

# STEAM

# Reading

Elementary

3

Science  
Technology  
Engineering  
Arts  
Math

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1

2

3

4

5

STEAM 11

**KEY WORDS**

**A** Look, listen, and repeat.  31

 *adj.* various

 *adj.* recognizable

 *n.* constellation

 *n.* light box

 *v.* shine

 *n.* ceiling

**B** Listen and number the words.  32

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I will learn... about stars and constellations.

# ALL THE STARS IN THE SKY

 Scan for Audio

**WARM-UP**  
Do you know of any constellations?  
Can you name them?

 Scan for Video

**READING**  
Listen and read.  33

There are **various** stars in the night sky. People group the bright stars together into **recognizable** shapes called **constellations**. Some of them look like people or animals.

Let's make a **light box** and see the constellations at home.



### 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.





**STEP 1**  
Look at a map of the stars. Make holes in the lid of a box to match one constellation.



**STEP 2**  
Make a large hole in the bottom of the box. Put a flashlight in the hole.



**STEP 3**  
Show your friends the constellation light box that you made. Go to a dark room, shine the flashlight at the ceiling or the walls, and enjoy the constellation show.

Constellations are different in summer and winter.

This is because Earth moves around the sun. As Earth moves in space, we can see different stars.



**WOW! I SEE!**

There are twelve zodiac\* constellations. They are: Aquarius, Pisces, Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpius, Sagittarius, and Capricorn.

Go to page 87 for the meaning of difficult words.

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

**D** Read and choose.

1. What does various mean in the reading?  
a. two equal things      b. many different things      c. only one thing
2. What does show mean in the reading?  
a. display      b. film      c. light

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#### 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.

## 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.**

- What is the main purpose of the reading?
  - To explain how heat transfers from cold to hot
  - To explain how heat transfers through a solid substance
  - To explain how heat transfers through a liquid substance
- Thermochromic adhesive labels to the copper sheets are used to
  - observe how much the temperature rises
  - observe how heat moves from cool to hot
  - observe how the color of the labels changes as heat transfers
- Which of the following is **NOT** needed in the experiment?
  - Heat
  - Ice cubes
  - Copper sheets

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

- When you heat one end of an object, the heat transfers to the whole object. T  F
- Heat transfers from a high temperature to a low temperature. T  F

**C Draw the direction in which the heat transfers in the experiment.**

**B Choose the correct word.**

- Be careful with that \_\_\_\_\_! I put the spoon in the soup pot, and it's very hot.
  - top
  - handle
  - door
- \_\_\_\_\_ is the way heat transfers through substances.
  - Conduction
  - Evaporation
  - Condensation
- We use \_\_\_\_\_ to make lots of things like pipes, pots, and pans.
  - water
  - copper
  - wood
- Please \_\_\_\_\_ very carefully how the sheet changes color.
  - observe
  - take care
  - reach

**STEAM PROJECT GOOD AND BAD CONDUCTORS\***

Some materials conduct or transfer heat better than others. Let's see which materials are good conductors and which are bad conductors.

To do this experiment, you will need:

**STEP 1** Place one stick in each bowl. Place a small cube of butter at the top end of each stick. Fill each bowl with hot water. What happens?

**STEP 2** Choose the correct words. Then answer the questions. Different materials transfer heat at **different / the same** rates. So they melt the butter at **different / the same** speeds. Some substances are better at conducting heat than others. Which transfers heat faster? Copper or wood? \_\_\_\_\_ Aluminum or plastic? \_\_\_\_\_ Aluminum or copper? \_\_\_\_\_

### PROJECT REFERENCE

**9 WHAT DISSOLVES IN WATER?**

Not all substances dissolve in water like sugar does. Let's see what dissolves and what doesn't with a simple experiment.

**Materials:**

**STEP**

- Put a spoonful of each substance into each jar.
- Add one cup of warm water to each jar. Make sure you pour the same volume of water in each jar.
- Stir each jar. Wait for one minute.
- Which materials dissolved? Which didn't?

In this experiment, brown sugar, black pepper powder, and flour dissolved. Pepper grains and sprinkles didn't. Powdered substances dissolve better than grained substances. To make something dissolve faster, you can break up the substance, stir the mixture, or heat the mixture.

**11 MAKE A CONSTELLATION**

You can see beautiful constellations in your room. Let's make one together!

