

Mirror, Mirror

Description

Using flashlights, mirrors, and spoons, learners explore how light travels. They investigate how light is reflected differently by curved and rough surfaces and why mirrors are the best surfaces for seeing themselves.

Suggested Grade Levels: K–2

Lesson Objectives Connecting to the Standards

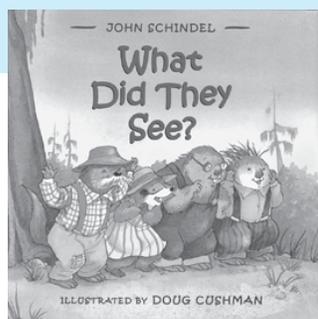
Content Standard A: Scientific Inquiry

- Ask a question about objects, organisms, and events in the environment.
- Design and conduct simple experiments to answer questions.
- Use data to construct reasonable explanations.

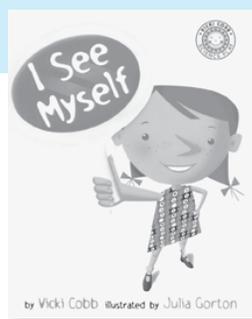
Content Standard B: Physical Science

- Understand that light travels in a straight line until it strikes an object. Light can be reflected by a mirror, refracted by a lens, or absorbed by the object.

Featured Picture Books



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|--------------------|--|
| Title | <i>What Did They See?</i> |
| Author | John Schindel |
| Illustrator | Doug Cushman |
| Publisher | Henry Holt |
| Year | 2003 |
| Genre | Story |
| Summary | Raccoon hurries to show Beaver, Porcupine, and Otter the most amazing “thingamajig” that they have ever seen (a mirror). |



| | |
|--------------------|--|
| Title | <i>I See Myself</i> |
| Author | Vicki Cobb |
| Illustrator | Julia Gorton |
| Publisher | HarperCollins |
| Year | 2002 |
| Genre | Non-narrative Information |
| Summary | Learn why you can see yourself in shiny objects with this fun, interactive book about light. |

Time Needed

This lesson will take several class periods. Suggested scheduling is as follows:

Day 1: **Engage** with *What Did They See?* read aloud, and **Explore/Explain** with *Can You See Yourself?*

Day 2: **Explore/Explain** with Mirror Challenges and *I See Myself* read aloud.

Day 3: **Elaborate/Evaluate** with Silly Spoons.

Materials

Per pair:

Plastic mirror hidden in a “mystery envelope”
with a question mark on the envelope

Flashlight

Shiny metal spoon

Crinkled aluminum foil square
(about 5 cm by 5 cm)

Ordering Information for Mirrors

Sheridan WorldWise

www.classroomgoodies.com

1-800-433-6259

Package of 15 small mirrors

Order # WNB 7641

Student Pages

Mirror Challenges

Silly Spoons

Background

Understanding that light travels in a straight line until it strikes an object and that light can be reflected by a mirror, refracted by a lens, or absorbed by an object are key components to the Physical Science Standard in grades K–4. In this lesson, students observe the path of light as it reflects off a mirror and what happens when light hits other objects.

Light is an essential part of our everyday lives. Without light, we would not be able to see. This fact can be difficult for some students to believe, because most of us have never been in a completely dark place before. Light behaves according to special rules. For example, it always travels in a straight line until it hits something. When light hits a mirror, it *reflects*, or bounces off the surface. (Note: The book *I See Myself* uses the kid-friendly term *bounce* instead of the scientific term *reflect*. Technically speaking, light does not “bounce” in the same way that a ball bounces. Instead, light is actually absorbed by the molecules in the mirror and then sent back out as a reflection.)

The *law of reflection* states that, when something bounces off a perfectly flat surface, the angle at which it hits the surface will be equal to the angle at which it bounces away. A *mirror* reflects light in this way because of its very flat, smooth surface. A mirror is made of a glass sheet in front of a metallic coating where the reflection actually occurs. A *curved mirror*, like a funhouse mirror, can be thought of as consisting of a very large number of small flat mirrors oriented at slightly different angles. The

law of reflection still applies, but the image you see is distorted. A very shiny spoon can be used to demonstrate this type of distortion.

Light isn't just reflected off mirrors; light is reflected off every object you see. When light strikes a rough surface, it reflects off in many directions due to the microscopic irregularities of the surface. Thus, a mirror image is not formed. This is called *diffuse reflection*. As you are reading this, light is reflecting off of the page. The black type on the page is absorbing all the light that hits it, but the rest of the page is reflecting light. The reflected light is scattering in many directions. Some of the scattered light reaches your eyes. That's why you can read this, but you can't see your reflection in the page.

