Chapter 5 – FIGURING THE DATE

Variable star observations reported to the AAVSO must be expressed either in terms of **Universal Time (UT)** or **Julian Day (JD)** and the decimal part of the day given in **Greenwich Mean Astronomical Time (GMAT)**.

UNIVERSAL TIME (UT)

Often in astronomy you will see the time of events being expressed in Universal Time (or UT). This is the same as Greenwich Mean Time (GMT) which starts at midnight in Greenwich, England. To find the UT equivalent of a specific time, simply add to it, or subtract from it, as the case may be, the zone difference for your observing location. The "World Map of Time Zones" (Figure 5.2) is provided to help you to determine the zone difference for your location.

JULIAN DATE (JD)

JD is the standard unit of time used by astronomers because it is convenient and unambiguous. Here are the advantages:

— The astronomical day runs from noon to noon so that you don't have to change calendar dates in the middle of the night.

— A single number represents days, months, years, hours, and minutes.

— Data on the same star from people observing anywhere in the world can be compared easily since they are all relative to the same time zone; that of the prime meridian in Greenwich, England.

DOING THE MATH

There are tools available on the internet and on the AAVSO website to help you figure the JD (see https://www.aavso.org/jd-calculator) so most people don't compute it themselves anymore, but it is still important to know how it is derived.

What follows is a simple procedure for figuring the JD and GMAT decimal of your observations. If you decide to submit your observations using UT, just follow steps 1 through 3.

Step-by-Step Instructions

1. Record the time and date of your observation using the 24-hour clock instead of AM or PM. (i.e. add 12 hrs if PM)

   examples:
   A. June 3, 2013 at 9:34 PM = June 3 at 21:34
   B. June 4, 2013 at 4:16 AM = June 4 at 04:16

2. If your observation was made when Daylight Savings Time (Summer Time) is in effect where you live, subtract one hour to get standard time.

   A. June 3 at 21:34 DST = June 3 at 20:34
   B. June 4 at 04:16 DST = June 4 at 03:16

3. Convert to UT by adding or subtracting your time zone difference from Greenwich, as the case may be. For this example we will assume that the observer is located 5 hours west of Greenwich.

   A. June 3 at 20:34 + 5hr = June 4 at 01:34 UT
   B. June 4 at 03:16 + 5hr = June 4 at 08:16 UT

4. To convert from UT to Greenwich Mean *Astronomical* Time (GMAT) subtract 12 hours. This is because GMAT runs from noon to noon rather than midnight to midnight.

   A. June 4 at 01:34 UT = June 3 at 13:34 GMAT
   B. June 4 at 08:16 UT = June 3 at 20:16 GMAT

5. Find the decimal equivalent of the hours and minutes of your observation from Table 5.2.

   A. 13:34 GMAT = .5653
   B. 20:16 GMAT = .8444

6. Look up the Julian Date equivalent to the GMAT date of your observation as determined in Step 4 above. You can use the sample JD calendar shown in Figure 5.1.

   A and B: June 3, 2013 = 2,456,447

7. Now add the decimal from Step 5 to the JD integer to arrive at the final result of:

   A. JD = 2456447.5653
   B. JD = 2456447.8444

Sample Calculations

Below are three more examples showing how JDs are calculated using the steps just outlined. All of these examples use the JD Calendar (Figure 5.1) and the JD decimal table (Table 5.2).

Example 1 — Observation from Istanbul, Turkey (2 hrs east of Greenwich) at 1:15 am, January 10, 2013.

Step 1: 01:15 Jan 10 Local Time
Step 2: N/A
Step 3: 01:15 - 2 hrs = 23:15 Jan 9 UT
Step 4: 23:15 - 12 hrs = 11:15 Jan 9 GMAT
Step 5: decimal = .4688
Step 6: JD for Jan 9, 2013 = 2456302
Final Result: 2456302.4688

Example 2 — Observation from Vancouver, BC Canada (8 hrs west of Greenwich) at 5:21 am, February 14, 2013.

Step 1: 05:21 Feb 14 Local Time
Step 2: N/A
Step 3: 05:21 + 8 hrs = 13:21 Feb 14 UT
Step 4: 13:21 - 12 hrs = 01:21 Feb 14 GMAT
Step 5: decimal = .0563
Step 6: JD for Feb 14 = 2456338
Final Result: 2456338.0563

Example 3 — Observation from Auckland, New Zealand (12 hrs east of Greenwich) at 10:25 pm Daylight Savings Time (DST), January 28, 2013.

