



Oreo Moon Phases
Adapted from
Paper Plate Education, Lunar and Planetary Institute

Objectives

Students will:

- Create an accurate model of the Earth – Moon system and the phases of the moon.

Suggested Grade Levels

K-5th

Subject Areas

Science

Timeline

20 – 30 minutes

NGSS Standards

- **1-ESS1-1** Use observations of the sun, moon, and stars to describe patterns that can be predicted

Other Standards

- NS.K-12.4 Earth and Space Science Properties of earth materials Objects in the sky Changes in earth and sky

21st Century Essential Skills

- Collaboration and teamwork
- Organizing concepts
- Predict patterns
- Constructing explanations
- Obtaining/evaluating/communicating ideas

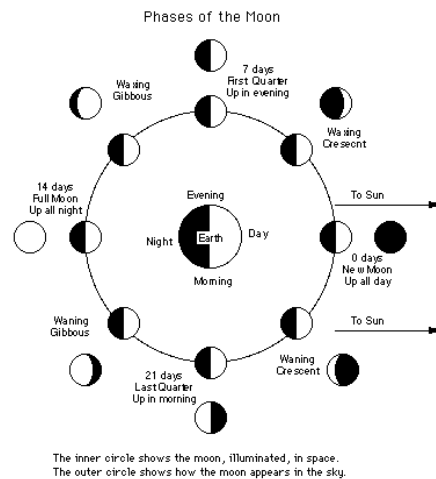


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Background



As shown in the above diagram, the new moon occurs when the moon is positioned between the earth and sun. The entire illuminated portion of the moon is on the back side of the moon, the half that we cannot see.

At a full moon, the Earth, moon, and Sun are in approximate alignment, just as the new moon, but the moon is on the opposite side of the earth, so the entire sunlit part of the moon is facing us. The shadowed portion is entirely hidden from view.

The first quarter and third quarter moons (both often called a "half moon"), happen when the moon is at a 90-degree angle with respect to the earth and sun. Therefore, we are seeing exactly half of the moon illuminated and half in shadow.

Once you understand those four key moon phases, the phases between should be fairly easy to visualize, as the illuminated portion gradually transitions between them.

An easy way to remember and understand those "between" lunar phase names is by breaking out and defining 4 words: crescent, gibbous, waxing, and waning. The word crescent refers to the phases where the moon is less than half illuminated. The word gibbous refers to phases where the moon is more than half illuminated. Waxing means "growing" or expanding in illumination, and waning means "shrinking" or decreasing in illumination. Thus, you can simply combine the two words to create the phase name, as follows:

- After the new moon, the sunlit portion is increasing, but less than half, so it is waxing crescent.
- After the first quarter, the sunlit portion is still increasing, but now it is more than half, so it is waxing gibbous.

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- After the full moon (maximum illumination), the light continually decreases. So, the waning gibbous phase occurs next.
- Following the third quarter is the waning crescent, which wanes until the light is completely gone -- a new moon.

Vocabulary

New moon, waxing, waning, crescent, gibbous, first quarter, full moon, third quarter

Materials

- Moon Phase Placemat/worksheet or paper plate per pair of students
- One Cream filled chocolate cookie per student
- Plastic knife per pair of students

Lesson

1. Prepare for the lesson: have the supplies on the table before starting the lesson.
2. Have one student draw the Earth in the center of the paper plate, and the other student draw the sun on the edge of the plate.
3. Explain how the moon orbits around the Earth. When the moon is directly between the sun and the Earth, you'll have a new moon or a full moon. As the moon orbits counter clockwise, the shadow from the sun dictates the different phases: waxing crescent, waxing half (first quarter), waxing gibbous, full, waning gibbous, waning half (third quarter), waning crescent, and back to new moon.
4. Draw and label the correct moon phases on the blank Moon Phase sheet. Explain to students that they will be creating the moon phases by using Oreos cookies.
5. Pass out one cookie to each student. Demonstrate how to carefully twist the cookie so that the crème filling is on one side. For the half-moons, have students carefully cut the crème in half with the knife. Make sure students keep the chocolate side to the Earth (shadow from the sun).
 - a. New moon: chocolate by itself closest to the sun, on the bottom of plate
 - b. Waxing crescent
 - c. First quarter: chocolate half closest to the Earth, on the right side of plate
 - d. Waxing gibbous
 - e. Full moon: completely covered with crème directly across the sun, on the top of the plate
 - f. Waning crescent
 - g. Third quarter: chocolate half closest to the Earth, on the left side of the plate
 - h. Waning gibbous
6. Put the cookie models in the correct position in relation to the Earth and Sun.

