

# Moonstick Supplemental Information

## Moon Phase Definition Conversions

To convert the *time of mean moon phase* (moonstick output) into the *time of moon phase* based on the traditional ecliptic-longitude-of-moon-minus-sun definition of moon phase, do as follows. First use the tables at right to find the Season Number, the Moon Phase Number, the Lunar Perigee Location Number, and the Solar Perigee Location Number. Then use the two formulas to compute the Lunar Anomaly Number and the Solar Anomaly Number. Now, using the next two tables, convert the Lunar Anomaly Number and the Solar Anomaly Number into time conversion factors for the occurrence of your particular moon phase. Finally add both time conversion factors to the *time of mean moon phase*. You now have the *time of moon phase* based on the traditional ecliptic-longitude-of-moon-minus-sun definition of moon phase within about 2 hours.

### Example

full moon, September 2000  
 mean full moon: SEP13PM2  
 (computed with moonstick)  
 Season Number = 73  
 Moon Phase Number = 50  
 Lunar Perigee Location Number = 56  
 Solar Perigee Location Number = 04  
 Lunar Anomaly Number = 67  
 Solar Anomaly Number = 69  
 Time Conversion Factor for the ...  
     Lunar Anomaly Number = +11h  
     Solar Anomaly Number = -4h

SEP13PM2
+11h
SEP14AM1
-4h
SEP13PM9 ±2h

correct answer: SEP13PM7  
 source: The World Almanac  
 and Book of Facts 2000

Season Number (00-99)											
	00's	10's	20's	30's	40's	50's	60's	70's	80's	90's	
0	DEC21	JAN27	MAR4	APR9	MAY16	JUN21	JUL28	SEP2	OCT9	NOV14	0
1	DEC25	JAN30	MAR7	APR13	MAY20	JUN25	AUG1	SEP6	OCT13	NOV18	1
2	DEC28	FEB3	MAR11	APR17	MAY23	JUN29	AUG4	SEP10	OCT16	NOV22	2
3	JAN1	FEB6	MAR15	APR20	MAY27	JUL2	AUG8	SEP13	OCT20	NOV25	3
4	JAN5	FEB10	MAR18	APR24	MAY30	JUL6	AUG12	SEP17	OCT24	NOV29	4
5	JAN8	FEB14	MAR22	APR28	JUN3	JUL10	AUG15	SEP21	OCT27	DEC3	5
6	JAN12	FEB17	MAR26	MAY1	JUN7	JUL13	AUG19	SEP24	OCT31	DEC6	6
7	JAN16	FEB21	MAR29	MAY5	JUN10	JUL17	AUG22	SEP28	NOV4	DEC10	7
8	JAN19	FEB25	APR2	MAY9	JUN14	JUL21	AUG26	OCT2	NOV7	DEC14	8
9	JAN23	FEB28	APR6	MAY12	JUN18	JUL24	AUG30	OCT5	NOV11	DEC17	9

For specified accuracy, use only New Style dates.

Moon Phase Number (00-99)																	
	00	06	12	19	25	31	38	44	50	56	62	69	75	81	88	94	00
	●	●	◐	◑	○	○	○	○	○	○	○	○	○	○	○	○	○

Interpolate as necessary.