Step 1: 22:25 Jan 28 Local DST
Step 2: 22:25 - 1 hr = 21:25 Jan 28 Standard Time
Step 3: 21:25 -12 = 09:25 Jan 28 UT
Step 4: 09:25 - 12 = 21:25 Jan 27 GMAT
Step 5: decimal = .8924
Step 6: JD for Jan 27 = 2456320
Final Result: 2456320.8924

The calendar in Figure 5.1 (page 33) was taken from the AAVSO website (https://www.aavso.org/jd-calculator). It gives the last four digits of the Julian Day for each day of every month of the year 2013 The months July–December are on the second page (not included in this Manual). For the complete JD, add 2,450,000 to the four digit value given in the calendar for the *Astronomical Day* of your observation.

Where does JD come from?

In the Julian Day system, all days are numbered consecutively from Julian Day zero, which began at noon on January 1, 4713 BC. Joseph Justus Scaliger, a French classical scholar of the 16th century, determined this as the date on which three important cycles coincided; the 28-year solar cycle, the 19-year lunar cycle, and the 15-year cycle of tax assessment called the "Roman Indiction".

Two additional reference tables are provided in this chapter for your convenience:

Table 5.2 can be used to find the GMAT decimal of the day to four decimal places. This degree of accuracy is only needed for certain types of stars Table 5.1, below, shows the precision needed in the JD for various types of stars.

Table 5.1 – *Precision of JD Needed*

Type of Star	***Report JD to...***
Cepheids	4 decimal places
RR Lyrae stars	4 decimal places
RV Tauri stars	1 decimal place
Long period variables	1 decimal place
Semiregulars	1 decimal place
Cataclysmic variables	4 decimal places
Symbiotic stars*	1 decimal place
R CrB stars*—*at Max*	1 decimal place
R CrB stars—*at Min*	4 decimal places
Eclipsing Binary stars	4 decimal places
Rotating stars	4 decimal places
Irregular variables	1 decimal place
Suspected variables	4 decimal places

*__Note:__ Symbiotic stars and R CrB stars may experience possible small-amplitude, short-period variability. If you are interested in looking for this, then observations should be made every clear night and reported to 4 decimal places.

Table 5.3 lists the JDs for the zero day of each month from 1996 to 2025. The zero day (which is actually the last day of the previous month) is used for ease in calculating the JD of any given day by making it possible to simply add the calendar date to the JD listed.

example: Jan. 28, 2015
= (JD for Jan 0) + 28
= 2457023+28
= 2457051

Figure 5.1 – *Sample JD Calendar*

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2013

JULIAN DAY CALENDAR

2,450,000 plus the value given under each date

JANUARY

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1 6294	2 6295	3 6296	4 6297	5 6298
6 6299	7 6300	8 6301	9 6302	10 6303	11 6304	12 6305
13 6306	14 6307	15 6308	16 6309	17 6310	18 6311	19 6312
20 6313	21 6314	22 6315	23 6316	24 6317	25 6318	26 6319
27 6320	28 6321	29 6322	30 6323	31 6324		

◑ 18 ○ 27 ◑ 5 ● 11

FEBRUARY

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1 6325	2 6326
3 6327	4 6328	5 6329	6 6330	7 6331	8 6332	9 6333
10 6334	11 6335	12 6336	13 6337	14 6338	15 6339	16 6340
17 6341	18 6342	19 6343	20 6344	21 6345	22 6346	23 6347
24 6348	25 6349	26 6350	27 6351	28 6352		

◑ 17 ○ 25 ◑ 3 ● 10

MARCH

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1 6353	2 6354
3 6355	4 6356	5 6357	6 6358	7 6359	8 6360	9 6361
10 6362	11 6363	12 6364	13 6365	14 6366	15 6367	16 6368
17 6369	18 6370	19 6371	20 6372	21 6373	22 6374	23 6375
24 6376	25 6377	26 6378	27 6379	28 6380	29 6381	30 6382
31 6383						

◑ 4 ● 11 ◑ 19 ○ 27

APRIL

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1 6384	2 6385	3 6386	4 6387	5 6388	6 6389
7 6390	8 6391	9 6392	10 6393	11 6394	12 6395	13 6396
14 6397	15 6398	16 6399	17 6400	18 6401	19 6402	20 6403
21 6404	22 6405	23 6406	24 6407	25 6408	26 6409	27 6410
28 6411	29 6412	30 6413				

