

The following instructional plan is part of a GaDOE collection of Unit Frameworks, Performance Tasks, examples of Student Work, and Teacher Commentary. Many more GaDOE approved instructional plans are available by using the Search Standards feature located on [GeorgiaStandards.Org](http://GeorgiaStandards.Org).

**Unit Six Organizer:**  
**4 weeks**  
**Light and Shadows**  
**First Grade**

**OVERVIEW:** In this unit students will recognize sources of light, including the Sun. They will explain how shadows are formed and how shadows differ. As students explore a variety of light sources, discovery learning will help them form enduring understandings about the importance of light in everyday life.

**STANDARDS ADDRESSED IN THIS UNIT**

**Focus Standards:**

**S1P1. Students will investigate light and sound.**

- a. Recognize sources of light.
- b. Explain how shadows are formed.

**STANDARDS ADDRESSED IN THIS UNIT**

**Supporting Standards:**

**S1CS1. Students will be aware of the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.**

- a. Raise questions about the world around them and be willing to seek answers to some of the questions by making careful observations and measurements and trying to figure things out.

**S1CS2. Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations.**

- a. Use whole numbers in ordering, counting, identifying, measuring, and describing things and experiences.

**S1CS3. Students will use tools and instruments for observing, measuring, and manipulating objects in scientific activities.**

- a. Use ordinary hand tools and instruments to construct, measure, and look at objects.
- b. Make something that can actually be used to perform a task, using paper, cardboard, wood, plastic, metal, or existing objects.
- c. Identify and practice accepted safety procedures in manipulating science materials and equipment.

**S1CS5. Students will communicate scientific ideas and activities clearly.**

- a. Describe and compare things in terms of number, shape, texture, size, weight, color, and motion.
- b. Draw pictures (grade level appropriate) that correctly portray features of the thing being described.
- c. Use simple pictographs and bar graphs to communicate data.

**ELA1W1. The student begins to demonstrate competency in the writing process. The student**

- a. Writes texts of a length appropriate to address a topic and tell a story.
- b. Describes an experience in writing.
- c. Rereads writing to self and others, revises to add details, and edits to make corrections.
- d. Prints with appropriate spacing between words and sentences.
- e. Writes in complete sentences with correct subject-verb agreement.
- f. Uses nouns (singular and plural) correctly.
- g. Begins to use personal pronouns (e.g., I, me, we, us) in place of nouns.
- h. Uses singular possessive pronouns.
- i. Begins to write different types of sentences (e.g., simple/compound and declarative/interrogative).
- j. Begins to use common rules of spelling.
- k. Begins to use a variety of resources (picture dictionaries, the Internet, books) and strategies to gather information to write about a topic.
- l. Uses appropriate end punctuation (period and question mark) and correct capitalization of initial words and common proper nouns (e.g., personal names, months).
- m. Uses commas in a series of items.

**M1M1. Students will compare and/or order the length, weight, or capacity of two or more objects by using direct comparison or a nonstandard unit.**

- a. Directly compare and/or order the length, weight, and capacity of concrete objects.

**SS1H2. The student will read or listen to American folktales and explain how they characterize our national heritage. The study will include John Henry, Johnny Appleseed, Davy Crockett, Paul Bunyan, and Annie Oakley.**

<b>ENDURING UNDERSTANDINGS</b>	
<ul style="list-style-type: none"> <li>• Light has natural and artificial sources</li> <li>• Sun produces light during the day</li> <li>• Be familiar with different sources of light at night.</li> <li>• Shadows are produced when a light source is blocked</li> <li>• The importance of light to student’s life</li> </ul>	
<b>ESSENTIAL QUESTIONS:</b>	
<ul style="list-style-type: none"> <li>• How do we get light?</li> <li>• How are shadows made?</li> <li>• How does light impact your life?</li> <li>• How does the lack of light impact your life?</li> <li>• Why are the Sun, fire, and light bulb sources of light?</li> <li>• How do weather conditions affect shadows?</li> </ul>	
<b>MISCONCEPTIONS</b>	<b>PROPER CONCEPTIONS</b>
<ul style="list-style-type: none"> <li>• Shadows vanish on a cloudy day because the Sun is not bright enough.</li> <li>• The Sun is not out on a cloudy day.</li> </ul>	<ul style="list-style-type: none"> <li>• On a cloudy day, the shadows of the clouds cover the local area of the Earth.</li> <li>• The Sun, or an addition light source, is needed to produce a shadow.</li> </ul>

