



האגודה הישראלית לצפייה בירח החדש

The Israeli New Moon Society



# Guide to Observing the New Moon from Israel in 5782 (2021/2)

*by Roy Hoffman*

The commandment (*mitzvah*) of sanctifying the month is the first one that the Children of Israel were commanded with on leaving Egypt. This commandment is of great importance because the dates of the festivals, including over 60 commandments, depend on it.

For over a thousand years, the Hebrew calendar has been fixed by calculation. Today, the Hebrew calendar does not match that fixed by observing the Moon. Even as the gap between the two calendars continues to increase, we do not have the authority to alter the calendar until a new authorized Sanhedrin (religious high court) is reestablished. While sanctification of the month according to observation is not practiced today, it is important to carry out calculations and practice observing the New Moon in order to be ready for when the Sanhedrin is reestablished. Of course, we are not intending to change the current calendar (this is a task for an authorized Sanhedrin, recognized by all) but just to increase involvement in and embellish the Torah.

For many years now, **the Israeli New Moon Society** has been asking the public at large to join us by trying to observe the New Moon at the beginning of each month. The Israeli New Moon Society was founded for this purpose by Rabbi Dr. Nachum Rabinovitch, head of Yeshivat Birkat Moshe, Maale Adumim. The society works with the Institute for Kiddush Hachodesh Studies and includes scientists and rabbis from Universities, Yeshivot and elsewhere. The society presents the subject from the point of view of mainstream (Rabbinical Orthodox) Judaism. Nevertheless, the society welcomes participation from anyone.

## Our aims

1. **To practice observing and to improve technique:** For this purpose you need to know when and where to look. To this end, we supply software, diagrams and instructions. Generally, an observer can develop the necessary skill after a few months of practice.
2. **To develop criteria for the limit of visibility:** For this, one has to find the Moon the moment it becomes visible to the naked eye of an experienced observer. The results can be analyzed according to physical, meteorological and physiological considerations to improve existing visibility criteria.
3. **To encourage general awareness of Jewish calendar issues.**

## Our achievements

1. Many of our members have become expert observers.
2. We have improved the accuracy of lunar visibility predictions.
3. New software has been developed to predict the appearance of the Moon.
4. We have made a number of important observations.

## Important lunisolar events in 5782 (2021/2)

**The start of one partial lunar eclipse is visible from Israel this year.** The table shows this and other eclipses that are visible from elsewhere in the World.

| Eclipse | Date                       | Extent from Israel  | Start Time | Mid Time | End Time   |
|---------|----------------------------|---------------------|------------|----------|------------|
| Lunar   | 19 <sup>th</sup> Nov. 2021 | Not visible partial | 09:19      | 11:03    | 12:47      |
| Solar   | 4 <sup>th</sup> Dec. 2021  | Not visible         |            |          |            |
| Solar   | 30 <sup>th</sup> Apr. 2022 | Not visible         |            |          |            |
| Lunar   | 16 <sup>th</sup> May 2022  | Partial from Israel | 05:27      | 07:13    | 05:44 sets |

## How to observe and report

In order to determine the moment when the Moon appears, one needs to know where to look. Diagrams and instructions showing how to find the Moon using simple techniques are given below for this purpose. An obvious object such as the Sunset or a bright planet is used to help locate the Moon. The angular distance between the Moon and the object and its height above the horizon is measured using fingers at arm's length, the fist or span (the distance between the thumb and little finger with the fingers outstretched) though more advanced techniques such as using calibrated scales may be to some advantage. The figures below are calculated for Jerusalem. They may be used throughout Israel with an accuracy of five minutes. For observations from elsewhere in the World, the parameters have to be calculated for each place separately. Our program LunaCal available from our Internet site <https://moonsocil.blogspot.co.il/p/english.html> or other programs: Hazon Shamayim, MoonCalc or Skyglobe, can be used for this purpose. Hazon Shamayim can be bought from Rabbi Tskuni +972 8-9945621, MoonCalc is available free of charge from <http://chem.ch.huji.ac.il/nmr/foo/moonc60.zip> and Skyglobe is available from <http://astro4.ast.vill.edu/skyglobe.htm>.