◑ 3 ● 10 ◑ 18 ○ 25

MAY

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1 6414	2 6415	3 6416	4 6417
5 6418	6 6419	7 6420	8 6421	9 6422	10 6423	11 6424
12 6425	13 6426	14 6427	15 6428	16 6429	17 6430	18 6431
19 6432	20 6433	21 6434	22 6435	23 6436	24 6437	25 6438
26 6439	27 6440	28 6441	29 6442	30 6443	31 6444	

● 10 ◑ 18 ○ 25 ◑ 31 ◑ 2

JUNE

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1 6445
2 6446	3 6447	4 6448	5 6449	6 6450	7 6451	8 6452
9 6453	10 6454	11 6455	12 6456	13 6457	14 6458	15 6459
16 6460	17 6461	18 6462	19 6463	20 6464	21 6465	22 6466
23 6467	24 6468	25 6469	26 6470	27 6471	28 6472	29 6473
30 6474						

● 8 ◑ 16 ○ 23 ◑ 30

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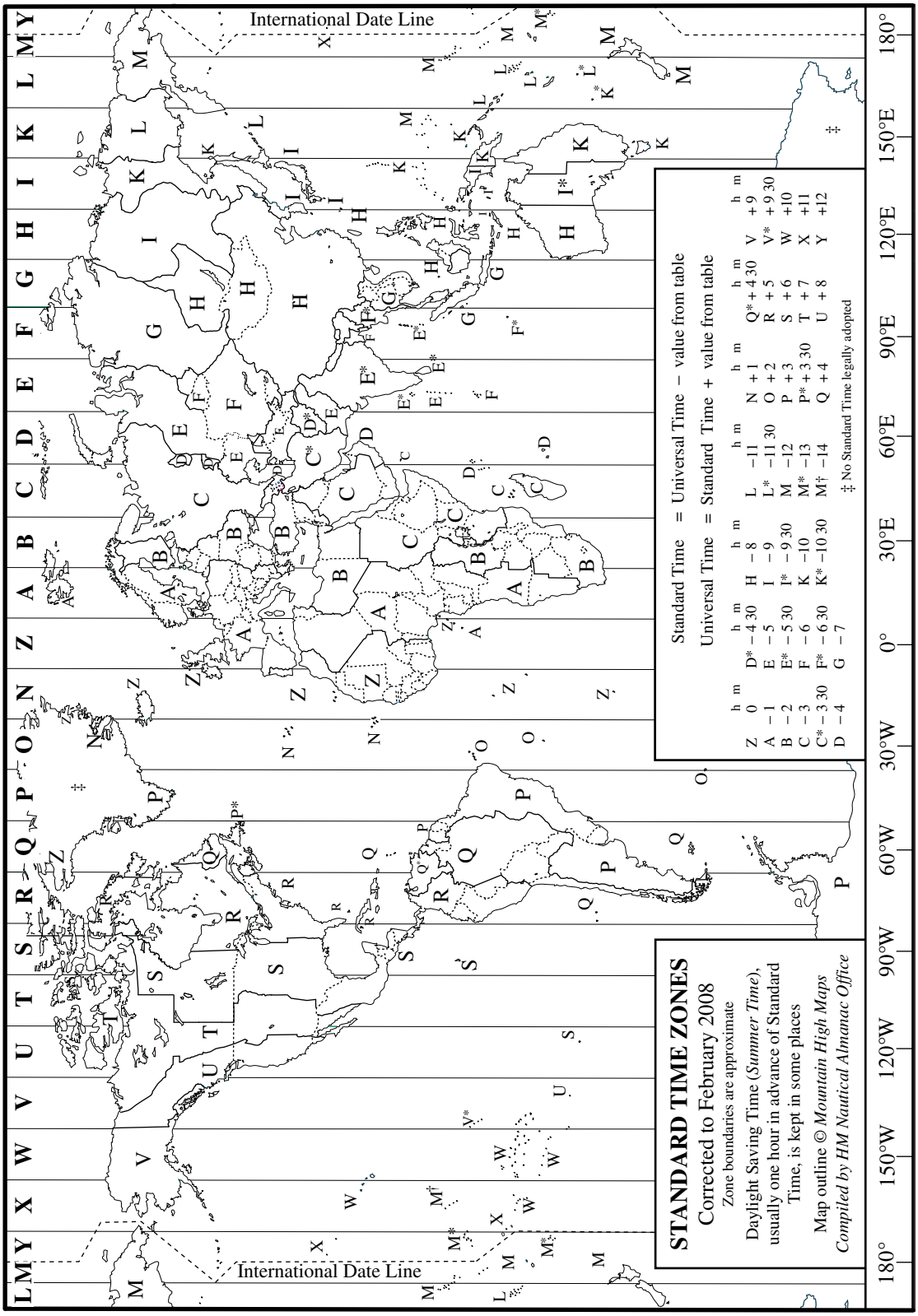
Figure 5.2 – *World Map of Time Zones*



