

S U B J E C T

Link

Curriculum Integration Reading Program



Lesson Components

BIG IDEA

The Big Idea section stimulates students' Interest and gives them a wider understanding of the chapter's theme.



Contents Map

The Contents Map previews the content covered in each lesson and the subject it is related to. Content-related questions are included to pique students' curiosity and help create classroom discussion.

Before You Read

The Before You Read activity gets students involved in the lesson by asking them to answer simple questions or complete short activities related to the content of the passage.



Key Words

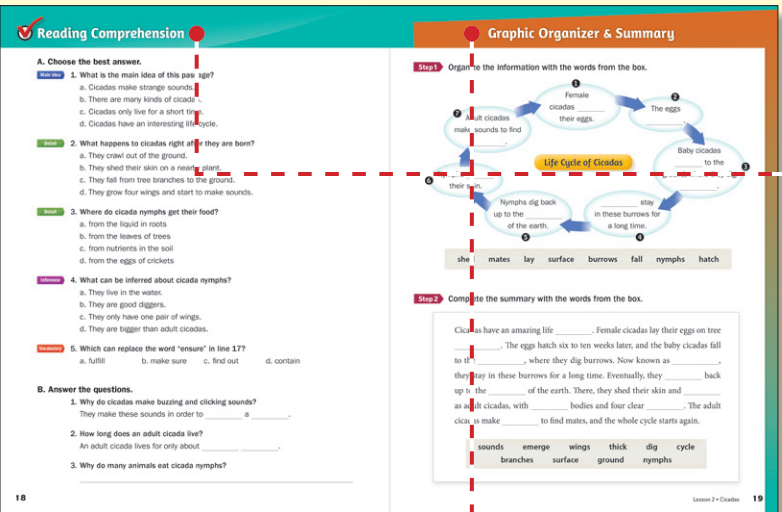
This section highlights the key words from the lesson with pictures and allows students to familiarize themselves with the language by using it in sentences.

Focus On

Focus On section encourages students to think about the main idea as they read through the passage.

Connect to Yourself / Think Critically

This section allows students to relate ideas from the passage to their own lives or to think critically about what they have read.



Reading Comprehension

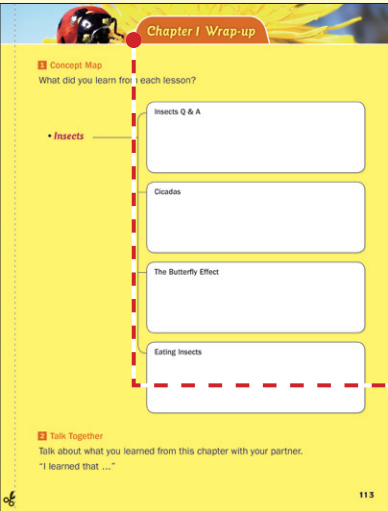
Students' understanding of the passage is checked through a series of multiple-choice and short-answer questions. Main idea, detail, vocabulary, and inference questions are included.

Graphic Organizer & Summary

A two-step summarizing activity teaches students how to make outlines and summaries. It also gives them a chance to review what they have learned.

Chapter Wrap-up

After completing each chapter, the teacher and students work together to think about and write down the key points from the lessons. The students can then discuss what they learned from the chapter with a partner.



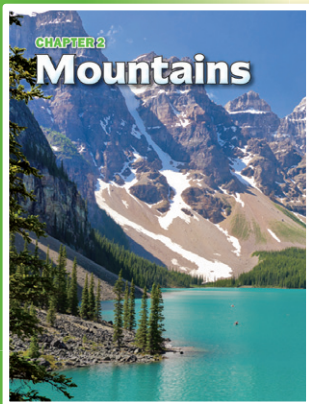
Contents

CHAPTER 1 Insects



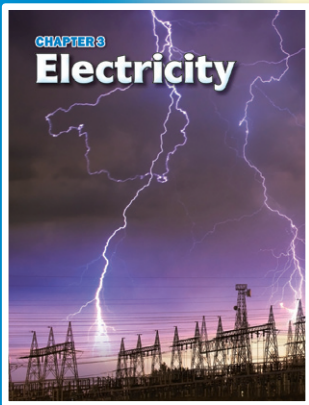
Subject	Lesson	Title	Words	Page
Science	1	Insects Q & A	281	6
Science	2	Cicadas	296	14
Social Studies	3	The Butterfly Effect	280	20
Social Studies	4	Eating Insects	283	26

CHAPTER 2 Mountains



Subject	Lesson	Title	Words	Page
Science	5	How Mountains Are Formed	254	32
Social Studies	6	The Wall of Death	270	40
Social Studies	7	Sherpas	271	46
Sports	8	Mountain Survival Skills	298	52

CHAPTER 3 Electricity



Subject	Lesson	Title	Words	Page
Science	9	How Electricity Is Made	275	58
Social Studies & Science	10	Eel Power!	269	66
Science	11	The Future of Driving	291	72
Social Studies	12	Student Switch Off	269	78

CHAPTER 4 Plastic



Subject	Lesson	Title	Words	Page
History	13	The History of Plastic	288	84
Social Studies	14	Solutions to the Plastic Problem	297	92
Social Studies	15	The Toy of the Century	288	98
Science	16	Benefits of Plastic	269	104

Supplementary
Material

Chapter 1 - Concept map	p. 113
Chapter 2 - Concept map	p. 115
Chapter 3 - Concept map	p. 117
Chapter 4 - Concept map	p. 119

CHAPTER 1

Insects



LESSON
1

Insects Q & A



Q What do you want to know about insects?

I want to know about why mosquitoes bite us.

LESSON
2

Cicadas



Q When can cicadas be seen?

They can be seen in the summer.

Science

Science

Insects

Social Studies

Social Studies

LESSON
4

Eating Insects



Q Have you ever eaten insects?

No. I don't think they would taste good.

LESSON
3

The Butterfly Effect



Q Have you heard of the butterfly effect?

Yes, I have. It was the name of a movie.

BIG IDEA

What do you know about insects?

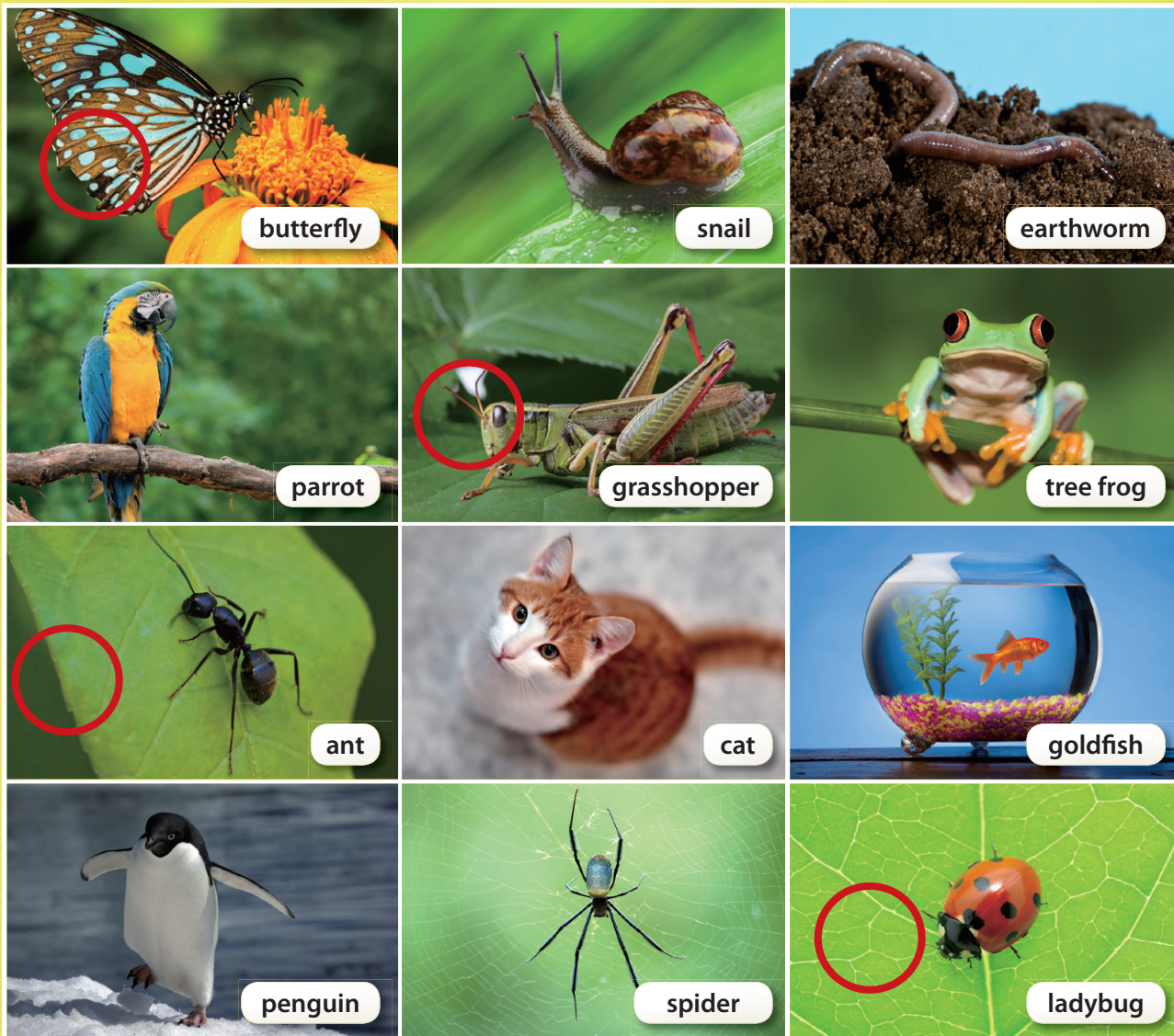
I know that there are millions of species of insects in the world.

Insects Q&A

Before You Read

Look at the pictures. Circle the insects.
What do they have in common?

They have six legs, and
they don't have fur.



Answer: butterfly, grasshopper, ant, ladybug



Key Words

Complete the sentences with the **key words**.



hatch



antennae



backbone



inject



starving



sticky



bites



saliva

1. Ants hatch from eggs.
2. The baby has a lot of saliva.
3. Doctors use needles to inject medicine.
4. When she feels nervous, she bites her nails.
5. Your backbone goes from your waist to your head.
6. This bandage is sticky, so it stays on the skin.
7. Insects have two antennae growing from their head.
8. Look at the cheetah! It looks like it's starving to death.

Background Knowledge

Ecosystem

An ecosystem is made up of all the plants and animals that live in a certain area. It can also include non-living things, such as soil, water and rocks. All of the things in an ecosystem interact in different ways.





Insects Q&A

All About Insects

Focus On

What are some general characteristics of insects?

They have a hard covering on the outside of their bodies, six legs and two antennae. And their bodies are divided into three sections.



▲ pollen: a powder produced by flowers that helps them produce seeds

Q1 How many species of insects are there in the world?

A1 Actually, nobody knows for sure. However, scientists estimate that there are about 1.4 to 1.8 million species. This number represents about 90% of the total number of animal species that exist on the earth.

Q2 What roles do insects play in ecosystems?

A2 They help plants spread their pollen and seeds. They also get rid of the bodies of dead animals by eating them. This keeps the earth clean. They are also an important part of the diets of other animals. If insects didn't exist, there wouldn't be any plants, the earth would be covered in waste, and many animals would **starve** to death.

Q3 What are the basic characteristics of insects?

A3 First, they **hatch** from eggs. And insects don't have **backbones** like some other animals. Instead, they have a hard covering on the outside of their bodies. Their bodies are **divided** into three sections, and they have six legs. They also have two **antennae**, which function like fingertips for touching, noses for smelling and tongues for tasting.

Q4 How can some insects, such as ants and flies, crawl up walls?

A4 They use tiny hooked claws at the ends of their legs to hold onto surfaces. Some have special, **sticky** pads between their claws that help them stick to the walls or ceilings.

Q5 Why do mosquitoes drink blood, and what makes mosquito bites itch?

A5 Only female mosquitoes **bite** you. They do it because they need your blood to lay eggs. When mosquitoes bite you, they **inject** some of their **saliva** to help them suck more quickly. To protect your body from the saliva, your immune system produces chemicals to fight it. This causes the itching.

Words 281



Connect to Yourself

What are your favorite insects? Why do you like them?

I like beetles. I think they are cute.

A. Choose the best answer.

- Main idea

1. What is this passage mainly about?

a. scientific research on insects

☒ b. a variety of facts about insects

c. the different categories of insects

d. how insects help and harm people
- Detail

2. Which is NOT true about insects?

a. They have two antennae.

☒ b. Only some insects hatch from eggs.

c. There are about 1.4 to 1.8 million species.

d. Insects are an important part of some animals' diets.
- Detail

3. How do insects help keep the earth clean?

a. by killing animals

b. by spraying chemicals

☒ c. by eating dead animals

d. by eating the seeds of plants
- Detail

4. Why do mosquitoes inject saliva into your skin?

a. to widen the hole that they will drink from

b. to kill dangerous bacteria living in your blood

c. to make sure you don't feel what they are doing

☒ d. to allow themselves to drink your blood more quickly
- Vocabulary

5. Which can replace the word "divided" in line 20?

a. removed

☒ b. separated

c. located

d. combined

B. Answer the questions.

- What do insects use their antennae for?
They use their antennae to touch, smell, and taste things.
- Why do plants need insects?
Insects spread their pollen and seeds.
- Why do female mosquitoes bite?
They need blood to lay eggs.

Graphic Organizer & Summary

Step 1 Organize the information with the words from the box.

All About Insects

- FACT 1.** There are about 1.4 to 1.8 million species of insects in the world.
- FACT 2.** Insects help plants spread their pollen and seeds, and they are food for many other animals.
- FACT 3.** Insects' bodies are divided into three sections, and they have six legs and two antennae.
- FACT 4.** Certain insects can crawl up walls because they have hooked claws and sticky pads between these claws.
- FACT 5.** Mosquito bites itch because our immune systems produce chemicals to fight the mosquito's saliva.

divided species food crawl up pads pollen antennae chemicals

Step 2 Complete the summary with the words from the box.

Scientists think there are 1.4 to 1.8 million insect species, which represent about 90% of all animal species. Within a(n) ecosystem, insects help plants spread pollen and seeds. They also get rid of animal waste and are eaten by other animals. Insects have some interesting characteristics. They differ from other animals in that they have three body sections, six legs and two antennae. Certain insects can crawl up walls using tiny hooks and sticky pads on the ends of their claws. Some insects, such as mosquitoes, bite people. Female mosquitoes bite because they need blood to lay eggs. A reaction by our immune system makes mosquito bites itch.

differ waste species sticky sections
hooks walls lay immune ecosystem

Cicadas

Before You Read

Among these insects, which one do you think lives the longest? Why?

I think the queen termite lives the longest because it is safe in the soil.

cicada

mayfly

queen termite

Answer: queen termite (queen termite-50 years, cicada-1~17 years, mayfly-three days)



Key Words

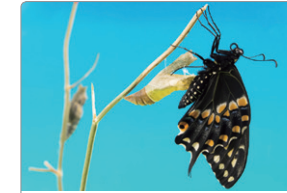
Complete the sentences with the key words.



dig



lay



shed



emerging



burrow



protein



thick



buzzing

1. Eggs are full of protein.
2. It is a very thick book.
3. The butterfly shed its skin.
4. Hens lay eggs every day.
5. Bees make a(n) buzzing sound.
6. He started to dig a hole to plant a tree.
7. The rabbit lives in a(n) burrow in the ground.
8. The head of an alligator is emerging from the water.

Background Knowledge

How cicadas make noise

Cicadas are the loudest insects. They make noise by vibrating parts of their body called tymbals. The noise is loud because the inside of a cicada's body is mostly empty.



Cicadas

An Amazing Life Cycle

Focus On

What are the three life stages of cicadas?

They start as eggs, then become nymphs and finally develop into adults.

What comes to mind when you think of cicadas? Most likely, it's all the noise they make on hot summer days. While their name means "tree crickets" in Latin, cicadas only spend a small part of their lives in trees; they spend most of their lives underground. Some cicadas even spend 17 years under the ground! Let's take a look at these cicadas' amazing life cycle.