Engage

What Did They See? Read Aloud

Note: If you are unable to locate a copy of *What Did They See?*, you can use a riddle to replace the read aloud: "It is flat. It is shiny. It can follow your every move. It contains something lovely, good looking, and amazing. What is it?" Then have them open their envelope to see the mirror.

Inferring

Hold up the cover of the book *What Did They See?* Ask

- ? What do you think this book might be about? Why do you think so?
- ? Do you think the book is fiction or nonfiction? How can you tell? (Possible answers include: It has cartoon animals on the cover, and the animals are wearing clothing.)

Questioning

Read *What Did They See?* to the class. Model the thinking of a good reader by saying aloud "I wonder what it could be?" when appropriate in the story. Stop reading before you read the last page, and pass out a sealed mystery envelope with a mirror in it to each pair of students. Then read the last page and tell them that the "good-looking thingamajig, lovely whatchamacallit, dashing

thingamabob" is in the envelope. Have them take it out as you read, "and what each one saw was something wonderful indeed." Ask

- ? What wonderful thing do you see when you look at the amazing "thingamabob" in the mystery envelope? (myself)
- ? Why did each character in the story think that what they saw was so "dashing," "amazing,"



Looking at the "amazing thingamabob" from the mystery envelope

“good looking,” or “lovely”? (They were seeing themselves in the mirror.)

- ? How do you know this book is fiction? (Possible answers include: Animals can't really talk, and they don't wear clothes.)

Explore/Explain

Can You See Yourself?

Next, give students a few minutes to walk around the room to discover if they can see themselves in anything. Ask

- ? In what things could you see yourself? (Answers include: metal objects, doorknobs, the glass in a picture frame, and windows.)
- ? What do these things have in common? (Answers include: They are smooth, and they are shiny.)
- ? Did you appear as clear in these objects as you appeared in the mirror? (no)
- ? Why do you think the mirror was best for seeing yourself? (Answers will vary.)

Explore/Explain

Mirror Challenges

Have each pair of students use their mirror and a flashlight for this activity. Make your room as dark as possible. Have students shine the flashlight on the mirror and observe where the beam of light goes. Ask

- ? Does the light from the flashlight go through the mirror? (No. It bounces off.)
- ? Where does the light go after it bounces off the mirror? (Answers might include: behind me and on the wall.)

Keep the room darkened, and pass out the Mirror Challenges student page. Have students put a checkmark in each box as they complete challenges 1–4. (They can use their flashlights to

view their papers.) As they are working, circulate to ask questions such as

- ? What do you think?
- ? How do you know?
- ? What is your evidence?

Turn the lights back on, and have students complete challenges 5–7.

Explain

Mirror Challenges Discussion and *I See Myself* Read Aloud

After students have completed the Mirror Challenges student page, ask them

- ? Were you able to do all of the challenges?
- ? Which one was the most difficult? Why?
- ? Did any of the results surprise you? Why?
- ? What word appeared in the mirror? (“REFLECT”)
- ? How did your name appear in the mirror? (backwards, or backwards and upside down, depending on where they placed the mirror.)

Tell students that the word *reflect* means to send back. Ask

- ? When you look into a mirror, what reflects or is sent back? (light)

Then explain that, when we look into a mirror, we call our mirror image a *reflection*, because it is formed by light reflecting off the mirror to our eyes.

Ask

- ? Do you think you could see your reflection in the mirror if this room were completely dark? (Answers will vary.)

Explain that, if the room were dark, there would be no light to reflect. In fact, you cannot see anything without light. Challenge students to



Mirror challenges

try this at home with adult supervision:

Take a flashlight and a small hand mirror into a room with no windows, such as a closet or bathroom. Shut the door, and cover the cracks below the door with towels. Then turn off the light and the flashlight. Look into the mirror. What can you see?

Determining Importance

Tell students you have a nonfiction book to help them learn about how mirrors work. Have them listen to find out why mirrors seem to be the best objects for seeing themselves. Read *I See Myself* to the class.

After reading, ask

- ? Why are mirrors the best objects for seeing yourself? (because they are flat and shiny)
- ? In order to see yourself, in order to see anything, you must have what? (light)
- ? When a ray of light hits a mirror, what happens? (It makes a perfect “bounce” every time.)
- ? Why can't you see yourself in a sweater or in the pages of a book? (A sweater or page is not perfectly flat and shiny. The light reflects off the sweater or page and scatters in many directions.)



Silly spoons

elaborate/evaluate

Silly Spoons

Ask students

? Have you ever looked into a fun-house mirror or into a mirror that made your reflection look funny? What did that mirror look like? (It was curved or not completely flat.)