"World Map of Time Zones" produced by HM Nautical Almanac Office Copyright Council for the Central Laboratory of the Research Councils. Reproduced with their permission.

Table 5.2 – *JD Decimal (to four places)* To use this table, find the **GMAT** hours across the top of the page and the minutes down the side. The result is the fraction of the day represented. GMAT is explained on page 31 of this manual.

GMAT	0h	1h	2h	3h	4h	5h	6h	7h	8h	9h	10h	11h
m	d	d	d	d	d	d	d	d	d	d	d	d
0	0.0000	0.0417	0.0833	0.1250	0.1667	0.2083	0.2500	0.2917	0.3333	0.3750	0.4167	0.4583
1	.0007	.0424	.0840	.1257	.1674	.2090	.2507	.2924	.3340	.3757	.4174	.4590
2	.0014	.0431	.0847	.1264	.1681	.2097	.2514	.2931	.3347	.3764	.4181	.4597
3	.0021	.0437	.0854	.1271	.1688	.2104	.2521	.2938	.3354	.3771	.4188	.4604
4	.0028	.0444	.0861	.1278	.1694	.2111	.2528	.2944	.3361	.3778	.4194	.4611
5	0.0035	0.0451	0.0868	0.1285	0.1701	0.2118	0.2535	0.2951	0.3368	0.3785	0.4201	0.4618
6	.0042	.0458	.0875	.1292	.1708	.2125	.2542	.2958	.3375	.3792	.4208	.4625
7	.0049	.0465	.0882	.1299	.1715	.2132	.2549	.2965	.3382	.3799	.4215	.4632
8	.0056	.0472	.0889	.1306	.1722	.2139	.2556	.2972	.3389	.3806	.4222	.4639
9	.0063	.0479	.0896	.1313	.1729	.2146	.2562	.2979	.3396	.3812	.4229	.4646
10	0.0069	0.0486	0.0903	0.1319	0.1736	0.2153	0.2569	0.2986	0.3403	0.3819	0.4236	0.4653
11	.0076	.0493	.0910	.1326	.1743	.2160	.2576	.2993	.3410	.3826	.4243	.4660
12	.0083	.0500	.0917	.1333	.1750	.2167	.2583	.3000	.3417	.3833	.4250	.4667
13	.0090	.0507	.0924	.1340	.1757	.2174	.2590	.3007	.3424	.3840	.4257	.4674
14	.0097	.0514	.0931	.1347	.1764	.2181	.2597	.3014	.3431	.3847	.4264	.4681
15	0.0104	0.0521	0.0938	0.1354	0.1771	0.2188	0.2604	0.3021	0.3438	0.3854	0.4271	0.4688
16	.0111	.0528	.0944	.1361	.1778	.2194	.2611	.3028	.3444	.3861	.4278	.4694
17	.0118	.0535	.0951	.1368	.1785	.2201	.2618	.3035	.3451	.3868	.4285	.4701
18	.0125	.0542	.0958	.1375	.1792	.2208	.2625	.3042	.3458	.3875	.4292	.4708
19	.0132	.0549	.0965	.1382	.1799	.2215	.2632	.3049	.3465	.3882	.4299	.4715
20	0.0139	0.0556	0.0972	0.1389	0.1806	0.2222	0.2639	0.3056	0.3472	0.3889	0.4306	0.4722
21	.0146	.0563	.0979	.1396	.1812	.2229	.2646	.3063	.3479	.3896	.4313	.4729
22	.0153	.0569	.0986	.1403	.1819	.2236	.2653	.3069	.3486	.3903	.4319	.4736
23	.0160	.0576	.0993	.1410	.1826	.2243	.2660	.3076	.3493	.3910	.4326	.4743
24	.0167	.0583	.1000	.1417	.1833	.2250	.2667	.3083	.3500	.3917	.4333	.4750
25	0.0174	0.0590	0.1007	0.1424	0.1840	0.2257	0.2674	0.3090	0.3507	0.3924	0.4340	0.4757
26	.0181	.0597	.1014	.1431	.1847	.2264	.2681	.3097	.3514	.3931	.4347	.4764
