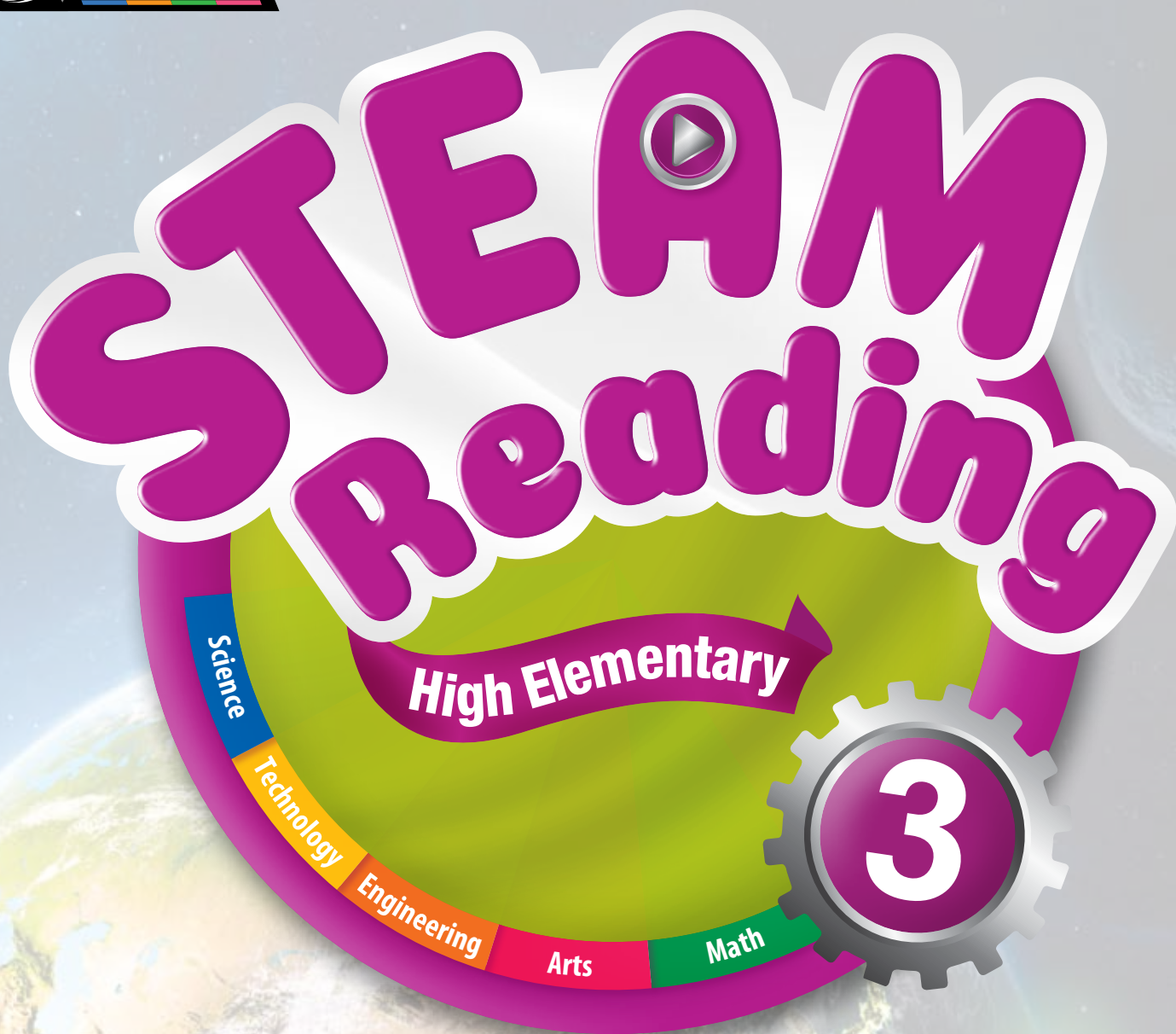




1

2

3

4

5



KEY WORDS

A Look, listen, and repeat. 37



phr. far away



adv. over



n. rainbow



n. wall



v. control



phr. come back



v. split



n. droplet

B Listen and number the words. 38

I will learn... about reflection and refraction.

THE WONDER OF RAINBOWS



WARM-UP

Do you know how rainbows are created?



READING

Listen and read. 39

Refraction and reflection are two ways of moving light.

Look at a bird with binoculars. It looks close even though it's **far away**. That's because of refraction. Binoculars bend and focus the light.

