

LIGHT - GRADE 4

OBJECTIVES:

1. Understand how the human eye uses light for vision.
2. Discovering ways in which light moves.



VOCABULARY:

Prism – transparent object with flat surfaces that refracts light. At least two of the flat surfaces must have an angle between them.

Reflection - change in the direction of a light wave that sends it back in the direction it came from.

Refraction - light waves are bent as they travel through one medium into another.

PROCEDURE:

Activity 1: How does the human eye use light for vision?

Background Information

The eye's **lens** is a bi-convex shape. It sits behind the iris (see page 1 of workbook). As light passes through the lens it is **refracted**, or bent (the bending happens as a result of the light wave passing through a medium, in this case, the lens of the eye) , and inverts the image so that on the retina it is upside down. The brain, connected to the eyes through the optic nerve, converts the image so it is right side up.

Materials: *Light* slideshow; bi-convex lens; blank index card (per person)

1. Go over the first four slides of the *Light* slideshow. Use the image of the human eye on the cover of the workbook for reference.
2. In front of a window, have students hold a bi-convex lens in front of an index card. Ask students to look at the index card and describe what happens to any objects that appear on the card.
3. Have them draw or describe what they see in on page 2 of their workbook.

Activity 2: Reflection

Background Information

When light hits a surface part of the light is reflected. On a clean and polished metallic surface almost 100 percent of incident light is reflected, while on a surface of clear glass only a small amount is reflected.

Materials: Mirror kit; *Light Magic* storybook

1. Read the storybook *Light Magic*
2. Have students work in pairs. Pass out a mirror kit to each pair. Have students arrange the two mirrors on their stands to match the angle on the index card. Place the object on the card in between the two mirrors. How many times is the dinosaur reflected?
3. Next have students arrange the mirrors to reflect the object many more times. How many reflections can they count? They can write their answers on page 3 of their workbooks.

Activity 3: Comparing the way light moves.

Background Information

The world is full of images for children. A reflection in a mirror or window can scare them; a penny in a pool may look closer than it really is. Light has always played with our sense of sight. Children can learn how these images are different from the real thing. Children need to discover that they can change the way light moves. As children play with optic toys, they begin to see that light can play tricks with their eyes.

Young children need to experience different examples of reflect and refract to recognize them easily. Reflect is easier to understand than refract. Reflection is just a "bouncing" back of an image, while refraction is a change of direction of an image. A prism for example, refracts or bends light to create a rainbow.

Materials: Lens kit (prism, periscope, small telescope, teleidoscope)

1. Working in pairs, have students look through the lenses and decide whether they are reflecting or refracting light. Have them describe or draw what they see on page 4 of the workbook.

Periscope (reflection) - There are two mirrors inside at an angle that allow you to see things at a right angle. Light bounces from one mirror to the other, which then bounces to your eye.

Prism – (refraction) - Light is bent twice when it passes through the prism from the air

and the separation of color is quite noticeable - a rainbow. The prism separates the frequencies of light, so a rainbow appears. Light must be shone correctly through a prism in order to get a rainbow. Students can also put the prism to their eyes to see the rainbow effect. If classroom has bright sunlight students may be able to make a rainbow.

Small telescope (refraction) - By expanding the telescope the refracted light will come in focus, depending on the distance of the object.

Teleidoscope (refraction) - The lens refracts light at different angles. This effect is similar to compound eyes of insects.

Materials Needed

- *Light* slideshow
- *Light Magic* storybook
- 32 bi-convex lenses with index card

- **15 lens kits**
 - Prism
 - Teleidoscope
 - Small telescope
 - Periscope

- **15 mirror kits:**
 - 2 mirrors
 - 4 mirror stands
 - Index card with angle outline
 - object