You should start searching for the Moon about five minutes (or earlier if using binoculars or a telescope) before it is expected to appear. Use the predicted times as a rough guide (they will only be correct for 95% of observations). At the end of the text at the bottom of each diagram the apparent topocentric illumination and lag time are given. (The simplified geocentric illumination is given in brackets.) The larger these values, the easier the Moon is to see. An observer that is looking hard sometimes tends to imagine that he has seen the Moon. To be sure that you really saw it, divert your gaze for a moment then look back to see if the Moon really is visible. Once the Moon has been found, please fill out an observation form available from our website (<https://moonsocil.blogspot.co.il/p/english.html>) to report your observation. One should ideally continue looking till the Moon fades or sets.

Using binoculars (diameter 50 mm) it is possible to see the Moon 10 to 15 minutes earlier than with the naked eye. In order to see the Moon with the naked eye, it is easiest to start with binoculars in order to locate it and then confirm the sighting with the naked eye. When the observation is difficult, binoculars can confirm that what was seen was the Moon rather than something else. For this purpose one should choose an appropriate pair of binoculars (magnification 7 to 20 ×, diameter 30 to 80 mm).

It is best to find a place to look from where the horizon is unobstructed and where there are no bright lights from that direction. The height of the skyline should be less than 3°, *i.e.*, do not stand in a valley.

## Want to join?

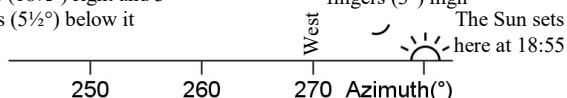
For further details, please contact Gadi Eidelheit, The Israeli New Moon Society, 1 David Eliezer, Givat Shmuel 54032, Israel., Fax +972 722495292, Tel. +972 507325927, Internet site <https://moonsocil.blogspot.co.il/p/english.html>, Email [moonsocil@gmail.com](mailto:moonsocil@gmail.com).

### The Moon on Tuesday, 7th September 2021

- Venus at 19:16. The Moon is 1½ spans (31°) right and 1½ fists (14½°) below it

Mercury at 19:16. The Moon is 1¾ fists (18½°) right and 3 fingers (5½°) below it

The Moon at 19:16, 1 finger (2°) left of the sunset, 1½ fingers (3°) high

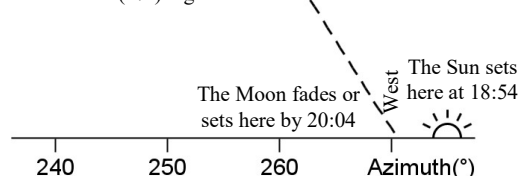


The Moon is impossible to see with the naked eye but may be visible with a telescope or with binoculars on Tuesday, 7th September 2021. This month Mercury and Venus can be used to find the Moon. The best chance of seeing the Moon is at 19:16, at azimuth 276°. Illum. 0.52 (0.67)% Lag 37 m.

### The Moon on Wednesday, 8th September 2021

- Venus at 18:40. The Moon is 1 span (21½°) right and 3½ fingers (7°) below it

The Moon at 18:40, 1¾ fists (17½°) left of the sunset, 1¾ fists (17°) high

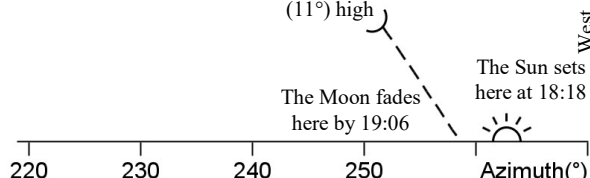


The Moon is likely\* to appear over the western horizon between 18:40 and 19:26 on Wednesday, 8th September 2021, at azimuth 260°, 1¾ fists left of the sunset, 1¾ fists (at arm's length) high. This month Venus can be used to find the Moon. The Moon is very easy to see until it fades or sets between 19:25 and 20:04. Illum. 3.23 (3.50)% Lag 70 m.

