Table of Contents

Section 1: Life Systems

Basic Science Concepts

STEM Experiments

ISBN: 978-1-960500-12-0

Basic Science Concepts

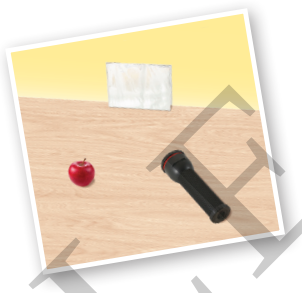
STEM Experiments

Popular USA

ISBN: 978-1-960500-12-0

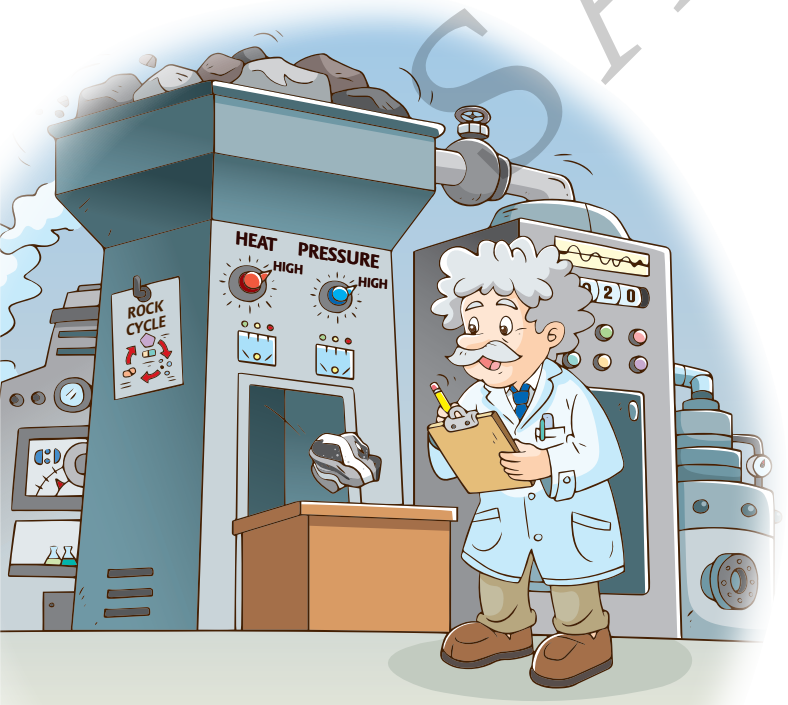
Basic Science Concepts

STEM Experiments

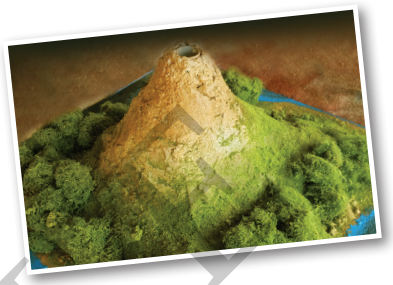


ISBN: 978-1-960500-12-0

Basic Science Concepts



STEM Experiments



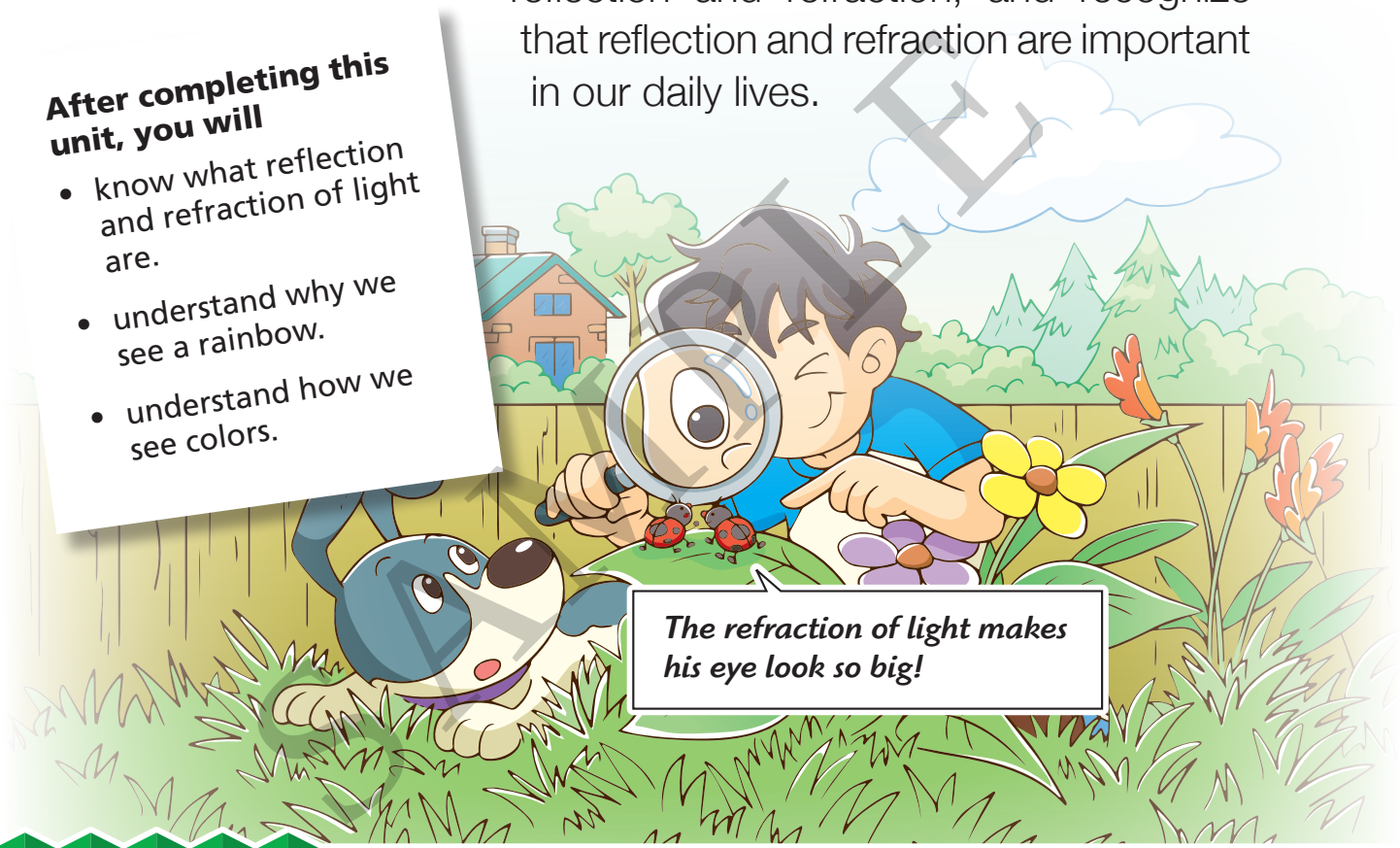
ISBN: 978-1-960500-12-0

2 Light: Reflection and Refraction

We see because of light. In this unit, you will learn about two special properties of light, reflection and refraction, and recognize that reflection and refraction are important in our daily lives.

After completing this unit, you will

- know what reflection and refraction of light are.
- understand why we see a rainbow.
- understand how we see colors.

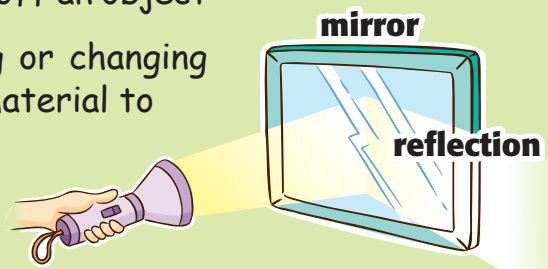


Vocabulary

reflection: the occurrence of light bouncing off an object

refraction: the occurrence of light bending or changing its angle as it passes from one material to another

