21st CENTURY SKILLS

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STEAM Reading

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Elementary
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Video Experiments

Matthew Broadhurst
Virginia Marconi

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Math

Elementary

2

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HOW TO USE THIS BOOK

STUDENT BOOK

KEY WORDS

A Look, listen, and repeat. 04

phr. get on

adj. crowded

phr. get off

n. rearview mirror

n. front

n. stop

B Listen and number the words. 05

READING

Listen and read. 06

Tom and Jenny got on the bus. It was 7 p.m. and the bus was full of people.

Tom said, "Wow, this bus is crowded!"

"Yes, it is," said Jenny.

After a while, Tom said, "Jenny, do you think we can get off? I don't think the bus driver can see us! There're too many people!"

Then Jenny said, "Don't worry. The bus driver can see everything. There's a rearview mirror at the

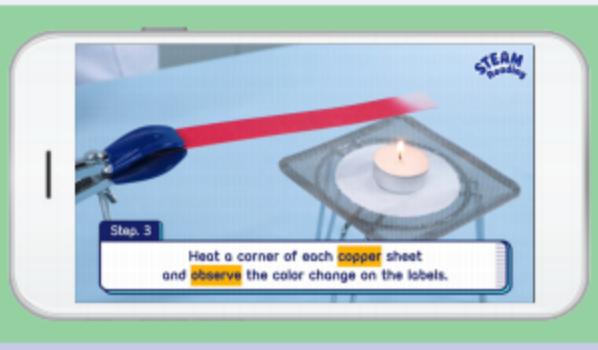
1 STEAM
Units are grouped together in pairs. Each pair of units has lessons on the same subject. Every unit focuses on one or more aspects of STEAM (Science, Technology, Engineering, Arts, Math).

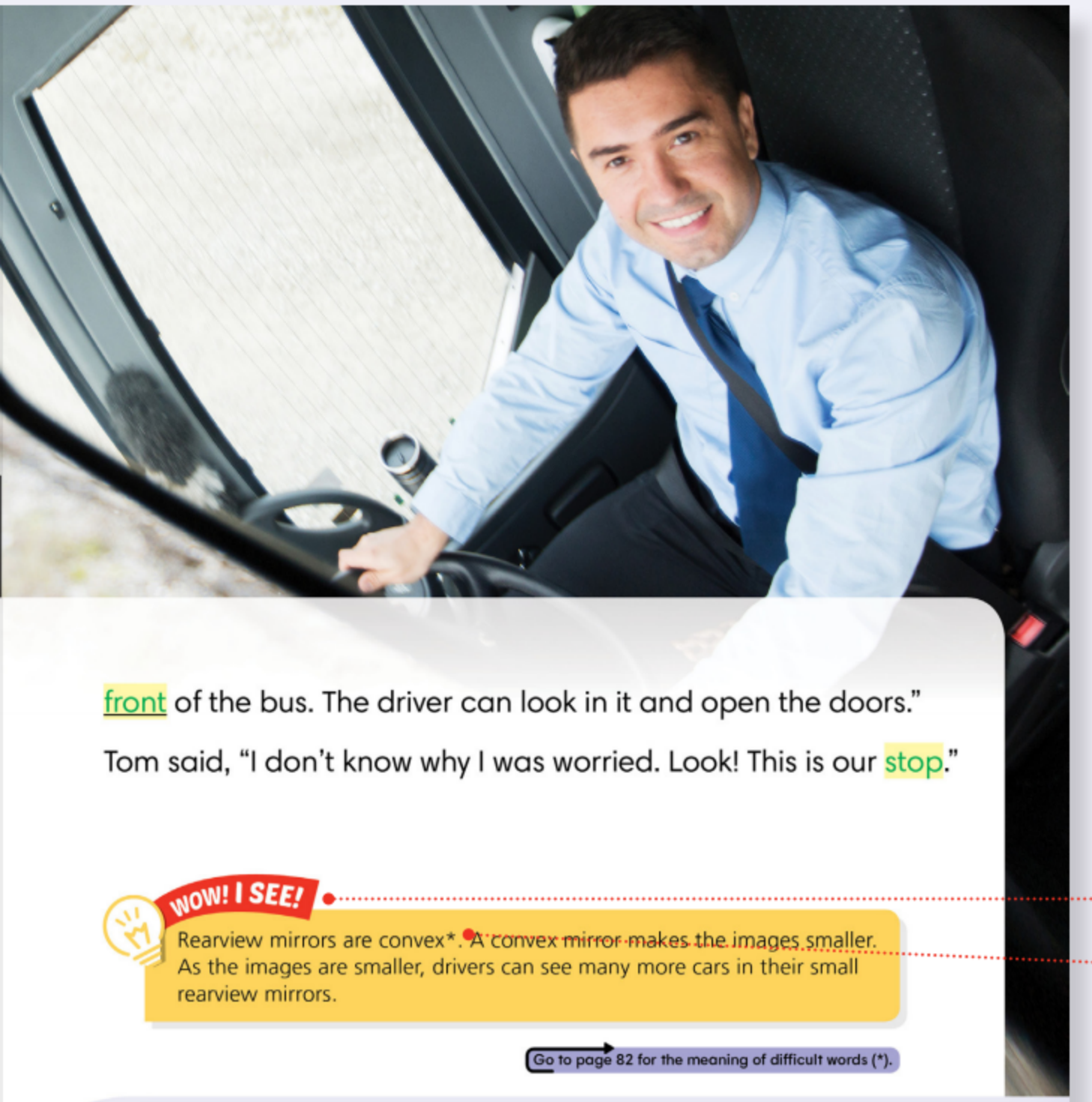
2 I WILL LEARN...
The academic objective of the unit is introduced to get students thinking.