### The Moon on Thursday, 7th October 2021

- Venus at 18:09. The Moon is 1¼ spans (29½°) right and 1¼ fists (11½°) below it

The Moon at 18:09, 1¼ fists (13°) left of the sunset, 1 fist (11°) high

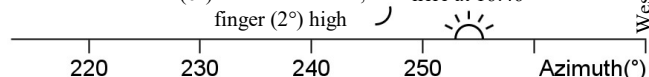


The Moon is likely\* to appear over the western horizon between 18:09 and 19:06 on Thursday, 7th October 2021, at azimuth 251°, 1¼ fists left of the sunset, 1 fist (at arm's length) high. This month Venus can be used to find the Moon. The Moon is not difficult to see. Illum. 1.79 (2.00)% Lag 52 m.

### The Moon on Friday, 5th November 2021

- Venus at 17:05. The Moon is 1½ spans (31°) right and 1 span (19°) below it

The Moon at 17:05, 3 fingers (6°) left of the sunset, 1 finger (2°) high

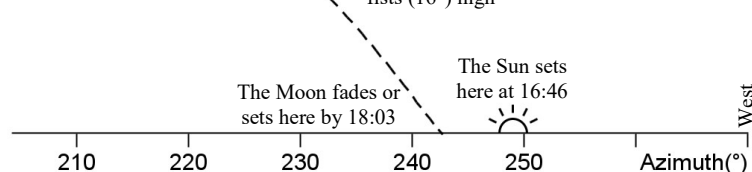


The Moon is impossible to see with the naked eye but may be visible with a telescope on Friday, 5th November 2021. This month Venus can be used to find the Moon. The best chance of seeing the Moon is at 17:05, at azimuth 246½°. Illum. 0.70 (0.85)% Lag 32 m.

### The Moon on Saturday, 6th November 2021

- Venus at 16:28. The Moon is 1 span (22½°) right and 1 fist (10°) below it

The Moon at 16:28, 1 span (23°) left of the sunset, 1½ fists (16°) high

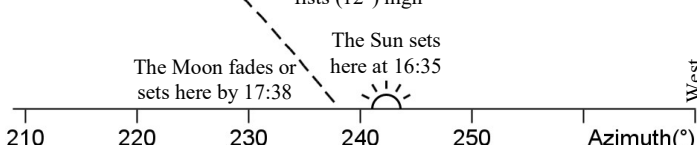


The Moon is likely\* to appear over the southwestern horizon between 16:28 and 17:16 on Saturday, 6th November 2021, at azimuth 229°, 1 span left of the sunset, 1½ fists (at arm's length) high. This month Venus can be used to find the Moon. The Moon is very easy to see until it fades or sets between 17:20 and 18:03. Illum. 4.41 (4.73)% Lag 79 m.

### The Moon on Sunday, 5th December 2021

- Venus at 16:24. The Moon is 1¾ fists (16½°) right and 1½ fists (15½°) below it

The Moon at 16:24, 1¾ fists (16½°) left of the sunset, 1¾ fists (12°) high

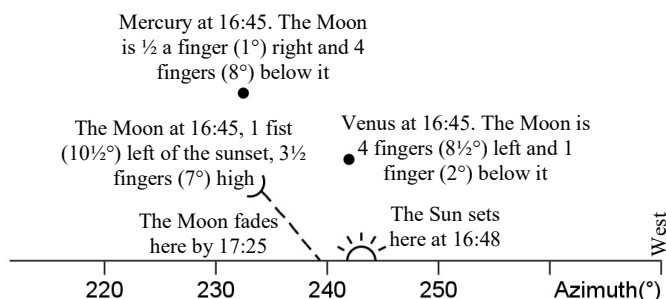


The Moon is likely\* to appear over the southwestern horizon between 16:24 and 17:38 on Sunday, 5th December 2021, at azimuth 227½°, 1¾ fists left of the sunset, 1¾ fists (at arm's length) high. This month Venus can be used to find the Moon. The Moon is not difficult to see. Illum. 2.67 (2.96)% Lag 65 m.

\*Assuming that it is not cloudy, there is still a 5% chance that the Moon will appear or disappear before or after the stated time. The times are about as reliable as the weather forecast for tomorrow.