Just before female cicadas die, they **lay** their eggs in the bark of branches. One cicada lays from 400 to 6,000 eggs. Six to ten weeks later, the eggs hatch. The baby cicadas drop to the ground and **dig burrows** deep into the soil. Small and wingless, they are known as nymphs. Depending on their species, nymphs spend from 1 to 17 years in these burrows, sucking liquid from tree roots. But not all the nymphs can survive. They are full of **protein**, so animals such as birds and snakes eat them. Cicadas lay so many eggs to **ensure** that their population remains stable even if many nymphs get eaten.

a nymph falling from a tree after hatching

a nymph

Eventually, the surviving nymphs dig back up to the surface of the earth. Then, after climbing onto a nearby plant, they **shed** their skin. What **emerges** is an adult cicada. Adult cicadas have **thick** bodies and four clear wings. These adults live for only about three weeks - just enough time to find a mate. This is when we hear all the **buzzing** and clicking. Male cicadas make these sounds to find a mate. They die soon after mating, while females die after they lay their eggs. And then the life cycle begins again.

No one is sure why some cicadas have such a long life cycle. But no matter what the reason is, cicadas are truly a wonder of nature.

Words 296

an adult cicada

a nymph shedding its skin

Connect to Yourself

Do you know any other insects that have interesting life cycles? What are they?

Butterflies have an interesting life cycle. They start off as ugly caterpillars and then completely change.

A. Choose the best answer.

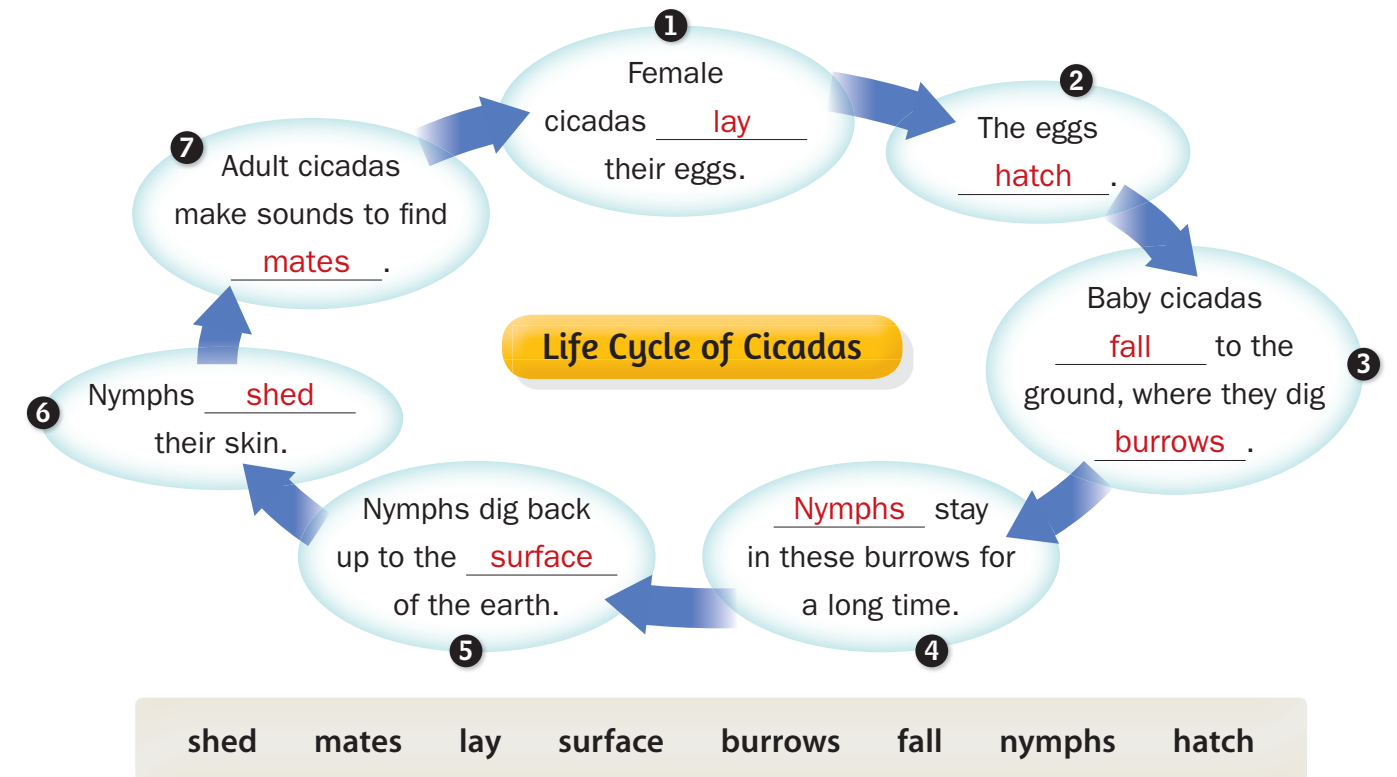
- Main idea** 1. What is the main idea of this passage?
- Cicadas make strange sounds.
 - There are many kinds of cicadas.
 - Cicadas only live for a short time.
 - ☒ Cicadas have an interesting life cycle.
- Detail** 2. What happens to cicadas right after they are born?
- They crawl out of the ground.
 - They shed their skin on a nearby plant.
 - ☒ They fall from tree branches to the ground.
 - They grow four wings and start to make sounds.
- Detail** 3. Where do cicada nymphs get their food?
- ☒ from the liquid in roots
 - from the leaves of trees
 - from nutrients in the soil
 - from the eggs of crickets
- Inference** 4. What can be inferred about cicada nymphs?
- They live in the water.
 - ☒ They are good diggers.
 - They only have one pair of wings.
 - They are bigger than adult cicadas.
- Vocabulary** 5. Which can replace the word “ensure” in line 17?
- fulfill
 - ☒ make sure
 - find out
 - contain

B. Answer the questions.

- Why do cicadas make buzzing and clicking sounds?
They make these sounds in order to find a(n) mate.
- How long does an adult cicada live?
An adult cicada lives for only about three weeks.
- Why do many animals eat cicada nymphs?
Cicada nymphs are full of protein.

Graphic Organizer & Summary

Step 1 Organize the information with the words from the box.



Step 2 Complete the summary with the words from the box.

Cicadas have an amazing life cycle. Female cicadas lay their eggs on tree branches. The eggs hatch six to ten weeks later, and the baby cicadas fall to the ground, where they dig burrows. Now known as nymphs, they stay in these burrows for a long time. Eventually, they dig back up to the surface of the earth. There, they shed their skin and emerge as adult cicadas, with thick bodies and four clear wings. The adult cicadas make sounds to find mates, and the whole cycle starts again.

sounds emerge wings thick dig cycle
branches surface ground nymphs

The Butterfly Effect

Before You Read

Look at the pictures. How can these two things be related?

Maybe the butterfly was caught in the hurricane.

► A butterfly is flapping its wings.



• A hurricane is passing over Texas.



Key Words

Complete the sentences with the **key words**.



flap



assassination



opposed to



laboratory



coast



tragedy



mold



consequence

1. He is strongly opposed to the war.
2. Birds flap their wings when they fly.
3. The tragedy of the plane crash shocked the nation.
4. The scientist is doing an experiment in her laboratory.
5. The assassination of Abraham Lincoln was a terrible event.
6. There are many beautiful beaches on the east coast.
7. This mold was the base material for making penicillin.
8. He cheated on the test, and as a(n) consequence, he failed it.

Background Knowledge

The butterfly effect

The butterfly effect is an idea developed by an American meteorologist named Edward Lorenz. It suggests that the flapping of a butterfly's wings could affect the weather.





The Butterfly Effect

Small Actions, Big Consequences

Focus On

What is the butterfly effect?

It is a theory about how small actions can eventually have big effects.

Somewhere in South America, a butterfly **flaps** its wings. A few days later, a huge hurricane hits the **coast** of Texas. Could these two events be **connected**? According to the “butterfly effect,” they can. It’s a concept that was first used to explain why weather forecasts are often wrong. Today, it has grown into a theory about how even the smallest actions can have big effects.

Throughout history, there have been many examples of the butterfly effect. Take the case of the **assassination** of Franz Ferdinand. He was expected to become the king of Austria-Hungary. In 1914, his driver made a wrong turn onto a backstreet. There, he was shot and killed by a man **opposed to** the Austro-Hungarian government. This single killing caused a series of events that eventually led to the start of the First World War. By the end of the war, more than 16 million people had died.

But the butterfly effect doesn’t always lead to **tragedy**. Take the example of a scientist named Alexander Fleming. In 1928, he was studying bacteria. He went on a vacation and forgot to put away a dish containing some of the bacteria. When he returned to his **laboratory**, he found that some kind of **mold** had killed the bacteria. He didn’t leave the dish there on purpose, but his small mistake would change modern medicine forever. He used this mold to create penicillin, which has saved millions of lives.

These examples of the butterfly effect remind us that everything we do has **consequences**. We might not experience them right away, but that doesn’t mean they won’t happen. Can you think of any other interesting examples of the butterfly effect?

Words 280



Think Critically

If you don’t do your homework today, what will happen to you tomorrow? Think about the long-term effects of your action.

My teacher would be angry, and it could later cause me to fail my class. And in the future, I might not get a good job.

A. Choose the best answer.

- Main idea** 1. What is the main idea of this passage?
- ☒ a. Even a small action can cause big things to happen.
 - b. The butterfly effect doesn't exist in the modern world.
 - c. Every person on the planet is connected in some way.
 - d. It is easier to destroy things than it is to create things.

- Detail** 2. Which is NOT true about Franz Ferdinand?
- ☒ a. He killed his driver.
 - b. He was shot by a man.
 - c. His death caused the First World War.
 - d. He was going to be the king of Austria-Hungary.

- Detail** 3. What did Alexander Fleming do by mistake?
- a. He took some penicillin.
 - b. He ate some strange mold.
 - ☒ c. He left a dish of bacteria out.
 - d. He studied the wrong bacteria.

- Inference** 4. What can be inferred about penicillin?
- ☒ a. It kills bacteria.
 - b. It is expensive.
 - c. It prevents mold.
 - d. It has many names.

- Vocabulary** 5. Which can replace the word “connected” in line 3?
- a. solved
 - ☒ b. related
 - c. confirmed
 - d. conquered

B. Answer the questions.

1. What was caused by Franz Ferdinand's driver's mistake?
His mistake led to the First World War, and more than 16 million people died.
2. What happened to Alexander Fleming's dish of bacteria?
Some kind of mold killed the bacteria.
3. Who killed Franz Ferdinand?
A man who was opposed to the Austro-Hungarian government killed him.

Graphic Organizer & Summary

Step 1 Organize the information with the words or phrases from the box.

Cause 1

Franz Ferdinand's driver turned onto a backstreet by mistake. There, Ferdinand was killed.

Effect 1

The First World War broke out, leading to the deaths of over 16 million people.

Cause 2

Alexander Fleming didn't put away a dish of bacteria before going on vacation.

Effect 2

He created penicillin and saved millions of lives.

bacteria	mistake	put away	killed
deaths	penicillin	lives	broke out

Step 2 Complete the summary with the words from the box.

The butterfly effect is a(n) theory that small actions can have big effects. For example, Franz Ferdinand was expected to become king of Austria-Hungary. But in 1914, his driver turned onto a backstreet by mistake. There, Ferdinand was assassinated. This caused the First World War to break out, leading to the deaths of over 16 million people. But the butterfly effect can cause good things too. In 1928, a scientist named Alexander Fleming didn't put away a dish of bacteria before going on vacation. When he returned, some mold had killed the bacteria. He used the mold to create penicillin, which has saved millions of lives.

driver	mold	effects	vacation	theory	World War
assassinated	deaths	bacteria	saved		

Eating Insects

Before You Read

What do you see in the picture?
Where is this place?

I see lots of insects. I think
it's a restaurant.



Key Words

Complete the sentences with the **key words**.



nutrients



disgusting



billion



decreasing



require



estimating



available



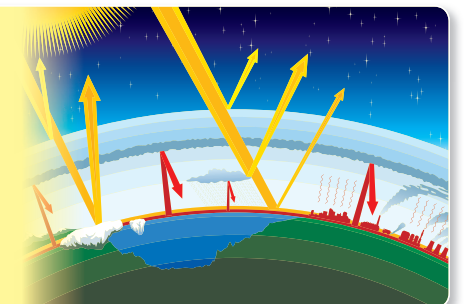
report

1. He is estimating his taxes.
2. This shoe smells disgusting.
3. One billion is a thousand million.
4. Plants require air, water and sunlight.
5. The stock market is decreasing these days.
6. There is no available space for more bags.
7. They are working on the report together.
8. This chart shows the nutrients that the juice contains.

Background Knowledge

Greenhouse gases

In the air, some gases trap energy from the sun. We call these gases greenhouse gases. The most common greenhouse gases are water vapor, carbon dioxide, and methane.





Eating Insects

A Cure for Hunger?

Focus On

Why are insects considered to be an ideal food source for the future?

They are abundant and good for people's health and the environment.



▲ termites

Would you eat an insect? It might sound **disgusting**, but insects have actually been part of traditional diets in many parts of the world. In Thailand, fried crickets are a popular snack. In Ghana, eating termites helps people get the protein they need. And in Mexico, ant eggs fried in butter are considered delicious.

Moreover, eating insects could be the answer to world hunger. Many people around the world don't have enough food to eat. Meanwhile, the earth's population keeps growing. It is **estimated** that it will reach nine **billion** by the year 2050. Also, we are quickly running out of new land to use for farming and raising animals. The number of fish in our oceans is also **decreasing**, because of pollution and overfishing. On the other hand, there are plenty of insects **available**; this is why a UN **report** suggests using insects as food.

Insects are not only abundant but also good for your health. They contain lots of protein and important **nutrients**. Locusts, for example, actually **contain** more iron than beef does. Moreover, raising insects for food is better for the environment than raising other animals, because they **require** less land, food and water. Also, farm animals like cows and pigs release harmful greenhouse gases into the air after they eat. Insects release greenhouse gases too, but not as much as other animals. What's more, they can break down the waste and dead bodies of other animals, returning their nutrients to the soil.

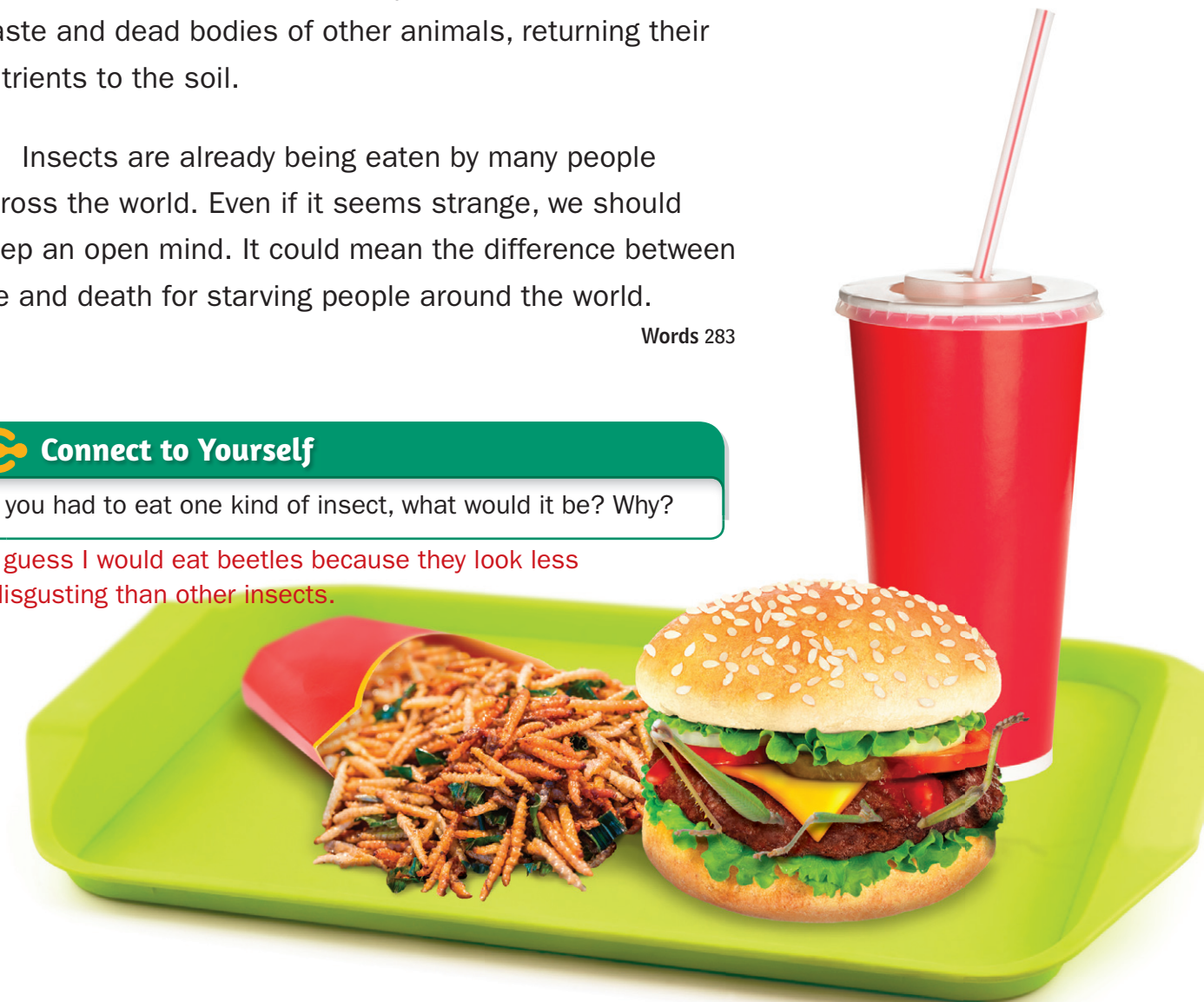
Insects are already being eaten by many people across the world. Even if it seems strange, we should keep an open mind. It could mean the difference between life and death for starving people around the world.

