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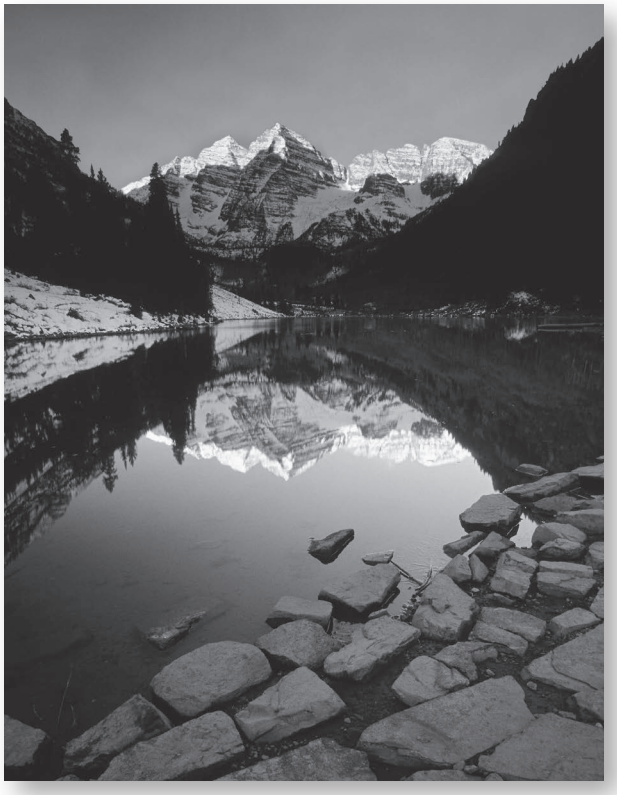
Unit 6
Geology
Activity Book



Unit 6
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GRADE 4

Core Knowledge Language Arts®

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Unit 6
Geology
Activity Book

This Activity Book contains activity pages that accompany the lessons from the Unit 6 Teacher Guide. The activity pages are organized and numbered according to the lesson number and the order in which they are used within the lesson. For example, if there are two activity pages for Lesson 4, the first will be numbered 4.1 and the second 4.2. The Activity Book is a student component, which means each student should have an Activity Book.

NAME: _____

DATE: _____

1.1 ACTIVITY PAGE

Areas of Study about the Earth

Read the questions related to areas of study about the earth. Discuss the questions with your group and identify those that relate to the area of study on your group's card. Write the related questions on the card.

- What are Earth's seven continents?
- What clues do the ruins of ancient buildings provide about the ancient Roman civilization?
- What is the name for the place where an animal or plant normally lives and grows?
- What can cause changes in an ecosystem?
- What was the city of London like in the Middle Ages?
- What are the names of the oceans of the world?
- How would you describe the tropical rainforest of the Amazon River?
- What features were common characteristics of ancient Islamic mosques?
- What are the four main directions on a map?
- What features make up the environment?
- What are the names of important rivers of the world?
- What do the pictures embroidered on the Bayeux Tapestry illustrate?

NAME: _____

DATE: _____

1.2 ACTIVITY PAGE

Vocabulary for "Earth's Changing Surface"

1. **catastrophe**, ***n.*** a terrible, sudden event (**catastrophes**) (**2**)

2. **erupt**, ***v.*** to send out rock, lava, and ash in a sudden explosion (**erupted**, ***n.*** **eruption**) (**2**)

3. **observation**, ***n.*** **1.** the act of paying careful attention to gather information; **2.** a statement based on paying careful attention to something (**observations**) (**4**)

4. **evidence**, ***n.*** proof; information and facts that are helpful in forming a conclusion or supporting an idea (**4**)

5. **fossil**, ***n.*** the preserved remains of things that lived long ago (**fossils**) (**4**)

6. **geologist**, ***n.*** a scientist who studies the makeup of the earth and the forces and processes that shape and change it (**geologists**) (**6**)

7. **climate**, ***n.*** the average weather conditions of a particular area (**7**)

8. **conclude**, ***v.*** to decide something or form an opinion based on information you have **(concluded**, ***n.*** **conclusion)** (**7**)

9. **dense**, ***adj.*** thick or heavy (**denser**) (**8**)

10. **hypothesis**, ***n.*** an idea that has been suggested and may be true but has not yet been proven (**9**)

11. **continental drift**, ***n.*** a process in which continents slowly move over time on the surface of the earth (**9**)

Word(s) from the Chapter	Pronunciation	Page
Shen Kua	/shen/ /kwə/	5
Pangaea	/pan*jee*ə/	9

NAME: _____

DATE: _____

1.3 ACTIVITY PAGE

Evidence Collector's Chart

Chapter #	What is the cause?	What evidence is there?	Letter
	At some point, Pangaea broke apart and the pieces slowly moved apart over a long period of time.		
	Tectonic plates move very slowly due to the heat and pressure in Earth's mantle.		
	Material in the mantle moves beneath stuck rocks at a fault, causing pressure to build over time and then suddenly release as the rocks break and slip past each other, shaking the ground.		

Chapter #	What is the cause?	What evidence is there?	Letter
	Tremendous pressure and heat in the mantle force magma in a chamber below Earth's crust to move upward through a crack in Earth's surface.		
	Rocks are created, destroyed, and recreated in a continuous cycle.		
	Over time, weathering breaks rocks into smaller pieces and erosion moves these pieces to new locations.		

Chapter #	What is the cause?	What evidence is there?	Letter
	Tectonic plates subduct underneath one another and move up and down against each other, and magma pushes up into the crust.		
	Tectonic plates interact to create seafloor spreading and underwater subduction zones.		

Riddle: _____

_____

_____

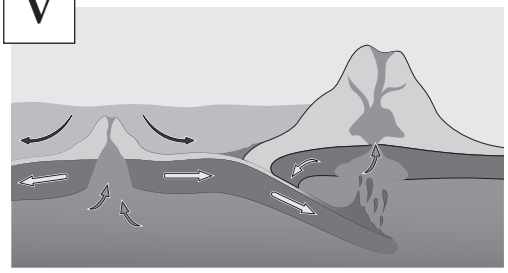
Answer: _____

NAME: _____

DATE: _____

Evidence of Changes on Earth

V



E

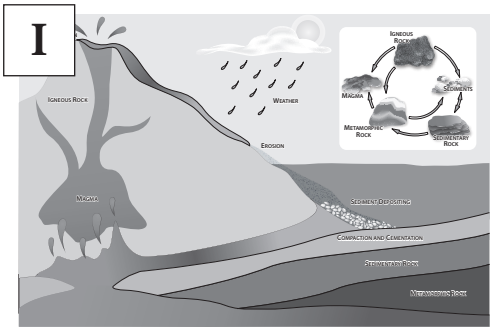
E

E

C

N

I



D

NAME: _____

DATE: _____

Excerpt from "Earth's Changing Surface"

Read the excerpt and complete the chart that follows.

Discoveries of rock layers, as well as coal and salt, indicated that the continents had once been joined.

Search for Clues

So what about the jigsaw-puzzle fit of the continents? During the 1800s and early 1900s, **geologists** studied rock layers on the continents. They made many intriguing discoveries. For example, rock layers along the northern and eastern coasts of South America match rock layers along Africa's western coast. Also, deposits of **coal** and salt in eastern North America are similar to those in southern Europe.

Geologists found fossils of an ancient fern called *Glossopteris* in similar rock layers in Africa, India, Australia, and South America. They found fossils of an ancient reptile, *Lystrosaurus*, in both southern Africa and India. In South America and Africa, fossils of another ancient reptile, *Cynognathus*, turned up directly across the Atlantic Ocean from each other.

These discoveries seemed to indicate that the continents had once been joined—but how? Furthermore, how had they become separated? Several scientists proposed explanations, but they were quite far-fetched. One involved a gigantic eruption from the center of the earth that ripped all the land apart. Another suggested that part of Earth's land broke away to become the moon and what was left became the

6

continents. Few people paid much attention to these ideas. A better explanation was needed, one with evidence to support it. In the early 1900s, Alfred Wegener provided just that.

Enter Alfred Wegener

Born and educated in Germany, Alfred Wegener was interested in many scientific subjects, including weather, astronomy, and cold, polar regions. Around 1910, Wegener read a scientific paper about similar fossils and rock formations found on different continents. He was intrigued by the mystery of the matching continents and he wanted to solve this mystery.

Alfred Wegener

Wegener gathered evidence. He pulled together discoveries made by many other scientists about rock formations, fossils, and mountain ranges. Polar explorers had recently unearthed fossils of *Glossopteris* in Antarctica. Similar fossils had previously been found in other parts of the world. This seemed to indicate that ice-covered Antarctica might once have been joined to South America, Africa, India, and Australia. It also meant that Antarctica had once had a **climate** warm enough for ferns to grow.

From this evidence, Wegener **concluded** that all the present-day continents had been joined as one huge landmass long ago. He understood, as with any new discovery, that his conclusions might be altered or challenged in the future by more evidence. Nonetheless, he believed that the existing evidence supported his conclusions.

The following chart contains a statement about Alfred Wegener's continental drift hypothesis. Using information from the excerpt, write five pieces of evidence that support Wegener's hypothesis.

Hypothesis	Long ago, continents were joined as one supercontinent that broke apart and the pieces slowly drifted away from each other.
Evidence	1.
	2.
	3.
	4.
	5.

NAME: _____

DATE: _____

Glossary for *The Changing Earth*

Words with an asterisk (*) are important bolded words in this Reader that are not part of the reading lessons.

A

active volcano**, ***n. a type of volcano that has erupted in the past 10,000 years and is likely to erupt again (**active volcanoes**)

aftershock, ***n.*** a smaller, weaker earthquake that often follows a main earthquake event (**aftershocks**)

altar, ***n.*** a platform or table used as a center of worship in religious ceremonies or services (**altars**)

B

basalt, ***n.*** heavy, dense rock formed from cooled, hardened lava

basin, ***n.*** a large area in the earth that is lower than the area around it (**basins**)

bitter, ***adj.*** **1.** resentful and angry because of unfair treatment; **2.** very cold

bulge, ***v.*** to stick out or swell

C

caldera, ***n.*** a crater caused by the collapse of the top of a volcano

canyon, ***n.*** a deep valley with steep sides and often a stream or river flowing through it (**canyons**)

catastrophe, ***n.*** a terrible, sudden event (**catastrophes**)

chemical weathering**, ***n. a process that breaks down rocks by changing the minerals they contain

climate, ***n.*** the average weather conditions of a particular area

clustered, ***adj.*** grouped close together

coal**, ***n. a dark, solid substance in the earth formed from plant fossils and used as fuel

collide**, ***v. to crash together with strong force (**colliding**)

compact, ***v.*** to closely pack or press together (**compacts**, **compacting**)

conclude, ***v.*** to decide something or form an opinion based on information you have (**concluded**, ***n.*** **conclusion**)

continental drift, ***n.*** a process in which continents slowly move over time on the surface of the earth

contract, ***v.*** to shrink slightly or get smaller

crater, ***n.*** a bowl-shaped opening at the top of a volcano or geyser

crust**, ***n. Earth's outermost layer, featuring a rocky surface

D

dense, ***adj.*** thick or heavy (**denser**)

deposit, **1.** ***v.*** to put or leave something in a particular place; **2.** ***n.*** material laid down or left by a natural process (***v.*** **deposited**, ***n.*** **deposits**)

descend, ***v.*** to move downward (**descends**)

detective, ***n.*** a person whose job is to find information about someone or something (**detectives**)

dissolved, ***adj.*** mixed with liquid so no solid pieces are visible anymore

distant, ***adj.*** far away in time

dome mountains**, ***n. mountains generally formed when magma pushes upward into Earth's crust from the mantle and cools into igneous rock underground, causing the crust above it to bulge; usually occur as isolated mountains on otherwise flat plains

dormant volcano**, ***n. a type of volcano that is considered active but hasn't erupted for a very long time

drift**, ***v. to slowly move with water, wind, or other natural processes (**drifted**)

durable, ***adj.*** able to last a long time in good condition

dwelling, ***n.*** a place where someone lives (**dwellings**)

