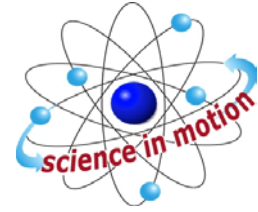


LIGHT

SECTION 1-PROPERTIES OF LIGHT

From *Hands on Science* by Linda Poore, 2003.



Westminster College

STANDARDS:

Students know light is reflected from mirrors and other surfaces.

Students know an object is seen when light traveling from an object enters our eye.

Students know the color of light striking an object affects the way the object is seen.

Students will repeat observations to improve accuracy, and know that the results of similar scientific investigations seldom turn out exactly the same because of differences in the things being investigated, methods being used, or uncertainty in the observation.

Students will differentiate evidence from opinion, and know that scientists do not rely on claims or conclusions unless they are backed by observations that can be confirmed.

Students will predict the outcome of a simple investigation, and compare the result with prediction.

IN ADVANCE:

Have students bring in shoe boxes, old 35 mm colored slides, and opaque objects in plastic sandwich bags to make shadow prints. Have the students remove the plastic protective cover sheet from each mirror the *first* time the mirrors are used.

You will need an overhead projector for a light source.

MATERIALS:

For Each Pair:

- 1 box (lg. crayon boxes with lids, checkbook boxes, or shoe boxes)
- 1 small bright colored object (marble or crayon)

For the Teacher:

- | | |
|---------------------------|------------------------------------|
| flashlight with batteries | white paper |
| mirror | black paper |
| 1 piece foil | projector as light source |
| chalk | 2 blackboard erasers full of chalk |



EXPLORE:



HOW DO WE SEE COLORS?

1. COLOR IS REFLECTED LIGHT

Have students:

Put a small bright colored object (crayon) in a box.

Tilt the box and barely open the box lid (about 1cm) so the object is in a far corner.

Can you see the object? (no) Can you see the color? (no)

2. DO YOU SEE THE OBJECT'S SHAPE OR COLOR FIRST?

Have students continue opening the box slowly. **[S, light-color][S, see-light]**

When can they see the object? (When light reflects off it.)

When can they see color? (it takes more light to reflect the color of an object, thus they see the object's shape before it's color.)

3. DISCUSS:

When you wake up at night, what color are the objects in the room?

(gray or black-they lack color.)

Sometimes we are frightened by what appears to be a strange object in our dark bedroom at night.

(A red jacket on a chair may look like a big, dark shape.)

Have students: Look at colored objects with their parents at night in a dark room and find out how much light is needed to see color.

ASSESSMENT:

Have students open the box so they see the object's shape but not color. Observe students to see if they have the box opened a little.

Have students open the box so that they can barely see color. Observe.

Have students switch boxes to see if they agree with their partner on how open the box must be to barely see the color.

[S, light-color][S, see-light]

NOTE:

If you do not have a 'dark' room, do the activity below when you visit the school library with your class or go to another room that can be darkened.

DEMONSTRATE:

1. DOES LIGHT TRAVEL IN A STRAIGHT LINE? (darken room)

First, shine a flashlight at a wall or a projection screen across the room.

Where do you see the light? (only on the wall or screen)

Have a student hit 2 erasers together while the teacher shines a flashlight through the chalk dust at different angles toward the screen. Discuss.

(Light travels in straight lines and the chalk dust reflects the light so you can see its straight path.)

[S, light-see]

2. REFLECTION: [S, reflect-mirrors] [S, predict]

Predict where the reflection from a mirror will land.

Shine the flashlight on a mirror.

Can you reflect light to the ceiling? The floor? The chalkboard?

3. COMPARING REFLECTORS: [S, reflect-surfaces]

Predict which objects in the room are good reflectors.

Turn off lights.

Shine the flashlight on different objects in the room.

Which objects look lighted? These objects are reflecting the light. Compare the reflecting properties of rough, smooth, shiny, and dull surfaces.

KEY WORDS:

REFLECT:

To rebound or bend back from a surface. More light reflects off smooth and/or shiny surfaces. The Moon has no light, but the Sun's light reflects off the Moon's surface.

MATERIALS:

For Each Pair:

1 flashlight with batteries

1 plastic bag containing: 1 spoon, 2 pieces of (4" x 4") foil

4" x 4" pieces of black paper, white paper and wax paper

TEACHING TIP:

If you do not have a 'dark room', turn off the lights and have students sit under their desks (where there is less light) to do these experiments.

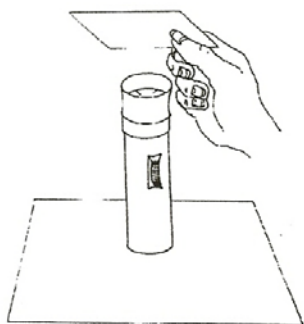
EXPLORE: [S, evidence-observations]

DOES BLACK REFLECT? [S, reflect-surfaces]

COMPARING REFLECTION OF DIFFERENT MATERIALS

1. PREDICT:

Which objects will reflect light? Ask students to sort their objects into 2 groups: objects that reflect and objects that do not reflect. Pass out the student work sheet, *Comparing Reflectors*. Students write their predictions on the worksheet. [S, predict]



2. REFLECTION EXPERIMENTS:

Have Students:

Have students compare their predictions to their results. Discuss.

(Most things, except dull black items, reflect some light.)

Which objects are better reflectors? (shiny, flat surfaces)

Have the students experiment again, reflecting with the objects they disagree on.

COMPARING REFLECTORS

PREDICT:

Which object will reflect light? Put all your objects into 2 groups and list your predictions on this chart:

WILL REFLECT LIGHT	WON'T REFLECT LIGHT

Which objects reflect the most light?

- Place the flashlight on your desk on this piece of white paper, so the light shines up at the ceiling.
- Hold each object 1" above the flashlight.
- Look at the white paper while the object is over the flashlight and then with no object above the flashlight. Is any light reflected by the object? Decide whether each object is an excellent, good, or poor reflector. Do any objects reflect no light _____?
- List all objects you tested on the chart.

Excellent	Good	Poor	Does Not Reflect

What was your best reflector? _____

Why do you think it is the best? _____