27	.0187	.0604	.1021	.1437	.1854	.2271	.2687	.3104	.3521	.3937	.4354	.4771
28	.0194	.0611	.1028	.1444	.1861	.2278	.2694	.3111	.3528	.3944	.4361	.4778
29	.0201	.0618	.1035	.1451	.1868	.2285	.2701	.3118	.3535	.3951	.4368	.4785
30	0.0208	0.0625	0.1042	0.1458	0.1875	0.2292	0.2708	0.3125	0.3542	0.3958	0.4375	0.4792
31	.0215	.0632	.1049	.1465	.1882	.2299	.2715	.3132	.3549	.3965	.4382	.4799
32	.0222	.0639	.1056	.1472	.1889	.2306	.2722	.3139	.3556	.3972	.4389	.4806
33	.0229	.0646	.1062	.1479	.1896	.2313	.2729	.3146	.3563	.3979	.4396	.4813
34	.0236	.0653	.1069	.1486	.1903	.2319	.2736	.3153	.3569	.3986	.4403	.4819
35	0.0243	0.0660	0.1076	0.1493	0.1910	0.2326	0.2743	0.3160	0.3576	0.3993	0.4410	0.4826
36	.0250	.0667	.1083	.1500	.1917	.2333	.2750	.3167	.3583	.4000	.4417	.4833
37	.0257	.0674	.1090	.1507	.1924	.2340	.2757	.3174	.3590	.4007	.4424	.4840
38	.0264	.0681	.1097	.1514	.1931	.2347	.2764	.3181	.3597	.4014	.4431	.4847
39	.0271	.0688	.1104	.1521	.1938	.2354	.2771	.3187	.3604	.4021	.4437	.4854
40	0.0278	0.0694	0.1111	0.1528	0.1944	0.2361	0.2778	0.3194	0.3611	0.4028	0.4444	0.4861
41	.0285	.0701	.1118	.1535	.1951	.2368	.2785	.3201	.3618	.4035	.4451	.4868
42	.0292	.0708	.1125	.1542	.1958	.2375	.2792	.3208	.3625	.4042	.4458	.4875
43	.0299	.0715	.1132	.1549	.1965	.2382	.2799	.3215	.3632	.4049	.4465	.4882
44	.0306	.0722	.1139	.1556	.1972	.2389	.2806	.3222	.3639	.4056	.4472	.4889
45	0.0313	0.0729	0.1146	0.1563	0.1979	0.2396	0.2813	0.3229	0.3646	0.4063	0.4479	0.4896
46	.0319	.0736	.1153	.1569	.1986	.2403	.2819	.3236	.3653	.4069	.4486	.4903
47	.0326	.0743	.1160	.1576	.1993	.2410	.2826	.3243	.3660	.4076	.4493	.4910
48	.0333	.0750	.1167	.1583	.2000	.2417	.2833	.3250	.3667	.4083	.4500	.4917
49	.0340	.0757	.1174	.1590	.2007	.2424	.2840	.3257	.3674	.4090	.4507	.4924
50	0.0347	0.0764	0.1181	0.1597	0.2014	0.2431	0.2847	0.3264	0.3681	0.4097	0.4514	0.4931
51	.0354	.0771	.1187	.1604	.2021	.2437	.2854	.3271	.3688	.4104	.4521	.4938
52	.0361	.0778	.1194	.1611	.2028	.2444	.2861	.3278	.3694	.4111	.4528	.4944
53	.0368	.0785	.1201	.1618	.2035	.2451	.2868	.3285	.3701	.4118	.4535	.4951
54	.0375	.0792	.1208	.1625	.2042	.2458	.2875	.3292	.3708	.4125	.4542	.4958
55	0.0382	0.0799	0.1215	0.1632	0.2049	0.2465	0.2882	0.3299	0.3715	0.4132	0.4549	0.4965
56	.0389	.0806	.1222	.1639	.2056	.2472	.2889	.3306	.3722	.4139	.4556	.4972
57	.0396	.0813	.1229	.1646	.2062	.2479	.2896	.3312	.3729	.4146	.4562	.4979
58	.0403	.0819	.1236	.1653	.2069	.2486	.2903	.3319	.3736	.4153	.4569	.4986
59	.0410	.0826	.1243	.1660	.2076	.2493	.2910	.3326	.3743	.4160	.4576	.4993
60	0.0417	0.0833	0.1250	0.1667	0.2083	0.2500	0.2917	0.3333	0.3750	0.4167	0.4583	0.5000