E

elder, ***n.*** a person who is older, respected, and often in a position of authority (**elders**)

entomb, ***v.*** to bury (**entombed**)

epicenter**, ***n. the point on Earth's surface directly above an earthquake's focus

erosion**, ***n. any process or force that moves sediments to new locations

erupt, ***v.*** to send out rock, lava, and ash in a sudden explosion (**erupted**, ***n.*** **eruption**)

eruption column, ***n.*** an enormous cloud of ash, bits of rock, and toxic gas produced by a volcanic eruption that can travel hundreds of feet per second

eternal, ***adj.*** lasting forever, with no beginning and no end

evacuate, ***v.*** to remove people from a dangerous place

evidence, ***n.*** proof; information and facts that are helpful in forming a conclusion or supporting an idea

excavation, ***n.*** a hollowed-out place formed by digging or carving (**excavations**)

exert, ***v.*** to cause a force to be felt or have an effect (**exerts**)

expand, ***v.*** to get bigger

experiment, ***n.*** a scientific test to try out something in order to learn about it

extinct volcano**, ***n. a type of volcano that has not erupted for at least 10,000 years (**extinct volcanoes**)

eyewitness, ***n.*** a person who has seen something happen and is able to describe it

F

fault, ***n.*** a crack in Earth's crust (**faults**)

fault-block mountains**, ***n. mountains formed when gigantic blocks of rock move up and down along faults

fine, ***adj.*** very small

firsthand, ***adv.*** coming directly from actually seeing or experiencing something

focus**, ***n. the place in Earth's crust where huge blocks of rock move along a fault, triggering an earthquake

fold mountains**, ***n. mountains formed when rocks are pushed up into huge folds by moving tectonic plates

force**, ***n. strength, power (**forces**)

fossil, ***n.*** the preserved remains of things that lived long ago (**fossils**)

foundation, ***n.*** the basis of something, the support upon which something else is built (**foundations**)

G

geologist, ***n.*** a scientist who studies the makeup of the earth and the forces and processes that shape and change it (**geologists**)

geyser**, ***n. an underground hot spring that periodically erupts, shooting hot water and steam into the air (**geysers**)

granite, ***n.*** a common igneous rock that forms from magma that cooled within Earth's crust

H

heave, ***v.*** **1.** to move up and down over and over; **2.** to lift, pull, push, or throw with a lot of effort

hoodoo, ***n.*** the tallest kind of pinnacle (**hoodoos**)

hotspot, ***n.*** a very hot region deep within Earth's mantle where a huge magma chamber forms (**hotspots**)

hot spring, ***n.*** a naturally flowing source of hot water (**hot springs**)

hydrothermal vent, ***n.*** a deep-sea geyser that forms as seawater sinks down through cracks in the oceanic crust and then releases extremely hot, mineral-rich water back up through cracks in the crust (**hydrothermal vents**)

hypothesis, ***n.*** an idea that has been suggested and may be true but has not yet been proven

I

ice wedging**, ***n. a process in which water alternately freezes and thaws and breaks rocks apart

igneous rock**, ***n. rock that forms when magma cools and solidifies (**igneous rocks**)

inner core**, ***n. Earth's deepest layer, made of very hot, solid metal

L

lava, ***n.*** red-hot melted rock that has erupted above Earth's crust from deep underground

limestone**, ***n. a sedimentary rock often packed with the fossilized skeletons and shells of tiny ocean creatures that is commonly used for building

litter, ***v.*** to scatter in disorder (**littered**)

lofty, ***adj.*** high up

M

magma, ***n.*** melted rock in Earth's mantle

magnitude, ***n.*** an earthquake's strength

mantle**, ***n. Earth's largest and thickest layer that consists of very hot, very dense rock

metamorphic rock**, ***n. rock that forms when minerals in igneous, sedimentary, or older metamorphic rocks are changed due to extreme heat and pressure (**metamorphic rocks**)

mineral, ***n.*** a solid, nonliving substance found in the earth that makes up rocks (**minerals**)

moai, ***n.*** statues on Easter Island carved from tuff in the shape of partial human figures with large heads, high cheekbones, and heavy brows

O

observation, ***n.*** **1.** the act of paying careful attention to gather information; **2.** a statement based on paying careful attention to something (**observations**)

obsidian, ***n.*** a dark rock or natural glass formed from lava that cooled very quickly

ocean trench, ***n.*** a narrow, extremely deep valley formed when the seafloor dips down as one tectonic plate slides under another (**ocean trenches**)

offering, ***n.*** something that is presented as an act of worship (**offerings**)

outer core**, ***n. the layer within Earth between the inner core and the mantle that is made of very hot, liquid metal

outsmart, ***v.*** to trick or defeat someone by being clever

P

panic, ***v.*** to be fearful in a sudden and overpowering way (**panicked**)

pepper, ***v.*** to sprinkle or cover

physical weathering**, ***n. a process that breaks big rocks into smaller rocks without changing the minerals they contain

pinnacle, ***n.*** a slender, soaring rock formation made of tuff (**pinnacles**)

pinpoint, ***v.*** to figure out the exact location of something

plate tectonics, ***n.*** a theory that Earth's crust and the solid top part of the mantle are broken up into sections that fit together but move against each other

plume, ***n.*** a column of magma that rises from the mantle into a chamber beneath Earth's crust

porthole, ***n.*** a small, round window on the side of a ship, submersible, or aircraft (**portholes**)

pressure, ***n.*** the weight or force produced when something presses or pushes against something else

pyroclastic flow, ***n.*** a sort of avalanche of intensely hot ash, rock fragments, and volcanic gas that rolls quickly down the side of a volcano (**pyroclastic flows**)

R

revenge, ***n.*** the act of getting even for a wrongdoing

rock cycle**, ***n. the continuous cycle in which rocks are created, destroyed, and recreated

rugged, ***adj.*** having a rough, uneven surface

S

scald, ***v.*** to burn with very hot water or steam

school, ***n.*** a large number of ocean animals of one type swimming together (**schools**)

sea level, ***n.*** the average height of the ocean's surface

seamount, ***n.*** an underwater volcano that forms wherever magma is erupting through oceanic crust (**seamounts**)

sediment**, ***n. rock, sand, or dirt that has been carried to a place by water, wind, or other natural processes (**sediments**)

sedimentary rock**, ***n. rock that is made of sediments that have been naturally compacted and cemented together (**sedimentary rocks**)

seismic wave, ***n.*** a surge of energy traveling out from an earthquake's source through the earth (**seismic waves**)

seismogram**, ***n. the record a seismograph makes, showing seismic waves as jagged up-and-down lines

seismograph**, ***n. an instrument used to track seismic waves traveling through the earth (**seismographs**)

sensor, ***n.*** an instrument that detects and measures changes, and then sends information to a controlling device **(sensors**)

sheer, ***adj.*** very steep, almost straight up and down

sheet, ***n.*** a broad stretch of something (**sheets**)

silt, ***n.*** very small sediments deposited by water

solidify, ***v.*** to make or become hard or solid (**solidifies**)

state, ***n.*** the condition of being a solid, liquid, or gas

strong-willed, ***adj.*** determined to do what you want even if other people tell you not to

subduction**, ***n. a process in which a heavier oceanic plate slides under a lighter continental plate

subduction zone, ***n.*** the place where one tectonic plate is sliding beneath another tectonic plate (**subduction zones**)

submersible, ***n.*** a small vehicle that can travel deep under water for research (**submersibles**)

surge, ***v.*** to move forward quickly, suddenly, and with force (**surges**)

T

texture, ***n.*** the size, shape, and sorting of mineral grains in rocks

theory, ***n.*** an explanation for why something happens based on evidence

trigger, ***v.*** to cause something to start or happen (**triggered**)

tsunami, ***n.*** a gigantic wave of seawater caused by an earthquake in oceanic crust (**tsunamis**)

tuff, ***n.*** a type of volcanic rock formed from hardened volcanic ash

U

ultimately, ***adv.*** finally; at the end of a process

underlie, ***v.*** to be located under something (**underlies**)

undertaking, ***n.*** something that someone takes on as a task or duty

V

volcano, ***n.*** a hill or mountain that forms over a crack in Earth's crust from which lava erupts (**volcanoes**)

W

weather**, ***v. to break down into smaller pieces (***n.* weathering**)

NAME: _____

DATE: _____

2.1 ACTIVITY PAGE

Vocabulary for "Earth's Layers and Moving Plates"

1. **seismic wave**, ***n.*** a surge of energy traveling out from an earthquake's source through the earth (**seismic waves**) (**13**)

2. **pressure**, ***n.*** the weight or force produced when something presses or pushes against something else (**15**)

3. **basalt**, ***n.*** heavy, dense rock formed from cooled, hardened lava (**16**)

4. **magma**, ***n.*** melted rock in Earth's mantle (**17**)

5. **lava**, ***n.*** red-hot melted rock that has erupted above Earth's crust from deep underground (**17**)

6. **basin**, ***n.*** a large area in the earth that is lower than the area around it (**basins**) (**17**)

7. **ocean trench**, ***n.*** a narrow, extremely deep valley formed when the seafloor dips down as one tectonic plate slides under another (**ocean trenches**) (**17**)

8. **theory**, ***n.*** an explanation for why something happens based on evidence (**17**)

9. **plate tectonics**, ***n.*** a theory that Earth's crust and the solid top part of the mantle are broken up into sections that fit together but move against each other (**17**)

10. **exert**, ***v.*** to cause a force to be felt or have an effect (**exerts**) (**19**)

Word(s) from the Chapter	Pronunciation	Page
Inge Lehmann	/ing*gə/ /lee*mon/	21

NAME: _____

DATE: _____

2.2 TAKE-HOME

Practice Commas

For each item, insert a comma or commas in the appropriate location(s).

Examples: We went to Concord North Carolina to visit friends for spring break.
We went to Concord, North Carolina to visit friends for spring break.

I needed paper pencils erasers and a notebook for school.
I needed paper, pencils, erasers, and a notebook for school.

Seismologist Inge Lehmann was born on May 13 1888.
Seismologist Inge Lehmann was born on May 13, 1888.

