

What Is a Shadow?

BROWARD COUNTY ELEMENTARY SCIENCE BENCHMARK PLAN

Grade 1—Quarter 4

Activity 33

SC.B.1.1.2

The student knows that light can pass through some objects and not others.

SC.H.1.1.1

The student knows that in order to learn, it is important to observe the same things often and compare them.

SC.H.1.1.2

The student knows that when tests are repeated under the same conditions, similar results are usually obtained.

SC.H.1.1.5

The student uses the senses, tools, and instruments to obtain information from his or her surroundings.

SC.H.2.1.1

The student knows that most natural events occur in patterns.

ACTIVITY ASSESSMENT OPPORTUNITIES

The following suggestions are intended to help identify major concepts covered in the activity that may need extra reinforcement. The goal is to provide opportunities to assess student progress without creating the need for a separate, formal assessment session (or activity) for each of the 40 hands-on activities at this grade level.

1. Ask, ***What three things did you need outdoors in order to make your own shadow?*** (I needed the sun, my body to block the sunlight, and the ground for my shadow to fall on.) Then ask, ***What three different things in this room could you use to make a shadow of something?*** (I'd need the classroom lights or a lamp, an object such as a desk or a book, and the wall or floor for the shadow to fall on.)
2. Use the Activity Sheet(s) to assess student understanding of the major concepts in the activity.

In addition to the above assessment suggestions, the questions in bold and tasks that students perform throughout the activity provide opportunities to identify areas that may require additional review before proceeding further with the activity.

What Is a Shadow?

OBJECTIVES

Students explore their own shadows and identify what is needed to produce a shadow.

The students

- ▶ observe and describe a shadow
- ▶ operationally define *shadow*
- ▶ identify the three things needed to produce a shadow

SCHEDULE

About 40 minutes

VOCABULARY

shade
shadow

MATERIALS

For each student

- 1 Activity Sheet 33

For the class

“My Shadow,” by Robert Louis Stevenson
Delta Science Reader, *Sunshine and Shadows*

*provided by the teacher

PREPARATION

- 1 Make a copy of Activity Sheet 33 for each student.
- 2 This activity must be done on a sunny day. (A few fair-weather clouds are not a problem.)
- 3 Select an outdoor area where students will be able to see their shadows.
- 4 You will need a copy of the poem “My Shadow” by Louis Stevenson. The poem is provided on a copymaster following Activity Sheet 33.

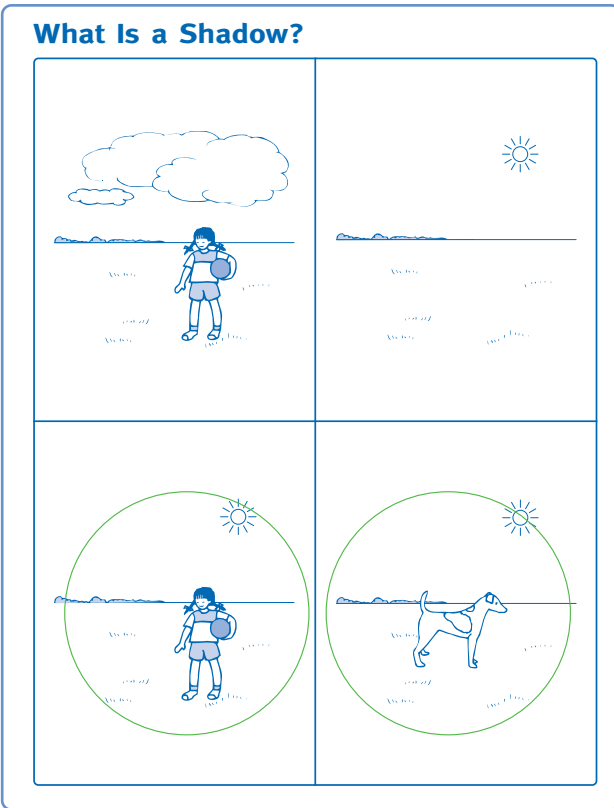
BACKGROUND INFORMATION

A **shadow** is the **shade** cast on a surface by an object that prevents light from reaching the surface by reflecting or absorbing all or part of the light.

