**Lunar and Solar Eclipse:**

**Lunar Eclipse:**

A lunar eclipse occurs when the Moon passes directly behind Earth and into its shadow. This can occur only when the Sun, Earth, and Moon are exactly or very closely aligned (in syzygy), with Earth between the other two. A lunar eclipse can occur only on the night of a full moon. The type and length of a lunar eclipse depend on the Moon's proximity to either node of its orbit.

During a total lunar eclipse, Earth completely blocks direct sunlight from reaching the Moon. The only light reflected from the lunar surface has been refracted by Earth's atmosphere. This light appears reddish for the same reason that a sunset or sunrise does: the Rayleigh scattering of bluer light. Due to this reddish color, a totally eclipsed Moon is sometimes called a blood moon.

Unlike a solar eclipse, which can only be viewed from a relatively small area of the world, a lunar eclipse may be viewed from anywhere on the night side of Earth. A total lunar eclipse can last up to nearly 2 hours, while a total solar eclipse lasts only up to a few minutes at any given place, due to the smaller size of the Moon's shadow. Also unlike solar eclipses, lunar eclipses are safe to view without any eye protection or special precautions, as they are dimmer than the full Moon.

At least two **lunar eclipses** and as **many** as five **occur** every **year**, although total **lunar eclipses** are significantly less common. If the date and **time** of an **eclipse** is known, the occurrences of upcoming **eclipses** are predictable using an **eclipse** cycle, like the saros.

**Solar Eclipse:**

A solar eclipse occurs when a portion of the Earth is engulfed in a shadow cast by the Moon which fully or partially blocks sunlight. This occurs when the Sun, Moon and Earth are aligned. Such alignment coincides with a new moon (syzygy) indicating the Moon is closest to the ecliptic plane.[[1]](https://en.wikipedia.org/wiki/Solar_eclipse#cite_note-1) In a total eclipse, the disk of the Sun is fully obscured by the Moon. In partial and annular eclipses, only part of the Sun is obscured.

If the Moon were in a perfectly circular orbit, a little closer to the Earth, and in the same orbital plane, there would be total solar eclipses every new moon. However, since the Moon's orbit is tilted at more than 5 degrees to the Earth's orbit around the Sun, its shadow usually misses Earth. A solar eclipse can only occur when the Moon is close enough to the ecliptic plane during a new moon.

Total solar eclipses are rare events. Although they occur somewhere on Earth every 18 months on average, it is estimated that they recur at any given place only once every 360 to 410 years, on average.

**Lunar Eclipse Compared To Solar Eclipse**

A "lunar eclipse" and a "solar eclipse" refer to events involving three celestial bodies: the Sun ("solar"), the moon ("lunar"), and the Earth. A lunar eclipse occurs when the Earth passes between the Moon and the Sun, and the Earth's shadow obscures the moon or a portion of it. A solar eclipse occurs when the Moon passes between the Earth and the Sun, blocking all or a portion of the Sun.  
  
An eclipse can be total, partial, or annular. A total solar eclipse is when the moon blocks out the Sun entirely, a partial eclipse is when it blocks out a portion of the Sun, and an annular eclipse is when the moon is at its furthest point in orbit. It will not cover the Sun completely that's when you can see a thin ring of light emerging from the outside rim of the moon.  
  
**How are a lunar eclipse and solar eclipse different?**  
  
A lunar eclipse occurs at night and a solar eclipse occurs during the day. There are only certain times when either of them can occur. A lunar eclipse can only occur when the moon is directly opposite the Sun in the sky — a full moon. Even though there is a full moon each month, obviously a lunar eclipse does not occur on a monthly basis because the Sun isn't *exactly* in line with the Earth and the moon. The moon's orbit is actually tilted 5 degrees more than that of the Earth; otherwise, we would see a lunar eclipse each month.  
  
We can see lunar eclipses more readily than solar eclipses, and it has to do with proximity. The Moon is much closer to the Earth (well over 300 times closer than the Sun!), so the Earth has a much greater chance of blocking sunlight to the Moon, compared to the Moon blocking light from the Sun. Also, a lunar eclipse can be seen from a greater portion of the Earth. Solar eclipses, on the other hand, are more rare and when they do happen can only be seen by a very narrow segment of people on Earth, for a short period of time.  
  
It is quite safe to watch a lunar eclipse with the naked eye, while watching a solar eclipse without eyewear protection can seriously damage your eyesight. You can use a telescope to get a clearer view of the moon during an eclipse and really see what is happening.  
  
A solar eclipse has always had a more profound effect on humans than a lunar eclipse. This is probably because of the importance of the Sun to all life on Earth. In ancient China, a solar eclipse was thought to be the dragon coming to eat the Sun. The effect that an eclipse has on all life on Earth is of particular interest to scientists. They eagerly await a solar eclipse because it helps them to gather more knowledge about the Sun and its position with respect to Earth.

**Day and Night Variation:**

The change between day and night is caused by the rotation of the Earth on its axis. If the Earth did not rotate as it does, the day/night cycle would be very different or possibly even nonexistent. The changing lengths of days and nights depends on where you are on Earth and the time of year. Also, daylight hours are affected by the tilt of the Earth's axis and its path around the sun.

## Length of a Rotation:

A solar day, 24 hours, is the time it takes for the Earth to rotate exactly once so that the sun appears at the same place in the sky the next day. However, the Earth is also moving around the sun, and this movement makes measuring the day somewhat complicated. The actual time of one Earth rotation is a little shorter – about 23 hours and 56 minutes. Astronomers discovered this by observing the time it took for a star to appear in the same place in the sky the following day, and they called this a sidereal day.

## Longer and Shorter Days:

Although a solar day is 24 hours, not every day has 12 hours of daylight and 12 hours of night. Daytime is shorter in winter than in summer. This is because the Earth’s imaginary axis isn’t straight up and down, it is tilted 23.5 degrees. As the Earth moves around the sun during a year, the northern half of the Earth is tilted towards the sun in the summer, making daytime longer than night. In winter, this reverses; the earth tilts away from the sun and nighttime becomes longer. In the spring and fall, the tilt is neither toward or away from the sun but somewhere between, so day and night are more the same at these times of the year.

## The Solstices:

The solstices are the positions of the Earth's orbit that mark the longest and shortest days of the year. The winter solstice in the Northern Hemisphere is the shortest day, after which daylight hours grow longer. The summer solstice in the Northern Hemisphere falls on the longest day, after which daylight hours become shorter. The solstices can also be named for the month in which they occur. For example, the June solstice is the point in the Earth's orbit where the North Pole faces the sun. In the Northern Hemisphere, the June solstice is the longest day of the year. In the Southern Hemisphere, the June solstice is the shortest day of the year.

## Position on Earth:

Your place on the Earth relative to the equator also affects the number of daylight hours you get in a solar day. For example, during summer in the Northern Hemisphere, daylight hours increase the farther north you go; at this time, the Arctic gets very little nighttime darkness. In the winter, daytime is shorter the farther north you go. The seasonal changes in daylight hours are small near the equator and more extreme close to the poles.