CONCEPTS:	KNOW AND DO	LANGUAGE	EVIDENCE OF LEARNING
There are different sources of Light	Students will identify sources of light that they interact with daily.	Source, light, Sun, fire, light bulb, candle.	<p>Students will illustrate different light sources in a science journal with pictures from magazines or sketches. Each page will contain similar light sources and illustrate how the source applies to the student's daily life. The student will label if the light source is artificial or natural.</p> <p>Have kids take pictures of sources of light and tell where they found those to develop ideas of symbols</p>
Shadows	Students will observe shadows and determine shadows are produced by a light source and another object, which blocks the light.	Shadow, sunny, cloudy, block, position, Sun, light	<p>Classmate draw shadow of another classmate with the Sun as a light source with sidewalk chalk</p> <p>Story telling with shadow puppet</p> <p>Using the poem by Robert Louis Stevenson, have the students write the adjectives used to describe shadow</p>

**GRASPS**  
**(4 – 7 days)**

**Culminating Activity:** GRASPS activity – Modeling shadows in your neighborhood.

**Goal:** To demonstrate understanding of how shadows are formed, how the shape of shadows depend on the object, and in what direction the shadow falls.

**Role:** Engineer, recorder, artist

**Audience:** First Grade Classmates

**Scenario:** Students have done a variety of tasks that involved shadows and different sources of light. Divide students into groups of 3-4. Each group will make either a 1-D or 3-D model of the neighborhood around the school. The students are to build a map (1-D) or model (3-D) of the school grounds, including the main building, some trees, street signs, plus other features that may be specific to your school. The map/model should show clearly which direction is north, either with an arrow on a map or by orienting a three-dimensional model correctly with respect to the actual directions. The Map/model should also include the position of the Sun. The teacher may wish to provide a flashlight so that students may mimic sunlight as a demonstration with their 3-D models.

**Product:** Map or Model

**Standard:** Rubric for map/model

**Materials needed:** Glue, cardboard, model buildings, model trees, markers, poster board for 1-D maps, foam balls for the Sun, optional - flashlight

## TEACHER RESOURCES

### Internet Resources:

NASA: What changes a shadow's size?

[http://ksnn.larc.nasa.gov/k2/videos/s\\_shadow\\_H.html](http://ksnn.larc.nasa.gov/k2/videos/s_shadow_H.html)

The Science of Light

<http://www.learner.org/teacherslab/science/light/>

Night Light Activity (click on NIGHT LIGHTS)[http://www.proteacher.com/cgi-](http://www.proteacher.com/cgi-bin/outside.cgi?id=450&external=http://www.eduplace.com/rdg/gen_act/night/light.html&original=http://www.proteacher.com/110017.shtml&title=Night%20Lights)

[bin/outside.cgi?id=450&external=http://www.eduplace.com/rdg/gen\\_act/night/light.html&original=http://www.proteacher.com/110017.shtml&title=Night%20Lights](http://www.proteacher.com/cgi-bin/outside.cgi?id=450&external=http://www.eduplace.com/rdg/gen_act/night/light.html&original=http://www.proteacher.com/110017.shtml&title=Night%20Lights)

<http://www.proteacher.com/110017.shtml>

Shadows activity (Click on SHADOW PLAY)[http://www.proteacher.com/cgi-](http://www.proteacher.com/cgi-bin/outside.cgi?id=14045&external=http://www.as.utexas.edu/mcdonald/scope/poster/shadow.pdf&original=http://www.proteacher.com/110017.shtml&title=Shadow%20Play)

