

The Shadow Knows

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Grade Level: Kindergarten-1

Time Allotment: 50 minutes

Overview: From video, streaming video, web sites and hands on experience, students will develop an understanding that shadows occur when light is blocked, that shadows occur naturally when sunlight is blocked and that shadows can be produced when artificial light sources are blocked.

Subject Matter: Science

Learning Objectives:

The students will be able to:

- Recognize a shadow.
- Understand that shadows occur when light is blocked.
- That shadows occur naturally.
- That shadows can be created when artificial light sources are blocked.

Standards:

This lesson addresses the Standards of Learning for the state of Virginia. These SOLs can be found at

<http://www.pen.k12.va.us/VDOE/Superintendent/Sols/sciencek.doc>

<http://www.pen.k12.va.us/VDOE/Superintendent/Sols/science1.doc>

- K.2 Students will investigate and understand that humans have senses that allow one to seek, find, take in, and react or respond to information in order to learn about one's surroundings. Key concepts include
- a) five senses and corresponding sensing organs (taste–tongue, touch–skin, smell–nose, hearing–ears, and sight–eyes)
- K.7 The student will investigate and understand that shadows occur when light is blocked by an object. Key concepts include
- a) shadows occur in nature when sunlight is blocked by an object; and
 - b) shadows can be produced by blocking artificial light sources.
- 1.6 The student will investigate and understand the basic relationships between the sun and the Earth. Key concepts include
- a) the sun is the source of heat and light that warms the land, air, and water; and
 - b) night and day are caused by the rotation of the Earth.

Media Components:

Video:

- *Science is Elementary*, #104, “Let’s Explore Light and Shadow” (available from BRPTV)

Streaming Videos:

- *Science Fact and Fun: What’s in a Shadow*
- *Stage One: Science: Lights and Color*

These are United Streaming Videos which can be found at www.unitedstreaming.com

Web Sites:

- “The Science of Light”, <http://www.learner.org/teacherslab/science/light/color/shadows/index.html>, can be used to show how a shadow is created and how it changes.

Materials:

For the Learning Activity the teacher will need:

- Flashlight
- Globe

For the Culminating Activity each student will need:

- Chalk

Preparations for Teacher:

- Preview and cue the video and streaming video as indicated in the Introductory and Learning Activities section. (The teacher will need to download the 2 streaming videos into a folder on the desktop of a computer or burn them on a disk. By hooking up an LCD projector or other presentation device the teacher may show this clip in full screen on a television or on a pull-down screen or may use a Smart Board.)
- The teacher should have all websites book marked for easier use.

When using video segments, websites, or other multimedia elements, always provide students with a **FOCUS FOR MEDIA INTERACTION**. This is a specific task to complete and/or identify information during or after the viewing of the intended multimedia.

Introductory Activity:

The following activity will prepare your students for a lesson on Shadows.

1. Provide students with a **Focus for Media Interaction** by saying, “Class, I would like for you to watch the following video which has a special type of puppet show in it. I would like for you to tell me why this puppet show is special.” Play United Streaming video, *Stage One: Science: Lights and Color* from time index 00:24 to 1:15.

2. **Ask**, “What was special about the puppet show? Was it different than puppet shows that you’ve seen before?” Accept answers. **Say**, “The puppet show was different because it was done with shadows. We are now going to learn how to recognize a shadow and how shadows are made.”

Learning Activities:

1. Provide students with a **Focus for Media Interaction** by saying, “Class, I would like for you to watch and listen to the following video clip so that we can learn what causes a shadow. Do any of you know what causes a shadow?” Let the class make guesses then say, “Let’s watch and find out.” Have the video, *Science is Elementary, #104, “Let’s Explore Light and Shadow”*, Fast **Forward** until you see a wire trash can. **Start** the video at this point. **Pause** when you see a cartoon fire hydrant. **Ask**, “Class, look at this picture. What object do you think makes this shadow?” Wait for answers. (Ans.: fire hydrant) **Say** “I would like for you to watch and listen for what makes a shadow.” **Resume** video. **Pause** when you see grass and a tree. **Ask**, “What causes a shadow?” (Ans.: When something blocks the light it causes a shadow.)

2. **Say**, “I would now like for you to pay close attention to what is causing the little girl to make a shadow.” **Fast Forward** until you see a little girl making a shadow of a dog using her hands. **Pause** after the teacher explains what makes a shadow. **Ask**, “What is causing the shadow?” (Ans.: Light, and someone in front of the light.)

3. **Ask**, “Do you think that shadows can grow and shrink?” Wait for student response. **Say**, “Class, we are now going to watch and learn if shadows can grow. **Start** from where you last paused the tape. **Pause** after the little girl says “When you get closer to the light it gets bigger. When you go away it gets smaller.” **Ask**, “Can shadows grow and shrink? Why do they grow and shrink?” (Ans.: Yes. Shadows grow when you are close to a light source. Shadows shrink the further away you are from a light source.)

