

SHADOW INTERLUDE

ITV SERIES

READING RAINBOW #109:
My Shadow

GRADES 1-3

PREVIEWING ACTIVITIES

On a sunny day, take the students to an open area on the playground. (PE time or 15 or 20 minutes before recess are good choices.) Choose one student to be “It.” Explain to the students that they will be learning to play a very old game called “Shadow Tag.” The object of the game is for “It” to try to step on someone else’s shadow. If “It” steps on someone’s shadow, that student must freeze. The last student whose shadow is tagged becomes the new “It.”

After the students have played for a few rounds (3 or 4 “Its”), gather the students into a group. Ask the students, “What happened to your shadow when you changed directions?”

Did your shadow get larger or smaller, or did your shadow disappear?” Acknowledge the students’ responses. Explain to them that if they run away from the sun, their shadows will fall in front of them, making their shadow harder to spot and to be tagged. Play the game again for a few more rounds, (another 3 or 4 “Its”).

Return to the classroom. Ask the students, “What did you learn about light and shadows from the game Shadow Tag that we played earlier?” Acknowledge the students’ responses. Ask, “What things do we need in order to have shadows?” Record the students’ responses on either a chart tablet or sentence strips. Guide their responses if needed to list the following key points.

- Shadows need a source of light.
- To make a shadow, something must block the light source.

Ask the students, “What are sources of light? What sources are found in nature? What sources are man-made? What sources do we find outdoors? What source are found indoors?” List these sources under the first key point listed above.

(The students will probably mention the moon. Explain to the students that the moon and the planets reflect light, like a mirror. Light sources like the sun and the stars produce their own light.)

OVERVIEW

In this lesson the students will explore light and shadows. The students should learn that the sun is the primary natural light source and that light travels in a straight path. The students should learn that an object blocking the source of light causes a shadow, and that the size and shape of a shadow depends upon the distance of an object to the light source. The students will construct a simple sundial; they will experiment and observe the movement of shadows. During the post viewing activities, the students will be introduced to and explore the concept of solar and lunar eclipses.



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LEARNING OBJECTIVES

Students should be able to

- Identify the sources of light.
- Define photons.
- Observe that light travels in a straight path.
- Observe that a shadow is formed when the path of light is blocked.
- Observe that the size of a shadow changes when distance from a light source changes.
- Demonstrate understanding of the directions, East, West, North, South.
- Observe that shadows can be used to mark the passage of time.
- Define the term eclipse.
- Demonstrate a solar and lunar eclipse.

FOCUS FOR VIEWING

The focus for viewing gives students a specific responsibility while viewing the video segment to focus and actively engage the students' viewing attention. Focus for viewing provides an introduction to the tape segment by asking a question or assigning a specific task; the students may be asked to listen for specific information or participate in an activity that will make the program's content clearer or more meaningful.

Explain to the students that they are going to view a segment from an episode of READING RAINBOW called "My Shadow." Ask the students to watch and listen for which of their five senses they would use to learn about light and shadows.

VIEWING ACTIVITIES

BEGIN THE VIDEO at the beginning of the video, just after the episode's opening credits. The clip begins with a montage of shadows. LaVar enters as a shadow.

PAUSE THE VIDEO when LaVar says, "So what is it?" Ask the students to list the five senses, writing them on a chart tablet as the students list them. Guide the students' responses as needed. Ask the students, "Which of your five senses did Mr. Burton tell us we used to identify light?" Circle the word sight, x-out the remaining senses. (Use a red pen for this activity.)

REFOCUS the students' attention to the video; tell the students that several other students will tell them some facts about light. Ask the students to listen for 5 facts about light. **RESUME THE VIDEO.**

PAUSE THE VIDEO when LaVar says, "Well there are lots of ways of describing light." Ask the students to list five things that they learned about light. Ask the students, "How fast is the speed of light?" (186,000 miles per second)

REFOCUS the students' attention to the video. Tell the students that in the next segment, they will learn more about light. Ask the students to listen for a special term that is used to describe light. **RESUME THE VIDEO.**

PAUSE THE VIDEO when LaVar says, "And they travel in straight lines." Ask the students to recall the special name for the light particles. (Photons) Explain to the students that scientists called Physicists believe that photons have no mass

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VIEWING ACTIVITIES (continued)

(weight) and move like waves. Light travels through the empty vacuum of space.

Light Bending Activity

Ask the students to take the flashlight, paper tube, and the roll of tape out of their workbasket. Direct them to tape a paper tube to the flashlight. Check that the tube is securely taped to the flashlight, and that no light leaks out around the tube. Ask the students to cut a small circle about the size of a penny in the center of a sheet of dark card stock. Ask the students to take out the mirror.

Darken the room. Direct the students to shine the flashlight on the wall. Ask the students, "What do you see? Is the beam of light straight or curved?" Direct the students to hold the paper in front of the flashlight, but not in front of the hole. Ask the students, "What happened to the beam of light? Why didn't the light beam hit the wall?" (The beam of light hit the paper; the paper stopped the beam of light.) "Why didn't the light just go around the light beam." (The paper blocks the beam of light, the light can not bend around the paper.)