[bin/outside.cgi?id=14045&external=http://www.as.utexas.edu/mcdonald/scope/poster/shadow.pdf&original=http://www.proteacher.com/110017.shtml&title=Shadow%20Play](http://www.proteacher.com/cgi-bin/outside.cgi?id=14045&external=http://www.as.utexas.edu/mcdonald/scope/poster/shadow.pdf&original=http://www.proteacher.com/110017.shtml&title=Shadow%20Play)

<http://www.proteacher.com/110017.shtml>

[http://www.carearts.org/lessons/investigating\\_light\\_color.html](http://www.carearts.org/lessons/investigating_light_color.html)

[www.bbc.co.uk/schools/scienceclips/ages/7\\_8/light\\_shadows.shtml](http://www.bbc.co.uk/schools/scienceclips/ages/7_8/light_shadows.shtml)

[www.exploratorium.edu/snacks/iconlight.html](http://www.exploratorium.edu/snacks/iconlight.html)

[http://www.proteacher.com/cgi-](http://www.proteacher.com/cgi-bin/outside.cgi?id=14045&external=http://www.as.utexas.edu/mcdonald/scope/poster/shadow.pdf&original=http://www.proteacher.com/110017.shtml&title=Shadow%20Play)

[bin/outside.cgi?id=14045&external=http://www.as.utexas.edu/mcdonald/scope/poster/shadow.pdf&original=http://www.proteacher.com/110017.shtml&title=Shadow%20Play](http://www.proteacher.com/cgi-bin/outside.cgi?id=14045&external=http://www.as.utexas.edu/mcdonald/scope/poster/shadow.pdf&original=http://www.proteacher.com/110017.shtml&title=Shadow%20Play)

**United Streaming Videos**

Blue Dragon: Shadow Play. Channel 4. 2004, www.unitedstreaming.com

Peep and the Big Wide World: Quack and the Very Big Rock/Shadow Play - Anywhere Science Activity: Shadow Puppets. WGBH. 2005. www.unitedstreaming.com

Science Facts and Fun: What's In A Shadow?. United Learning. 1995. www.unitedstreaming.com

**Suggested Literature:**

Ashe, Frank. Bear Shadow. New York: Scholastic, 1992

Bulla, Clyde Robert. What makes a shadow?

Challoner, Jack. Light and Dark, Steck-Vaughn Company, 1997

Kincaid, Doug and Peter Coles. Light and Dark, Rourke Publications, 1984

Nankivell-Aston, Sally and Dorothy Jackson. Science Experiments with Light, Franklin Watts - Grolier Publishing, 1999

Stevenson, Robert Louis. "My Shadow" (poem)

← GENERAL TIMELINE →						
Intro / Pre Assess	Measuring shadow	Source of light	Shadows	GRASPS Development	Post Assess	Reteach or Extend
1 Lesson	1 Lesson (see "How the shadows Change" lesson below)	1.5 week	1.5 week	1 week	1 Lesson	2-4 Lessons

## TASKS

The following collection of tasks represents the level of depth, rigor and complexity expected of all students to demonstrate evidence of learning.

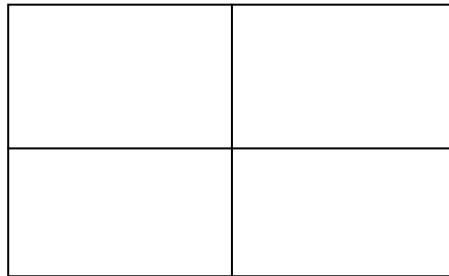
Lessons may take more than one day to complete. Time frames are suggested and depend on your class.

### Lesson: (1 day)

### Lights Lights Everywhere

#### Description:

Materials needed: Four-corner Placemats (laminated paper divided into four sections as shown – students can write on the placemat with erasable markers or white-board markers), markers



Concept: There are different sources of light. Questions: What are sources of light?

Have students work in groups of four. Each student will have one corner of the placemat. Have the student write their name on the corner and write as many sources of light as they can recall.

#### Assessment:

Collect the placemats and keep to compare to a lesson later where the students will do the same activity.

