

Getting to Know: Phases

Some people believe that the phases of the moon affect the behavior of people and animals. It may be true that fish bite more at night when there's a full moon—so that's a great time to go fishing. It may even be that people act differently if only because when there is a full moon, it is easier to see around you at night. Those theories may be interesting, but they are not scientific. Scientists do know a lot about the moon and its patterns, however, and can explain the changes in the shape of the moon that we see.



The moon orbits Earth in just over 27 days, which is the basis of our calendar month. Because the position of the moon changes constantly, its appearance changes daily so that you at times see the entire moon and at others do not see it at all. These changes in the appearance of the moon are called *moon phases*, and each is determined by moon's position in relationship to Earth and the Sun.



The full moon occurs when the Earth is between the Sun and the moon.

How does the Sun affect the moon's phases?

The moon appears to shine because its highly reflective surface, known as *regolith*, bounces the Sun's light back to Earth. Of course, sunlight only reaches the half of the moon's surface that is facing the Sun. As the moon moves around Earth, different portions of the moon's sunlit surface are visible to us.

When is a full moon visible?

A *full moon* is visible when Earth is between the Sun and the Moon. Sunlight bounces off the highly reflective lunar soil and is visible from Earth.



Misconception 1: *Why is the far side of the moon, or the "dark side," always dark?*

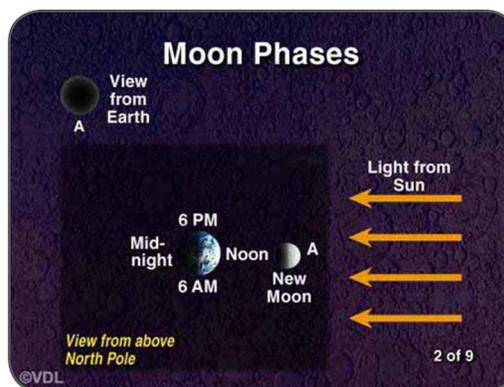
We only see one side of the moon from Earth. That is because the moon completes one rotation on its axis in the same time that it completes one orbit around Earth. The side of the moon that we cannot see is called the far side of the moon. However, the far side of the moon is *not* always dark. Remember that at any given time, half of the moon's surface is illuminated by the Sun. So when we see a new moon from Earth, the far side of the moon is completely illuminated by the Sun. The only time the so-called "dark side" of the moon is actually dark is during a full moon.

What are the other phases of the moon?

A *new moon* occurs when the moon is in between Earth and the Sun. At this point, the Sun is shining directly on the moon, but it is shining on the half we cannot see. The silhouette of the moon is often still visible, just as you see the silhouette of a person who walks in front of a lamp. Also, a small amount of light sometimes is reflected off Earth back to the moon, a phenomenon known as *earthshine*, which enables us to see the outline of a new moon.

When the moon appears as a half-circle in the sky, it is called a *quarter moon* because we can see a quarter of the moon's surface at that time. A *crescent moon* has a thinner shape than the quarter moon, and a *gibbous moon* is thicker. As the shape of the reflected light that we see grows larger, we refer to it as *waxing*, and as it becomes smaller again, we say it is *waning*. The moon is waxing as it comes closer to reaching the full moon phase and waning as it approaches the new moon phase.

Day by day, the moon's appearance changes as a result of its orbital position. You will learn more about moon phases as you explore this lesson.



Misconception 2: What does the Earth's shadow have to do with moon phases?

Earth's shadow does not affect moon phases. Moon phases are caused by the orbital position of the moon relative to Earth and the Sun. The only time Earth's shadow is projected onto the moon is during a lunar eclipse.