## THE LENGTH OF TIME BETWEEN THE NEW MOONS OF THE 1ST AND THE 7TH MONTHS

Since the Jewish molads are woefully inaccurate in determining the new moons, we need to have correct information regarding the new moons in order to make some sound decisions.

The following data is taken from the book "ASTRONOMICAL TABLES OF THE SUN, MOON, AND PLANETS" by Jean Meeus, and published by Willmann-Bell Inc. of Richmond. VA, USA.

The data presented here covers the years 2000-2025.
In all cases I have added 2 hours 20 minutes to express the times for local Jerusalem time ( 35 degrees east).

For those years where the Jewish calendar starts Nisan 1 before the end of winter (i.e. before March 20), I have given the data for the next new moons (i.e. the correct new moons).

Specifically, what is needed is:

1) The correct new moon date \& time for the first month
2) 1st Day of the 1st Month
3) The correct new moon date \& time for the seventh month
4) 1st Day of the 7th Month
5) The number of days in the first 6 months

The date given for "1st Day of the 1 st Month" is the day that starts with the sunset AFTER the conjunction; and the date given for "1st Day of the 7th Month" is the day that starts with the sunset AFTER the 7th new moon. This rule is followed consistently irrespective of which days of the week may be involved.

Keep in mind that if the time is between 6:00 p.m. and midnight, then it is already a part of the next day. For example: a new moon on April 4 at 8:33 p.m. is a new moon on April 5 when reckoning days from sunset to sunset. And April 6 , which starts at sunset on April 5 , is the next day.

THE YEAR 2000
New moon 1st Month:
April 4 8:33:03 p.m.
Day 1 of 1st Month:
April 6
New moon 7th Month: $\quad$ September 27 10:14:00 p.m.
Day 1 of 7th Month: September 29

THE YEAR 2001

New moon 1st Month:
March 25 3:42:03 a.m.
Day 1 of 1st Month: March 26
New moon 7th Month: $\quad$ September 17 12:48:25 p.m.
Day 1 of 7 th Month: $\quad$ September 18
Number of days in the first 6 months: 176 days
THE YEAR 2002
New moon 1st Month:
April 12 9:42:12 p.m.
Day 1 of 1st Month: April 14
New moon 7th Month: $\quad$ October 6 1:38:37 p.m.
Day 1 of 7th Month: $\quad$ October 7
Number of days in the first 6 months:
176 days
THE YEAR 2003
New moon 1st Month:
April 19:39:46 p.m.
Day 1 of 1st Month: April 3
New moon 7th Month: $\quad$ September 26 5:30:15 a.m.
Day 1 of 7th Month: September 27
Number of days in the first 6 months:
177 days
THE YEAR 2004

New moon 1st Month:
Day 1 of 1st Month: March 22
New moon 7th Month: $\quad$ September 14 4:50:06 p.m.
Day 1 of 7th Month: September 15
Number of days in the first 6 months:
177 days

THE YEAR 2005

New moon 1st Month:

Day 1 of 1st Month:

New moon 7th Month:

Day 1 of 7th Month: October 4

Number of days in the first 6 months:

THE YEAR 2006

New moon 1st Month: March 29 12:36:20 p.m.

Day 1 of 1st Month: March 30

New moon 7th Month: $\quad$ September 22 2:06:06 p.m.

Day 1 of 7th Month: September 23
Number of days in the first 6 months:
177 days

THE YEAR 2007

New moon 1st Month:
April 17 1:57:06 p.m.

Day 1 of 1st Month:
April 18

New moon 7th Month: $\quad$ October 11 7:21:42 a.m.

Day 1 of 7th Month: October 12

Number of days in the first 6 months:
177 days

THE YEAR 2008

New moon 1st Month:
April 6 6:16:23 a.m.

Day 1 of 1st Month:
April 7

New moon 7th Month: $\quad$ September 29 10:33:18 a.m.

Day 1 of 7th Month: September 30

Number of days in the first 6 months: 176 days

THE YEAR 2009

New moon 1st Month:
March 26 6:27:00 p.m.