3 QR CODES
Scan the audio QR CODE to listen to the key words and reading passages. In the experiment units, scan the video QR CODE to watch a video of a real experiment.

Video Experiments

Live-action videos take students step-by-step through all science experiments. This visual aid enhances their learning experience and makes the topic come alive.





front of the bus. The driver can look in it and open the doors."

Tom said, "I don't know why I was worried. Look! This is our stop."

WOW! I SEE!

Rearview mirrors are convex*. A convex mirror makes the images smaller. As the images are smaller, drivers can see many more cars in their small rearview mirrors.

Go to page 82 for the meaning of difficult words (*).

C **Circle the key words in the reading.**

D **Read and choose.**

1. Which is the opposite of crowded?
   a. full b. clear c. empty
2. What does front mean in the reading?
   a. straight b. forward c. behind

4 KEY WORDS
Every unit introduces new KEY WORDS that are necessary to understand the unit's topic. All key words are found in the READING and are illustrated with a photograph.

5 READING
Each READING is an introduction to the topic of the unit. The first unit in a pair introduces the subject through an experiment. The experiment is illustrated and easy to follow. The second unit features an engaging short story on the same topic.

6 WOW! I SEE!
This section goes into further detail on the concepts introduced in the READING.

7 WORDS WITH AN ASTERISK (*)
Difficult words in the unit are marked with an asterisk (*) and are explained in a word list at the back of the book.