#### Suggestions/Resources:

The teacher may want to start building a vocabulary list on the board of somewhere that will include key words the students introduce or may miss. Refer to the vocabulary list above.

<b>Lesson: (2-3 day)</b>	<b>Where oh where do the lights come from?</b>
<b>Description:</b>	<p>Materials needed: The Placemats from the first lesson, markers, poster size paper to place on the walls around the room, old magazines.</p> <p>Concept: There are different sources of light, Questions: What are the sources of light? What do the sources have in common?</p> <p>On the front board, list the different lights that students wrote on the placements. Have students work in groups. The goal of this lesson is to have students sort the light sources according to their characteristics. Groupings could be: natural/artificial, white/red/blue, etc. The students should have the freedom at the moment to choose how they are going to group the light sources. Later they will focus on natural versus artificial.</p> <p>Students will then create a column organizer demonstrating their groupings. The column organizer should include at least two main groups (columns) with ten examples under each. The group should be able to explain why they have chosen their groupings. The organizer may use words or pictures from the internet or magazines.</p> <p><b>Assessment:</b> Column Organizer rubric (see attachment for a sample)</p> <p><b>Suggestions/Resources:</b> Encourage the students to think about multiple ways that light can be characterized into groups.</p>

<b>Lesson: (2-3 day)</b>	<b>Sun, fire, and light bulbs</b>
<b>Description:</b>	<p>Materials needed: Different lamps or light bulbs, old magazines, construction or color paper.</p> <p>Concept: There are natural and artificial sources. Sun produces light during the day</p> <p>Questions: What are the sources of light? What do the sources have in common? What impact do lights have on my life? What are sources of light in your house?</p> <p>In the previous lesson, students grouped light sources according to different characteristics. During this lesson, the students will focus on natural versus artificial light sources.</p>

Discuss the light sources that are in the classroom. Then discuss light sources that exist in the school. Have the students collect pictures of light sources around town as an out of class assignment. The students will then take these images (either taken with a camera or cut from a magazine, if a similar source can be found there) and produce a "Light Source" book. Each page should be devoted to one light source. That page should include the image, the location of the light source, and whether it is natural or artificial. There should be a minimum of ten pages to the book. Students may make sketches if pictures cannot be found. The sketch should represent the color of the light source.

**Assessment:**

Formal Assessment: Light Source Book

**Suggestions/Resources:**

Think about "alternative" or secondary sources of light such as a computer screen or television.

**Lesson: (3 - 4 days)**

**My Shadow**

**Description:**

Materials needed: KWL Chart, Long sheets of paper (rolled paper used for tables will work well), lamp with 100 W or greater bulb, markers

Concept: Formation of Shadows, Shadows are produced when a light source is blocked

Questions: How are shadows formed?

Begin class by asking students what they know about shadows. List these statements on the "What we Know" section of a "Shadows" KWL chart. Some points may include (note some may be correct and some may be incorrect):

Shadows are dark.

Shadows are cool.

The Sun creates shadows.

Shadows only happen outside. (wrong)

We all make shadows.

If there is sunshine, there will be shadows.

Without the Sun, we would not have shadows.

If the Sun is shining behind us, we will see our shadows in front of us.

Materials needed: KWL Chart, Long sheets of paper (rolled paper used for tables will work well), lamp with 100 W or greater bulb, markers

Concept: Formation of Shadows, Shadows are produced when a light source is blocked

Questions: How are shadows formed?

Begin class by asking students what they know about shadows. List these statements on the "What we Know" section of a "Shadows" KWL chart. Some points may include (note some may be correct and some may be incorrect):

Shadows are dark.

Shadows are cool.

The Sun creates shadows.

Shadows only happen outside. (wrong)

We all make shadows.

If there is sunshine, there will be shadows.

Without the Sun, we would not have shadows.

If the Sun is shining behind us, we will see our shadows in front of us.

Shadows happen when an object (or a person) gets between the Sun and the surface of the Earth.

Ask students if they have any questions about shadows. List 3-4 of them on the "What we Want to Know" section of the KWL chart.