Extensions

- Pass out two more cookies to represent the gibbous and crescent phases.

Resources

Bueter, Chuck. [Paper Plate Education](#). Lunar and Planetary Institute. 2006.

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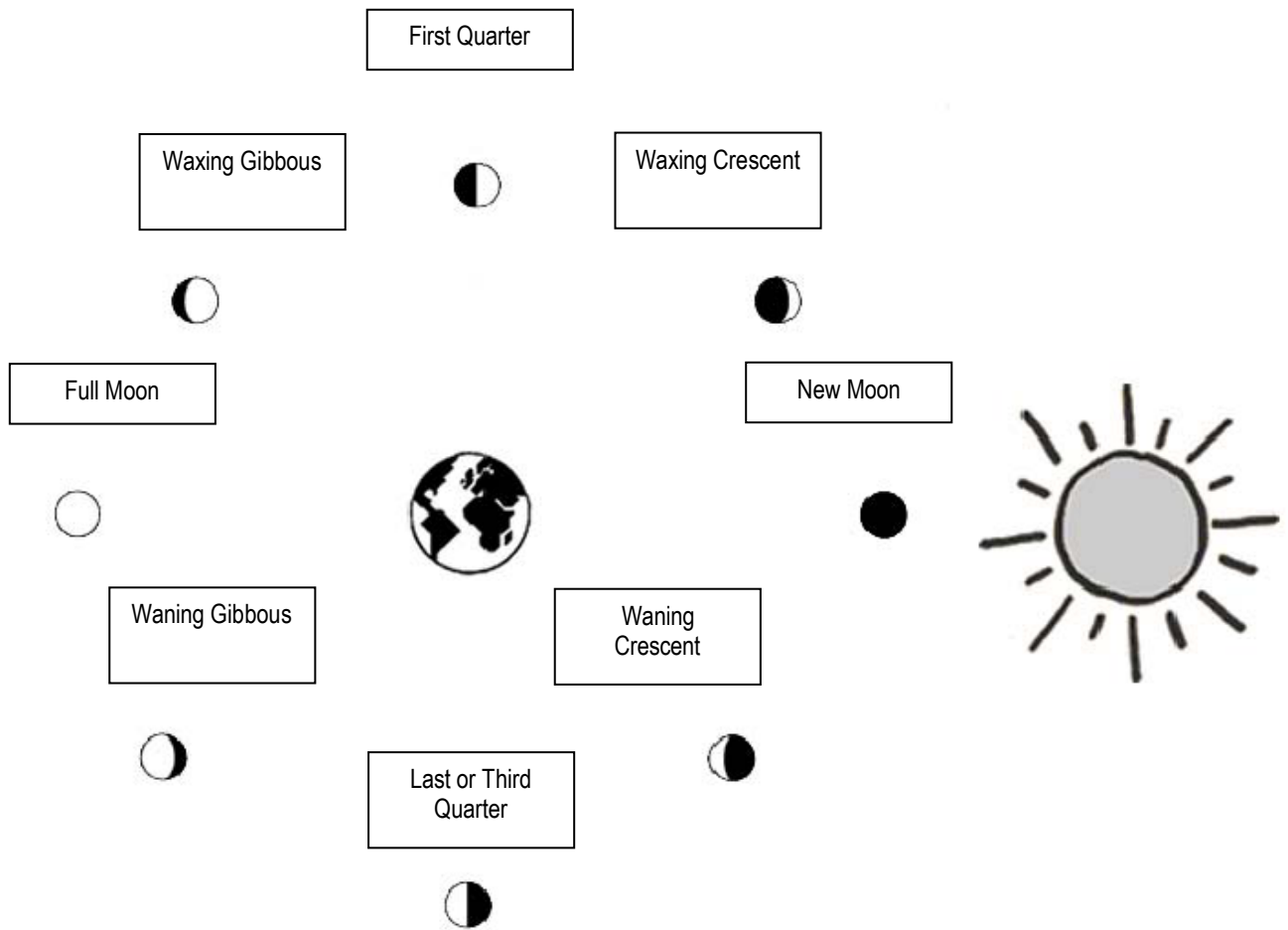
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