Words 283

Connect to Yourself

If you had to eat one kind of insect, what would it be? Why?

I guess I would eat beetles because they look less disgusting than other insects.



A. Choose the best answer.

- Main idea

1. What is the main idea of this passage?
a. Insects can cause many problems.
b. People need more protein in their diet.
✓ c. Insects could be the cure to world hunger.
d. Greenhouse gases are polluting the environment.
- Detail

2. Which insect do people in Ghana eat to get protein?
a. crickets
b. termites ✓
c. cicadas
d. ants
- Detail

3. Which is NOT a reason we should eat insects?
a. decreasing fish populations
✓ b. increasing insect populations
c. the earth's increasing human population
d. decreasing land for farming and raising animals
- Inference

4. What can be inferred from this passage?
a. Insects are rich in only protein.
✓ b. World hunger will become serious.
c. Insects are often eaten in North America.
d. Animals don't contain protein and nutrients.
- Vocabulary

5. Which can replace the word "contain" in line 19?
✓ a. have
b. take
c. consume
d. continue

B. Answer the questions.

1. Why are insects better for the environment than farm animals?
They release less greenhouse gas than farm animals.
2. Why are fish populations decreasing?
They are decreasing because of pollution and overfishing.
3. Why are insects good for your health?
They contain lots of protein and important nutrients.

Graphic Organizer & Summary

Step 1 Organize the information with the words from the box.

Problem There is not <u>enough</u> food for people around the world.	
Solution <u>Insects</u> could be the answer to world <u>hunger</u> .	
Reason 1	There are many insects <u>available</u> .
Reason 2	Insects <u>contain</u> a lot of protein and many important nutrients.
Reason 3	<u>Raising</u> insects is better for the environment than raising <u>farm</u> animals.

raising farm available hunger insects contain enough

Step 2 Complete the summary with the words from the box.

There is not enough food for people around the world, and the human population is growing quickly. However, a UN report suggests that insects can help end world hunger. Insects are already eaten in some countries, and there are many available. Insects have a lot of protein and many important nutrients. Locusts, for example, contain more iron than beef does. Raising insects is also better for the environment than raising cows and pigs. They require less land, food and water, and they break down animal waste, returning its nutrients to the soil.

report available population raising nutrients
break down land require hunger iron

CHAPTER 2

Mountains

LESSON
5

How Mountains Are Formed



Q Do all mountains look alike?

No, they don't. Some have lots of trees but other have rocks.

LESSON
6

The Wall of Death



Q What is the Eiger?

It's a mountain in Switzerland.

LESSON
8

Mountain Survival Skills



Q What should we do when lost in the mountains?

We should start a fire and find water and shelter.

LESSON
7

Sherpas



Q Who are Sherpas?

Sherpas are a group of people who live around Mt. Everest.

BIG IDEA

What are mountains?

They're high parts of the land.



How Mountains Are Formed

Before You Read

Look at the pictures. What are the differences between these two mountains?

Mt. Fuji seems to have trees, but Mt. Lhotse has only rocks. The top of Mt. Fuji is flat, but the peak of Mt. Lhotse is very sharp.



◀ Mt. Fuji in Japan



▶ Mt. Lhotse at the border of Tibet and Nepal



Key Words

Complete the sentences with the **key words**.



crash



cracks



explosively



hardens



erupt



enormous



ash



force

1. Clay hardens when it dries.
2. I saw the car crash into a tree.
3. She sneezed explosively, making a loud noise.
4. After the fire, there is nothing left but ash.
5. I dropped my cell phone. Now there are cracks in it.
6. When volcanoes erupt, they can be very dangerous.
7. Stonehenge is famous for the enormous size of its rocks.
8. The man tried to force the clothes into the washing machine.

Background Knowledge

The earth's plates

The surface of the earth is made up of eight major plates, along with many other minor ones. These plates are constantly moving, but at a rate of just a few centimeters a year.





How Mountains Are Formed

Our Active Earth

Focus On

How are mountains formed?

Mountains are formed when the earth's plates crash together, when fault lines force blocks of rock upward or when volcanoes erupt and the lava hardens.

Are there any mountains near your home? Aren't they **enormous**? Have you ever wondered what made these big mountains? Mountains are **formed** as a result of the earth's activities, and all mountains take millions of years to be made.

Mountains are usually formed when the earth's plates **crash** together. These mountains are called "fold mountains." The plates crash together with so much energy that they are **forced** up. This is the way the Himalayas, the world's highest mountain range, began to form 25 million years ago. In fact, these mountains are still growing, as the plates continue to push against each other.

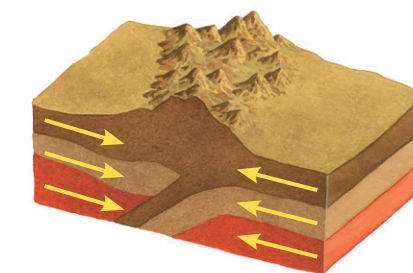
Mountains can also be formed along fault lines.

We call these mountains "block mountains." Fault lines are **cracks** in the earth's crust. These cracks force blocks of rock upward or downward; the uplifted blocks become block mountains. The Harz Mountains in Germany were formed in this way.

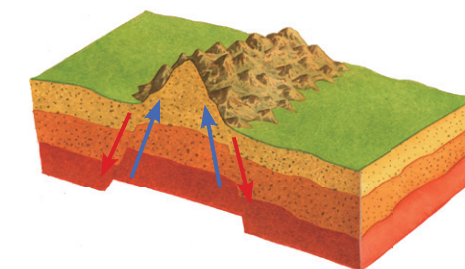
Magma under the earth's surface can form mountains as well. Magma is molten rock. It's liquid, so it flows through cracks. When the magma finds its way to the surface, it **erupts explosively** as lava, rock, **ash** and volcanic gas. As the lava cools and **hardens**, a "volcanic mountain" is created. One example of this kind of mountain is Mt. Halla on Jeju-do, a Korean island.

No matter how they were formed, mountains are natural wonders for us to enjoy. They provide beautiful scenery and can be hiked for fun. The next time you see a mountain, try to figure out how it was formed.

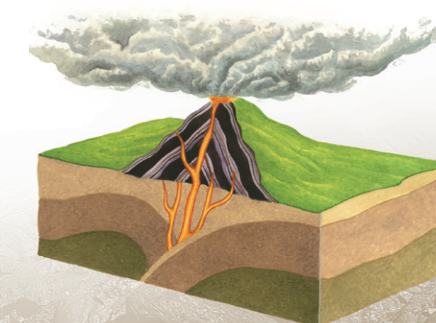
Words 254



▲ fold mountain



▲ block mountain



▲ volcanic mountain



Connect to Yourself

What is the highest mountain in your country? How was it formed?

Mt. Halla on Jeju-do is the highest mountain in my country. It was formed by an eruption.

A. Choose the best answer.

- Main idea

1. What is this passage mainly about?

a. high mountains around the world

☒ b. the different ways that mountains are formed

c. how volcanic eruptions affect the earth's plates

d. why the world's highest mountain is changing its shape
- Detail

2. What is a fold mountain?

☒ a. a mountain formed by moving plates

b. a mountain that is sinking downward

c. a mountain found in the middle of an island

d. a mountain that is surrounded by volcanoes
- Detail

3. How were the Harz Mountains formed?

a. Magma flowed through fault lines.

b. Lava exploded from a large volcano.

c. Two of the earth's plates crashed into each other.

☒ d. Blocks were forced up through cracks in the earth.
- Inference

4. What can be inferred about Mt. Halla?

a. It is located on a fault line.

b. It has cracks in its surface.

☒ c. It has a very large hole at the top.

d. It is younger than other mountains.
- Vocabulary

5. Which can replace the word "formed" in line 3?

a. frozen

b. placed

c. broken

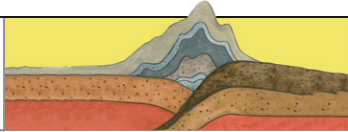
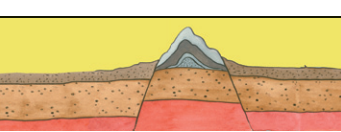
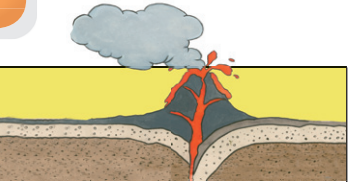
☒ d. created

B. Answer the questions.

1. When did the Himalayas start to form?
- They started to form 25 million years ago.
2. Why are the Himalayas still growing?
- The plates below them continue to push against each other.
3. Where are block mountains formed?
- They are formed along fault lines.

Graphic Organizer & Summary

Step 1 Organize the information with the words from the box.

How Mountains Are Formed			
			
Type	<u>fold</u> mountain	<u>block</u> mountain	<u>volcanic</u> mountain
Formation	The earth's plates <u>crash</u> together and the <u>plates</u> are forced up.	<u>Fault</u> lines force blocks of rock <u>upward</u> .	<u>Magma</u> erupts and <u>lava</u> cools and hardens.
Example	the Himalayas	the Harz Mountains	Mt. Halla

fold lava fault upward volcanic plates magma crash block

Step 2 Complete the summary with the words from the box.

Mountains are formed over millions of years because of the earth's activities. Fold mountains, such as the Himalayas, are created when the earth's plates crash together and are pushed up. Block mountains, such as the Harz Mountains, form on top of fault lines when blocks of rock are forced upward. Finally, volcanic mountains, such as Mt. Halla, begin to form when magma reaches the earth's surface and erupts explosively. Later, the lava from these eruptions cools and hardens, forming a mountain.

crash magma hardens explosively fault
activities Himalayas blocks millions surface

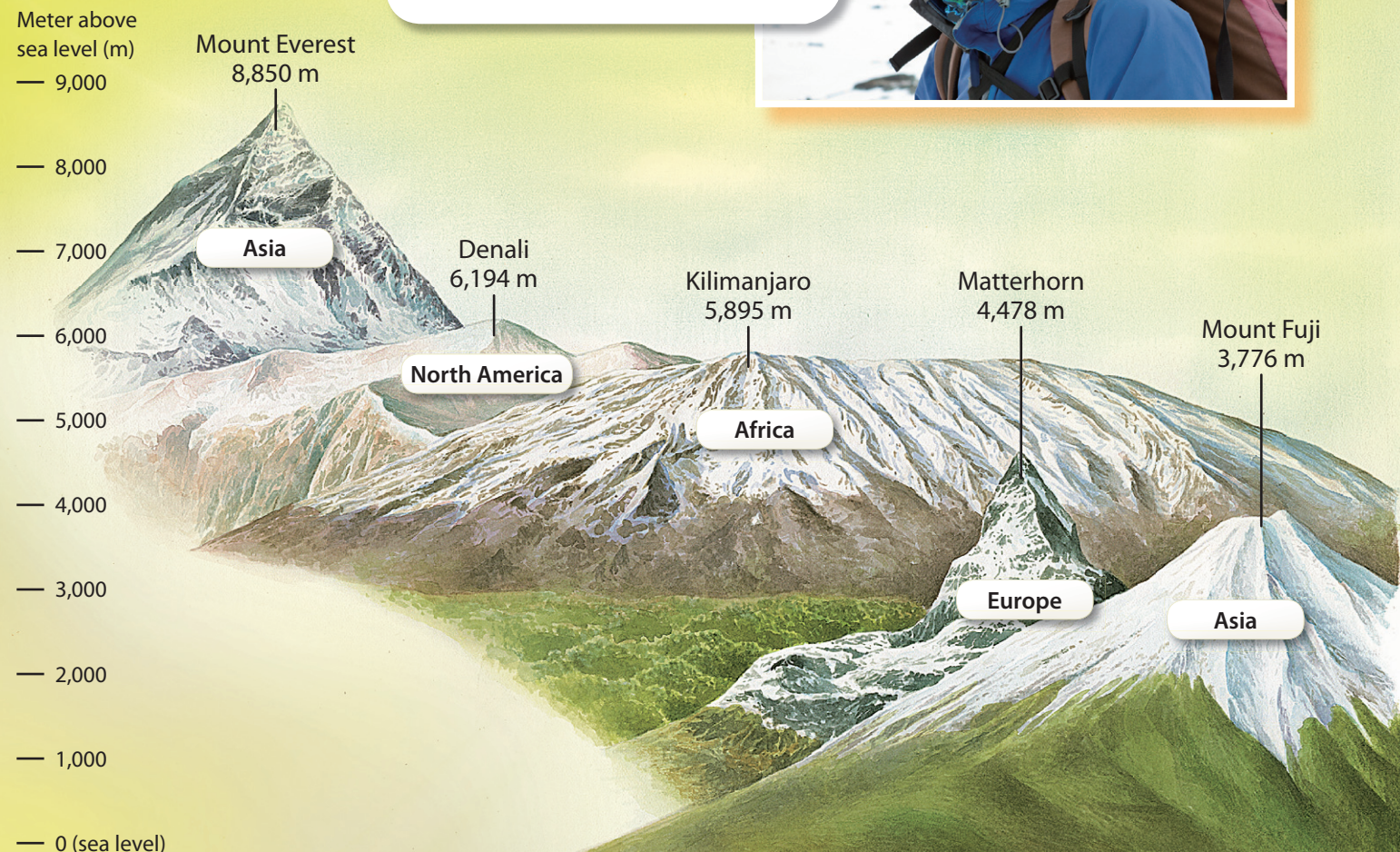
The Wall of Death

Before You Read

These are famous mountains around the world. Which mountain do you want to go to? Why?

I'd like to go to the Matterhorn in the Alps. It's famous for its icecap and I want to see it.

I want to go to Mt. Everest because it's the highest mountain in the world.



Key Words

Complete the sentences with the key words.



twists



reached



unstable



route



frozen



steep



challenging



adventure

- Mountain climbing is quite challenging.
- Finally, he reached the top of the mountain.
- The green line shows the shortest route.
- Hiking across the desert is a great adventure.
- He couldn't ride his bike up the steep hill.
- We can't get water because the pipe is frozen.
- The ladder will be unstable unless someone holds it.
- There are many twists in this road, so drive slowly.

Background Knowledge

Snowstorm

When cold air from the north meets warmer air, a large cloud will sometimes form. If the air temperature below the cloud is below 5 °C, heavy snow will begin to fall. This is called a snowstorm.





The Wall of Death

The North Face of the Eiger

Focus On

Why is the north face of the Eiger nicknamed the *Mordwand*?

It was given the nickname because many people have died there.

The Eiger is a mountain in Switzerland. It is 3,970 meters high, and there are several **routes** to climb up to the top. The north face of the Eiger is the most famous of these routes. It is called *Nordwand* in German, which ⁵ **simply** means “north wall.” However, it is nicknamed *Mordwand*, which means “death wall.”

People have been trying to climb the north face of the Eiger for years, but few have succeeded. In fact, more than 65 people have been killed trying to **reach** the ¹⁰ top. The first people who succeeded were a group of two Germans and two Austrians on July 24, 1938.

There are three main reasons why climbing the north face of the Eiger is so **challenging**. The first is that the length of the route is longer than the north face itself. ¹⁵ The north face is 1,800 meters high, but the route is more than 2,500 meters long. This is because the wall

is so **steep** that climbers have to go up many **twists** and turns. Secondly, snowstorms can occur at any time. Many climbers have been trapped on the mountain as ²⁰ a result. Some have even **frozen** to death after being caught in snowstorms. Finally, warmer temperatures in summer have been causing the ice on the face to melt. This makes the face very **unstable** and can lead to falling rocks.

