

# + Explore your book!

Richmond Solution BE Primary Science 6 includes ten units in four different areas of science: **Biology**, **Chemistry**, **Physics** and **Earth and Space**.

Each unit teaches a different topic.

## Engage!

Start your adventure here! Think about what you already know about the topic. How does it relate to your life?

## Explore!

Carry out an experiment or observation! This is a chance to explore the topic and your ideas. Make observations and draw conclusions.

## Explain!

Read explanations of new ideas!

## Extend!

Check your understanding and find out more!

### Unit 7

## Light

### Engage!

**Can you make a rainbow?**

Place a small mirror inside a glass of water at an angle. Put the glass in a sunny area. Adjust the mirror or glass so that sunlight **reflects** onto a white wall or sheet of paper.

- What is the light like when it reaches the glass?
- What is the light like when it reaches the white wall or paper?
- In what weather conditions do rainbows form?

### Explore!

**Make a color wheel!**

**Objective:** Make a color wheel to investigate light.

**Method**

- Use the cup to trace a circle on each plate. Use the ruler to divide each circle into six equal segments. Color the segments in this order: red, orange, yellow, green, blue, purple.
- Cut out the circles, and glue the blank sides back to back.
- Make two small holes 2 centimeters apart in the center of the circle. Pass the yarn through the holes and make a loop.
- Hold the ends of the yarn with the circle in the middle. Move your hands as if skipping to twist the yarn, and then quickly pull the yarn tight to make the circle spin fast.
- Stop pulling once the yarn unravels so it twists in the other direction. Repeat to spin the circle as fast as possible.
- Record your observations below.

**Observations**

- Draw your observations.

wheel before spinning

wheel while spinning

**Conclusions**

- What happened to the colors when the wheel was spinning?
- What does this activity show about light?

**You will need**

- a large plastic cup
- 2 white paper plates
- glue
- a ruler
- a pencil
- scissors
- 1 meter of yarn
- colored markers (red, orange, yellow, green, blue, purple)

### Lesson 7.1

### What is light?

Light is a type of energy. We need light to see. We see an object when light travels from the object to our eyes. There are two kinds of objects: light sources and objects that reflect light. Light sources give off light themselves. The rays of light travel in straight lines and spread out in all directions. When they reach our eyes, we see the objects. There are several...

**Practice**

- Choose the true sentences.
 

a. ☐ Shiny objects absorb light.

b. ☐ Dark objects do not reflect much light.

c. ☐ Blue objects absorb blue light.

d. ☐ You can see your reflection in a smooth, shiny surface.

e. ☐ Light bounces off a rough surface in different directions.
- Draw the reflected rays of light. Use a ruler.
 

a.

b.

c.
- Complete the sentences with the colors.

- A \_\_\_\_\_ object absorbs all the colors of light.
- A \_\_\_\_\_ object reflects all the colors of light.
- A \_\_\_\_\_ object reflects \_\_\_\_\_ light and absorbs all the other colors.

**Explain.** What color light does a leaf reflect?

### Lesson 7.2

### What is reflection?

A ray of light travels in a straight line, and when it hits an object, it bounces off in a straight line, too. This is called **reflection**. Light bounces off an object in a similar way to a bouncing ball. If you drop the ball straight down, it will bounce straight back up. If you bounce the ball at an angle, like in the picture above, it will bounce away at an angle.

All objects give off light or reflect light, which is why we can see them. Light reflects well off smooth, shiny surfaces, such as a mirror, so the object and the reflected image look similar. If an object has a rough surface, however, the light bounces off it in different directions, and you cannot see a clear reflected image.

When an object reflects a lot of light, it appears shiny or bright. When an object does not reflect much light, it appears dark or dull. For example, dark clothes and black objects do not reflect much light. Dark objects take in light—in other words, they **absorb** it.

As you saw in the opening activities, white light is composed of lots of colors of light. When white light hits an object, some colors are absorbed and some colors are reflected. Red objects reflect red light and absorb all the other colors, so we only see red. The same is true for all other colors. White objects reflect all the light.

Light reflects perfectly off a smooth shiny surface, but it bounces off a rough surface in different directions.

### Practice

- Complete the table with the objects and add more.
 

a candle

the Moon

an eye

a lamp

| Light sources | Objects that reflect light |
|---------------|----------------------------|
|               |                            |
- Complete the text.
 

\_\_\_\_\_ eyes light reflected spreads straight

We need \_\_\_\_\_ to see. We see things when light enters our \_\_\_\_\_.

Light travels in \_\_\_\_\_ lines. It \_\_\_\_\_ out in all directions from a light source. When it hits an object, some light is \_\_\_\_\_. When this light reaches our eyes, we see the object.
- Write what these shadows are of.
 

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

## Evaluate!

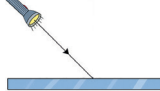
Check your progress!  
At the end of each unit,  
there are plenty of  
activities to see how  
much you have learned.

**Check my progress**

- Match.
  - a. Dark objects
  - b. Shiny objects
  - c. Opaque objects
  - d. Translucent objects
  - e. Transparent objects
- Choose the correct endings.
  - a. When light reflects, ...
    - ☐ it bounces off an object.
    - ☐ it passes from one medium to another.
  - b. When light passes from water into air, ...
    - ☐ it reflects.
    - ☐ it refracts.
  - c. A rainbow is an example of...
    - ☐ reflection.
    - ☐ refraction.
- Do the activities and answer the questions.
 



a. Draw the part of the pencil under water. Is this an example of reflection or refraction?