Three things are needed to produce a shadow: light, an object, and a surface. If there is no surface for the shadow to be cast upon, there will be no shadow. Thus, if a light is shone upward into the sky, even if there is an object in front of it, no shadow will be formed.

Outdoors, the sun is the source of light for producing shadows during the day. At night, a full moon can cause objects to cast shadows, as will streetlights and other artificial lights. Indoors, artificial lights create shadows.

▼ Activity Sheet 33



My Shadow

by Robert Louis Stevenson

I have a little shadow that goes in and out with me,
And what can be the use of him is more than I can see.
He is very, very like me from the heels up to the head;
And I see him jump before me, when I jump into my bed.

The funniest thing about him is the way he likes to grow—
Not at all like proper children, which is always very slow;
For he sometimes shoots up taller like an india-rubber ball,
And he sometimes goes so little that there's none of him at all.

He hasn't got a notion of how children ought to play,
And can only make a fool of me in every sort of way.
He stays so close behind me, he's a coward you can see;
I'd think shame to stick to nurse as that shadow sticks to me!

One morning, very early, before the Sun was up,
I rose and found the shining dew on every buttercup;
But my lazy little shadow, like an arrant sleepy-head,
Had stayed at home behind me and was fast asleep in bed.

Guiding the Activity

Additional Information

1 Take the students outside on a sunny day. Instruct them to line up with their backs to the sun. Tell students to look at the ground in front of them. Ask, **What do you see?**

If students do not mention the word, tell them that they are seeing their *shadows*. Ask the students to point to their shadows.

Invite volunteers to describe their shadows.

Students may know that they are seeing their shadows.

Students may mention that they are dark and have a shape similar to the shape of their bodies.

2 Ask students, **What happens to your shadow when you move?**

Ask, **Can you get away from your shadow?**

Students should notice that their shadows move when they move.

As long as students remain in the sun, they will not be able to get away from their shadows.

Guiding the Activity

Ask, **Will your shadow wave back if you wave to it?**

Have students wave to their shadows, as shown in Figure 33-1.

Additional Information

Answers will vary.

Students should see their shadows “waving back.”



▲ *Figure 33-1. A shadow mimics a student’s movement.*

3 Instruct students to turn around and face the sun.

Ask students, **What happened to your shadow?**

Ask, **Will your shadow still wave back to you if you wave your hand?**

4 Have students turn back to face their shadows. Ask, **What is the difference between the area on the ground with the shadow and the area without the shadow?**

Ask, **Why is the shadow darker than the area around it?**

Safety Note: Warn students not to look directly at the sun. Doing so can cause severe eye damage.

Students should note that their shadows are now behind them.

Students will discover that their shadows still mirror their movements.

Students will note that the area with the shadow is darker.

Students should suggest that the sunlight is blocked in the area where the shadow is.

Guiding the Activity

Ask, **What blocks the sunlight?**

5 Ask, **How would you explain what a shadow is?**

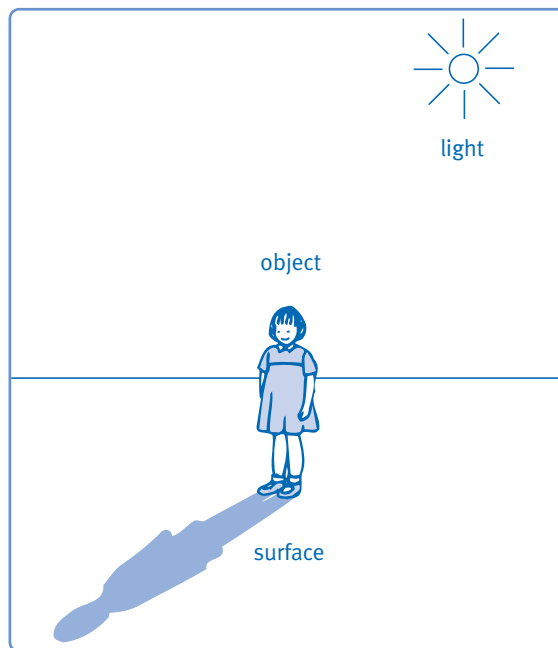
Ask the students, **What three things are needed to produce a shadow?**

Additional Information

Students should say that their bodies block the sunlight.