Give each student the Silly Spoons student page. Give each pair of students a shiny metal spoon, a small plastic mirror, and a square of crinkled foil. Have them complete the activities on the student page and then share their explanations with other pairs. Discuss their findings as a class.

Answers to the Silly Spoons student page are as follows:

1 and **2** Answers might be: My face looks funny, and my nose looks too big, OR my face looks upside down (answer depends on which way the student is holding the spoon).

3 It is not flat.

4 yes

5 no

6 b. (Explain that because of the crinkles in the shiny foil, the light rays are reflected in many directions. Even though the foil is shiny, you don't see a clear reflection because it is not smooth.)

7 light, smooth surface, shiny surface

Inquiry Place

Have students brainstorm testable questions about light, such as

- ? What material lets more light through: tissue paper or construction paper?
- ? What time of day is your shadow the longest? the shortest?
- ? Can you see your shadow in the shade of a tree?

Then have students select a question to investigate as a class, or have groups of students vote on the question they want to investigate as a team. After they make their hypotheses, have them design an experiment to test their hypotheses. Students can present their findings at a poster session.

More Books to Read

Bahrampour, A. 2003. *Otto: The story of a mirror*. New York: Farrar, Straus and Giroux.

Summary: A humorous story about Otto, a mirror in a hat shop, who dreams of faraway lands. He eventually escapes from the shop and ends up on an exotic island where he meets another mirror and they reflect back and forth forever and ever.

Bulla, C.R. 1994. *What makes a shadow?* New York: HarperCollins.

Summary: This Let's-Read-and-Find-Out Science book gives simple explanations for shadows. Each page offers a brief description of an object and its shadow. Simple activities to demonstrate various sizes and shapes of shadows are included.

Narahashi, K. 1987. *I have a friend*. New York: Aladdin.

Summary: A small boy tells about his friend who lives with him, who follows him, who sometimes is very tall, but who disappears when the Sun goes down—his shadow.

Pulley Sayre, A. 2002. *Shadows*. New York: Henry Holt.

Summary: A boy and girl search for shadows on a sunny summer day.

Rosinsky, N.M. 2003. *Light: Shadows, mirrors, and rainbows*. Minneapolis: Picture Window Books.

Summary: Simple text and fun, colorful illustrations help readers understand how shadows are made, how mirrors work, how rainbows are made, and more. Includes simple experiments, table of contents and glossary, and a website with links to other safe, fun websites related to the book's content.

Name: _____

Mirror Challenges



Put a check mark in the box after you complete each challenge.

- 1. Using the mirror, make your light shine on the wall behind you.
- 2. Using the mirror, make your light shine on the ceiling.
- 3. Using the mirror, make your light shine on your shirt.
- 4. Join another team, and make your light bounce off of two mirrors at the same time.
- 5. Move your mirror around until you can read the word in the box below.

REFLECT

Then write the word on this line: _____

- 6. Write your name in the box below.

- 7. Show how your name appears in the mirror in the box below.

Name: _____



Silly Spoons

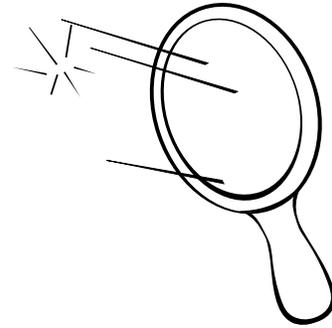
1. Look in the spoon. How does your face appear in the spoon?

2. Look in the other side of the spoon. How does your face appear in the other side of the spoon?

3. Why do you think the spoon does not give you a perfect reflection of yourself?

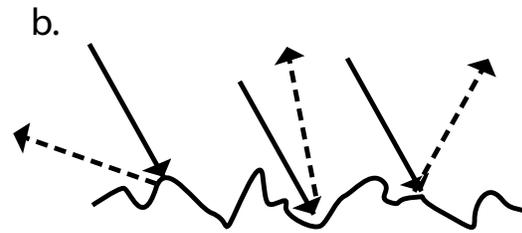
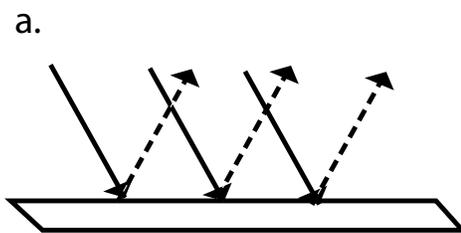
4. Look in the mirror and smile. Can you see your smile in the mirror? _____

5. Look in the crinkled foil and smile. Can you see your smile in the foil? _____



Silly Spoons cont.

6. Circle the picture that shows light bouncing off a crinkled piece of foil.



7. What three things are needed for you to see your reflection? (circle three things)

light

dark

colored surface

smooth surface

shiny surface

bumpy surface