4. **Ask**, “Do you think shadows can move?” Wait for responses. **Say**, “Let’s watch and listen to see if shadows can move.” **Continue** video from where you last paused. **Pause** at the little girl explaining why shadows move. **Ask**, “Did the shadow move? How and why did the shadows move?” (Ans.: Yes, the shadows moved when the object in front of the light moved and they also moved when the light source moved.)

5. Go to United Streaming video, *Science Fun and Facts: What’s in a Shadow?* Have your starting place set at time index 6:28. **Say**, “Class we are now going to watch some clips from another video that will show us why we have day and night and how the sun makes shadows. Right now I would like for you to watch how the sun causes daytime and nighttime.” Turn the volume down to zero on your computer speakers and **Start**

streaming video at time index 6:28 when you see the sun and the earth. **Pause** at time index 6:48 when you see students gathered around a globe. **Ask**, “What did you see in the video clip?” (Ans.: We saw the earth spin with the sun shining on it.) **Ask**, “How do you think that the earth spinning causes day and night?” (Ans.: The sun only shines on one side while the earth is spinning.) **Say**, “With the earth spinning we only get light on one side of the world. It takes 24 hours for the earth to spin all the way around and that is what causes day and night.”

6. This activity will demonstrate the earth’s rotation using a globe and a flash light so that the class can see one side of the earth under light and the other under darkness. **Say**, “Let’s try an experiment. Let’s take a globe and flash light and see if we can do the same thing in the classroom that the sun and earth did in the video. Do you think that we will get the same result as the sun and earth did with our globe and flash light? Let’s make some predictions and graph what we think will happen.” Go around the room asking the children if they think that the model will work the same as it really does in nature. Ask the children to explain their answers. Turn off the lights and position the flash light to one side of the globe. Slowly spin the globe and let children make observations about the globe. Then have the children tell you which group was right.

7. **Say**, “We have seen that the earth’s spinning causes night and day. I would now like for you to watch and see if our shadow moves during the day. I would like for you to watch the following clip and see what happens. I would also like for you to tell me why it happened.” Continue with sound off. **Start** streaming video at time index 7:57 when you see a model of the earth with two people on it and the sun. **Pause** at time index 8:20 when you see sun has passed to the left side of the screen. **Say**, “Do shadows move? Why do shadows move?” (Ans.: Yes, our shadows moved because the position of the sun moved.) Remind the students that, yes the sun did appear to move but, it was really the earth spinning and not the sun moving. If the children have difficulty remembering that shadows can move, then go back to Step 4 and repeat that video segment. Repeat step 7 and orally collect answers from the class.

8. **Say**, “Class we have now seen what causes shadows, that shadows are caused by lights and by the sun, why we have day and night and that shadows can move. Let’s now try some experiments that will help us have a better understanding of shadows”.

Culminating Activity:

On large screen monitor, LCD projector or a Smartboard, use the Internet site: <http://www.learner.org/teacherslab/science/light/color/shadows/index.html>. Show the class how a shadow moves by the changing of the light source and by the movement of the blocking object. Provide the students with a focus for Media Interaction by saying “We are going to divide our class into pairs and go outside and see if we can track the movement of our shadows.” The teacher will take the class outside and have the pairs take turns tracing each others feet and marking with a straight line from the feet to where the shadow lies. Repeat this process every hour for the remainder of the day. It is best to

start this activity early in the morning for the students to see the movement of their shadows.

Cross-Curricular Extensions

Language Arts:

Read and discuss the following books about shadows:

What Makes a Shadow by Clyde Robert Bulla and illustrated by June Otani. Harper Collins Publisher 1994.

What Makes Day and Night by Franklin M. Bradley and illustrated by Arthur Dorros. Harper Collins Publisher 1986.

Shadows are About by Ann Whitford Hall and illustrated by Mark Graham. SRA/McGraw Hill 1992.

Sun up, Sun down by Gail Gibbons. Voyager Book/Harcourt Brace 1983.

My Shadow by Susan Winter. Doubleday Publishing 1992.

Footprints and Shadows by Anne Wescott Dodd and illustrated by Henri Sorensen. SRA/McGraw Hill 1992.

Math:

Using 3D shapes the children shall make predictions on what the shadows will look like. This will involve the angle at which the light source is cast on the shape and how that will affect the shadow.

Art: The students will make silhouettes of each other.

Technology: Digital Scavenger Hunt: Using Digital Cameras, the students will go around the school taking pictures of shadows and how they are made. The pictures will then be placed in a slide show using a presentation program with explanations of the source of the shadows and how the shadows were made.

Community Connections:

Invite an astronomer from a local college or astronomy group to come into the classroom and teach how shadows affect our world.