Day 1 of 1st Month: March 28

New moon 7th Month: $\quad$ September 189:05:23 p.m.
Day 1 of 7th Month: September 20
Number of days in the first 6 months:
THE YEAR 2010
New moon 1st Month:
April 14 2:50:00 p.m.
Day 1 of 1 st Month: April 15
New moon 7th Month: $\quad$ October 7 9:05:33 p.m.
Day 1 of 7 th Month: October 9
Number of days in the first 6 months:
177 days
THE YEAR 2011
New moon 1st Month:
April 3 4:53:25 p.m.
Day 1 of 1 st Month: April 4
New moon 7th Month: $\quad$ September 27 1:29:46 p.m.
Day 1 of 7th Month: September 28
Number of days in the first 6 months:
177 days
THE YEAR 2012
New moon 1st Month: March 22 4:58:12 p.m.

Day 1 of 1st Month: March 23
New moon 7th Month: $\quad$ September 16 4:31:44 a.m.
Day 1 of 7th Month: September 17
Number of days in the first 6 months: 178 days
THE YEAR 2013
New moon 1st Month:
April 10 11:56:24 a.m.
Day 1 of 1st Month:
April 11
New moon 7th Month:
October 5 2:55:37 a.m.
Day 1 of 7th Month:
October 6

THE YEAR 2014
New moon 1st Month:
March 30 9:05:47 p.m.
Day 1 of 1st Month: 1 April
New moon 7th Month: $\quad$ September 24 8:34:52 a.m.
Day 1 of 7 th Month: $\quad$ September 25
Number of days in the first 6 months:
THE YEAR 2015
New moon 1st Month:
March 20 11:57:18 a.m.
Day 1 of 1st Month: March 21
New moon 7th Month: $\quad$ September 13 9:02:22 a.m.
Day 1 of 7th Month: September 14
Number of days in the first 6 months:
177 days
THE YEAR 2016
New moon 1st Month:
April 7 1:44:47 p.m.
Day 1 of 1st Month: April 8
New moon 7th Month: $\quad$ October 12:32:28 a.m.
Day 1 of 7th Month: October 2
Number of days in the first 6 months:
177 days
THE YEAR 2017
New moon 1st Month:
March 28 5:18:21 a.m.
Day 1 of 1 st Month: March 29
New moon 7th Month: $\quad$ September 20 7:50:59 a.m.
Day 1 of 7th Month: September 21
Number of days in the first 6 months:
176 days
THE YEAR 2018

New moon 1st Month:

Day 1 of 1st Month:

New moon 7th Month:

Day 1 of 7th Month: October 10

Number of days in the first 6 months:

THE YEAR 2019

New moon 1st Month:
April 5 11:11:37 a.m

Day 1 of 1st Month: April 6

New moon 7th Month: $\quad$ September 28 8:47:29 p.m.

Day 1 of 7th Month: September 30

Number of days in the first 6 months:
177 days

THE YEAR 2020

New moon 1st Month:
March 24 11:49:21 a.m.

Day 1 of 1st Month: March 25

New moon 7th Month: $\quad$ September 171:21:20 p.m.
Day 1 of 7th Month: September 18

Number of days in the first 6 months:
177 days

THE YEAR 2021

New moon 1st Month:
April 12 4:51:59 a.m.

Day 1 of 1st Month:
April 13

New moon 7th Month: $\quad$ October 6 1:26:31 p.m.

Day 1 of 7th Month: October 7

Number of days in the first 6 months:
177 days

THE YEAR 2022

New moon 1st Month:
April 18:45:33 a.m.

Day 1 of 1st Month:
April 2

New moon 7th Month: $\quad$ September 26 00:15:42 a.m.
Day 1 of 7th Month: September 27
Number of days in the first 6 months:
THE YEAR 2023
New moon 1st Month:
March 21 7:44:17 p.m.
Day 1 of 1 st Month: March 23
New moon 7th Month: September 15 4:00:56 a.m.
Day 1 of 7th Month: September 16
Number of days in the first 6 months:
177 days
THE YEAR 2024
New moon 1st Month:
April 8 8:42:01 p.m.
Day 1 of 1st Month: April 10
New moon 7th Month: $\quad$ October 2 9:10:23 p.m.
Day 1 of 7th Month: October 4
Number of days in the first 6 months:
THE YEAR 2025
New moon 1st Month: March 29 1:18:59 p.m.