**Materials:**

**STEP**

- Choose a constellation that you want to make and draw it.
- Now, sprinkle some white watercolor on the black plate to make the stars.
- Draw the constellation on the plate. Glue each star in its place in the constellation.
- Use your white felt tip pen to join the stars to look like a constellation.
- Write the name of your constellation at the top of the plate.

There are eighty-eight officially recognized constellations in our universe. There are five major constellations. See the images below.

## 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.


7 **HEAT TRANSFER**

### VOCABULARY PRACTICE

**1** Circle the correct word. Then write it.




attach  
close  
finish




hear  
play  
observe

---




window  
handle  
spoon




copper  
tin  
can

---



tie  
spray  
involve



conduction  
evaporation  
condensation

---

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

attach
copper
handle
involved
observed

1. Don't forget to \_\_\_\_\_ a label to the package.
2. Be careful with that spoon \_\_\_\_\_. It was near the stove, so it's very hot.
3. We \_\_\_\_\_ this plant closely for a few weeks.
4. Mom has a(n) \_\_\_\_\_ pot to make coffee. It becomes hot very quickly.

### SENTENCE PRACTICE

Match the sentences and write.

1. When you heat part of a solid material, \_\_\_\_\_ to the rest of the object.
2. Then the heat moves \_\_\_\_\_ color is the part near the fire.
3. But the spoon handle \_\_\_\_\_ to a low temperature.
4. The first part of the sheet to change \_\_\_\_\_ wasn't inside the soup.
5. Heat transfers from a high temperature \_\_\_\_\_ that part gets hotter.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

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### SUMMARY

Complete the summary. One word is not used.

attach
conduction
copper
fire
handle
involve
observe

When you leave a spoon in a hot pot of soup, its 1. \_\_\_\_\_ becomes hot. We call this 2. \_\_\_\_\_. This means that when you heat one end of an object, heat moves through it. The whole object becomes hot. Let's 3. \_\_\_\_\_ thermochromic labels to three 4. \_\_\_\_\_ sheets. Then let's heat a corner of each copper sheet and 5. \_\_\_\_\_ what happens. The corner near the 6. \_\_\_\_\_ changes color first. Then the rest of the sheet changes color. This shows that heat transfers from a high temperature to a low temperature.

## 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	
<b>1</b> Page 8	S T E A M	Title	WHAT'S THE TEMPERATURE? / WC: 105
		Academic Objective	Learn about thermometers and how to measure temperature
		Vocabulary	thermometer, exact, add, food coloring, horizontal, show
		STEAM Project	Fahrenheit Scale to Celsius Scale <b>21st Century Skills:</b> Critical Thinking, Collaboration, Communication
<b>2</b> Page 12	S T E A M	Title	JAMES FEELS HOT / WC: 110
		Academic Objective	Learn more about thermometers and temperature
		Vocabulary	cough, forehead, stuff, alcohol, reason, botanical
		STEAM Project	Types of Thermometers <b>21st Century Skills:</b> Critical Thinking, Collaboration
<b>3</b> Page 16	S T E A M	Title	MELTING POINTS / WC: 132
		Academic Objective	Learn about the melting points of substances
		Vocabulary	movie, finish, speed, at the same time, order, melting point
		STEAM Project	Melting Ice Experiment <b>21st Century Skills:</b> Critical Thinking, Creativity, Collaboration
<b>4</b> Page 20	S T E A M	Title	THE CASE OF THE DISAPPEARING SNOWMAN / WC: 133
		Academic Objective	Learn more about the melting points of substances
		Vocabulary	wake up, snowman, grandparent, tasty, below, Celsius
		STEAM Project	What Melts in the Sun? <b>21st Century Skills:</b> Critical Thinking, Creativity, Collaboration
<b>5</b> Page 24	S T E A M	Title	WET AND DRY / WC: 132
		Academic Objective	Learn about humidity
		Vocabulary	humidity, sweat, hygrometer, arrow, cardboard, expand
		STEAM Project	Humidity Effects <b>21st Century Skills:</b> Critical Thinking
<b>6</b> Page 28	S T E A M	Title	HOT AND HUMID / WC: 133
		Academic Objective	Learn more about humidity
		Vocabulary	sticky, go bad, harmful, not at all, skin, breathe
		STEAM Project	Crossword Puzzle <b>21st Century Skills:</b> Critical Thinking, Communication
<b>7</b> Page 32	S T E A M	Title	HEAT TRANSFER / WC: 116
		Academic Objective	Learn about the way heat transfers
		Vocabulary	handle, conduction, involve, copper, attach, observe
		STEAM Project	Good and Bad Conductors <b>21st Century Skills:</b> Critical Thinking, Collaboration
<b>8</b> Page 36	S T E A M	Title	INSULATING ICE / WC: 115
		Academic Objective	Learn about insulation from the cold
		Vocabulary	igloo, magazine, insulation, heat, escape, North Pole
		STEAM Project	Which Is the Best Insulating Material? <b>21st Century Skills:</b> Critical Thinking, Collaboration

