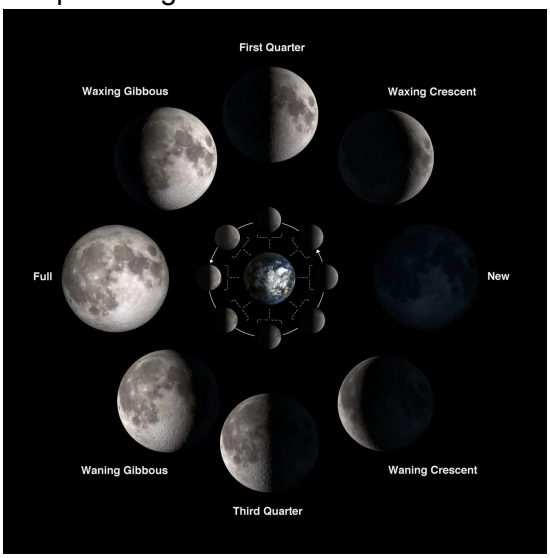
Astronomy Reviewer

The Motions of the Moon

The Moon is the Earth's only natural satellite. It completes one revolution around the Earth every **sidereal month** or 27.32 days. However, it takes 29.5 days or one **synodic month** for the Moon to cycle through its phases.

Every month, we observe the Moon go through eight phases. The different phases are the result of the motion of the Moon and the amount of sunlight that is reflected off the Moon's surface.

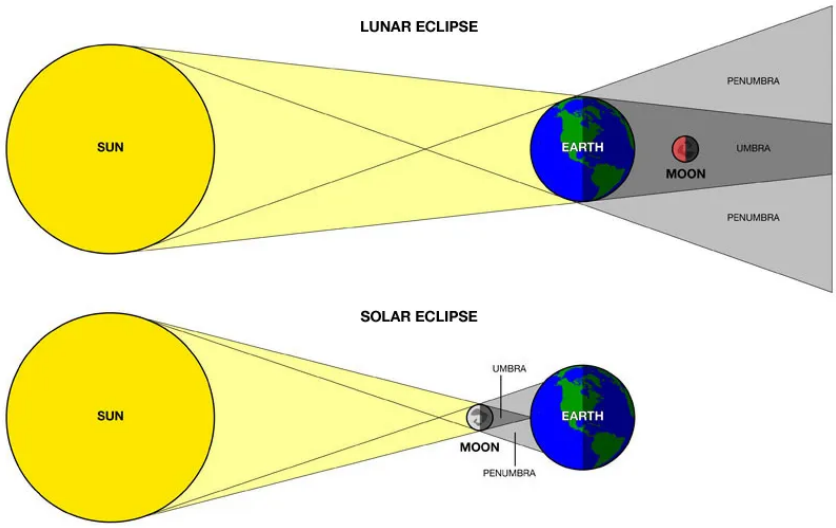
As we start from the new moon, more portions of the moon can be seen (**waxing**). When it reaches the full moon phase, portions of the moon then start to decrease in visibility (**waning**) until it reaches the new moon phase again.



Phases of the Moon. Credit: NASA/Bill Dunford

As the Earth revolves around the Sun and the moon revolves around the Earth, certain positions will allow for eclipses to happen.

A **lunar eclipse** occurs when the Earth comes between the Moon and the Sun, blocking any sunlight from reaching the Moon's surface. This happens when the Moon falls within the inner shadow cast by the Earth called the **umbra**. The outer portion of the Earth's shadow that only partially blocks the sun's rays is called the **penumbra**. On the other hand, a **solar eclipse** occurs when the Moon comes between the Sun and the Earth and casts a shadow on the Earth.



Types of Eclipses. Credit: Rice Space Institute

Eclipses are rare due to the fact that the Moon's orbit is tilted approximately 5℃. Eclipses can only occur when a full moon or a new moon occurs while the Moon's orbit crosses the plane of the ecliptic. Because of this, **the usual number of eclipses per year is four.**