Direct the students to shine the light beam through the hole in the card stock. Call the students' attention to the light beam. Ask the students, "What does this tell you about the way that light travels?" (Light travels in a straight line.) Ask the students, "What would we need in order to bend the light around the paper?" (Something to bend or reflect the light.) Direct the students to block the light with the card stock. Direct the students to experiment angling the mirror between the card stock and the light beam. Ask the students, "What happened to the light beam? Why did the light move?" (The mirror reflected the light to a new direction.) Turn on the room lights.

REFOCUS the students' attention to the video. Tell the students that they will be learning some specific facts about shadows. Ask them to watch carefully, as they will be doing the same experiment that LaVar shows them in the video.

RESUME THE VIDEO.

PAUSE THE VIDEO at the words, "That's where the shadow is made. You see?"

MATERIALS

Previewing and Viewing Activities:

Per class:

- 1 small flash light or pen light
- 1 Lined Chart Tablet or Sentence Strips
- 1 Pocket Chart (if using sentence strips)
- 1 Blue or Black Felt Tipped Marker
- 1 Red Felt Tipped Marker
- Extra C or D cell batteries for the flashlights

Light Bending Activity

Per group:

- 1 flashlight or light source (filmstrip or slide projector)
- 1 empty toilet paper tube
- 1 sheet dark brown or black card stock (pre-cut a "penny-sized" hole in the center for grade 1 students)
- 1 pair pointed scissors
- 1 roll duct tape or 3 inch masking tape
- 1 small hand mirror

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MATERIALS (continued)

Shadow Size Activity

Per group:

- 1 flashlight
- 1 card stock shape (simple geometric shape or seasonal shape, approximately 5 inches by 7 inches up to 9 inches by 9 inches)
- 1 12 inch wooden ruler
- 1 box of Crayola "Classic" Markers
- 1 sheet, blank chart tablet/ butcher paper (butcher paper, approximately 24 inches by 24 inches, mounted on the wall, at each groups work station)

Sundial Activity

Teacher:

- playground ball

Per group:

- 1 lump of clay
- 1 unsharpened pencil
- 1 sheet, blank chart tablet or butcher paper, (approximately 24 inches by 24 inches.)

VIEWING ACTIVITIES (continued)

Shadow Size Activity

Direct the students to take out the card stock shape, the ruler, the tape, and the markers. Direct the students to tape the card stock cut-out to the ruler.

Darken the room. Ask the students to turn on their flashlight. Direct the students to put the cutout approximately 12 inches from the light beam. Ask them to trace the cutout shadow on the piece of paper taped to the wall. Direct them to move the cutout approximately 18 inches from the light source. Direct them to trace the shadow again, using another color. Direct the students to move the cutout approximately 24 inches from the light source. Direct the students to trace the shadow, using a third color. Ask the students to move the cut-out approximately 36 inches from the light source, direct them to trace the shadow again, using another color.

Turn on the room lights. Ask the students, "What happened to the cut-out's shadow each time that you moved it farther from the light source?" (The shadow became smaller.)

REFOCUS the students' attention to the video. Tell the students to watch carefully. Explain to the students that they will be learning about a very old way of telling time. **RESUME THE VIDEO.**

PAUSE THE VIDEO as LaVar says, "There are shadows everywhere in your life, if you know where to look." **STOP THE VIDEO.**

POST VIEWING ACTIVITIES

The Sundial

Direct the students to take the lump of clay and the pencil out of their workbasket. Demonstrate for the students how to push the pencil into the clay so that the pencil will stand upright. Ask the students to place this model at the center point of the pre-folded and marked 24-inch by 24-inch paper. (Teachers, pre-fold the paper into quarters. Mark the fold lines east, west, north and south. From the south center point divide the quarters between east and west into 4 equal sections, (see illustration.) Explain to the students that the flashlight is going to represent the sun. Explain that although the sun does

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POST VIEWING ACTIVITIES (continued)

not move, it appears to move by rising in the east and setting in the west each day. Explain to the students that the earth is moving. Demonstrate to the students how the earth rotates daily using a playground ball. Tell the students that they have built a very simple sundial. A sundial is the oldest known tool used for measuring time, the rotation of the earth.

Darken the room. Direct the students to place the flashlight on the table, so that the beam of light shines down the east-west line. Ask the students where the shadow of the pencil falls? (The shadow falls down the west line.) Direct the students to trace where the shadow falls on the paper. Direct the students to move the light beam over one point on the paper, tracing where the shadow falls. (The flashlight must be kept on the table and moved clock-wise. The shadows will be moving from west to east, while the light beam will be moving from east to west.) Ask the students to continue, until they have traced all points ending at the west line.

When the students have completed marking each shadow point, turn on the classroom lights. Direct the students to observe the shadow points that they traced. Ask the students, "What happened to the shadows as the light beam moved from point to point?" (The shadows moved from point to point in relationship to the light source.) Tell the students that as the earth rotates, the shadows move, marking the passage of time.