²⁵ Even with its scary nickname and difficult route, many climbers still dream of making it to the top of the north face of the Eiger. No matter how difficult something may be, the spirit of **adventure** will ensure that people keep trying.

Words 270



▲ close-up shot of the north face of Eiger

Think Critically

Why do you think people take such big risks?

I think taking risks makes them feel more satisfied with their lives.

A. Choose the best answer.

- Main idea** 1. What is the main idea of this passage?
- a. Large snowstorms often occur on the Eiger.
 - b. The north face of the Eiger is starting to melt.
 - c. People want to build a road to the top of the Eiger.
 - ✓ d. Climbing the north face of the Eiger is challenging.
- Detail** 2. What does *Nordwand* mean in English?
- a. the storm wall
 - b. the death wall
 - c. the new wall
 - ✓ d. the north wall
- Detail** 3. Why does the path up the north wall of the Eiger have many twists?
- a. because the path is icy
 - ✓ b. because the wall is steep
 - c. because the mountain is small
 - d. because the rocks are unstable
- Inference** 4. What can be inferred about the Eiger?
- a. There is always a chance of animal attacks there.
 - ✓ b. Climbers will keep challenging it even if it is dangerous.
 - c. No one is allowed to climb it because it is too dangerous.
 - d. It is much easier to climb because there is no ice anymore.
- Vocabulary** 5. Which can replace the word “simply” in line 5?
- a. kindly
 - b. oddly
 - ✓ c. just
 - d. fast

B. Answer the questions.

1. What does *Mordwand* mean?
- It means “ death wall .”
2. What makes it difficult to climb the Eiger in summer?
- Warmer temperatures are making the ice melt , causing the face to become unstable.
3. Where is the Eiger located?
- It is located in Switzerland.

Graphic Organizer & Summary

Step 1 Organize the information with the words from the box.

The Wall of Death

Main Idea	Climbing the north face of the Eiger is very difficult.
Reason 1	The <u>route</u> is long because the wall is <u>steep</u> , and climbers have to go up many <u>twists</u> and turns.
Reason 2	There is always a chance of snowstorms. When climbers get <u>trapped</u> in snowstorms, they can <u>freeze</u> to death.
Reason 3	Because warmer weather <u>melts</u> ice on the north face, the face becomes <u>unstable</u> and there is a danger of falling <u>rocks</u> .

melts steep unstable trapped route freeze twists rocks

Step 2 Complete the summary with the words from the box.

The Eiger is a mountain in Switzerland . Its north face is called the “ death wall ” because many people have died climbing it. There are several reasons why the north wall is so dangerous. First of all, the route to the top is longer than the north face itself. The path has many twists and turns . Also, there is always a chance of snowstorms . Climbers caught in one of these storms can freeze to death . Finally, ice on the north face has been melting due to warmer summers. This makes the face unstable and can lead to falling rocks.

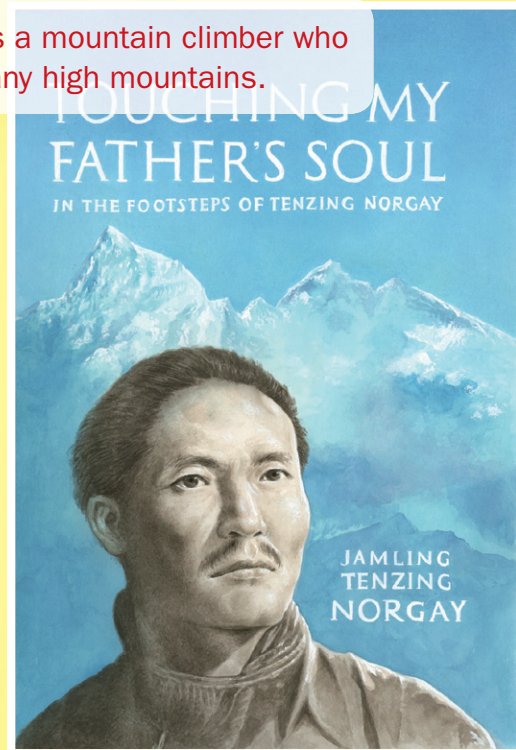
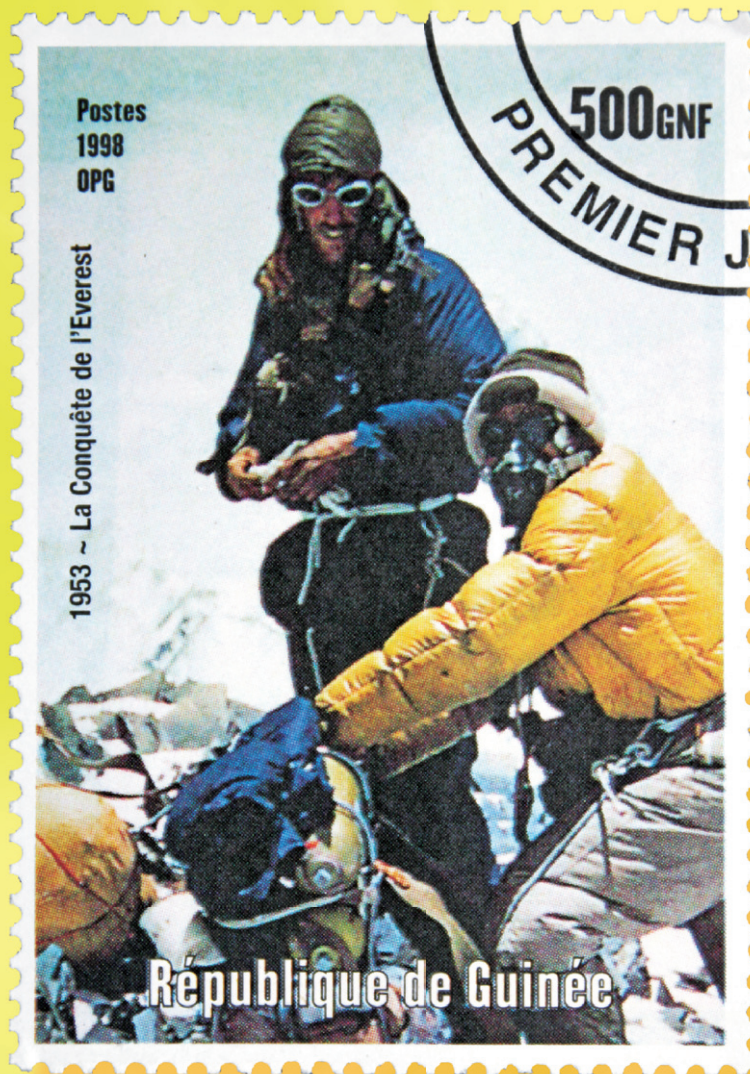
unstable Switzerland longer climbers face
snowstorms death wall melting death turns

Sherpas

Before You Read

Look at the pictures and guess who Tenzing Norgay is and what he did.

I think he is a mountain climber who climbed many high mountains.



▲ The son of Tenzing Norgay, Jamling Tenzing Norgay, wrote a book about the Sherpa's world.

◀ a stamp that shows Edmund Hillary (left) and Tenzing Norgay (right)



Key Words

Complete the sentences with the **key words**.



worships



porters



conditions



equipment



adapt



summit



hire



expert

1. The man worships the sun.
2. Porters carry things for others.
3. He is carrying equipment for climbing.
4. The weather conditions are bad for fishing.
5. She is interviewing a person to hire.
6. They reached the summit after a long climb.
7. After years of training, he has become a(n) expert skier.
8. The Arctic fox changes its color to adapt to the surroundings.

Background Knowledge

Mt. Everest

- Location: It is located on the border between Tibet and Nepal in the Himalayan Mountains in Asia.
- Altitude: At 8,850 meters above sea level, it is the tallest mountain in the world.





Sherpas

Helping Climbers Reach Their Goals

Focus On

What are Sherpas famous for?

Sherpas are famous for guiding climbers to the top of Mt. Everest.

Sherpas are a group of people living in northeastern Nepal. Most of them live around the world's highest mountain, Mt. Everest, and there are about 40,000 Sherpas in all. Sherpas are most likely from Tibet, because they wear Tibetan clothing and share many Tibetan traditions. Sherpas **worship** the mountains. They even call Mt. Everest "Chomolungma," which means "mother of the gods."

Nowadays, the word "Sherpa" usually refers to guides or **porters hired** by mountain climbers in the Himalayas. This is because Sherpas are famous for providing support to foreign mountain climbers. They started to help climbers in the 1900s when British mountain climbers began exploring the mountains of Nepal. Sherpas were perfect guides because they were **expert** climbers and knew a lot about the area. They were also



physically suited for the job because they had **adapted** to the high altitude **conditions** and **harsh** weather. This allowed them to easily carry climber's **equipment** up the mountains.

A Sherpa named Tenzing Norgay made history when he helped Edmund Hillary, a climber from New Zealand, reach the top of Mt. Everest on May 29, 1953. They were the first people ever to do so. Because of Tenzing Norgay, the Sherpas suddenly became known to the world as the best guides for Himalayan mountaineering. Today, many Sherpas still make their living by helping tourists climb mountains.



▲ Edmund Hillary and Tenzing Norgay

Since that first successful climb in 1953, more than 2,300 people have reached the top of Mt. Everest, and most of the time they did so with the help of Sherpas. Without these highly skilled guides, most climbers would likely fail to reach the **summit** of Mt. Everest.

Words 271

Connect to Yourself

If you were going to climb Mt. Everest, would you hire a Sherpa or would you want to do it without help?

I would hire a Sherpa. I would be too scared to climb Mt. Everest alone.



A. Choose the best answer.

- Main idea

1. What is the main idea of this passage?

a. Edmund Hillary and Tenzing Norgay were famous Sherpas.

b. Climbing high mountains is dangerous without expert help.

c. Thousands of people have climbed to the top of Mt. Everest.

☒ d. Sherpas help climbers reach the tops of Himalayan mountains.
- Detail

2. What does “Chomolungma” mean?

a. expert guide

b. foreign climber

☒ c. mother of the gods

d. the tallest mountain in the world
- Detail

3. Which is NOT a reason why Sherpas were good guides?

a. They knew the area well.

b. They were good climbers.

☒ c. Only Sherpas would take such risks.

d. Their bodies had adapted to high altitudes.
- Inference

4. What can be inferred about Sherpas?

a. They no longer act as porters.

b. They don’t like foreign climbers.

c. Their equipment is of high quality.

☒ d. Nepal is not their original homeland.
- Vocabulary

5. Which can replace the word “harsh” in line 19?

a. moist

☒ b. extreme

c. mild

d. chilly

B. Answer the questions.

1. Who was Tenzing Norgay?

He was a(n) Sherpa who was one of the first people to climb Mt. Everest.
2. What happened in Nepal in the 1900s?

British climbers began exploring the mountains of Nepal.
3. What do many Sherpas do today?

They still help people climb mountains.

Graphic Organizer & Summary

Step 1 Organize the information with the words from the box.

Sherpas

Who are Sherpas?

- They live around Mt. Everest.
- They share many traditions with the people of Tibet.
- They worship the mountains.

Why are they good guides?

- They have expert knowledge of the area.
- They are good at climbing mountains.
- Their bodies have adapted to high altitudes and harsh weather.

worship Mt.Everest climbing expert harsh Tibet adapted traditions

Step 2 Complete the summary with the words from the box.

Sherpas live around Mt. Everest. Although Nepal is their home, they share many traditions with the people of Tibet. They worship the mountains and call Mt. Everest the “mother of the gods.” They are known for serving as guides and porters. In the 1900s, British climbers started exploring the area. They hired the Sherpas to help them because they knew the mountains well and had no problem working at higher altitudes. In 1953, a Sherpa named Tenzing Norgay reached the summit of Mt. Everest, becoming one of the first two men to do so. Since then, Sherpas have been helping people climb Mt. Everest.

summit altitudes gods Nepal guides
hired exploring reached mountains porters

Mountain Survival Skills

Before You Read

You are going to stay alone in the mountains for a few days. If you could have only two things in the picture, which would you choose? Why?

I would take the bottles of water and the first aid kit. People need water to survive. And the first aid kit would be helpful if I got hurt.



Key Words

Complete the sentences with the key words.



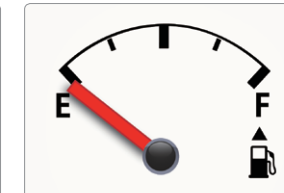
prepare



shelter



blanket



ran out



essential



stream



spark



steel

1. The bridge is made of steel.
2. He is hiding under the blanket.
3. Exercise is essential for your health.
4. My parents prepare dinner together.
5. His car stopped because it ran out of gas.
6. The man got some water from the stream.
7. He used a cave for shelter when it started to rain.
8. Knocking a rock against metal can create a(n) spark.

Background Knowledge

Backpacking tips

When going hiking, pack your backpack carefully. Put heavier items at the top and pack water and snacks where you can easily reach them. Make sure the backpack doesn't weigh more than 1/3 of your weight.





Mountain Survival Skills

Three Elements For Survival

Focus On

What is essential to survive in the mountains?

I think food, water, and warm clothes are essential to survive in the mountains.



▲ a box of matches

Mountains are great places to spend your free time, but they can be dangerous if you're not **prepared**. Imagine you went hiking with your friends or family and got lost while taking pictures of plants and animals. What if you couldn't find your way back and had to wait until someone came and saved you? To survive, you'd need three things: fire, water and **shelter**.

Fire is **essential** because mountains get cold at night, even in the summer. Fire also keeps dangerous animals away and can let people know where you are. Therefore, you should always carry a lighter or a box of matches with you. If you don't have either of these, you can hit a rock against a piece of **steel** to make a **spark** and start a fire. Just make sure that the fire doesn't spread!

Another thing you'll need is clean drinking water. Humans can't live without water. If your drinking water **runs out**, you'll need to find clean water as soon as possible. It's best to look for **running** water, such as a **stream** or river. If you can't find any, try digging a deep hole to find water underground. Or, if you have any empty containers, you can use them to collect rainwater.

Finally, you will need some kind of shelter. A cave can be a good shelter. If you can't find one, find a dry, flat area, build a frame with branches, and cover it with a **blanket**. If you don't have a blanket, cover your body with a pile of leaves instead. This will keep you dry on the rainiest nights and block the wind.



▲ a pile of leaves

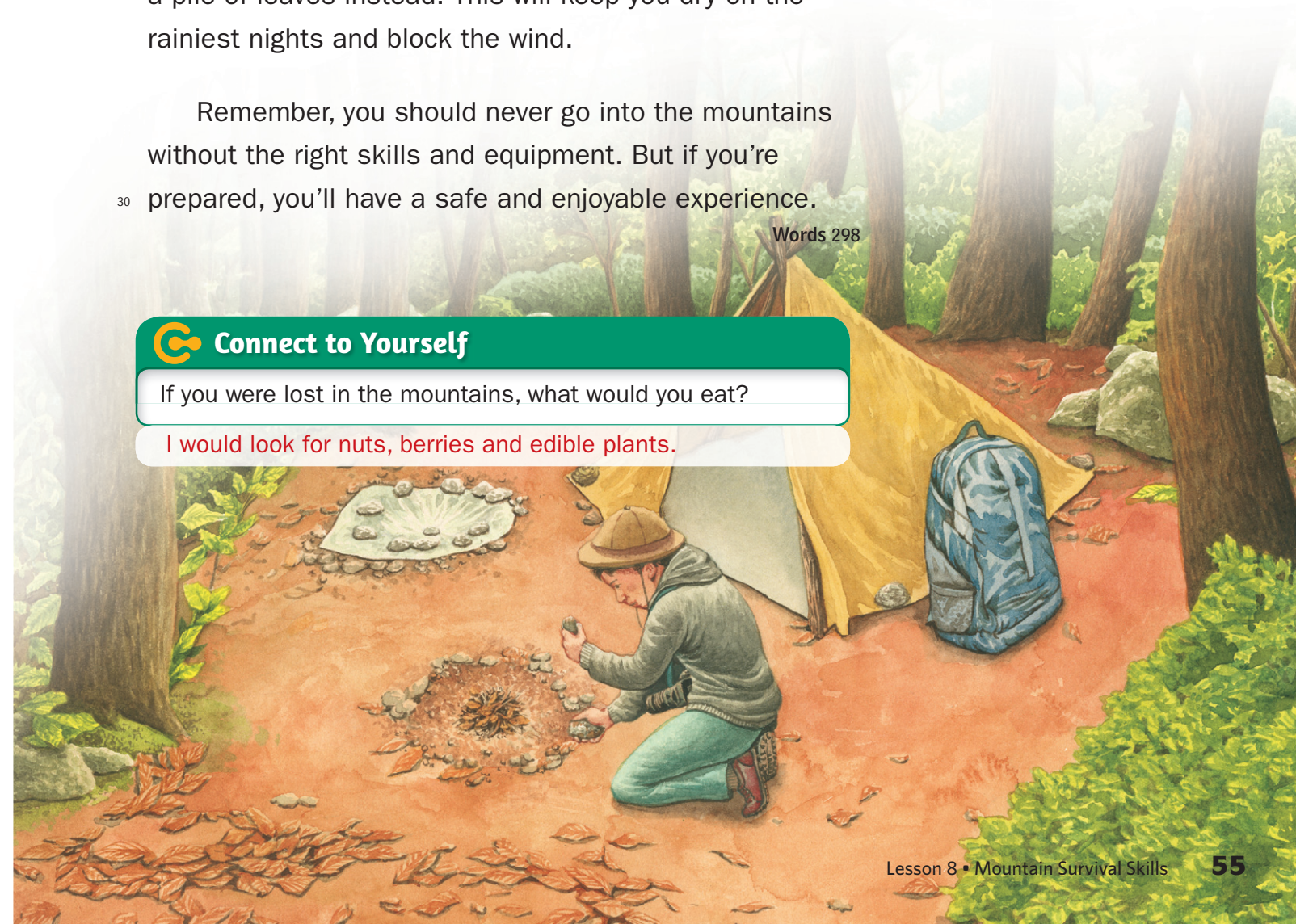
Remember, you should never go into the mountains without the right skills and equipment. But if you're prepared, you'll have a safe and enjoyable experience.