The birds fly **over** a lake. You can see them in the water. The light bounces off the water and is reflected. Let's look at reflection and refraction at the same time. We will make our own **rainbow**!

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
Fill a transparent glass with water. Put the mirror in the water at an angle.



STEP 2
Place the glass near a window so the sun can shine on the mirror.



STEP 3
Check the reflection on the wall. **Control** the angle of the glass to make a rainbow on the wall.

How did this work?

The sunlight was refracted as it entered the water. It slowed down and changed direction. Then the light hit the mirror. It was reflected. It bounced off the mirror and **came back**. As it left the water, it was refracted again.

Light is made of many colors. We usually see it as only white. When the light hit the mirror and left the water, the light was **split** up into different colors.

We saw a rainbow.

In nature, we only see rainbows when the sun shines after it rains. There are water **droplets** in the air. Light is refracted and reflected like in the experiment.

Aren't rainbows amazing?

c Read and choose.

1. What does it mean in the reading?
a. the bird b. the light c. the rainbow
2. What does come back mean in the reading?
a. go away from b. return c. stay away

57

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 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

1. Choose the correct answers.

- What is the main purpose of the reading?
 - To explain how reflection causes refraction to happen
 - To explain how refraction and reflection create light from nothing
 - To explain how refraction and reflection split light into different colors
- When the light hit the water and mirror, _____.
 - the colorful sunlight become white
 - the white sunlight was split into many colors
 - the white sunlight was split into a red and green rainbow
- Which of the following is **NOT** true about refraction?
 - It makes far away things look closer when we use binoculars.
 - Refraction can make rainbows without the need for reflection.
 - It happens when light slows down and changes direction as it enters water.

2. Circle T for true or F for false. Correct the false statements.

- We see rainbows when the sun shines after a windy day. T F
- Rainbows are made by sunlight hitting water droplets under the ground. T F

3. Complete the chart.

	Reflection	Refraction
How it changes light	Bounces the light back	_____
Where we see it	Mirrors	Lenses
What it happens to a rainbow	When light hits the back of a raindrop	When light _____

PROJECT RAINBOW PRISM*

To do this experiment, you need:

- A glass prism
- White paper

STEP 1: Place the white paper flat near sunlight. Put the prism closer or on the paper. Rotate the prism until you see a rainbow on the paper.

STEP 2: Read about the colors in a rainbow. The colors of a rainbow are always in the same order. Light always splits in the following order: red, orange, yellow, green, blue, indigo, and violet.

STEP 3: Draw a rainbow in the colors you see. Write the colors in the order you see them.

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.

PROJECT REFERENCE

7 MAKE YOUR OWN COMPASS

You can easily make your own compass and find the directions.

Materials:

- a round magnet
- scissors
- a card
- tape
- a bowl of water
- a pin

STEP:

- Cut a circle shape out of the card.
- Glue the magnet to the card, so it sticks up.
- Put the compass in the water. Watch the compass move. It will always point north.
- Take the compass out of the water and write N, E, S, and W around the edges.

A magnet will always point to Earth's magnetic north. If it can move freely, when we put the magnet in the water, it can move freely, so it lines itself up with the north. Even if we spin the compass or put it in the water in a different direction, it will still move to point north.

9 SUGAR AND YEAST BALLOONS

What happens when you put sugar and yeast together? Let's check it out.

Materials:

- four bottles
- very warm water
- four balloons
- yeast flour packet
- sugar
- a spoon
- a funnel

STEP:

- Fill each bottle with the same amount of water (at about 40 degrees Celsius).
- Use the funnel to pour a pack of yeast into each bottle.
- In the first bottle, do not add sugar. Add one spoon of sugar in the second, put two spoons of sugar in the third, and put three spoons of sugar in the fourth.
- Close the lids and shake the bottles. Put a balloon on top of each bottle and wait a few hours. What happens?

Yeast is a living organism that actually eats sugar. As it eats the sugar, it produces a gas called carbon dioxide. The gas can't escape, so it fills the bottle and then begins to fill the balloons. Yeast is what makes the holes in bread that make it light and airy. It eats the sugar in the bread dough and creates small gas bubbles in the bread.

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.

COMPREHENSION PRACTICE

These questions focus on a passage from the reading and check students' understanding of the text.

3

LIGHT ENERGY

VOCABULARY PRACTICE

A Match and write.

1.	Old planes had _____ that moved them through the air.
2.	_____ the lettuce into the small pieces and add to the salad.
3.	Kara's mom works in a lab and experiments with _____ reactions.
4.	Earth spins on a tilted _____.