8 SHORT ACTIVITIES
Short activities focus attention on the KEY WORDS and check understanding.

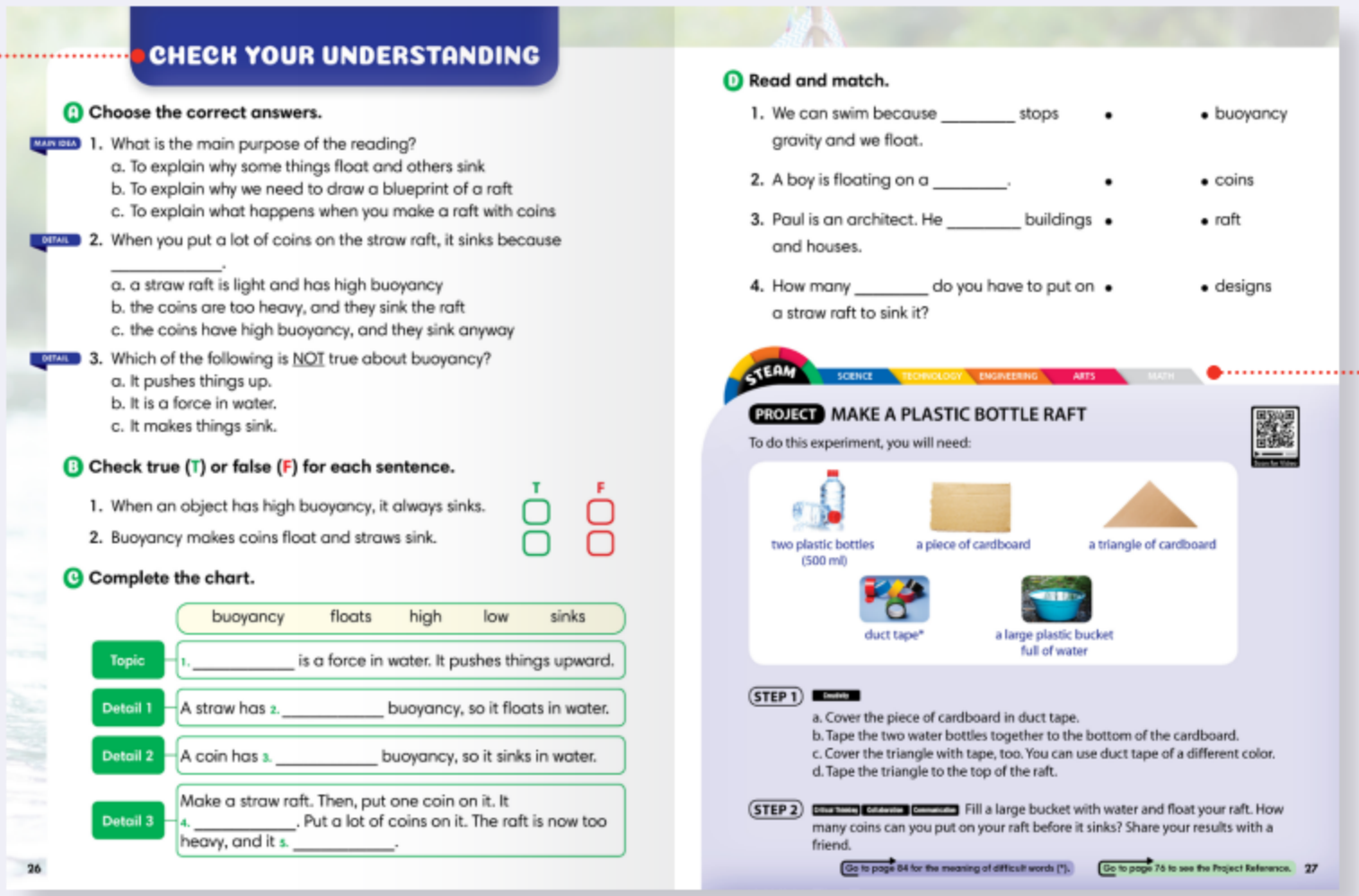
HOW TO USE THIS BOOK

CHECK YOUR UNDERSTANDING

This section features a range of activities to check both reading comprehension and understanding of the unit vocabulary.

STEAM PROJECT

The STEAM PROJECT ends the unit with a fun and interactive project that encourages individual creativity as well as collaboration. Project types include experiments, math problems, and arts & crafts. Experimental projects have a video available via QR code. Further explanation for certain projects can be found in the PROJECT REFERENCE at the end of the book.



CHECK YOUR UNDERSTANDING

A Choose the correct answers.

MAIN IDEA 1. What is the main purpose of the reading?
a. To explain why some things float and others sink
b. To explain why we need to draw a blueprint of a raft
c. To explain what happens when you make a raft with coins

DETAIL 2. When you put a lot of coins on the straw raft, it sinks because _____.
a. a straw raft is light and has high buoyancy
b. the coins are too heavy, and they sink the raft
c. the coins have high buoyancy, and they sink anyway

DETAIL 3. Which of the following is NOT true about buoyancy?
a. It pushes things up.
b. It is a force in water.
c. It makes things sink.

B Check true (T) or false (F) for each sentence.

	T	F
1. When an object has high buoyancy, it always sinks.	☐	☐
2. Buoyancy makes coins float and straws sink.	☐	☐

C Complete the chart.

buoyancy	floats	high	low	sinks

Topic	1. _____ is a force in water. It pushes things upward.
Detail 1	A straw has 2. _____ buoyancy, so it floats in water.
Detail 2	A coin has 3. _____ buoyancy, so it sinks in water.
Detail 3	Make a straw raft. Then, put one coin on it. It 4. _____. Put a lot of coins on it. The raft is now too heavy, and it 5. _____.

