22:27	06:54:00	16:33:52	17:05:24	17:40:47	02:58:34
N 40°	05:40:38	06:13:14	06:42:03	16:45:54	17:14:43	17:47:17	02:59:49
35°	05:34:38	06:05:04	06:31:50	16:56:11	17:22:56	17:53:22	03:00:54
30°	05:28:53	05:57:39	06:22:51	17:05:13	17:30:25	17:59:11	03:01:52
20°	05:17:39	05:44:12	06:07:17	17:20:53	17:43:59	18:10:32	03:03:32
N 10°	05:06:09	05:31:36	05:53:35	17:34:41	17:56:42	18:22:09	03:05:01
0°	04:53:42	05:18:57	05:40:39	17:47:44	18:09:27	18:34:43	03:06:25
S 10°	04:39:30	05:05:27	05:27:36	18:00:54	18:23:04	18:49:03	03:07:50
20°	04:22:23	04:50:05	05:13:32	18:15:05	18:38:34	19:06:19	03:09:21
30°	04:00:23	04:31:24	04:57:16	18:31:30	18:57:26	19:28:33	03:11:05
35°	03:46:27	04:20:02	04:47:45	18:41:07	19:08:55	19:42:38	03:12:05
40°	03:29:30	04:06:39	04:36:51	18:52:09	19:22:27	19:59:47	03:13:14
45°	03:08:03	03:50:23	04:23:58	19:05:11	19:38:55	20:21:31	03:14:32
S 50°	02:39:18	03:29:48	04:08:14	19:21:08	19:59:48	20:50:45	03:16:06
52°	02:24:29	03:19:48	04:00:49	19:28:39	20:09:56	21:05:53	03:16:50
54°	02:06:41	03:08:26	03:52:34	19:37:01	20:21:30	21:24:08	03:17:37
56°	01:44:19	02:55:18	03:43:18	19:46:27	20:34:54	21:47:15	03:18:29
58°	01:13:37	02:39:47	03:32:44	19:57:11	20:50:44	22:19:35	03:19:26
S 60°	00:14:32	02:20:57	03:20:32	20:09:37	21:10:05	—:—	03:20:30

Nov 12	SHA	Mer.pass
Venus	162° 31.3	09:43:51
Mars	345° 33.0	21:27:48
Jupiter	65° 23.6	16:09:55
Saturn	61° 00.3	16:27:09

13 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:53:40	08:26:47	10:38:13	12:49:18	15:00:37	16:33:35	05:02:34
N 70°	06:44:12	08:05:18	09:39:14	13:48:22	15:22:12	16:43:11	04:55:08
68°	06:36:18	07:48:32	09:05:25	14:22:15	15:39:04	16:51:12	04:49:06
66°	06:29:33	07:34:54	08:41:08	14:46:37	15:52:47	16:58:02	04:44:07
64°	06:23:40	07:23:31	08:22:13	15:05:35	16:04:14	17:03:59	04:39:55
62°	06:18:29	07:13:47	08:06:49	15:21:02	16:14:01	17:09:16	04:36:18
60°	06:13:49	07:05:20	07:53:54	15:34:00	16:22:32	17:13:59	04:33:10
N 58°	06:09:34	06:57:53	07:42:49	15:45:08	16:30:02	17:18:17	04:30:25
56°	06:05:41	06:51:14	07:33:10	15:54:49	16:36:44	17:22:14	04:27:58
54°	06:02:05	06:45:14	07:24:38	16:03:24	16:42:46	17:25:53	04:25:47
52°	05:58:42	06:39:46	07:17:00	16:11:04	16:48:16	17:29:18	04:23:48
50°	05:55:32	06:34:45	07:10:07	16:17:59	16:53:19	17:32:31	04:22:00
45°	05:48:16	06:23:44	06:55:22	16:32:48	17:04:25	17:39:53	04:18:07
N 40°	05:41:40	06:14:19	06:43:12	16:45:02	17:13:55	17:46:33	04:14:53
35°	05:35:31	06:05:59	06:32:49	16:55:30	17:22:18	17:52:47	04:12:07
30°	05:29:37	05:58:26	06:23:40	17:04:42	17:29:56	17:58:44	04:09:42
20°	05:18:08	05:44:44	06:07:51	17:20:37	17:43:45	18:10:20	04:05:32
N 10°	05:06:25	05:31:54	05:53:56	17:34:38	17:56:40	18:22:10	04:01:56
0°	04:53:46	05:19:03	05:40:47	17:47:53	18:09:38	18:34:56	03:58:35
S 10°	04:39:21	05:05:20	05:27:31	18:01:15	18:23:28	18:49:29	03:55:16
20°	04:21:59	04:49:45	05:13:14	18:15:40	18:39:11	19:07:00	03:51:48
30°	03:59:40	04:30:46	04:56:43	18:32:21	18:58:21	19:29:33	03:47:54
35°	03:45:32	04:19:14	04:47:02	18:42:07	19:09:59	19:43:50	03:45:41
40°	03:28:20	04:05:39	04:35:57	18:53:20	19:23:44	20:01:14	03:43:11
45°	03:06:32	03:49:08	04:22:51	19:06:35	19:40:27	20:23:18	03:40:19
S 50°	02:37:14	03:28:10	04:06:49	19:22:49	20:01:41	20:53:07	03:36:55
52°	02:22:05	03:18:00	03:59:16	19:30:28	20:12:02	21:08:34	03:35:22
54°	02:03:48	03:06:24	03:50:51	19:39:00	20:23:49	21:27:19	03:33:40
56°	01:40:39	02:52:58	03:41:24	19:48:37	20:37:30	21:51:16	03:31:49
58°	01:08:16	02:37:05	03:30:37	19:59:35	20:53:44	22:25:29	03:29:46
S 60°	—:—	02:17:43	03:18:08	20:12:18	21:13:37	—:—	03:27:29

Nov 13	SHA	Mer.pass
Venus	161° 22.6	09:44:29
Mars	345° 35.5	21:23:44
Jupiter	65° 13.1	16:06:41
Saturn	60° 55.9	16:23:31

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
12	15:53	15:49	11:44:11	09:18:38	21:44:41	27(11%)
13	15:45	15:40	11:44:20	10:11:10	22:38:11	28(5%)



14 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	06:57:19	08:31:31	10:52:20	12:35:32	14:56:15	16:30:18	07:35:50
N 70°	06:47:25	08:09:15	09:45:37	13:42:19	15:18:37	16:40:18	07:14:18
68°	06:39:11	07:51:55	09:10:05	14:17:55	15:36:01	16:48:39	06:57:46
66°	06:32:10	07:37:54	08:44:55	14:43:09	15:50:07	16:55:45	06:44:33
64°	06:26:04	07:26:11	08:25:27	15:02:41	16:01:53	17:01:56	06:33:39
62°	06:20:40	07:16:13	08:09:38	15:18:33	16:11:56	17:07:24	06:24:28
60°	06:15:50	07:07:33	07:56:25	15:31:49	16:20:39	17:12:18	06:16:35
N 58°	06:11:27	06:59:55	07:45:06	15:43:11	16:28:20	17:16:45	06:09:43
56°	06:07:26	06:53:06	07:35:14	15:53:05	16:35:11	17:20:49	06:03:41
54°	06:03:42	06:46:58	07:26:32	16:01:49	16:41:22	17:24:35	05:58:18
52°	06:00:13	06:41:23	07:18:45	16:09:38	16:46:59	17:28:07	05:53:27
50°	05:56:57	06:36:16	07:11:44	16:16:41	16:52:09	17:31:25	05:49:04
45°	05:49:28	06:25:01	06:56:44	16:31:46	17:03:28	17:39:00	05:39:39
N 40°	05:42:42	06:15:24	06:44:21	16:44:13	17:13:09	17:45:51	05:31:52
35°	05:36:23	06:06:55	06:33:47	16:54:50	17:21:43	17:52:14	05:25:14
30°	05:30:21	05:59:13	06:24:30	17:04:11	17:29:28	17:58:20	05:19:25
20°	05:18:38	05:45:16	06:08:25	17:20:22	17:43:32	18:10:10	05:09:25
N 10°	05:06:42	05:32:13	05:54:17	17:34:36	17:56:40	18:22:12	05:00:45
0°	04:53:51	05:19:10	05:40:56	17:48:03	18:09:50	18:35:11	04:52:41
S 10°	04:39:13	05:05:14	05:27:28	18:01:37	18:23:52	18:49:56	04:44:41
20°	04:21:36	04:49:25	05:12:57	18:16:15	18:39:49	19:07:42	04:36:14
30°	03:58:58	04:30:10	04:56:10	18:33:11	18:59:15	19:30:32	04:26:42
35°	03:44:38	04:18:28	04:46:21	18:43:06	19:11:04	19:45:01	04:21:15
40°	03:27:11	04:04:41	04:35:05	18:54:30	19:25:00	20:02:40	04:15:05
45°	03:05:03	03:47:54	04:21:45	19:07:58	19:41:59	20:25:06	04:07:58
S 50°	02:35:11	03:26:35	04:05:27	19:24:30	20:03:35	20:55:28	03:59:29
52°	02:19:41	03:16:13	03:57:45	19:32:17	20:14:06	21:11:17	03:55:35
54°	02:00:55	03:04:24	03:49:11	19:40:59	20:26:08	21:30:33	03:51:19
56°	01:36:56	02:50:41	03:39:32	19:50:47	20:40:06	21:55:21	03:46:37
58°	01:02:41	02:34:25	03:28:32	20:01:59	20:56:43	22:31:44	03:41:24
S 60°	—:—	02:14:29	03:15:46	20:14:58	21:17:11	—:—	03:35:33

Nov 14	SHA	Mer.pass
Venus	160° 13.8	09:45:08
Mars	345° 37.3	21:19:44
Jupiter	65° 02.5	16:03:28
Saturn	60° 51.5	16:19:53

15 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:00:55	08:36:15	11:11:27	12:16:46	14:51:53	16:27:04	11:19:47
N 70°	06:50:37	08:13:10	09:52:14	13:36:05	15:15:03	16:37:29	09:57:25
68°	06:42:03	07:55:18	09:14:48	14:13:34	15:33:00	16:46:09	09:19:11
66°	06:34:46	07:40:52	08:48:43	14:39:44	15:47:31	16:53:32	08:52:42
64°	06:28:26	07:28:51	08:28:40	14:59:50	15:59:36	16:59:56	08:32:27
62°	06:22:51	07:18:37	08:12:27	15:16:05	16:09:53	17:05:36	08:16:10
60°	06:17:50	07:09:45	07:58:56	15:29:40	16:18:49	17:10:39	08:02:37
N 58°	06:13:18	07:01:56	07:47:22	15:41:16	16:26:40	17:15:15	07:51:05
56°	06:09:09	06:54:58	07:37:18	15:51:22	16:33:41	17:19:27	07:41:05
54°	06:05:19	06:48:42	07:28:26	16:00:17	16:39:59	17:23:20	07:32:17
52°	06:01:44	06:43:00	07:20:30	16:08:15	16:45:44	17:26:58	07:24:27
50°	05:58:21	06:37:45	07:13:21	16:15:25	16:51:00	17:30:22	07:17:25
45°	05:50:40	06:26:17	06:58:05	16:30:46	17:02:34	17:38:09	07:02:28
N 40°	05:43:43	06:16:29	06:45:30	16:43:25	17:12:26	17:45:11	06:50:13
35°	05:37:15	06:07:50	06:34:46	16:54:13	17:21:08	17:51:43	06:39:51
30°	05:31:05	05:59:59	06:25:19	17:03:43	17:29:02	17:57:56	06:30:48
20°	05:19:08	05:45:48	06:09:00	17:20:08	17:43:20	18:10:00	06:15:20
N 10°	05:07:00	05:32:33	05:54:39	17:34:35	17:56:41	18:22:15	06:01:55
0°	04:53:56	05:19:18	05:41:06	17:48:14	18:10:03	18:35:26	05:49:27
S 10°	04:39:05	05:05:10	05:27:26	18:02:00	18:24:17	18:50:24	05:37:04
20°	04:21:14	04:49:07	05:12:42	18:16:51	18:40:28	19:08:24	05:23:58
30°	03:58:19	04:29:36	04:55:40	18:34:02	19:00:09	19:31:32	05:09:05
35°	03:43:47	04:17:44	04:45:41	18:44:06	19:12:08	19:46:13	05:00:31
40°	03:26:05	04:03:45	04:34:14	18:55:41	19:26:17	20:04:07	04:50:47
45°	03:03:36	03:46:42	04:20:42	19:09:22	19:43:31	20:26:53	04:39:28
S 50°	02:33:10	03:25:02	04:04:07	19:26:10	20:05:28	20:57:49	04:25:50
52°	02:17:19	03:14:29	03:56:17	19:34:06	20:16:11	21:14:00	04:19:31
54°	01:58:02	03:02:26	03:47:33	19:42:57	20:28:26	21:33:47	04:12:33
56°	01:33:11	02:48:26	03:37:43	19:52:56	20:42:42	21:59:32	04:04:48
58°	00:56:47	02:31:46	03:26:29	20:04:21	20:59:43	22:38:25	03:56:06
S 60°	—:—	02:11:16	03:13:27	20:17:38	21:20:46	—:—	03:46:15

Nov 15	SHA	Mer.pass
Venus	159° 04.7	09:45:48
Mars	345° 38.3	21:15:47
Jupiter	64° 51.7	16:00:15
Saturn	60° 47.0	16:16:15

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
14	15:36	15:31	11:44:29	11:05:51	23:34:14	29(1%)
15	15:26	15:20	11:44:40	12:03:20	—:—	0(0%)

16 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:04:29	08:41:00	■	■	14:47:32	16:23:54	■
N 70°	06:53:46	08:17:05	09:59:04	13:29:38	15:11:33	16:34:44	■
68°	06:44:53	07:58:40	09:19:33	14:09:13	15:30:03	16:43:43	12:37:00
66°	06:37:19	07:43:49	08:52:31	14:36:19	15:44:57	16:51:22	11:12:07
64°	06:30:46	07:31:29	08:31:53	14:57:00	15:57:21	16:57:59	10:34:36
62°	06:25:00	07:21:00	08:15:16	15:13:40	16:07:53	17:03:50	10:08:11
60°	06:19:50	07:11:55	08:01:25	15:27:33	16:17:01	17:09:04	09:47:38
N 58°	06:15:09	07:03:56	07:49:37	15:39:24	16:25:03	17:13:48	09:30:50
56°	06:10:52	06:56:49	07:39:21	15:49:42	16:32:13	17:18:08	09:16:40
54°	06:06:54	06:50:25	07:30:19	15:58:47	16:38:40	17:22:08	09:04:26
52°	06:03:13	06:44:35	07:22:14	16:06:53	16:44:31	17:25:51	08:53:42
50°	05:59:45	06:39:15	07:14:58	16:14:12	16:49:54	17:29:22	08:44:10
45°	05:51:51	06:27:33	06:59:26	16:29:48	17:01:41	17:37:21	08:24:09
N 40°	05:44:44	06:17:33	06:46:39	16:42:39	17:11:44	17:44:32	08:07:58
35°	05:38:08	06:08:45	06:35:44	16:53:37	17:20:36	17:51:13	07:54:22
30°	05:31:50	06:00:47	06:26:09	17:03:15	17:28:38	17:57:34	07:42:34
20°	05:19:39	05:46:21	06:09:35	17:19:55	17:43:10	18:09:52	07:22:29
N 10°	05:07:18	05:32:53	05:55:01	17:34:35	17:56:43	18:22:19	07:05:07
0°	04:54:02	05:19:26	05:41:16	17:48:25	18:10:16	18:35:42	06:48:59
S 10°	04:38:59	05:05:07	05:27:24	18:02:23	18:24:43	18:50:52	06:32:56
20°	04:20:54	04:48:51	05:12:28	18:17:27	18:41:06	19:09:06	06:15:53
30°	03:57:41	04:29:03	04:55:11	18:34:53	19:01:04	19:32:32	05:56:24
35°	03:42:57	04:17:02	04:45:03	18:45:06	19:13:13	19:47:24	05:45:06
40°	03:25:00	04:02:50	04:33:26	18:56:51	19:27:33	20:05:33	05:32:11
45°	03:02:10	03:45:32	04:19:41	19:10:45	19:45:02	20:28:41	05:17:00
S 50°	02:31:11	03:23:31	04:02:49	19:27:49	20:07:20	21:00:10	04:58:28
52°	02:14:59	03:12:47	03:54:51	19:35:53	20:18:14	21:16:42	04:49:46
54°	01:55:10	03:00:30	03:45:58	19:44:54	20:30:43	21:37:03	04:40:04
56°	01:29:23	02:46:12	03:35:56	19:55:04	20:45:17	22:03:47	04:29:08
58°	00:50:28	02:29:09	03:24:29	20:06:43	21:02:43	22:45:40	04:16:41
S 60°	—:—	02:08:03	03:11:10	20:20:17	21:24:23	—:—	04:02:13

Nov 16	SHA	Mer.pass
Venus	157° 55.5	09:46:29
Mars	345° 38.5	21:11:53
Jupiter	64° 40.9	15:57:03
Saturn	60° 42.4	16:12:38

17 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:08:01	08:45:46	■	■	14:43:12	16:20:48	■
N 70°	06:56:54	08:20:59	10:06:12	13:22:55	15:08:04	16:32:02	■
68°	06:47:41	08:02:00	09:24:22	14:04:49	15:27:08	16:41:21	■
66°	06:39:52	07:46:45	08:56:19	14:32:56	15:42:27	16:49:15	■
64°	06:33:05	07:34:06	08:35:05	14:54:13	15:55:09	16:56:06	12:31:22
62°	06:27:07	07:23:22	08:18:03	15:11:18	16:05:56	17:02:08	11:50:41
60°	06:21:47	07:14:05	08:03:54	15:25:30	16:15:17	17:07:31	11:22:46
N 58°	06:16:58	07:05:55	07:51:51	15:37:35	16:23:29	17:12:23	11:01:09
56°	06:12:34	06:58:39	07:41:23	15:48:05	16:30:48	17:16:51	10:43:29
54°	06:08:29	06:52:07	07:32:11	15:57:20	16:37:22	17:20:58	10:28:32
52°	06:04:42	06:46:10	07:23:58	16:05:35	16:43:21	17:24:47	10:15:35
50°	06:01:09	06:40:44	07:16:34	16:13:00	16:48:50	17:28:23	10:04:11
45°	05:53:03	06:28:48	07:00:47	16:28:52	17:00:50	17:36:34	09:40:33
N 40°	05:45:45	06:18:38	06:47:47	16:41:55	17:11:04	17:43:56	09:21:38
35°	05:39:00	06:09:40	06:36:43	16:53:03	17:20:05	17:50:45	09:05:51
30°	05:32:34	06:01:34	06:26:59	17:02:50	17:28:15	17:57:14	08:52:11
20°	05:20:10	05:46:54	06:10:10	17:19:44	17:43:01	18:09:45	08:29:00
N 10°	05:07:37	05:33:15	05:55:24	17:34:36	17:56:46	18:22:24	08:08:59
0°	04:54:09	05:19:36	05:41:28	17:48:38	18:10:31	18:35:58	07:50:23
S 10°	04:38:54	05:05:04	05:27:24	18:02:47	18:25:09	18:51:21	07:31:50
20°	04:20:35	04:48:35	05:12:15	18:18:03	18:41:45	19:09:49	07:12:04
30°	03:57:04	04:28:32	04:54:43	18:35:44	19:01:58	19:33:32	06:49:20
35°	03:42:09	04:16:21	04:44:27	18:46:06	19:14:17	19:48:36	06:36:03
40°	03:23:57	04:01:57	04:32:39	18:58:01	19:28:49	20:06:59	06:20:46
45°	03:00:47	03:44:24	04:18:41	19:12:07	19:46:33	20:30:27	06:02:38
S 50°	02:29:14	03:22:03	04:01:33	19:29:28	20:09:12	21:02:31	05:40:11
52°	02:12:40	03:11:07	03:53:27	19:37:40	20:20:17	21:19:25	05:29:28
54°	01:52:18	02:58:36	03:44:25	19:46:50	20:33:00	21:40:20	05:17:24
56°	01:25:32	02:44:01	03:34:12	19:57:11	20:47:52	22:08:08	05:03:36
58°	00:43:37	02:26:33	03:22:31	20:09:04	21:05:42	22:53:42	04:47:31
S 60°	—:—	02:04:51	03:08:55	20:22:55	21:28:00	—:—	04:28:17

Nov 17	SHA	Mer.pass
Venus	156° 46.1	09:47:10
Mars	345° 38.0	21:08:02
Jupiter	64° 29.9	15:53:51
Saturn	60° 37.7	16:09:01

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
16	15:15	15:09	11:44:51	13:03:28	00:33:07	1(2%)
17	15:03	14:57	11:45:03	14:05:06	01:34:12	2(7%)

18 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:11:31	08:50:32	■	■	14:38:53	16:17:46	■
N 70°	06:59:59	08:24:52	10:13:40	13:15:54	15:04:38	16:29:25	■
68°	06:50:27	08:05:18	09:29:13	14:00:25	15:24:16	16:39:02	■
66°	06:42:22	07:49:39	09:00:07	14:29:35	15:39:59	16:47:12	■
64°	06:35:22	07:36:42	08:38:16	14:51:29	15:53:00	16:54:16	13:55:02 16:18:17
62°	06:29:13	07:25:43	08:20:49	15:08:58	16:04:02	17:00:28	13:06:36 17:06:39
60°	06:23:44	07:16:13	08:06:22	15:23:29	16:13:35	17:06:01	12:35:46 17:37:26
N 58°	06:18:46	07:07:53	07:54:04	15:35:49	16:21:58	17:11:02	12:12:27 18:00:42
56°	06:14:14	07:00:28	07:43:25	15:46:30	16:29:25	17:15:37	11:53:36 18:19:30
54°	06:10:03	06:53:48	07:34:02	15:55:55	16:36:08	17:19:50	11:37:44 18:35:19
52°	06:06:10	06:47:44	07:25:41	16:04:18	16:42:13	17:23:46	11:24:04 18:48:57
50°	06:02:31	06:42:12	07:18:09	16:11:51	16:47:48	17:27:27	11:12:04 19:00:55
45°	05:54:13	06:30:03	07:02:07	16:27:58	17:00:01	17:35:50	10:47:14 19:25:39
N 40°	05:46:46	06:19:42	06:48:56	16:41:13	17:10:26	17:43:21	10:27:26 19:45:23
35°	05:39:52	06:10:36	06:37:41	16:52:31	17:19:36	17:50:19	10:10:53 20:01:51
30°	05:33:19	06:02:21	06:27:49	17:02:26	17:27:54	17:56:55	09:56:35 20:16:05
20°	05:20:41	05:47:28	06:10:46	17:19:34	17:42:53	18:09:40	09:32:19 20:40:15
N 10°	05:07:56	05:33:36	05:55:48	17:34:38	17:56:50	18:22:31	09:11:20 21:01:06
0°	04:54:17	05:19:46	05:41:40	17:48:51	18:10:46	18:36:16	08:51:48 21:20:31
S 10°	04:38:50	05:05:03	05:27:25	18:03:12	18:25:35	18:51:50	08:32:18 21:39:54
20°	04:20:18	04:48:21	05:12:04	18:18:40	18:42:25	19:10:32	08:11:25 22:00:37
30°	03:56:29	04:28:03	04:54:17	18:36:35	19:02:53	19:34:32	07:47:19 22:24:31
35°	03:41:23	04:15:42	04:43:53	18:47:05	19:15:21	19:49:47	07:33:10 22:38:33
40°	03:22:56	04:01:07	04:31:54	18:59:10	19:30:04	20:08:25	07:16:50 22:54:44
45°	02:59:25	03:43:19	04:17:44	19:13:29	19:48:04	20:32:13	06:57:19 23:14:02
S 50°	02:27:18	03:20:36	04:00:20	19:31:06	20:11:03	21:04:51	06:32:56 23:38:07
52°	02:10:22	03:09:29	03:52:06	19:39:26	20:22:20	21:22:08	06:21:10 23:49:42
54°	01:49:26	02:56:45	03:42:54	19:48:45	20:35:16	21:43:38	06:07:50 .. ..
56°	01:21:36	02:41:51	03:32:30	19:59:18	20:50:26	22:12:34	05:52:24 .. ..
58°	00:36:01	02:23:59	03:20:36	20:11:24	21:08:41	23:02:57	05:34:08 .. ..
S 60°	—:—	02:01:39	03:06:42	20:25:32	21:31:39	—:—	05:11:44 .. ..

