Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Student Exploration:** **Phases of the Moon**

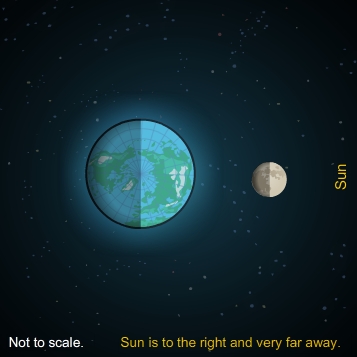
**Vocabulary:** axis, crescent, First Quarter, Full Moon, gibbous, illuminate, Moon phase, New Moon, orbit, revolve, rotate, Third Quarter, waning, waxing

**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)

1. A **Moon phase** is what the Moon looks like from Earth at a particular time. In the space below, draw a few pictures of different Moon phases, based on what you have seen before.

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1. About how often does a Full Moon happen? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**Gizmo Warm-up**

1. In the *Phases of the Moon* Gizmo, click **Play** (**Play**). What do you notice about the motion of the Moon?

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The path that the Moon takes is called its **orbit**. The Moon is **revolving** around Earth.

1. What do you notice about the motion of Earth?

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This motion is called **rotation**. Earth rotates on its **axis**, a straight line connecting the North Pole to the South Pole.

1. Where would you have to be to see the view shown above? Explain. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| **Activity A:**  **Moon phases** | Get the Gizmo ready:   * Click **Reset** (Reset). | 2nd |

**Question: Why do we see phases of the Moon?**

1. Brainstorm: Why do *you* think we see phases of the Moon? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. Run Gizmo:
   * Click **Play**. As the Moon goes around Earth, notice what the Moon looks like on the right side of the Gizmo. (This shows what an observer on the North Pole would see.)
   * Turn on **Show view area** to see which part of the Moon is visible from Earth.
2. Observe: How does the Moon’s appearance change as the Moon revolves around Earth?

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1. Analyze:
   * 1. Look at the overhead view of the Moon and Earth. How much of the Moon is always lit up, or **illuminated**, by the Sun? ­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     2. Can we always see the same amount of the illuminated side of the Moon from Earth? Explain. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Think and discuss: Based on your observations, why do we see Moon phases?

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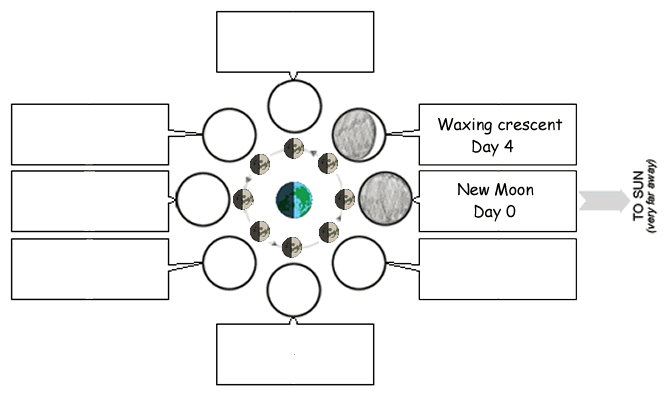
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| **Activity B:**  **Name that phase!** | Get the Gizmo ready:   * Click **Reset**. | 3rd |

**Goals: Learn the names of Moon phases and when they occur.**

1. Run Gizmo: Click **Play**. When you are ready to fill in part of the diagram, click **Pause** (Pause). Sketch what the Moon looks like and write the phase name and day next to your sketch. (The first two are done for you.) Click **Play** to continue.



1. Predict: Suppose you saw a waxing gibbous Moon. What phase would you expect one week later? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Test your prediction using the Gizmo.
2. Think and discuss: **Waxing** means “growing” and **waning** means “shrinking.”
   1. Seen from the North Pole, which side of a waxing Moon is illuminated? \_\_\_\_\_\_\_\_\_\_\_
   2. Which side is illuminated when the Moon is waning? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Suppose you see a crescent Moon. How do you know if it is waxing or waning?

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| **Extension:**  **The Man in the Moon** | Get the Gizmo ready:   * Click **Reset**. * Turn on **Show flag**. | 4th |

**Question: If you look closely at the Full Moon, you may notice dark areas that look a bit like a face. This is known as “The Man in the Moon.” Does this side of the Moon always face Earth?**

* 1. Form hypothesis: Do you think we always see the same side of the Moon? \_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. Run Gizmo: Click **Play**. The flag helps you notice how quickly the Moon is rotating. Click **Pause** when the flag has rotated in a full circle, showing that the Moon has rotated once.
  2. Observe: Where does the flag point as the Moon revolves around Earth? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  3. Draw conclusions: Do we always see the same side of the Moon? How do you know?

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* 1. Observe:

* + 1. How long did it take for the Moon to go around Earth?

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* + 1. How long did it take for the flag to rotate once in a full circle?

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* 1. Analyze: What do you notice about these two time intervals? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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* 1. Think and discuss: Suppose the Moon rotated on its axis just as quickly as Earth. Would we still always see the same side of the Moon from Earth? Explain.

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