GMAT	12h	13h	14h	15h	16h	17h	18h	19h	20h	21h	22h	23h
m	d	d	d	d	d	d	d	d	d	d	d	d
0	0.5000	0.5417	0.5833	0.6250	0.6667	0.7083	0.7500	0.7917	0.8333	0.8750	0.9167	0.9583
1	.5007	.5424	.5840	.6257	.6674	.7090	.7507	.7924	.8340	.8757	.9174	.9590
2	.5014	.5431	.5847	.6264	.6681	.7097	.7514	.7931	.8347	.8764	.9181	.9597
3	.5021	.5437	.5854	.6271	.6687	.7104	.7521	.7937	.8354	.8771	.9187	.9604
4	.5028	.5444	.5861	.6278	.6694	.7111	.7528	.7944	.8361	.8778	.9194	.9611
5	0.5035	0.5451	0.5868	0.6285	0.6701	0.7118	0.7535	0.7951	0.8368	0.8785	0.9201	0.9618
6	.5042	.5458	.5875	.6292	.6708	.7125	.7542	.7958	.8375	.8792	.9208	.9625
7	.5049	.5465	.5882	.6299	.6715	.7132	.7549	.7965	.8382	.8799	.9215	.9632
8	.5056	.5472	.5889	.6306	.6722	.7139	.7556	.7972	.8389	.8806	.9222	.9639
9	.5062	.5479	.5896	.6312	.6729	.7146	.7562	.7979	.8396	.8812	.9229	.9646
10	0.5069	0.5486	0.5903	0.6319	0.6736	0.7153	0.7569	0.7986	0.8403	0.8819	0.9236	0.9653
11	.5076	.5493	.5910	.6326	.6743	.7160	.7576	.7993	.8410	.8826	.9243	.9660
12	.5083	.5500	.5917	.6333	.6750	.7167	.7583	.8000	.8417	.8833	.9250	.9667
13	.5090	.5507	.5924	.6340	.6757	.7174	.7590	.8007	.8424	.8840	.9257	.9674
14	.5097	.5514	.5931	.6347	.6764	.7181	.7597	.8014	.8431	.8847	.9264	.9681
15	0.5104	0.5521	0.5938	0.6354	0.6771	0.7188	0.7604	0.8021	0.8438	0.8854	0.9271	0.9688
16	.5111	.5528	.5944	.6361	.6778	.7194	.7611	.8028	.8444	.8861	.9278	.9694
17	.5118	.5535	.5951	.6368	.6785	.7201	.7618	.8035	.8451	.8868	.9285	.9701
18	.5125	.5542	.5958	.6375	.6792	.7208	.7625	.8042	.8458	.8875	.9292	.9708
19	.5132	.5549	.5965	.6382	.6799	.7215	.7632	.8049	.8465	.8882	.9299	.9715
20	0.5139	0.5556	0.5972	0.6389	0.6806	0.7222	0.7639	0.8056	0.8472	0.8889	0.9306	0.9722
21	.5146	.5563	.5979	.6396	.6813	.7229	.7646	.8063	.8479	.8896	.9313	.9729
22	.5153	.5569	.5986	.6403	.6819	.7236	.7653	.8069	.8486	.8903	.9319	.9736
23	.5160	.5576	.5993	.6410	.6826	.7243	.7660	.8076	.8493	.8910	.9326	.9743
24	.5167	.5583	.6000	.6417	.6833	.7250	.7667	.8083	.8500	.8917	.9333	.9750
25	0.5174	0.5590	0.6007	0.6424	0.6840	0.7257	0.7674	0.8090	0.8507	0.8924	0.9340	0.9757
26	.5181	.5597	.6014	.6431	.6847	.7264	.7681	.8097	.8514	.8931	.9347	.9764
27	.5188	.5604	.6021	.6438	.6854	.7271	.7688	.8104	.8521	.8938	.9354	.9771
28	.5194	.5611	.6028	.6444	.6861	.7278	.7694	.8111	.8528	.8944	.9361	.9778
29	.5201	.5618	.6035	.6451	.6868	.7285	.7701	.8118	.8535	.8951	.9368	.9785