Nov 18	SHA	Mer.pass
Venus	155° 36.6	09:47:52
Mars	345° 36.7	21:04:13
Jupiter	64° 18.8	15:50:39
Saturn	60° 32.9	16:05:24

19 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:14:58	08:55:18	■	■	14:34:36	16:14:48	■
N 70°	07:03:02	08:28:44	10:21:34	13:08:29	15:01:15	16:26:51	■
68°	06:53:11	08:08:36	09:34:08	13:55:59	15:21:28	16:36:47	■
66°	06:44:50	07:52:32	09:03:55	14:26:15	15:37:35	16:45:12	15:46:47 16:29:17
64°	06:37:38	07:39:16	08:41:27	14:48:47	15:50:55	16:52:29	14:25:32 17:50:07
62°	06:31:18	07:28:02	08:23:34	15:06:42	16:02:12	16:58:52	13:48:24 18:26:52
60°	06:25:39	07:18:20	08:08:48	15:21:30	16:11:56	17:04:34	13:21:55 18:53:01
N 58°	06:20:33	07:09:50	07:56:16	15:34:05	16:20:29	17:09:43	13:01:06 19:13:32
56°	06:15:54	07:02:16	07:45:25	15:44:58	16:28:05	17:14:25	12:43:54 19:30:25
54°	06:11:37	06:55:28	07:35:52	15:54:33	16:34:56	17:18:45	12:29:17 19:44:47
52°	06:07:37	06:49:18	07:27:22	16:03:04	16:41:08	17:22:47	12:16:33 19:57:15
50°	06:03:53	06:43:39	07:19:44	16:10:45	16:46:49	17:26:33	12:05:19 20:08:15
45°	05:55:23	06:31:17	07:03:27	16:27:06	16:59:15	17:35:07	11:41:53 20:31:08
N 40°	05:47:47	06:20:46	06:50:03	16:40:33	17:09:50	17:42:48	11:23:04 20:49:27
35°	05:40:44	06:11:31	06:38:39	16:52:00	17:19:08	17:49:55	11:07:16 21:04:48
30°	05:34:04	06:03:08	06:28:39	17:02:03	17:27:34	17:56:38	10:53:34 21:18:04
20°	05:21:13	05:48:02	06:11:22	17:19:25	17:42:46	18:09:36	10:30:14 21:40:38
N 10°	05:08:17	05:33:58	05:56:12	17:34:41	17:56:55	18:22:38	10:10:00 22:00:06
0°	04:54:26	05:19:57	05:41:53	17:49:05	18:11:02	18:36:34	09:51:06 22:18:13
S 10°	04:38:47	05:05:03	05:27:27	18:03:37	18:26:03	18:52:20	09:32:12 22:36:16
20°	04:20:01	04:48:09	05:11:54	18:19:17	18:43:04	19:11:15	09:11:55 22:55:32
30°	03:55:56	04:27:35	04:53:53	18:37:26	19:03:48	19:35:32	08:48:30 23:17:39
35°	03:40:39	04:15:04	04:43:20	18:48:05	19:16:25	19:50:58	08:34:43 23:30:33
40°	03:21:58	04:00:18	04:31:12	19:00:20	19:31:19	20:09:50	08:18:49 23:45:23
45°	02:58:06	03:42:15	04:16:49	19:14:51	19:49:33	20:33:59	07:59:48 .. ..
S 50°	02:25:25	03:19:12	03:59:09	19:32:43	20:12:54	21:07:11	07:36:03 .. ..
52°	02:08:06	03:07:54	03:50:47	19:41:11	20:24:21	21:24:51	07:24:36 .. ..
54°	01:46:35	02:54:56	03:41:26	19:50:40	20:37:31	21:46:57	07:11:37 00:02:51
56°	01:17:37	02:39:44	03:30:51	20:01:23	20:52:59	22:17:07	06:56:37 00:18:01
58°	00:27:13	02:21:27	03:18:43	20:13:42	21:11:40	23:14:26	06:38:53 00:35:55
S 60°	—:—	01:58:28	03:04:33	20:28:08	21:35:18	—:—	06:17:13 00:57:46

Nov 19	SHA	Mer.pass
Venus	154° 26.8	09:48:35
Mars	345° 34.7	21:00:28
Jupiter	64° 07.6	15:47:28
Saturn	60° 28.1	16:01:47

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
18	14:51	14:45	11:45:15	15:06:14	02:35:52	3(15%)
19	14:38	14:31	11:45:29	16:04:46	03:35:56	4(23%)

20 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:18:23	09:00:04	■	■	14:30:20	16:11:55	■
N 70°	07:06:02	08:32:34	10:30:01	13:00:32	14:57:55	16:24:21	■
68°	06:55:52	08:11:51	09:39:05	13:51:32	15:18:43	16:34:36	16:08:30
66°	06:47:17	07:55:23	09:07:43	14:22:57	15:35:15	16:43:16	15:08:06
64°	06:39:52	07:41:48	08:44:36	14:46:07	15:48:52	16:50:45	14:33:33
62°	06:33:21	07:30:20	08:26:18	15:04:28	16:00:24	16:57:20	14:08:20
60°	06:27:33	07:20:26	08:11:13	15:19:35	16:10:21	17:03:11	13:48:22
N 58°	06:22:19	07:11:45	07:58:26	15:32:24	16:19:04	17:08:28	13:31:52
56°	06:17:32	07:04:03	07:47:24	15:43:29	16:26:49	17:13:17	13:17:50
54°	06:13:09	06:57:07	07:37:41	15:53:13	16:33:46	17:17:43	13:05:39
52°	06:09:03	06:50:50	07:29:03	16:01:53	16:40:05	17:21:50	12:54:55
50°	06:05:14	06:45:05	07:21:17	16:09:41	16:45:52	17:25:42	12:45:20
45°	05:56:33	06:32:31	07:04:45	16:26:16	16:58:30	17:34:27	12:25:05
N 40°	05:48:47	06:21:50	06:51:11	16:39:54	17:09:15	17:42:18	12:08:38
35°	05:41:36	06:12:25	06:39:37	16:51:31	17:18:43	17:49:32	11:54:42
30°	05:34:48	06:03:55	06:29:29	17:01:42	17:27:16	17:56:23	11:42:34
20°	05:21:45	05:48:36	06:11:59	17:19:18	17:42:41	18:09:32	11:21:45
N 10°	05:08:37	05:34:21	05:56:37	17:34:45	17:57:01	18:22:46	11:03:38
0°	04:54:36	05:20:09	05:42:07	17:49:20	18:11:19	18:36:53	10:46:40
S 10°	04:38:46	05:05:04	05:27:30	18:04:03	18:26:30	18:52:50	10:29:40
20°	04:19:47	04:47:57	05:11:45	18:19:54	18:43:44	19:11:58	10:11:25
30°	03:55:24	04:27:09	04:53:31	18:38:17	19:04:42	19:36:32	09:50:22
35°	03:39:56	04:14:29	04:42:49	18:49:04	19:17:28	19:52:08	09:38:01
40°	03:21:01	03:59:31	04:30:31	19:01:28	19:32:34	20:11:15	09:23:48
45°	02:56:49	03:41:14	04:15:56	19:16:11	19:51:02	20:35:44	09:06:52
S 50°	02:23:34	03:17:50	03:58:00	19:34:19	20:14:43	21:09:30	08:45:54
52°	02:15:42	03:06:22	03:49:31	19:42:55	20:26:21	21:27:34	08:35:53
54°	01:43:44	02:53:09	03:40:00	19:52:33	20:39:46	21:50:18	08:24:36
56°	01:13:33	02:37:40	03:29:15	20:03:27	20:55:32	22:21:48	08:11:42
58°	00:16:12	02:18:57	03:16:53	20:16:00	21:14:39	23:33:12	07:56:42
S 60°	—:—	01:55:17	03:02:26	20:30:42	21:38:58	—:—	07:38:49

Nov 20	SHA	Mer.pass
Venus	153° 16.9	09:49:18
Mars	345° 31.9	20:56:46
Jupiter	63° 56.3	15:44:17
Saturn	60° 23.1	15:58:11

21 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:21:44	09:04:51	■	■	14:26:05	16:09:06	17:30:52
N 70°	07:09:00	08:36:23	10:39:13	12:51:52	14:54:39	16:21:56	16:03:54
68°	06:58:31	08:15:05	09:44:06	13:47:02	15:16:01	16:32:29	15:24:17
66°	06:49:41	07:58:12	09:11:31	14:19:41	15:32:57	16:41:24	14:56:40
64°	06:42:03	07:44:19	08:47:44	14:43:31	15:46:54	16:49:05	14:35:26
62°	06:35:22	07:32:35	08:29:00	15:02:17	15:58:40	16:55:50	14:18:15
60°	06:29:25	07:22:30	08:13:37	15:17:43	16:08:48	17:01:50	14:03:53
N 58°	06:24:03	07:13:39	08:00:36	15:30:46	16:17:41	17:07:15	13:51:36
56°	06:19:10	07:05:48	07:49:21	15:42:03	16:25:34	17:12:11	13:40:55
54°	06:14:39	06:58:45	07:39:29	15:51:56	16:32:39	17:16:43	13:31:28
52°	06:10:29	06:52:22	07:30:43	16:00:44	16:39:05	17:20:56	13:23:03
50°	06:06:34	06:46:31	07:22:50	16:08:39	16:44:57	17:24:53	13:15:26
45°	05:57:42	06:33:44	07:06:04	16:25:29	16:57:48	17:33:49	12:59:12
N 40°	05:49:47	06:22:53	06:52:18	16:39:18	17:08:43	17:41:49	12:45:49
35°	05:42:28	06:13:20	06:40:35	16:51:04	17:18:19	17:49:11	12:34:25
30°	05:35:33	06:04:43	06:30:19	17:01:23	17:26:59	17:56:09	12:24:24
20°	05:22:17	05:49:11	06:12:35	17:19:12	17:42:37	18:09:31	12:07:09
N 10°	05:08:59	05:34:45	05:57:02	17:34:50	17:57:08	18:22:55	11:52:04
0°	04:54:47	05:20:22	05:42:22	17:49:36	18:11:36	18:37:13	11:37:53
S 10°	04:38:45	05:05:06	05:27:34	18:04:29	18:26:58	18:53:21	11:23:40
20°	04:19:33	04:47:47	05:11:37	18:20:32	18:44:24	19:12:41	11:08:26
30°	03:54:55	04:26:44	04:53:10	18:39:08	19:05:36	19:37:31	10:50:54
35°	03:39:16	04:13:56	04:42:20	18:50:03	19:18:31	19:53:18	10:40:39
40°	03:20:06	03:58:47	04:29:52	19:02:37	19:33:48	20:12:39	10:28:54
45°	02:55:35	03:40:15	04:15:06	19:17:32	19:52:31	20:37:28	10:15:01
S 50°	02:21:45	03:16:31	03:56:54	19:35:55	20:16:31	21:11:48	09:58:00
52°	02:03:40	03:04:51	03:48:17	19:44:38	20:28:21	21:30:16	09:49:58
54°	01:40:54	02:51:25	03:38:38	19:54:25	20:41:59	21:53:39	09:41:00
56°	01:09:23	02:35:38	03:27:41	20:05:30	20:58:03	22:26:36	09:30:53
58°	—:—	02:16:29	03:15:07	20:18:16	21:17:36	—:—	09:19:18
S 60°	—:—	01:52:08	03:00:22	20:33:15	21:42:39	—:—	09:05:51

Nov 21	SHA	Mer.pass
Venus	152° 06.8	09:50:03
Mars	345° 28.4	20:53:06
Jupiter	63° 44.9	15:41:07
Saturn	60° 18.1	15:54:35

Day	Sun			Moon		
	Eqn.of Time 00 <sup>h</sup> mm:ss	Time 12 <sup>h</sup> mm:ss	Mer. Pass hh:mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	Age
20	14:24	14:17	11:45:43	16:59:20	04:32:36	5(33%)
21	14:09	14:01	11:45:59	17:49:33	05:24:58	6(43%)

22 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:25:03	09:09:38	■	■	14:21:52	16:06:21	15:53:41
N 70°	07:11:55	08:40:10	10:49:30	12:42:08	14:51:25	16:19:35	15:26:13
68°	07:01:08	08:18:16	09:49:11	13:42:31	15:13:23	16:30:26	15:05:24
66°	06:52:03	08:00:58	09:15:18	14:16:28	15:30:44	16:39:36	14:48:49
64°	06:44:13	07:46:47	08:50:51	14:40:57	15:44:58	16:47:29	14:35:09
62°	06:37:21	07:34:50	08:31:41	15:00:09	15:56:59	16:54:24	14:23:38
60°	06:31:15	07:24:32	08:15:59	15:15:54	16:07:19	17:00:33	14:13:43
N 58°	06:25:46	07:15:32	08:02:44	15:29:11	16:16:22	17:06:05	14:05:05
56°	06:20:45	07:07:32	07:51:18	15:40:39	16:24:23	17:11:08	13:57:27
54°	06:16:09	07:00:22	07:41:16	15:50:42	16:31:35	17:15:46	13:50:37
52°	06:11:53	06:53:52	07:32:22	15:59:38	16:38:07	17:20:05	13:44:29
50°	06:07:53	06:47:55	07:24:22	16:07:40	16:44:06	17:24:06	13:38:53
45°	05:58:51	06:34:57	07:07:21	16:24:44	16:57:08	17:33:14	13:26:50
N 40°	05:50:46	06:23:55	06:53:25	16:38:44	17:08:13	17:41:22	13:16:48
35°	05:43:20	06:14:15	06:41:33	16:50:39	17:17:57	17:48:52	13:08:12
30°	05:36:18	06:05:30	06:31:09	17:01:06	17:26:44	17:55:56	13:00:36
20°	05:22:50	05:49:45	06:13:12	17:19:07	17:42:34	18:09:30	12:47:27
N 10°	05:09:21	05:35:09	05:57:28	17:34:56	17:57:16	18:23:05	12:35:54
0°	04:54:58	05:20:36	05:42:37	17:49:52	18:11:54	18:37:33	12:25:02
S 10°	04:38:45	05:05:09	05:27:39	18:04:55	18:27:27	18:53:52	12:14:07
20°	04:19:21	04:47:39	05:11:31	18:21:10	18:45:04	19:13:25	12:02:27
30°	03:54:27	04:26:22	04:52:50	18:39:58	19:06:31	19:38:31	11:49:03
35°	03:38:37	04:13:24	04:41:52	18:51:01	19:19:34	19:54:28	11:41:15
40°	03:19:14	03:58:04	04:29:16	19:03:45	19:35:02	20:14:02	11:32:21
45°	02:54:22	03:39:19	04:14:18	19:18:51	19:53:58	20:39:11	11:21:55
S 50°	02:19:59	03:15:15	03:55:51	19:37:29	20:18:19	21:14:06	11:09:15
52°	02:01:30	03:03:24	03:47:06	19:46:20	20:30:19	21:32:57	11:03:19
54°	01:38:05	02:49:44	03:37:18	19:56:15	20:44:11	21:57:00	10:56:46
56°	01:05:07	02:33:38	03:26:11	20:07:31	21:00:33	22:31:33	10:49:26
58°	—:—	02:14:03	03:13:23	20:20:30	21:20:33	—:—	10:41:10
S 60°	—:—	01:48:59	02:58:21	20:35:47	21:46:20	—:—	10:31:44

Nov 22	SHA	Mer.pass
Venus	150° 56.4	09:50:48
Mars	345° 24.2	20:49:30
Jupiter	63° 33.4	15:37:57
Saturn	60° 13.1	15:51:00

23 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:28:18	09:14:25	■	■	14:17:41	16:03:41	15:18:27
N 70°	07:14:47	08:43:55	11:01:36	12:30:38	14:48:15	16:17:18	15:03:51
68°	07:03:42	08:21:25	09:54:20	13:37:57	15:10:49	16:28:28	14:52:02
66°	06:54:22	08:03:43	09:19:04	14:13:16	15:28:34	16:37:51	14:42:14
64°	06:46:21	07:49:14	08:53:56	14:38:27	15:43:07	16:45:57	14:33:56
62°	06:39:19	07:37:02	08:34:20	14:58:05	15:55:21	16:53:01	14:26:48
60°	06:33:04	07:26:33	08:18:19	15:14:08	16:05:53	16:59:19	14:20:34
N 58°	06:27:27	07:17:22	08:04:50	15:27:40	16:15:05	17:04:59	14:15:05
56°	06:22:20	07:09:15	07:53:12	15:39:19	16:23:15	17:10:08	14:10:11
54°	06:17:38	07:01:58	07:43:02	15:49:31	16:30:34	17:14:52	14:05:47
52°	06:13:16	06:55:21	07:33:59	15:58:35	16:37:12	17:19:16	14:01:47
50°	06:09:12	06:49:19	07:25:52	16:06:44	16:43:16	17:23:22	13:58:08
45°	05:59:58	06:36:09	07:08:38	16:24:01	16:56:31	17:32:40	13:50:12
N 40°	05:51:45	06:24:58	06:54:31	16:38:12	17:07:45	17:40:57	13:43:34
35°	05:44:11	06:15:09	06:42:30	16:50:16	17:17:37	17:48:34	13:37:50
30°	05:37:03	06:06:17	06:31:58	17:00:50	17:26:31	17:55:46	13:32:46
20°	05:23:23	05:50:20	06:13:49	17:19:04	17:42:33	18:09:31	13:23:58
N 10°	05:09:43	05:35:33	05:57:54	17:35:04	17:57:25	18:23:16	13:16:12
0°	04:55:10	05:20:50	05:42:53	17:50:09	18:12:13	18:37:54	13:08:53
S 10°	04:38:47	05:05:13	05:27:45	18:05:23	18:27:56	18:54:24	13:01:33
20°	04:19:11	04:47:32	05:11:26	18:21:47	18:45:44	19:14:08	12:53:43
30°	03:54:00	04:26:00	04:52:33	18:40:49	19:07:24	19:39:30	12:44:45
35°	03:38:00	04:12:54	04:41:27	18:52:00	19:20:37	19:55:37	12:39:33
40°	03:18:24	03:57:24	04:28:41	19:04:52	19:36:15	20:15:25	12:33:38
45°	02:53:13	03:38:25	04:13:32	19:20:09	19:55:25	20:40:53	12:26:44
S 50°	02:18:15	03:14:01	03:54:50	19:39:02	20:20:05	21:16:22	12:18:25
52°	01:59:22	03:01:59	03:45:57	19:48:01	20:32:15	21:35:38	12:14:34
54°	01:35:17	02:48:06	03:36:00	19:58:05	20:46:21	22:00:23	12:10:19
56°	01:00:43	02:31:42	03:24:43	20:09:31	21:03:02	22:36:41	12:05:36
58°	—:—	02:11:40	03:11:42	20:22:43	21:23:29	—:—	12:00:20
S 60°	—:—	01:45:51	02:56:23	20:38:17	21:50:02	—:—	11:54:22

Nov 23	SHA	Mer.pass
Venus	149° 45.8	09:51:34
Mars	345° 19.3	20:45:56
Jupiter	63° 21.8	15:34:48
Saturn	60° 07.9	15:47:25

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
	mm:ss	mm:ss	hh:mm:ss	hh:mm:ss	hh:mm:ss	
22	13:54	13:46	11:46:14	18:35:50	06:13:08	7(53%)
23	13:37	13:29	11:46:31	19:19:03	06:57:46	8(63%)

24 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:31:30	09:19:11	■	■	14:13:31	16:01:06	14:52:52
N 70°	07:17:36	08:47:38	11:17:37	12:15:13	14:45:08	16:15:06	14:46:17
68°	07:06:13	08:24:32	09:59:32	13:33:21	15:08:18	16:26:33	14:40:50
66°	06:56:39	08:06:25	09:22:49	14:10:07	15:26:28	16:36:11	14:36:14
64°	06:48:26	07:51:38	08:56:59	14:36:00	15:41:19	16:44:28	14:32:18
62°	06:41:14	07:39:12	08:36:57	14:56:04	15:53:47	16:51:42	14:28:53
60°	06:34:51	07:28:31	08:20:38	15:12:26	16:04:30	16:58:08	14:25:53
N 58°	06:29:07	07:19:12	08:06:54	15:26:11	16:13:52	17:03:55	14:23:13
56°	06:23:53	07:10:56	07:55:06	15:38:01	16:22:10	17:09:11	14:20:50
54°	06:19:05	07:03:32	07:44:46	15:48:23	16:29:36	17:14:01	14:18:41
52°	06:14:38	06:56:49	07:35:36	15:57:35	16:36:20	17:18:30	14:16:43
50°	06:10:29	06:50:42	07:27:22	16:05:50	16:42:29	17:22:41	14:14:55
45°	06:01:05	06:37:20	07:09:54	16:23:21	16:55:55	17:32:09	14:11:01
N 40°	05:52:43	06:25:59	06:55:36	16:37:42	17:07:19	17:40:34	14:07:44
35°	05:45:02	06:16:03	06:43:27	16:49:54	17:17:18	17:48:19	14:04:53
30°	05:37:47	06:07:04	06:32:48	17:00:36	17:26:20	17:55:36	14:02:22
20°	05:23:56	05:50:56	06:14:27	17:19:02	17:42:33	18:09:33	13:57:59
N 10°	05:10:06	05:35:58	05:58:21	17:35:12	17:57:35	18:23:28	13:54:07
0°	04:55:24	05:21:05	05:43:10	17:50:27	18:12:33	18:38:16	13:50:29
S 10°	04:38:50	05:05:18	05:27:52	18:05:50	18:28:26	18:54:56	13:46:50
20°	04:19:01	04:47:26	05:11:23	18:22:26	18:46:25	19:14:52	13:42:57
30°	03:53:36	04:25:41	04:52:17	18:41:39	19:08:18	19:40:28	13:38:30
35°	03:37:26	04:12:26	04:41:03	18:52:57	19:21:39	19:56:46	13:35:57
40°	03:17:36	03:56:46	04:28:08	19:05:59	19:37:27	20:16:46	13:33:02
45°	02:52:05	03:37:33	04:12:48	19:21:27	19:56:50	20:42:33	13:29:39
S 50°	02:16:33	03:12:50	03:53:52	19:40:34	20:21:49	21:18:37	13:25:36
52°	01:57:16	03:00:38	03:44:52	19:49:40	20:34:11	21:38:17	13:23:44
54°	01:32:30	02:46:31	03:34:46	19:59:52	20:48:30	22:03:46	13:21:41
56°	00:56:10	02:29:48	03:23:18	20:11:29	21:05:29	22:42:02	13:19:24
58°	—:—	02:09:20	03:10:04	20:24:54	21:26:23	—:—	13:16:53
S 60°	—:—	01:42:44	02:54:29	20:40:45	21:53:45	—:—	13:14:02