Choose a student to stand by a lamp. Turn on a lamp (with shade removed), turn off the room lights.

Have students to observe the student's shadow being cast in the classroom. Ask them where the light source is and where the shadow is cast.

Demonstrate how to trace the shadow by following the outline of the student's shadow with your finger.

Explain that each student will use a marker to trace the outline of his or her partner's shadow on the long sheets of paper. After students have drawn on their work sheets they can add more detail with crayons such as hair and clothes. Have the students draw the sun and the person in the sketch as well such that the students can realize the direction of the shadow and the position of the light source. Remind students that the shadows are not colorful.

<b>Assessment:</b>	On the KWL, have students list “What we have learned” on the KWL chart. Using paper and other objects, have students create a play by making shadow puppets and perform them for the class. Assess the play using a rubric.
<b>Suggestions/Resources:</b>	Peep and the Big Wide World: Quack and the Very Big Rock/Shadow Play - Anywhere Science Activity: Shadow Puppets. WGBH. 2005. <a href="http://www.unitedstreaming.com">www.unitedstreaming.com</a>

<b>Lesson: (2 – 3 days)</b>	<b>The Sun Walk</b>
<b>Description:</b>	<p>Materials needed: A sunny day, sidewalk chalk</p> <p>Concept: Formation of shadows, Sun produces light during the day Shadows are produced when a light source is blocked</p> <p>Questions: How are shadows formed? How do shadows differ?</p> <p>Review what they observed while they were making shadows in the classroom. Ask them what they think would happen when they go outside.</p> <p>Have the students stand outside facing the Sun, but remind them to not look directly at the Sun. Have the students discuss what they feel. Then have them look around their feet. Ask them what they see. They should say they see their shadow. Ask them how the shadow is formed. Here the teacher should compare the sun and the light bulb, explaining both are light sources, but the Sun is natural and the light bulb is artificial.</p> <p>Then have them find different size shadows. What makes the largest shadow? The smallest shadow? The thinnest shadow? The widest shadow?</p> <p>Ask the students: How can you make your shadow larger? Smaller? Wider? Thinner? Have them demonstrate what they would do.</p>
<b>Assessment:</b>	Formal Assessment: Using a worksheet similar to the one found at <a href="http://www.eyeonthesky.org/activities_pdf/04sun_shadows-ws.pdf">http://www.eyeonthesky.org/activities_pdf/04sun_shadows-ws.pdf</a> , have students sketch their shadow and include the Sun and themselves.

	Formal Assessment: Score the student on a scale of 0 – 4 where 0 = could not make their shadow larger, smaller, wider or thinner, 1 = could do one change of the shadow, 2 = could do two changes to the shadow, 3 = could do three changes to the shadow, and 4 = could do all changes to the shadow.
<b>Suggestions/Resources:</b>	Science Facts and Fun: What's In A Shadow?. United Learning. 1995. <a href="http://www.unitedstreaming.com">www.unitedstreaming.com</a>

<b>Lesson: (2 – 3 days – but done all year)</b>	<b>How the Shadows Change</b>
<b>Description:</b>	<p>The students should have been collecting the measurements of the shadow of one object throughout the year. However, if they have not, have the students start as soon as possible and continue through the end of the year.</p> <p>Materials needed: Sunny Days, a “permanent” object such as a flag pole, street sign or structure in the playground where the shadows and sunlight will not be blocked by another building or tree</p> <p>Concept: Formation of shadows          Sun produces light during the day          The position of the light source will affect the shadow.</p> <p>Questions: What weather conditions make the best shadows?          What weather conditions make the least shadows in pictures?          How are shadows formed?          How do shadows differ throughout the day?          How do shadows differ from season to season?</p> <p>The goal is to have the students understand that shadows change throughout the day and year because of the Sun’s position with respect to the object. They will not have to understand that the tilt of the Earth is causing these changes. That will come in 2<sup>nd</sup> or 4<sup>th</sup> grade. Here you want the students to observe the patterns that occur:</p> <p>Daily changes:</p> <ul style="list-style-type: none"> <li>• The shadow is long and toward the west in the morning</li> <li>• The shadow gets shorter as noon approaches (but does not disappear).</li> <li>• The shadow gets longer, but toward the east, as evening approaches.</li> <li>• The shadow does not exist when the Sun has set.</li> </ul>

Yearly changes: The shadow should be measured at the same time of the day

- The shadows get long as summer turns into fall and into winter.
- The shadows get shorter as winter turns into spring and into summer.