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D Read and match.

1. We can swim because _____ stops gravity and we float.	• buoyancy
2. A boy is floating on a _____.	• coins
3. Paul is an architect. He _____ buildings and houses.	• raft
4. How many _____ do you have to put on a straw raft to sink it?	• designs

STEAM SCIENCE TECHNOLOGY ENGINEERING ARTS MATH

PROJECT MAKE A PLASTIC BOTTLE RAFT

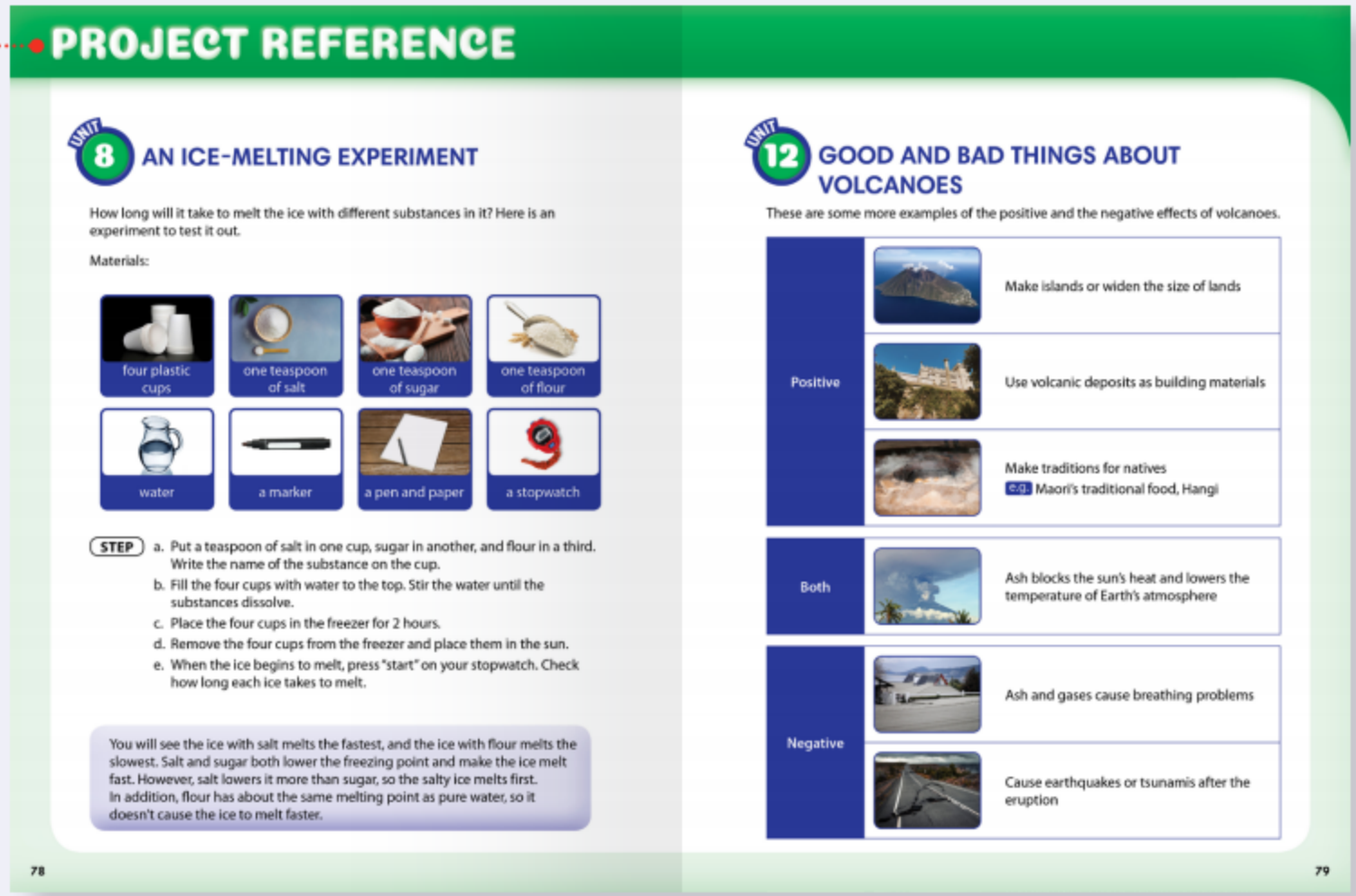
To do this experiment, you will need:

two plastic bottles (500 ml) · a piece of cardboard · a triangle of cardboard · duct tape* · a large plastic bucket full of water