30	0.5208	0.5625	0.6042	0.6458	0.6875	0.7292	0.7708	0.8125	0.8542	0.8958	0.9375	0.9792
31	.5215	.5632	.6049	.6465	.6882	.7299	.7715	.8132	.8549	.8965	.9382	.9799
32	.5222	.5639	.6056	.6472	.6889	.7306	.7722	.8139	.8556	.8972	.9389	.9806
33	.5229	.5646	.6062	.6479	.6896	.7312	.7729	.8146	.8562	.8979	.9396	.9812
34	.5236	.5653	.6069	.6486	.6903	.7319	.7736	.8153	.8569	.8986	.9403	.9819
35	0.5243	0.5660	0.6076	0.6493	0.6910	0.7326	0.7743	0.8160	0.8576	0.8993	0.9410	0.9826
36	.5250	.5667	.6083	.6500	.6917	.7333	.7750	.8167	.8583	.9000	.9417	.9833
37	.5257	.5674	.6090	.6507	.6924	.7340	.7757	.8174	.8590	.9007	.9424	.9840
38	.5264	.5681	.6097	.6514	.6931	.7347	.7764	.8181	.8597	.9014	.9431	.9847
39	.5271	.5687	.6104	.6521	.6937	.7354	.7771	.8187	.8604	.9021	.9437	.9854
40	0.5278	0.5694	0.6111	0.6528	0.6944	0.7361	0.7778	0.8194	0.8611	0.9028	0.9444	0.9861
41	.5285	.5701	.6118	.6535	.6951	.7368	.7785	.8201	.8618	.9035	.9451	.9868
42	.5292	.5708	.6125	.6542	.6958	.7375	.7792	.8208	.8625	.9042	.9458	.9875
43	.5299	.5715	.6132	.6549	.6965	.7382	.7799	.8215	.8632	.9049	.9465	.9882
44	.5306	.5722	.6139	.6556	.6972	.7389	.7806	.8222	.8639	.9056	.9472	.9889
45	0.5313	0.5729	0.6146	0.6563	0.6979	0.7396	0.7813	0.8229	0.8646	0.9063	0.9479	0.9896
46	.5319	.5736	.6153	.6569	.6986	.7403	.7819	.8236	.8653	.9069	.9486	.9903
47	.5326	.5743	.6160	.6576	.6993	.7410	.7826	.8243	.8660	.9076	.9493	.9910
48	.5333	.5750	.6167	.6583	.7000	.7417	.7833	.8250	.8667	.9083	.9500	.9917
49	.5340	.5757	.6174	.6590	.7007	.7424	.7840	.8257	.8674	.9090	.9507	.9924
50	0.5347	0.5764	0.6181	0.6597	0.7014	0.7431	0.7847	0.8264	0.8681	0.9097	0.9514	0.9931
51	.5354	.5771	.6188	.6604	.7021	.7438	.7854	.8271	.8688	.9104	.9521	.9938
52	.5361	.5778	.6194	.6611	.7028	.7444	.7861	.8278	.8694	.9111	.9528	.9944
53	.5368	.5785	.6201	.6618	.7035	.7451	.7868	.8285	.8701	.9118	.9535	.9951
54	.5375	.5792	.6208	.6625	.7042	.7458	.7875	.8292	.8708	.9125	.9542	.9958
55	0.5382	0.5799	0.6215	0.6632	0.7049	0.7465	0.7882	0.8299	0.8715	0.9132	0.9549	0.9965
56	.5389	.5806	.6222	.6639	.7056	.7472	.7889	.8306	.8722	.9139	.9556	.9972
57	.5396	.5813	.6229	.6646	.7063	.7479	.7896	.8313	.8729	.9146	.9563	.9979
58	.5403	.5819	.6236	.6653	.7069	.7486	.7903	.8319	.8736	.9153	.9569	.9986
59	.5410	.5826	.6243	.6660	.7076	.7493	.7910	.8326	.8743	.9160	.9576	.9993
60	0.5417	0.5833	0.6250	0.6667	0.7083	0.7500	0.7917	0.8333	0.8750	0.9167	0.9583	1.0000