Lunar Perigee Location Number (00-99)											
	00's	10's	20's	30's	40's	50's	60's	70's	80's	90's	
0	'95SEP	'96AUG	'97JUL	'98MAY	'99APR	'00FEB	'01JAN	'01DEC	'02OCT	'03SEP	0
1	'95OCT	'96SEP	'97AUG	'98JUN	'99MAY	'00APR	'01FEB	'02JAN	'02NOV	'03OCT	1
2	'95DEC	'96OCT	'97SEP	'98JUL	'99JUN	'00MAY	'01MAR	'02FEB	'02DEC	'03NOV	2
3	'96JAN	'96NOV	'97OCT	'98AUG	'99JUL	'00JUN	'01APR	'02MAR	'03JAN	'03DEC	3
4	'96FEB	'96DEC	'97NOV	'98SEP	'99AUG	'00JUL	'01MAY	'02APR	'03MAR	'04JAN	4
5	'96MAR	'97JAN	'97DEC	'98NOV	'99SEP	'00AUG	'01JUN	'02MAY	'03APR	'04FEB	5
6	'96APR	'97FEB	'98JAN	'98DEC	'99OCT	'00SEP	'01JUL	'02JUN	'03MAY	'04MAR	6
7	'96MAY	'97MAR	'98FEB	'99JAN	'99NOV	'00OCT	'01AUG	'02JUL	'03JUN	'04APR	7
8	'96JUN	'97MAY	'98MAR	'99FEB	'99DEC	'00NOV	'01OCT	'02AUG	'03JUL	'04MAY	8
9	'96JUL	'97JUN	'98APR	'99MAR	'00JAN	'00DEC	'01NOV	'02SEP	'03AUG	'04JUN	9

For other times,  $48 + ((\text{year} - 2000) \times 12 + \text{month}) \times .94189 \pmod{100}$

Solar Perigee Location Number (00-99)			
AD1666	AD1875	AD2085	AD2294
02	03	04	05

For other times,  $04 + (\text{year} - 2000) \times .0048 \pmod{100}$

Lunar Anomaly Number (00-99)  
 = Season Number + Moon Phase Number - Lunar Perigee Location Number (mod 100)

Solar Anomaly Number (00-99)  
 = Season Number - Solar Perigee Location Number (mod 100)

Time Conversion Factor for the Lunar Anomaly Number											
	00's	10's	20's	30's	40's	50's	60's	70's	80's	90's	
0	±0h	-7h	-12h	-12h	-7h	±0h	+7h	+12h	+12h	+7h	0
1	-1h	-8h	-12h	-12h	-7h	+1h	+8h	+12h	+12h	+7h	1
2	-2h	-8h	-12h	-11h	-6h	+2h	+8h	+12h	+11h	+6h	2
3	-2h	-9h	-12h	-11h	-5h	+2h	+9h	+12h	+11h	+5h	3
4	-3h	-10h	-12h	-10h	-5h	+3h	+10h	+12h	+10h	+5h	4
5	-4h	-10h	-12h	-10h	-4h	+4h	+10h	+12h	+10h	+4h	5
6	-5h	-10h	-12h	-10h	-3h	+5h	+10h	+12h	+10h	+3h	6
7	-5h	-11h	-12h	-9h	-2h	+5h	+11h	+12h	+9h	+2h	7
8	-6h	-11h	-12h	-8h	-2h	+6h	+11h	+12h	+8h	+2h	8
9	-7h	-12h	-12h	-8h	-1h	+7h	+12h	+12h	+8h	+1h	9

Time Conversion Factor for the Solar Anomaly Number											
	00's	10's	20's	30's	40's	50's	60's	70's	80's	90's	
0	±0h	+2h	+4h	+4h	+2h	±0h	-2h	-4h	-4h	-2h	0
1	±0h	+2h	+4h	+4h	+2h	±0h	-2h	-4h	-4h	-2h	1
2	±0h	+3h	+4h	+3h	+2h	±0h	-3h	-4h	-3h	-2h	2
3	+1h	+3h	+4h	+3h	+2h	-1h	-3h	-4h	-3h	-2h	3
4	+1h	+3h	+4h	+3h	+1h	-1h	-3h	-4h	-3h	-1h	4
5	+1h	+3h	+4h	+3h	+1h	-1h	-3h	-4h	-3h	-1h	5
6	+1h	+3h	+4h	+3h	+1h	-1h	-3h	-4h	-3h	-1h	6
7	+2h	+3h	+4h	+3h	+1h	-2h	-3h	-4h	-3h	-1h	7
8	+2h	+3h	+4h	+3h	±0h	-2h	-3h	-4h	-3h	±0h	8
9	+2h	+4h	+4h	+2h	±0h	-2h	-4h	-4h	-2h	±0h	9