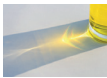
b. Draw the ray of light after it hits the mirror. Is this an example of reflection or refraction?

**Answer the questions.**

- Where does the light come from for you to read this activity?
- What happens to the light when it hits the page?
- At what moment do you see the page?

**Explain.** Can you see a white cat in a pitch-black room?

**Look at the pictures. Write reflection or refraction.**








**Glossary**

**absorb** Take in (e.g., energy or liquid)

**accelerate** Move faster

**acne** A skin condition that causes spots, especially on the face and during puberty

**adolescence** A stage of human development that starts at puberty (around eight to thirteen years old) and ends at early adulthood (around eighteen)

**adulthood** A stage of human development that begins around 25 when humans reach mental maturity and organ function starts to decrease

**alveolus (pl. alveoli)** A tiny sac in a lung where gas exchange takes place

**appliance** A machine that uses electricity, such as a lamp or motor

**artery** A narrow tube that carries blood from the heart to all parts of the body

**asexual reproduction** A method of reproduction that requires only one parent and that leads to a new living thing with identical characteristics

**axis** An imaginary line about which an object such as a planet rotates

**balanced forces** Forces of the same strength that act in opposite directions, so there is no change in movement

**battery** A container with two or more cells that convert chemical energy into electricity

**bedrock** A layer under soil consisting of solid rock

**bioaccumulation** The buildup of a toxin in the body of a living thing that is unable to process or eliminate it

**blood** The red liquid that circulates in vertebrates taking water, oxygen and nutrients to cells and removing carbon dioxide and waste

**blood vessel** A tube that carries blood; an artery, a vein or a capillary

**boiling point** The temperature at which a substance changes from a liquid to a gas

**bronchus (pl. bronchi)** Any of the major air passages of the lungs that divide from the trachea

**bronchiole** Any of the tiny air passages in the lungs that divide from the bronchi

**buoyant force** The upward force that a liquid exerts on a body floating in it; upthrust

**burial** A process involving extreme heat and pressure that produces metamorphic rocks underground

**capillary** A tiny blood vessel that carries blood with water, nutrients and oxygen to cells and carries away blood with carbon dioxide and waste

**carnivore** An animal that only eats other animals

**cast fossil** A fossil formed when minerals in water enter a mold fossil of a prehistoric living thing, harden and form a replica

**cell** The basic building block of all living things

**chemical reaction** A process in which one or more substances (reactants) are converted to one or more different substances (products)

**childhood** A stage of life that starts around eighteen months old and ends at puberty

**circuit diagram** A simplified representation of the components of an electrical circuit using standard symbols

**circulatory system** An organ system consisting of the heart and blood vessels that takes water, oxygen and nutrients to all the cells of the body and removes carbon dioxide and waste

**clay** A heavy, sticky, firm component of soil with tiny grains

**clot** (Of blood), become solid

**composites** The combination of parts that make up something

**compost** Decayed organic matter used to fertilize plants

**compress** Squeeze and decrease the amount of space something takes up

**contaminated** Containing a germ or harmful substance

**crop** A plant grown for food

**crop rotation** The practice of changing the crop on a piece of land each season to maintain a balance of nutrients

**crystal** A clear, hard, colorless or light-colored mineral

**decay** Break down organic matter through the action of bacteria, fungi or another organism

**decelerate** Move more slowly

**decomposer** A living thing that gets energy and nutrients by breaking down dead matter

**diaphragm** A large flat muscle under the lungs that makes the lungs inhale when it contracts and exhale when it relaxes

**dissolving** The incorporation of a solid into a liquid to form a solution

**early adulthood** A stage of human development between adolescence and adulthood

**earwax** A waxy secretion produced by the ear that traps dirt and germs

**egg** A female reproductive cell produced in the ovaries

**electric current** A flow of electrons

**electrical circuit** A path for electricity that starts and ends in the same place

**electrical conductor** A material through which electricity can flow easily

**electrical insulator** A material through which electricity does not flow easily

**electron** A tiny particle with a negative charge of electricity that travels around a circuit and makes appliances work

**embryo** An early stage of development of an animal that is humans lasts from around one week old to eight weeks old when it becomes a fetus

**energy store** A component in a circuit where energy comes from such as a cell

**erosion** The gradual wearing away of rock or soil by water, wind or ice

**exhale** Breathe out

**fertilize** (Of a soil) good for plants to grow in

**fertilization** The joining of a female reproductive cell and a male reproductive cell to produce new life

**fertilizer** A natural or chemical substance added to soil to help plants grow

**Glossary**

**At the back of the book, there is a Glossary with definitions of all the important scientific words you will need to understand.**

This science course helps you develop these global skills, too.  
Look out for these symbols next to activities:



**Collaborative learning**

Work with others to improve your knowledge and develop your interpersonal and social skills.



**Critical thinking**

Apply what you have learned, analyze information, form new ideas and communicate them to others.



**Research**

Find out new things about the topic in books or online, select important information and present your findings.



**Social and emotional development**

Respond to topics as an individual or as a member of society, and discuss your thoughts and feelings about them.

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