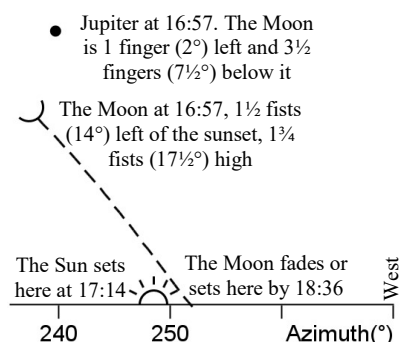
### The Moon on Monday, 3rd January 2022

- Jupiter at 16:45. The Moon is 1 span ( $19\frac{1}{2}^\circ$ ) right and  $1\frac{1}{2}$  spans ( $32\frac{1}{2}^\circ$ ) below it



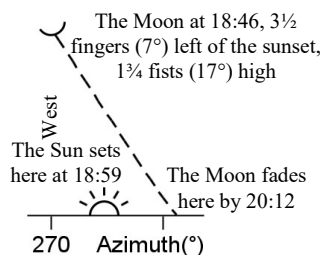
The Moon might appear over the southwestern horizon between 16:45 and 17:25 on Monday, 3rd January 2022, at azimuth  $233\frac{1}{2}^\circ$ , 1 fist left of the sunset,  $3\frac{1}{2}$  fingers (at arm's length) high. This month Mercury, Venus and Jupiter can be used to find the Moon. The Moon is very difficult to see. Illum. 1.17 (1.38)% Lag 43 m.

### The Moon on Wednesday, 2nd February 2022



The Moon is likely\* to appear over the southwestern horizon between 16:57 and 17:46 on Wednesday, 2nd February 2022, at azimuth  $237\frac{1}{2}^\circ$ ,  $1\frac{1}{2}$  fists left of the sunset,  $1\frac{1}{4}$  fists (at arm's length) high. This month Jupiter can be used to find the Moon. The Moon is very easy to see until it fades or sets between 17:54 and 18:36. Illum. 2.77 (3.06)% Lag 83 m.

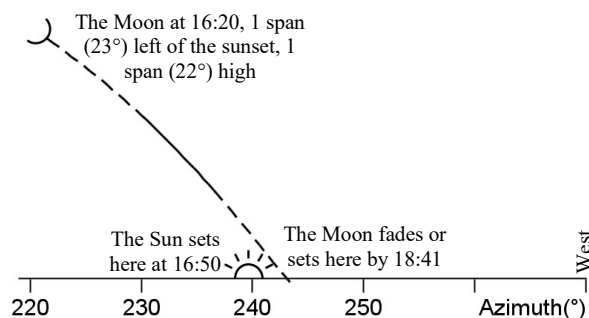
### The Moon on Saturday, 2nd April 2022



The Moon is likely\* to appear over the western horizon between 18:46 and 19:33 on Saturday, 2nd April 2022, at azimuth  $270^\circ$ ,  $3\frac{1}{2}$  fingers left of the sunset,  $1\frac{1}{4}$  fists (at arm's length) high. The Moon is easy to see until it fades between 19:33 and 20:12. Illum. 1.88 (2.14)% Lag 75 m.

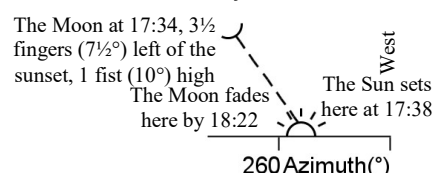
\*Assuming that it is not cloudy, there is still a 5% chance that the Moon will appear or disappear before or after the stated time. The times are about as reliable as the weather forecast for tomorrow.

### The Moon on Tuesday, 4th January 2022



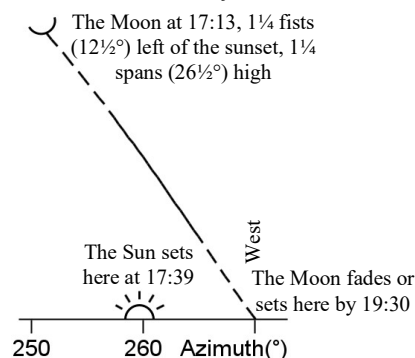
The Moon is likely\* to appear over the southwestern horizon between 16:20 and 17:11 on Tuesday, 4th January 2022, at azimuth  $221^\circ$ , 1 span left of the sunset, 1 span (at arm's length) high. The Moon is very easy to see until it fades or sets between 17:56 and 18:41. Illum. 5.62 (5.97)% Lag 114 m.