B Choose the correct words.

- A person running in a race is using _____ energy.
a. solar b. kinetic c. sonic
- Eric went to the counter to _____ his points into cash to spend in the store.
a. convert b. power c. tear
- Jenny took her car to the mechanic to take a look at the _____.
a. lens b. piece c. motor
- After making a smoothie, Wanda cleaned the _____ in her blender.
a. blades b. propellers c. clips

COMPREHENSION PRACTICE

Read the following passage and choose the correct answers.

The electric energy from the battery powered the motor. ① The electric energy became kinetic energy when the propeller turned. So, light energy turns into electric energy. ② We can't see the energy change forms because it happens so quickly. ③

- What is the main idea of this passage?
a. How solar energy turns the propeller
b. How gravitational energy turns the energy
c. How energy is converted and then turns the propeller
- What is the best place for the sentence below?
Then electric energy turns into kinetic energy.
a. ① b. ② c. ③
- What does **turn** mean in the passage?
a. convert b. move c. change

SUMMARY

Complete the summary. One word is not used.

chemical convert electricity energy kinetic motor powered solar

Sunlight is a great source of power. Plants need it to grow. They 1. _____ light energy from the sun into 2. _____ energy. This helps them grow big and strong. In the same way, solar batteries turn light energy into electric energy. In the experiment, we connected a(n) 3. _____ battery to a motor and a propeller. Light energy from the sun 4. _____ the solar battery. The battery turned this into electric energy. The electric energy then powered the motor. Finally, the 5. _____ turned electric energy into 6. _____ energy and turned the propeller. The conversion of 7. _____ happens quickly and invisibly.

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.

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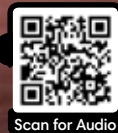
UNIT / PAGE	STEAM	DETAILS	
1 Page 8	S T E A M	Title	MUSCLES MOVE OUR BODIES / WC: 182 🎧
		Academic Objective	Learn about how muscles move bones
		Vocabulary	stretch, muscle, locomotive, organ, structure, lung, surround, extend
		STEAM Project	Bone Ghost Leg Game 21st Century Skills: Critical Thinking, Creativity, Communication
2 Page 12	S T E A M	Title	AMAZING BONES / WC: 181
		Academic Objective	Learn about different types of bones
		Vocabulary	bravely, skull, rib, bamboo, orthopedic, x-ray, recommend, calcium
		STEAM Project	Make the Muscular System of a Hand 🎧 21st Century Skills: Critical Thinking
3 Page 16	S T E A M	Title	LIGHT ENERGY / WC: 134 🎧
		Academic Objective	Learn about different types of energy
		Vocabulary	convert, chemical, tear, blade, propeller, motor, axis, kinetic
		STEAM Project	Different Types of Energy 21st Century Skills: Critical Thinking
4 Page 20	S T E A M	Title	ROLLER COASTER CARS / WC: 179
		Academic Objective	Learn about potential and kinetic energy
		Vocabulary	amusement park, ride, scream, roller coaster, track, potential, all the time, merry-go-round
		STEAM Project	Energy Conversion 21st Century Skills: Critical Thinking, Collaboration, Communication
5 Page 24	S T E A M	Title	OUR HEARTS PUMP BLOOD / WC: 172 🎧
		Academic Objective	Learn about how blood moves through my body
		Vocabulary	extract, oxygen, stomach, intestine, pump, vessel, circulatory, beat
		STEAM Project	Valves in the Heart 🎧 21st Century Skills: Critical Thinking
6 Page 28	S T E A M	Title	BLOOD MOVES ALL AROUND / WC: 170
		Academic Objective	Learn about different types of blood vessels
		Vocabulary	bandage, wound, treat, contain, powerful, artery, vein, capillary
		STEAM Project	Heart-Related Diseases 21st Century Skills: Critical Thinking, Creativity, Communication
7 Page 32	S T E A M	Title	MAKING MAGNETIC FIELDS / WC: 175 🎧
		Academic Objective	Learn about how to create magnetism with electricity
		Vocabulary	magnetism, take a look, compass, needle, the other way around, giant, magnetic field, anymore
		STEAM Project	Make Your Own Compass 🎧 21st Century Skills: Critical Thinking, Communication
8 Page 36	S T E A M	Title	EARTH IS A MAGNET / WC: 169
		Academic Objective	Learn how a compass works
		Vocabulary	squirrel, realize, campsite, repel, attract, enormous, guess, explorer
		STEAM Project	Earth's Magnetic Field Protects Us 21st Century Skills: Critical Thinking, Communication

