

STEM Challenge: Making Shade

Sample Grade 1

Task: Students will work in small groups to design a structure that provides shade for two small toys.

Getting Started

Build Content Knowledge

If you wish to provide students with background knowledge about sunlight, shadows, and shade, reproduce and distribute pages 10 and 11. Preview the Visual Literacy page with students. Then read the Science Concept page to students as they follow along, or, if they are able, have them read it independently. Next, discuss the science concept and the visual literacy graphics on those pages.

Introduce the Challenge

Reproduce and distribute the STEM Challenge on page 12. Then have students read the challenge and the testable goals. Discuss the materials with the students and decide on a plan for gathering the materials.

Next, help students research ways to protect themselves from sunlight. Ask them to think about how science, technology, engineering, and math can be used to create a structure that provides shade. Finally, have students independently brainstorm and draw their ideas on page 12.

Completing the Challenge

Assign students to small groups.

Optional: Model the Design Process

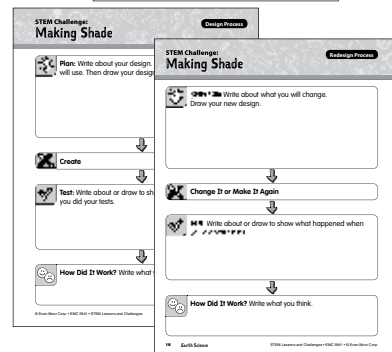
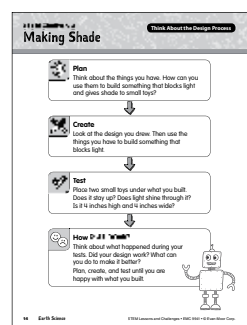
You may wish to reproduce and distribute page 14 to students. This resource is intended to help students think about how to approach each step in the design process.

Design Process Worksheets

Reproduce and distribute the STEM design process worksheets to students. Provide support when needed to help students describe and evaluate their plans.

After the Challenge

Have students share their design processes, compare their shady structures, and brainstorm ideas for improvements.