Words 298

Connect to Yourself

If you were lost in the mountains, what would you eat?

I would look for nuts, berries and edible plants.



A. Choose the best answer.

- Main idea** 1. What is the main idea of this passage?
- a. People can find many natural things to eat in the mountains.
 - ✓ b. There are three basic necessities for surviving in the mountains.
 - c. Bad weather is the most dangerous thing hikers have to deal with.
 - d. When lost in the mountains, there are ways to find your way home.

- Detail** 2. Which is NOT a suggested reason to make a fire?
- a. to keep warm
 - ✓ b. to make a dry spot for a shelter
 - c. to keep dangerous animals away
 - d. to let people know where you are

- Detail** 3. What can you do to keep dry if you don't have a blanket?
- a. dig a deep hole
 - b. find a flat place to stay
 - ✓ c. cover yourself in leaves
 - d. make an umbrella from branches

- Detail** 4. Which is NOT suggested as a way to get water?
- a. look for a stream
 - ✓ b. cut open large plants
 - c. dig for water underground
 - d. collect rainwater with containers

- Vocabulary** 5. Which can replace the word "running" in line 18?
- a. boiling
 - b. standing
 - c. disappearing
 - ✓ d. flowing

B. Answer the questions.

1. What are the three elements needed to survive in the mountains?
- We need fire, water and shelter to survive in the mountains.
2. How can you make a fire if you don't have a match?
- I can make a fire by hitting a(n) rock against steel.
3. What can be a good shelter?
- A cave can be a good shelter.

Graphic Organizer & Summary

Step 1 Organize the information with the words from the box.

Mountain Survival Skills

Fire	Water	Shelter
keeps you warm, keeps dangerous animals away and helps you to signal your location	keeps you alive	keeps you dry and blocks the wind
1) Make a fire with <u>matches</u> or a lighter. 2) Make a(n) <u>spark</u> by hitting a rock against a piece of <u>steel</u> .	1) Find a(n) <u>stream</u> or river. 2) <u>Dig</u> a deep hole to find water, or collect <u>rainwater</u> .	1) Find a cave. 2) <u>Build</u> a shelter with <u>branches</u> and a blanket.

steel rainwater dig matches branches stream spark build

Step 2 Complete the summary with the words from the box.

If you get lost in the mountains, you need three things. First, you need fire to keep you warm and to keep animals away. You should carry a(n) lighter or matches. If you don't have these, hit a rock against a piece of steel. Second, you need water to live. You should try to find a stream or river. If you can't, dig a deep hole to find underground water. Finally, find shelter to keep yourself dry and to block the wind. You should try to find a(n) cave. If you can't, build a(n) frame with branches and cover it with a(n) blanket.

hole underground lighter blanket
warm frame cave dry lost block

CHAPTER 3

Electricity

BIG IDEA

Is electricity natural or made by people?

I think it is both. Electricity such as lightning is found in nature, but people can make it, too.

LESSON
9

How Electricity Is Made

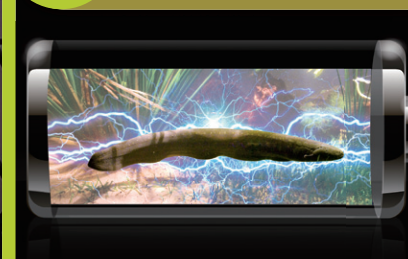


Q Where is the electricity in your home from?

I think it's from a nuclear power plant.

LESSON
10

Eel Power!



Q Can animals generate electricity?

Yes. Some animals, such as eels, can make electricity.

LESSON
12

Student Switch Off



Q Why do we need to use less electricity?

We need to use less electricity because we are running out of natural resources.

LESSON
11

The Future of Driving



Q What do cars need to run?

All cars need some kind of fuel to run.



How Electricity Is Made

Before You Read

What do we use electricity for?

We use it to keep food fresh, get light, stay cool and watch TV.



Key Words

Complete the sentences with the **key words**.



magnet



alternative



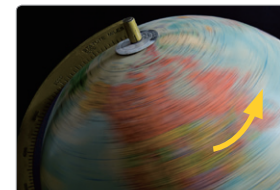
operating



pollutes



renewable



spinning



reliable



steam

1. The globe is spinning fast.
2. Steam is rising from a pot.
3. She is operating the copy machine.
4. This car is old, but it is still reliable.
5. There are some nails stuck to the magnet.
6. The dirty water from the factory pollutes the river.
7. Sunlight and wind are types of renewable energy sources.
8. When our plan failed, we had to think of a(n) alternative one.

Background Knowledge

Fossil fuel

Fossil fuels are fuels formed by natural processes. There are three major forms of fossil fuel: coal, oil and natural gas. Unfortunately, the supply of each is limited.





How Electricity Is Made

Steam, Water and Wind

Focus On

How is electricity made?

Most electricity is produced by generators. Steam, water and wind are used to operate the generators.

Electricity was first found in nature. But since then, people have found ways to make electricity for themselves, bringing many dramatic changes to our lives. So how is electricity made?

Most of the electricity we use every day is produced by generators in power plants. A generator is a machine with **magnets** inside it. The magnets **spin** around a wire. The spinning of the magnets is what creates electricity. Below are some of the methods used to **operate** generators.

Steam

- Fossil fuels can be burned to create **steam**, which is then used to operate generators. This is the most common method of operating generators. Unfortunately, burning fossil fuels **releases** large amounts of carbon into the air, so it **pollutes** our environment.

- Using nuclear power is another way to create steam. Nuclear reactions create lots of heat, which is then used to make steam. Nuclear power has the disadvantage of producing radioactive waste, but many countries use it to replace fossil fuels.



▲ the international symbol for radioactive waste

Water

When water flows through dams, it produces energy that operates generators. This is a **renewable** and relatively clean method of producing electricity. However, building dams can have harmful effects on plants and animals that live in the water.



▲ dam

Wind

Wind causes windmills to turn, which can also power generators. Wind power causes fewer problems than other methods of creating electricity, but it is not **reliable** because the wind does not blow all the time.

Not all electricity is made by generators, though. There are many **alternative** methods to make electricity. For example, we can use sunlight. Solar energy is created when the sun's energy is changed into electricity. What else can be used to make electricity?

Words 275

Think Critically

Which method of producing electricity do you think is the best?

Wind and sunlight are free, so I think they are the best ways of making electricity.

A. Choose the best answer.

- Main idea** 1. What is the main idea of this passage?
- a. We need to find alternatives to fossil fuels.
 - ✓ There are several ways to create electricity.
 - c. Generators help people use less electricity.
 - d. Nuclear power is the best way of making electricity.
- Detail** 2. Which is an alternative to producing electricity with generators?
- a. steam
 - b. water
 - c. nuclear power
 - ✓ d. sunlight
- Detail** 3. Which is NOT true about nuclear power?
- a. It produces harmful radioactive waste.
 - b. It creates steam to operate generators.
 - ✓ c. It is renewable and relatively clean power.
 - d. Many countries use it to replace fossil fuels.
- Inference** 4. What can be inferred about building dams?
- a. It is encouraged by economists.
 - b. It is most common in warm areas.
 - ✓ c. It is opposed by environmentalists.
 - d. It is no longer done to create electricity.
- Vocabulary** 5. Which can replace the word “releases” in line 15?
- ✓ a. sends out
 - b. processes
 - c. takes in
 - d. absorbs

B. Answer the questions.

1. How does a generator create electricity?
- It creates electricity by making magnets spin around a(n) wire.
2. What is a problem of burning fossil fuels, according to the passage?
- It pollutes our environment by releasing carbon into the atmosphere.
3. What are the two sources that are used to create steam to operate generators?
- Fossil fuels and nuclear power are used.

Step 1 Organize the information with the words from the box.

How Electricity Is Made		
Steam	Fossil Fuels	– release carbon into the air – <u>pollute</u> the environment
	Nuclear Power	– produces <u>radioactive</u> waste – used in many countries to <u>replace</u> fossil fuel
Water		– relatively clean and <u>renewable</u> – may have <u>harmful</u> effects on plants and animals in the water
Wind		– causes fewer environmental problems – not <u>reliable</u> because wind does not <u>blow</u> all the time

renewable radioactive pollute replace harmful reliable blow

Step 2 Complete the summary with the words from the box.

There are several ways to make electricity. One way is by using steam. Steam is usually produced by burning fossil fuels, but this pollutes the environment by releasing carbon into the atmosphere. Steam can also be produced by nuclear energy, but this produces radioactive waste. Using water is a clean and renewable method of powering generators, but it requires building dams, which can have harmful effects on plants and animals in the water. Finally, wind can be used. This causes fewer environmental problems than other methods, but it is unreliable because it doesn't blow at a(n) steady rate.

unreliable fossil fuels nuclear dams carbon steady
environmental methods effects generators

Eel Power!

Before You Read

How do these animals protect themselves?

Hedgehogs curl up into balls to hide inside their sharp hair. And dart frogs are poisonous, so most other animals leave them alone. Electric rays use electric shocks to protect themselves.



▲ hedgehog



▲ dart frog



▲ electric ray



Key Words

Complete the sentences with the **key words**.



powered



aluminum



awareness



promote



captured



panels



attacking



electrical socket

1. The electrical socket caught fire.
2. An eagle is attacking a rabbit.
3. This can is made of aluminum.
4. There are solar panels on the roof.
5. The train is powered by a steam engine.
6. Fireflies have been captured and put in the jar.
7. They are trying to raise awareness of global poverty.
8. She is offering cheese blocks to promote her restaurant.

Background Knowledge

Volt

The volt is a unit used to measure the pressure of electricity. Like water, electricity needs pressure to get the power to move. The more volts electricity has, the more powerful it is.





Eel Power!

Nature's Electric Generators

Focus On

How does the electric eel light up the Christmas tree?

It makes electricity when it moves, and the aluminum panels in a specially designed water tank absorb the electricity and send it to the Christmas tree.

At the end of every year, there's something special at the Enoshima Aquarium in Japan. It's a Christmas tree that is about 183 centimeters tall. It has decorations and lights like any other Christmas tree. So what's so special about it? This tree is **powered** by an electric eel!

Electric eels live mainly in the streams and ponds of South America. Of all the animals that produce electricity, electric eels give off the most. Electric eels have about 6,000 special cells that **store** power like batteries. They can give off 500 to 800 volts of electricity. That's more power than an **electrical socket** in your home. What's even more surprising is that they can control the amount of electricity they give off. For example, an electric eel gives off more electricity to protect itself from fish that **attack** it than it does to shock and catch fish to eat.

So how does the electric eel light the Christmas tree? The power of the electric eel is **captured** with a specially designed water tank. There are two **aluminum panels** inside the tank, which make it act like a battery. The electric eel gives off electricity every time it moves. The aluminum panels absorb that electricity. The electricity then travels from the aluminum panels to the lights on the Christmas tree.

The purpose of the eel-powered Christmas tree is to **promote** eco-awareness. It serves as an example of a way to generate electricity that does not harm the environment. Although electric eels are probably not the future of electric energy, they can teach us to be more aware of the environment.

Words 269



Think Critically

Why do you think electric eels don't shock each other?

Electric eels can control how much electricity they give off, so they probably only give off a little when they're around each other.

A. Choose the best answer.

- Main idea** 1. What is this passage mainly about?
- a. the importance of protecting electric eels
 - b. the amount of electricity an electric eel can make
 - ✓ a Christmas tree in Japan lighten up in a special way
 - d. a special electric eel exhibited in Enoshima Aquarium
- Detail** 2. What is special about the electric eel in the Enoshima Aquarium?
- ✓ It is used to light up a Christmas tree.
 - b. It can produce 6,000 volts of electricity.
 - c. It is the longest electric eel in the world.
 - d. It was found in a pond in South America.
- Detail** 3. Where do electric eels store their electricity?
- a. in their sharp front teeth
 - ✓ in thousands of special cells
 - c. in the water that they swim in
 - d. in aluminum found in their bodies
- Inference** 4. What can be inferred about electric eels?
- a. They are smaller than other eels.
 - b. They are an endangered species.
 - ✓ They use electricity when they hunt.
 - d. They will be the main source of electricity in the future.
- Vocabulary** 5. Which can replace the word “store” in line 9?
- a. shop
 - b. reflect
 - ✓ keep
 - d. create

B. Answer the questions.

1. Why did the Enoshima Aquarium create a special Christmas tree?
They created it to promote eco- awareness .
2. How does an electric eel protect itself from its attackers?
It gives off electricity to protect itself.
3. Where are electric eels usually found?
They are usually found in South American streams and ponds.

Graphic Organizer & Summary

Step 1 Organize the information with the words or phrases from the box.

Characteristics of electric eels		They are mostly <u>found</u> in South America in <u>streams</u> and ponds.
		They give off from 500 to 800 <u>volts</u> of electricity.
		They can <u>control</u> the amount of electricity they <u>give off</u> .
How the Christmas tree is lit	Step 1	The electric eel gives off electricity when it moves in a special tank.
	Step 2	The <u>aluminum</u> panels inside the tank <u>absorb</u> the electricity.
	Step 3	The electricity <u>travels</u> from the aluminum panels to the Christmas tree.

give off control travels aluminum volts found streams absorb

Step 2 Complete the summary with the words from the box.

Electric eels usually live in South America in streams and ponds. They have the ability to give off from 500 to 800 volts of electricity . Surprisingly, they can even control how much electricity they give off. For example, they increase the amount when protecting themselves. A(n) aquarium in Japan has found an interesting way to use the power of electric eels. An eel is placed in a special tank, where it gives off electricity by moving. This electricity is absorbed by the aluminum panels inside the tank . Then, the electricity moves from the aluminum panels to the Christmas tree . It's enough to light up the tree!