Nov 24	SHA	Mer.pass
Venus	148° 35.0	09:52:21
Mars	345° 13.6	20:42:25
Jupiter	63° 10.1	15:31:39
Saturn	60° 02.7	15:43:50

25 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:34:39	09:23:57	■	■	14:09:24	15:58:36	14:30:26
N 70°	07:20:22	08:51:19	■	■	14:42:06	16:12:58	14:30:27
68°	07:08:42	08:27:36	10:04:50	13:28:42	15:05:52	16:24:43	14:30:28
66°	06:58:54	08:09:05	09:26:33	14:07:01	15:24:27	16:34:34	14:30:29
64°	06:50:29	07:54:00	09:00:00	14:33:37	15:39:35	16:43:02	14:30:30
62°	06:43:08	07:41:20	08:39:32	14:54:07	15:52:17	16:50:26	14:30:31
60°	06:36:37	07:30:28	08:22:54	15:10:47	16:03:11	16:57:01	14:30:31
N 58°	06:30:45	07:20:59	08:08:57	15:24:46	16:12:42	17:02:55	14:30:32
56°	06:25:25	07:12:36	07:56:57	15:36:47	16:21:08	17:08:17	14:30:33
54°	06:20:31	07:05:05	07:46:28	15:47:18	16:28:40	17:13:12	14:30:33
52°	06:15:59	06:58:16	07:37:11	15:56:37	16:35:31	17:17:46	14:30:34
50°	06:11:45	06:52:03	07:28:50	16:04:59	16:41:45	17:22:02	14:30:35
45°	06:02:12	06:38:30	07:11:09	16:22:43	16:55:22	17:31:39	14:30:36
N 40°	05:53:41	06:27:01	06:56:41	16:37:14	17:06:54	17:40:13	14:30:38
35°	05:45:53	06:16:56	06:44:23	16:49:35	17:17:02	17:48:05	14:30:39
30°	05:38:32	06:07:51	06:33:37	17:00:23	17:26:09	17:55:29	14:30:41
20°	05:24:30	05:51:31	06:15:04	17:19:01	17:42:34	18:09:36	14:30:44
N 10°	05:10:30	05:36:24	05:58:48	17:35:21	17:57:46	18:23:41	14:30:47
0°	04:55:37	05:21:21	05:43:28	17:50:46	18:12:53	18:38:39	14:30:51
S 10°	04:38:54	05:05:24	05:28:00	18:06:18	18:28:56	18:55:28	14:30:55
20°	04:18:54	04:47:21	05:11:21	18:23:04	18:47:05	19:15:36	14:31:01
30°	03:53:13	04:25:23	04:52:02	18:42:30	19:09:12	19:41:26	14:31:08
35°	03:36:53	04:12:01	04:40:42	18:53:55	19:22:40	19:57:54	14:31:12
40°	03:16:51	03:56:10	04:27:38	19:07:05	19:38:38	20:18:07	14:31:17
45°	02:51:01	03:36:44	04:12:07	19:22:44	19:58:15	20:44:13	14:31:24
S 50°	02:14:55	03:11:42	03:52:56	19:42:05	20:23:32	21:20:50	14:31:31
52°	01:55:13	02:59:19	03:43:49	19:51:18	20:36:05	21:40:56	14:31:35
54°	01:29:43	02:44:58	03:33:35	20:01:39	20:50:37	22:07:09	14:31:39
56°	00:51:26	02:27:57	03:21:57	20:13:25	21:07:55	22:47:38	14:31:44
58°	—:—	02:07:02	03:08:30	20:27:03	21:29:16	—:—	14:31:49
S 60°	—:—	01:39:39	02:52:38	20:43:10	21:57:27	—:—	14:31:55

Nov 25	SHA	Mer.pass
Venus	147° 24.0	09:53:09
Mars	345° 07.3	20:38:56
Jupiter	62° 58.3	15:28:30
Saturn	59° 57.4	15:40:15

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
24	13:20	13:11	11:46:49	20:00:16	07:39:51	9(72%)
25	13:02	12:53	11:47:07	20:40:30	08:20:27	10(80%)

26 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:37:44	09:28:43	■	■	14:05:18	15:56:11	14:08:09
N 70°	07:23:05	08:54:57	■	■	14:39:07	16:10:55	14:14:44
68°	07:11:07	08:30:37	10:10:12	13:23:59	15:03:31	16:22:57	14:20:12
66°	07:01:06	08:11:42	09:30:16	14:03:58	15:22:29	16:33:02	14:24:47
64°	06:52:30	07:56:19	09:02:59	14:31:17	15:37:55	16:41:41	14:28:44
62°	06:44:59	07:43:26	08:42:04	14:52:13	15:50:51	16:49:14	14:32:09
60°	06:38:20	07:32:23	08:25:08	15:09:11	16:01:55	16:55:56	14:35:10
N 58°	06:32:21	07:22:45	08:10:57	15:23:24	16:11:35	17:01:58	14:37:50
56°	06:26:55	07:14:14	07:58:47	15:35:36	16:20:08	17:07:26	14:40:14
54°	06:21:56	07:06:36	07:48:09	15:46:16	16:27:48	17:12:27	14:42:23
52°	06:17:19	06:59:42	07:38:44	15:55:42	16:34:44	17:17:06	14:44:22
50°	06:13:00	06:53:23	07:30:17	16:04:10	16:41:04	17:21:26	14:46:10
45°	06:03:17	06:39:39	07:12:23	16:22:07	16:54:51	17:31:13	14:50:06
N 40°	05:54:39	06:28:01	06:57:45	16:36:49	17:06:32	17:39:54	14:53:25
35°	05:46:44	06:17:49	06:45:19	16:49:17	17:16:47	17:47:53	14:56:18
30°	05:39:16	06:08:38	06:34:26	17:00:12	17:26:01	17:55:23	14:58:51
20°	05:25:03	05:52:07	06:15:42	17:19:02	17:42:37	18:09:41	15:03:19
N 10°	05:10:54	05:36:50	05:59:16	17:35:32	17:57:58	18:23:55	15:07:16
0°	04:55:52	05:21:38	05:43:46	17:51:05	18:13:14	18:39:02	15:11:01
S 10°	04:38:59	05:05:32	05:28:10	18:06:47	18:29:26	18:56:01	15:14:47
20°	04:18:47	04:47:18	05:11:20	18:23:42	18:47:46	19:16:19	15:18:50
30°	03:52:53	04:25:08	04:51:50	18:43:20	19:10:05	19:42:24	15:23:29
35°	03:36:23	04:11:37	04:40:22	18:54:52	19:23:41	19:59:01	15:26:11
40°	03:16:08	03:55:36	04:27:10	19:08:10	19:39:49	20:19:27	15:29:15
45°	02:49:59	03:35:57	04:11:28	19:23:59	19:59:38	20:45:51	15:32:49
S 50°	02:13:19	03:10:36	03:52:04	19:43:34	20:25:14	21:23:02	15:37:07
52°	01:53:12	02:58:03	03:42:49	19:52:54	20:37:57	21:43:33	15:39:06
54°	01:26:58	02:43:29	03:32:27	20:03:23	20:52:42	22:10:32	15:41:17
56°	00:46:28	02:26:10	03:20:39	20:15:20	21:10:18	22:53:34	15:43:41
58°	—:—	02:04:47	03:06:59	20:29:10	21:32:07	—:—	15:46:23
S 60°	—:—	01:36:35	02:50:50	20:45:34	22:01:10	—:—	15:49:24

Nov 26	SHA	Mer.pass
Venus	146° 12.7	09:53:58
Mars	345° 00.3	20:35:30
Jupiter	62° 46.3	15:25:22
Saturn	59° 52.1	15:36:40

27 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:40:45	09:33:27	■	■	14:01:14	15:53:52	13:43:07
N 70°	07:25:44	08:58:32	■	■	14:36:13	16:08:58	13:57:34
68°	07:13:30	08:33:36	10:15:40	13:19:12	15:01:13	16:21:15	14:09:16
66°	07:03:15	08:14:16	09:33:57	14:00:57	15:20:36	16:31:34	14:18:58
64°	06:54:28	07:58:36	09:05:55	14:29:01	15:36:19	16:40:24	14:27:11
62°	06:46:48	07:45:29	08:44:34	14:50:24	15:49:28	16:48:06	14:34:16
60°	06:40:01	07:34:16	08:27:20	15:07:40	16:00:43	16:54:56	14:40:26
N 58°	06:33:56	07:24:29	08:12:56	15:22:06	16:10:32	17:01:04	14:45:53
56°	06:28:24	07:15:50	08:00:35	15:34:29	16:19:12	17:06:38	14:50:45
54°	06:23:19	07:08:06	07:49:48	15:45:17	16:26:58	17:11:44	14:55:08
52°	06:18:37	07:01:06	07:40:16	15:54:51	16:34:00	17:16:27	14:59:06
50°	06:14:15	06:54:43	07:31:43	16:03:25	16:40:25	17:20:52	15:02:43
45°	06:04:22	06:40:48	07:13:37	16:21:34	16:54:23	17:30:48	15:10:36
N 40°	05:55:36	06:29:01	06:58:49	16:36:25	17:06:12	17:39:37	15:17:13
35°	05:47:34	06:18:42	06:46:15	16:49:01	17:16:34	17:47:42	15:22:55
30°	05:40:00	06:09:24	06:35:15	17:00:03	17:25:54	17:55:18	15:27:59
20°	05:25:37	05:52:43	06:16:19	17:19:04	17:42:40	18:09:46	15:36:47
N 10°	05:11:18	05:37:16	05:59:44	17:35:43	17:58:11	18:24:10	15:44:34
0°	04:56:08	05:21:56	05:44:06	17:51:25	18:13:36	18:39:25	15:51:56
S 10°	04:39:05	05:05:40	05:28:20	18:07:16	18:29:57	18:56:34	15:59:20
20°	04:18:43	04:47:17	05:11:21	18:24:20	18:48:26	19:17:03	16:07:16
30°	03:52:34	04:24:54	04:51:39	18:44:09	19:10:57	19:43:22	16:16:22
35°	03:35:55	04:11:15	04:40:04	18:55:48	19:24:42	20:00:08	16:21:39
40°	03:15:27	03:55:05	04:26:44	19:09:14	19:40:59	20:20:46	16:27:41
45°	02:49:00	03:35:13	04:10:52	19:25:14	20:01:00	20:47:28	16:34:43
S 50°	02:11:47	03:09:34	03:51:14	19:45:02	20:26:54	21:25:12	16:43:13
52°	01:51:15	02:56:51	03:41:53	19:54:28	20:39:47	21:46:08	16:47:09
54°	01:24:14	02:42:03	03:31:22	20:05:06	20:54:46	22:13:56	16:51:30
56°	00:41:12	02:24:26	03:19:24	20:17:12	21:12:40	22:59:56	16:56:19
58°	—:—	02:02:35	03:05:32	20:31:15	21:34:57	—:—	17:01:43
S 60°	—:—	01:33:32	02:49:06	20:47:55	22:04:52	—:—	17:07:50

Nov 27	SHA	Mer.pass
Venus	145° 01.2	09:54:48
Mars	344° 52.7	20:32:07
Jupiter	62° 34.3	15:22:14
Saturn	59° 46.7	15:33:06

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
26	12:44	12:34	11:47:26	21:20:46	09:00:35	11(87%)
27	12:24	12:15	11:47:45	22:02:00	09:41:13	12(93%)

28 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:43:42	09:38:11	■	■	13:57:13	15:51:37	13:09:41
N 70°	07:28:19	09:02:04	■	■	14:33:24	16:07:05	13:36:18
68°	07:15:49	08:36:31	10:21:14	13:14:20	14:59:01	16:19:39	13:56:35
66°	07:05:21	08:16:47	09:37:36	13:58:00	15:18:47	16:30:10	14:12:47
64°	06:56:24	08:00:50	09:08:49	14:26:49	15:34:47	16:39:10	14:26:09
62°	06:48:35	07:47:30	08:47:02	14:48:38	15:48:09	16:47:01	14:37:27
60°	06:41:40	07:36:06	08:29:30	15:06:12	15:59:35	16:53:58	14:47:10
N 58°	06:35:28	07:26:11	08:14:52	15:20:52	16:09:32	17:00:13	14:55:39
56°	06:29:50	07:17:25	08:02:21	15:33:24	16:18:20	17:05:53	15:03:09
54°	06:24:41	07:09:34	07:51:26	15:44:21	16:26:12	17:11:04	15:09:51
52°	06:19:54	07:02:29	07:41:46	15:54:02	16:33:19	17:15:52	15:15:54
50°	06:15:27	06:56:00	07:33:07	16:02:42	16:39:49	17:20:21	15:21:24
45°	06:05:26	06:41:55	07:14:49	16:21:04	16:53:57	17:30:26	15:33:16
N 40°	05:56:32	06:30:00	06:59:51	16:36:04	17:05:54	17:39:23	15:43:09
35°	05:48:24	06:19:34	06:47:10	16:48:48	17:16:23	17:47:34	15:51:39
30°	05:40:45	06:10:11	06:36:04	16:59:56	17:25:49	17:55:15	15:59:09
20°	05:26:11	05:53:19	06:16:57	17:19:07	17:42:46	18:09:53	16:12:10
N 10°	05:11:43	05:37:43	06:00:12	17:35:55	17:58:25	18:24:26	16:23:37
0°	04:56:24	05:22:14	05:44:26	17:51:46	18:13:59	18:39:50	16:34:26
S 10°	04:39:12	05:05:50	05:28:31	18:07:45	18:30:28	18:57:07	16:45:18
20°	04:18:39	04:47:16	05:11:23	18:24:59	18:49:07	19:17:47	16:56:57
30°	03:52:17	04:24:41	04:51:30	18:44:59	19:11:50	19:44:19	17:10:21
35°	03:35:29	04:10:55	04:39:48	18:56:44	19:25:41	20:01:14	17:18:10
40°	03:14:49	03:54:36	04:26:20	19:10:18	19:42:07	20:22:03	17:27:05
45°	02:48:04	03:34:32	04:10:18	19:26:27	20:02:21	20:49:04	17:37:34
S 50°	02:10:17	03:08:35	03:50:27	19:46:28	20:28:33	21:27:20	17:50:18
52°	01:49:20	02:55:41	03:40:59	19:56:01	20:41:35	21:48:42	17:56:15
54°	01:21:32	02:40:41	03:30:20	20:06:47	20:56:47	22:17:19	18:02:51
56°	00:35:31	02:22:46	03:18:12	20:19:03	21:14:59	23:06:54	18:10:13
58°	—:—	02:00:27	03:04:08	20:33:18	21:37:44	—:—	18:18:32
S 60°	—:—	01:30:31	02:47:26	20:50:14	22:08:34	—:—	18:28:03

Nov 28	SHA	Mer.pass
Venus	143° 49.4	09:55:39
Mars	344° 44.4	20:28:46
Jupiter	62° 22.3	15:19:07
Saturn	59° 41.2	15:29:32

29 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:46:35	09:42:54	■	■	13:53:15	15:49:29	11:55:40
N 70°	07:30:51	09:05:33	■	■	14:30:39	16:05:17	13:02:51
68°	07:18:05	08:39:22	10:26:55	13:09:22	14:56:53	16:18:07	13:39:35
66°	07:07:25	08:19:15	09:41:13	13:55:07	15:17:03	16:28:50	14:05:46
64°	06:58:17	08:03:01	09:11:40	14:24:42	15:33:19	16:38:01	14:26:07
62°	06:50:20	07:49:28	08:49:27	14:46:57	15:46:54	16:46:00	14:42:40
60°	06:43:18	07:37:54	08:31:37	15:04:48	15:58:30	16:53:05	14:56:33
N 58°	06:36:59	07:27:51	08:16:46	15:19:41	16:08:35	16:59:25	15:08:27
56°	06:31:16	07:18:57	08:04:05	15:32:24	16:17:30	17:05:11	15:18:49
54°	06:26:01	07:11:01	07:53:02	15:43:28	16:25:29	17:10:27	15:28:00
52°	06:21:10	07:03:50	07:43:15	15:53:16	16:32:41	17:15:19	15:36:12
50°	06:16:39	06:57:17	07:34:30	16:02:02	16:39:15	17:19:52	15:43:36
45°	06:06:29	06:43:02	07:16:00	16:20:36	16:53:33	17:30:06	15:59:27
N 40°	05:57:28	06:30:59	07:00:53	16:35:45	17:05:39	17:39:10	16:12:31
35°	05:49:13	06:20:26	06:48:04	16:48:36	17:16:14	17:47:27	16:23:41
30°	05:41:28	06:10:57	06:36:52	16:59:50	17:25:46	17:55:14	16:33:29
20°	05:26:45	05:53:55	06:17:35	17:19:11	17:42:52	18:10:01	16:50:24
N 10°	05:12:09	05:38:10	06:00:41	17:36:09	17:58:40	18:24:42	17:05:15
0°	04:56:41	05:22:33	05:44:46	17:52:08	18:14:22	18:40:14	17:19:12
S 10°	04:39:20	05:06:00	05:28:44	18:08:15	18:30:59	18:57:41	17:33:14
20°	04:18:38	04:47:17	05:11:26	18:25:37	18:49:48	19:18:30	17:48:18
30°	03:52:02	04:24:31	04:51:22	18:45:48	19:12:42	19:45:15	18:05:40
35°	03:35:05	04:10:37	04:39:34	18:57:40	19:26:40	20:02:18	18:15:50
40°	03:14:13	03:54:09	04:25:58	19:11:21	19:43:15	20:23:20	18:27:29
45°	02:47:11	03:33:53	04:09:47	19:27:39	20:03:40	20:50:37	18:41:16
S 50°	02:08:51	03:07:39	03:49:43	19:47:53	20:30:09	21:29:26	18:58:10
52°	01:47:29	02:54:35	03:40:08	19:57:33	20:43:21	21:51:13	19:06:09
54°	01:18:51	02:39:22	03:29:22	20:08:25	20:58:46	22:20:42	19:15:04
56°	00:29:14	02:21:09	03:17:04	20:20:51	21:17:16	23:14:51	19:25:07
58°	—:—	01:58:23	03:02:48	20:35:18	21:40:29	—:—	19:36:37
S 60°	—:—	01:27:31	02:45:50	20:52:30	22:12:15	—:—	19:49:59

Nov 29	SHA	Mer.pass
Venus	142° 37.4	09:56:31
Mars	344° 35.5	20:25:28
Jupiter	62° 10.1	15:15:59
Saturn	59° 35.6	15:25:59

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
28	12:04	11:54	11:48:06	22:45:00	10:23:14	13(97%)
29	11:44	11:33	11:48:27	23:30:24	11:07:22	14(99%)



30 November 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	07:49:24	09:47:34	■	■	13:49:20	15:47:26	□
N 70°	07:33:19	09:08:58	■	■	14:27:59	16:03:34	□
68°	07:20:18	08:42:10	10:32:46	13:04:17	14:54:50	16:16:39	13:06:56
66°	07:09:25	08:21:40	09:44:47	13:52:18	15:15:23	16:27:35	13:56:38
64°	07:00:07	08:05:09	09:14:27	14:22:39	15:31:56	16:36:55	14:28:10
62°	06:52:02	07:51:24	08:51:48	14:45:20	15:45:43	16:45:03	14:51:47
60°	06:44:53	07:39:40	08:33:41	15:03:29	15:57:29	16:52:15	15:10:41
N 58°	06:38:28	07:29:28	08:18:38	15:18:34	16:07:42	16:58:41	15:26:25
56°	06:32:39	07:20:28	08:05:46	15:31:27	16:16:44	17:04:32	15:39:51
54°	06:27:20	07:12:25	07:54:35	15:42:39	16:24:48	17:09:53	15:51:33
52°	06:22:24	07:05:09	07:44:42	15:52:34	16:32:06	17:14:50	16:01:54
50°	06:17:49	06:58:32	07:35:52	16:01:25	16:38:44	17:19:26	16:11:09
45°	06:07:31	06:44:07	07:17:10	16:20:10	16:53:12	17:29:48	16:30:44
N 40°	05:58:23	06:31:57	07:01:54	16:35:28	17:05:25	17:38:59	16:46:42
35°	05:50:02	06:21:18	06:48:58	16:48:26	17:16:06	17:47:22	17:00:13
30°	05:42:12	06:11:42	06:37:40	16:59:46	17:25:44	17:55:14	17:12:02
20°	05:27:20	05:54:31	06:18:13	17:19:17	17:42:59	18:10:11	17:32:20
N 10°	05:12:35	05:38:38	06:01:11	17:36:23	17:58:56	18:25:00	17:50:03
0°	04:56:59	05:22:53	05:45:07	17:52:30	18:14:45	18:40:40	18:06:40
S 10°	04:39:30	05:06:12	05:28:57	18:08:45	18:31:31	18:58:14	18:23:22
20°	04:18:37	04:47:20	05:11:30	18:26:16	18:50:28	19:19:13	18:41:17
30°	03:51:49	04:24:22	04:51:16	18:46:36	19:13:33	19:46:10	19:02:01
35°	03:34:44	04:10:22	04:39:22	18:58:34	19:27:38	20:03:22	19:14:12
40°	03:13:40	03:53:45	04:25:39	19:12:23	19:44:22	20:24:35	19:28:13
45°	02:46:21	03:33:17	04:09:18	19:28:50	20:04:58	20:52:09	19:44:55
S 50°	02:07:29	03:06:46	03:49:02	19:49:16	20:31:44	21:31:30	20:05:36
52°	01:45:41	02:53:33	03:39:21	19:59:02	20:45:05	21:53:43	20:15:29
54°	01:16:12	02:38:07	03:28:27	20:10:02	21:00:42	22:24:04	20:26:37
56°	00:22:01	02:19:36	03:16:00	20:22:37	21:19:30	23:24:39	20:39:19
58°	—:—	01:56:22	03:01:32	20:37:15	21:43:11	—:—	20:54:05
S 60°	—:—	01:24:34	02:44:18	20:54:43	22:15:55	—:—	21:11:41

Nov 30	SHA	Mer.pass
Venus	141° 25.1	09:57:24
Mars	344° 25.9	20:22:12
Jupiter	61° 57.8	15:12:53
Saturn	59° 30.0	15:22:25