1. When I was a child, my family moved from Chicago Illinois to Madison Wisconsin.

2. We have two dogs three cats a turtle and a bunny.

3. 801 East High Street
Charlottesville VA 22902

4. President Obama was elected the 44th President of the United States on November 4 2008.

5. My dad cooked eggs bacon toast and pancakes for breakfast.

6. We traveled from Boston Massachusetts to San Diego California on our cross-country trip.

7. Earth's layers are the inner core the outer core the mantle and the crust.

8. 233 Broadway
New York NY 10007

9. Her graduation date is scheduled for May 24 2016.

Write a sentence that includes a date or items in a series. Be sure to use correct capitalization and punctuation.

Write an address. Be sure to use correct capitalization and punctuation.

Challenge: *Write a sentence that includes at least two of the following:*

a date	a city and state	items in a series

NAME: _____

DATE: _____

2.3 TAKE-HOME

-ly: Suffix Meaning "in a _____ way"

Write the correct word to complete each sentence.

easy	easily	loud
careful	carefully	temporary
speedy	accidentally	temporarily

1. Even though his stay was only _____, I got really attached to the neighbor's dog staying with us for a week while his owners were on vacation.

2. Amber's dad _____ put his coffee in her thermos instead of his thermos.

3. I was _____ not to wake up the baby while he was sleeping, so I listened to music quietly through headphones instead of speakers.

4. According to the continental drift hypothesis, continents move very slowly, which is definitely not a(n) _____ process.

5. The buzzer on my alarm clock is so _____ that it wakes up everyone in the house.

6. The ground _____ shakes during an earthquake, as seismic waves travel through Earth's crust and its interior.

Write a sentence using one of the words left in the box.

_____

_____

Write a sentence using one of the words left in the box.

_____

_____

NAME: _____

DATE: _____

2.4 ACTIVITY PAGE

Similes about Earth's Changes

Reread the text on the page noted for each simile. Then, fill in the chart to explain what the simile is comparing and what it means.

Page	Simile from Text	What is the simile comparing?	What does the simile mean?
9	*What if continents were like enormous pieces of ice?*		
13	*An earthquake is a bit like a rock plunking into water.*		
16	*The rift was like a seam in a pants leg, where two pieces of fabric come together.*		

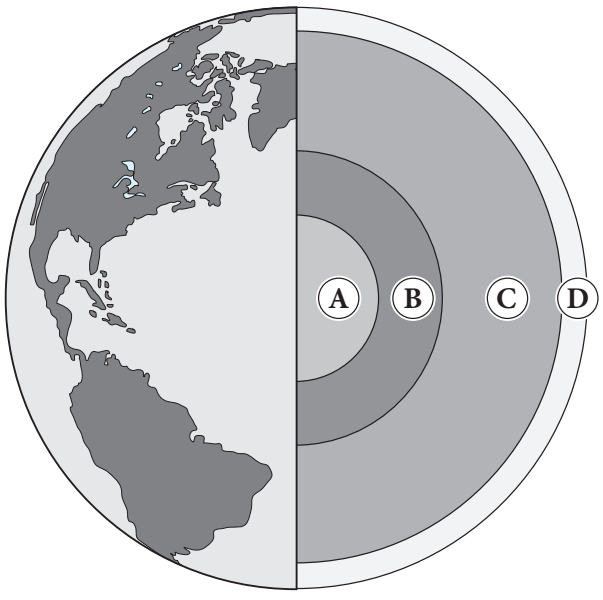
NAME: _____

DATE: _____

Excerpt from "Earth's Layers and Moving Plates"

Read the following excerpt and use it to label Earth's layers in the diagram that follows.

Earth's deepest layer is a solid inner core of very hot metal. This metal may be nearly as hot as the sun's surface. The outer core is also made of hot metal, but it's liquid, not solid. The mantle surrounds the outer core. The mantle is Earth's largest and thickest layer and consists of very hot, very dense rock. The rock is solid in the lower and upper parts of the mantle. In between, however, is a region where the rock is neither liquid nor solid. The slow movement and behavior of this material, caused by heat and pressure, have an impact on Earth's surface. Above the mantle is Earth's outermost layer, the thin, rocky crust. There are two types of crust: oceanic crust and continental crust. Oceanic crust is covered by ocean water. Most of the continental crust is dry land, but some of the crust around the edges is covered by water. Oceanic crust is thinner but heavier than continental crust.



A.

B.

C.

D.

Read the following excerpt and use it to complete the activity that follows.

Moving Plates

Scientists are still learning about plate tectonics. The theory of plate tectonics states that Earth's crust, together with the solid top of the mantle, is broken up into sections. These huge, rocky slabs are called

18

tectonic plates. Tectonic plates fit tightly together. They aren't fixed in place though; they can move. They move because of heat and pressure in the mantle. As the material in the mantle slowly moves, it **exerts** enormous pressure on the overlying plates. All that pressure forces the plates to move as well—very, very slowly.

Earth's tectonic plates have been slowly moving and interacting for billions of years. They interact mostly along their edges, or boundaries. Plate boundaries are where two or more tectonic plates meet.

19

A Matter of Time


Tectonic plates move apart.

At some boundaries, tectonic plates are moving apart. As the plates separate, molten rock flows up from the mantle into the space between them, creating new crust. Mid-ocean ridges are an example of this type of plate interaction. Tectonic plates along the mid-ocean ridge in the Atlantic Ocean are moving apart at a rate of about 0.8 to 2 inches per year. That may not seem like much, but it adds up. Two hundred million years ago, the landmasses of North America and Europe were joined. So were South America and Africa. Thanks to separating plates, these continents now lie on opposite sides of a vast ocean.


Tectonic plates collide.

At other plate boundaries, tectonic plates are **colliding**, or crashing together. In some places, colliding plates slowly crash into each other. The crust at their edges gradually crumples and is pushed higher and higher, creating mountains. In other places, one of the colliding plates slides under the other. Two plates are colliding this way along the western coast of South America. A heavier oceanic plate is sliding under a lighter continental plate. Scientists call this process **subduction**. Subduction has created a deep ocean trench off the coast of Chile and Peru. It has also had a role in creating the towering Andes Mountains along the western edge of South America. Similar plate interactions have formed mountain ranges throughout Earth's long history.


Tectonic plates slide sideways past one another.

Finally, tectonic plates slide sideways past one another. It's never a smooth process. Plate edges press together hard. They often get stuck while the

pressure keeps building. Eventually the pressure gets too great. The stuck edges break free, causing the plates to jerk past each other.

Providing the Answers

The theory of plate tectonics answered many questions in geology. It explained how Wegener's Pangaea broke apart. It explained how the continents have been slowly rearranged over millions of years. The movement of the plates also explained mid-ocean ridges, deep ocean trenches, patterns in the locations of mountains, and many other features on Earth's surface. The theory has become the cornerstone of modern geology.

As plates move, interesting things happen. Most of the time, they happen incredibly slowly. Sometimes, though, the effects of plate movements are sudden and dramatic. Think earthquakes and volcanoes!

Core Conclusions

You may never have heard of the Danish scientist Inge Lehmann. Among seismologists, however, she is famous. Around 1900, scientists thought the earth had just three layers: an outer crust, a solid mantle, and a liquid core. Lehmann studied seismograph records of earthquakes. She analyzed how seismic waves changed as they traveled through Earth's interior. Lehmann collected thousands of records organized in boxes—there were no computers back then! She saw patterns in how seismic waves behaved as they moved through Earth. Lehmann concluded that Earth's core has two parts: a liquid outer core and a solid inner core. In 1936, she announced her findings and changed our view of Earth!

Use the correct word from the word bank to fill in each blank in the following paragraphs.

trench	theory	plate	subduction
continental	tectonic	collide	

Sam is excited to tell his family what he is reading and learning about geology at school. His cousins live in the South American country of Chile, and today he learned that there is a deep ocean _____ along Chile's coast. He explained, "There are two _____ plates that meet along the western coast of South America. One is a _____ plate and one is an oceanic plate. The heavier oceanic plate is sliding beneath the lighter continental _____. And, this process has a big name I learned today—it's called _____!"

"I think I know how the Andes Mountains of South America are formed," exclaimed Sam's dad. "When the plates _____ at plate boundaries along the Pacific Coast, I bet the continental crust crumples and gets pushed higher and higher to form the mountains. I learned about the _____ of plate tectonics when I was in school, too."

Sam's dad described an earthquake that the country of Chile had recently experienced. Sam said, "Hmmm . . . I wonder if earthquakes have anything to do with moving tectonic plates?"

What do you think?

NAME: _____

DATE: _____

4.1 ACTIVITY PAGE

Vocabulary for "Earth's Shakes and Quakes"

1. **eyewitness**, ***n.*** a person who has seen something happen and is able to describe it (**22**)

2. **experiment**, ***n.*** a scientific test to try out something in order to learn about it (**24**)

3. **fault**, ***n.*** a crack in Earth's crust (**faults**) (**24**)

4. **heave**, ***v.*** **1.** to move up and down over and over; **2.** to lift, pull, push, or throw with a lot of effort (**24**)

5. **trigger**, ***v.*** to cause something to start or happen (**triggered**) (**25**)

6. **pinpoint**, ***v.*** to figure out the exact location of something (**27**)

7. **magnitude**, ***n.*** an earthquake's strength (**28**)

8. **aftershock**, ***n.*** a smaller, weaker earthquake that often follows a main earthquake event (**aftershocks**) (**29**)

9. **tsunami**, ***n.*** a gigantic wave of seawater caused by an earthquake in oceanic crust (**tsunamis**) (**30**)

10. **surge**, ***v.*** to move forward quickly, suddenly, and with force (**surges**) (**30**)

Word(s) from the Chapter	Pronunciation	Page
Francesco Petrarch	/fran*ches*koe/ /pe*trark/	22
Richter	/rik*ter/	28
tsunami	/soo*no*mee/	30

NAME: _____

DATE: _____

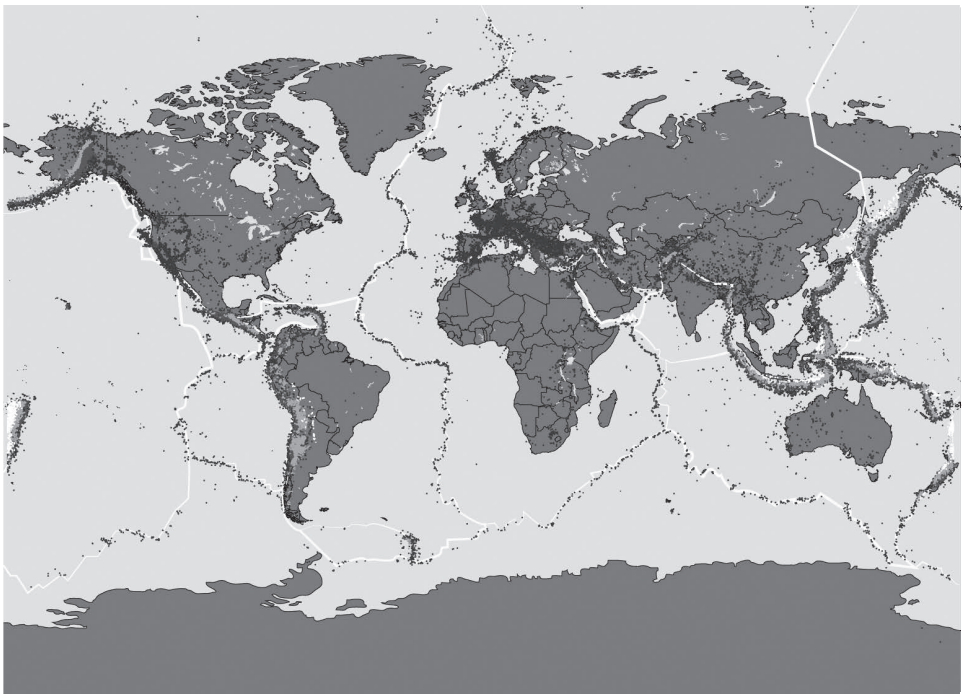
4.2 TAKE-HOME

Excerpt from "Earth's Shakes and Quakes"

Read the first full paragraph of the following excerpt aloud to a family member and answer the questions that follow.

objects tumble from shelves, and buildings may even collapse. In 1348 CE, people had no idea what caused earthquakes. Today we know that earthquakes are the result of powerful natural forces at work in Earth's crust and mantle.

