

Phases of the Moon

Subject / Course:	Middle School Science		
Topic:	Lunar Orbit and Earth Space Science		
Lesson Title:	Phases of the Moon		
Level:	6-8 grade	Lesson Duration:	45 minutes

Lesson Objectives:

1. Students will be able to identify and order phases of the moon as it revolves around Earth.
2. Students will be able to explain why the moon appears in different phases when viewed from Earth.

Summary of Tasks / Actions:

Considerations for teaching students with blindness or visual impairments:

The moon phase model has both a textured and smooth side, which turns on its axis to show how the appearance of the moon changes in the night sky. Because of the way that the device works, students may develop the misconception that the same part of the moon is always being lit by the sun or that different parts of the moon are turned toward Earth as it revolves through its orbit. To combat this, it is important to explicitly state how the model fails to match up with reality (unlike in the model, the same part of the moon is always pointing toward Earth, but it gets lit up by the sun in different areas based on its position along its orbit). The tactile components are textured/smooth in order to provide a representation of how the moon's appearance changes from the perspective of someone on Earth.

Bell Ringer/Introductory Activity:

1. What did the moon look like in the sky last night?
2. What are the phases of the moon?
3. Why does the moon look different at different times of the month?

(Be prepared to address the fact that some students with visual impairments may not know that the moon appears differently in the sky as time passes. This can be expanded on during the discussion section.)

Discussion/Exploration:

1. Describe the moon's path around the Earth. When viewed from above the Earth's north pole, the moon travels roughly counterclockwise around the Earth. The moon takes about 27.3 days to complete one revolution around the Earth.
2. Describe how the sun's light reflects off the moon. The part of the moon that is visible from Earth is the part that is lit by sunlight. Depending on the moon's position around Earth, different amounts of the moon's surface are visible, following a regular pattern, which gives the moon the appearance of a changing shape.
3. Show students the moon phase diagram (tactile version as well as visual model where appropriate). Describe each phase of the moon. Provide names of the moon's phases: New moon, waxing crescent, first quarter, waxing gibbous, full moon, waning gibbous, third quarter, waning crescent.
4. Show students the phase changes of the moon using the ratcheting mechanism on the rotating moon 3D model. Be sure to adjust the position after ratcheting to match up specifically with the new moon, first quarter, full moon, and third quarter phases, as the ratcheting mechanism allows for some overturning.
5. Clarify that the moon is always facing the same direction toward Earth, but different parts of the moon are lit by the sun as it travels around Earth.

Activity:

1. Have students practice identifying phases of the moon based on the visual/tactile appearance of the two models.
2. Have students act out the orbit of the moon around the Earth (include someone to act out the sun, or use a lamp to represent the sun).

Phases of the Moon

3. Model the phases of the moon using the ratcheting moon model. Use the lamp as a representation of the sun and the globe as a representation of Earth. Turn off the overhead lights and show students the path of the moon around Earth. The tactile portion of the ratcheting model should be adjusted to match up with the correct phase that the moon is in as it travels around the Earth. (For students who are blind or visually impaired, have them follow the orbit of the moon during this exercise to identify how the model is changing.) This activity can also be done using the optional handle for the ratcheting moon phase model (disassembly required).

Review:

Go over names and order of the phases of the moon, why the moon's appearance changes over time, how many days does it take for the moon to go through all of its phases, and other relevant discussion points.

Exit Slip:

1. Why does the moon's appearance change?
2. What does "waxing" mean in terms of the moon's phases?
3. What does "waning" mean in terms of the moon's phases?

Materials / Equipment:

Tactile Moon Phase Diagram

Moon phases with Braille ([Link](#)) - Keep in mind that this only includes 4 phases, not all.

STEIL Rotating Moon 3D Model ([Link](#))

Optional:

Lamp or object to represent the sun

Globe (tactile for students with visual impairments or blindness)

NGSS Alignment:

MS-ESS1-1: Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. [Clarification Statement: Examples of models can be physical, graphical, or conceptual.]

Take Home Tasks:

Have students look up what phase the moon is in for the day of this lesson. Additionally, have students identify when the next full moon is/whether or not they can find the moon's phases on a calendar (digital or physical).