01 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	07:52:08	09:52:13	■	■	13:45:27	15:45:28	□
N 70°	07:35:43	09:12:19	■	■	14:25:25	16:01:57	□
68°	07:22:27	08:44:54	10:38:46	12:59:03	14:52:53	16:15:17	□
66°	07:11:22	08:24:01	09:48:18	13:49:32	15:13:48	16:26:24	13:38:45
64°	07:01:55	08:07:14	09:17:12	14:20:41	15:30:37	16:35:54	14:35:19
62°	06:53:41	07:53:17	08:54:07	14:43:48	15:44:36	16:44:10	15:08:37
60°	06:46:25	07:41:23	08:35:43	15:02:13	15:56:32	16:51:28	15:33:13
N 58°	06:39:55	07:31:03	08:20:27	15:17:31	16:06:53	16:58:01	15:52:51
56°	06:34:01	07:21:57	08:07:26	15:30:33	16:16:01	17:03:56	16:09:11
54°	06:28:36	07:13:48	07:56:07	15:41:53	16:24:11	17:09:22	16:23:10
52°	06:23:37	07:06:27	07:46:07	15:51:54	16:31:33	17:14:23	16:35:22
50°	06:18:58	06:59:45	07:37:11	16:00:51	16:38:16	17:19:03	16:46:11
45°	06:08:32	06:45:12	07:18:18	16:19:47	16:52:53	17:29:33	17:08:48
N 40°	05:59:17	06:32:54	07:02:55	16:35:13	17:05:13	17:38:50	17:27:02
35°	05:50:50	06:22:08	06:49:52	16:48:18	17:16:01	17:47:19	17:42:23
30°	05:42:55	06:12:28	06:38:28	16:59:44	17:25:44	17:55:16	17:55:42
20°	05:27:54	05:55:07	06:18:51	17:19:24	17:43:08	18:10:21	18:18:29
N 10°	05:13:01	05:39:06	06:01:40	17:36:38	17:59:13	18:25:18	18:38:16
0°	04:57:18	05:23:13	05:45:29	17:52:53	18:15:09	18:41:06	18:56:48
S 10°	04:39:40	05:06:25	05:29:11	18:09:15	18:32:02	18:58:48	19:15:23
20°	04:18:38	04:47:24	05:11:36	18:26:54	18:51:08	19:19:56	19:35:20
30°	03:51:38	04:24:15	04:51:12	18:47:24	19:14:24	19:47:05	19:58:27
35°	03:34:24	04:10:08	04:39:12	18:59:28	19:28:36	20:04:25	20:12:04
40°	03:13:10	03:53:23	04:25:22	19:13:24	19:45:28	20:25:49	20:27:47
45°	02:45:34	03:32:44	04:08:52	19:30:00	20:06:15	20:53:39	20:46:36
S 50°	02:06:10	03:05:56	03:48:24	19:50:37	20:33:16	21:33:31	21:10:07
52°	01:43:57	02:52:34	03:38:37	20:00:29	20:46:47	21:56:09	21:21:27
54°	01:13:35	02:36:56	03:27:35	20:11:36	21:02:36	22:27:25	21:34:19
56°	00:12:59	02:18:07	03:14:59	20:24:20	21:21:41	23:41:13	21:49:11
58°	—:—	01:54:25	03:00:20	20:39:10	21:45:50	—:—	22:06:45
S 60°	—:—	01:21:39	02:42:50	20:56:53	22:19:34	—:—	22:28:13

Dec 01	SHA	Mer.pass
Venus	140° 12.5	09:58:18
Mars	344° 15.8	20:18:59
Jupiter	61° 45.4	15:09:46
Saturn	59° 24.3	15:18:52

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
30	11:22	11:11	11:48:49	—:—	11:54:07	15(100%)
01	11:00	10:49	11:49:11	00:18:32	12:43:35	16(99%)

# 2020 December 02 to Dec. 03

02 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:54:48	09:56:50	■	■	13:41:39	15:43:37	☐
N 70°	07:38:03	09:15:35	■	■	14:22:57	16:00:25	☐
68°	07:24:32	08:47:33	10:44:58	12:53:38	14:51:01	16:13:59	☐
66°	07:13:16	08:26:18	09:51:46	13:46:52	15:12:19	16:25:18	☐
64°	07:03:40	08:09:15	09:19:52	14:18:48	15:29:23	16:34:57	14:57:09 12:11:29
62°	06:55:18	07:55:07	08:56:22	14:42:20	15:43:34	16:43:20	15:40:42 11:28:03
60°	06:47:56	07:43:04	08:37:41	15:01:02	15:55:38	16:50:45	16:09:49 10:59:03
N 58°	06:41:19	07:32:36	08:22:13	15:16:32	16:06:07	16:57:23	16:32:10 10:36:48
56°	06:35:20	07:23:23	08:09:03	15:29:43	16:15:22	17:03:24	16:50:23 10:18:42
54°	06:29:52	07:15:10	07:57:36	15:41:11	16:23:37	17:08:54	17:05:46 10:03:24
52°	06:24:48	07:07:44	07:47:30	15:51:18	16:31:04	17:13:58	17:19:04 09:50:12
50°	06:20:06	07:00:58	07:38:29	16:00:20	16:37:51	17:18:42	17:30:47 09:38:34
45°	06:09:31	06:46:15	07:19:25	16:19:26	16:52:37	17:29:20	17:55:05 09:14:28
N 40°	06:00:10	06:33:50	07:03:54	16:35:00	17:05:04	17:38:43	18:14:31 08:55:11
35°	05:51:38	06:22:59	06:50:44	16:48:12	17:15:57	17:47:18	18:30:48 08:39:05
30°	05:43:39	06:13:13	06:39:15	16:59:43	17:25:45	17:55:20	18:44:53 08:25:08
20°	05:28:29	05:55:43	06:19:28	17:19:33	17:43:18	18:10:33	19:08:52 08:01:25
N 10°	05:13:28	05:39:35	06:02:10	17:36:55	17:59:31	18:25:37	19:29:39 07:40:55
0°	04:57:38	05:23:35	05:45:52	17:53:16	18:15:34	18:41:32	19:49:04 07:21:47
S 10°	04:39:52	05:06:38	05:29:26	18:09:45	18:32:34	18:59:22	20:08:30 07:02:39
20°	04:18:41	04:47:29	05:11:44	18:27:33	18:51:49	19:20:39	20:29:22 06:42:10
30°	03:51:29	04:24:11	04:51:10	18:48:12	19:15:14	19:48:00	20:53:31 06:18:30
35°	03:34:07	04:09:57	04:39:04	19:00:21	19:29:32	20:05:27	21:07:44 06:04:36
40°	03:12:42	03:53:03	04:25:07	19:14:24	19:46:32	20:27:01	21:24:10 05:48:33
45°	02:44:50	03:32:14	04:08:28	19:31:08	20:07:30	20:55:07	21:43:52 05:29:24
S 50°	02:04:55	03:05:10	03:47:49	19:51:57	20:34:47	21:35:30	22:08:34 05:05:30
52°	01:42:17	02:51:38	03:37:56	20:01:54	20:48:26	21:58:33	22:20:30 04:54:00
54°	01:11:00	02:35:48	03:26:47	20:13:09	21:04:27	22:30:45	22:34:06 04:40:57
56°	—:—	02:16:42	03:14:03	20:26:01	21:23:49	—:—	22:49:52 04:25:54
58°	—:—	01:52:32	02:59:12	20:41:01	21:48:25	—:—	23:08:38 04:08:08
S 60°	—:—	01:18:46	02:41:27	20:58:59	22:23:12	—:—	23:31:50 03:46:27

Dec 02	SHA	Mer.pass
Venus	138°59.7	09:59:14
Mars	344°05.0	20:15:48
Jupiter	61°33.0	15:06:40
Saturn	59°18.5	15:15:19

03 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:57:22	10:01:24	■	■	13:37:54	15:41:52	☐
N 70°	07:40:19	09:18:46	■	■	14:20:34	15:58:59	☐
68°	07:26:33	08:50:08	10:51:27	12:47:58	14:49:15	16:12:47	☐
66°	07:15:07	08:28:31	09:55:11	13:44:16	15:10:54	16:24:17	☐
64°	07:05:21	08:11:14	09:22:28	14:17:00	15:28:14	16:34:04	15:54:00 13:05:35
62°	06:56:53	07:56:53	08:58:33	14:40:57	15:42:36	16:42:35	16:36:57 12:22:30
60°	06:49:24	07:44:42	08:39:36	14:59:56	15:54:49	16:50:06	17:05:47 11:53:33
N 58°	06:42:42	07:34:07	08:23:56	15:15:37	16:05:25	16:56:49	17:27:55 11:31:17
56°	06:36:38	07:24:48	08:10:37	15:28:57	16:14:46	17:02:55	17:45:58 11:13:08
54°	06:31:05	07:16:29	07:59:03	15:40:32	16:23:06	17:08:29	18:01:12 10:57:47
52°	06:25:58	07:08:58	07:48:52	15:50:45	16:30:58	17:13:37	18:14:22 10:44:31
50°	06:21:12	07:02:08	07:39:45	15:59:52	16:37:29	17:18:24	18:25:58 10:32:50
45°	06:10:30	06:47:17	07:20:31	16:19:08	16:52:23	17:29:09	18:50:01 10:08:34
N 40°	06:01:03	06:34:45	07:04:52	16:34:50	17:04:57	17:38:39	19:09:14 09:49:09
35°	05:52:26	06:23:48	06:51:36	16:48:08	17:15:56	17:47:18	19:25:19 09:32:54
30°	05:44:21	06:13:57	06:40:01	16:59:44	17:25:48	17:55:25	19:39:14 09:18:50
20°	05:29:04	05:56:19	06:20:06	17:19:43	17:43:30	18:10:46	20:02:54 08:54:52
N 10°	05:13:56	05:40:04	06:02:40	17:37:12	17:59:49	18:25:57	20:23:22 08:34:06
0°	04:57:58	05:23:57	05:46:15	17:53:40	18:16:00	18:41:59	20:42:28 08:14:42
S 10°	04:40:05	05:06:53	05:29:43	18:10:16	18:33:07	18:59:56	21:01:33 07:55:16
20°	04:18:45	04:47:36	05:11:52	18:28:11	18:52:29	19:21:21	21:22:00 07:34:25
30°	03:51:22	04:24:07	04:51:10	18:48:59	19:16:04	19:48:53	21:45:37 07:10:17
35°	03:33:53	04:09:47	04:38:58	19:01:14	19:30:28	20:06:28	21:59:29 06:56:04
40°	03:12:17	03:52:46	04:24:54	19:15:23	19:47:35	20:28:12	22:15:29 06:39:38
45°	02:44:09	03:31:46	04:08:07	19:32:15	20:08:43	20:56:33	22:34:35 06:19:56
S 50°	02:03:44	03:04:27	03:47:17	19:53:14	20:36:15	21:37:25	22:58:24 05:55:15
52°	01:40:40	02:50:46	03:37:18	20:03:18	20:50:03	22:00:53	23:09:51 05:43:19
54°	01:08:27	02:34:45	03:26:03	20:14:38	21:06:15	22:34:03	23:22:51 05:29:43
56°	—:—	02:15:22	03:13:10	20:27:39	21:25:53	—:—	23:37:49 05:13:57
58°	—:—	01:50:44	02:58:08	20:42:50	21:50:58	—:—	23:55:29 04:55:11
S 60°	—:—	01:15:56	02:40:08	21:01:02	22:26:48	—:—	.. .. 04:32:00

Dec 03	SHA	Mer.pass
Venus	137°46.5	10:00:10
Mars	343°53.7	20:12:39
Jupiter	61°20.5	15:03:34
Saturn	59°12.7	15:11:47

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
02	10:38	10:26	11:49:34	01:09:14	13:35:22	17(96%)
03	10:14	10:02	11:49:58	02:01:52	14:28:34	18(91%)

# 2020 December 04 to Dec. 05

04 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	07:59:51	10:05:54	■	■	13:34:14	15:40:14	□
N 70°	07:42:30	09:21:53	■	■	14:18:18	15:57:38	□
68°	07:28:31	08:52:39	10:58:17	12:41:58	14:47:35	16:11:40	□
66°	07:16:54	08:30:40	09:58:31	13:41:46	15:09:35	16:23:20	16:32:31 14:19:00
64°	07:07:00	08:13:08	09:25:01	14:15:18	15:27:09	16:33:16	17:24:43 13:26:21
62°	06:58:24	07:58:37	09:00:40	14:39:40	15:41:42	16:41:53	17:56:36 12:54:03
60°	06:50:49	07:46:17	08:41:28	14:58:53	15:54:04	16:49:30	18:20:18 12:29:58
N 58°	06:44:02	07:35:35	08:25:37	15:14:46	16:04:47	16:56:19	18:39:16 12:10:40
56°	06:37:54	07:26:10	08:12:09	15:28:15	16:14:13	17:02:28	18:55:03 11:54:32
54°	06:32:17	07:17:46	08:00:28	15:39:57	16:22:39	17:08:07	19:08:34 11:40:43
52°	06:27:06	07:10:11	07:50:11	15:50:15	16:30:14	17:13:19	19:20:21 11:28:39
50°	06:22:17	07:03:17	07:40:59	15:59:28	16:37:10	17:18:09	19:30:48 11:17:56
45°	06:11:28	06:48:18	07:21:36	16:18:53	16:52:11	17:29:00	19:52:36 10:55:31
N 40°	06:01:55	06:35:39	07:05:49	16:34:42	17:04:52	17:38:36	20:10:09 10:37:25
35°	05:53:13	06:24:37	06:52:27	16:48:05	17:15:56	17:47:20	20:24:53 10:22:11
30°	05:45:04	06:14:42	06:40:47	16:59:47	17:25:53	17:55:31	20:37:39 10:08:57
20°	05:29:38	05:56:56	06:20:44	17:19:54	17:43:42	18:11:00	20:59:25 09:46:18
N 10°	05:14:23	05:40:33	06:03:11	17:37:30	18:00:08	18:26:18	21:18:15 09:26:37
0°	04:58:19	05:24:19	05:46:39	17:54:05	18:16:25	18:42:26	21:35:49 09:08:11
S 10°	04:40:19	05:07:09	05:30:00	18:10:47	18:33:39	19:00:31	21:53:22 08:49:41
20°	04:18:51	04:47:44	05:12:02	18:28:49	18:53:09	19:22:04	22:12:06 08:29:48
30°	03:51:17	04:24:06	04:51:11	18:49:45	19:16:53	19:49:46	22:33:39 08:06:47
35°	03:33:40	04:09:40	04:38:54	19:02:05	19:31:23	20:07:28	22:46:14 07:53:14
40°	03:11:55	03:52:31	04:24:44	19:16:20	19:48:37	20:29:21	23:00:41 07:37:35
45°	02:43:32	03:31:22	04:07:49	19:33:20	20:09:54	20:57:56	23:17:49 07:18:51
S 50°	02:02:37	03:03:48	03:46:48	19:54:30	20:37:40	21:39:18	23:38:57 06:55:26
52°	01:39:08	02:49:59	03:36:44	20:04:38	20:51:37	22:03:11	23:49:01 06:44:10
54°	01:05:58	02:33:45	03:25:22	20:16:06	21:08:00	22:37:20	.. .. 06:31:22
56°	—:—	02:14:06	03:12:21	20:29:14	21:27:54	—:—	.. .. 06:16:35
58°	—:—	01:49:01	02:57:08	20:44:35	21:53:26	—:—	.. .. 05:59:08
S 60°	—:—	01:13:10	02:38:54	21:03:02	22:30:21	—:—	00:17:00 05:37:51

Dec 04	SHA	Mer.pass
Venus	136°33.1	10:01:08
Mars	343°41.8	20:09:32
Jupiter	61°07.9	15:00:28
Saturn	59°06.9	15:08:14

05 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:02:15	10:10:21	■	■	13:30:39	15:38:41	□
N 70°	07:44:36	09:24:53	■	■	14:16:09	15:56:23	□
68°	07:30:25	08:55:04	11:05:36	12:35:30	14:46:00	16:10:38	17:56:20 14:45:57
66°	07:18:37	08:32:45	10:01:46	13:39:22	15:08:22	16:22:28	18:38:56 14:02:30
64°	07:08:35	08:14:59	09:27:28	14:13:41	15:26:10	16:32:32	19:07:28 13:33:12
62°	06:59:53	08:00:17	09:02:44	14:38:27	15:40:53	16:41:16	19:29:09 13:10:50
60°	06:52:12	07:47:49	08:43:16	14:57:56	15:53:23	16:48:58	19:46:36 12:52:45
N 58°	06:45:20	07:37:00	08:27:14	15:13:59	16:04:12	16:55:52	20:01:10 12:37:37
56°	06:39:07	07:27:30	08:13:38	15:27:36	16:13:44	17:02:06	20:13:37 12:24:38
54°	06:33:27	07:19:01	08:01:51	15:39:25	16:22:14	17:07:48	20:24:28 12:13:17
52°	06:28:12	07:11:22	07:51:28	15:49:49	16:29:54	17:13:03	20:34:02 12:03:14
50°	06:23:20	07:04:24	07:42:12	15:59:06	16:36:53	17:17:56	20:42:36 11:54:14
45°	06:12:25	06:49:17	07:22:39	16:18:41	16:52:02	17:28:54	21:00:41 11:35:09
N 40°	06:02:46	06:36:33	07:06:45	16:34:36	17:04:48	17:38:35	21:15:24 11:19:33
35°	05:53:59	06:25:25	06:53:18	16:48:05	17:15:58	17:47:24	21:27:50 11:06:18
30°	05:45:46	06:15:25	06:41:33	16:59:52	17:25:59	17:55:39	21:38:39 10:54:44
20°	05:30:13	05:57:32	06:21:21	17:20:06	17:43:56	18:11:15	21:57:10 10:34:50
N 10°	05:14:52	05:41:02	06:03:42	17:37:49	18:00:29	18:26:40	22:13:13 10:17:26
0°	04:58:41	05:24:42	05:47:04	17:54:30	18:16:52	18:42:54	22:28:12 10:01:06
S 10°	04:40:34	05:07:26	05:30:18	18:11:19	18:34:12	19:01:05	22:43:09 09:44:41
20°	04:18:58	04:47:54	05:12:13	18:29:27	18:53:48	19:22:46	22:59:04 09:27:03
30°	03:51:14	04:24:07	04:51:14	18:50:31	19:17:41	19:50:37	23:17:17 09:06:38
35°	03:33:30	04:09:35	04:38:52	19:02:56	19:32:16	20:08:26	23:27:52 08:54:40
40°	03:11:36	03:52:19	04:24:36	19:17:17	19:49:37	20:30:28	23:39:57 08:40:52
45°	02:42:58	03:31:00	04:07:34	19:34:24	20:11:04	20:59:18	23:54:08 08:24:27
S 50°	02:01:35	03:03:12	03:46:22	19:55:43	20:39:04	21:41:07	.. .. 08:04:08
52°	01:37:41	02:49:15	03:36:13	20:05:57	20:53:08	22:05:24	.. .. 07:54:26
54°	01:03:32	02:32:50	03:24:45	20:17:30	21:09:42	22:40:33	00:00:18 07:43:31
56°	—:—	02:12:55	03:11:36	20:30:46	21:29:52	—:—	00:13:08 07:31:05
58°	—:—	01:47:23	02:56:13	20:46:17	21:55:50	—:—	00:28:01 07:16:38
S 60°	—:—	01:10:27	02:37:45	21:04:57	22:33:51	—:—	00:45:38 06:59:29

Dec 05	SHA	Mer.pass
Venus	135°19.4	10:02:07
Mars	343°29.3	20:06:28
Jupiter	60°55.2	14:57:23
Saturn	59°00.9	15:04:42

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
04	09:50	09:38	11:50:22	02:55:20	15:22:01	19(84%)
05	09:26	09:13	11:50:47	03:48:30	16:14:41	20(76%)

# 2020 December 06 to Dec. 07

06 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	08:04:34	10:14:44	■	■	13:27:09	15:37:16	18:57:56
N 70°	07:46:38	09:27:48	■	■	14:14:07	15:55:14	19:43:23
68°	07:32:14	08:57:25	11:13:40	12:28:18	14:44:33	16:09:41	20:12:52
66°	07:20:17	08:34:45	10:04:57	13:37:03	15:07:14	16:21:40	20:34:44
64°	07:10:07	08:16:46	09:29:51	14:12:11	15:25:15	16:31:52	20:51:59
62°	07:01:18	08:01:54	09:04:43	14:37:20	15:40:08	16:40:42	21:06:08
60°	06:53:32	07:49:18	08:45:01	14:57:03	15:52:46	16:48:30	21:18:02
N 58°	06:46:35	07:38:23	08:28:48	15:13:17	16:03:42	16:55:28	21:28:15
56°	06:40:19	07:28:47	08:15:04	15:27:02	16:13:19	17:01:46	21:37:09
54°	06:34:34	07:20:13	08:03:11	15:38:57	16:21:53	17:07:32	21:45:02
52°	06:29:17	07:12:31	07:52:42	15:49:26	16:29:37	17:12:50	21:52:04
50°	06:24:22	07:05:29	07:43:22	15:58:47	16:36:39	17:17:46	21:58:25
45°	06:13:20	06:50:15	07:23:40	16:18:31	16:51:56	17:28:51	22:11:59
N 40°	06:03:36	06:37:25	07:07:40	16:34:33	17:04:48	17:38:37	22:23:08
35°	05:54:44	06:26:13	06:54:07	16:48:07	17:16:02	17:47:30	22:32:37
30°	05:46:27	06:16:09	06:42:18	16:59:58	17:26:07	17:55:49	22:40:55
20°	05:30:48	05:58:08	06:21:59	17:20:20	17:44:11	18:11:32	22:55:10
N 10°	05:15:20	05:41:32	06:04:13	17:38:09	18:00:50	18:27:02	23:07:35
0°	04:59:03	05:25:06	05:47:29	17:54:55	18:17:19	18:43:22	23:19:11
S 10°	04:40:50	05:07:43	05:30:37	18:11:50	18:34:45	19:01:39	23:30:44
20°	04:19:07	04:48:05	05:12:26	18:30:05	18:54:27	19:23:27	23:43:01
30°	03:51:13	04:24:09	04:51:19	18:51:17	19:18:28	19:51:28	23:57:00
35°	03:33:23	04:09:32	04:38:52	19:03:46	19:33:09	20:09:23	.. ..
40°	03:11:19	03:52:10	04:24:30	19:18:12	19:50:36	20:31:34	.. ..
45°	02:42:28	03:30:42	04:07:21	19:35:26	20:12:11	21:00:36	.. ..
S 50°	02:00:37	03:02:40	03:46:00	19:56:55	20:40:24	21:42:52	00:11:25
52°	01:36:19	02:48:35	03:35:45	20:07:13	20:54:36	22:07:33	00:19:32
54°	01:01:09	02:32:00	03:24:11	20:18:52	21:11:20	22:43:44	00:28:33
56°	—:—	02:11:49	03:10:55	20:32:15	21:31:45	—:—	00:38:40
58°	—:—	01:45:50	02:55:22	20:47:55	21:58:09	—:—	00:50:10
S 60°	—:—	01:07:48	02:36:41	21:06:49	22:37:18	—:—	01:03:27