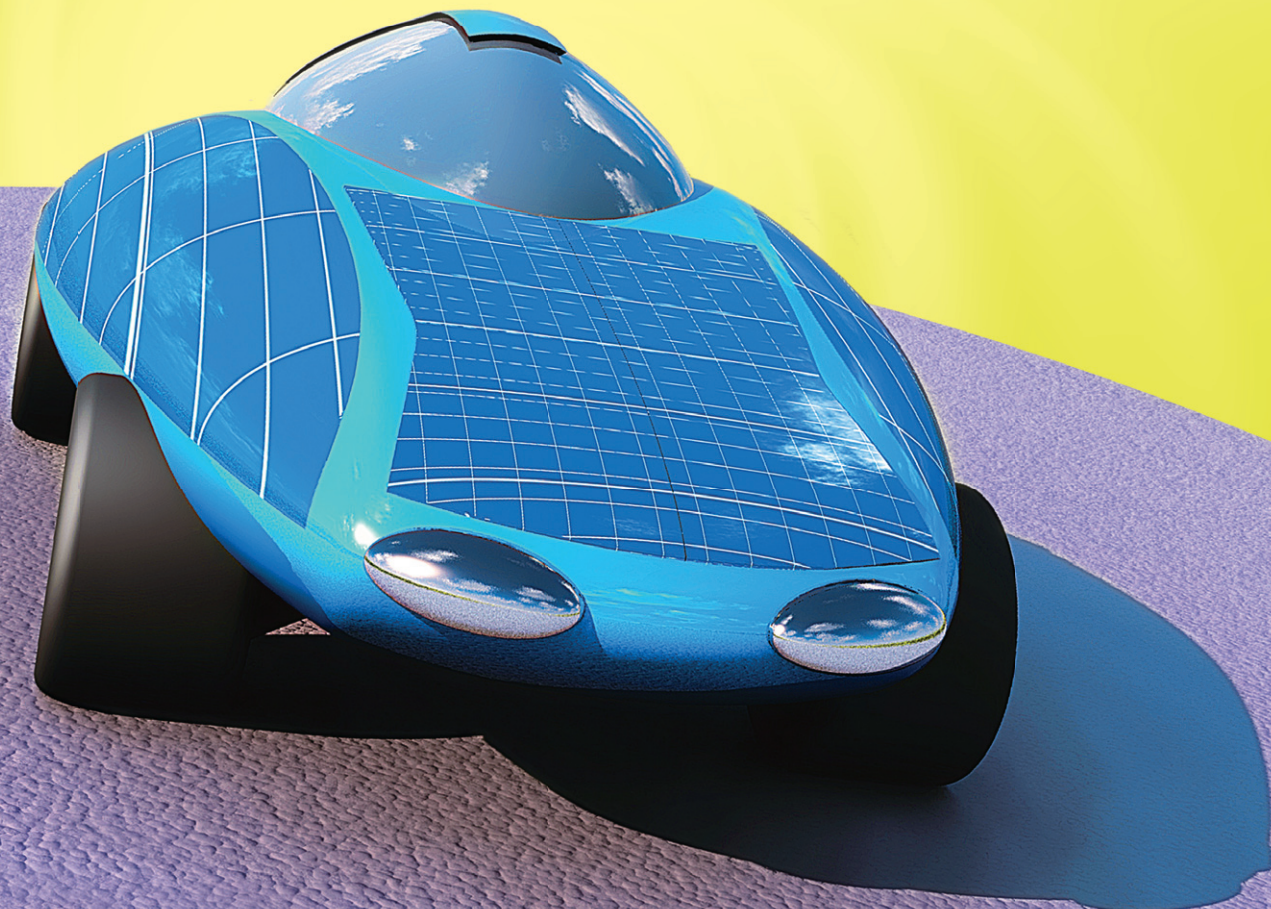
electricity South America tank Christmas tree moves
protecting aquarium light power increase

The Future of Driving

Before You Read

What will be used to make cars run in the future?

I think cars might have solar panels on them in the future. They would be able to use sunlight for fuel.



Key Words

Complete the sentences with the **key words**.



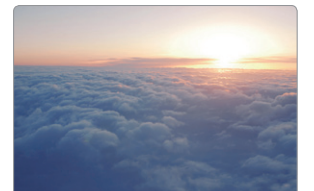
rechargeable



costs



research



atmosphere



emissions



engine



impact



average

- Each ticket costs one dollar.
- Cell phone batteries are rechargeable.
- He is trying to fix the car's engine.
- This book had a great impact on me.
- I did some research to find the lowest price.
- The emissions from this car are polluting the air.
- Clouds are found in the lowest part of earth's atmosphere.
- The average people get pimples at some point in their lives.

Background Knowledge

Gasoline

Today, most cars use gasoline as their fuel. It allows them to start easily, speed up quickly and run quietly. Unfortunately, it has negative effects on the environment.



The Future of Driving

Gasoline-powered Cars vs. Electric Cars

Focus On

What are some advantages of electric cars over gasoline-powered cars?

Electric cars are cleaner and cheaper to drive than gasoline-powered cars.

Today, most cars use energy made by burning fossil fuels, like gasoline. But there are many problems with fossil fuels, including high prices and air pollution. For these reasons, people have been trying to find better forms of energy to power their cars. One of the **alternatives** to today's gasoline-powered cars is the electric car. Let's take a look at some of the differences between electric cars and gasoline-powered cars.

Energy

Electric cars get their power from electricity that is stored inside a **rechargeable** battery. On the other hand, gasoline-powered cars' **engines** use energy produced by the burning of fossil fuels.

Recharge or Refuel

The **average** gasoline-powered car can only be refueled at gas stations. It takes less than five minutes

to fill the empty tank. On the other hand, electric cars can be recharged not only at charging stations but also in other places, like your home. Unlike refueling, though, it takes about six or seven hours to charge, depending on the size of the battery.

Cost

According to **research**, driving an electric car **costs** about 1.25 cents per kilometer, while driving a gasoline-powered car costs a little more than 12.5 cents per kilometer. This means that driving an electric car costs about 90% less than driving a gasoline-powered car.

Environmental Impact

Gasoline-powered cars have a huge environmental **impact** because when they burn fossil fuels, they release CO₂ into the **atmosphere**. On the other hand, electric cars don't release any **emissions** when driven. However, electric cars indirectly harm the environment because they use electricity that is often created by burning fossil fuels.

Speed

Gasoline-powered cars can go much faster than electric cars. An electric car can reach top speeds of only 160 km per hour, while some gasoline-powered cars can go faster than 480 km per hour.

Words 291

Think Critically

Would you rather buy a gasoline-powered car or an electric car? Why?

I'd rather buy an electric car because I care about the environment.



A. Choose the best answer.

- Main idea

1. What is this passage mainly about?

a. the impact of fossil fuels on gasoline-powered cars

b. the development of new technology to replace electric cars

☒ c. the comparison between electric and gasoline-powered cars

d. the unexpected negative effects of electric cars on the environment
- Detail

2. Which is NOT mentioned in the passage?

a. Gasoline is a kind of fossil fuel.

☒ b. Electric cars are cheaper to buy.

c. Electric cars are also responsible for creating CO₂.

d. Recharging time depends on the size of the battery.
- Detail

3. How fast are gasoline-powered cars compared to electric cars?

a. They are slightly slower.

b. They have similar top speeds.

c. They are about ten times as fast.

☒ d. They are about three times as fast.
- Inference

4. About how much would it cost to drive an electric car for a kilometer?

a. two cents

☒ b. 12 cents

c. 90 cents

d. two dollars
- Vocabulary

5. Which can replace the word “alternatives” in line 6?

a. forms

☒ b. choices

c. differences

d. advantages

B. Answer the questions.

1. Why have people been looking for alternatives to fossil fuels?






There are many problems with fossil fuels, including high prices and air pollution.
2. What are the problems with electric cars?

They are slower than gasoline-powered cars and take a lot of time to recharge.
3. How do electric cars harm the environment?

They use electricity that is often created by burning fossil fuels.

Graphic Organizer & Summary

Step 1 Organize the information with the words from the box.

The Electric Car		The Gasoline-powered Car
– powered by <u>electricity</u>		– powered by burning <u>fossil fuels</u>
– takes about 6 or 7 hours to <u>charge</u> its battery		– takes less than five minutes to <u>fill</u> its tank
– can be recharged at many places		– can be refueled only at gas stations
– costs about 1.25 cents per kilometer to drive		– costs about 12.5 cents per kilometer to drive
– is much more <u>environmentally</u> friendly		– releases much more <u>CO2</u>
– can reach <u>speeds</u> of about 160 km per hour		– can go <u>faster</u> than 480 km per hour

CO₂ charge electricity faster environmentally fossil fuels fill speeds

Step 2 Complete the summary with the words from the box.

Electric cars get their energy from electricity, while gasoline-powered cars get energy from burning fossil fuels. Gasoline-powered cars release much more CO₂ than electric cars. What’s more, electric cars cost about 90% less to operate than gasoline-powered cars. Electric cars are convenient because they can be charged in many places. But they also have disadvantages. It takes about six or seven hours to charge an electric car’s battery, while you can fill a gasoline-powered car’s tank in less than five minutes. And electric cars can only go about 160 km per hour, while gasoline-powered cars can go faster than 480 km per hour.

disadvantages energy faster burning release
tank less operate battery cost

Student Switch Off

Before You Read

Look at the pictures. They show examples of electricity being wasted. What should be done in each situation to save electricity?

In picture ①, the lights should be turned off because nobody is using them. In picture ②, the woman should turn off the computer if she is going to sleep.



Key Words

Complete the sentences with the key words.



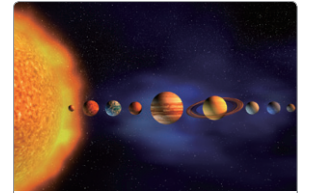
residence hall



campaign



appliances



planets



upload



participate



remarkable



competition

1. She went to the mall to buy some appliances.
2. He raised his hand to participate in the debate.
3. He is moving into a(n) residence hall at his university.
4. The landscape of the Grand Canyon is remarkable.
5. Earth is one of the eight planets in the solar system.
6. They started a(n) campaign to recycle cans and plastics.
7. The children had a(n) competition to see which team was stronger.
8. I connected the camera to the computer to upload the pictures.

Background Knowledge

Social networking sites (SNS)

Social networking sites are very popular these days. These websites allow users to share information and photographs with other people.



Student Switch Off

Making Schools Eco-friendly

Focus

On

How does the Student Switch Off campaign spread its message?

The campaign used social networking sites to spread its message and raise awareness among students.



▲ Putting a lid on a pan saves up to 90% of the energy!

Natural resources are used to produce electricity, but they will not last forever. Therefore, it's important to save energy because doing so reduces our usage of these resources. There are many energy **campaigns** with this goal in mind. One interesting campaign in the UK, called Student Switch Off, is run by university students.

Student Switch Off first began in 2006 at the University of East Anglia in the UK. This campaign encourages students who live in the school's **residence halls** to save energy. It asks them to turn off lights and **appliances** when they are not needed. It also suggests putting on a sweater instead of turning up the heat when it's cold. Another tip for students is to put a lid on pans when cooking. During the campaign's first year, energy use in residence halls was reduced by an average of more than 10%. That's nearly \$30,000 worth of savings!

Currently, more than 40 universities in the UK **participate** in Student Switch Off. It used social networking sites to spread its message and raise awareness among students. Now, it promotes fun events such as energy-saving **competitions** between the residence halls of different universities. It also holds photo contests. On its website, students can **upload** funny pictures about saving electricity, and the winners get prizes. Overall, Student Switch Off aims to make saving energy fun.

Student Switch Off continues to grow and **reduce** energy use every year. As we can see from this campaign's **remarkable** results, energy use can be reduced simply by changing small habits. Why don't you follow this campaign's examples and help protect the **planet**?

Words 269



Connect to Yourself

What small habits can you change to save energy?

I can turn off my computer when I am not using it.



A. Choose the best answer.

- Main idea

1. What is the main idea of this passage?

a. Schools are starting classes on saving electricity.

☒ b. A campaign is helping save energy in UK schools.

c. Electricity use in UK schools has been rising sharply.

d. Students are encouraging their families to use less energy.
- Detail

2. Which is NOT suggested as a way of saving energy?

a. putting on extra layers of clothes

b. putting lids on pans when cooking

c. turning off appliances when they are not in use

☒ d. drinking hot water to heat up the body when cold
- Detail

3. Which is NOT a method used to increase the popularity of the campaign?

☒ a. advertising on TV

b. running photo contests

c. promoting competitions between universities

d. using social networking sites to spread its message
- Detail

4. How can students win prizes from Student Switch Off?

a. by saving the most electricity

☒ b. by uploading funny pictures online

c. by spreading the campaign's message

d. by writing essays about the environment
- Vocabulary

5. Which can replace the word "reduce" in line 27?

☒ a. decrease

b. prevent

c. recycle

d. change

B. Answer the questions.

- Why is it important to save energy?
Natural resources used to produce electricity will not last forever.
- How much energy did they save during the campaign's first year?
They saved nearly \$ 30,000 worth of energy.
- Where does the Student Switch Off campaign take place?
It takes place at universities in the UK.

Graphic Organizer & Summary

Step 1 Organize the information with the words or phrases from the box.

Students Switch Off

- They save energy by
 - turning off lights and appliances when they are not in use
 - dressing warmly instead of turning up the heater
 - putting lids on pans when cooking
- It was spread by
 - using social networking sites
 - holding photo contests
 - running competitions between schools

contest turning off turning up networking lids competitions

Step 2 Complete the summary with the words from the box.

Student Switch Off is a(n) campaign in the UK that is run by university students. It asks students living in residence halls to save electricity. They are encouraged to turn off lights and appliances that aren't being used and to dress warmly instead of turning up the heat. After just one year, residence hall energy use dropped by a(n) average of more than 10%. The campaign became popular by using social networking sites and holding photo competitions. There are more than 40 universities in the UK that are currently participating in Student Switch Off. Why don't you follow this campaign's examples?

campaign residence halls average holding participating
popular encouraged university heat social

CHAPTER 4

Plastic

LESSON
13

The History of Plastic



Q Why was plastic invented?

People wanted material that could be made into any shape.

LESSON
14

Solutions to the Plastic Problem



Q How can we help solve the plastic problem?

We can recycle and reuse plastic products.

LESSON
16

Benefits of Plastic



Q Why is plastic a good material for medical tools?

It is lighter than other materials.

LESSON
15

Toy of the Century



Q What was your favorite toy when you were little?

My favorite toy was an action figure.

BIG IDEA

What do you use every day that is made of plastic?

My cell phone, my computer and my pen are all made of plastic.



The History of Plastic

Before You Read

Look at the pictures. Which option do you prefer for each situation? Why?

I would carry the plastic bottle because it's lighter and doesn't break easily and I would put my groceries in a plastic bag because it is more durable than a paper bag.



Key Words

Complete the sentences with the key words.



substitute



flexible



transparent



leaking



prize



toxic



molded



offering

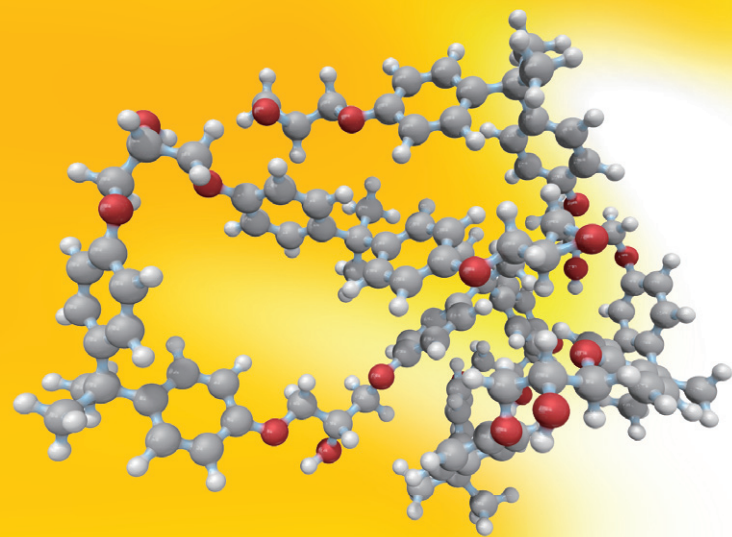
1. Clay can be molded into any shape.
2. Honey can be a(n) substitute for sugar.
3. Water is leaking through a hole in a pipe.
4. They got a(n) prize for winning the game.
5. Soon flexible smartphones will be available.
6. Stay away from the bottles. They are toxic.
7. The girl is offering her grandmother a cup of coffee.
8. The containers are transparent, so you can see what's in them.

Background Knowledge

Before the invention of plastic

Before plastic, the only materials that could be molded into different shapes were clay and glass. However, both of these materials are heavy and break easily. This is why plastic was a big improvement.





The History of Plastic

From Plant to Petroleum

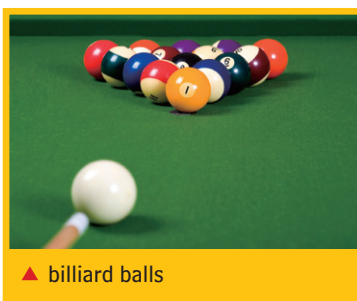
Focus On

What were some early plastics?

Parkesine, Celluloid and Bakelite were some early plastic.



▲ ivory



▲ billiard balls

Today, plastic is used in almost everything, from shopping bags and bottles to chairs and cars. Plastic has conquered the world. But do you know how it was first made?

1862 - Parkesine

The first man-made plastic was created by Alexander Parkes, who introduced it at the 1862 Great International Exhibition in London. It was called Parkesine, and it was made from plant materials. Once heated, it could be **molded**, and it held its shape when cooled. Also, it could be made colored or **transparent**. However, it was too expensive to **produce** for common use.