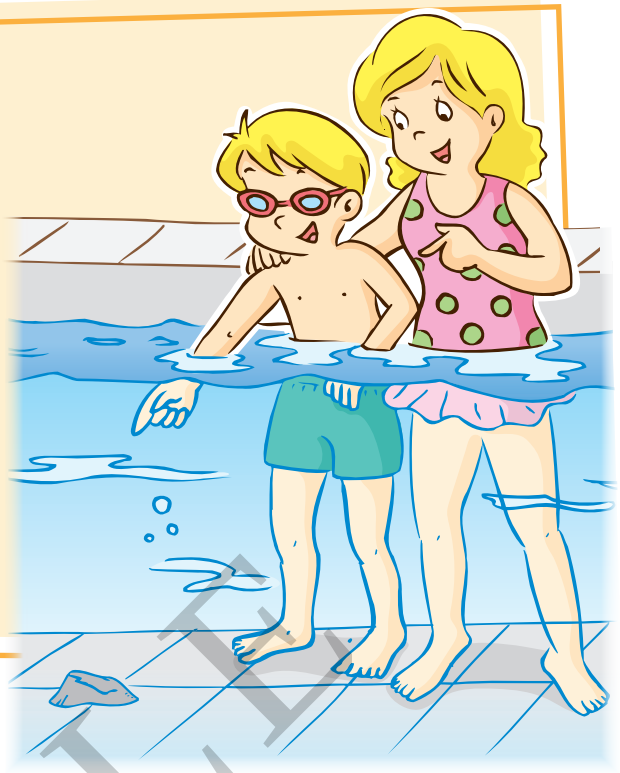
absorb: to take in (light)



ISBN: 978-1-960500-12-0

Extension

Pools, lakes, and rivers often appear less deep than they really are because water acts just like a magnifying lens, bending light to make it seem like the bottom of these bodies of water are nearer to us than they truly are. Next time you go swimming, try picking up an object from under the water. You might find that it is deeper than you think.

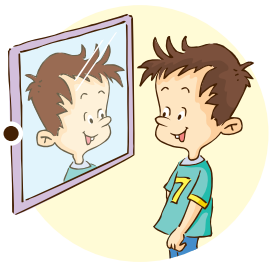


A. Fill in the blanks with "reflection" or "refraction." Then draw lines to match the pictures with the correct descriptions.

Properties of Light

- When light hits an object and bounces off, it creates a _____ .

- Light travels in a straight line, but when it passes through another medium such as water, it may bend and change direction. This is called _____ .