Dec 06	SHA	Mer.pass
Venus	134°05.4	10:03:06
Mars	343°16.3	20:03:25
Jupiter	60°42.4	14:54:18
Saturn	58°54.9	15:01:10

07 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		
	Naut.	Civil			Civil	Naut.	
N 72°	08:06:46	10:19:01	■	■	13:23:46	15:35:57	21:40:27
N 70°	07:48:35	09:30:37	■	■	14:12:12	15:54:12	21:59:16
68°	07:33:59	08:59:39	11:23:05	12:19:47	14:43:11	16:08:50	22:13:55
66°	07:21:53	08:36:41	10:08:01	13:34:52	15:06:11	16:20:58	22:25:45
64°	07:11:36	08:18:28	09:32:08	14:10:47	15:24:25	16:31:17	22:35:34
62°	07:02:41	08:03:27	09:06:38	14:36:18	15:39:28	16:40:13	22:43:54
60°	06:54:50	07:50:43	08:46:41	14:56:16	15:52:13	16:48:06	22:51:03
N 58°	06:47:49	07:39:43	08:30:19	15:12:39	16:03:15	16:55:08	22:57:19
56°	06:41:28	07:30:02	08:16:28	15:26:31	16:12:57	17:01:30	23:02:50
54°	06:35:40	07:21:24	08:04:28	15:38:32	16:21:36	17:07:19	23:07:46
52°	06:30:20	07:13:37	07:53:55	15:49:06	16:29:23	17:12:40	23:12:13
50°	06:25:22	07:06:33	07:44:30	15:58:32	16:36:29	17:17:39	23:16:15
45°	06:14:14	06:51:12	07:24:40	16:18:23	16:51:51	17:28:49	23:24:56
N 40°	06:04:25	06:38:16	07:08:34	16:34:32	17:04:49	17:38:40	23:32:09
35°	05:55:29	06:26:59	06:54:56	16:48:11	17:16:07	17:47:37	23:38:19
30°	05:47:08	06:16:51	06:43:02	17:00:06	17:26:17	17:56:00	23:43:44
20°	05:31:22	05:58:44	06:22:36	17:20:35	17:44:27	18:11:49	23:53:05
N 10°	05:15:49	05:42:02	06:04:44	17:38:30	18:01:11	18:27:25	.. ..
0°	04:59:26	05:25:31	05:47:54	17:55:22	18:17:46	18:43:51	.. ..
S 10°	04:41:07	05:08:02	05:30:57	18:12:22	18:35:17	19:02:14	.. ..
20°	04:19:17	04:48:17	05:12:40	18:30:42	18:55:06	19:24:08	.. ..
30°	03:51:14	04:24:14	04:51:25	18:52:01	19:19:15	19:52:18	.. ..
35°	03:33:17	04:09:31	04:38:54	19:04:35	19:34:00	20:10:19	00:05:05
40°	03:11:05	03:52:03	04:24:27	19:19:06	19:51:34	20:32:37	00:14:15
45°	02:42:01	03:30:26	04:07:11	19:36:27	20:13:17	21:01:53	00:24:57
S 50°	01:59:44	03:02:11	03:45:41	19:58:04	20:41:42	21:44:34	00:37:49
52°	01:35:02	02:47:59	03:35:21	20:08:27	20:56:01	22:09:38	00:43:47
54°	00:58:50	02:31:14	03:23:42	20:20:11	21:12:55	22:46:51	00:50:22
56°	—:—	02:10:48	03:10:18	20:33:41	21:33:34	—:—	00:57:41
58°	—:—	01:44:23	02:54:36	20:49:30	22:00:24	—:—	01:05:52
S 60°	—:—	01:05:13	02:35:42	21:08:36	22:40:41	—:—	01:15:10

Dec 07	SHA	Mer.pass
Venus	132°51.2	10:04:08
Mars	343°02.7	20:00:25
Jupiter	60°29.6	14:51:14
Saturn	58°48.9	14:57:39

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
06	09:01	08:48	11:51:12	04:40:32	17:06:00	21(66%)
07	08:35	08:22	11:51:38	05:31:08	17:55:58	22(56%)

# 2020 December 08 to Dec. 09

08 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:08:53	10:23:12	■	■	13:20:29	15:34:45	23:57:31
N 70°	07:50:26	09:33:18	■	■	14:10:25	15:53:15	.. ..
68°	07:35:39	09:01:49	11:35:57	12:07:49	14:41:57	16:08:04	.. ..
66°	07:23:25	08:38:32	10:11:00	13:32:48	15:05:15	16:20:20	.. ..
64°	07:13:01	08:20:07	09:34:20	14:09:29	15:23:41	16:30:46	.. ..
62°	07:04:00	08:04:57	09:08:28	14:35:22	15:38:53	16:39:48	.. ..
60°	06:56:04	07:52:06	08:48:18	14:55:33	15:51:44	16:47:45	.. ..
N 58°	06:48:59	07:41:00	08:31:47	15:12:06	16:02:52	16:54:52	.. ..
56°	06:42:35	07:31:14	08:17:48	15:26:05	16:12:39	17:01:17	.. ..
54°	06:36:44	07:22:32	08:05:43	15:38:11	16:21:21	17:07:09	.. ..
52°	06:31:21	07:14:42	07:55:05	15:48:50	16:29:12	17:12:33	.. ..
50°	06:26:20	07:07:34	07:45:36	15:58:19	16:36:21	17:17:35	.. ..
45°	06:15:07	06:52:07	07:25:39	16:18:19	16:51:50	17:28:50	.. ..
N 40°	06:05:13	06:39:06	07:09:26	16:34:33	17:04:52	17:38:45	.. ..
35°	05:56:13	06:27:45	06:55:43	16:48:17	17:16:15	17:47:47	.. ..
30°	05:47:49	06:17:33	06:43:46	17:00:16	17:26:28	17:56:12	.. ..
20°	05:31:57	05:59:20	06:23:13	17:20:51	17:44:44	18:12:08	.. ..
N 10°	05:16:18	05:42:32	06:05:15	17:38:51	18:01:34	18:27:49	00:01:15
0°	04:59:50	05:25:56	05:48:20	17:55:48	18:18:13	18:44:20	00:08:54
S 10°	04:41:25	05:08:22	05:31:18	18:12:54	18:35:50	19:02:48	00:16:31
20°	04:19:29	04:48:30	05:12:55	18:31:20	18:55:45	19:24:48	00:24:36
30°	03:51:17	04:24:20	04:51:33	18:52:45	19:20:01	19:53:06	00:33:47
35°	03:33:15	04:09:33	04:38:59	19:05:23	19:34:51	20:11:13	00:39:04
40°	03:10:55	03:51:58	04:24:26	19:19:59	19:52:30	20:33:39	00:45:02
45°	02:41:38	03:30:13	04:07:04	19:37:25	20:14:20	21:03:06	00:51:57
S 50°	01:58:55	03:01:47	03:45:25	19:59:11	20:42:57	21:46:12	01:00:13
52°	01:33:50	02:47:27	03:35:01	20:09:38	20:57:23	22:11:38	01:04:01
54°	00:56:37	02:30:32	03:23:16	20:21:27	21:14:26	22:49:54	01:08:11
56°	—:—	02:09:52	03:09:45	20:35:03	21:35:19	—:—	01:12:46
58°	—:—	01:43:02	02:53:55	20:51:01	22:02:33	—:—	01:17:53
S 60°	—:—	01:02:44	02:34:48	21:10:19	22:43:59	—:—	01:23:36

Dec 08	SHA	Mer.pass
Venus	131°36.6	10:05:10
Mars	342°48.7	19:57:27
Jupiter	60°16.7	14:48:09
Saturn	58°42.8	14:54:07

09 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:10:54	10:27:16	■	■	13:17:21	15:33:41	.. ..
N 70°	07:52:13	09:35:52	■	■	14:08:47	15:52:24	00:04:24
68°	07:37:15	09:03:52	■	■	14:40:49	16:07:23	00:09:59
66°	07:24:53	08:40:18	10:13:51	13:30:52	15:04:24	16:19:48	00:14:38
64°	07:14:23	08:21:41	09:36:26	14:08:18	15:23:02	16:30:20	00:18:33
62°	07:05:17	08:06:23	09:10:13	14:34:32	15:38:22	16:39:27	00:21:55
60°	06:57:16	07:53:25	08:49:51	14:54:55	15:51:20	16:47:29	00:24:51
N 58°	06:50:07	07:42:14	08:33:10	15:11:37	16:02:33	16:54:39	00:27:26
56°	06:43:39	07:32:24	08:19:05	15:25:43	16:12:24	17:01:07	00:29:44
54°	06:37:46	07:23:38	08:06:54	15:37:54	16:21:10	17:07:02	00:31:48
52°	06:32:20	07:15:45	07:56:12	15:48:37	16:29:05	17:12:29	00:33:40
50°	06:27:17	07:08:34	07:46:40	15:58:10	16:36:16	17:17:33	00:35:22
45°	06:15:58	06:53:01	07:26:35	16:18:17	16:51:51	17:28:53	00:39:03
N 40°	06:06:00	06:39:55	07:10:17	16:34:36	17:04:58	17:38:53	00:42:07
35°	05:56:57	06:28:30	06:56:30	16:48:24	17:16:24	17:47:58	00:44:46
30°	05:48:29	06:18:15	06:44:29	17:00:27	17:26:41	17:56:26	00:47:05
20°	05:32:31	05:59:55	06:23:50	17:21:08	17:45:03	18:12:27	00:51:08
N 10°	05:16:47	05:43:03	06:05:46	17:39:14	18:01:57	18:28:14	00:54:40
0°	05:00:14	05:26:21	05:48:47	17:56:15	18:18:42	18:44:49	00:58:00
S 10°	04:41:44	05:08:42	05:31:39	18:13:25	18:36:23	19:03:22	01:01:20
20°	04:19:42	04:48:45	05:13:11	18:31:57	18:56:23	19:25:28	01:04:52
30°	03:51:22	04:24:28	04:51:43	18:53:28	19:20:45	19:53:54	01:08:53
35°	03:33:14	04:09:36	04:39:05	19:06:09	19:35:40	20:12:06	01:11:12
40°	03:10:47	03:51:56	04:24:27	19:20:50	19:53:24	20:34:39	01:13:48
45°	02:41:18	03:30:04	04:06:59	19:38:22	20:15:22	21:04:17	01:16:49
S 50°	01:58:11	03:01:26	03:45:12	20:00:15	20:44:09	21:47:45	01:20:24
52°	01:32:45	02:46:59	03:34:44	20:10:46	20:58:42	22:13:33	01:22:03
54°	00:54:28	02:29:55	03:22:54	20:22:41	21:15:53	22:52:52	01:23:51
56°	—:—	02:09:02	03:09:17	20:36:22	21:36:59	—:—	01:25:49
58°	—:—	01:41:47	02:53:19	20:52:28	22:04:36	—:—	01:28:00
S 60°	—:—	01:00:20	02:34:00	21:11:57	22:47:12	—:—	01:30:26

Dec 09	SHA	Mer.pass
Venus	130°21.7	10:06:13
Mars	342°34.1	19:54:31
Jupiter	60°03.7	14:45:05
Saturn	58°36.6	14:50:36

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
08	08:09	07:56	11:52:04	06:20:35	18:45:07	23(45%)
09	07:42	07:29	11:52:31	07:09:40	19:34:22	24(34%)

# 2020 December 10 to Dec. 11

10 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:12:48	10:31:12	■	■	13:14:22	15:32:43	02:10:50
N 70°	07:53:54	09:38:18	■	■	14:07:17	15:51:40	02:08:09
68°	07:38:47	09:05:49	■	■	14:39:48	16:06:49	02:05:58
66°	07:26:17	08:41:58	10:16:35	13:29:04	15:03:40	16:19:20	02:04:08
64°	07:15:41	08:23:11	09:38:25	14:07:15	15:22:28	16:29:58	02:02:36
62°	07:06:30	08:07:45	09:11:53	14:33:48	15:37:56	16:39:10	02:01:16
60°	06:58:25	07:54:41	08:51:19	14:54:23	15:51:00	16:47:16	02:00:07
N 58°	06:51:12	07:43:25	08:34:30	15:11:12	16:02:18	16:54:29	01:59:06
56°	06:44:42	07:33:30	08:20:19	15:25:25	16:12:13	17:01:01	01:58:12
54°	06:38:45	07:24:41	08:08:03	15:37:41	16:21:03	17:06:58	01:57:24
52°	06:33:17	07:16:45	07:57:17	15:48:28	16:29:00	17:12:28	01:56:40
50°	06:28:11	07:09:32	07:47:41	15:58:04	16:36:14	17:17:34	01:56:00
45°	06:16:48	06:53:53	07:27:30	16:18:17	16:51:54	17:28:59	01:54:34
N 40°	06:06:46	06:40:43	07:11:07	16:34:42	17:05:05	17:39:02	01:53:23
35°	05:57:39	06:29:14	06:57:16	16:48:34	17:16:35	17:48:10	01:52:22
30°	05:49:09	06:18:56	06:45:11	17:00:40	17:26:55	17:56:42	01:51:29
20°	05:33:06	06:00:31	06:24:26	17:21:27	17:45:22	18:12:48	01:49:59
N 10°	05:17:17	05:43:34	06:06:18	17:39:37	18:02:22	18:28:39	01:48:40
0°	05:00:39	05:26:47	05:49:14	17:56:43	18:19:10	18:45:18	01:47:29
S 10°	04:42:05	05:09:04	05:32:02	18:13:57	18:36:56	19:03:56	01:46:18
20°	04:19:56	04:49:02	05:13:29	18:32:33	18:57:01	19:26:08	01:45:05
30°	03:51:29	04:24:38	04:51:55	18:54:10	19:21:29	19:54:40	01:43:44
35°	03:33:16	04:09:42	04:39:13	19:06:55	19:36:27	20:12:57	01:42:58
40°	03:10:42	03:51:57	04:24:31	19:21:39	19:54:17	20:35:36	01:42:07
45°	02:41:03	03:29:58	04:06:57	19:39:17	20:16:21	21:05:25	01:41:08
S 50°	01:57:33	03:01:09	03:45:03	20:01:17	20:45:18	21:49:15	01:39:59
52°	01:31:45	02:46:36	03:34:31	20:11:52	20:59:57	22:15:22	01:39:27
54°	00:52:25	02:29:23	03:22:36	20:23:51	21:17:16	22:55:43	01:38:53
56°	—:—	02:08:17	03:08:53	20:37:38	21:38:34	—:—	01:38:16
58°	—:—	01:40:39	02:52:47	20:53:51	22:06:34	—:—	01:37:34
S 60°	—:—	00:58:03	02:33:18	21:13:30	22:50:17	—:—	01:36:48

Dec 10	SHA	Mer.pass
Venus	129°06.5	10:07:18
Mars	342°18.9	19:51:37
Jupiter	59°50.6	14:42:02
Saturn	58°30.4	14:47:05

11 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:14:36	10:34:58	■	■	13:11:33	15:31:53	04:30:41
N 70°	07:55:29	09:40:37	■	■	14:05:56	15:51:02	04:17:04
68°	07:40:13	09:07:39	■	■	14:38:55	16:06:19	04:06:14
66°	07:27:37	08:43:33	10:19:10	13:27:26	15:03:02	16:18:58	03:57:22
64°	07:16:55	08:24:36	09:40:19	14:06:18	15:22:00	16:29:41	03:49:56
62°	07:07:39	08:09:02	09:13:28	14:33:10	15:37:35	16:38:57	03:43:37
60°	06:59:31	07:55:53	08:52:43	14:53:56	15:50:45	16:47:07	03:38:09
N 58°	06:52:15	07:44:32	08:35:47	15:10:53	16:02:07	16:54:23	03:33:22
56°	06:45:41	07:34:34	08:21:29	15:25:11	16:12:06	17:00:58	03:29:07
54°	06:39:42	07:25:42	08:09:09	15:37:32	16:20:59	17:06:58	03:25:20
52°	06:34:11	07:17:43	07:58:19	15:48:22	16:28:58	17:12:29	03:21:55
50°	06:29:04	07:10:27	07:48:40	15:58:02	16:36:15	17:17:37	03:18:48
45°	06:17:36	06:54:43	07:28:23	16:18:21	16:52:00	17:29:07	03:12:06
N 40°	06:07:31	06:41:29	07:11:55	16:34:50	17:05:15	17:39:13	03:06:33
35°	05:58:21	06:29:57	06:58:00	16:48:46	17:16:49	17:48:25	03:01:48
30°	05:49:48	06:19:36	06:45:52	17:00:55	17:27:11	17:56:59	02:57:38
20°	05:33:40	06:01:06	06:25:02	17:21:46	17:45:43	18:13:09	02:50:29
N 10°	05:17:47	05:44:04	06:06:50	17:40:01	18:02:46	18:29:04	02:44:15
0°	05:01:05	05:27:14	05:49:41	17:57:11	18:19:39	18:45:48	02:38:28
S 10°	04:42:26	05:09:26	05:32:25	18:14:29	18:37:29	19:04:30	02:32:44
20°	04:20:12	04:49:19	05:13:47	18:33:09	18:57:38	19:26:47	02:26:41
30°	03:51:38	04:24:49	04:52:08	18:54:52	19:22:12	19:55:25	02:19:52
35°	03:33:21	04:09:50	04:39:23	19:07:39	19:37:14	20:13:46	02:15:58
40°	03:10:40	03:52:00	04:24:37	19:22:28	19:55:07	20:36:32	02:11:35
45°	02:40:51	03:29:54	04:06:58	19:40:10	20:17:18	21:06:30	02:06:31
S 50°	01:57:00	03:00:56	03:44:57	20:02:16	20:46:24	21:50:39	02:00:31
52°	01:30:52	02:46:17	03:34:22	20:12:54	21:01:08	22:17:06	01:57:46
54°	00:50:30	02:28:57	03:22:22	20:24:57	21:18:35	22:58:28	01:54:45
56°	—:—	02:07:38	03:08:34	20:38:50	21:40:04	—:—	01:51:27
58°	—:—	01:39:38	02:52:21	20:55:09	22:08:24	—:—	01:47:47
S 60°	—:—	00:55:54	02:32:41	21:14:58	22:53:16	—:—	01:43:42

Dec 11	SHA	Mer.pass
Venus	127°51.1	10:08:24
Mars	342°03.3	19:48:45
Jupiter	59°37.5	14:38:58
Saturn	58°24.1	14:43:34

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
10	07:15	07:02	11:52:58	07:59:23	20:24:50	25(23%)
11	06:48	06:34	11:53:26	08:50:53	21:17:38	26(14%)

12 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:16:17	10:38:34	■	■	13:08:56	15:31:11	07:14:04
N 70°	07:56:59	09:42:46	■	■	14:04:45	15:50:30	06:40:05
68°	07:41:35	09:09:22	■	■	14:38:10	16:05:56	06:15:59
66°	07:28:52	08:45:03	10:21:36	13:25:58	15:02:30	16:18:40	05:57:29
64°	07:18:05	08:25:57	09:42:05	14:05:30	15:21:38	16:29:28	05:42:36
62°	07:08:46	08:10:16	09:14:58	14:32:38	15:37:19	16:38:49	05:30:16
60°	07:00:34	07:57:02	08:54:02	14:53:34	15:50:34	16:47:01	05:19:49
N 58°	06:53:15	07:45:37	08:36:59	15:10:38	16:02:00	16:54:21	05:10:48
56°	06:46:39	07:35:35	08:22:36	15:25:01	16:12:02	17:00:58	05:02:54
54°	06:40:37	07:26:40	08:10:12	15:37:26	16:20:58	17:07:00	04:55:54
52°	06:35:04	07:18:39	07:59:19	15:48:20	16:29:00	17:12:34	04:49:38
50°	06:29:55	07:11:21	07:49:37	15:58:02	16:36:19	17:17:44	04:43:58
45°	06:18:23	06:55:32	07:29:14	16:18:27	16:52:08	17:29:17	04:31:52
N 40°	06:08:15	06:42:15	07:12:42	16:35:00	17:05:27	17:39:27	04:21:55
35°	05:59:02	06:30:39	06:58:43	16:48:59	17:17:03	17:48:41	04:13:26
30°	05:50:26	06:20:15	06:46:33	17:01:11	17:27:28	17:57:17	04:06:02
20°	05:34:14	06:01:41	06:25:38	17:22:07	17:46:05	18:13:32	03:53:19
N 10°	05:18:17	05:44:35	06:07:21	17:40:25	18:03:12	18:29:31	03:42:17
0°	05:01:31	05:27:41	05:50:09	17:57:39	18:20:08	18:46:18	03:32:02
S 10°	04:42:48	05:09:49	05:32:49	18:15:01	18:38:01	19:05:04	03:21:51
20°	04:20:30	04:49:38	05:14:07	18:33:45	18:58:15	19:27:25	03:11:05
30°	03:51:49	04:25:03	04:52:23	18:55:32	19:22:54	19:56:09	02:58:54
35°	03:33:28	04:10:00	04:39:35	19:08:23	19:37:59	20:14:34	02:51:54
40°	03:10:41	03:52:06	04:24:45	19:23:14	19:55:56	20:37:25	02:43:58
45°	02:40:42	03:29:54	04:07:02	19:41:01	20:18:12	21:07:31	02:34:47
S 50°	01:56:32	03:00:47	03:44:54	20:03:13	20:47:27	21:51:59	02:23:47
52°	01:30:05	02:46:02	03:34:16	20:13:54	21:02:16	22:18:43	02:18:43
54°	00:48:42	02:28:35	03:22:12	20:26:01	21:19:50	23:01:05	02:13:09
56°	—:—	02:07:05	03:08:19	20:39:58	21:41:29	—:—	02:06:59
58°	—:—	01:38:44	02:51:59	20:56:24	22:10:08	—:—	02:00:07
S 60°	—:—	00:53:53	02:32:10	21:16:21	22:56:05	—:—	01:52:22

Dec 12	SHA	Mer.pass
Venus	126°35.3	10:09:31
Mars	341°47.2	19:45:55
Jupiter	59°24.3	14:35:55
Saturn	58°17.8	14:40:03

