

# SHADOW TRACKERS



## **BENCHMARKS and TASKS**

**SC.B.1.1.1** The student knows that the Sun supplies heat and light energy to Earth.

**SC.B.1.1.2** The student knows that light can pass through some objects and not others.

- The student creates shadows by blocking light.
- The student identifies the sun as the primary source of light energy and heat energy.
- The student tracks and measures, using nonstandard units, the sun's shadow throughout the day and notes the changes.

## **KEY QUESTION**

How do shadows change?

## **BACKGROUND INFORMATION**

There are several common sources of light. The primary source of light is the sun. The sun is essential to life on earth. The energy from the sun is changed to heat energy that warms the earth. There are other natural sources of light such as fire and lightning. Artificial light can be produced by bulbs and lasers.

Light travels in straight lines. The speed of light is 186,000 miles per second. When light strikes an object, it may go through the object, be blocked by the object, or it may be reflected by the object. Shadows are made when light is blocked. Shadows can be influenced by the source of light, the object that blocks the light, and the surface that receives the shadow.

## **MATERIALS**

### **Per student**

chalk

nonstandard measuring units such as lots-o'-links or interlocking cubes

## **TEACHING TIPS**

1. This activity needs to be started in the morning on a sunny day.
2. Prior to the activity, locate a paved spot outdoors where students can trace their shadow.

## **ENGAGE**

1. Read the following poem to the students:

### MY SHADOW

My dark little shadow  
likes to tag along.  
I walk in the shade,  
then it's all gone.

The silly little shadow  
Who copies me,  
Follows me around  
and can't be free.

Me and my shadow  
like to play around.  
I see it on the wall  
and sometimes on the ground.

by *Deirdre Englehart and Beth Compton*

2. Tell the students that they are going outdoors to find their shadow and to see if it changes during the day.
3. Ask: *What do you think creates shadows?*

### **EXPLORE**

1. Take the students to the predetermined paved area outdoors and demonstrate with one student how they should trace their shadows. Be sure that the foot positions are traced so that students can stand on the same spot for later drawings.
2. Have students write their names and the time of day by their shadow outlines.
3. Show students how to use their cubes or links to measure the length (head to toe) of their shadow. Record the number of units by "the time of day" near their shadow.
4. Explain to students that they will be drawing their shadows two other times during the day. They will record the time of day, and then measure and record the length of their shadows.
5. After students have completed their drawings and recordings, allow them to investigate their shadows by making the shadows move. Some interesting movements to suggest:
  - Make your shadow walk beside you.
  - Make your shadow fat, then thin; long, then short.
  - Make your shadow disappear.
  - Make your shadow shake hands with a partner.
  - Make your shadow stand on top of someone else's shadow.
6. After students have measured their third shadow, tell them to keep their links or cubes together and take them back to the classroom.

### **EXPLAIN**

1. Make sure students have had the opportunity to trace their shadows three different times during the day. After they have completed the third tracing, remain outside and ask the following questions to reinforce the concept that shadows change:  
*In what ways did your shadow change?*  
*At what time of the day was your shadow the longest?*  
*At what time of the day was your shadow the smallest?*  
*What do you think your shadow would look like two hours from now?*  
*What is creating the shadows?*  
*What do you think is causing the shadow to change?*

*When you were playing with your shadow, how did you make it disappear?*

*Why is it important to do this activity on a sunny day?*

*Do you face the sun or have your back to the sun to see your shadow?*

2. Help students understand that the sun is now in a different position relative to the earth and that, as the day progresses, the shadows will keep changing.

### **EXTEND/APPLY**

Explain that before clocks were invented, people told time by the position of the sun in the sky. They used a device called a sundial. The sundial was similar to the shadow clock they made today.

### **EXTENSION**

With the links or cubes saved from the third shadow measurement, have students order them from shortest to longest and make comparison statements such as:

*My shadow is the same length as Tony's shadow.*

*Sandra's shadow is longer than my shadow.*

*My shadow is shorter than Sandra's shadow.*

*Mary's shadow is in the middle.*

*There are 8 students with shadows shorter than Mary's.*

*There are 8 students with shadows longer than Mary's.*

### **ASSESSMENT**

Have students identify the three things (light, something to block the light, and something on which the shadow can fall) needed to make a shadow.