Phases of the Moon

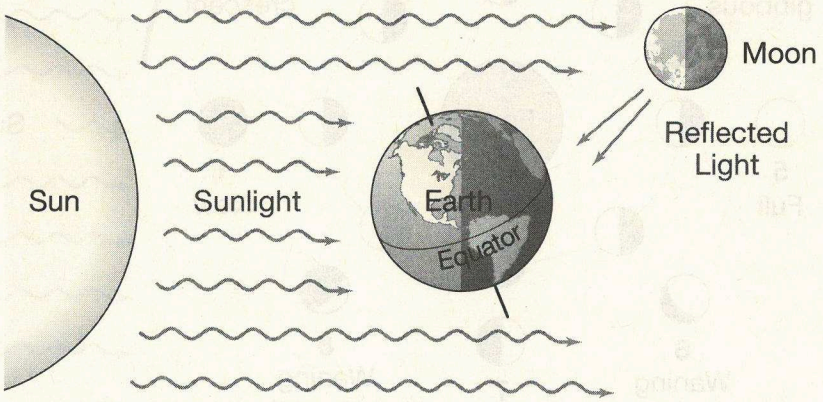
Key Words • phase • lunar cycle • waxing • waning

Getting the Idea

As the moon revolves around Earth, it seems to change shape. Sometimes the moon looks round. At other times, it looks like a small sliver in the sky. However, the moon only seems to change because of our viewpoint from here on Earth.

Understanding Moonlight

You know that Earth rotates on its axis. It is day on the part of Earth that faces the sun. It is night on the side of Earth that faces away from the sun. On a clear night when the moon is full, bright moonlight shines down on Earth. Sometimes it is so bright that you can see shadows on the ground. What you may not realize is that moonlight is not produced by the moon. The light that you see is actually sunlight reflected by the moon.



NOTE: Not to scale

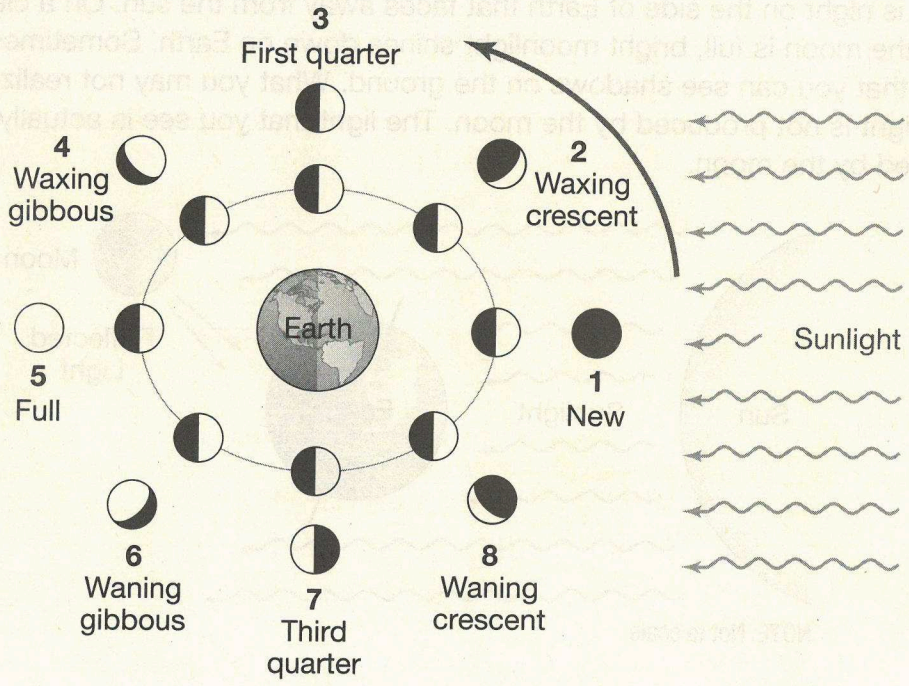
Why Does the Moon Seem to Change Shape?

Exactly half of the moon is normally lit by the sun. So why does the moon's shape seem to change? No matter where the moon is on its normal orbit around Earth, the sun always shines on half the moon. It just looks different because of your point of view.

The shape we see depends on the moon's position in relation to Earth and the sun. As the moon orbits Earth, we see different parts of the half that is lit by the sun. The different shapes that we see are called the moon's **phases**. The moon takes about 29.5 days to make one full revolution around Earth. This length of time is one **lunar cycle**.

Look at the diagram below. The inner circle shows the moon in orbit around Earth. The side of the moon that faces the sun is the side that is lit by sunlight. You can see that sunlight always lights half of the moon's surface. But the moon does not stay in one place. It orbits around Earth. Throughout the lunar cycle, you see different parts of the lit half of the moon. Sometimes you see all of the lit half; sometimes you see only a bit of it. As the lit portion that we see gets larger, the moon is said to be **waxing**. As it gets smaller, the moon is said to be **waning**.

The outer circle shows the shapes you see from Earth. Because Earth rotates, your part of Earth faces the moon once a day. No matter where you are on Earth, the moon phase will look the same. As you read about the phases and their names, look back at the diagram below to help you understand.



Waxing Phases

A *new moon* (1) happens when the moon is located between Earth and the sun. When the moon is in this position, the entire lit side of the moon faces away from Earth. We cannot see the moon at this time. The new moon is often regarded as the beginning of a lunar cycle.

As the moon continues in its orbit, it moves out of this position between Earth and the sun. Gradually, you see more and more of its lit side. The next phase after a new moon is called a *waxing crescent* (2). It is a crescent shape that appears to get bigger from day to day.

After another few days pass, half of the bright side of the moon is visible from Earth. This phase is called a *first-quarter moon* (3) because the moon has completed one quarter of a full revolution around Earth.

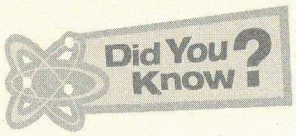
The next phase, when more than half of the moon's lit side faces us, is called a *waxing gibbous* moon (4). Then, when the moon has moved halfway around its orbit and the entire lit side of the moon faces Earth, you see the phase called a *full moon* (5).

Waning Phases

After a full moon, you begin to see less of the lit half of the moon as time passes. As the moon continues to orbit Earth, you see a *waning gibbous moon* (6).

After a few more days pass, more of the lit side of the moon is facing away from Earth. When half the lit side of the moon is facing away, you see a *third-quarter moon* (7). The moon has completed three-quarters of a revolution around Earth. This phase is also called a last-quarter moon because the moon is at the beginning of the last quarter of its orbit.

As the moon wanes more, you see a *waning crescent* (8). Finally, the lit side of the moon is facing completely away from Earth, and you see a new moon phase again. Then the cycle repeats.



The sun is 400 times larger than the moon. It is also about 400 times farther from Earth. This is why the moon and the sun seem to be the same size.

Discussion Question

Explain why a new moon and a full moon are considered to be opposite phases.

Phases of the Moon

1. About how long does it take for the moon to go from one new moon to the next new moon?

   A. 15 days
   B. 30 days
   C. 45 days
   D. 60 days

2. How much of the lit side of the moon is visible during a full moon?

   A. none of it
   B. half of it
   C. most of it
   D. all of it

3. Which of these phases comes right before the full moon?

   A. new moon
   B. third quarter
   C. waxing gibbous
   D. waning gibbous

4. What is the source of the moon's light?

   A. Earth
   B. the sun
   C. the moon
   D. the stars