### The Moon on Thursday, 3rd March 2022



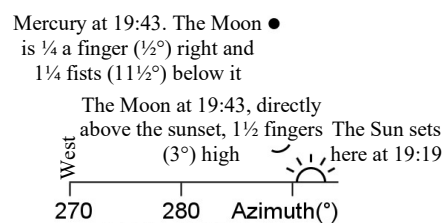
The Moon might appear over the western horizon between 17:34 and 18:22 on Thursday, 3rd March 2022, at azimuth  $255\frac{1}{2}^\circ$ ,  $3\frac{1}{2}$  fingers left of the sunset, 1 fist (at arm's length) high. The Moon is very difficult to see. Illum. 1.01 (1.20)% Lag 49 m.

### The Moon on Friday, 4th March 2022



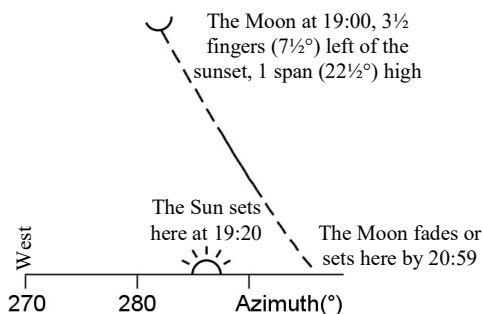
The Moon is likely\* to appear over the western horizon between 17:13 and 18:00 on Friday, 4th March 2022, at azimuth  $251^\circ$ ,  $1\frac{1}{4}$  fists left of the sunset,  $1\frac{1}{4}$  spans (at arm's length) high. The Moon is very easy to see until it fades or sets between 18:49 and 19:30. Illum. 4.13 (4.49)% Lag 110 m.

### The Moon on Sunday, 1st May 2022



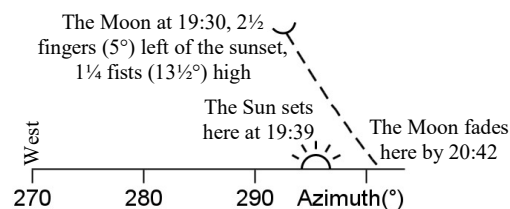
The Moon is impossible to see with the naked eye but may be visible with a telescope or with binoculars on Sunday, 1st May 2022. This month Mercury can be used to find the Moon. The best chance of seeing the Moon is at 19:43, at azimuth  $289^\circ$ . Illum. 0.55 (0.69)% Lag 43 m.

### The Moon on Monday, 2nd May 2022



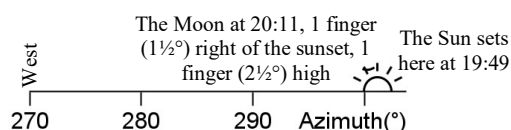
The Moon is likely\* to appear over the western horizon between 19:00 and 19:48 on Monday, 2nd May 2022, at azimuth 282°, 3 1/2 fingers left of the sunset, 1 span (at arm's length) high. The Moon is very easy to see until it fades or sets between 20:17 and 20:59. Illum. 3.03 (3.34)% Lag 101 m.

### The Moon on Tuesday, 31st May 2022



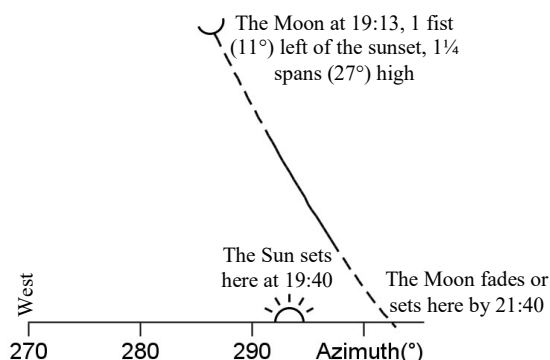
The Moon is likely\* to appear over the western horizon between 19:30 and 20:42 on Tuesday, 31st May 2022, at azimuth 292 1/2°, 2 1/2 fingers left of the sunset, 1 1/4 fists (at arm's length) high. The Moon is not difficult to see. Illum. 1.30 (1.52)% Lag 69 m.