Day 1 of 1st Month: March 30
New moon 7th Month: $\quad$ September 21 10:15:15 p.m.
Day 1 of 7th Month: September 23
Number of days in the first 6 months: 177 days
NUMBER OF DAYS IN THE FIRST 6 MONTHS FOR THE ABOVE YEARS:

| $2000=176$ days | $2001=176$ days | $2002=176$ days |
| :--- | :--- | :--- |
| $2003=177$ | $2004=177$ | $2005=177$ |
| $2006=177$ | $2007=177$ | $2008=176$ |
| $2009=176$ | $2010=177$ | $2011=177$ |

$2012=178$
$2013=178$
$2016=177$
$2019=177$
$2022=178$
$2025=177$
$2024=177$
$2014=177$
$2017=176$
$2020=177$
$2023=177$

## HOW LONG BEFORE SUNSET ARE THE NEW MOON CONJUNCTIONS?

Assuming 6:00 p.m. as local sunset time in Jerusalem for dates around March/April and around September/October, purely for calculation purposes, we have the following picture for the next 26 years:

We are interested in HOW LONG before the next sunset the new moons occurs. It could be anywhere from a few minutes to almost 24 hours. But let's see the actual facts.

| 2000 = 1st month $=$ over 21 hours; | 7th month = over 19 hours |
| :---: | :---: |
| 2001 = 1st month $=$ over 14 hours; | 7th month $=$ over 5 hours |
| $2002=1$ st month $=$ over 20 hours; | 7 th month $=$ over 4 hours |
| 2003 = 1st month $=$ over 20 hours; | 7th month $=$ over 12 hours |
| 2004 = 1st month $=$ over 16 hours; | 7 th month $=$ about 70 minutes |
| $2005=1$ st month $=$ over 19 hours; | 7th month $=$ over 5 hours |
| $2006=1$ st month $=$ over 5 hours; | 7 th month $=$ about 4 hours |
| 2007 = 1st month $=$ over 4 hours; | 7th month $=$ over 10 hours |
| 2008 = 1st month $=$ over 11 hours; | 7 th month = over 7 hours |
| 2009 = 1st month $=$ over 23 hours; | 7th month $=$ over 20 hours |
| $2010=1$ st month $=$ over 3 hours; | 7th month $=$ over 20 hours |
| 2011 = 1st month $=67$ minutes; | 7th month $=$ over 4 hours |
| $2012=1$ st month $=62$ minutes; | 7th month $=$ over 13 hours |
| 2013 = 1st month $=$ over 6 hours; | 7 th month $=$ over 15 hours |
| 2014 = 1st month $=$ over 20 hours; | 7th month $=$ over 9 hours |
| $2015=1$ st month $=$ over 6 hours; | 7th month $=$ about 9 hours |
| $2016=1$ st month $=$ over 4 hours; | 7th month $=$ over 15 hours |


| 2017 = 1st month = over 12 hours; | 7th month = over 10 hours |
| :---: | :---: |
| 2018 = 1st month $=$ over 13 hours; | 7th month = about 12 hours |
| $2019=1$ st month $=$ over 6 hours; | 7th month = over 21 hours |
| $2020=1$ st month $=$ over 6 hours; | 7th month $=$ over 4 hours |
| 2021 = 1st month $=$ over 13 hours; | 7th month = over 4 hours |
| $2022=1$ st month $=$ over 9 hours; | 7th month = over 17 hours |
| 2023 = 1st month $=$ over 22 hours; | 7 th month $=$ about 14 hours |
| $2024=1$ st month $=$ over 21 hours; | 7th month $=$ over 20 hours |
| 2025 = 1st month $=$ over 4 hours; | 7th month = over 19 hours |

So the new moon conjunctions take place AS EARLY AS 62 minutes before sunset (in 2012 A.D.) and AS LATE AS 27 minutes after sunset (i.e. 23 hours and 33 minutes before the NEXT sunset, in 2009 A.D.). MOSTLY the new moons occur between 4 hours and 20 hours before the next sunset (local Jerusalem time).