UNIT / PAGE	STEAM	DETAILS	
9 Page 40	S T E A M	Title	BACTERIA VS. FUNGI / WC: 196 ▶
		Academic Objective	Learn about the differences between bacteria and fungi
		Vocabulary	bacterium (bacteria), lactic acid, fermentation, bare, properly, moldy, produce, cell
		STEAM Project	Sugar and Yeast Balloons ▶ 21st Century Skills: Critical Thinking
10 Page 44	S T E A M	Title	STRANGE SMELLS / WC: 176
		Academic Objective	Learn more about bacteria and mold
		Vocabulary	smell, athlete's foot, embarrassed, illness, scary, paste, strengthen, exist
		STEAM Project	What Mold Needs in Order to Grow ▶ 21st Century Skills: Critical Thinking
11 Page 48	S T E A M	Title	62 DEGREES IN THE MORNING? / WC: 169 ▶
		Academic Objective	Learn about measuring temperature with Fahrenheit
		Vocabulary	latest, condition, Fahrenheit, chart, describe, formula, subtract, multiply
		STEAM Project	Celsius or Fahrenheit? 21st Century Skills: Critical Thinking, Creativity
12 Page 52	S T E A M	Title	DIFFERENT TEMPERATURES / WC: 173
		Academic Objective	Learn more about Fahrenheit and Celsius
		Vocabulary	go on a trip, accommodations, watch, difference, propose, adopt, unit, except
		STEAM Project	Temperature Chart 21st Century Skills: Critical Thinking
13 Page 56	S T E A M	Title	THE WONDER OF RAINBOWS / WC: 183 ▶
		Academic Objective	Learn about reflection and refraction
		Vocabulary	far away, over, rainbow, wall, control, come back, split, droplet
		STEAM Project	Rainbow Prism ▶ 21st Century Skills: Critical Thinking, Collaboration, Creativity
14 Page 60	S T E A M	Title	ALL THE COLORS OF THE RAINBOW / WC: 184
		Academic Objective	Learn more about how rainbows are formed
		Vocabulary	shower, order, rain, come out, end, raindrop, exit, wavelength
		STEAM Project	Refraction and Reflection 21st Century Skills: Critical Thinking
15 Page 64	S T E A M	Title	CREATING ORGANS AND LIMBS / WC: 190
		Academic Objective	Learn about artificial organs
		Vocabulary	consist, limb, accident, replace, damaged, inner, copy, over and over
		STEAM Project	Design an Artificial Body Part 21st Century Skills: Critical Thinking, Creativity, Communication
16 Page 68	S T E A M	Title	ONLINE DOCTORS / WC: 174
		Academic Objective	Learn about online doctors
		Vocabulary	telemedicine, allow, without, medical, prescribe, prefer, face-to-face, disabled
		STEAM Project	Be an Online Doctor 21st Century Skills: Critical Thinking



I will learn... about how muscles move bones.

MUSCLES MOVE OUR BODIES



Scan for Audio

WARM-UP

Close your **fist**. **Stretch** out your fingers. What makes your hand move?

KEY WORDS

A Look, listen, and repeat. 01



v. stretch



n. muscle



adj. locomotive



n. organ



n. structure



n. lung



v. surround



v. extend

B Listen and number the words. 02

READING

Listen and read. 03



Scan for Video

Write a **letter** to a friend. Run fast to catch the bus for school. Stand up and **stretch** after watching too much TV. What's the connection between these actions? They all use our bones and **muscles**!

The bones and muscles which help us move are called "**locomotive organs**." Bones form the **structure** of our body. They support our body, too. They also protect important organs like our heart, **lungs**, and brain.

Muscles **surround** the bones. They **extend** and flex to make the body move. Let's see how muscles work to move bones.



Flatten two straight straws using a pencil. Push a paper fastener through one end of each straw.



Put a bendy straw into a plastic bag. Tie the opening of the bag to the straw so no air can get out.



Tape both sides of the bag to both straws, front and back. You can tape a drawing of a hand to the front straw.



Blow air into the plastic bag through the bendy straw. What happens?

When you blew air, the plastic bag swelled up. It got thicker and shorter, and it made the front straw lift up. This is how arms move.

Our muscles are connected to our bones. When the muscles in our arms flex, they get thicker and bend our arms. When our muscles extend, they get flatter and straighten our arms again.