As you read in Chapter 2, scientists developed the theory of plate tectonics in the 1960s. The theory explains how Earth's surface and interior change over very long periods of time. Some plates are pulling apart at their boundaries, other plates are colliding, and still others are sliding past each other. A lot happens at plate boundaries, including most earthquakes. In fact, one of the easiest ways to locate plate boundaries is to determine where earthquakes are occurring!



Locations of plate boundaries and past earthquake epicenters

23

1. According to the excerpt, what does the theory of plate tectonics explain?

2. The last sentence of the excerpt states, "In fact, one of the easiest ways to locate plate boundaries is to determine where earthquakes are occurring!" How does the image on the page support this statement?

NAME: _____

DATE: _____

Practice Commas

For each item, insert a comma or commas in the appropriate location(s).

1. My dad is from Austin Texas and my mom is from Minneapolis Minnesota.

2. She plays tennis soccer and basketball.

3. Opening night of his first play is scheduled for June 24 2015.

4. Yellowstone National Park
   P.O. Box 168
   Yellowstone National Park WY 82190

Write a sentence for each of the following items. Be sure to use correct capitalization and punctuation. Each sentence should include at least one comma in its appropriate location.

1. a date

2. city and state or an address

3. items in a series

NAME: _____

DATE: _____

4.4 TAKE-HOME

–*ly*: Suffix Meaning "in a _____ way"

Write the correct word to complete each sentence.

1. Even though earthquakes are only _____ (temporary, temporarily, accidental, accidentally), they can still cause significant and sometimes permanent damage.

2. The fire engine was so _____ (loud, loudly, careful, carefully) that I had to cover my ears as it drove by my house.

3. Tsunamis are _____ (loud, loudly, speedy, speedily)—they travel as fast as 500 miles per hour.

4. He _____ (easy, easily, accidental, accidentally) dropped a glass, spilling milk all over the floor.

5. Scientist Inge Lehmann was _____ (careful, carefully, temporary, temporarily) to do lots of research and analysis before concluding that Earth's core has two parts—a liquid outer core and a solid inner core.

6. It was _____ (temporary, temporarily, easy, easily) to see that he loved baseball because his face lit up every time he got to play.

Write a sentence using one of the –ly *words.*

Write a sentence using one of your own –ly *words.*

Challenge*: Write a sentence using one of the root words and its* –ly *word.*

NAME: _____

DATE: _____

5.1 ACTIVITY PAGE

Earth's Shakes and Quakes

Answer each question thoughtfully, citing the page number(s) where you found evidence for each question. Answer in complete sentences and restate the question in your answer whenever possible.

1. Fill in the blank:

   Most earthquakes happen at _____.

   Page(s) _____

2. How much energy is released when blocks of rock that were stuck break and slip past each other?

   _____

   _____

   _____

   Page(s) _____

3. Circle the two answers that correctly complete the following statement.

   Surface waves cause _____.

   A. the ground to shake, heave, sway, and lurch during an earthquake
   B. a fault to form in Earth's crust
   C. most tsunamis
   D. the most earthquake damage

   Page(s) _____

4. List one way in which the seismograph and the Richter scale are different. List one way in which they are similar.

Different:

Similar:

Page(s) _____

5. Write two or three sentences that include one fact about a tsunami and at least two descriptive words from the text.

Page(s) _____

NAME: _____

DATE: _____

5.2 ACTIVITY PAGE

Take Notes on Tsunamis

Read through all the questions in the chart so you are clear about what information you should scan the Reader text for related to tsunamis. Take notes by paraphrasing the Reader text or writing information in your own words. Write key information in the shortest form possible.

Questions	Notes
What is a tsunami?	
What causes a tsunami?	
Why do tsunamis happen?	
How fast does a tsunami travel?	
Can we stop tsunamis from happening?	
How can we prepare and protect ourselves?	

NAME: _____

DATE: _____

5.3 ACTIVITY PAGE

Tsunami Pamphlet

Draft your pamphlet by composing answers to the questions.

Question: What was THAT?

Answer: A tsunami!

Tsunamis are caused by _____

_____

_____

_____

_____

_____

_____

Question: What is a tsunami?

Answer:

Question: Why do tsunamis happen?

Answer:

Question: How fast does a tsunami travel?

Answer:

Question: Can we stop tsunamis from happening?

Answer:

Question: How can we prepare and protect ourselves?

Answer:

NAME: _____

DATE: _____

6.1 ACTIVITY PAGE

Vocabulary for "Earth's Fiery Volcanoes"

1. **volcano**, ***n.*** a hill or mountain that forms over a crack in Earth's crust from which lava erupts (**volcanoes**) (**32**)

2. **crater**, ***n.*** a bowl-shaped opening at the top of a volcano or geyser (**32**)

3. **fine**, ***adj.*** very small (**33**)

4. **subduction zone**, ***n.*** the place where one tectonic plate is sliding beneath another tectonic plate (**subduction zones**) (**36**)

5. **descend**, ***v.*** to move downward (**descends**) (**36**)

6. **hotspot**, ***n.*** a very hot region deep within Earth's mantle where a huge magma chamber forms (**hotspots**) (**38**)

7. **plume**, ***n.*** a column of magma that rises from the mantle into a chamber beneath Earth's crust (**40**)

8. **hot spring**, ***n.*** a naturally flowing source of hot water (**hot springs**) (**40**)

Word(s) from the Chapter	Pronunciation	Page
Kilauea	/kee*lə*wae*ə/	32
Mauna Loa	/mon*ə/ /loe*ə/	36
Paricutin	/par*ee*koo*teen/	37
Krakatoa	/krak*ə*toe*ə/	37
Molokai	/mol*o*chee/	38
Maui	/mow*ee/	38
Kauai	/koo*wie/	39
Oahu	/oe*wo*hoo/	39
Loihi	/loo*ee*hee/	39

NAME: _____

DATE: _____

Commas and Quotation Marks

Rewrite each sentence, inserting a comma or commas and quotation marks in the appropriate locations. Be sure to use correct capitalization and end punctuation.

Example: The time he explained is 3:47 pm

"The time," he explained, "is 3:47 pm."

1. You don't have to look hard the teacher said to find rocks

_____

_____

_____

2. Students might ask what are rocks? before reading the text

_____

_____

_____

3. Rocks are naturally occurring materials made of solid substances the author explains

_____

_____

_____

4. The rock cycle according to the text has been going on for several billion years

5. Given enough time the text explains all rocks change

6. There are three types of rocks the teacher explained igneous sedimentary and metamorphic

NAME: _____

DATE: _____

6.3 TAKE-HOME

Root *rupt*

Write the correct word to complete each sentence. You may need to add –ed, –ing, *or* –s *to make the word correctly fit in the sentence.*

uninterrupted	erupt	disrupt
rupture	abrupt	eruption

1. A volcanic _____ is usually sudden and violent.

2. When my friend lied to me, it caused a(n) _____ in our friendship.

3. My parents say it's bad for me to spend _____ hours watching television, so they limit how much I can watch.

4. Old Faithful is a geyser in Yellowstone National Park that _____ several times a day.

5. Sometimes my dog _____ my sleep when she barks in the middle of the night.

6. During an argument, my brother left the room in a(n) _____ way instead of continuing the conversation.

Write a complete sentence for each of the following words. Be sure to use correct capitalization and punctuation.

7. *disrupt*

8. *abrupt*

9. *eruption*

NAME: _____

DATE: _____

Spelling Words

The following is a list of spelling words. These words have been covered in morphology lessons and have one of the following roots: arch, graph, *or* rupt.

During Lesson 10, you will be assessed on how to spell these words. Practice spelling the words by doing one or more of the following:

- *spell the words out loud*
- *write sentences using the words*
- *copy the words onto paper*
- *write the words in alphabetical order*

When you practice spelling and writing the words, remember to pronounce and spell each word one syllable at a time.

1. hierarchy
2. matriarch
3. archrival
4. anarchy
5. autograph
6. biographer
7. calligraphy
8. paragraph
9. eruption
10. uninterrupted
11. rupture
12. abrupt

The following chart provides the meanings of the spelling words. You are not expected to know the word meanings for the spelling assessment but it may be helpful to have them as a reference as you practice the spelling words.

Spelling Word	Definition
hierarchy	a system in which people are placed into social classes of different levels of power and importance
matriarch	a woman who controls a family, group, or government
archrival	a chief or main rival or opponent
anarchy	a situation not controlled by rules or laws and without a leader
autograph	a person's handwritten signature
biographer	a person who writes the story of someone's life
calligraphy	the art of beautiful handwriting
paragraph	a piece of writing that includes a few sentences focused on a certain subject in an organized manner
eruption	**1.** the process of sending out rock, lava, and ash in a sudden explosion; **2.** an event in which something breaks or bursts in a sudden and often violent way
uninterrupted	continuing without breaking or being stopped by something
rupture	a break or burst
abrupt	sudden and unexpected; breaking through suddenly

NAME: _____

DATE: _____

Practice Spelling Words

Sort the spelling words into categories based on the root in each word.

uninterrupted	matriarch	hierarchy	abrupt
archrival	calligraphy	eruption	paragraph
autograph	rupture	anarchy	biographer

arch	***graph***	***rupt***

List the spelling words in alphabetical order. Remember to pronounce and spell the words syllable by syllable.

