The Phases of the Moon. During a synodic month, we can see the moon "change" from a slim crescent to a full circle and back again. These apparent changes in the moon's shape and size are actually different conditions of lighting called *phases*. They are caused by changes in the amount of sunlight reflected by the moon toward the earth. The moon seems to change shape because we see different parts of its sunlit surface as it orbits the earth. Like the earth, half the moon is always lighted by the sun's rays except during eclipses. Sometimes the far side of the moon is in full sunlight even though it is out of view.

When the moon is between the sun and the earth, its sunlit side—the far side—is turned away from the earth. Astronomers call this darkened phase of the moon a *new moon*. In this phase, the side of the moon facing the earth is dimly lighted by *earthshine*, which is sunlight reflected from the earth to the moon.

A day after a new moon, a thin slice of light appears along the moon's eastern edge. The line between the sunlit part of the moon's face and its dark part is called the *terminator*. Each day, more and more of the moon's sunlit side is seen as the terminator moves from east to west. After about seven days, we can see half of a full moon. This half-circle shape is half of the moon's side that is exposed to sunlight and is the part that can be seen from the earth. This phase is called the *first quarter*. About seven days later, the moon has moved to a point where the earth is between the moon and the sun. We can now see the entire sunlit side. This phase is called *full moon*. A full moon seems bright on a clear night. But a whole sky of full moons would be only about a fifth as bright as the sun.

About seven days after full moon, we again see half of a full moon. This phase is called the *last quarter*, or the third quarter. After another week, the moon returns to a point between the earth and the sun for the new moon phase. As the moon changes from new moon to full moon, it is said to be *waxing*. During the period from full moon back to new moon, the moon is *waning*. When the moon appears smaller than half of a full moon, it is called *crescent*. When the moon looks larger than half of a full moon, yet is not a full moon, it is called *gibbous*.

The moon rises and sets at different times. In the new moon phase, it rises above the horizon with the sun in the east and travels close to the sun across the sky. With each passing day, the moon rises an average of about 50 minutes later and drops about 12 degrees farther behind in relation to the sun. By the end of a week—at the first quarter phase—the moon rises at about noon and sets at about midnight. In another week—at full moon—it rises as the sun sets and sets as the sun rises. At last quarter, it rises at about midnight and sets at about noon. A week later—back at new moon—the moon and the sun rise together in the east.

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