Thanks to our bones and muscles moving together, we are able to move. Without them, we wouldn't be able to do simple things, like turn the pages of this book!

c Read and choose.

1. Which is the opposite of extend?
 - a. stretch
 - b. shrink
 - c. move
2. What does them mean in the reading?
 - a. bones
 - b. muscles
 - c. bones and muscles

CHECK YOUR UNDERSTANDING

A Choose the correct answers.

MAIN IDEA

1. What is the main purpose of the reading?
 - a. To explain how bones move muscles
 - b. To explain how muscles move bones
 - c. To explain how many muscles we have in our bodies

DETAIL

2. Bones and muscles that help us move _____.
 - a. are called locomotive organs
 - b. are known as structural organs
 - c. are referred to as surrounding organs

DETAIL

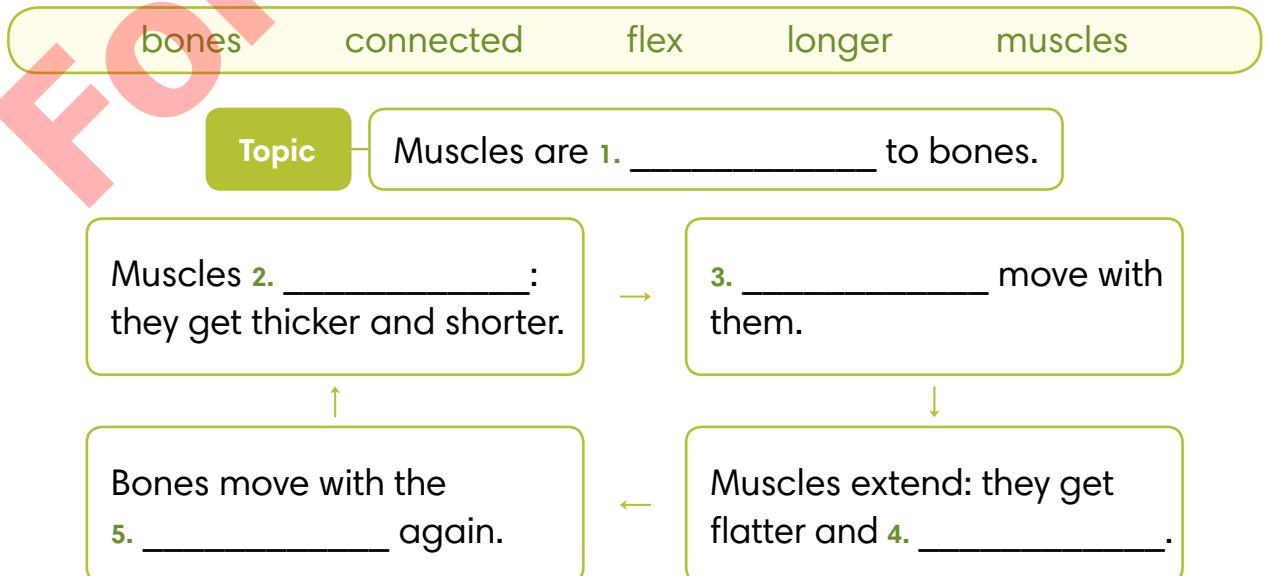
3. Which of the following is NOT true about when muscles stretch?
 - a. They get longer and flatter.
 - b. The bones move with them.
 - c. They get thicker and shorter.

B Circle T for true or F for false. Correct the false statements.

1. Muscles are surrounded by bones. T F

2. Bones protect important organs like the heart, lungs, and brain. T F

C Complete the chart.



D Complete the sentences.

extended locomotive lungs muscles stretched surrounded

1. We breathe in air through our _____.
2. After taking a nap, the cat _____ its back.
3. Bones and muscles which help us move are _____ organs.
4. George's pants were too short, so his mom _____ them.
5. Mike wanted to have a hot bath to soothe his tired _____.
6. After buying ice cream at the beach, Fiona found herself _____ by hungry seagulls.