## ACTUAL LENGTH OF THE FIRST 6 LUNAR CYCLES:

From the 1st to the 7th new moons may be as short as 176 days 1 hour 40 minutes 57 seconds in 2000 A.D..

It may be as long as 177 days 14 hours 59 minutes 13 seconds in 2013 A.D.
Thus the fluctuations in the lengths of the first 6 new moons may be as much as 37 HOURS 18 MINUTES 16 SECONDS! This is more than one-and-one-half days!

## ASSESSING THE ABOVE DATA:

The data presented in the astronomical tables by Jean Meeus can be taken as being quite accurate, with an error margin of perhaps a few seconds. It is based on the same calculations that are employed when sending satellites and manned spacecraft into space.

The data clearly confronts us with the reality that all lunations are NOT of the same duration. Even at the same time of the year (i.e. from March/April to September/October) they vary from one year to the next, even by as much as 37 hours for those 6 lunations.

We, in our desire to set up systems that follow ordered rules, may be tempted to resort to using "averages". It is clear that, whatever system we may use, we will have to establish SOME rules. The question is only: exactly what rules are desirable?

QUESTION:
What is more important to us:
TO HAVE THE START OF THE FIRST \& THE SEVENTH MONTH CORRECTLY LINKED TO THE

ACTUAL NEW MOONS FOR THOSE MONTHS? OR DO WE ONLY ACCURATELY CALCULATE THE NEW MOON OF THE FIRST MONTH AND THEN ALWAYS ADD A FIXED NUMBER OF DAYS FOR THE FIRST SIX MONTHS?

IF the start of the 1st month (for Passover and Days of UB dates) and the start of the 7th month (for Trumpets, Atonement, Tabernacles, and Last Great Day dates) are linked to the actual new moon dates, THEN those first 6 months will sometimes have 176 days, sometimes 177 days and sometimes 178 days. Which of those first 6 months have 30 days and which have only 29 days is really immaterial and does not affect the timing of any Holy Days.

IF we were to adopt a system of always having a fixed number of days in the first 6 months (e.g. as is the case in the present Jewish calendar), THEN we may for the 7th month, the Day of Trumpets, sometimes be at variance with the actual new moons, sometimes a day too early (when those 6 lunations take up 177 days and 15 hours), and at other times a day too late (when those 6 lunations only take up 176 days and 1 hour and 40 minutes).

Scientific knowledge today enables us to accurately predict all new moons to an accuracy of within a few seconds, and this REMOVES THE NEED FOR A SYSTEM OF OUR OWN FOR PREDICTING NEW MOONS! In our age the Jewish system of predicting the molads, which often contains an error of 15 hours, is not needed; it has been replaced by highly accurate prediction tables.

Realize that IF such accurate prediction tables for the new moons had been available to the Jews, then they NEVER would have resorted to establishing a system based on AVERAGES. The only reason they resorted to using averages was because they did not have the means to accurately predict future lunations of constantly varying lengths. We today can see that their "averages" will vary from being as much as 15 hours TOO LATE, to at other times being almost 4 hours TOO EARLY!

So I believe that we need to base BOTH, the start of the 1st month (for Passover, Days of UB and Pentecost) and the start of the 7th month (for Trumpets, Atonement, etc.) on the actual new moons, and not on fictitious "molads". For us today there is no value in the Jewish calculations of the molads. We must use the data for the REAL new moons, which is readily available.

And I would suggest that we CONSISTENTLY start the 1st Day of the 1st Month, and also the 1st Day of the 7th Month, with the sunset that FOLLOWS the respective new moon conjunctions. This avoids the need for involved rules of postponing when, for example, the new moon takes place only 62 minutes before sunset.

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