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

NAME: _____

DATE: _____

7.1 ACTIVITY PAGE

Vocabulary for "Mythic Volcano Spirits"

1. **offering**, ***n.*** something that is presented as an act of worship (**offerings**) (**42**)

2. **strong-willed**, ***adj.*** determined to do what you want even if other people tell you not to (**43**)

3. **bitter**, ***adj.*** **1.** resentful and angry because of unfair treatment; **2.** very cold (**43**)

4. **outsmart**, ***v.*** to trick or defeat someone by being clever (**44**)

5. **revenge**, ***n.*** the act of getting even for a wrongdoing (**46**)

6. **caldera**, ***n.*** a crater caused by the collapse of the top of a volcano (**46**)

7. **lofty**, ***adj.*** high up (**47**)

8. **eternal**, ***adj.*** lasting forever, with no beginning and no end (**49**)

9. **elder**, ***n.*** a person who is older, respected, and often in a position of authority (**elders**) (**50**)

Word(s) from the Chapter	Pronunciation	Page
Pele	/pae*lae/	42
Kilauea	/kee*lə*wae*ə/	42
Na-maka-o-kaha'i	/no*mo*kə*oe*kə*hie/	43
Hi'iaka	/hee*ie*ə*kə/	43
Kauai	/koo*wie/	43
Lohi'au	/loe*ee*o/	43
Oahu	/oe*wo*hoo/	44
Molokai	/mol*o*chee/	44
Maui	/mow*ee/	44
Monadalkni	/mon*ə*dok*nie/	49
Sahale Tyee	/so*ho*lee/ /tie*ee/	49

NAME: _____

DATE: _____

7.2 ACTIVITY PAGE

Mythic Volcano Spirits

The following words were used in Chapter 5, "Mythic Volcano Spirits." For each word, pick an activity and complete the chart below.

outsmart fond revenge caldera lofty	**Vocabulary Activities** 1. Write a definition in your own words. 2. Provide a synonym (similar meaning). 3. Provide an antonym (opposite meaning). 4. Use the word in a sentence. 5. Provide another word that the word or phrase makes you think of and explain why. (*Apple* makes me think of bananas because they are both fruits.) 6. Think of an example of the word or phrase and write about it. (An example of *fruit* is cantaloupe. It is a melon that is white on the outside and orange on the inside. They are really tasty in the summer.)

Word	Activity	Activity Response

NAME: _____

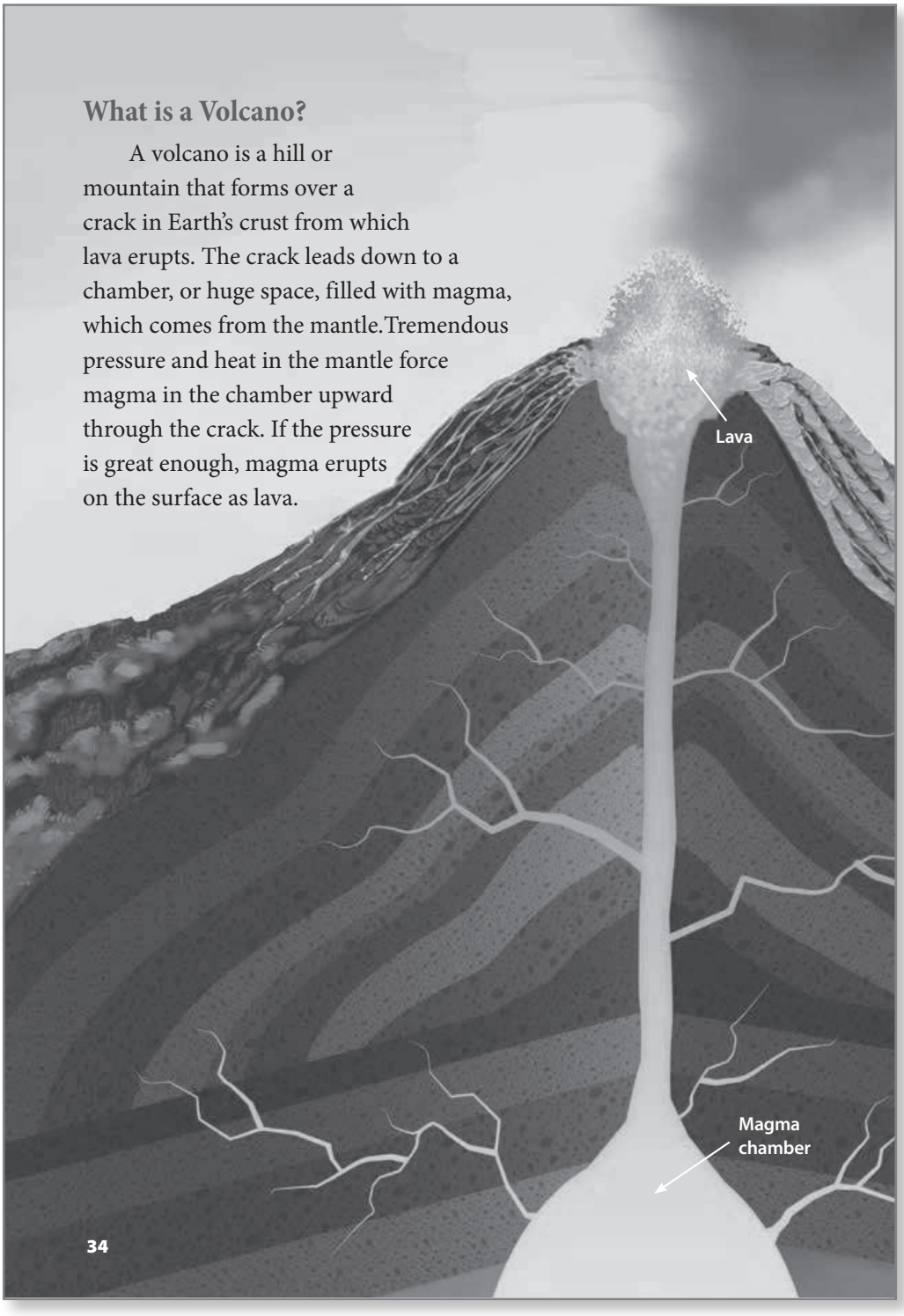
DATE: _____

7.3 TAKE-HOME

Excerpts from *The Changing Earth*

Read the following excerpts and use them to complete the activity that follows.

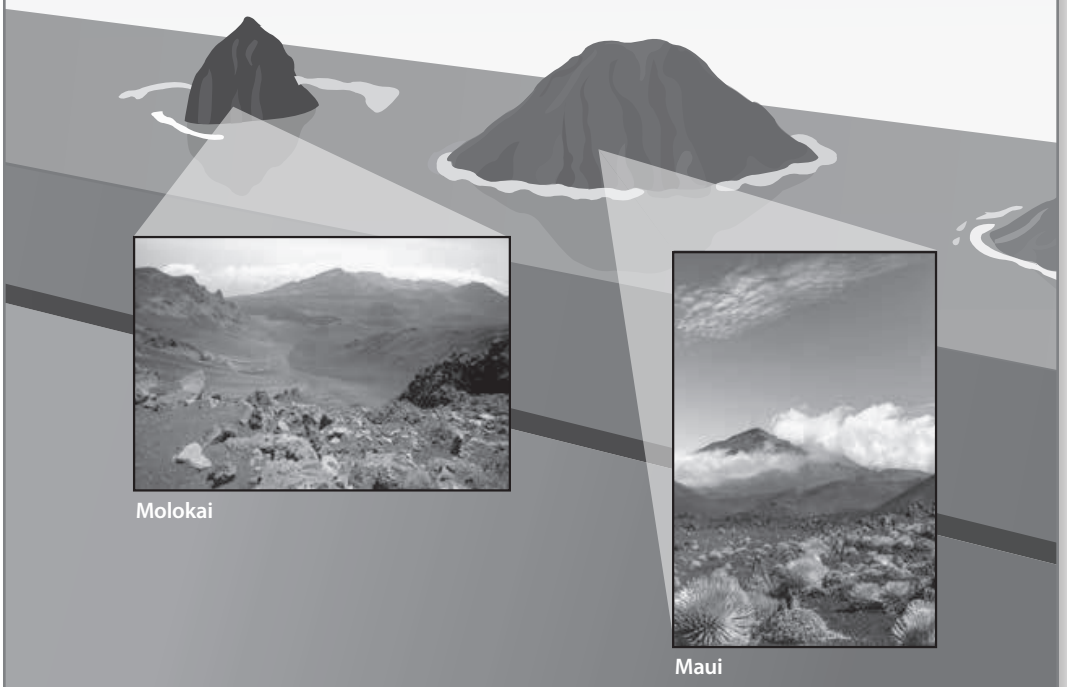
Earth's Fiery Volcanoes



Hotspots

Not all volcanoes form along plate boundaries. Some occur in places that geologists call **hotspots**. A hotspot is a very hot region deep within the mantle. A huge magma chamber forms beneath Earth's crust at a hotspot. Magma periodically erupts from the chamber through cracks in the crust.

Geologists have identified dozens of hotspots worldwide. Some are beneath continental crust. Others are beneath oceanic crust. Hotspots underneath oceanic crust have formed many islands. The process begins when magma erupting from a hotspot forms a volcano on the seafloor. With repeated eruptions, the volcano grows taller and taller over time. Eventually the top of the volcano may rise above the ocean's surface and form an island.



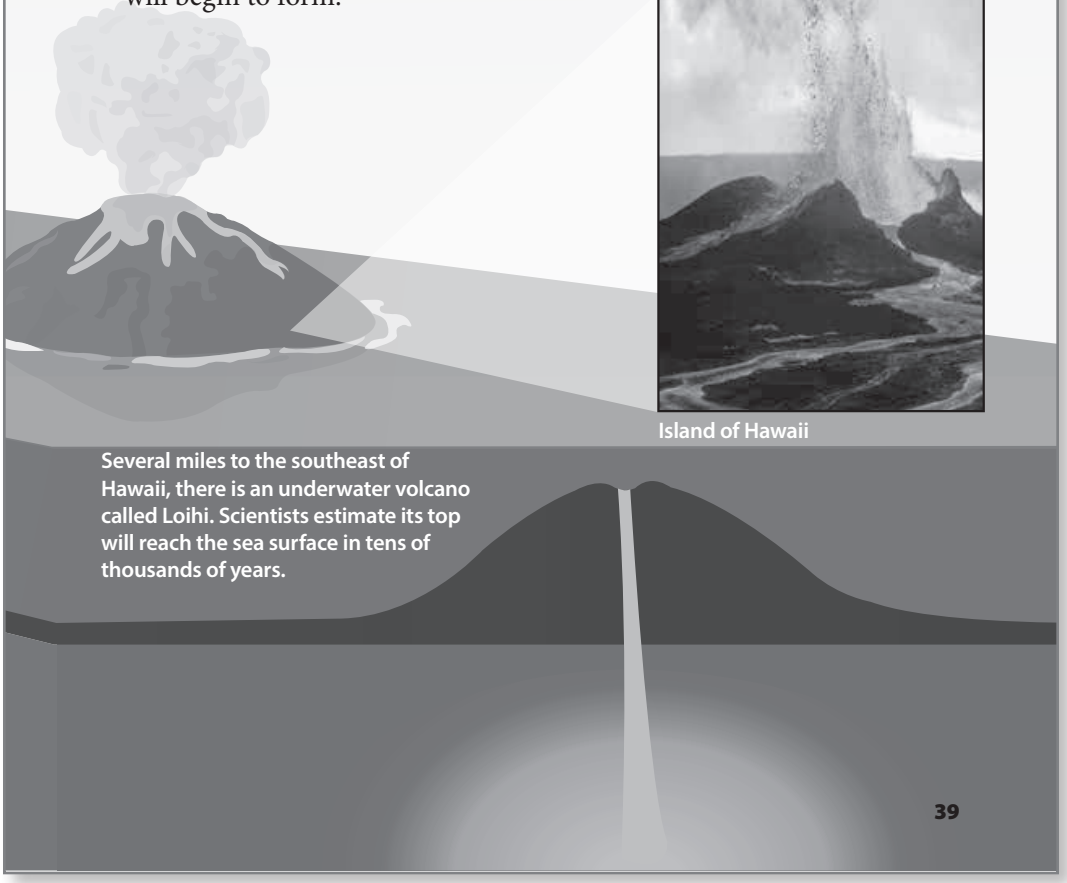
Molokai

Maui

38

Over a very long period of time, ocean hotspots may form chains of islands. This is because hotspots remain in the same place while tectonic plates slowly keep moving. The Hawaiian Islands, for example, were formed by a hotspot located beneath the middle of the Pacific Plate. The island of Kauai formed about 5 million years ago. It began as an undersea volcano that grew tall enough to rise above the water. As the Pacific Plate inched its way northwest, however, Kauai moved along with it. At some point, the island was no longer directly above the hotspot. A new underwater volcano began forming on the seafloor. This volcano grew to form the island of Oahu. Next came the island of Molokai, then Maui, and finally the island of Hawaii. Hawaii currently lies over the hotspot, which is why it has so many active volcanoes. Eventually, Hawaii will drift away from the hotspot and a new island will begin to form.