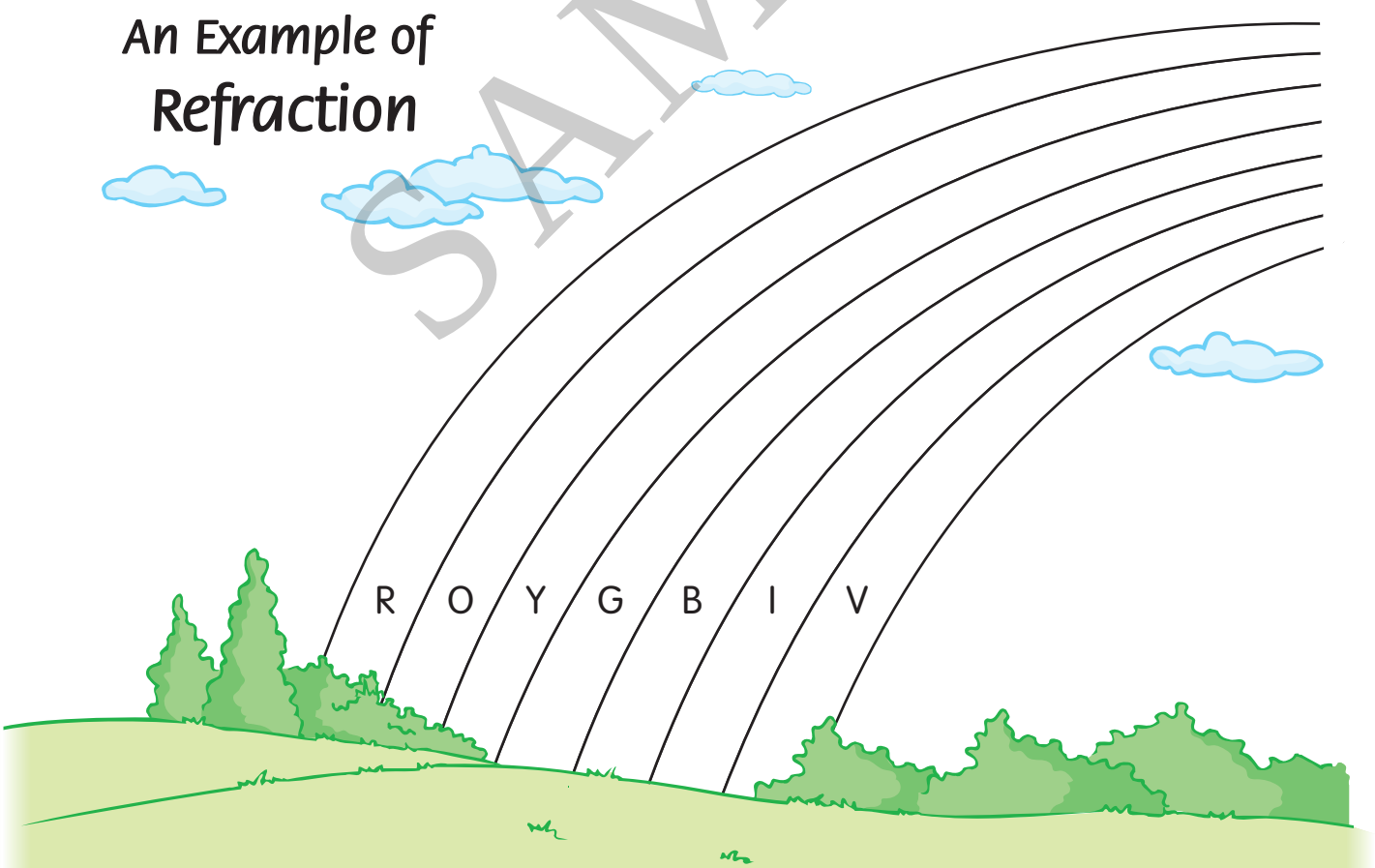


ISBN: 978-1-960500-12-0

B. Fill in the blanks with the given words. Then color the rainbow.

red	white	direction	refraction	yellow	green
blue	indigo	violet	raindrop	orange	

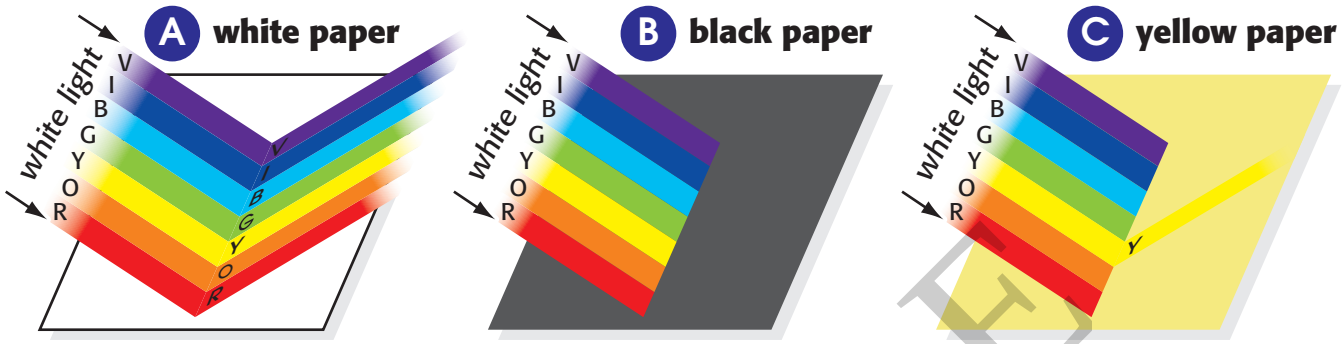
Since sunlight appears to have no colors, we call it 1. _____ light, but it is really made up of all the colors of the rainbow: 2. _____ , 3. _____ , 4. _____ , 5. _____ , 6. _____ , 7. _____ , and 8. _____ . When white light meets a 9. _____ , it changes 10. _____ . This change of direction is called 11. _____ . When the colors in the light are refracted and separated, a beautiful rainbow is formed.



ISBN: 978-1-960500-12-0

C. Fill in the blanks to complete the descriptions. Then answer the question.

How Do We See Colors?



A When sunlight shines on a white surface, we see _____ because the surface _____ all the colors.
white/black
reflects/absorbs

B When sunlight shines on a black surface, we see _____ because all the colors have been taken in or _____ .
white/black
reflected/absorbed

C When sunlight shines on a yellow surface, we see _____ because all the colors except yellow have been _____ by the surface.
yellow/red
reflected/absorbed

What makes a green frog green?

_____

_____

ISBN: 978-1-960500-12-0

LIGHT REFLECTION

understanding what happens when light hits mirrors

Have you ever wondered why you can see your reflection in a mirror? Light travels in a straight line and can bounce off an object like a ball bouncing off a wall. The object reflects the light into our eyes; therefore, we can see the object. Mirrors and other shiny surfaces are special because light hitting these surfaces at an angle reflects off at the exact same angle. This is why we can see our reflection clearly in a mirror.