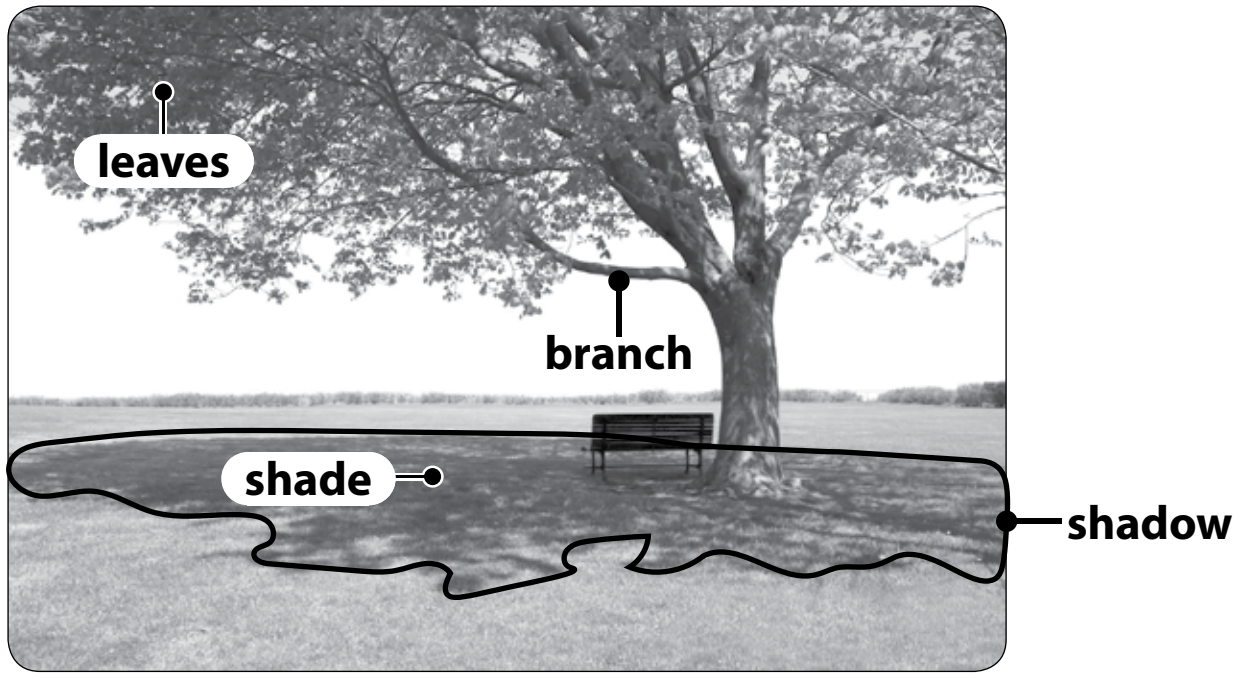
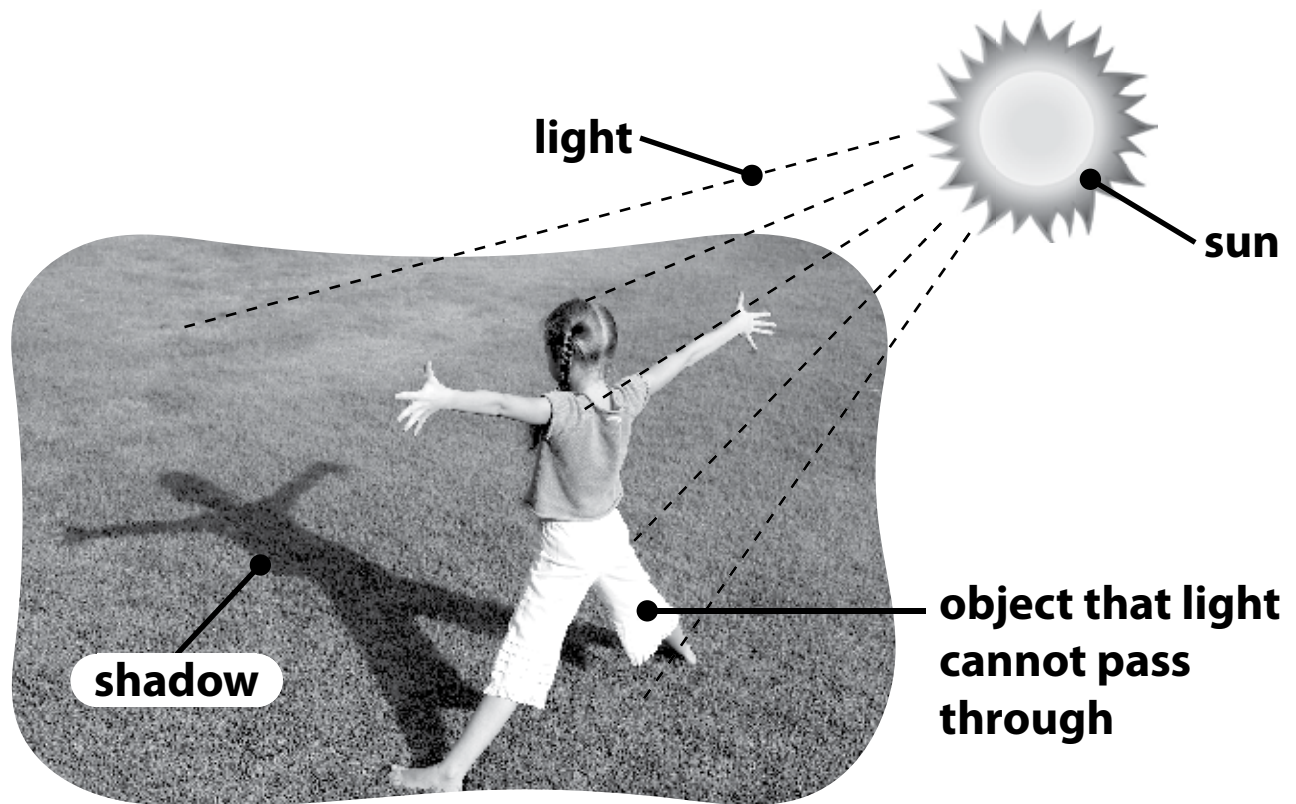
Shade from the Sun's Energy