13 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:17:51	10:41:57	■	■	13:06:31	15:30:36	■
N 70°	07:58:23	09:44:47	■	■	14:03:43	15:50:05	10:13:44
68°	07:42:52	09:10:59	■	■	14:37:32	16:05:38	08:45:59
66°	07:30:03	08:46:27	10:23:53	13:24:40	15:02:05	16:18:28	08:07:47
64°	07:19:12	08:27:12	09:43:44	14:04:49	15:21:21	16:29:20	07:41:11
62°	07:09:49	08:11:26	09:16:21	14:32:12	15:37:08	16:38:44	07:20:41
60°	07:01:33	07:58:07	08:55:17	14:53:18	15:50:27	16:47:00	07:04:03
N 58°	06:54:12	07:46:38	08:38:07	15:10:28	16:01:57	16:54:22	06:50:07
56°	06:47:33	07:36:34	08:23:40	15:24:56	16:12:02	17:01:02	06:38:11
54°	06:41:30	07:27:36	08:11:12	15:37:24	16:21:00	17:07:06	06:27:46
52°	06:35:55	07:19:32	08:00:15	15:48:21	16:29:05	17:12:41	06:18:33
50°	06:30:44	07:12:12	07:50:31	15:58:06	16:36:25	17:17:53	06:10:18
45°	06:19:09	06:56:19	07:30:03	16:18:35	16:52:19	17:29:29	05:52:53
N 40°	06:08:57	06:42:58	07:13:27	16:35:12	17:05:41	17:39:42	05:38:43
35°	05:59:42	06:31:20	06:59:26	16:49:14	17:17:20	17:48:58	05:26:45
30°	05:51:04	06:20:54	06:47:12	17:01:29	17:27:47	17:57:37	05:16:21
20°	05:34:47	06:02:15	06:26:13	17:22:29	17:46:27	18:13:55	04:58:34
N 10°	05:18:47	05:45:06	06:07:53	17:40:51	18:03:38	18:29:57	04:43:12
0°	05:01:58	05:28:09	05:50:37	17:58:08	18:20:37	18:46:48	04:28:54
S 10°	04:43:11	05:10:14	05:33:14	18:15:33	18:38:34	19:05:37	04:14:42
20°	04:20:49	04:49:58	05:14:28	18:34:21	18:58:51	19:28:02	03:59:37
30°	03:52:03	04:25:18	04:52:40	18:56:12	19:23:35	19:56:52	03:42:28
35°	03:33:37	04:10:12	04:39:49	19:09:05	19:38:42	20:15:20	03:32:33
40°	03:10:45	03:52:14	04:24:56	19:23:59	19:56:44	20:38:16	03:21:15
45°	02:40:38	03:29:57	04:07:08	19:41:50	20:19:04	21:08:30	03:08:03
S 50°	01:56:10	03:00:41	03:44:55	20:04:07	20:48:26	21:53:14	02:52:04
52°	01:29:25	02:45:52	03:34:14	20:14:51	21:03:20	22:20:14	02:44:36
54°	00:47:03	02:28:18	03:22:07	20:27:01	21:21:00	23:03:33	02:36:20
56°	—:—	02:06:38	03:08:09	20:41:02	21:42:49	—:—	02:27:06
58°	—:—	01:37:58	02:51:43	20:57:33	22:11:45	—:—	02:16:40
S 60°	—:—	00:52:01	02:31:45	21:17:39	22:58:44	—:—	02:04:43

Dec 13	SHA	Mer.pass
Venus	125°19.2	10:10:39
Mars	341°30.6	19:43:06
Jupiter	59°11.0	14:32:52
Saturn	58°11.4	14:36:33

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
12	06:20	06:06	11:53:54	09:45:12	22:13:37	27(7%)
13	05:52	05:37	11:54:23	10:42:54	23:12:57	28(2%)

# 2020 December 14 to Dec. 15

14 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:19:18	10:45:06	■	■	13:04:22	15:30:08	■
N 70°	07:59:41	09:46:38	■	■	14:02:52	15:49:47	■
68°	07:44:03	09:12:28	■	■	14:37:02	16:05:26	■
66°	07:31:09	08:47:45	10:25:59	13:23:33	15:01:46	16:18:21	10:37:01
64°	07:20:14	08:28:23	09:45:16	14:04:16	15:21:09	16:29:17	09:42:12
62°	07:10:48	08:12:31	09:17:39	14:31:53	15:37:01	16:38:44	09:09:33
60°	07:02:30	07:59:08	08:56:27	14:53:07	15:50:25	16:47:03	08:45:25
N 58°	06:55:06	07:47:36	08:39:11	15:10:23	16:01:58	16:54:27	08:26:12
56°	06:48:25	07:37:29	08:24:40	15:24:55	16:12:06	17:01:09	08:10:13
54°	06:42:20	07:28:28	08:12:08	15:37:26	16:21:06	17:07:15	07:56:34
52°	06:36:43	07:20:22	08:01:09	15:48:26	16:29:13	17:12:51	07:44:40
50°	06:31:31	07:13:01	07:51:23	15:58:13	16:36:35	17:18:04	07:34:08
45°	06:19:52	06:57:05	07:30:50	16:18:47	16:52:32	17:29:44	07:12:11
N 40°	06:09:38	06:43:41	07:14:10	16:35:27	17:05:57	17:39:59	06:54:33
35°	06:00:21	06:32:00	07:00:07	16:49:32	17:17:38	17:49:18	06:39:46
30°	05:51:41	06:21:32	06:47:51	17:01:48	17:28:07	17:57:58	06:26:58
20°	05:35:21	06:02:49	06:26:48	17:22:52	17:46:51	18:14:20	06:05:12
N 10°	05:19:17	05:45:37	06:08:25	17:41:17	18:04:05	18:30:25	05:46:26
0°	05:02:25	05:28:37	05:51:06	17:58:37	18:21:06	18:47:18	05:28:58
S 10°	04:43:35	05:10:38	05:33:40	18:16:05	18:39:06	19:06:10	05:11:35
20°	04:21:09	04:50:20	05:14:51	18:34:55	18:59:27	19:28:39	04:53:05
30°	03:52:18	04:25:35	04:52:58	18:56:50	19:24:14	19:57:33	04:31:54
35°	03:33:49	04:10:27	04:40:04	19:09:45	19:39:24	20:16:04	04:19:33
40°	03:10:52	03:52:25	04:25:09	19:24:43	19:57:29	20:39:05	04:05:24
45°	02:40:38	03:30:03	04:07:18	19:42:36	20:19:54	21:09:25	03:48:42
S 50°	01:55:53	03:00:40	03:44:59	20:04:58	20:49:22	21:54:24	03:28:11
52°	01:28:53	02:45:47	03:34:15	20:15:45	21:04:19	22:21:38	03:18:27
54°	00:45:33	02:28:06	03:22:05	20:27:57	21:22:05	23:05:50	03:07:34
56°	—:—	02:06:17	03:08:03	20:42:02	21:44:02	—:—	02:55:14
58°	—:—	01:37:20	02:51:31	20:58:38	22:13:14	—:—	02:41:00
S 60°	—:—	00:50:21	02:31:26	21:18:51	23:01:11	—:—	02:24:17

Dec 14	SHA	Mer.pass
Venus	124°02.9	10:11:49
Mars	341°13.5	19:40:20
Jupiter	58°57.7	14:29:49
Saturn	58°05.0	14:33:03

15 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:20:38	10:47:59	■	■	13:02:29	15:29:49	■
N 70°	08:00:53	09:48:19	■	■	14:02:11	15:49:35	■
68°	07:45:09	09:13:50	■	■	14:36:40	16:05:20	■
66°	07:32:11	08:48:57	10:27:54	13:22:38	15:01:34	16:18:19	■
64°	07:21:13	08:29:28	09:46:41	14:03:51	15:21:03	16:29:18	11:30:01
62°	07:11:43	08:13:32	09:18:51	14:31:41	15:37:00	16:38:48	10:42:52
60°	07:03:23	08:00:05	08:57:31	14:53:02	15:50:27	16:47:09	10:12:30
N 58°	06:55:57	07:48:30	08:40:11	15:10:22	16:02:03	16:54:36	09:49:27
56°	06:49:14	07:38:21	08:25:36	15:24:58	16:12:13	17:01:19	09:30:48
54°	06:43:07	07:29:18	08:13:02	15:37:32	16:21:16	17:07:26	09:15:06
52°	06:37:30	07:21:11	08:02:00	15:48:34	16:29:24	17:13:04	09:01:34
50°	06:32:16	07:13:47	07:52:11	15:58:23	16:36:47	17:18:18	08:49:41
45°	06:20:35	06:57:48	07:31:35	16:19:01	16:52:48	17:30:01	08:25:05
N 40°	06:10:18	06:44:21	07:14:52	16:35:44	17:06:15	17:40:18	08:05:29
35°	06:00:59	06:32:39	07:00:46	16:49:51	17:17:58	17:49:38	07:49:07
30°	05:52:17	06:22:08	06:48:28	17:02:09	17:28:29	17:58:21	07:34:58
20°	05:35:54	06:03:23	06:27:22	17:23:16	17:47:16	18:14:45	07:10:58
N 10°	05:19:48	05:46:08	06:08:56	17:41:44	18:04:32	18:30:53	06:50:16
0°	05:02:53	05:29:05	05:51:35	17:59:06	18:21:36	18:47:49	06:30:59
S 10°	04:44:00	05:11:04	05:34:06	18:16:36	18:39:38	19:06:43	06:11:46
20°	04:21:31	04:50:42	05:15:14	18:35:30	19:00:02	19:29:14	05:51:14
30°	03:52:35	04:25:54	04:53:18	18:57:27	19:24:52	19:58:13	05:27:35
35°	03:34:03	04:10:43	04:40:22	19:10:25	19:40:05	20:16:47	05:13:43
40°	03:11:02	03:52:38	04:25:24	19:25:24	19:58:12	20:39:51	04:57:45
45°	02:40:41	03:30:12	04:07:30	19:43:21	20:20:41	21:10:17	04:38:43
S 50°	01:55:42	03:00:43	03:45:07	20:05:47	20:50:15	21:55:28	04:15:02
52°	01:28:27	02:45:46	03:34:20	20:16:35	21:05:15	22:22:55	04:03:40
54°	00:44:15	02:28:00	03:22:07	20:28:50	21:23:06	23:07:55	03:50:48
56°	—:—	02:06:02	03:08:02	20:42:58	21:45:10	—:—	03:35:59
58°	—:—	01:36:49	02:51:25	20:59:39	22:14:36	—:—	03:18:35
S 60°	—:—	00:48:52	02:31:13	21:19:57	23:03:25	—:—	02:57:28

Dec 15	SHA	Mer.pass
Venus	122°46.2	10:12:59
Mars	340°56.0	19:37:35
Jupiter	58°44.3	14:26:47
Saturn	57°58.5	14:29:33

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
	mm:ss	mm:ss	hh:mm:ss	hh:mm:ss	hh:mm:ss	
14	05:23	05:09	11:54:51	11:43:37	—:—	29(0%)
15	04:54	04:40	11:55:20	12:45:50	00:14:41	1(1%)



16 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	08:21:51	10:50:35	■	■	13:00:54	15:29:37	■
N 70°	08:01:59	09:49:49	■	■	14:01:40	15:49:30	■
68°	07:46:10	09:15:05	■	■	14:36:26	16:05:19	■
66°	07:33:09	08:50:03	10:29:37	13:21:55	15:01:28	16:18:22	■
64°	07:22:07	08:30:29	09:47:57	14:03:35	15:21:03	16:29:24	12:27:44
62°	07:12:35	08:14:28	09:19:57	14:31:35	15:37:04	16:38:56	11:43:13
60°	07:04:13	08:00:59	08:58:31	14:53:02	15:50:34	16:47:19	11:13:41
N 58°	06:56:45	07:49:21	08:41:06	15:10:27	16:02:12	16:54:48	10:51:04
56°	06:50:01	07:39:09	08:26:28	15:25:05	16:12:24	17:01:32	10:32:39
54°	06:43:53	07:30:05	08:13:52	15:37:42	16:21:28	17:07:41	10:17:06
52°	06:38:14	07:21:56	08:02:48	15:48:46	16:29:38	17:13:20	10:03:40
50°	06:32:59	07:14:32	07:52:58	15:58:37	16:37:03	17:18:35	09:51:51
45°	06:21:15	06:58:29	07:32:18	16:19:17	16:53:06	17:30:20	09:27:21
N 40°	06:10:57	06:45:01	07:15:33	16:36:03	17:06:35	17:40:39	09:07:45
35°	06:01:35	06:33:16	07:01:24	16:50:12	17:18:20	17:50:01	08:51:22
30°	05:52:52	06:22:44	06:49:05	17:02:32	17:28:52	17:58:45	08:37:11
20°	05:36:27	06:03:56	06:27:56	17:23:42	17:47:41	18:15:11	08:13:04
N 10°	05:20:18	05:46:39	06:09:27	17:42:11	18:05:00	18:31:21	07:52:12
0°	05:03:21	05:29:34	05:52:04	17:59:35	18:22:06	18:48:19	07:32:45
S 10°	04:44:26	05:11:30	05:34:33	18:17:08	18:40:10	19:07:16	07:13:19
20°	04:21:53	04:51:06	05:15:38	18:36:03	19:00:36	19:29:49	06:52:29
30°	03:52:54	04:26:15	04:53:40	18:58:04	19:25:29	19:58:51	06:28:25
35°	03:34:20	04:11:02	04:40:42	19:11:02	19:40:44	20:17:27	06:14:16
40°	03:11:15	03:52:54	04:25:42	19:26:04	19:58:53	20:40:34	05:57:56
45°	02:40:48	03:30:25	04:07:44	19:44:03	20:21:25	21:11:05	05:38:23
S 50°	01:55:37	03:00:50	03:45:18	20:06:32	20:51:04	21:56:27	05:13:55
52°	01:28:10	02:45:49	03:34:29	20:17:22	21:06:07	22:24:04	05:02:07
54°	00:43:10	02:27:59	03:22:14	20:29:40	21:24:01	23:09:46	04:48:42
56°	—:—	02:05:54	03:08:05	20:43:50	21:46:12	—:—	04:33:11
58°	—:—	01:36:27	02:51:24	21:00:34	22:15:49	—:—	04:14:46
S 60°	—:—	00:47:38	02:31:06	21:20:58	23:05:25	—:—	03:52:07

Dec 16	SHA	Mer.pass
Venus	121°29.2	10:14:11
Mars	340°38.0	19:34:53
Jupiter	58°30.8	14:23:45
Saturn	57°52.0	14:26:03

17 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	08:22:56	10:52:50	■	■	12:59:40	15:29:33	■
N 70°	08:02:58	09:51:10	■	■	14:01:21	15:49:31	■
68°	07:47:06	09:16:11	■	■	14:36:20	16:05:25	■
66°	07:34:01	08:51:02	10:31:07	13:21:24	15:01:29	16:18:30	13:31:00
64°	07:22:57	08:31:24	09:49:05	14:03:27	15:21:08	16:29:35	12:43:39
62°	07:13:23	08:15:20	09:20:57	14:31:36	15:37:12	16:39:09	12:12:58
60°	07:04:59	08:01:48	08:59:25	14:53:08	15:50:45	16:47:33	11:49:45
N 58°	06:57:50	07:50:08	08:41:57	15:10:36	16:02:25	16:55:03	11:31:00
56°	06:50:45	07:39:55	08:27:17	15:25:17	16:12:39	17:01:49	11:15:17
54°	06:44:35	07:30:49	08:14:38	15:37:56	16:21:44	17:07:58	11:01:47
52°	06:38:55	07:22:39	08:03:33	15:49:01	16:29:55	17:13:39	10:49:57
50°	06:33:40	07:15:13	07:53:41	15:58:53	16:37:21	17:18:55	10:39:27
45°	06:21:54	06:59:09	07:32:58	16:19:37	16:53:26	17:30:41	10:17:26
N 40°	06:11:34	06:45:38	07:16:11	16:36:24	17:06:57	17:41:02	09:59:38
35°	06:02:11	06:33:53	07:02:01	16:50:34	17:18:43	17:50:25	09:44:39
30°	05:53:27	06:23:19	06:49:40	17:02:56	17:29:17	17:59:10	09:31:37
20°	05:36:59	06:04:29	06:28:29	17:24:08	17:48:08	18:15:38	09:09:20
N 10°	05:20:48	05:47:10	06:09:59	17:42:39	18:05:28	18:31:49	08:50:00
0°	05:03:50	05:30:03	05:52:33	18:00:05	18:22:36	18:48:49	08:31:54
S 10°	04:44:52	05:11:57	05:35:00	18:17:39	18:40:42	19:07:48	08:13:46
20°	04:22:18	04:51:31	05:16:04	18:36:36	19:01:09	19:30:23	07:54:20
30°	03:53:15	04:26:37	04:54:03	18:58:39	19:26:05	19:59:27	07:31:53
35°	03:34:39	04:11:22	04:41:03	19:11:39	19:41:21	20:18:06	07:18:41
40°	03:11:31	03:53:12	04:26:01	19:26:42	19:59:32	20:41:15	07:03:28
45°	02:41:00	03:30:40	04:08:02	19:44:43	20:22:06	21:11:50	06:45:18
S 50°	01:55:38	03:01:00	03:45:32	20:07:15	20:51:49	21:57:20	06:22:41
52°	01:28:00	02:45:57	03:34:42	20:18:06	21:06:55	22:25:06	06:11:49
54°	00:42:18	02:28:03	03:22:24	20:30:25	21:24:52	23:11:24	05:59:32
56°	—:—	02:05:52	03:08:13	20:44:38	21:47:07	—:—	05:45:24
58°	—:—	01:36:14	02:51:29	21:01:25	22:16:54	—:—	05:28:49
S 60°	—:—	00:46:38	02:31:05	21:21:52	23:07:09	—:—	05:08:47

Dec 17	SHA	Mer.pass
Venus	120°12.0	10:15:24
Mars	340°19.5	19:32:12
Jupiter	58°17.3	14:20:43
Saturn	57°45.5	14:22:33

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
16	04:25	04:10	11:55:50	13:47:11	01:16:47	2(5%)
17	03:56	03:41	11:56:19	14:45:27	02:16:49	3(10%)

# 2020 December 18 to Dec. 19

18 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	08:23:54	10:54:44	■	■	12:58:47	15:29:37	■
N 70°	08:03:52	09:52:19	■	■	14:01:13	15:49:40	15:00:32
68°	07:47:56	09:17:10	■	■	14:36:22	16:05:36	16:33:21
66°	07:34:49	08:51:55	10:32:25	13:21:08	15:01:37	16:18:43	13:50:47
64°	07:23:43	08:32:13	09:50:05	14:03:28	15:21:20	16:29:50	13:13:57
62°	07:14:07	08:16:07	09:21:50	14:31:43	15:37:26	16:39:25	12:47:36
60°	07:05:42	08:02:33	09:00:14	14:53:19	15:51:00	16:47:51	18:43:25
N 58°	06:58:12	07:50:52	08:42:44	15:10:50	16:02:42	16:55:22	12:27:02
56°	06:51:25	07:40:37	08:28:01	15:25:33	16:12:57	17:02:08	19:03:13
54°	06:45:15	07:31:31	08:15:21	15:38:13	16:22:03	17:08:19	12:10:12
52°	06:39:34	07:23:19	08:04:14	15:49:20	16:30:15	17:14:00	11:55:59
50°	06:34:18	07:15:53	07:54:21	15:59:13	16:37:42	17:19:16	11:43:45
45°	06:22:31	06:59:46	07:33:36	16:19:58	16:53:48	17:31:04	19:44:33
N 40°	06:12:09	06:46:15	07:16:48	16:36:47	17:07:21	17:41:26	11:33:01
35°	06:02:46	06:34:27	07:02:37	16:50:59	17:19:08	17:50:50	19:54:43
30°	05:54:00	06:23:53	06:50:15	17:03:21	17:29:43	17:59:36	11:23:29
20°	05:37:31	06:05:01	06:29:02	17:24:35	17:48:35	18:16:06	20:03:43
N 10°	05:21:19	05:47:40	06:10:29	17:43:07	18:05:57	18:32:18	11:14:55
0°	05:04:18	05:30:32	05:53:03	18:00:35	18:23:06	18:49:19	20:11:48
S 10°	04:45:19	05:12:25	05:35:28	18:18:10	18:41:13	19:08:19	10:56:44
20°	04:22:43	04:51:57	05:16:30	18:37:09	19:01:42	19:30:56	20:28:52
30°	03:53:38	04:27:01	04:54:27	18:59:13	19:26:39	20:00:03	19:32:54
35°	03:35:00	04:11:45	04:41:27	19:12:14	19:41:56	20:18:42	19:44:33
40°	03:11:50	03:53:33	04:26:23	19:27:18	20:00:09	20:41:53	19:54:43
45°	02:41:15	03:30:59	04:08:22	19:45:20	20:22:45	21:12:31	20:03:43
S 50°	01:55:44	03:01:15	03:45:50	20:07:54	20:52:31	21:58:08	08:54:28
52°	01:27:58	02:46:10	03:34:58	20:18:47	21:07:38	22:26:00	08:25:08
54°	00:41:40	02:28:12	03:22:39	20:31:07	21:25:38	23:12:45	08:35:08
56°	—:—	02:05:57	03:08:26	20:45:22	21:47:57	—:—	08:23:50
58°	—:—	01:36:09	02:51:39	21:02:10	22:17:51	—:—	08:10:50
S 60°	—:—	00:45:55	02:31:11	21:22:41	23:08:35	—:—	22:58:30

Dec 18	SHA	Mer.pass
Venus	118° 54.5	10:16:38
Mars	340° 00.6	19:29:32
Jupiter	58° 03.7	14:17:41
Saturn	57° 38.8	14:19:04

19 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	08:24:44	10:56:15	■	■	12:58:18	15:29:49	14:30:04
N 70°	08:04:38	09:53:17	■	■	14:01:16	15:49:54	18:47:43
68°	07:48:41	09:18:01	■	■	14:36:33	16:05:53	13:52:01
66°	07:35:32	08:52:42	10:33:29	13:21:05	15:01:52	16:19:02	13:25:13
64°	07:24:24	08:32:57	09:50:57	14:03:37	15:21:37	16:30:10	19:49:35
62°	07:14:48	08:16:49	09:22:36	14:31:58	15:37:45	16:39:46	13:04:38
60°	07:06:21	08:03:14	09:00:58	14:53:36	15:51:20	16:48:13	12:48:02
N 58°	06:58:50	07:51:31	08:43:26	15:11:09	16:03:03	16:55:44	20:08:57
56°	06:52:03	07:41:16	08:28:41	15:25:53	16:13:19	17:02:31	12:34:14
54°	06:45:52	07:32:09	08:16:00	15:38:35	16:22:26	17:08:42	20:48:07
52°	06:40:11	07:23:56	08:04:52	15:49:42	16:30:38	17:14:24	12:12:18
50°	06:34:54	07:16:29	07:54:59	15:59:36	16:38:06	17:19:41	20:57:29
45°	06:23:06	07:00:22	07:34:13	16:20:23	16:54:13	17:31:30	12:03:22
N 40°	06:12:43	06:46:49	07:17:23	16:37:13	17:07:46	17:41:52	11:55:25
35°	06:03:19	06:35:01	07:03:11	16:51:25	17:19:35	17:51:17	21:12:55
30°	05:54:33	06:24:26	06:50:48	17:03:48	17:30:10	18:00:03	11:48:16
20°	05:38:02	06:05:33	06:29:34	17:25:03	17:49:03	18:16:34	21:19:24
N 10°	05:21:49	05:48:11	06:11:00	17:43:36	18:06:26	18:32:48	11:41:48
0°	05:04:48	05:31:01	05:53:33	18:01:04	18:23:36	18:49:49	21:25:16
S 10°	04:45:47	05:12:54	05:35:57	18:18:41	18:41:44	19:08:50	21:37:48
20°	04:23:10	04:52:24	05:16:58	18:37:40	19:02:14	19:31:28	11:16:22
30°	03:54:03	04:27:26	04:54:53	18:59:45	19:27:12	20:00:36	11:06:30
35°	03:35:23	04:12:09	04:41:52	19:12:47	19:42:30	20:19:16	21:56:54
40°	03:12:12	03:53:56	04:26:47	19:27:52	20:00:44	20:42:29	10:57:49
45°	02:41:34	03:31:20	04:08:45	19:45:56	20:23:21	21:13:09	22:04:35
S 50°	01:55:57	03:01:34	03:46:10	20:08:31	20:53:09	21:58:49	10:42:48
52°	01:28:05	02:46:27	03:35:18	20:19:24	21:08:17	22:26:46	22:17:46
54°	00:41:20	02:28:27	03:22:57	20:31:45	21:26:18	23:13:50	10:29:38
56°	—:—	02:06:08	03:08:43	20:46:01	21:48:39	—:—	22:29:14
58°	—:—	01:36:13	02:51:54	21:02:51	22:18:38	—:—	10:17:15
S 60°	—:—	00:45:29	02:31:23	21:23:23	23:09:43	—:—	22:39:55