1866 - Celluloid

In the 19th century, billiards was so popular that a lot of elephants were being killed for their ivory, which was used to make billiard balls. So, people tried to find

a **substitute**. A U.S. billiard ball company **offered** a **prize** of \$10,000 to the person who could design the best substitute for natural ivory. In 1866, John Wesley Hyatt created Celluloid while trying to win the prize. Although he failed to win, Celluloid was later used to make many products, including false teeth, piano keys, and ping pong balls.

1909 - Bakelite

Leo Baekeland created Bakelite in 1909. Made entirely of artificial materials, it was the first true plastic. It was inexpensive, and it kept its shape when heated. Soon, it was being used in many things, including electrical products and jewelry. Since then, many other plastics have been developed.

Today - Petroleum

Today, most plastics are produced from non-natural materials made from petroleum. They are light, **flexible**, strong, and cheap. Despite all these advantages, there is one problem: plastic waste breaks down slowly and **toxic** chemicals can **leak** from it. Therefore, people are trying to develop less harmful plastics.



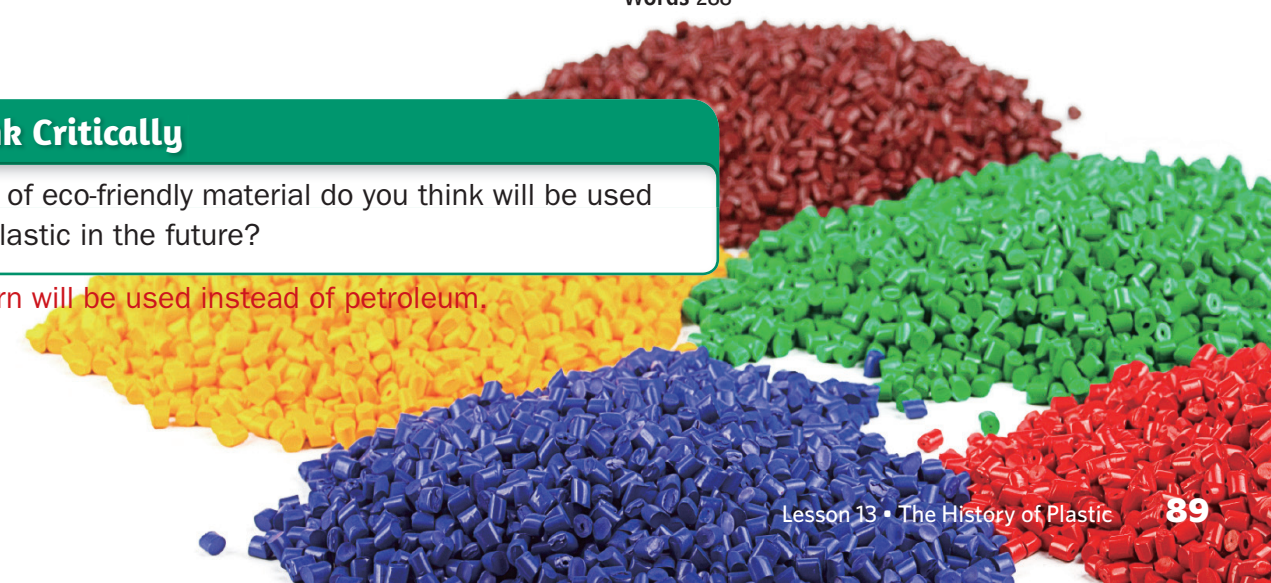
▲ petroleum

Words 288

Think Critically

What kind of eco-friendly material do you think will be used to make plastic in the future?

I think corn will be used instead of petroleum.



A. Choose the best answer.

- Main idea** 1. What is the main idea of this passage?
- a. Plastic is harmful to many plants and crops.
 - b. New materials are currently being created to replace plastic.
 - c. Plastic was originally invented as a substitute for petroleum.
 - ☒ d. Plastic has been developed and improved over a long period of time.

- Detail** 2. Which item was NOT made with Celluloid?
- a. ping pong balls
 - ☒ b. billiard balls
 - c. false teeth
 - d. piano keys

- Detail** 3. Which was an advantage of Bakelite?
- a. It broke down very slowly.
 - b. It didn't contain any chemicals.
 - c. It could be used to store petroleum.
 - ☒ d. It could be heated without changing shape.

- Inference** 4. What can be inferred about Parkesine?
- a. It wasn't as strong as ivory.
 - b. It could not be seen through.
 - ☒ c. It cost more to make than Bakelite.
 - d. It was named after a billiard ball company.

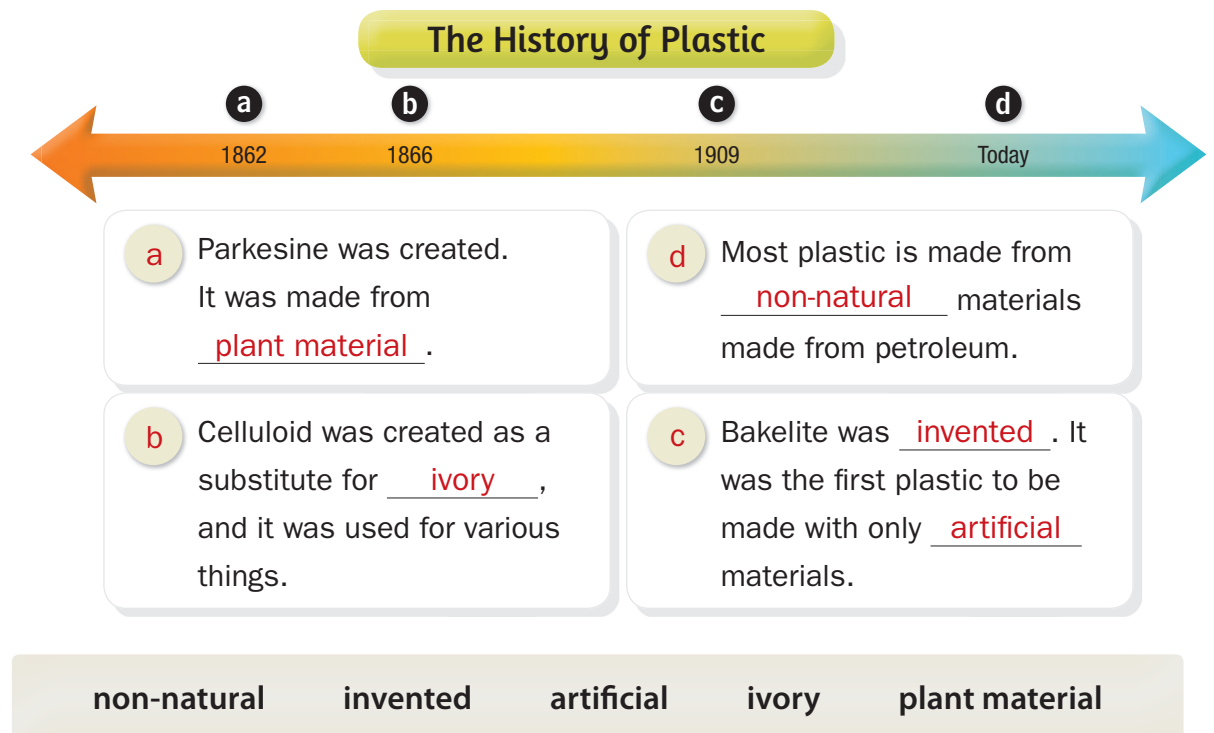
- Vocabulary** 5. Which can replace the word "produce" in line 12?
- a. discover
 - b. analyze
 - c. introduce
 - ☒ d. manufacture

B. Answer the questions.

1. What were billiard balls made from in the 19th century?
They were made from ivory from elephants.
2. What are two problems with plastic waste?
It breaks down slowly and releases toxic chemicals.
3. How was Parkesine different from other plastics mentioned in this passage?
It was made from plant materials.

Graphic Organizer & Summary

Step 1 Complete the sentences with the words from the box and write a~d in the correct order.



Step 2 Complete the summary with the words from the box.

Plastic is used to make many products today. The first man-made plastic, called Parkesine, was created from plant material in 1862. However, it was too expensive to make. In 1866, John Wesley Hyatt invented Celluloid. He was trying to find a(n) substitute for ivory, which was used to make billiard balls. Bakelite was invented in 1909. It was the first plastic to be made entirely from artificial materials. Today, most plastic is made from petroleum. Unfortunately, this is bad for the environment. Therefore, people are still looking for alternatives.

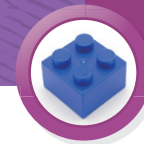
expensive petroleum unfortunately products Parkesine
environment Celluloid artificial substitute invented

Solutions to the Plastic Problem

Before You Read

These things are made to be used only one time. What is good and bad about them?

They are very convenient, but they are bad for the environment.



Key Words

Complete the sentences with the key words.



recycle



floating



rusted



reuse



punching



disposable



convenient



vehicles

1. The nails have rusted.
2. He is punching holes in the paper.
3. Using a remote control is convenient.
4. An iceberg is floating in the ocean.
5. There are many vehicles on the road.
6. We should recycle glass, paper, plastic and cans.
7. You can reuse an old can and make a pot for a plant.
8. Disposable products are used only one time and thrown away.

Background Knowledge

The three Rs

- Reduce: Use fewer products and create less waste.
- Reuse: Find a new use for old products.
- Recycle: Turn plastic waste into something new.





Solutions to the Plastic Problem

Creative Ideas

Focus On

What are some examples of creative ways to recycle and reuse plastic waste?

You can make a variety of things, such as buildings, bridges and even boats out of plastic waste.

To make life **convenient**, many **disposable** products are made, such as plastic bags and containers. As a result, huge amounts of plastic are thrown away every day, creating a big environmental problem. To solve this problem, we **recycle** or **reuse** plastic waste. Here are some examples of amazing, **creative** ways of recycling and reusing plastic.

In Taiwan, there is a building called the EcoARK. Three hundred tons of plastic waste were made into 1.5 million bottle-shaped bricks to build it. The plastic bricks, despite their light weight, are designed to survive earthquakes and typhoons.

Another amazing example of recycled plastic is a bridge in Scotland. It's the world's longest plastic bridge. Fifty tons of plastic bottles and containers were used to make it. It is so strong that it can hold 44 tons of people and **vehicles**. In addition, it doesn't **rust** or need regular painting.

There is also a sailboat named *Plastiki*. It was built from about 12,000 plastic bottles and weighs about 9 tons. It sailed all the way across the Pacific Ocean from San Francisco to Sydney! The purpose of the journey was to make people aware that millions of tons of plastic are **floating** in and polluting the ocean.

Next time, before you throw away something plastic, see if it can be recycled, or think of a creative way to reuse it. It doesn't necessarily have to be a big creation like the examples above. There are many simple, useful things you can do. For example, you can **punch** little holes in the bottom of a plastic bottle and use it to water plants. Or you can cut a bottle in half and use it as a hand shovel. Why don't you try to come up with some creative ideas of your own?



▲ the journey across the Pacific Ocean

Words 297

Connect to Yourself

Do you know a creative way to reuse plastic bottles? What is it?

I can cut a plastic bottle in half and use it as a vase.

A. Choose the best answer.

- Main idea** 1. What is this passage mainly about?
- a. effective methods of cleaning up trash
 - b. problems caused by disposable products
 - ✓ c. ways of reusing and recycling plastic waste
 - d. new materials that are stronger than plastic
- Detail** 2. Which was made of 12,000 plastic bottles?
- a. EcoARK
 - ✓ c. *Plastiki*
 - c. a hand shovel
 - d. a bridge in Scotland
- Detail** 3. Which is true about EcoARK?
- ✓ a. The bricks look like bottles.
 - b. It can't survive earthquakes.
 - c. The bricks are heavy and strong.
 - d. It can hold 44 tons of people and vehicles.
- Inference** 4. What can be inferred about the plastic bridge in Scotland?
- a. It was very expensive to build.
 - b. It is only used by people and bicycles.
 - c. It will soon be replaced by a longer bridge.
 - ✓ d. It is easier to maintain than metal bridges.
- Vocabulary** 5. Which can replace the word “creative” in line 7?
- a. productive
 - b. manageable
 - ✓ c. imaginative
 - d. portable

B. Answer the questions.

1. What is the purpose of this passage?
- It is to encourage people to be creative and find ways to reuse and recycle plastic.
2. Why did the *Plastiki* sail across the Pacific Ocean?
- It did so to make people aware of pollution in ocean.
3. What are the problems with disposable plastic products?
- Huge amounts of plastic are thrown away every day.

Graphic Organizer & Summary

Step 1 Organize the information with the words from the box.

	EcoARK	Plastic Bridge	<i>Plastiki</i>
Type of structure	building	bridge	<u>sailboat</u>
Amount of plastic used	300 tons of plastic waste	50 tons of plastic <u>waste</u>	12,000 plastic <u>bottles</u>
Special feature	Its <u>bricks</u> are strong enough to survive <u>earthquakes</u> and typhoons.	It is very strong, doesn't <u>rust</u> and doesn't need regular painting.	It made people aware of plastic waste <u>floating</u> in the sea.

waste floating bottles sailboat bricks earthquakes rust

Step 2 Complete the summary with the words from the box.

Serious environmental problems are being caused by large amounts of disposable plastic products. Therefore, people are finding creative ways to reuse and recycle plastic. The EcoARK is a(n) building made with bottle-shaped bricks. These bricks were made from 300 tons of plastic waste. Another example is the world's longest plastic bridge, built with 50 tons of plastic waste. It is strong and doesn't require much work to maintain. Finally, the *Plastiki* is a sailboat built from 12,000 plastic bottles. It sailed across the Pacific Ocean to make people aware of pollution in the ocean. Before you throw away something made of plastic, think of a creative way to reuse or recycle it.

aware 300 longest building pollution
amounts across creative caused recycle

The Toy of the Century

Before You Read

Look at the pictures. What do you think the buildings are made of?

I think they are made of LEGO bricks.



◀ model of London



▶ model of Venice



Key Words

Complete the sentences with the key words.



carpenter



arranging



satisfied



durable



achieve



ideal



theme



complicated

- Jane is arranging flowers.
- This map is very complicated.
- He is satisfied with the present.
- This beach is the ideal vacation spot.
- She is studying hard to achieve her dream.
- The theme of the party is ghosts and witches.
- A(n) carpenter is someone who is skilled in woodwork.
- Steel is used to make buildings because it is durable.

Background Knowledge

LEGOLAND

LEGOLAND is a chain of LEGO-themed amusement parks. There are many attractions built with LEGO bricks, such as models of famous cities. LEGOLAND parks have rides that are suitable for young children.





The Toy of the Century

The LEGO Story

Focus On

What are the reasons for LEGO's success?

The LEGO Group keeps trying to innovate and their toys are ideal for kids because they let them use their imagination.

In 1932, a Danish **carpenter** named Ole Kirk Christiansen started a business making wooden toys. He took the Danish words *leg* and *godt*, meaning “play well,” and came up with “LEGO.” It soon became a name that kids all over the world would grow up with. And, in 2000, LEGO bricks were recognized as the “Toy of the Century.” How did a kids’ toy become so successful?

There are three main reasons for LEGO's success. The first is that the company wasn't **satisfied** until its toy was just right. For example, LEGO bricks were made of wood at first. But, as the wooden parts didn't stay together, LEGO searched for a way to make parts that would stick together even when moved to somewhere else. This is how their unique plastic bricks were invented.

The second reason for LEGO's success is the toy itself. The LEGO Group's **vision** was to make toys that let children learn through playing. And their unique bricks allowed them to **achieve** their vision. The design of these simple, **durable**, colorful bricks is **ideal** for a child's toy. It allows kids to create nearly anything imaginable. It is possible to **arrange** six bricks in 915,103,765 different ways!

The last reason for LEGO's success is that the LEGO Group keeps trying to innovate. They now have many different product lines, from large toys for younger children to **complicated** toys for adults. Some product lines use **themes** from popular movies. And now LEGO even has its own movie!

With these reasons for success in mind, it's no surprise that LEGO was named the “Toy of the Century.” And there's little doubt that children around the world will continue to love LEGO toys for years to come.

Words 288



▲ a scene from *Star Wars*

Think Critically

What do you think the “Toy of the 21st Century” will be?

I think it will be some kind of smartphone game.