Island of Hawaii



Several miles to the southeast of Hawaii, there is an underwater volcano called Loihi. Scientists estimate its top will reach the sea surface in tens of thousands of years.

39

Mythic Volcano Spirits: Hawaii's Goddess of Fire

Pele had a magic digging stick. When she jabbed the stick into the ground, a crater would open up in which volcanic fires burned. Pele began digging along Kauai's rocky coast. Every time she made a crater, seawater mysteriously flooded in and put out the flames. Much to her dismay, Pele discovered that her sister, Na-maka-o-kaha'i, had followed Pele to Kauai. Na-maka-o-kaha'i was trying to ruin Pele's plans to build a home and get married.

Hoping to ***outsmart*** *her hateful sister, Pele fled to Oahu, the next island in the Hawaiian chain. She took her youngest sister, Hi'iaka, and her brothers with her. Na-maka-o-kaha'i followed them and, once again, she caused seawater to fill every crater Pele dug. So Pele kept moving, traveling to the islands of Molokai and then Maui. There, too, Na-maka-o-kaha'i worked her watery magic. Time and again, she turned Pele's craters into cold, wet holes in the ground.*

44

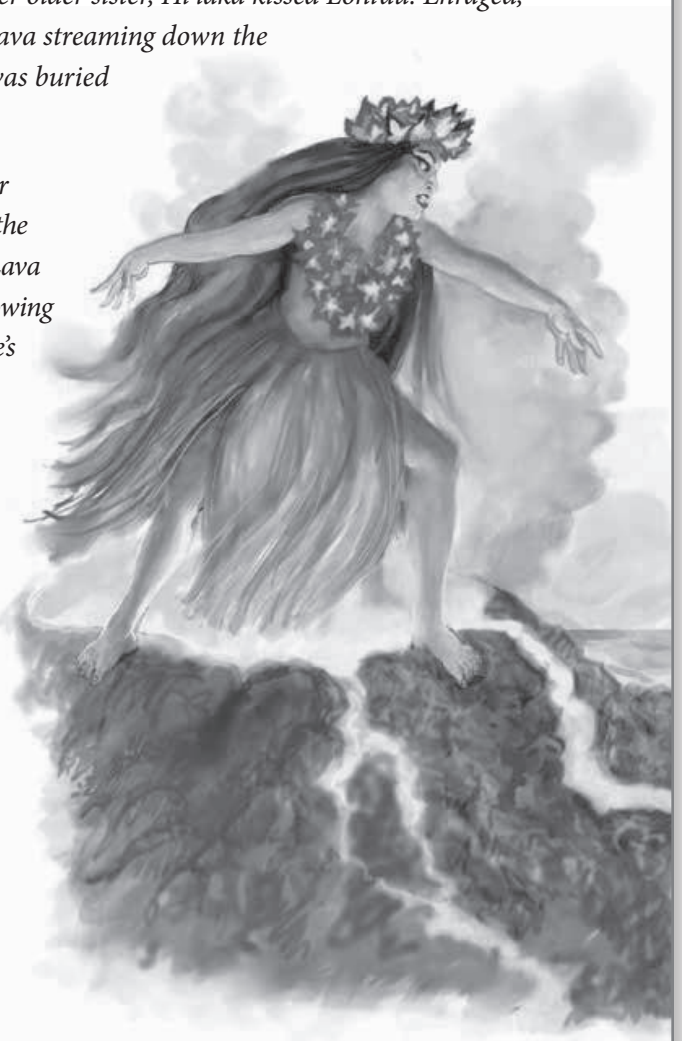
Finally, Pele reached Hawaii, the largest island in the chain. Pele climbed the mountain called Kilauea and dug a crater at its top. The bright orange flames of volcanic fire flared and did not go out. Pele's crater on Kilauea was far above the sea, out of the reach of the ocean goddess.

Pele was pleased with her new home. She sent Hi'iaka to fetch her husband-to-be from Kauai. She told her little sister to be back in less than 40 days. She also warned Hi'iaka not to fall in love with Lohi'au herself. In turn, Hi'iaka made Pele promise to protect a grove of beautiful trees that grew on Kilauea. Hi'iaka adored the trees. She was afraid that if Pele lost her temper, she would send out rivers of lava to burn them down.

45

The journey took much longer than Hi'iaka expected. By the time she reached Kauai and found Lohi'au, more than 40 days had passed. On the trip back to Hawaii, Hi'iaka grew increasingly fond of Lohi'au. She also grew increasingly afraid of how Pele would react to their being so late in returning.

When Hi'iaka finally reached Kilauea with Lohi'au, she looked in horror on her beautiful forest. It was gone, burned to the ground by Pele's volcanic fire. To punish her older sister, Hi'iaka kissed Lohi'au. Enraged, Pele sent a huge river of lava streaming down the side of Kilauea. Lohi'au was buried beneath it.



*Driven by the need for **revenge**, Hi'iaka dug into the rocky side of the volcano. Lava began draining out and flowing toward the sea. One of Pele's brothers stopped Hi'iaka before all of Pele's volcanic fire drained away. Because so much lava had already been lost, the top of Kilauea collapsed. A great **caldera**, or bowl-shaped depression, was left behind. It is still visible at the volcano's top.*

Two of Pele's brothers took pity on the dead king—and on Hi'iaka, who truly loved him. They dug Lohi'au out of the lava

and brought him back to life. Hi'iaka and Lohi'au were married and lived happily ever after, while Pele remained in her ***lofty*** *volcano home.*

Some people believe that Pele still lives in Kilauea. When the volcano erupts, they say it's a sign her fiery temper is flaring again.

Princess Power

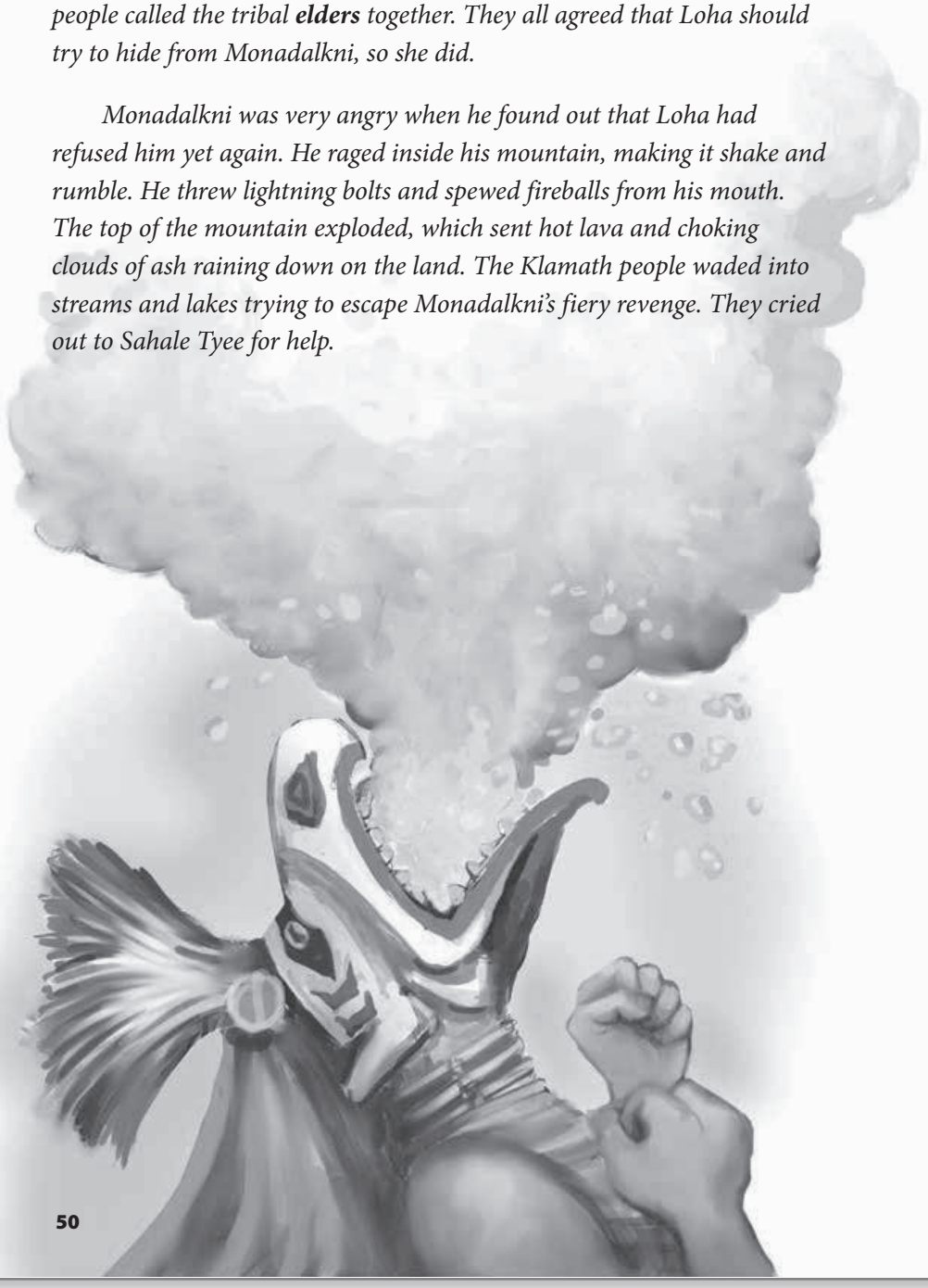
In 1880, Mauna Loa erupted. A large lava flow crept down the mountainside toward the city of Hilo. The Hawaiian princess Ruth Keelikolani traveled to the scene as the lava neared the city. Princess Ruth stood directly in the path of the advancing lava. She recited ancient chants and made offerings to Pele. The next day the lava flow stopped. This helped keep belief in Pele alive.

47

Mythic Volcano Spirits: The Origin of Crater Lake

She ran to her father and asked for help. The chief of the Klamath people called the tribal ***elders*** *together. They all agreed that Loha should try to hide from Monadalkni, so she did.*

Monadalkni was very angry when he found out that Loha had refused him yet again. He raged inside his mountain, making it shake and rumble. He threw lightning bolts and spewed fireballs from his mouth. The top of the mountain exploded, which sent hot lava and choking clouds of ash raining down on the land. The Klamath people waded into streams and lakes trying to escape Monadalkni's fiery revenge. They cried out to Sahale Tyee for help.