Table 5.3 – *Julian Day Number 1996–2025* To use this table, add the calendar date (based on the noon to noon astronomical time) of your observation to the zero day of the appropriate month for the desired year. For example, for an observation made on February 6, 2015, the Julian date would be: 2457054 + 6 = 2457060.

Year	Jan 0	Feb 0	Mar 0	Apr 0	May 0	Jun 0	Jul 0	Aug 0	Sep 0	Oct 0	Nov 0	Dec 0
1996	2450083	2450114	2450143	2450174	2450204	2450235	2450265	2450296	2450327	2450357	2450388	2450418
1997	2450449	2450480	2450508	2450539	2450569	2450600	2450630	2450661	2450692	2450722	2450753	2450783
1998	2450814	2450845	2450873	2450904	2450934	2450965	2450995	2451026	2451057	2451087	2451118	2451148
1999	2451179	2451210	2451238	2451269	2451299	2451330	2451360	2451391	2451422	2451452	2451483	2451513
2000	2451544	2451575	2451604	2451635	2451665	2451696	2451726	2451757	2451788	2451818	2451849	2451879
2001	2451910	2451941	2451969	2452000	2452030	2452061	2452091	2452122	2452153	2452183	2452214	2452244
2002	2452275	2452306	2452334	2452365	2452395	2452426	2452456	2452487	2452518	2452548	2452579	2452609
2003	2452640	2452671	2452699	2452730	2452760	2452791	2452821	2452852	2452883	2452913	2452944	2452974
2004	2453005	2453036	2453065	2453096	2453126	2453157	2453187	2453218	2453249	2453279	2453310	2453340
2005	2453371	2453402	2453430	2453461	2453491	2453522	2453552	2453583	2453614	2453644	2453675	2453705
2006	2453736	2453767	2453795	2453826	2453856	2453887	2453917	2453948	2453979	2454009	2454040	2454070
2007	2454101	2454132	2454160	2454191	2454221	2454252	2454282	2454313	2454344	2454374	2454405	2454435
2008	2454466	2454497	2454526	2454557	2454587	2454618	2454648	2454679	2454710	2454740	2454771	2454801
2009	2454832	2454863	2454891	2454922	2454952	2454983	2455013	2455044	2455075	2455105	2455136	2455166
2010	2455197	2455228	2455256	2455287	2455317	2455348	2455378	2455409	2455440	2455470	2455501	2455531
2011	2455562	2455593	2455621	2455652	2455682	2455713	2455743	2455774	2455805	2455835	2455866	2455896
2012	2455927	2455958	2455987	2456018	2456048	2456079	2456109	2456140	2456171	2456201	2456232	2456262
2013	2456293	2456324	2456352	2456383	2456413	2456444	2456474	2456505	2456536	2456566	2456597	2456627
2014	2456658	2456689	2456717	2456748	2456778	2456809	2456839	2456870	2456901	2456931	2456962	2456992
2015	2457023	2457054	2457082	2457113	2457143	2457174	2457204	2457235	2457266	2457296	2457327	2457357
2016	2457388	2457419	2457448	2457479	2457509	2457540	2457570	2457601	2457632	2457662	2457693	2457723
2017	2457754	2457785	2457813	2457844	2457874	2457905	2457935	2457966	2457997	2458027	2458058	2458088
2018	2458119	2458150	2458178	2458209	2458239	2458270	2458300	2458331	2458362	2458392	2458423	2458453
2019	2458484	2458515	2458543	2458574	2458604	2458635	2458665	2458696	2458727	2458757	2458788	2458818
2020	2458849	2458880	2458909	2458940	2458970	2459001	2459031	2459062	2459093	2459123	2459154	2459184
2021	2459215	2459246	2459274	2459305	2459335	2459366	2459396	2459427	2459458	2459488	2459519	2459549
2022	2459580	2459611	2459639	2459670	2459700	2459731	2459761	2459792	2459823	2459853	2459884	2459914
2023	2459945	2459976	2460004	2460035	2460065	2460096	2460126	2460157	2460188	2460218	2460249	2460279
2024	2460310	2460341	2460370	2460401	2460431	2460462	2460492	2460523	2460554	2460584	2460615	2460645
2025	2460676	2460707	2460735	2460766	2460796	2460827	2460857	2460888	2460919	2460949	2460980	2461010