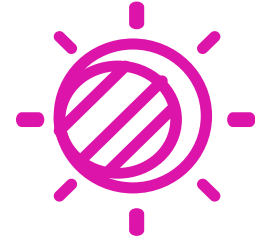


# Light and Shadows



## SUMMARY OF CLASSROOM LEARNING

In this lesson, students built a foundational understanding of light by exploring how light interacts with different objects. They also discovered relationships between light and shadows. Students began the lesson by discussing how light travels and observed and sorted objects that are transparent, reflective, and opaque. Then students collected and examined data on how changing the distance between an object and a light source affected the size of a shadow.

## OBJECTIVES

Students will be able to:

- identify and sort objects as reflective, transparent, or opaque.
- describe how the distance between an object and its light source affects the size of a shadow.
- recognize the sun as a source of light.

## BACKGROUND INFORMATION

Light travels in straight lines. When light reaches an object, it can travel through the object if the object is transparent. It can be reflected from a shiny object or light can be absorbed if the object is opaque. Shadows are produced when light hits an opaque object which prevents the light beams from passing through. When an object blocks the light's path, then darkness appears on the other side. This darkness is called a shadow.

The sun is a source of light. When sunlight hits an object, it causes a shadow. As the Earth rotates each day, the sun appears to change position in the sky and changing angles of sunlight affect the appearance of shadows. For instance, on a sunny day, you can stand a stick in the ground and watch its shadow move and change shape. When the sun gets low in the sky, the stick's shadow gets longer.

## HOME ACTIVITY

Your young scientist has been learning about light and how light can travel through, bounce off of, or be absorbed by objects. Today your child completed an investigation to discover how changing the distance of an object to a light source can change the size of a shadow.



Complete the following tasks together with your child to help reinforce and apply his/her understanding of science concepts:

- **Activity 1:** On a sunny day, go outside and observe the shadows created by different objects. Select an object and trace the object's shadow. Do not move the object. Return to the same object three hours later and trace its shadow. Observe and discuss how the appearance of the shadow has changed.
- **Activity 2:** Locate objects around the home that are transparent (light travels through), reflective (light bounces off), or opaque (light is absorbed). Discuss together how these physical properties help the object in its function.

## MATERIALS

### Activity 1:

- Large pieces of paper for tracing
- Pencil/marker/chalk
- Notebook or paper

### Activity 2:

- Transparent, reflective, and opaque items around the house
- Physical Property Chart (found below)
- Pencil

## VOCABULARY

- **Transparent:** letting light pass through and giving a clear view of objects on the other side.
- **Reflective:** heat, light, or an image that bounces off an object or surface.
- **Opaque:** not letting light pass through.
- **Physical Properties:** characteristics that can be observed, like appearance, texture, color, size, mass, and volume.



## THOUGHT/CONVERSATION STARTERS

- What causes shadows?
- How do shadows get bigger and smaller?
- What kinds of objects can have shadows: transparent, reflective, opaque?

## STEPS

### Activity 1:

Parent/Guardian note: this activity must be done on a sunny day.

1. Gather your materials.
2. Go outside and locate 2-3 objects and determine whether they are **transparent**, **reflective**, or **opaque**.
3. Observe their shadows.
4. Write down the name of the object and what you notice about their shadow (size, shape, etc.).
5. Trace the shadow. If the shadow is on the concrete, you may choose to trace the shadow with chalk. Alternatively, you may lay down a piece of paper and trace the shadow onto the piece of paper. Leave the paper there (you may need to put a heavy item on top of it to prevent it from blowing away).
6. Visit the shadow again 3 hours later.
7. Trace the new shadow.
8. Discuss with your family and write down what you notice about the new shadow.
9. How did the **physical properties** of the shadows change? Why do you think they changed in this way?

### Activity 2:

1. Gather the Physical Property Chart (below) and a pencil.
2. Go on a hunt around your house for objects that are **transparent**, **reflective**, and **opaque**.
3. Write down the names of the items on the chart.
4. Find at least 5 items for each category.
5. Discuss your findings with your family.
6. What makes each item transparent, reflective, or opaque?
7. How do these **physical properties** help each item perform its function?



## DOCUMENT THE LEARNING IDEA

- Send the notes and charts from the activities to school with your young scientist to share with their classmates.
- Take pictures or draw pictures of your family completing different steps of the activity. Send them to school with your young scientist to share with their class.

## CONTINUE MAKING CONNECTIONS

Keep observing! Next time you go on a drive as a family, go on a shadow hunt. Look for different objects that are transparent, reflective, and opaque and discuss how their shadows look or would look. Can you find any shadows from the car? Make a list of what you find and send it to school with your young scientist.

## PHYSICAL PROPERTY CHART

Find objects around the house. Write the name of the object under its correct physical property: transparent, reflective, or opaque.

Transparent	Reflective	Opaque