50

The Chief of the Above World came to the aid of his people. He fought Monadalkni and the two spirits waged a violent, fiery battle. Sahale Tyee eventually gained the upper hand and forced Monadalkni back down into his mountain. Sahale Tyee caused the top of the mountain to collapse, forever shutting off this entrance to the Below World.

The Klamath elders prayed for rain. The rains came and put out the volcanic fires. Rainwater filled the caldera on the mountaintop, creating the high, deep body of water known today as Crater Lake.

51

Using information from the excerpts, make notes on how volcanic activity is explained in the excerpts. Shaded cells indicate that no information is needed there.

Volcanic Activity	"Earth's Fiery Volcanoes"	"Mythic Volcano Spirits: Hawaii's Goddess of Fire"	"Mythic Volcano Spirits: The Origin of Crater Lake"
creation of volcanoes on an island chain			
eruptions			
formation of a caldera			

1. What similarities do you notice across excerpts?

2. What differences do you notice across excerpts?

NAME: _____

DATE: _____

Wiki Entry Rubric

	Exemplary	Strong	Developing	Beginning
Introduction	Initial section(s) provide accurate, general information related to location and type of volcano	Initial section(s) provide accurate information related to either location or type of volcano, but not both	Initial section(s) provide information loosely related to location and/or type of volcano	Initial section(s) lack information related to location and type of volcano
Body	Additional sections provide increasingly specific information about the volcano	Additional sections provide more information about the volcano	Additional sections provide some information about the volcano	Additional sections provide little to no information about the volcano
Conclusion	A final statement provides a thought-provoking summative or closing reflection about the volcano	A final statement provides a summative or closing reflection about the volcano	The summative or closing nature of the final statement is unclear	No final statement is provided
Structure of the Piece	All sentences in sections are presented logically	Most sentences in sections are presented logically	Some sentences in sections are presented logically	Connections between sentences in sections are confusing
	All information has been paraphrased	Most information has been paraphrased	Some information has been paraphrased	Little information has been paraphrased

You may correct capitalization, punctuation, and grammar errors while you are revising. However, if you create a final copy of your writing to publish, you will use an editing checklist to address those types of mistakes after you revise.

NAME: _____

DATE: _____

7.5 ACTIVITY PAGE

Wiki Entry Editing Checklist

Wiki Entry Editing Checklist	**After checking for each type of edit, place a check here.**
Meaning	
All my sentences have a subject and predicate.	
I included all the words I wanted to write.	
I took out repeated words or information.	
I have checked how long my sentences are and split run-on sentences into two.	
I have used nouns and adjectives correctly.	
Format	
The volcano name is the title at the top.	
Each section of the entry has a heading.	
Indenting is not used.	
If lists are included, they are bulleted or numbered.	
There is a reference list at the end in the appropriate format.	
Capitals	
I began each sentence with a capital letter.	
I used capital letters for all proper nouns.	
I used capital letters for all words in titles or headings.	
Spelling	
I have checked the spelling for any words I was unsure of or my teacher marked.	
Punctuation	
I read my writing piece aloud to check for commas at pauses and periods, question marks, and exclamation points at the ends of my sentences.	
I used commas and quotation marks in places where they belong.	
The titles in my reference list are underlined or in italics.	

NAME: _____

DATE: _____

8.1 ACTIVITY PAGE

Vocabulary for "Earth's Building Blocks"

1. **mineral**, ***n.*** a solid, nonliving substance found in the earth that makes up rocks (**minerals**) (**53**)

2. **texture**, ***n.*** the size, shape, and sorting of the mineral grains in rocks (**53**)

3. **solidify**, ***v.*** to make or become hard or solid (**solidifies**) (**54**)

4. **obsidian**, ***n.*** a dark rock or natural glass formed from lava that cooled very quickly (**54**)

5. **granite**, ***n.*** a common igneous rock that forms from magma that cooled within Earth's crust (**54**)

6. **durable**, ***adj.*** able to last a long time in good condition **(55**)

7. **compact**, ***v.*** to closely pack or press together (**compacts**, **compacting**) (**56**)

8. **dissolved**, ***adj.*** mixed with liquid so no solid pieces are visible anymore (**56**)

Word(s) from the Chapter	Pronunciation	Page
gneiss	/nees/	58
Agnes Nyanhongo	/ag*nes/ /nie*an*hong*goe/	59
Zimbabwe	/zim*bob*wae/	59

NAME: _____

DATE: _____

8.2 ACTIVITY PAGE

Earth's Building Blocks

Answer each question thoughtfully, citing the page number(s) where you found evidence for each question. Answer in complete sentences and restate the question in your answer whenever possible.

1. How might rocks differ from each other?

_____

_____

_____

_____

Page(s) _____

2. How does igneous rock form?

_____

_____

_____

_____

Page(s) _____

3. Which statement distinguishes between the two basic types of igneous rock?

   A. Two igneous rocks are granite and basalt.

   B. Different rocks have different size grains and different textures.

   C. One type forms on Earth's surface and the other forms below Earth's surface.

   D. The slower the rock cools and hardens, the larger its mineral grains will be.

   Page(s) _____

4. How does a sedimentary rock form?

   _____

   _____

   _____

   _____

   Page(s) _____

5. How does metamorphic rock form?

   _____

   _____

   _____

   _____

   Page(s) _____

6. What is the rock cycle?

   A. the continuous process of volcanoes erupting

   B. the continuous process of change in which rocks are created, destroyed, and recreated

   C. the continuous process of sedimentary rock changing to become igneous rock

   D. the continuous process of mineral grains making rocks smooth and shiny

   Page(s) _____

Complete the following items after you have finished reading the chapter. Match the following words with the correct definitions and examples. You may use some words more than once. Try to think of the answer to each item first from memory and then check back in the text to verify your answer before filling in the blank.

minerals	limestone	erosion
sedimentary rock	igneous rock	metamorphic rock

7. **Word**: _____
   Definition: any process or force that moves sediments to new locations

   Page(s) _____

8. **Word**: _____
   Definition: a rock that forms when magma cools and solidifies; the most abundant class of rocks

   Page(s) _____

9. **Word**: _____
   Definition: the building blocks of rocks that consist of solid, nonliving substances

   Page(s) _____

10. **Word**: _____
Definition: a type of sedimentary rock that often has many fossils and shells of tiny ocean creatures

Page(s) _____

11. **Word**: _____
Definition: a type of rock that forms when either igneous or sedimentary rock is changed due to extreme heat and pressure

Page(s) _____

12. **Word**: _____
Definition: a type of rock made of tiny bits of rock and sand mixed with small pieces of things that were once alive

Page(s) _____

13. **Word**: _____
Examples: basalt, granite, and obsidian are examples of this class of rock

Page(s) _____

14. **Word**: _____
Examples: serpentine, marble, and gneiss are examples of this class of rock

Page(s) _____

15. **Word**: _____
Examples: sandstone, limestone, and mudstone are examples of this class of rock

Page(s) _____

NAME: _____

DATE: _____

8.3 ACTIVITY PAGE

Take Notes on a Volcano

Take Notes on a Volcano	
Name of the Volcano	
Location of the Volcano	
Type of Volcano; Date of Last Eruption	
Description of Volcano or of Last Eruption	
Other Facts	

References for Volcano Wiki Entry		
Title	**Date**	**Source (Book or Web Address)**

NAME: _____

DATE: _____

Volcano Wiki Entry

Use complete sentences to fill in the information below.

Volcano Name:

_____

_____

Location:

_____

_____

Volcano Type and Last Eruption Date:

_____

_____

Description:

_____

_____

_____

_____

Other Facts:

References:

NAME: _____

DATE: _____

Excerpt from "Earth's Building Blocks"

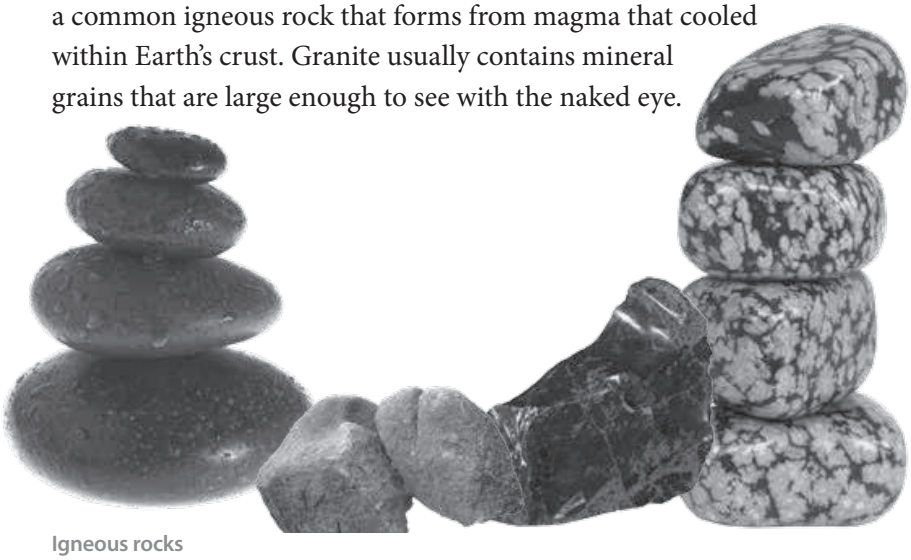
Read the following excerpt and use it to complete the activity that follows.

Born from Magma: Igneous Rock

Let's start with **igneous rocks**, the most abundant class of rocks on the earth. Igneous rocks form when magma cools and **solidifies**. When you think of igneous rocks, think of volcanoes.

There are two basic types of igneous rock. One type forms from magma that erupts onto Earth's surface as lava. The lava cools and hardens into rock. The faster it cools, the smaller the mineral grains will be in the resulting rock. **Obsidian** is an igneous rock formed from lava that cooled very quickly, so quickly, there wasn't time for the minerals to form grains. As a result, obsidian is as smooth and shiny as glass. In fact, it is often called volcanic glass. Basalt is an igneous rock formed from lava that took longer to cool. Basalt is typically a dark-colored rock. It has fairly small mineral grains that give it a fine-grained texture.

The second type of igneous rock forms from magma that solidifies below Earth's surface. Magma cools very slowly when it's deep beneath the surface. Slow cooling leads to igneous rocks with relatively large mineral grains. The slower the cooling, the larger the grains. **Granite** is a common igneous rock that forms from magma that cooled within Earth's crust. Granite usually contains mineral grains that are large enough to see with the naked eye.