Dec 19	SHA	Mer.pass
Venus	117° 36.7	10:17:53
Mars	339° 41.3	19:26:55
Jupiter	57° 50.1	14:14:39
Saturn	57° 32.2	14:15:34

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
18	03:26	03:11	11:56:49	15:39:20	03:12:58	4(18%)
19	02:56	02:42	11:57:18	16:28:42	04:04:33	5(26%)

20 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	08:25:26	10:57:22	■	■	12:58:13	15:30:09	13:43:45
N 70°	08:05:19	09:54:05	■	■	14:01:30	15:50:16	13:24:49
68°	07:49:19	09:18:43	■	■	14:36:52	16:06:15	13:09:46
66°	07:36:09	08:53:22	10:34:20	13:21:15	15:02:13	16:19:25	12:57:26
64°	07:25:01	08:33:36	09:51:40	14:03:55	15:21:59	16:30:34	12:47:05
62°	07:15:24	08:17:27	09:23:16	14:32:19	15:38:08	16:40:11	12:38:15
60°	07:06:57	08:03:51	09:01:37	14:53:59	15:51:45	16:48:38	12:30:34
N 58°	06:59:25	07:52:07	08:44:03	15:11:32	16:03:28	16:56:10	12:23:49
56°	06:52:38	07:41:51	08:29:18	15:26:18	16:13:44	17:02:57	12:17:49
54°	06:46:27	07:32:44	08:16:36	15:39:00	16:22:52	17:09:09	12:12:25
52°	06:40:45	07:24:31	08:05:28	15:50:08	16:31:05	17:14:51	12:07:33
50°	06:35:28	07:17:03	07:55:33	16:00:02	16:38:32	17:20:08	12:03:06
45°	06:23:39	07:00:55	07:34:46	16:20:50	16:54:40	17:31:57	11:53:29
N 40°	06:13:16	06:47:22	07:17:56	16:37:40	17:08:14	17:42:20	11:45:26
35°	06:03:51	06:35:33	07:03:43	16:51:53	17:20:03	17:51:45	11:38:30
30°	05:55:04	06:24:58	06:51:20	17:04:16	17:30:38	18:00:32	11:32:23
20°	05:38:33	06:06:04	06:30:05	17:25:32	17:49:32	18:17:03	11:21:45
N 10°	05:22:19	05:48:41	06:11:31	17:44:06	18:06:55	18:33:17	11:12:23
0°	05:05:17	05:31:31	05:54:02	18:01:34	18:24:06	18:50:20	11:03:34
S 10°	04:46:16	05:13:22	05:36:26	18:19:11	18:42:14	19:09:21	10:54:44
20°	04:23:38	04:52:52	05:17:26	18:38:11	19:02:45	19:32:00	10:45:16
30°	03:54:30	04:27:53	04:55:21	19:00:17	19:27:44	20:01:08	10:34:26
35°	03:35:49	04:12:36	04:42:19	19:13:19	19:43:02	20:19:49	10:28:09
40°	03:12:37	03:54:22	04:27:14	19:28:24	20:01:16	20:43:02	10:20:59
45°	02:41:57	03:31:45	04:09:10	19:46:28	20:23:54	21:13:43	10:12:36
S 50°	01:56:16	03:01:57	03:46:35	20:09:04	20:53:42	21:59:25	10:02:29
52°	01:28:19	02:46:48	03:35:41	20:19:58	21:08:51	22:27:24	09:57:47
54°	00:41:16	02:28:47	03:23:20	20:32:19	21:26:53	23:14:37	09:52:35
56°	—:—	02:06:26	03:09:04	20:46:35	21:49:16	—:—	09:46:48
58°	—:—	01:36:27	02:52:14	21:03:26	22:19:17	—:—	09:40:19
S 60°	—:—	00:45:22	02:31:41	21:24:00	23:10:32	—:—	09:32:57

Dec 20	SHA	Mer.pass
Venus	116°18.6	10:19:10
Mars	339°21.6	19:24:19
Jupiter	57°36.4	14:11:38
Saturn	57°25.5	14:12:05

21 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	08:26:00	10:58:03	■	■	12:58:33	15:30:36	13:14:57
N 70°	08:05:52	09:54:40	■	■	14:01:56	15:50:44	13:05:28
68°	07:49:53	09:19:18	■	■	14:37:19	16:06:44	12:57:40
66°	07:36:42	08:53:56	10:34:56	13:21:40	15:02:41	16:19:54	12:51:08
64°	07:25:34	08:34:09	09:52:14	14:04:22	15:22:27	16:31:03	12:45:32
62°	07:15:56	08:17:59	09:23:50	14:32:47	15:38:37	16:40:40	12:40:42
60°	07:07:29	08:04:23	09:02:09	14:54:27	15:52:13	16:49:07	12:36:28
N 58°	06:59:57	07:52:40	08:44:35	15:12:01	16:03:57	16:56:39	12:32:42
56°	06:53:10	07:42:23	08:29:50	15:26:46	16:14:13	17:03:27	12:29:21
54°	06:46:58	07:33:15	08:17:08	15:39:29	16:23:21	17:09:38	12:26:19
52°	06:41:16	07:25:03	08:05:59	15:50:37	16:31:34	17:15:20	12:23:33
50°	06:35:59	07:17:35	07:56:05	16:00:31	16:39:01	17:20:37	12:21:02
45°	06:24:10	07:01:26	07:35:18	16:21:19	16:55:10	17:32:27	12:15:33
N 40°	06:13:47	06:47:53	07:18:27	16:38:09	17:08:44	17:42:50	12:10:56
35°	06:04:22	06:36:04	07:04:14	16:52:22	17:20:32	17:52:15	12:06:57
30°	05:55:35	06:25:29	06:51:50	17:04:46	17:31:08	18:01:01	12:03:26
20°	05:39:03	06:06:34	06:30:35	17:26:01	17:50:02	18:17:33	11:57:17
N 10°	05:22:49	05:49:11	06:12:01	17:44:36	18:07:25	18:33:47	11:51:52
0°	05:05:47	05:32:01	05:54:32	18:02:04	18:24:36	18:50:49	11:46:46
S 10°	04:46:46	05:13:52	05:36:55	18:19:41	18:42:44	19:09:51	11:41:39
20°	04:24:07	04:53:22	05:17:55	18:38:41	19:03:15	19:32:30	11:36:12
30°	03:54:58	04:28:22	04:55:50	19:00:47	19:28:14	20:01:38	11:29:57
35°	03:36:18	04:13:04	04:42:47	19:13:49	19:43:32	20:20:19	11:26:21
40°	03:13:04	03:54:50	04:27:42	19:28:54	20:01:46	20:43:32	11:22:15
45°	02:42:23	03:32:12	04:09:38	19:46:58	20:24:24	21:14:13	11:17:29
S 50°	01:56:41	03:02:24	03:47:02	20:09:34	20:54:12	21:59:55	11:11:45
52°	01:28:42	02:47:15	03:36:08	20:20:28	21:09:21	22:27:54	11:09:06
54°	00:41:29	02:29:13	03:23:47	20:32:49	21:27:23	23:15:06	11:06:12
56°	—:—	02:06:50	03:09:31	20:47:05	21:49:46	—:—	11:02:58
58°	—:—	01:36:49	02:52:40	21:03:56	22:19:47	—:—	10:59:23
S 60°	—:—	00:45:34	02:32:06	21:24:30	23:11:01	—:—	10:55:20

Dec 21	SHA	Mer.pass
Venus	115°00.3	10:20:27
Mars	339°01.4	19:21:44
Jupiter	57°22.7	14:08:37
Saturn	57°18.8	14:08:36

Day	Sun			Moon		
	Eqn. of Time		Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup>	12 <sup>h</sup>		Upper	Lower	
20	02:27	02:12	11:57:48	17:14:11	04:51:52	6(36%)
21	01:57	01:42	11:58:18	17:56:48	05:35:47	7(45%)

22 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:26:27	10:58:20	■	■	12:59:19	15:31:12	12:51:26
N 70°	08:06:19	09:55:04	■	■	14:02:34	15:51:19	12:48:59
68°	07:50:20	09:19:44	■	■	14:37:54	16:07:18	12:46:56
66°	07:37:10	08:54:23	10:35:19	13:22:19	15:03:15	16:20:28	12:45:13
64°	07:26:02	08:34:36	09:52:40	14:04:58	15:23:01	16:31:36	12:43:44
62°	07:16:25	08:18:27	09:24:17	14:33:21	15:39:10	16:41:13	12:42:27
60°	07:07:58	08:04:51	09:02:37	14:55:01	15:52:47	16:49:40	12:41:19
N 58°	07:00:26	07:53:08	08:45:03	15:12:34	16:04:30	16:57:12	12:40:18
56°	06:53:38	07:42:52	08:30:18	15:27:19	16:14:46	17:03:59	12:39:24
54°	06:47:27	07:33:44	08:17:36	15:40:01	16:23:53	17:10:10	12:38:35
52°	06:41:45	07:25:31	08:06:28	15:51:09	16:32:06	17:15:52	12:37:51
50°	06:36:28	07:18:04	07:56:34	16:01:03	16:39:33	17:21:09	12:37:10
45°	06:24:39	07:01:56	07:35:46	16:21:51	16:55:41	17:32:58	12:35:41
N 40°	06:14:16	06:48:22	07:18:56	16:38:41	17:09:15	17:43:21	12:34:27
35°	06:04:51	06:36:33	07:04:43	16:52:53	17:21:03	17:52:46	12:33:22
30°	05:56:04	06:25:58	06:52:20	17:05:17	17:31:39	18:01:32	12:32:25
20°	05:39:33	06:07:04	06:31:05	17:26:32	17:50:33	18:18:03	12:30:46
N 10°	05:23:19	05:49:41	06:12:30	17:45:06	18:07:55	18:34:17	12:29:19
0°	05:06:17	05:32:31	05:55:02	18:02:34	18:25:05	18:51:19	12:27:58
S 10°	04:47:16	05:14:22	05:37:25	18:20:10	18:43:14	19:10:20	12:26:37
20°	04:24:37	04:53:52	05:18:25	18:39:10	19:03:44	19:32:58	12:25:11
30°	03:55:29	04:28:52	04:56:20	19:01:15	19:28:42	20:02:06	12:23:33
35°	03:36:48	04:13:35	04:43:18	19:14:17	19:44:00	20:20:46	12:22:37
40°	03:13:35	03:55:21	04:28:12	19:29:22	20:02:14	20:43:59	12:21:33
45°	02:42:54	03:32:43	04:10:08	19:47:26	20:24:51	21:14:39	12:20:20
S 50°	01:57:12	03:02:54	03:47:33	20:10:01	20:54:39	22:00:19	12:18:52
52°	01:29:13	02:47:45	03:36:39	20:20:54	21:09:47	22:28:15	12:18:11
54°	00:42:01	02:29:43	03:24:17	20:33:15	21:27:48	23:15:16	12:17:27
56°	—:—	02:07:21	03:10:01	20:47:31	21:50:09	—:—	12:16:38
58°	—:—	01:37:20	02:53:11	21:04:21	22:20:08	—:—	12:15:43
S 60°	—:—	00:46:06	02:32:37	21:24:53	23:11:10	—:—	12:14:42

Dec 22	SHA	Mer.pass
Venus	113°41.7	10:21:45
Mars	338°40.9	19:19:11
Jupiter	57°08.9	14:05:36
Saturn	57°12.0	14:05:07

23 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:26:45	10:58:11	■	■	13:00:29	15:31:55	12:29:14
N 70°	08:06:40	09:55:17	■	■	14:03:23	15:52:00	12:33:16
68°	07:50:42	09:20:01	■	■	14:38:38	16:07:58	12:36:37
66°	07:37:33	08:54:43	10:35:27	13:23:12	15:03:56	16:21:07	12:39:27
64°	07:26:25	08:34:58	09:52:56	14:05:42	15:23:41	16:32:14	12:41:53
62°	07:16:49	08:18:50	09:24:36	14:34:02	15:39:49	16:41:50	12:44:00
60°	07:08:22	08:05:15	09:02:58	14:55:40	15:53:24	16:50:16	12:45:52
N 58°	07:00:51	07:53:32	08:45:26	15:13:12	16:05:06	16:57:47	12:47:32
56°	06:54:04	07:43:17	08:30:42	15:27:56	16:15:22	17:04:34	12:49:01
54°	06:47:53	07:34:09	08:18:00	15:40:38	16:24:29	17:10:45	12:50:22
52°	06:42:12	07:25:57	08:06:53	15:51:45	16:32:41	17:16:27	12:51:35
50°	06:36:55	07:18:30	07:56:59	16:01:39	16:40:08	17:21:43	12:52:43
45°	06:25:06	07:02:22	07:36:13	16:22:25	16:56:15	17:33:32	12:55:10
N 40°	06:14:44	06:48:49	07:19:23	16:39:14	17:09:48	17:43:54	12:57:14
35°	06:05:19	06:37:01	07:05:11	16:53:26	17:21:36	17:53:18	12:59:02
30°	05:56:33	06:26:26	06:52:48	17:05:49	17:32:11	18:02:04	13:00:39
20°	05:40:02	06:07:33	06:31:33	17:27:03	17:51:04	18:18:34	13:03:27
N 10°	05:23:49	05:50:11	06:13:00	17:45:36	18:08:25	18:34:47	13:05:56
0°	05:06:47	05:33:01	05:55:32	18:03:04	18:25:35	18:51:49	13:08:17
S 10°	04:47:46	05:14:53	05:37:56	18:20:39	18:43:43	19:10:49	13:10:40
20°	04:25:08	04:54:23	05:18:56	18:39:38	19:04:12	19:33:26	13:13:14
30°	03:56:01	04:29:24	04:56:51	19:01:43	19:29:09	20:02:32	13:16:11
35°	03:37:20	04:14:07	04:43:50	19:14:44	19:44:26	20:21:12	13:17:53
40°	03:14:08	03:55:53	04:28:45	19:29:48	20:02:39	20:44:23	13:19:50
45°	02:43:28	03:33:16	04:10:41	19:47:51	20:25:15	21:15:01	13:22:05
S 50°	01:57:49	03:03:29	03:48:06	20:10:25	20:55:01	22:00:37	13:24:49
52°	01:29:52	02:48:21	03:37:13	20:21:17	21:10:08	22:28:28	13:26:04
54°	00:42:51	02:30:20	03:24:52	20:33:38	21:28:07	23:15:10	13:27:27
56°	—:—	02:07:59	03:10:37	20:47:52	21:50:26	—:—	13:28:58
58°	—:—	01:38:00	02:53:47	21:04:41	22:20:19	—:—	13:30:40
S 60°	—:—	00:46:58	02:33:15	21:25:11	23:11:00	—:—	13:32:35

Dec 23	SHA	Mer.pass
Venus	112°22.8	10:23:05
Mars	338°20.0	19:16:40
Jupiter	56°55.1	14:02:35
Saturn	57°05.2	14:01:38

Day	Sun			Moon		
	Eqn.of Time		Mer. Pass	Mer.Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
22	01:27	01:12	11:58:48	18:37:42	06:17:24	8(55%)
23	00:57	00:42	11:59:18	19:18:00	06:57:51	9(64%)

24 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:26:56	10:57:38	■	■	13:02:04	15:32:47	12:05:35
N 70°	08:06:54	09:55:18	■	■	14:04:23	15:52:48	12:16:48
68°	07:50:58	09:20:11	■	■	14:39:30	16:08:43	12:25:59
66°	07:37:51	08:54:56	10:35:22	13:24:18	15:04:44	16:21:50	12:33:40
64°	07:26:45	08:35:14	09:53:04	14:06:36	15:24:26	16:32:56	12:40:12
62°	07:17:09	08:19:08	09:24:50	14:34:50	15:40:32	16:42:31	12:45:51
60°	07:08:44	08:05:34	09:03:15	14:56:25	15:54:06	16:50:56	12:50:48
N 58°	07:01:13	07:53:53	08:45:44	15:13:55	16:05:47	16:58:27	12:55:10
56°	06:54:27	07:43:38	08:31:01	15:28:38	16:16:01	17:05:13	12:59:05
54°	06:48:16	07:34:31	08:18:21	15:41:18	16:25:07	17:11:23	13:02:37
52°	06:42:35	07:26:20	08:07:15	15:52:24	16:33:19	17:17:04	13:05:49
50°	06:37:19	07:18:53	07:57:22	16:02:17	16:40:45	17:22:20	13:08:45
45°	06:25:31	07:02:47	07:36:37	16:23:01	16:56:51	17:34:07	13:15:09
N 40°	06:15:10	06:49:15	07:19:48	16:39:49	17:10:23	17:44:28	13:20:31
35°	06:05:46	06:37:28	07:05:37	16:54:01	17:22:10	17:53:52	13:25:09
30°	05:57:00	06:26:53	06:53:15	17:06:22	17:32:44	18:02:37	13:29:17
20°	05:40:30	06:08:01	06:32:01	17:27:35	17:51:36	18:19:06	13:36:28
N 10°	05:24:18	05:50:40	06:13:29	17:46:07	18:08:56	18:35:18	13:42:49
0°	05:07:17	05:33:31	05:56:02	18:03:34	18:26:04	18:52:18	13:48:49
S 10°	04:48:18	05:15:23	05:38:27	18:21:08	18:44:11	19:11:17	13:54:52
20°	04:25:40	04:54:55	05:19:28	18:40:06	19:04:39	19:33:53	14:01:21
30°	03:56:35	04:29:58	04:57:24	19:02:09	19:29:35	20:02:57	14:08:47
35°	03:37:55	04:14:41	04:44:23	19:15:09	19:44:51	20:21:35	14:13:06
40°	03:14:44	03:56:28	04:29:19	19:30:12	20:03:02	20:44:45	14:18:01
45°	02:44:07	03:33:53	04:11:17	19:48:13	20:25:36	21:15:20	14:23:45
S 50°	01:58:31	03:04:07	03:48:43	20:10:45	20:55:19	22:00:49	14:30:39
52°	01:30:40	02:49:00	03:37:51	20:21:37	21:10:24	22:28:34	14:33:51
54°	00:43:58	02:31:01	03:25:31	20:33:56	21:28:21	23:14:46	14:37:23
56°	—:—	02:08:43	03:11:17	20:48:09	21:50:36	—:—	14:41:17
58°	—:—	01:38:49	02:54:28	21:04:55	22:20:22	—:—	14:45:38
S 60°	—:—	00:48:09	02:33:58	21:25:22	23:10:31	—:—	14:50:33

Dec 24	SHA	Mer.pass
Venus	111°03.7	10:24:25
Mars	337°58.6	19:14:10
Jupiter	56°41.3	13:59:34
Saturn	56°58.3	13:58:10

25 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:26:59	10:56:41	■	■	13:04:02	15:33:46	11:36:27
N 70°	08:07:01	09:55:09	■	■	14:05:34	15:53:42	11:57:33
68°	07:51:08	09:20:12	■	■	14:40:30	16:09:34	12:14:08
66°	07:38:03	08:55:03	10:35:03	13:25:38	15:05:39	16:22:39	12:27:38
64°	07:26:59	08:35:25	09:53:04	14:07:37	15:25:17	16:33:43	12:38:54
62°	07:17:25	08:19:21	09:24:56	14:35:44	15:41:20	16:43:16	12:48:30
60°	07:09:01	08:05:49	09:03:25	14:57:15	15:54:52	16:51:40	12:56:49
N 58°	07:01:31	07:54:09	08:45:58	15:14:42	16:06:31	16:59:09	13:04:07
56°	06:54:46	07:43:56	08:31:17	15:29:23	16:16:44	17:05:54	13:10:36
54°	06:48:36	07:34:50	08:18:38	15:42:01	16:25:49	17:12:03	13:16:24
52°	06:42:56	07:26:40	08:07:33	15:53:06	16:33:59	17:17:43	13:21:39
50°	06:37:40	07:19:14	07:57:41	16:02:58	16:41:25	17:22:59	13:26:26
45°	06:25:54	07:03:09	07:36:58	16:23:40	16:57:29	17:34:44	13:36:47
N 40°	06:15:34	06:49:39	07:20:11	16:40:27	17:10:59	17:45:04	13:45:26
35°	06:06:11	06:37:52	07:06:01	16:54:36	17:22:45	17:54:26	13:52:54
30°	05:57:26	06:27:19	06:53:40	17:06:57	17:33:18	18:03:11	13:59:29
20°	05:40:58	06:08:28	06:32:28	17:28:08	17:52:08	18:19:38	14:10:56
N 10°	05:24:47	05:51:08	06:13:57	17:46:38	18:09:27	18:35:48	14:21:01
0°	05:07:47	05:34:01	05:56:31	18:04:03	18:26:34	18:52:47	14:30:33
S 10°	04:48:49	05:15:55	05:38:58	18:21:36	18:44:39	19:11:44	14:40:08
20°	04:26:14	04:55:28	05:20:01	18:40:32	19:05:05	19:34:18	14:50:24
30°	03:57:10	04:30:32	04:57:58	19:02:33	19:29:59	20:03:20	15:02:12
35°	03:38:32	04:15:17	04:44:59	19:15:32	19:45:13	20:21:56	15:09:05
40°	03:15:23	03:57:06	04:29:56	19:30:34	20:03:23	20:45:03	15:16:55
45°	02:44:48	03:34:32	04:11:55	19:48:33	20:25:54	21:15:34	15:26:06
S 50°	01:59:20	03:04:50	03:49:23	20:11:02	20:55:33	22:00:55	15:37:14
52°	01:31:35	02:49:44	03:38:32	20:21:52	21:10:36	22:28:31	15:42:25
54°	00:45:23	02:31:48	03:26:13	20:34:10	21:28:30	23:14:07	15:48:09
56°	—:—	02:09:33	03:12:01	20:48:20	21:50:40	—:—	15:54:32
58°	—:—	01:39:47	02:55:15	21:05:04	22:20:16	—:—	16:01:43
S 60°	—:—	00:49:38	02:34:48	21:25:27	23:09:45	—:—	16:09:54

Dec 25	SHA	Mer.pass
Venus	109°44.4	10:25:46
Mars	337°37.0	19:11:42
Jupiter	56°27.3	13:56:34
Saturn	56°51.5	13:54:41

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
24	00:27	00:12	11:59:48	19:58:44	07:38:14	10(73%)
25	00:02	00:17	12:00:17	20:40:53	08:19:34	11(81%)