STEP 1 Creativity
a. Cover the piece of cardboard in duct tape.
b. Tape the two water bottles together to the bottom of the cardboard.
c. Cover the triangle with tape, too. You can use duct tape of a different color.
d. Tape the triangle to the top of the raft.

STEP 2 Critical Thinking Collaboration Communication Fill a large bucket with water and float your raft. How many coins can you put on your raft before it sinks? Share your results with a friend.

Go to page 84 for the meaning of difficult words (*). Go to page 76 to see the Project Reference. 27



PROJECT REFERENCE

UNIT 8 AN ICE-MELTING EXPERIMENT

How long will it take to melt the ice with different substances in it? Here is an experiment to test it out.

Materials:

four plastic cups · one teaspoon of salt · one teaspoon of sugar · one teaspoon of flour · water · a marker · a pen and paper · a stopwatch

STEP
a. Put a teaspoon of salt in one cup, sugar in another, and flour in a third. Write the name of the substance on the cup.
b. Fill the four cups with water to the top. Stir the water until the substances dissolve.
c. Place the four cups in the freezer for 2 hours.
d. Remove the four cups from the freezer and place them in the sun.
e. When the ice begins to melt, press "start" on your stopwatch. Check how long each ice takes to melt.

You will see the ice with salt melts the fastest, and the ice with flour melts the slowest. Salt and sugar both lower the freezing point and make the ice melt fast. However, salt lowers it more than sugar, so the salty ice melts first. In addition, flour has about the same melting point as pure water, so it doesn't cause the ice to melt faster.

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UNIT 12 GOOD AND BAD THINGS ABOUT VOLCANOES

These are some more examples of the positive and the negative effects of volcanoes.

Positive		Make islands or widen the size of lands
		Use volcanic deposits as building materials
		Make traditions for natives e.g. Maori's traditional food, Hangi
Both		Ash blocks the sun's heat and lowers the temperature of Earth's atmosphere
Negative		Ash and gases cause breathing problems
		Cause earthquakes or tsunamis after the eruption

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PROJECT REFERENCE

PROJECT REFERENCE pages go into further detail of the concepts behind the project.

WORKBOOK

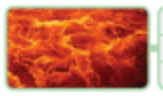
VOCABULARY PRACTICE
This checks students' understanding of the key words introduced in the Student Book unit.

SENTENCE PRACTICE
This is a sentence match activity featuring sentences taken from the unit reading.

11 A VOLCANIC ERUPTION

VOCABULARY PRACTICE

A Circle the correct word. Then write it.

1.  magma / mixture / liquid — _____
2.  lava / lake / volcano — _____
3.  lava / liquid / mountain — _____
4.  water / vinegar / lava — _____
5.  water / clay / detergent — _____
6.  erupt / shake / die — _____

B Complete the sentences with the words from the box. One word is not used.

detergent erupted lava vinegar volcano

1. When the people saw the ash cloud coming out of the _____, they left their homes in a hurry.
2. Lava and ash came out of the top of the volcano when it _____.
3. The red, hot _____ was flowing out of the volcano like a river.
4. Mix the oil with the _____ and pour it on the salad.

SENTENCE PRACTICE

Match the sentences and write.

1. There are	• the molten rock comes out.
2. When volcanoes erupt,	• shake it to mix the contents well.
3. Let's make a mini	• and observe what happens.
4. Close the bottle and	• rocks deep inside Earth.
5. Pour vinegar in the volcano crater	• volcano and watch it erupt.

1. _____
2. _____
3. _____
4. _____
5. _____

SUMMARY

Complete the summary. One word is not used.

clay deep detergent erupts islands lava magma

1. _____ inside Earth, it's so hot that rocks melt. Molten rock is called magma. When 2. _____ comes out of the volcano, we call it 3. _____. Lava is dangerous because it's very hot, but it can also make new 4. _____ when it cools down. To make a mini volcano, we need a plastic bottle, baking soda, some drops of red food coloring, and some kitchen 5. _____. We close and shake the bottle to mix the ingredients. Then, we place the bottle on a plate and make a volcano around it using 6. _____. We open the lid of the bottle and pour in vinegar. Fake lava comes out of our model volcano.

