Name: _____ Date: _____

Student Exploration: Phases of the Moon

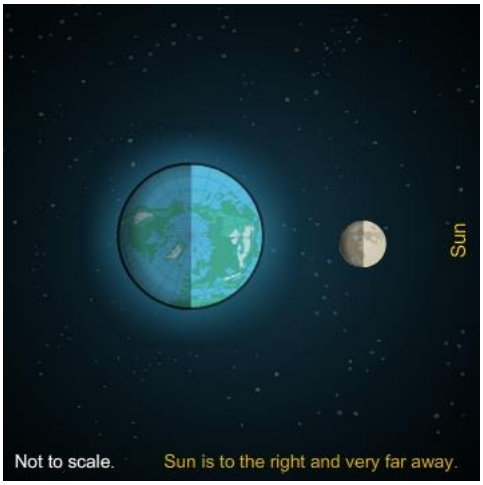
Vocabulary: axis, crescent, First Quarter, Full Moon, gibbous, illuminate, Moon phase, New Moon, orbit, revolve, rotate, Third Quarter, waning, waxing

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.

2. About how often does a Full Moon happen? _____

Gizmo Warm-up



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

   _____

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

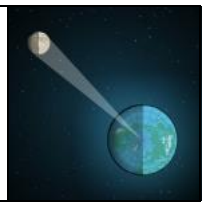
2. What do you notice about the motion of Earth?

   _____

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

3. Where would you have to be to see the view shown above? Explain. _____

   _____

Activity A: **Moon phases**	Get the Gizmo ready: • Click **Reset** (↺).	

Question: Why do we see phases of the Moon?

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

   _____

   _____

2. 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.

3. Observe: How does the Moon's appearance change as the Moon revolves around Earth?

   _____

   _____

4. Analyze:
   A. Look at the overhead view of the Moon and Earth. How much of the Moon is always lit up, or **illuminated**, by the Sun? _____
   B. Can we always see the same amount of the illuminated side of the Moon from Earth? Explain. _____

5. Think and discuss: Based on your observations, why do we see Moon phases?

   _____

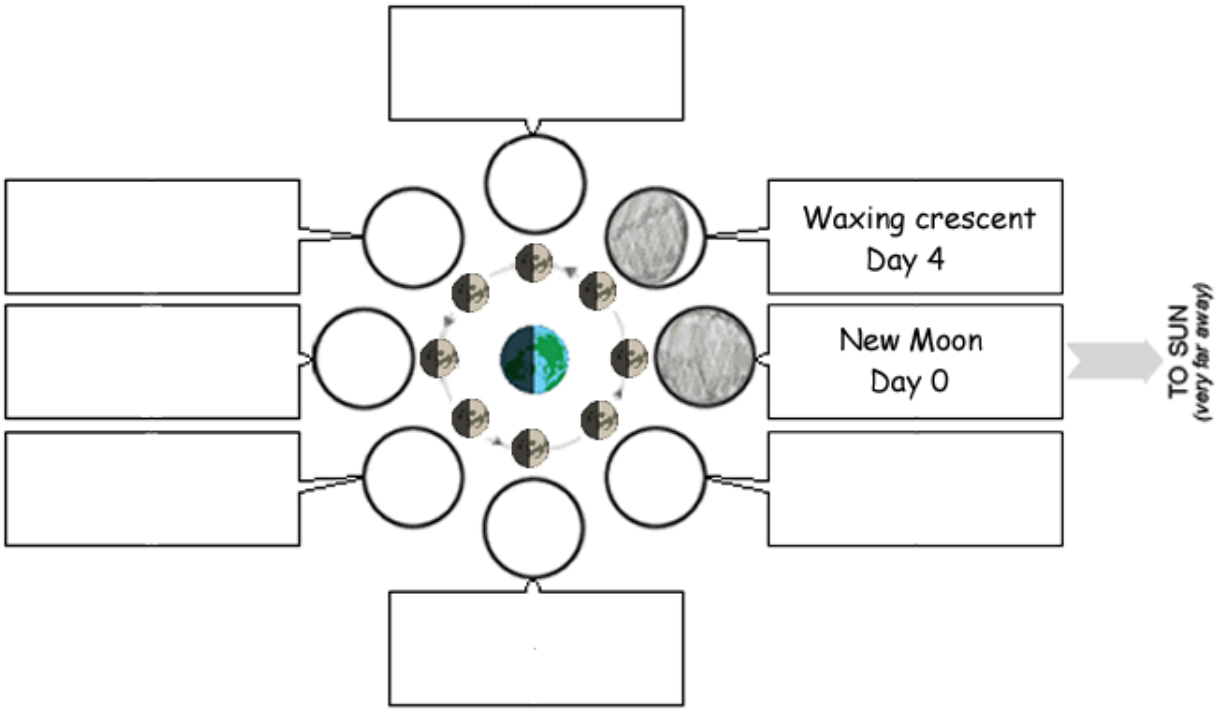
   _____

   _____

Activity B: **Name that phase!**	Get the Gizmo ready: • Click **Reset**.	

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** (⏸). 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.



2. Predict: Suppose you saw a waxing gibbous Moon. What phase would you expect one week later? _____ Test your prediction using the Gizmo.

3. Think and discuss: **Waxing** means "growing" and **waning** means "shrinking."
   A. Seen from the North Pole, which side of a waxing Moon is illuminated? _____
   B. Which side is illuminated when the Moon is waning? _____
   C. Suppose you see a crescent Moon. How do you know if it is waxing or waning?

      _____

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

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? _____

2. 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.

3. Observe: Where does the flag point as the Moon revolves around Earth? _____

4. Draw conclusions: Do we always see the same side of the Moon? How do you know?

   _____

5. Observe:

   A. How long did it take for the Moon to go around Earth?

      _____

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

      _____

6. Analyze: What do you notice about these two time intervals? _____

   _____

7. 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.

   _____

   _____