UNIT / PAGE	STEAM	DETAILS	
9 Page 40	S T E A M	Title	DISSOLVING SUBSTANCES / WC: 102 🎧
		Academic Objective	Learn about substances that dissolve into other substances
		Vocabulary	another, dissolution, beaker, electronic, cube, completely
		STEAM Project	What Dissolves in Water? 🎧 <b>21st Century Skills:</b> Critical Thinking, Creativity
10 Page 44	S T E A M	Title	SOLVENTS AND SOLUTES / WC: 139
		Academic Objective	Learn more about solvents and solutes
		Vocabulary	coffee, bitter, online, dissolve, solute, solvent
		STEAM Project	Problems With Solvents and Solutes <b>21st Century Skills:</b> Critical Thinking, Creativity, Collaboration
11 Page 48	S T E A M	Title	ALL THE STARS IN THE SKY / WC: 127 🎧
		Academic Objective	Learn about stars and constellations
		Vocabulary	various, recognizable, constellation, light box, shine, ceiling
		STEAM Project	Make a Constellation <b>21st Century Skills:</b> Critical Thinking, Creativity, Communication
12 Page 52	S T E A M	Title	ORION AND THE BIG DIPPER / WC: 129
		Academic Objective	Learn more about stars and constellations
		Vocabulary	camping, campfire, fog, point, spot, ladle
		STEAM Project	How to Find North in the Stars <b>21st Century Skills:</b> Critical Thinking, Collaboration, Communication
13 Page 56	S T E A M	Title	WATER IN THE AIR / WC: 123 🎧
		Academic Objective	Learn about dew and fog
		Vocabulary	dew, form, branch, wipe, incense stick, take out
		STEAM Project	Is Fog Always the Same? <b>21st Century Skills:</b> Critical Thinking, Creativity, Communication, Collaboration
14 Page 60	S T E A M	Title	STEAMING HOT SOUP / WC: 112
		Academic Objective	Learn more about fog and water vapor in the air
		Vocabulary	foggy, come out from, cool down, steam up, have a shower, get home
		STEAM Project	What Is Happening With Water Vapor? <b>21st Century Skills:</b> Critical Thinking, Collaboration, Communication, Creativity
15 Page 64	S T E A M	Title	AEROSPACE ENGINEERS / WC: 128
		Academic Objective	Learn about planes, rockets, and aerospace engineers
		Vocabulary	invent, aerospace, drone, satellite, rocket, universe
		STEAM Project	Make a Flying Saucer 🎧 <b>21st Century Skills:</b> Creativity, Critical Thinking, Collaboration, Communication
16 Page 68	S T E A M	Title	3D PRINTING / WC: 135
		Academic Objective	Learn about 3D printing
		Vocabulary	install, software, deliver, expensive, artificial, heart
		STEAM Project	Make a Spaceship <b>21st Century Skills:</b> Creativity, Communication

# STEM 1

I will learn... about thermometers and how to measure temperature.

# WHAT'S THE TEMPERATURE?



Scan for Audio

## KEY WORDS

**A** Look, listen, and repeat. 01



*n.* thermometer



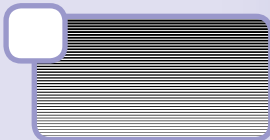
*adj.* exact



*v.* add



*n.* food coloring



*adj.* horizontal



*v.* show

**B** Listen and number the words. 02

## WARM-UP

What happens when you put a thermometer in the sun?



Scan for Video

## READING

Listen and read. 03

**Thermometers** tell us when it is hot or cold. They tell us the **exact** temperature. We use them in our daily lives.

How do they work?

Can we make our own thermometer?

Let's make a thermometer with everyday materials.



STEP 1

Pour water into a small bottle and **add** a few drops of **food coloring**.







STEP 2  
Poke a small hole in the lid.



