

REFLECTING LIGHT

(MODIFIED FOR ADEED)

INSTRUCTIONS



Science Concept:

Planetary objects are seen due to either reflected light or emitted light.

Objectives:

The student will:

- explain that planetary objects are seen due to emitted light or reflected light;
- complete an investigation; and
- illustrate the path light takes from the sun to the moon.

GLEs Addressed:

Science

- [6] SD4.1 The student demonstrates an understanding of the theories regarding the origin and evolution of the universe by contrasting characteristics of planets and stars (i.e., light reflecting, light emitting, orbiting, orbited, composition).
- [6] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.

Vocabulary:

emit – to throw or give off or out (*emit* light)

produce – to cause to be or happen (this will *produce* results)

reflect – to bend or throw back waves of light, sound, or heat (a polish surface *reflects* light)

Materials:

- Flashlights (one per group)
- Hand mirrors (two per group)
- Candle (one per group)
- Small mirrors (two per group)
- Electric heater or other heat source (one per group)
- 3X5 index cards (one per group)
- Hole punch
- Tape
- TEACHER INFORMATION SHEET: “Target”
- Student log book (see Explore, step 2)

Activity Preparation:

1. Punch a hole in the center of each index card and tape one index card to each flashlight so the hole in the card is centered over the lens of the flashlight.
2. Make copies of the TEACHER INFORMATION SHEET: “Target” (one per group, and one for demonstration).
3. Tape the TEACHER INFORMATION SHEET: “Target” on a wall in a location suitable for demonstration.
4. Place several small mirrors around the room so light from a flashlight reflects off the mirrors and shines on the target. Adjust mirrors as needed.

Activity Procedure:

Gear Up

Process Skills: observing, inferring, and communicating

1. Ask students to gather around to observe the following demonstration.
 - a. Dim lights in the classroom to see the effect clearly.
 - b. Shine the flashlight on the mirrors so the light is reflected onto the target.
 - c. Turn the lights back on. Ask students to return to their seats.

2. Discuss the meaning of the words “emit,” “reflect,” and “produce” with students.
3. Create a three-column KWL chart to be filled in during student discussion. The first column should be labeled “K (What I KNOW),” the second column “W (What I WANT to Know),” and the third column “L (What I LEARNED).”
 - a. Fill in the first columns of the chart by asking students what they know about light, specifically, why some objects emit light and others reflect light.
 - b. Fill in the second column of the chart by asking students what they want to know about light.

Explore

Process Skills: observing, inferring, and communicating

1. Divide students into groups. Distribute a flashlight (with cover), candle, two small mirrors, and one target to each group. Assign each group a different location in which to conduct their activity. NOTE: Each group will need space to perform the activity without interfering with other groups. Several groups can perform the activity in one room, but large classes may need to move to the gymnasium or cafeteria.
2. Instruct groups to tape their target to the wall and then try and make the light shine in as many ways as possible using the flashlight and mirrors. For example, students might use the flashlight and mirror to reflect light onto their target, or bounce the light off both mirrors first. Instruct students to keep a log of observations during their investigation.
3. After students have explored for approximately ten minutes, instruct them to make the light shine from each source (flashlight and candle) to the target, using the same set-up as was done during the Gear Up demonstration.
4. Ask students to draw a diagram in their log, using arrows to illustrate the path the light took from its source to the target.

Generalize

Process Skills: inferring and communicating

5. Discuss with the class how light moved to the target. For each source, what path did the light take? How do the light sources differ?
6. Help the class relate what they learned during the student investigation to how light from the sun and moon travels to our eyes. During the discussion, ask students to use the words “emit,” “reflect,” and “produce.”
7. Ask students why some objects emit and others reflect light. Explain objects that emit light also give off heat. Explain bodies in space (such as the sun and stars) give off heat, or have a certain amount of internal heat. What we can or cannot see of these celestial bodies depends on the degree of heat produced by them.
8. Explain all objects also reflect light. As light from very hot objects bounces off other objects, that light is reflected, or bounced back, off the second object. What determines how well we see the object is the amount of light emitted from the light source, and the amount reflected off of the object. Each object reflects and absorbs different amounts of light.

Apply/Assess

Process Skill: communicating

9. Complete the third column of the KWL chart, by asking students to explain what they have learned about light.
10. Instruct students to write a short essay describing the light reflection and emission. Instruct students to draw a diagram showing the different paths light travels from the sun to Earth. Remind students that the moon should be shown in their diagram.

Extension Idea

Process Skill: communicating

Ask students to research and explain how reflected light is used in grocery stores, hospitals, and schools.

REFLECTING LIGHT

RUBRIC

Objective	GLE	Emergent	Developing	Proficient	Advanced
The student explains planetary objects are seen due to emitted or reflected light.	[6] SD4.1	The student does not explain emitted light or reflected light, or does so incorrectly.	The student correctly explains emitted or reflected light, but does not correctly explain both; or the student provides examples of emitted and reflected light, but does not explain either.	The student correctly explains reflected and emitted light, and provides a correct example of at least one.	The student correctly explains reflected and emitted light, provides a correct example of each, and explains the path each type of light takes to reach Earth.
The student completes the investigation.	[6] SA1.1	The student does not participate in the investigation, or participates but does not record observations or illustrate the path of light.	The student participates in the investigation and records observations or illustrates the path of light, but not both.	The student participates in the investigation, records observations, and illustrates the path of light.	The student participates in the investigation, records observations, illustrates the path of light, and explains how the investigation relates to our solar system.
The student illustrates the path light takes from the sun to the moon.	[6] SD4.1	The student does not complete the illustration or does so incorrectly.	The student's illustration does not include the sun, moon, and Earth; or shows the path of light incorrectly.	The student's illustration shows Earth, the sun and the moon, as well as the correct paths light takes from the sun to Earth.	The student's illustration shows Earth, the sun and the moon, and correctly shows the paths light takes from the sun to Earth. The illustration includes the path light takes upon reaching Earth.

**REFLECTING LIGHT
"TARGET"**

TEACHER INFORMATION