A. Choose the best answer.

- Main idea

1. What is this passage mainly about?

a. how a toy became a movie

☒ reasons for LEGO's success

c. different toys made of plastic

d. where LEGO bricks got their name
- Detail

2. What is TRUE about the LEGO Group?

a. It only makes bricks.

b. It made its first toy with plastic.

c. It started as a wooden furniture company.

☒ Its products can be played with by people of different ages.
- Detail

3. Which is NOT true about LEGO bricks?

a. They are simple, durable and colorful.

b. Their design encourages kids to be creative.

☒ They can stay together because they are sticky.

d. They were recognized as the "Toy of the Century."
- Inference

4. What can be inferred about LEGO's wooden bricks?

a. They are still being made today.

b. They came in many different colors.

c. They were much larger than today's bricks.

☒ They weren't as popular as the plastic bricks.
- Vocabulary

5. Which can replace the word "vision" in line 17?

a. eyesight

b. sense

☒ idea

d. quality

B. Answer the questions.

1. Why did the LEGO Group start to make bricks with plastic?

The wooden ones didn't stay together when moved to somewhere else.
2. Where does the word "LEGO" come from?

It comes from the Danish words *leg* and *godt*, meaning "play well."
3. What was the LEGO Group's vision?

Their vision was to make toys that let children learn through playing.

Graphic Organizer & Summary

Step 1 Organize the information with the words from the box.

Main Idea	The LEGO Group is very successfull, and LEGO bricks have been <u>recognized</u> as the "Toy of the Century."
Detail 1	To solve the problems with their <u>wooden</u> toys, they started to make toys with <u>plastic</u> .
Detail 2	The bricks are <u>ideal</u> for kids. They help children to create nearly anything <u>imaginable</u> .
Detail 3	The LEGO Group keeps trying to <u>innovate</u> . Now they have toys for different <u>age</u> groups.

imaginable wooden ideal plastic age recognized innovate

Step 2 Complete the summary with the words from the box.

The LEGO Group was started by Ole Kirk Christiansen in Denmark in 1932. In 2000, LEGO bricks were named the "Toy of the Century." There are three reasons for their success. First, the company wasn't satisfied until their toy was perfect. As a result, they came out with plastic bricks that stuck together better than wooden bricks. Second, LEGO bricks are ideal for kids. They help kids learn while they play, allowing them to create nearly anything imaginable. Finally, the LEGO Group never stopped innovating. Today, they make toys that every generation can enjoy.

success bricks Denmark Century stuck
learn create innovating plastic satisfied

Benefits of Plastic

Before You Read

The industries shown in the pictures have taken advantage of plastic. Why do you think they use plastic?

I think they all use plastic to make their products stronger and lighter.



▲ construction industry



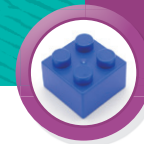
▲ transportation industry



▲ electronics industry



▲ packaging industry



Key Words

Complete the sentences with the key words.



medical



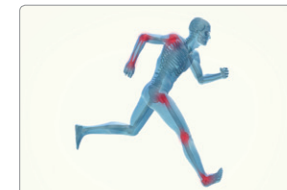
sanitizing



eyesight



scratch



joint



advantage



groceries



combination

1. The cat likes to scratch the sofa.
2. Orange is a(n) combination of red and yellow.
3. She's carrying groceries in a paper bag.
4. Rubber has the advantage of being flexible.
5. Doctors use medical tools to perform surgery.
6. A(n) joint is a body part where two bones are joined.
7. The doctor is sanitizing her hands before performing surgery.
8. My grandfather has bad eyesight. He can't read without a magnifying glass.

Background Knowledge

How diseases are spread

Many diseases are spread through blood or saliva. That's why medical tools must be cleaned or thrown away after being used.



Benefits of Plastic

Modern Medicine's Essential Helper

Focus On

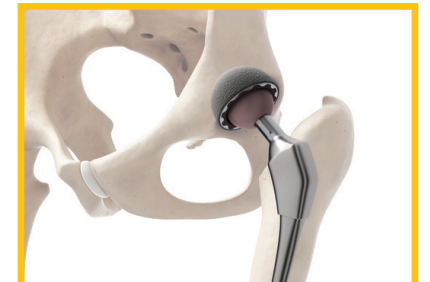
What are some benefits to using plastic in the medical industry?

The use of plastic reduces the rate of infection. Also, it can be used to make artificial joints as well as lenses that are light and comfortable.

Plastic is one of the most common artificial materials used in our daily lives. We store food in plastic containers, carry **groceries** in plastic bags and drink out of plastic cups. But did you know that plastic also plays an important role in the **medical** industry?

Plastic has caused significant changes in the medical industry by reducing the risk of infection. Before disposable plastic products existed, hospitals used to boil medical tools to **sanitize** them. Although this method worked, there was a danger of infection if the tools were not properly sanitized. However, disposable products have solved this problem.

Another medical use of plastic is to make artificial **joints**. Artificial hips and knees are needed by many older people so that they can continue to walk. In the past, most artificial joints were made of metal. But plastic has the **advantages** of weighing less and being easily **formed** into any shape. Today, many joints are made from a **combination** of metal and plastic parts.



▲ artificial joint

Finally, how's your **eyesight**? If you wear glasses or contact lenses, you can thank plastic for giving you good eyesight. Today, actual glass isn't used to make eyeglass lenses anymore. Instead, plastic is used. Plastic eyeglass lenses are lighter, thinner, less likely to break and harder to **scratch**. And contact lenses are made of plastic, too. This makes them more comfortable than those that were made of glass.



▲ contact lens

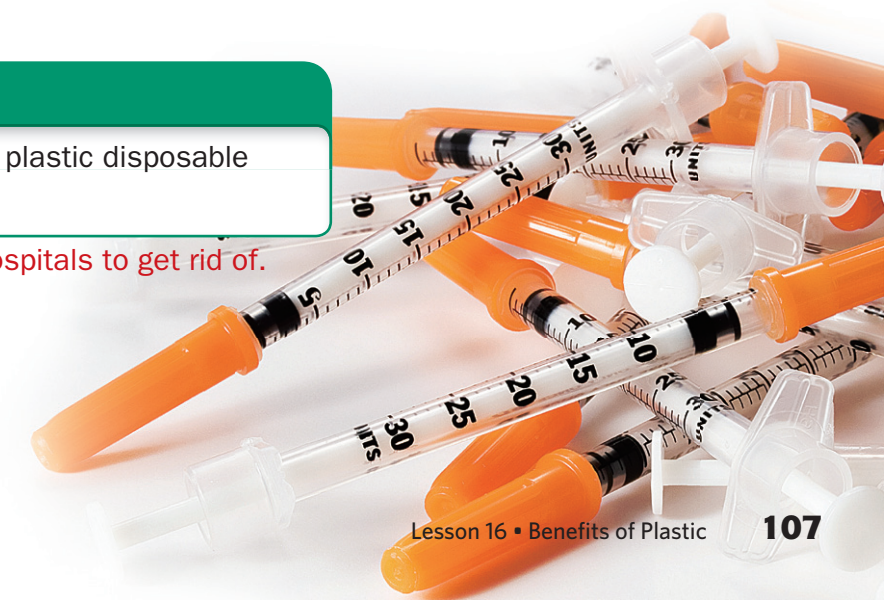
While plastic causes some environmental problems, it also brings us many benefits. Without it, our lives would be much more difficult. In the future, we should continue to enjoy its advantages while finding ways to lessen its disadvantages.

Words 269

Think Critically

What would be some disadvantages of plastic disposable medical tools?

They probably create more trash for hospitals to get rid of.



A. Choose the best answer.

- Main idea

1. What is this passage mainly about?

a. why plastic is lighter than metal

b. harmful health effects of plastic

☒ c. plastic's role in the medical industry

d. the development of a new kind of plastic
- Detail

2. Which is NOT mentioned as a benefit of plastic eyeglass lenses?

a. They are lighter.

b. They are thinner.

c. They are less likely to scratch.

☒ d. They are cheaper than getting surgery.
- Detail

3. Why is plastic used in artificial joints?

a. It is not likely to cause infections.

b. It is stronger than other materials.

c. Its cost is less than that of other materials.

☒ d. It is light and its shape can easily be changed.
- Inference

4. What can be inferred about hospitals before disposable plastic products?

a. They had more doctors on their staff.

☒ b. They had to deal with more infections.

c. They charged their patients more money.

d. They weren't able to replace hips or knees.
- Vocabulary

5. Which can replace the word "formed" in line 17?

a. melted

b. cut

c. frozen

☒ d. molded

B. Answer the questions.

1. How is plastic used to improve eyesight?

It is used to make eyeglass lenses and contact lenses.
2. What are artificial joints made of today?

They are made of a combination of metal and plastic parts.
3. How did hospitals sanitize their tools in the past?

They boiled their tools.

Graphic Organizer & Summary

Step 1 Organize the information with the words from the box.

	Before Using Plastic	After Using Plastic
Medical tools	There was a chance of <u>infection</u> if tools were not properly sanitized.	Disposable plastic products don't have to be <u>sanitized</u> .
Artificial joints	Metal <u>joints</u> were too heavy.	Plastic parts weigh <u>less</u> and can be made into any <u>shape</u> .
Glasses and contact lenses	Lenses made from glass were heavy and could be <u>broken</u> easily.	Plastic lenses are light, and they are harder to break and <u>scratch</u> .

infection sanitized scratch less shape broken joints

Step 2 Complete the summary with the words from the box.

Plastic is used in the medical industry in many ways. In the past, hospitals sanitized their medical tools by boiling them. But this led to a(n) risk of infection. Nowadays, hospitals use disposable plastic products, which don't have to be sanitized. Plastic is also used to make artificial joints. These plastic parts weigh less than metal and can easily be formed into any shape. Finally, plastic is now used to make eyeglass lenses. Glass lenses were heavy and broke easily. But plastic lenses are lighter, stronger and harder to scratch.

heavy

lighter

sanitized

risk

artificial

medical

disposable

metal

boiling

formed

Supplementary Material



Chapter 1 Wrap-up

1 Concept Map

What did you learn from each lesson?

• *Insects*

- Insects Q & A**
 - number of species of insects
 - what roles they play in ecosystems
 - their basic characteristics
 - how some can crawl up walls
 - why mosquitoes bite you
- Cicadas**
 - Some cicadas have a 17 year life cycle.
 - where female cicadas lay eggs
 - how nymphs live in the soil
 - what an adult cicada looks like and why it makes such sound
- The Butterfly Effect**
 - what the “butterfly effect” is
 - how assassination of Franz Ferdinand resulted in the First World War
 - how Fleming’s mistake resulted in the discovery of penicillin
 - Everything we do has consequences.
- Eating Insects**
 - countries where people eat insects
 - growing population causing world hunger
 - why insects can be a solution to world hunger
 - the importance of eating insects

2 Talk Together

Talk about what you learned from this chapter with your partner.

“I learned that ...”



1 Concept Map

What did you learn from each lesson?

• **Mountains**

How Mountains Are Formed

- Mountains are formed as a result of the earth's activities.
- how fold mountains are formed
- how block mountains are formed
- how volcanic mountains are formed

The Wall of Death

- the Eiger's location
- its north face which is called the “death wall”
- what makes climbing the north face so challenging
- what makes people keep trying to climb it

Sherpas

- where they live and where they are from
- what they do for mountain climbers in the Himalayas
- why they are perfect guides
- Tenzing Norgay helped Edmund Hillary climb Mt. Everest.

Mountain Survival Skills

- things you need when you're lost in the mountains: fire, water and shelter
- Hit a rock against a piece of steel to start a fire.
- Find running water or dig a deep hole to get clean drinking water.
- Cover your body with a pile of leaves if you don't have a blanket.
- Be prepared and have a safe and enjoyable experience.

2 Talk Together

Talk about what you learned from this chapter with your partner.

“I learned that ...”



1 Concept Map

What did you learn from each lesson?

• *Electricity*

How Electricity Is Made

- Most is produced by generators.
- steam created by fossil fuels and nuclear power
- water going through dams
- wind turning windmills
- made without a generator by using solar energy

Eel Power!

- a Christmas tree powered by an electric eel
- where electric eels live and some facts about their electricity
- how the electricity is captured and used to light the Christmas tree
- the purpose of the eel-powered Christmas tree

The Future of Driving

- why people have been trying to find better forms of energy to power their cars
- the differences between gasoline-powered cars and electric cars in terms of energy used, recharging or refueling, cost, environmental impact and speed

Student Switch Off

- why it's important to save energy
- what Student Switch off encourages
- how the campaign promotes itself: social networking websites and photo contests
- Changing small habits can reduce energy use.

2 Talk Together

Talk about what you learned from this chapter with your partner.

"I learned that ..."



1 Concept Map

What did you learn from each lesson?

• **Plastic**

The History of Plastic

- how plastic was first made
- early plastics: Parkesine, Celluloid, Bakelite
- produced from non-natural materials made from petroleum today

Solutions to the Plastic Problem

- a big environmental problem made by plastic
- creative ways of recycling and reusing plastic
- A building called the EcoARK
- a plastic bridge in Scotland
- a sailboat named *Plastiki*
- You can also try simple things to reuse plastic.

The Toy of the Century

- how the name LEGO was created
- recognized as the “Toy of the Century”
- three main reasons for LEGO’s success

Benefits of Plastic

- Plastic also plays an important role in the medical industry.
- reduces the risk of infection
- used to make artificial joints and eyeglasses
- causes environmental problems, but brings us many benefits

2 Talk Together

Talk about what you learned from this chapter with your partner.

“I learned that ...”





Vocabulary List

► Lesson 1

- ☐ hatch
- ☐ antennae
- ☐ backbone
- ☐ inject
- ☐ starve
- ☐ sticky
- ☐ bite
- ☐ saliva

► Lesson 2

- ☐ dig
- ☐ lay
- ☐ shed
- ☐ emerge
- ☐ burrow
- ☐ protein
- ☐ thick
- ☐ buzz

► Lesson 3

- ☐ flap
- ☐ assassination
- ☐ opposed to
- ☐ laboratory
- ☐ coast
- ☐ tragedy
- ☐ mold
- ☐ consequence

► Lesson 4

- ☐ nutrient
- ☐ disgusting
- ☐ billion
- ☐ decrease
- ☐ require
- ☐ estimate
- ☐ available
- ☐ report

► Lesson 5

- ☐ crash
- ☐ crack
- ☐ explosively
- ☐ harden
- ☐ erupt
- ☐ enormous
- ☐ ash
- ☐ force

► Lesson 6

- ☐ twist
- ☐ reach
- ☐ unstable
- ☐ route
- ☐ freeze
- ☐ steep
- ☐ challenging
- ☐ adventure

► Lesson 7

- ☐ worship
- ☐ porter
- ☐ condition
- ☐ equipment
- ☐ adapt
- ☐ summit
- ☐ hire
- ☐ expert

► Lesson 8

- ☐ prepare
- ☐ shelter
- ☐ blanket
- ☐ run out
- ☐ essential
- ☐ stream
- ☐ spark
- ☐ steel

► Lesson 9

- ☐ magnet
- ☐ alternative
- ☐ operate
- ☐ pollute
- ☐ renewable
- ☐ spin
- ☐ reliable
- ☐ steam

Lesson 10

- ☐ power
- ☐ aluminum
- ☐ awareness
- ☐ promote
- ☐ capture
- ☐ panel
- ☐ attack
- ☐ electrical socket

► Lesson 11

- ☐ rechargeable
- ☐ cost
- ☐ research
- ☐ atmosphere
- ☐ emission
- ☐ engine
- ☐ impact
- ☐ average

► Lesson 12

- ☐ residence hall
- ☐ campaign
- ☐ appliance
- ☐ planet
- ☐ upload
- ☐ participate
- ☐ remarkable
- ☐ competition

Lesson 13

- ☐ substitute
- ☐ flexible
- ☐ transparent
- ☐ leak
- ☐ prize
- ☐ toxic
- ☐ mold
- ☐ offer

Lesson 14

- ☐ recycle
- ☐ float
- ☐ rust
- ☐ reuse
- ☐ punch
- ☐ disposable
- ☐ convenient
- ☐ vehicle

► Lesson 15

- ☐ carpenter
- ☐ arrange
- ☐ satisfied
- ☐ durable
- ☐ achieve
- ☐ ideal
- ☐ theme
- ☐ complicated

► Lesson 16

- ☐ medical
- ☐ sanitize
- ☐ eyesight
- ☐ scratch
- ☐ joint
- ☐ advantage
- ☐ grocery
- ☐ combination

Memo

Memo

Handwriting practice lines on a memo page. The page contains 20 horizontal dotted lines for writing, starting from the top of the main content area and extending to the bottom.