### The Moon on Wednesday, 29th June 2022



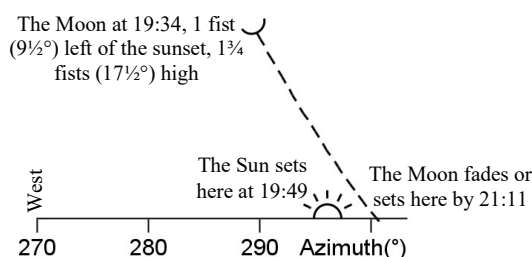
The Moon is impossible to see with the naked eye but may be visible with a telescope on Wednesday, 29th June 2022. The best chance of seeing the Moon is at 20:11, at azimuth 300 1/2°. Illum. 0.30 (0.41)% Lag 39 m.

### The Moon on Wednesday, 1st June 2022



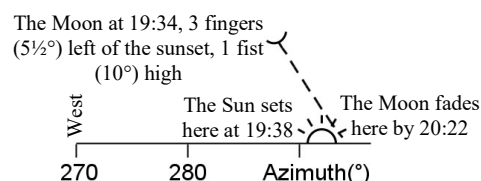
The Moon is likely\* to appear over the western horizon between 19:13 and 20:04 on Wednesday, 1st June 2022, at azimuth 286 1/2°, 1 fist left of the sunset, 1 1/4 spans (at arm's length) high. The Moon is very easy to see until it fades or sets between 20:55 and 21:40. Illum. 4.80 (5.18)% Lag 122 m.

### The Moon on Thursday, 30th June 2022



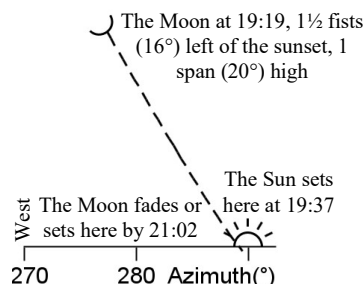
The Moon is likely\* to appear over the western horizon between 19:34 and 20:26 on Thursday, 30th June 2022, at azimuth 289 1/2°, 1 fist left of the sunset, 1 3/4 fists (at arm's length) high. The Moon is very easy to see until it fades or sets between 20:27 and 21:11. Illum. 2.54 (2.83)% Lag 84 m.

### The Moon on Friday, 29th July 2022



The Moon might appear over the western horizon between 19:34 and 20:22 on Friday, 29th July 2022, at azimuth 288°, 3 fingers left of the sunset, 1 fist (at arm's length) high. The Moon is very difficult to see. Illum. 0.95 (1.13)% Lag 52 m.

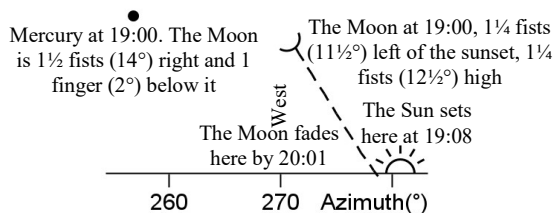
### The Moon on Saturday, 30th July 2022



The Moon is likely\* to appear over the western horizon between 19:19 and 20:09 on Saturday, 30th July 2022, at azimuth 277°, 1 1/2 fists left of the sunset, 1 span (at arm's length) high. The Moon is very easy to see until it fades or sets between 20:21 and 21:02. Illum. 3.73 (4.05)% Lag 85 m.

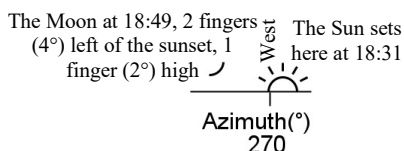
\*Assuming that it is not cloudy, there is still a 5% chance that the Moon will appear or disappear before or after the stated time. The times are about as reliable as the weather forecast for tomorrow.