STEP 3  
Close the lid. Put the straw through the hole so it touches the water. Seal it with clay.



STEP 4  
Draw **horizontal** lines on a piece of paper and put it on the straw.

What did we see?

When the temperature was warm, the water went up inside the straw.

When the temperature was cold, the water went down into the bottle.

How does it work? Liquids increase when they meet something warm.

The water moves up the straw. Water decreases when it meets something cold. So, it moves down the straw.

The thermometer **showed** us the change in temperature.



**WOW! I SEE!**

There are three scales to measure temperature: The **Celsius scale** is used in most countries in the world. The **Fahrenheit scale** is used in the USA. The **Kelvin scale** is mainly used in science and technology. Zero degrees is different on each scale.

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

**D** Read and choose.

1. What does exact mean in the reading?

a. correct

b. incorrect

c. usual

2. What does work mean in the reading?

a. earn money

b. be employed

c. have an effect

# CHECK YOUR UNDERSTANDING

## A Choose the correct answers.

MAIN IDEA

1. What is the main purpose of the reading?

- a. We use thermometers to measure how hot or cold it is.
- b. We use thermometers when the water goes up the straw.
- c. We use thermometers to measure how high the water can go up.

DETAIL

2. The colored water goes down the straw because liquids \_\_\_\_\_ when it is cold.

- a. become bigger
- b. become smaller
- c. do not change

DETAIL

3. Which of these things does a thermometer NOT tell us?

- a. How heavy it is
- b. How hot it is
- c. How cold it is

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

1. Thermometers can tell us the exact temperature.

T

F

2. The water moves down the straw when it's hot.

## C Complete the chart.

add    changes    draw    food coloring    goes down    goes up

**Topic** — How to make our own thermometer

**Step 1** — Pour water into a small water bottle. 1. \_\_\_\_\_ a few drops of 2. \_\_\_\_\_.

**Step 2** — Poke a small hole in the lid of the bottle. Close the lid.

**Step 3** — Put the straw through the hole. Seal it with clay.  
3. \_\_\_\_\_ some horizontal lines on a piece of paper.  
Put it on the straw.

**Conclusion** — When the temperature is warm, the water 4. \_\_\_\_\_ the straw. When it is cold, the water 5. \_\_\_\_\_ the straw. This is how a thermometer shows us that temperature 6. \_\_\_\_\_.

## D Choose the correct word.

- I feel too hot. Where's the \_\_\_\_\_? I think I have a cold.  
a. telephone                      b. thermometer                      c. fridge
- The electronic thermometer \_\_\_\_\_ the temperature immediately.  
a. showed                      b. painted                      c. counted
- He wants a blue cake. Can you get me some \_\_\_\_\_ from the store?  
a. drops                      b. food coloring                      c. thermometers
- I've put in the eggs, the flour, and the butter. Do I need to \_\_\_\_\_ anything else?  
a. add                      b. take out                      c. change



SCIENCE

TECHNOLOGY

ENGINEERING

ARTS

MATH

### PROJECT FAHRENHEIT SCALE TO CELSIUS SCALE

On the Celsius scale, water boils at 100°C and freezes at 0°C. On the Fahrenheit scale, water boils at 212°F and freezes at 32°F. So one degree Celsius is 1.8 times bigger than one degree Fahrenheit.

#### STEP 1 **Critical Thinking**

- To convert\* Fahrenheit to Celsius, we have to apply this formula\*:

$$^{\circ}\text{C} = (^{\circ}\text{F} - 32) / 1.8$$

Imagine you hear it's 60°F outside. If you apply\* the formula,

$$(60 - 32) / 1.8 = 15.5^{\circ}\text{C}$$

- Now, let's see how to convert Celsius to Fahrenheit. This is the formula:

$$^{\circ}\text{F} = (^{\circ}\text{C} \times 1.8) + 32$$

Imagine you hear it's 30°C outside.

$$(30 \times 1.8) + 32 = 86^{\circ}\text{F}$$

#### STEP 2 **Critical Thinking** **Collaboration** What's the temperature?

- Convert 25° Celsius to Fahrenheit. \_\_\_\_\_
- Convert 98.6° Fahrenheit to Celsius. \_\_\_\_\_
- Convert 10° Celsius to Fahrenheit. \_\_\_\_\_
- Convert 120° Fahrenheit to Celsius. \_\_\_\_\_

#### STEP 3 **Communication** Share your results with a friend.