SCIENCE

TECHNOLOGY

ENGINEERING

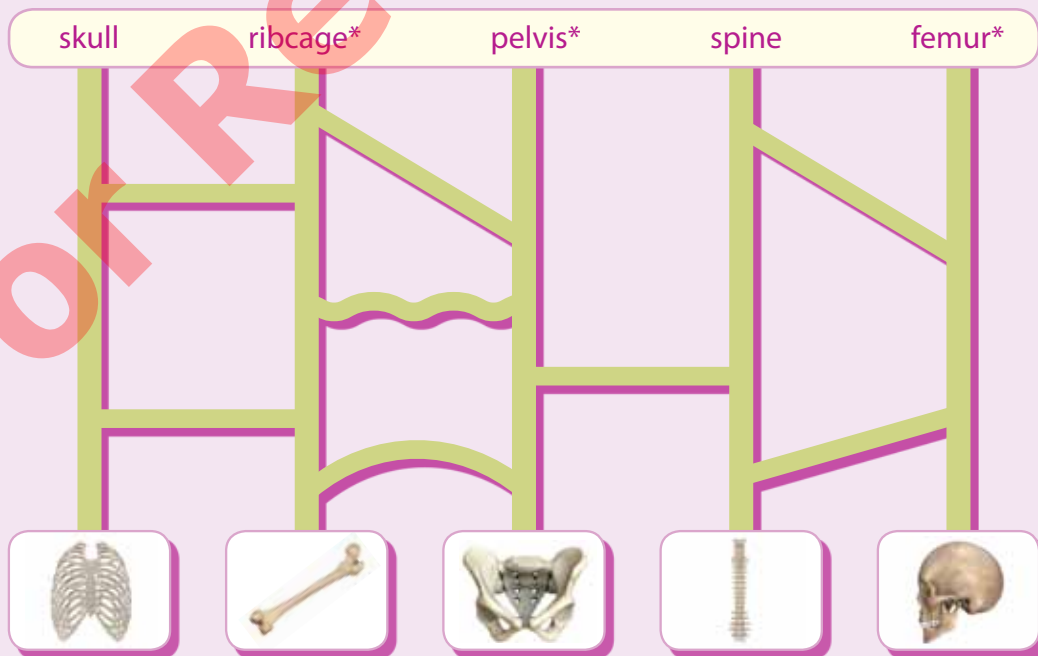
ARTS

MATH

PROJECT BONE GHOST LEG GAME

The adult human body is made up of 206 bones. They protect our organs and give structure to our body.

STEP 1 **Critical Thinking** Follow the lines to match the bone names to their images. Write their names.



STEP 2 **Creativity** **Communication** Make your own ghost leg game. Write the names of the bones and draw them. Share it with a friend.

STEAM Reading

High Elementary

Science

Technology

Engineering

Arts

Math

3

Workbook

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VOCABULARY PRACTICE

A Match and write.

1.



muscles

Smoking is very bad for your
_____.

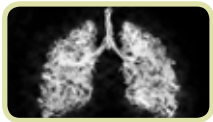
2.



stretch

Trees _____ the house.

3.



lungs

Justin needs to work out more to make his
_____ stronger.

4.



surround

Make sure to _____ before you
start exercising.

B Choose the correct words.

1. Your stomach and intestines are two of your digestive _____.

a. muscles

b. organs

c. organisms

2. Tina planned to _____ her vacation by one extra day.

a. extend

b. scroll

c. explain

3. Our _____ organs help us move our body.

a. digestive

b. stretching

c. locomotive

4. A carpenter knows about the _____ of furniture.

a. secure

b. structure

c. situation

COMPREHENSION PRACTICE

Read the following passage and choose the correct answers.

When you blew air, the plastic bag swelled up. ① It got thicker and shorter, and it made the front straw lift up. ② Our muscles are connected to our bones. When the muscles in our arms flex, they get thicker and bend our arms. When our muscles extend, they get flatter and straighten our arms again. ③

1. Why does the straw lift up?
 - a. It blows in the air.
 - b. There is water in it.
 - c. It is connected to the bag of air.
2. What is the best place for the sentence below?

This is how arms move.

- a. ①
 - b. ②
 - c. ③
3. What does extend mean in the passage?
 - a. travel far
 - b. stretch out
 - c. last a long time

SUMMARY

Complete the summary. One word is not used.

bones extend flex locomotive muscles structure surrounded write

Our bones and 1. _____ help us move our body. They help us 2. _____ letters, read books, and run for the bus. They are called “ 3. _____ organs.” Bones support our bodies and form the 4. _____. They are 5. _____ by muscles. These muscles 6. _____ and flex to move our bodies. Connect two straws with a paper fastener. Put a bendy straw in a bag and seal the bag so no air can get out. Then tape the bag to both straws. When you blow into the bag connected to the straws, you make the straws move. The bag is like a muscle, and the straws are like 7. _____. In the same way, our bones move when our muscles flex and stretch.