SUMMARY
This is a recap of the unit's reading passage. Students are able to check their understanding of the ideas introduced in the unit.

TABLE OF CONTENTS

UNIT / PAGE	STEAM	DETAILS	
9 Page 40	S	Title	THE POWER OF PULLEYS / WC: 98
	T	Academic Objective	Learn about pulleys and how to lift things easily
	E	Vocabulary	lift, pulley, wheel, loose, wrap, distribute
	A	STEAM Project	How Pulleys Make Life Easier
	M		**21st Century Skills:** Critical Thinking, Communication
10 Page 44	S	Title	INVENTIONS OF THE PAST / WC: 103
	T	Academic Objective	Learn more about pulleys
	E	Vocabulary	fortress, electricity, easily, work, carry, need
	A	STEAM Project	More About Pulleys
	M		**21st Century Skills:** Critical Thinking
11 Page 48	S	Title	A VOLCANIC ERUPTION / WC: 100
	T	Academic Objective	Learn about volcanoes and volcanic eruptions
	E	Vocabulary	magma, volcano, erupt, lava, detergent, vinegar
	A	STEAM Project	Learn About Volcanoes
	M		**21st Century Skills:** Critical Thinking
12 Page 52	S	Title	VOLCANOES: GOOD OR BAD? / WC: 113
	T	Academic Objective	Learn more about volcanoes
	E	Vocabulary	worried, danger, cause, ash, surface, hot spring
	A	STEAM Project	Good and Bad Things About Volcanoes
	M		**21st Century Skills:** Critical Thinking, Collaboration, Communication
13 Page 56	S	Title	THE FAULTS IN OUR EARTH / WC: 89
	T	Academic Objective	Learn about earthquakes
	E	Vocabulary	crust, puzzle, crack, fault, spine, relax
	A	STEAM Project	Earthquake Experiment
	M		**21st Century Skills:** Critical Thinking, Collaboration
14 Page 60	S	Title	EARTHQUAKE SAFETY / WC: 127
	T	Academic Objective	Learn more about earthquakes
	E	Vocabulary	grab, news report, fall down, turn off, power, elevator
	A	STEAM Project	Do During an Earthquake
	M		**21st Century Skills:** Critical Thinking, Communication
15 Page 64	S	Title	MACHINES ALL AROUND / WC: 104
	T	Academic Objective	Learn about machines and mechanical engineers
	E	Vocabulary	complicated, mechanical, industry, turn on, switch, fridge
	A	STEAM Project	Let's Make Our Own Lift
	M		**21st Century Skills:** Critical Thinking, Collaboration
16 Page 68	S	Title	UNDERWATER EXPLORERS / WC: 100
	T	Academic Objective	Learn about archaeology and underwater archaeologists
	E	Vocabulary	important, archaeologist, dig, percent, item, underwater
	A	STEAM Project	Are You a Good Archaeologist?
	M		**21st Century Skills:** Critical Thinking, Creativity, Communication

• Project Reference / Page 74 • Word List / Page 82

STEAM 1

I will learn... about how light moves.

LIGHT TRAVELS

Scan for Audio

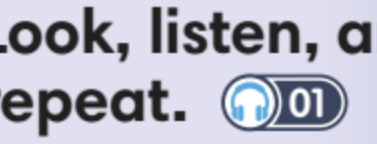
KEY WORDS

A Look, listen, and repeat. 01

adj. straight

n. flashlight

n. direction



n. target

prep. toward

n. reflection

B Listen and number the words. 02

WARM-UP

What do you see when you put an object in front of a mirror?