### The Moon on Sunday, 28th August 2022



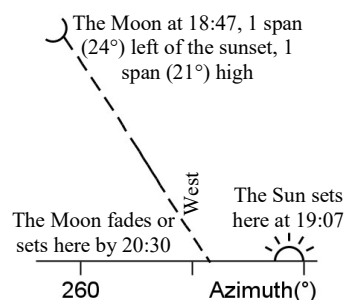
The Moon is likely\* to appear over the western horizon between 19:00 and 20:01 on Sunday, 28th August 2022, at azimuth  $271^\circ$ ,  $1\frac{1}{4}$  fists left of the sunset,  $1\frac{1}{4}$  fists (at arm's length) high. This month Mercury can be used to find the Moon. The Moon is not difficult to see. Illum. 1.72 (1.94)% Lag 55 m.

### The Moon on Monday, 26th September 2022



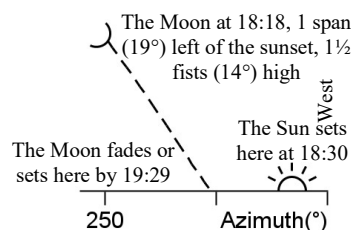
The Moon is impossible to see with the naked eye but may be visible with a telescope on Monday, 26th September 2022. The best chance of seeing the Moon is at 18:49, at azimuth  $265\frac{1}{2}^\circ$ . Illum. 0.52 (0.65)% Lag 30 m.

### The Moon on Monday, 29th August 2022



The Moon is likely\* to appear over the western horizon between 18:47 and 19:34 on Monday, 29th August 2022, at azimuth  $258^\circ$ , 1 span left of the sunset, 1 span (at arm's length) high. The Moon is very easy to see until it fades or sets between 19:52 and 20:30. Illum. 5.29 (5.59)% Lag 84 m.

### The Moon on Tuesday, 27th September 2022



The Moon is likely\* to appear over the western horizon between 18:18 and 19:04 on Tuesday, 27th September 2022, at azimuth  $250^\circ$ , 1 span left of the sunset,  $1\frac{1}{2}$  fists (at arm's length) high. The Moon is easy to see until it fades or sets between 18:50 and 19:29. Illum. 3.16 (3.38)% Lag 61 m.

\*Assuming that it is not cloudy, there is still a 5% chance that the Moon will appear or disappear before or after the stated time. The times are about as reliable as the weather forecast for tomorrow.

### Table of Moon visibility parameters from Jerusalem for advanced observers.

OR Orech Rishon or ecliptic elongation 20 minutes after geometric sunset.

KR Keshet Reiyah, time between Geometric sunset and moonset divided by four.

KR+OR The sum of orech rishon and keshet reiyah. According to Maimonides, the Moon may be visible if orech rishon  $> 9^\circ$  and KR+OR  $> 22^\circ$

Illumination Apparent topocentric illumination in % at geometric sunset. (The simplified geometric illumination is given in brackets.)

LagTime The time between sunset and moonset (geometric)

Dist. Distance from observer to center of Moon at apparent sunset over sea level horizon

DALT Topocentric difference in altitude between the mid-crescent of the Moon and center of the Sun, at 0.6 of the lagtime after geometric sunset

Width Apparent width of crescent, at 0.6 of the lagtime after geometric sunset

Ease The ease of visibility:  $< -0.7$  impossible,  $< 0$  requires binoculars or telescope,  $< 1$  might be visible to naked eye,  $> 1$  definitely visible unless cloudy.