ISBN: 978-1-960500-12-0

Difficulty:

Time needed:
30 minutes

In this experiment, you will explore the concept of light reflection.

What you need:


a flashlight

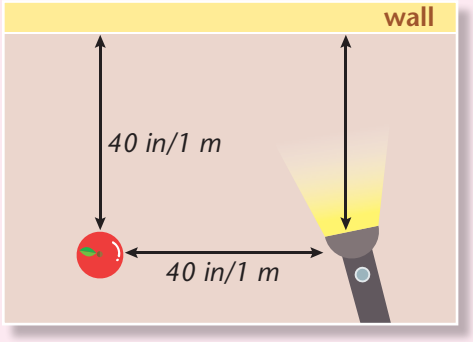

an apple


aluminum foil


cardboard

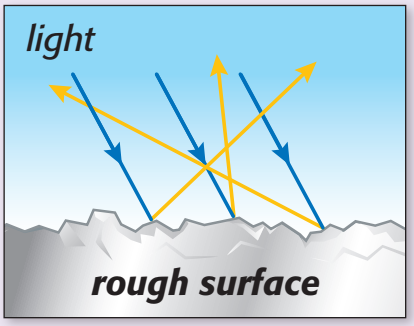
What to do:

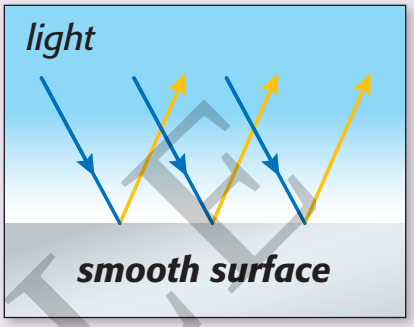
1. Cut two cards that are 8 in by 6 in (about 20 cm by 15 cm) out of the cardboard.
2. Wrap one card with a piece of smooth and flat foil with the shiny side facing out and the other card with a piece of crumpled foil.
3. Go into a dark room with the cards, the apple, and the flashlight.
4. Put the apple and the flashlight 40 in/1 m apart and 40 in/1 m away from a wall.



5. Place the card wrapped with the crumpled foil against the wall and shine the flashlight onto it.
6. Move and adjust the angle of the card to see whether you can see the apple itself being lit up and the reflection of the apple on the card.
7. Repeat Steps 5 and 6 using the card wrapped with the smooth and flat foil. Can you see the apple this time?

ISBN: 978-1-960500-12-0





In this experiment, when the flashlight shone on the card wrapped with the crumpled foil, the rough surface caused the light to scatter in different directions. This made it difficult to see a clear reflection of the apple on the foil.

On the other hand, when the flashlight shone on the card wrapped with the smooth foil, the light hit the card and was reflected off at the same angle. The smooth and flat surface of the foil allowed the light to bounce off in the same direction. Therefore, the image of the apple appeared clearly on the card.

This experiment showed that the surface of an object can affect how light behaves when it hits the surface. Rough surfaces, like the crumpled foil, scatter the light in different directions, making it harder to see clear reflections. Whereas smooth surfaces, like the smooth foil, reflect the light more uniformly, allowing us to see clear reflections.

Knowing how light interacts with different surfaces helps us understand why some objects appear shiny, while others look dull or rough.

ISBN: 978-1-960500-12-0

STEM INQUIRY

- What are some other materials that show good reflections of objects?

- Optical fibers are thin fibers that use light reflection to transmit light and information over a long distance. Do some research and find videos online with the permission from an adult to see how light bounces off the fiber's walls.

- If you are asked to build your own bedroom, will you use fairly smooth or textured surface for the floor and walls? Why?
- Design and build your own small-scale mirror maze. Adjust the angle of position of each mirror. Shine a flashlight on it. Observe the reflection and the light path.

- Look into a mirror. How is symmetry related to the reflected image in the mirror?

Fun to know

What Is "ƎɔNALUBMA"?

Have you ever wondered why the word in the front of an ambulance is spelled backward? This is because it is meant to be read in the rearview mirror of cars in front of the ambulance. Since it is seen through a mirror, "ƎɔNALUBMA" will be read as "AMBULANCE" for drivers.

Popular USA
ISBN: 978-1-960500-12-0