The sun gives us light and energy that help us live and grow. We can see the energy as light. We can feel the energy as heat. But the sun's light and heat are powerful. Too much sunlight can hurt living things. It can hurt our eyes, burn our skin, and make us too hot. We must stay safe in the sun.

Light travels in a straight line. It can shine through some things, like a glass window or water. Light cannot shine through other things, like wood, a rock, or a ball. When light cannot move through something, you can see a **shadow**. A shadow is a dark shape that appears when an object blocks light. The darkness from the shadow is called **shade**. It helps keep you cool and safe from the sun's light.

A great place to find shade is under a tree. The branches and leaves of a tree grow out from the thick trunk. Light cannot shine through wood or leaves, so a shadow appears in the shape of the tree. You can also stand under an umbrella to get shade. The shade from a tree or an umbrella helps you stay safe on a sunny day.

STEM Challenge: Making Shade



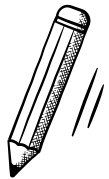
Making Shade

Challenge: Build something that blocks light and makes shade for two small toys.

Testable goals: The shelter will block the sun and is 4 inches (10 centimeters) high and 4 inches (10 centimeters) wide.

Research: Think about things that give shade on a sunny day. Look at pictures of buildings, trees, and umbrellas. Notice the shapes of the objects and the materials they are made from.

Brainstorm: Think about all the different things that give shade. Think about what you will build to block light and make shade. Then draw a picture of it in the box.



A large, empty rectangular box with a dotted border, intended for drawing a picture of a shade-making shelter.

STEM Challenge: Making Shade

Suggested Materials List

Items for each group

- glue
- string
- tape
- scissors

Items for the whole class

- cardboard
- paper
- plastic wrap
- wax paper
- craft sticks
- paper towel rolls
- straws
- _____
- _____
- _____
- _____
- _____
- _____

Items for testing

- ruler
- sunlight or flashlight
- two small toys

STEM Challenge: Making Shade

Think About the Design Process



Plan

Think about the things you have. How can you use them to build something that blocks light and gives shade to small toys?



Create

Look at the design you drew. Then use the things you have to build something that blocks light.



Test

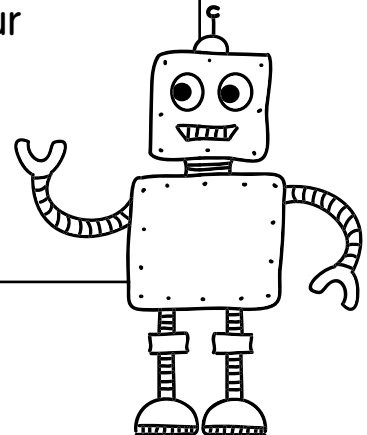
Place two small toys under what you built. Does it stay up? Does light shine through it? Is it 4 inches high and 4 inches wide?



How Did It Work?

Think about what happened during your tests. Did your design work? What can you do to make it better?

Plan, create, and test until you are happy with what you built.



STEM Challenge: Making Shade



Plan: Write about your design. Tell what things you will use. Then draw your design.



Create



Test: Write about or draw to show what happened when you did your tests.



How Did It Work? Write what you think.



Redesign: Write about what you will change.
Draw your new design.



Change It or Make It Again



Test: Write about or draw to show what happened when you did your tests.



How Did It Work? Write what you think.