|            | KR     | OR     | KR+OR  | Lagtime | Illumination | Dist./km | DALT   | Width | Ease |
|------------|--------|--------|--------|---------|--------------|----------|--------|-------|------|
| 2021-09-07 | 9°13'  | 8°14'  | 17°27' | 37m52s  | 0.52(0.67)   | 373873   | 7°40'  | 10"   | -0.2 |
| 2021-09-08 | 17°34' | 21°19' | 38°53' | 70m16s  | 3.23(3.50)   | 370161   | 14°38' | 64"   | 1.4  |
| 2021-10-07 | 12°52' | 16°08' | 29°01' | 51m29s  | 1.79(2.00)   | 363077   | 10°42' | 36"   | 0.6  |
| 2021-10-08 | 22°24' | 29°50' | 52°15' | 90m37s  | 6.32(6.63)   | 361523   | 18°18' | 129"  | 2.4  |
| 2021-11-05 | 7°50'  | 10°25' | 18°15' | 31m19s  | 0.70(0.85)   | 358255   | 6°16'  | 14"   | -0.3 |
| 2021-11-06 | 19°35' | 24°28' | 44°03' | 78m20s  | 4.41(4.73)   | 357754   | 15°10' | 91"   | 1.7  |
| 2021-12-05 | 16°02' | 18°25' | 34°28' | 64m10s  | 2.66(2.96)   | 357008   | 11°48' | 55"   | 0.9  |
| 2022-01-03 | 10°28' | 12°01' | 22°29' | 42m53s  | 1.17(1.38)   | 359842   | 7°45'  | 24"   | 0.0  |
| 2022-01-04 | 28°20' | 25°51' | 54°11' | 113m21s | 5.62(5.97)   | 362488   | 21°09' | 115"  | 2.7  |
| 2022-02-02 | 20°41' | 18°55' | 39°36' | 83m44s  | 2.77(3.06)   | 368928   | 16°17' | 56"   | 1.6  |
| 2022-03-03 | 12°14' | 11°53' | 24°08' | 49m56s  | 1.01(1.20)   | 377710   | 10°06' | 20"   | 0.3  |
| 2022-03-04 | 27°31' | 24°20' | 51°51' | 110m05s | 4.13(4.49)   | 381071   | 22°49' | 81"   | 2.7  |
| 2022-04-02 | 18°45' | 16°48' | 35°33' | 75m01s  | 1.88(2.14)   | 389991   | 15°22' | 36"   | 1.3  |
| 2022-05-01 | 10°35' | 9°30'  | 20°05' | 42m19s  | 0.55(0.69)   | 398039   | 8°17'  | 10"   | -0.1 |
| 2022-05-02 | 25°05' | 20°40' | 45°46' | 100m22s | 3.03(3.34)   | 399447   | 19°11' | 57"   | 2.0  |
| 2022-05-31 | 16°59' | 13°24' | 30°23' | 68m56s  | 1.30(1.52)   | 404097   | 12°19' | 24"   | 0.7  |
| 2022-06-01 | 30°15' | 24°17' | 54°32' | 121m59s | 4.80(5.18)   | 403687   | 21°39' | 89"   | 2.6  |
| 2022-06-29 | 9°30'  | 6°26'  | 15°56' | 38m58s  | 0.30(0.41)   | 405745   | 6°53'  | 6"    | -0.4 |
| 2022-06-30 | 20°53' | 17°20' | 38°14' | 84m34s  | 2.54(2.83)   | 404133   | 15°06' | 47"   | 1.3  |
| 2022-07-29 | 12°51' | 10°37' | 23°28' | 51m23s  | 0.95(1.13)   | 401470   | 9°51'  | 18"   | 0.3  |
| 2022-07-30 | 21°16' | 21°49' | 43°05' | 85m03s  | 3.73(4.05)   | 398293   | 16°29' | 69"   | 1.7  |
| 2022-08-28 | 13°48' | 15°28' | 29°16' | 55m13s  | 1.72(1.94)   | 392122   | 11°23' | 32"   | 0.7  |
| 2022-08-29 | 21°01' | 27°13' | 48°14' | 84m04s  | 5.28(5.59)   | 388115   | 17°21' | 100"  | 2.1  |
| 2022-09-26 | 7°35'  | 9°01'  | 16°36' | 30m19s  | 0.52(0.65)   | 384156   | 6°26'  | 10"   | -0.4 |
| 2022-09-27 | 15°10' | 21°18' | 36°28' | 61m41s  | 3.16(3.38)   | 380039   | 12°40' | 61"   | 1.1  |