Either use the table from the weather unit, or create your own wall chart for the class. Have the students choose a stationary, permanent object outside. Using the measuring technique of your choice, have the students measure the shadow and monitor has it changes daily and monthly.

At the time this lesson is taught, have students make a line graph of their data. From there should observe the patterns.

**Assessment:**

Formal Assessment Completion of Wall Chart and graph

**Suggestions/Resources:**

Science Facts and Fun: What's In A Shadow?. United Learning. 1995. [www.unitedstreaming.com](http://www.unitedstreaming.com)

**Lesson: (2-3 days)**

**You are my sunshine!**

**Description:**

Materials needed: Mystery (UV) beads, pipe cleaners or leather string, sunscreen lotion, sunglasses

Concept: Sun produces light every day.

Questions: What kind of light is coming from the Sun?

Students will have already studied that the Sun is a natural light source. Students are also aware of visible light. This lesson will go beyond visible light, so decide if your students are ready for this concept. The UV beads, which can be found at several locations especially online and at science education dealers, change color when exposed to ultraviolet light such as that produced by the Sun.

Give each student several beads without telling them what they are. Have them go outside on a sunny day with 2 of their beads and observe what happens. Then have them write in their journal why the beads changed.

From their responses, have the students test their ideas. For example, if a student states that it is the heat from the sun that is changing the color, they could hold the beads in their hands to warm them. Have them record what they observe. If a student says it is the (visible) light from the sun, have them use a flashlight and see if the beads change. After some time of investigation, have the students go outside and cover the beads with sunglasses (remember that some protect against

UV and some do not) or with the sunscreen lotion and observe what happens. The students should infer that there is ultraviolet light coming from the sun.

**Assessment:** Science journal submission

**Suggestions/Resources:** Denver, John. Sunshine on My Shoulders. Dawn Publications, 2003

Example of a Column Organizer Rubric

	3	2	1	Points Earned
Content	Contains minimum of two groups of light sources. There are a minimum of ten examples within each group. Sources are properly placed within each group.	Contains a minimum of two groups of light sources. There are between 5 – 10 examples of light sources within each group. Sources are generally placed within each group.	Contains one group of light sources with less than 5 examples of light sources.	
Format of Organizer	The graphic organizer is neatly written. The light sources are written in straight columns.	The graphic organizer is nearly written, but the columns are starting to meander across the poster.	The graphic organizer is unorganized.	
Grammar/spelling	There are one or fewer spelling mistakes.	There are 2 – 3 spelling mistakes.	There are greater than three mistakes.	

Example of Rubric for GRASP activity

	3	2	1	Points Earned
Science Content	The shadows are going in the right direction (opposite the Sun). The shadows are the appropriate length and size with respect to the object.	One or two shadows are at the wrong direction or are the wrong size or length.	Many of the shadows are in the direction and are the wrong size and length.	
Map/Model design	Contains the appropriate structures of the school's campus and in the proper location. The position of the Sun is marked. The North is marked.	Contains most of the appropriate structures of the school's campus and in the proper location. The position of the Sun is marked. The North is not marked.	Contains very few structures of the school's campus and many not in the proper location. The position of the Sun is not marked. The North is not marked.	
Format of Organizer	The graphic organizer is neatly written. The light sources are written in straight columns.	The graphic organizer is nearly written, but the columns are starting to meander across the poster.	The graphic organizer is unorganized.	
Grammar/spelling	There are one or fewer spelling mistakes.	There are 2 – 3 spelling mistakes.	There are greater than three mistakes.	