READING

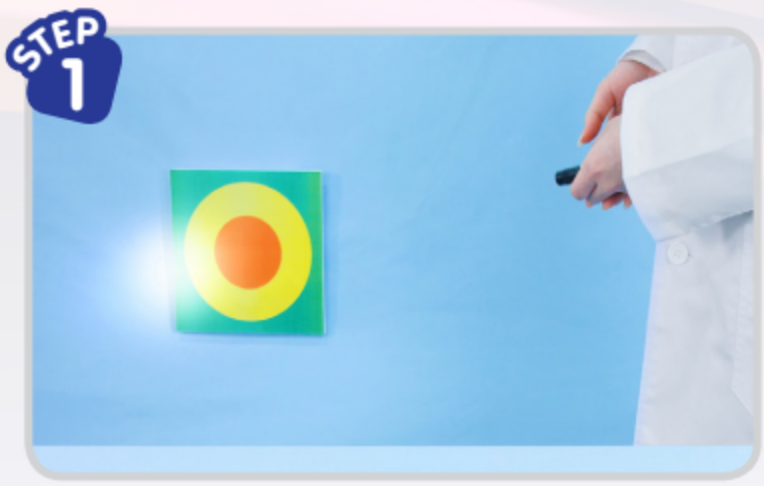
Listen and read. 03

Scan for Video

Light travels in a straight line. How do we know this? Turn on a flashlight. The light moves away from the flashlight. It moves in a straight line. When light hits a mirror, what happens to it? Does it keep going? Does it change direction?

Let's find out.

You need a mirror, a flashlight, and a target.



Put the target on the wall and shine the flashlight at it.

Use the mirror to change the direction of the light. Make the light go toward the target.

When light hits a mirror, it changes direction. This is called reflection.

We can change the direction of the light by moving the mirror.

Look around you.

A bus driver uses her rearview mirror to see who is getting off the bus. She doesn't need to turn her head.

Where else can you see reflections every day?

C Circle the key words in the reading.

D Read and choose.

1. What does target mean in the reading?
   a. goal b. mirror c. block

2. Which is the opposite of toward?
   a. into b. near c. away from

CHECK YOUR UNDERSTANDING

A Choose the correct answers.

MAIN IDEA **1.** What is the main purpose of the reading?

a. Light moves in a straight line through a mirror.
b. Light changes direction when it hits a flashlight.
c. Light changes direction when it bounces off a mirror.

DETAIL **2.** Bus drivers use _____ to see people getting off the bus.

a. target b. flashlight c. reflection

DETAIL **3.** Which of the following does light NOT do according to the reading?

a. Move in a straight line b. Change shape c. Bounce off

B Check true (T) or false (F) for each sentence.

	T	F
1. Light moves in a straight line when it comes out of a flashlight.	☐	☐
2. The bus driver uses a rearview mirror to turn her head.	☐	☐

C Complete the chart.

Topic	Reflection happens when light hits a mirror and changes direction.
Detail 1	Light travels in 1. _____.
Detail 2	A mirror can change 2. _____.
Detail 3	Bus drivers use 3. _____.

a. the direction of light and we call this reflection
b. reflection to see people getting off the bus
c. a straight line from the flashlight to the target

D Choose the correct word.

1. You need a _____ when you find your keys under the bed.
   a. telephone b. flashlight c. plate

2. When we look in a mirror, we can see our _____.
   a. reflection b. bouncer c. direction

3. Are we walking in the right _____? There are no stores on this road.
   a. toward b. direction c. reflection

4. This line isn't _____. Why don't you use a ruler to draw it?
   a. straight b. bent c. thin

STEAM — SCIENCE | TECHNOLOGY | ENGINEERING | ARTS | MATH

PROJECT REFLECTING LIGHT

Scan for Video

To do this experiment, you will need:


a ball


a mirror


a flashlight

STEP 1 Critical Thinking

a. Turn off the light so the room is dark. Turn on the flashlight and put it on a table. Where does the light go?

b. Hold a mirror in front of the flashlight. Does the light go to the same place? Where does it go?

STEP 2 Critical Thinking Creativity

a. Place the ball close to the flashlight. Move the mirror so you can get the light to reach the ball.

b. Keep moving the mirror so the light hits different objects in the room.

STEP 3 Critical Thinking Collaboration

Complete the sentences using the word bank below.

direction	light	reflection	straight	targets	toward

Light always moves in a **1.** _____ line. When **2.** _____ hits the mirror, it bounces off in a different **3.** _____. We call this **4.** _____. We can use it to make the light go **5.** _____ different **6.** _____.

Go to page 74 to see the Project Reference.