The Eclipse

Explain to the students, that night is the earth's shadow. An eclipse happens when either the earth or the moon obscures (blocks) the other. Ask the students to close one eye. Tell the students to hold out a finger at arm's length and look at it. Direct the students to slowly move a finger from their other hand in front of their open eye. Ask the students what happened when the nearer finger blocked out the farther finger. (They could only see the nearer finger.) Tell the students that this is what happens during a full eclipse.

Explain to the students that a solar eclipse happens when the moon passes directly between the earth and the sun and the sun is temporarily hidden from view. A lunar eclipse happens when the earth passes between the moon and the sun.

MATERIALS (continued)

The Eclipse Activity

Per group:

- 1 6 to 8 inch playground ball
- 1 6-inch tag board circle, or small paper plate
- 1 12 inch wooden ruler
- 1 roll, duct or 3 inch masking tape

(For this lesson, it is important that the classroom be darkened as dark as possible. Windows, doors and other areas that admit light need to be covered. Cover windows with black paper, black plastic, or the padded roll foil used to insulate water heaters (available from the local hardware or building supply. The TV screen will also need to be covered during the activities, or the TV will need to be turned off. The penlight is for the teacher's use to safely move from group to group and to find the light switch. It would be helpful for students in the first and second grades to have a parent volunteer, a classroom aide, or an upper grade helper to assist each cooperative learning group in this lesson. The teacher may wish to prepare all cutouts and constructions in advance for grade 1 students.)



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ACTION PLAN

Invite a photographer to the classroom. Ask how shadow and light play an important role in photography. With the photographer's assistance, build pinhole cameras. Experiment with black and white photography.

View the final segment of *READING RAINBOW #109 "My Shadow"*, featuring an interview with Andrea Davis, a professional photographer. After watching the segment, give the students cameras loaded with black and white film. Take the students outside. Have teams of two or three students work together to take photographs of light and shadows. Develop the film. Examine the photos for the contrast of shadow and light. (Inexpensive, simple cameras can be found at thrift and second hand shops.)

Visit an art gallery or invite a local artist into the classroom. Look at examples of light and shadow in the artwork of the artist and famous paintings. Experiment with adding light and shadow effects in paintings and drawings.

Visit a local hands-on-science center/museum. Explore the exhibits dealing with shadow and light. Prepare a program for another classroom/grade or for a parent program.

POST VIEWING ACTIVITIES (continued)

Direct the students to tape the tag board circle "moon" to the ruler. Ask one student in each group to hold the light source "the sun," another to hold the ball "the earth", and a third to hold the "moon." Darken the room.

Direct the student holding the "moon" to slowly move it between the "sun" and the "earth." Ask the students, "What happened when the moon passed between the sun and the earth?" (A solar eclipse occurred.) "Did the moon block all the light of the sun?" (No, a ring of light was visible around the moon.)

Direct the students to shine the "sun" on the "moon." Pass the "earth" between the "sun" and the "moon." Ask the students, "What happened to the moon?" (The earth blocked the light of sun.)

EXTENSIONS

Technology: Search the World Wide Web for information on the next total solar Eclipse. (*Teachers, watch the sites on this topic, many references to the occult appear under the words, light and shadow, and eclipse.*)

Language Arts: Provide a collection of fiction and non-fiction literature.

View the feature book from the *READING RAINBOW 109: "My Shadow"* by Robert Louis Stevenson.

Additional suggestions:

"Bear Shadow" by Frank Asch

"Shadow and Reflections" by Tana Hoban

"I Have a Friend" by Keiko Narahashi

"Shadowgraphs Anyone Can Make" by Phila H. Webb and Jane Corby

Art: Construct a Shadow Box Theater. See pages 20-21 from "Projects with Color and Light" by John Williams (Simple Science Projects with Color and Light)

Draw Silhouettes of the students. Cut from a good grade art paper, mounted and framed, silhouettes make wonderful holiday gifts for parents.

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EXTENSIONS (continued)

Library Skills: Learn about the Legend of Groundhog Day. Research other folk tales/legends that deal with light and shadow.

Play "What Is It." Invite the students to bring interesting objects from home. Place a three-sided screen around the overhead projector. Invite the students to place their object on the projector. Guess what makes the shadow.

ACTION PLAN (continued)

View the segment of *READING RAINBOW 109: "My Shadow,"* which follows the reading of the feature book. Sonny Fontana, a master puppeteer, demonstrates shadowgraphs. Invite a member from the local Puppeteers of America Guild to visit the classroom. Learn about shadow puppets and shadowgraphs. Write, construct, and produce a play using either shadow puppets or shadowgraphs for another classroom or for parents.

VIDEO AVAILABLE FROM:

Can be taped off-air. Consult your local PBS station for broadcast schedule.

This tape is available on loan from the Idaho State Video Library.

This tape may be purchased from:
GPN
PO Box 80669
Lincoln, NE 68501-0669
Fax: (402) 472-4076
Phone: 800-228-4630

Lesson plan developed by Master Teacher Penny Jean Morrison, Bliss School, Bliss, Idaho.



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Illustration, The Sun Dial

24 x 24 inches