# 2020 December 26 to Dec. 27

26 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:26:54	10:55:24	■	■	13:06:21	15:34:52	10:48:36
N 70°	08:07:01	09:54:47	■	■	14:06:56	15:54:43	11:30:38
68°	07:51:13	09:20:05	■	■	14:41:39	16:10:31	11:59:17
66°	07:38:11	08:55:03	10:34:31	13:27:11	15:06:39	16:23:32	12:21:00
64°	07:27:09	08:35:29	09:52:55	14:08:47	15:26:13	16:34:34	12:38:23
62°	07:17:37	08:19:29	09:24:56	14:36:45	15:42:12	16:44:05	12:52:47
60°	07:09:14	08:05:59	09:03:30	14:58:10	15:55:42	16:52:27	13:04:59
N 58°	07:01:46	07:54:22	08:46:06	15:15:34	16:07:19	16:59:55	13:15:33
56°	06:55:02	07:44:10	08:31:28	15:30:12	16:17:30	17:06:38	13:24:48
54°	06:48:54	07:35:06	08:18:51	15:42:48	16:26:34	17:12:46	13:33:01
52°	06:43:14	07:26:57	08:07:48	15:53:52	16:34:43	17:18:25	13:40:24
50°	06:38:00	07:19:32	07:57:57	16:03:42	16:42:07	17:23:40	13:47:05
45°	06:26:15	07:03:29	07:37:17	16:24:21	16:58:09	17:35:23	14:01:26
N 40°	06:15:56	06:50:00	07:20:32	16:41:06	17:11:37	17:45:41	14:13:19
35°	06:06:35	06:38:16	07:06:24	16:55:14	17:23:22	17:55:02	14:23:29
30°	05:57:51	06:27:43	06:54:04	17:07:33	17:33:53	18:03:45	14:32:26
20°	05:41:25	06:08:55	06:32:54	17:28:41	17:52:41	18:20:11	14:47:56
N 10°	05:25:16	05:51:37	06:14:25	17:47:10	18:09:58	18:36:19	15:01:32
0°	05:08:18	05:34:31	05:57:01	18:04:33	18:27:03	18:53:15	15:14:20
S 10°	04:49:21	05:16:27	05:39:29	18:22:04	18:45:06	19:12:10	15:27:13
20°	04:26:48	04:56:01	05:20:34	18:40:58	19:05:30	19:34:42	15:41:02
30°	03:57:47	04:31:08	04:58:34	19:02:56	19:30:21	20:03:41	15:56:58
35°	03:39:11	04:15:54	04:45:35	19:15:53	19:45:33	20:22:15	16:06:16
40°	03:16:04	03:57:45	04:30:34	19:30:53	20:03:41	20:45:19	16:16:55
45°	02:45:34	03:35:14	04:12:35	19:48:50	20:26:09	21:15:45	16:29:28
S 50°	02:00:14	03:05:36	03:50:07	20:11:16	20:55:44	22:00:55	16:44:49
52°	01:32:38	02:50:33	03:39:17	20:22:05	21:10:44	22:28:20	16:52:02
54°	00:47:02	02:32:39	03:27:00	20:34:20	21:28:34	23:13:13	17:00:04
56°	—:—	02:10:30	03:12:49	20:48:28	21:50:37	—:—	17:09:05
58°	—:—	01:40:54	02:56:06	21:05:08	22:20:02	—:—	17:19:21
S 60°	—:—	00:51:25	02:35:43	21:25:26	23:08:43	—:—	17:31:12

Dec 26	SHA	Mer.pass
Venus	108°24.8	10:27:09
Mars	337°14.9	19:09:15
Jupiter	56°13.4	13:53:34
Saturn	56°44.5	13:51:13

27 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:26:41	10:53:46	■	■	13:09:00	15:36:06	□
N 70°	08:06:55	09:54:16	■	■	14:08:29	15:55:50	10:22:45
68°	07:51:12	09:19:49	■	■	14:42:54	16:11:33	11:35:43
66°	07:38:13	08:54:57	10:33:46	13:28:57	15:07:46	16:24:31	12:12:59
64°	07:27:14	08:35:28	09:52:37	14:10:05	15:27:14	16:35:29	12:39:29
62°	07:17:45	08:19:32	09:24:49	14:37:52	15:43:10	16:44:58	13:00:09
60°	07:09:24	08:06:06	09:03:30	14:59:11	15:56:36	16:53:18	13:17:03
N 58°	07:01:58	07:54:30	08:46:10	15:16:31	16:08:10	17:00:43	13:31:17
56°	06:55:15	07:44:21	08:31:35	15:31:05	16:18:20	17:07:25	13:43:33
54°	06:49:08	07:35:18	08:19:01	15:43:39	16:27:22	17:13:32	13:54:18
52°	06:43:30	07:27:10	08:07:59	15:54:40	16:35:29	17:19:10	14:03:51
50°	06:38:16	07:19:47	07:58:10	16:04:29	16:42:52	17:24:23	14:12:26
45°	06:26:34	07:03:47	07:37:34	16:25:05	16:58:51	17:36:04	14:30:39
N 40°	06:16:17	06:50:20	07:20:51	16:41:46	17:12:17	17:46:20	14:45:34
35°	06:06:57	06:38:37	07:06:44	16:55:52	17:24:00	17:55:40	14:58:15
30°	05:58:15	06:28:06	06:54:26	17:08:10	17:34:30	18:04:21	15:09:21
20°	05:41:51	06:09:20	06:33:19	17:29:15	17:53:15	18:20:44	15:28:27
N 10°	05:25:44	05:52:05	06:14:53	17:47:41	18:10:29	18:36:49	15:45:09
0°	05:08:48	05:35:01	05:57:31	18:05:02	18:27:32	18:53:44	16:00:51
S 10°	04:49:54	05:16:59	05:40:01	18:22:31	18:45:32	19:12:36	16:16:37
20°	04:27:23	04:56:36	05:21:08	18:41:22	19:05:53	19:35:05	16:33:33
30°	03:58:26	04:31:46	04:59:11	19:03:17	19:30:41	20:04:00	16:53:06
35°	03:39:52	04:16:34	04:46:14	19:16:13	19:45:52	20:22:31	17:04:34
40°	03:16:49	03:58:27	04:31:14	19:31:11	20:03:56	20:45:32	17:17:46
45°	02:46:23	03:35:59	04:13:18	19:46:05	20:26:21	21:15:52	17:33:26
S 50°	02:01:14	03:06:25	03:50:53	20:11:27	20:55:50	22:00:49	17:52:46
52°	01:33:49	02:51:25	03:40:05	20:22:13	21:10:47	22:28:01	18:01:58
54°	00:48:57	02:33:36	03:27:50	20:34:26	21:28:32	23:12:05	18:12:17
56°	—:—	02:11:33	03:13:42	20:48:31	21:50:28	—:—	18:24:01
58°	—:—	01:42:09	02:57:03	21:05:06	22:19:38	—:—	18:37:35
S 60°	—:—	00:53:28	02:36:45	21:25:18	23:07:26	—:—	18:53:34

Dec 27	SHA	Mer.pass
Venus	107°05.0	10:28:32
Mars	336°52.5	19:06:49
Jupiter	55°59.4	13:50:34
Saturn	56°37.6	13:47:45

Day	Sun		Mer. Pass	Moon		Age
	Eqn. of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
26	00:32	00:47	12:00:47	21:25:17	09:02:46	12(88%)
27	01:02	01:16	12:01:16	22:12:31	09:48:32	13(93%)

28 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:26:20	10:51:50	■	■	13:11:56	15:37:28	□
N 70°	08:06:43	09:53:33	■	■	14:10:12	15:57:04	□
68°	07:51:05	09:19:26	■	■	14:44:18	16:12:41	□
66°	07:38:11	08:54:43	10:32:49	13:30:54	15:09:00	16:25:34	12:00:26
64°	07:27:15	08:35:22	09:52:11	14:11:31	15:28:21	16:36:28	12:44:16
62°	07:17:48	08:19:30	09:24:36	14:39:06	15:44:12	16:45:54	13:13:37
60°	07:09:30	08:06:07	09:03:24	15:00:17	15:57:34	16:54:12	13:36:03
N 58°	07:02:06	07:54:35	08:46:09	15:17:31	16:09:06	17:01:35	13:54:16
56°	06:55:25	07:44:27	08:31:37	15:32:02	16:19:13	17:08:15	14:09:35
54°	06:49:19	07:35:27	08:19:06	15:44:33	16:28:12	17:14:21	14:22:46
52°	06:43:43	07:27:21	08:08:07	15:55:32	16:36:18	17:19:57	14:34:20
50°	06:38:30	07:19:59	07:58:20	16:05:18	16:43:39	17:25:09	14:44:38
45°	06:26:51	07:04:02	07:37:47	16:25:50	16:59:35	17:36:47	15:06:14
N 40°	06:16:36	06:50:38	07:21:08	16:42:29	17:12:59	17:47:01	15:23:43
35°	06:07:18	06:38:57	07:07:03	16:56:33	17:24:39	17:56:18	15:38:28
30°	05:58:37	06:28:28	06:54:47	17:08:48	17:35:07	18:04:58	15:51:18
20°	05:42:16	06:09:45	06:33:44	17:29:50	17:53:49	18:21:17	16:13:17
N 10°	05:26:12	05:52:32	06:15:19	17:48:13	18:11:00	18:37:20	16:32:25
0°	05:09:19	05:35:31	05:58:00	18:05:31	18:28:00	18:54:12	16:50:21
S 10°	04:50:27	05:17:31	05:40:33	18:22:57	18:45:58	19:13:01	17:08:20
20°	04:28:00	04:57:11	05:21:42	18:41:46	19:06:16	19:35:27	17:27:39
30°	03:59:06	04:32:25	04:59:48	19:03:37	19:31:00	20:04:17	17:50:02
35°	03:40:35	04:17:15	04:46:53	19:16:31	19:46:08	20:22:46	18:03:11
40°	03:17:35	03:59:11	04:31:56	19:31:26	20:04:10	20:45:42	18:18:23
45°	02:47:16	03:36:46	04:14:03	19:49:16	20:26:30	21:15:55	18:36:32
S 50°	02:02:20	03:07:19	03:51:42	20:11:34	20:55:52	22:00:37	18:59:10
52°	01:35:08	02:52:22	03:40:56	20:22:18	21:10:45	22:27:35	19:10:02
54°	00:51:04	02:34:38	03:28:44	20:34:28	21:28:25	23:10:45	19:22:21
56°	—:—	02:12:42	03:14:39	20:48:29	21:50:13	—:—	19:36:31
58°	—:—	01:43:32	02:58:04	21:05:00	22:19:07	—:—	19:53:10
S 60°	—:—	00:55:44	02:37:53	21:25:04	23:05:56	—:—	20:13:21

Dec 28	SHA	Mer.pass
Venus	105°45.0	10:29:56
Mars	336°29.8	19:04:25
Jupiter	55°45.3	13:47:34
Saturn	56°30.6	13:44:17

29 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonrise
	Naut.	Civil			Civil	Naut.	
N 72°	08:25:52	10:49:38	■	■	13:15:08	15:38:57	□
N 70°	08:06:23	09:52:40	■	■	14:12:05	15:58:23	□
68°	07:50:52	09:18:55	■	■	14:45:49	16:13:53	□
66°	07:38:03	08:54:24	10:31:40	13:33:02	15:10:19	16:26:41	□
64°	07:27:11	08:35:10	09:51:37	14:13:05	15:29:33	16:37:32	12:59:13
62°	07:17:48	08:19:23	09:24:16	14:40:25	15:45:18	16:46:54	13:39:24
60°	07:09:32	08:06:05	09:03:12	15:01:28	15:58:36	16:55:09	14:07:12
N 58°	07:02:10	07:54:35	08:46:03	15:18:37	16:10:05	17:02:30	14:28:48
56°	06:55:32	07:44:31	08:31:36	15:33:03	16:20:09	17:09:08	14:46:31
54°	06:49:28	07:35:33	08:19:08	15:45:31	16:29:06	17:15:11	15:01:32
52°	06:43:53	07:27:29	08:08:11	15:56:27	16:37:10	17:20:46	15:14:33
50°	06:38:42	07:20:09	07:58:27	16:06:11	16:44:29	17:25:56	15:26:02
45°	06:27:05	07:04:16	07:37:59	16:26:38	17:00:21	17:37:31	15:49:55
N 40°	06:16:53	06:50:54	07:21:22	16:43:13	17:13:42	17:47:42	16:09:04
35°	06:07:37	06:39:15	07:07:21	16:57:14	17:25:19	17:56:57	16:25:07
30°	05:58:59	06:28:49	06:55:07	17:09:27	17:35:45	18:05:35	16:39:01
20°	05:42:41	06:10:09	06:34:07	17:30:25	17:54:23	18:21:51	17:02:44
N 10°	05:26:40	05:52:59	06:15:46	17:48:45	18:11:32	18:37:51	17:23:18
0°	05:09:49	05:36:00	05:58:29	18:06:00	18:28:29	18:54:39	17:42:32
S 10°	04:51:01	05:18:04	05:41:05	18:23:23	18:46:23	19:13:26	18:01:47
20°	04:28:37	04:57:47	05:22:18	18:42:08	19:06:38	19:35:47	18:22:28
30°	03:59:48	04:33:05	05:00:27	19:03:56	19:31:17	20:04:32	18:46:25
35°	03:41:20	04:17:57	04:47:35	19:16:47	19:46:22	20:22:57	19:00:31
40°	03:18:25	03:59:57	04:32:40	19:31:39	20:04:20	20:45:48	19:16:50
45°	02:48:12	03:37:37	04:14:51	19:49:26	20:26:36	21:15:54	19:36:23
S 50°	02:03:31	03:08:16	03:52:34	20:11:38	20:55:51	22:00:20	20:00:53
52°	01:36:33	02:53:23	03:41:51	20:22:19	21:10:39	22:27:01	20:12:43
54°	00:53:24	02:35:44	03:29:41	20:34:26	21:28:12	23:09:14	20:26:12
56°	—:—	02:13:57	03:15:41	20:48:23	21:49:51	—:—	20:41:50
58°	—:—	01:45:03	02:59:10	21:04:48	22:18:27	—:—	21:00:24
S 60°	—:—	00:58:14	02:39:06	21:24:45	23:04:14	—:—	21:23:21

Dec 29	SHA	Mer.pass
Venus	104°24.7	10:31:20
Mars	336°06.7	19:02:02
Jupiter	55°31.3	13:44:34
Saturn	56°23.6	13:40:49

Day	Sun		Moon		
	Eqn. of Time	Mer. Pass	Mer. Pass.		Age
	00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss	Upper hh:mm:ss	Lower hh:mm:ss	
28	01:31	01:46	12:01:46	23:02:42	14(97%)
29	02:00	02:15	12:02:15	23:55:24	15(100%)

30 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	08:25:16	10:47:12	■	■	13:18:34	15:40:32	□
N 70°	08:05:58	09:51:37	■	■	14:14:08	15:59:49	□
68°	07:50:33	09:18:16	■	■	14:47:27	16:15:11	□
66°	07:37:50	08:53:58	10:30:21	13:35:21	15:11:45	16:27:53	□
64°	07:27:03	08:34:52	09:50:55	14:14:46	15:30:50	16:38:39	13:42:30 11:03:09
62°	07:17:43	08:19:12	09:23:50	14:41:50	15:46:29	16:47:58	14:27:18 10:18:19
60°	07:09:31	08:05:58	09:02:55	15:02:44	15:59:42	16:56:10	14:56:50 09:48:44
N 58°	07:02:12	07:54:32	08:45:52	15:19:46	16:11:07	17:03:28	15:19:24 09:26:08
56°	06:55:35	07:44:31	08:31:30	15:34:08	16:21:08	17:10:04	15:37:44 09:07:45
54°	06:49:33	07:35:35	08:19:06	15:46:31	16:30:02	17:16:05	15:53:12 08:52:15
52°	06:44:00	07:27:33	08:08:13	15:57:24	16:38:04	17:21:37	16:06:34 08:38:51
50°	06:38:51	07:20:15	07:58:31	16:07:06	16:45:21	17:26:46	16:18:19 08:27:04
45°	06:27:18	07:04:26	07:38:07	16:27:28	17:01:09	17:38:18	16:42:40 08:02:39
N 40°	06:17:08	06:51:08	07:21:35	16:43:59	17:14:26	17:48:26	17:02:08 07:43:08
35°	06:07:55	06:39:32	07:07:36	16:57:57	17:26:01	17:57:38	17:18:24 07:26:48
30°	05:59:19	06:29:08	06:55:25	17:10:07	17:36:24	18:06:13	17:32:29 07:12:40
20°	05:43:05	06:10:32	06:34:29	17:31:01	17:54:58	18:22:25	17:56:26 06:48:37
N 10°	05:27:07	05:53:25	06:16:11	17:49:17	18:12:03	18:38:21	18:17:09 06:27:48
0°	05:10:20	05:36:30	05:58:58	18:06:29	18:28:57	18:55:06	18:36:30 06:08:21
S 10°	04:51:35	05:18:37	05:41:37	18:23:48	18:46:48	19:13:49	18:55:50 05:48:54
20°	04:29:15	04:58:24	05:22:53	18:42:29	19:06:58	19:36:06	19:16:34 05:28:01
30°	04:00:31	04:33:46	05:01:07	19:04:12	19:31:33	20:04:46	19:40:33 05:03:52
35°	03:42:07	04:18:41	04:48:17	19:17:01	19:46:35	20:23:07	19:54:38 04:49:40
40°	03:19:16	04:00:44	04:33:26	19:31:49	20:04:29	20:45:52	20:10:55 04:33:14
45°	02:49:11	03:38:29	04:15:40	19:49:32	20:26:39	21:15:50	20:30:23 04:13:34
S 50°	02:04:47	03:09:16	03:53:29	20:11:39	20:55:45	21:59:57	20:54:43 03:48:56
52°	01:38:06	02:54:28	03:42:48	20:22:17	21:10:29	22:26:21	21:06:28 03:37:02
54°	00:55:53	02:36:55	03:30:42	20:34:20	21:27:55	23:07:34	21:19:48 03:23:29
56°	—:—	02:15:17	03:16:46	20:48:12	21:49:23	—:—	21:35:13 03:07:47
58°	—:—	01:46:41	03:00:21	21:04:31	22:17:40	—:—	21:53:29 02:49:08
S 60°	—:—	01:00:56	02:40:25	21:24:19	23:02:21	—:—	22:15:54 02:26:07

Dec 30	SHA	Mer.pass
Venus	103°04.3	10:32:46
Mars	335°43.3	18:59:40
Jupiter	55°17.2	13:41:34
Saturn	56°16.6	13:37:21

31 December 2020							
Lat.	Twilight		Sunrise	Sunset	Twilight		Moonset
	Naut.	Civil			Civil	Naut.	
N 72°	08:24:32	10:44:33	■	■	13:22:13	15:42:15	□
N 70°	08:05:25	09:50:24	■	■	14:16:20	16:01:20	□
68°	07:50:09	09:17:30	■	■	14:49:13	16:16:34	□
66°	07:37:32	08:53:25	10:28:51	13:37:50	15:13:16	16:29:10	13:55:43 12:43:56
64°	07:26:50	08:34:29	09:50:05	14:16:34	15:32:11	16:39:51	15:05:40 11:33:37
62°	07:17:34	08:18:55	09:23:17	14:43:21	15:47:44	16:49:06	15:41:17 10:57:40
60°	07:09:25	08:05:46	09:02:33	15:04:05	16:00:52	16:57:14	16:06:55 10:31:45
N 58°	07:02:09	07:54:25	08:45:37	15:21:00	16:12:12	17:04:29	16:27:06 10:11:16
56°	06:55:35	07:44:27	08:31:20	15:35:16	16:22:10	17:11:02	16:43:47 09:54:19
54°	06:49:36	07:35:34	08:19:00	15:47:35	16:31:02	17:17:01	16:58:00 09:39:53
52°	06:44:04	07:27:35	08:08:10	15:58:25	16:39:00	17:22:31	17:10:20 09:27:18
50°	06:38:57	07:20:19	07:58:31	16:08:03	16:46:16	17:27:38	17:21:15 09:16:10
45°	06:27:28	07:04:35	07:38:13	16:28:20	17:01:59	17:39:05	17:43:58 08:52:58
N 40°	06:17:22	06:51:20	07:21:45	16:44:47	17:15:12	17:49:10	18:02:12 08:34:18
35°	06:08:11	06:39:47	07:07:50	16:58:41	17:26:44	17:58:19	18:17:28 08:18:37
30°	05:59:37	06:29:25	06:55:41	17:10:49	17:37:04	18:06:52	18:30:43 08:05:00
20°	05:43:28	06:10:54	06:34:50	17:31:38	17:55:34	18:23:00	18:53:15 07:41:45
N 10°	05:27:33	05:53:51	06:16:37	17:49:49	18:12:34	18:38:52	19:12:45 07:21:34
0°	05:10:50	05:36:59	05:59:27	18:06:57	18:29:24	18:55:33	19:30:56 07:02:41
S 10°	04:52:09	05:19:10	05:42:09	18:24:13	18:47:11	19:14:11	19:49:06 06:43:44
20°	04:29:53	04:59:01	05:23:30	18:42:50	19:07:17	19:36:24	20:08:31 06:23:24
30°	04:01:15	04:34:28	05:01:48	19:04:28	19:31:46	20:04:57	20:30:52 05:59:50
35°	03:42:55	04:19:27	04:49:01	19:17:13	19:46:45	20:23:14	20:43:58 05:45:57
40°	03:20:10	04:01:34	04:34:13	19:31:58	20:04:34	20:45:53	20:59:01 05:29:54
45°	02:50:14	03:39:25	04:16:32	19:49:36	20:26:39	21:15:41	21:16:54 05:10:41
S 50°	02:06:08	03:10:20	03:54:27	20:11:36	20:55:36	21:59:29	21:39:04 04:46:38
52°	01:39:45	02:55:37	03:43:49	20:22:11	21:10:14	22:25:33	21:49:38 04:35:01
54°	00:58:32	02:38:11	03:31:47	20:34:10	21:27:33	23:05:45	22:01:33 04:21:49
56°	—:—	02:16:44	03:17:55	20:47:57	21:48:49	—:—	22:15:10 04:06:31
58°	—:—	01:48:27	03:01:37	21:04:09	22:16:46	—:—	22:31:02 03:48:24
S 60°	—:—	01:03:47	02:41:49	21:23:47	23:00:19	—:—	22:50:00 03:26:08

Dec 31	SHA	Mer.pass
Venus	101°43.7	10:34:12
Mars	335°19.5	18:57:20
Jupiter	55°03.0	13:38:35
Saturn	56°09.5	13:33:53

Day	Sun		Mer. Pass	Moon		Age
	Eqn.of Time 00 <sup>h</sup> mm:ss	12 <sup>h</sup> mm:ss		Upper hh:mm:ss	Lower hh:mm:ss	
30	02:29	02:43	12:02:43	—:—	12:22:23	16(100%)
31	02:58	03:12	12:03:12	00:49:35	13:16:49	17(98%)