*Students should be able to say that a **shadow** is a dark shape cast upon a surface by something that blocks the light from that surface.*

Students should mention sunshine (or a light), an object (in this case their bodies), and the ground or other surface where the shadow is seen (see Figure 33-2).



▲ **Figure 33-2.** The three things needed to produce a shadow.

Students should say no.

Students should say that there is no sunshine to make the shadows.

Students may point out shaded areas that are the shadows of trees or buildings.

6 Ask, **On a cloudy day, will you have a shadow?**

Ask, **Why not?**

If the day is partly cloudy, have students wait for a cloud to pass in front of the sun to see that their shadows disappear.

Ask, **Do you see any areas of shade?** Point out that **shade**—like a large shadow—is an area partly darkened because something is blocking off light from it.

Guiding the Activity

- 7 Back in the classroom, write the word *shadow* on the board to help students learn it. Then give each student a copy of **Activity Sheet 33**. Tell students to circle a picture if a shadow of the child or dog can form in that picture.

Review the students' answers with them. Make sure that they understand and remember the three things needed to produce a shadow: sunshine or light, an object to block the light, and a surface for the shadow to fall on.

- 8 Read to the class Robert Louis Stevenson's poem, "My Shadow." Ask students, **How does your shadow compare with the shadow in the poem?**

Answers will vary. Allow students plenty of time to react to the poem. They should note that their shadows also move with them.

- 9 As appropriate, read or review pages 2–3 and 4–7 of the Delta Science Reader *Sunshine and Shadows*.

REINFORCEMENT

Have the students play "Shadow Simon Says." Play a game of Simon Says with commands pertaining to their shadows: Simon says, "Touch your shadow." Simon says, "Have your shadow move its legs." Simon says, "Stand with your shadow behind you."

SCIENCE JOURNALS

Have students place their completed activity sheets in their science journals.

Connections

Science Extension

Show students that the shadows they see in front of them when they are facing away from the sun appear also to be facing away from the sun in the same direction as students. Have students raise their right arms and observe that the shadows appear to be raising their right arms. Also encourage students to stand facing the sun and look over one shoulder to see their shadows. Have them raise their right arms and observe that the shadows appear to be raising their right arms indicating that the orientation of the shadows is the same as that of the students. (If students cannot reliably differentiate between right and left, tie a red ribbon around each student's right wrist and ankle.)

Science and the Arts

Obtain a children's book illustrated with photographs of interesting and unusual shadows. When all students have had an opportunity to browse through the book, take the class on a walk around the school grounds or neighborhood to look for interesting shadows. If possible, provide at least one simple camera so students can photograph their favorite shadows. When the film is developed and printed, let students help you create a classroom display of their photographs.

Science and Language Arts

Try to find additional poems about shadows to read to students. After reading several poems, discuss rhythm and rhyme as two major characteristics of poems. Then ask students to work together with you to compose a short poem of their own about shadows. Write students' suggestions on chart paper as they compose the poem.

Science and Health

Overexposure to the ultraviolet rays in sunlight is directly related to an increased risk of skin cancer. In fact, scientists have found that skin damage from sunburns in childhood and adolescence increases the risk of developing skin cancer in adulthood. For this reason, even very young children should be made aware of the need to protect themselves against skin damage from sunlight. Briefly discuss the dangers of overexposure—not only that it causes painful sunburn but that sunburn permanently damages the skin—and then ask students to suggest ways to protect themselves. Students will probably mention applying suntan lotion when they are at a beach or other exposed place for a long period of time. Emphasize that protective lotion should be worn any time they are outdoors in sunny weather—even just in their yards or neighborhood or at a park or playground.

Science and Careers

As a follow-up to Science and the Arts above, invite a professional photographer or an experienced hobbyist to visit the class and describe his or her work or hobby. Before the visit, help students prepare a list of questions that they would like to ask the visitor, such as how he or she finds interesting things to photograph or how a camera works. Ask the visitor to bring samples of his or her photographs to show the class. Suggest that the visitor take candid pictures of the class and/or help students use a simple camera to take pictures of one another. Add these photographs to the display created in Science and the Arts above.