

Motion and Phases of the Moon

There's a full moon tonight.

Supply list:

- 1 copy of "Phases of the Moon" worksheet per child (pg. 64)



Just as the earth moves in two different ways with respect to the sun, so also the moon moves in two ways with respect to the earth. The moon revolves around the earth and it rotates on its axis. From the perspective of the earth, the moon revolves around, or circles, the earth about once every $29\frac{1}{2}$ days, or about once per month. The moon rotates on its axis about once per month also. This results in the same side of the moon always facing the earth. This side is called the near side of the moon. The back side is called the far side of the moon.

Because the moon orbits the earth, it is in a different position with respect to the sun each day for $29\frac{1}{2}$ days, and then it repeats the cycle. The moon's position with respect to the sun determines how much light reflects off of its surface to the earth. Therefore, the moon appears to change shape throughout the month.

At new moon, the moon is between the earth and the sun. We can't see the moon at all because the sun is too bright and shining only on the far side of the moon. The next night, we can see a small sliver lit up on the right side of the moon. This is called a waxing crescent. After seven days, the right half will be lit up. This is called the first quarter. As the moon continues to "grow" throughout the next week, it is called a waxing gibbous. At $14\frac{3}{4}$ days through the cycle, the moon is at the opposite side of the earth from the sun and is considered a full moon. The full moon rises at sunset, and sets at sunrise. A full moon is nine times brighter than the moon when it is half lit (during the first or last quarter). The line between the lighted and dark sides of the moon is called the moon's terminator.

The next day, after the full moon, the moon appears to get smaller. This is called a waning gibbous. Then $\frac{3}{4}$ of the way through the cycle, only the left half of the moon is lit and is called the last quarter. Finally, as the moon shrinks further it is called a waning crescent.

Just as the moon passing directly between the earth and the sun causes a solar eclipse, so too, if the earth passes directly between the sun and the moon we see a lunar eclipse. This can only occur at full moon and only when the sun, earth, and moon are all directly lined up. This happens infrequently because the moon's orbit is tilted with respect to the earth's orbit. During a lunar eclipse, the moon is still slightly visible with a slightly red color. The longest

lunar eclipse was recorded at 1 hour 40 minutes of complete eclipse with the moon being at least partially blocked for 3 hours and 40 minutes.



The Moon's Phases:

Have your child label the drawings of the moon on the Phases of the Moon worksheet.

Answers: 1. new moon 2. waxing crescent 3. first quarter 4. waxing gibbous 5. full moon 6. waning gibbous 7. last quarter 8. waning crescent



What did we learn?

What causes the phases of the moon? (The orbit of the moon around the earth causes it to be in a different position with respect to the sun each day.)

Why does the same side of the moon always face the earth? (The moon rotates on its axis at the same rate that it revolves around the earth.)

What causes a lunar eclipse? (The earth comes directly between the moon and the sun, blocking the light of the sun from the moon.)

How long does it take for the moon to complete its cycle around the earth? (29 ½ days)

Taking it further

Why doesn't a lunar eclipse occur every month? (The moon's orbit is tilted 5 degrees from the earth's orbit so the sun, earth, and moon don't line up perfectly very often.)

What is the difference between a waxing crescent and a waning crescent? (The waxing crescent is lit up on the right side of the moon and the waning crescent is lit up on the left side of the moon from the earth's perspective.)

Phases of the Moon

Label each phase of the moon. Use words from the box below.

full moon	new moon	waxing crescent	waning crescent
first quarter	last quarter	waxing gibbous	waning gibbous

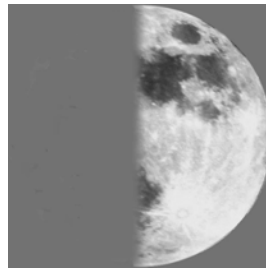
A little trick to help you remember whether a moon is waxing (getting bigger) or waning (getting smaller) is to mentally draw a line between the dark and light parts of the moon. If the lighted part forms a lower case b the moon is being “born” or waxing. If the lighted part forms a lower case d the moon is “dying” or waning.



1. _____



2. _____



3. _____



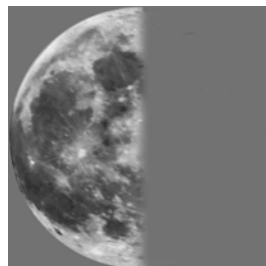
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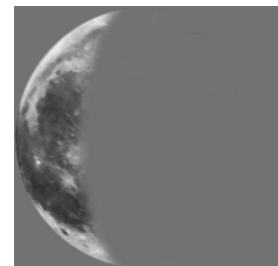
5. _____



6. _____



7. _____



8. _____

FUN FACT

The first full moon after the autumn equinox, September 21-23, is called the Harvest Moon. The next full moon is called the Hunter’s Moon.