Igneous rocks

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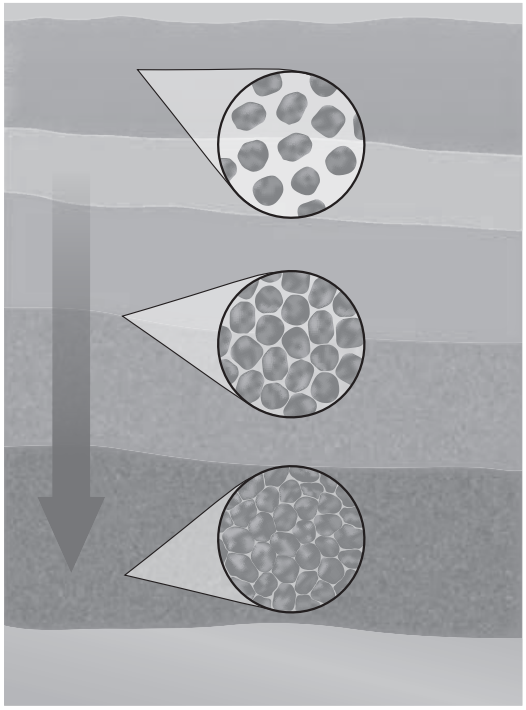
Layer after Layer: Sedimentary Rock

Sedimentary rock is the second major class of rocks. Sedimentary rocks are made of sediments. Sediments are tiny bits of rock and sand combined with fragments of once-living things. Sediments collect in low-lying areas both on land and in bodies of water. They form layers, one on top of another. Over long periods of time, the weight of overlying layers **compacts** the sediments in deeper layers, squeezing them closer together. Sediments also become cemented, or glued, together as **dissolved** minerals fill the spaces between the sediments. As the sediments dry, the dissolved minerals turn into solids, binding the sediments together. Over time, compacting and cementing processes transform sediments into sedimentary rock.



The weight of overlying layers compacts the sediments, squeezing them closer together.

Most sedimentary rocks are more easily broken than most igneous rocks. Hit a sedimentary rock with a hammer, and it will crumble or break apart. Some sedimentary rocks contain fossils. **Limestone** is a sedimentary rock often packed with the fossilized skeletons and shells of tiny ocean creatures. Some sedimentary rocks get their name from their sediments. Sandstone started as grains of sand, whereas mudstone formed from ancient mud.

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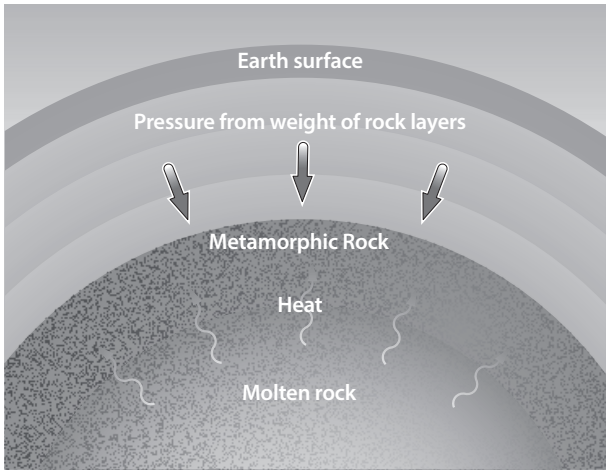
Changing Form: Metamorphic Rock

The third major class of rocks is **metamorphic rock**. Metamorphic rocks form when igneous or sedimentary rocks are exposed to extreme heat and pressure. They can even form from older metamorphic rocks. High temperatures and crushing pressure alter the minerals in the rocks. Mineral grains may be flattened or rearranged into layers, swirls, or stripes. They may also be changed into completely different minerals!

Remember granite, the igneous rock? When granite is subjected to intense heat and pressure, it becomes a metamorphic rock called gneiss. When the sedimentary rock limestone is squeezed and heated deep below ground, it becomes a metamorphic rock called marble.

Metamorphic rocks tend to form deep within Earth's crust. The pressure from countless tons of overlying rock is tremendous. Equally powerful is the heat rising from hot magma in the mantle beneath the crust. Metamorphic rocks often form where tectonic plates are slowly colliding. They can also form as magma travels up through cracks in Earth's crust and heats the rocks around the cracks. If the heat of the magma completely melts the rock again, then it becomes igneous rock. If the rock is heated just enough to be changed, however, it instead becomes metamorphic rock.



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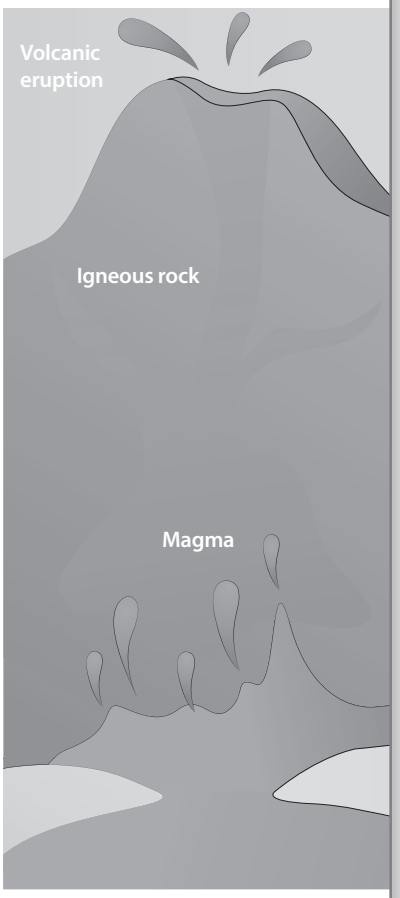
The Rock Cycle

Rocks you see in the world around you might seem like permanent fixtures. Given enough time, however, all rocks change. They are created, destroyed, and recreated in a continuous cycle. Geologists call this ongoing process the **rock cycle**.



The rock cycle has no starting or ending point. You can jump in anywhere to see how it works. Let's begin with magma erupting from a towering volcano. The magma (now lava) cools and hardens into igneous rock. Over the course of thousands of years, sun, wind, rain, and freezing temperatures cause the rock to **weather**, or break down into smaller pieces. The pieces continue to weather, slowly breaking down into sediments. Howling winds, flowing water, and gravity gradually move the sediments down the sides of the volcano and beyond. Movement of sediments from place to place is called **erosion**.

Imagine that the sediments end up in a lake, where they settle to the bottom. Over long periods of time, more layers of sediments are deposited on top of them. Compacting and cementing processes eventually turn the deeply buried sediments into sedimentary rock.

Now imagine that the sedimentary rock is near the edge of a tectonic plate. The plate collides with another plate—very slowly, of course. Tremendous heat and pressure generated by the collision gradually turn the sedimentary rock into metamorphic rock. As the plates continue colliding, their rocky edges crumple. The metamorphic

NAME: _____

DATE: _____

Write the correct word or phrase to complete each sentence. Each of the words/phrases will be used once.

compacted	erosion	magma	igneous	metamorphic
obsidian	rock cycle	sedimentary	solidified	texture

1. Lava flowed down the volcano's side and quickly hardened to form a glassy type of _____ rock.

2. Tiny flakes of _____ fell on the ground as an ancient tool maker worked to create a sharp blade for cutting.

3. The tiny flakes of rock were washed into a nearby stream, where they joined other sediments created by the _____ of rock from the nearby mountains.

4. The sediments formed layers on the stream bed, which _____ over time as the weight of the layers squeezed out the air and water.

5. The sediments cemented together and _____ into rock.

6. _____ rock was buried by even more layers of sediments over millions of years.

7. The heat and pressure from the weight of the overlying rock changed the _____ of the minerals in the rock.

8. New _____ rock formed and lay buried in the earth for millions of years.

9. Heat from _____ below the rock melted it, turning it into igneous rock.

10. As part of its journey through the _____, this piece of rock might someday be found on a beach in Maine or a mountaintop in Tennessee!

NAME: _____

DATE: _____

9.2 ACTIVITY PAGE

Commas and Quotation Marks

For each item, insert commas and quotation marks in the appropriate places.

Example: He said my favorite board game is checkers.
He said, "My favorite board game is checkers."

1. Just then, my dad asked What would you like to eat for dinner?

2. I replied I would like to have grilled chicken.

3. I want spaghetti and meatballs exclaimed my sister.

4. How about my mom asked we make sandwiches?

5. What if we . . . Dad paused and then said order pizza?

6. My sister and I both cried Yes! in response.

Read the following passages from Chapter 5 "Mythic Volcano Spirits." Rewrite the sentences marked in bold so they include dialogue. Make sure at least one sentence is rewritten as a split quotation. Be sure to use correct capitalization and punctuation.

Example: Loha refused.
Loha said, "No."

1. *One day Monadalkni spotted the daughter of the Klamath chief, Loha. Monadalkni thought Loha was the most beautiful woman he had ever seen. Immediately he wanted her to be his wife. He came down from the mountaintop and proposed to Loha.* ***He promised her eternal life if she would agree to marry him.*** *Loha refused.*

2. ***She ran to her father and asked for help.*** *The chief of the Klamath people called the tribal elders together. They all agreed that Loha should try to hide from Monadalkni, so she did.*

3. *Monadalkni was very angry when he found out that Loha had refused him yet again. He raged inside his mountain, making it shake and rumble. He threw lightning bolts and spewed fireballs from his mouth. The top of the mountain exploded, which sent hot lava and choking clouds of ash raining down on the land. The Klamath people waded into streams and lakes trying to escape Monadalkni's fiery revenge.* ***They cried out to Sahale Tyee for help.***

NAME: _____

DATE: _____

9.3 ACTIVITY PAGE

Root *rupt*

Write a complete sentence for each of the following words. Be sure to use correct capitalization and punctuation.

1. *erupt*

_____

_____

2. *uninterrupted*

_____

_____

3. *rupture*

_____

_____

Choose the correct word to complete the sentence and write it on the line.

4. The science lesson was _____ when the fire alarm went off
(erupting, uninterrupted, interrupted, erupted)
and we all had to quickly walk outside.

5. They _____ a serious discussion by making jokes and
(erupted, uninterrupted, disrupted, ruptured)
acting silly, causing everyone to lose focus.

6. An _____ of a geyser releases hot water and steam.
(interruption, interrupt, erupt, eruption)

Challenge: Write a complete sentence using two words with the root *rupt*. Be sure to use correct capitalization and punctuation.

_____

_____

_____

NAME: _____

DATE: _____

Practice Spelling Words

Write the correct word to complete each sentence. Words will not be used more than once; some words will not be used.

abrupt	autograph	matriarch	paragraph
eruption	archrival	uninterrupted	hierarchy
calligraphy	biographer	rupture	anarchy

1. He left in a(n) _____ way without even saying goodbye.

2. My grandma has a(n) _____ book that includes the signatures of noteworthy actors, sports players, and political figures.

3. A volcanic _____ can add new land to Earth's surface but can also cause a large amount of destruction.

4. A man from North Carolina won a world record for jumping rope for a(n) _____ period of time—33 hours straight.

5. The _____ conducted a series of interviews to collect the information he needed to write a book about the baseball player's life.

6. The tennis player finally defeated his _____ in a heated match.

7. She wrote a(n) _____ focusing on how earthquakes occur.

8. The queen is the _____ of her kingdom and government.

NAME: _____

DATE: _____

Spelling Assessment

Write the spelling words as your teacher calls them out.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____

Write the sentence as your teacher calls it out.

NAME: _____

DATE: _____

10.2 ACTIVITY PAGE

Vocabulary for "Earth's Powerful Forces of Change"

1. **expand**, ***v.*** to get bigger (**63**)

2. **contract**, ***v.*** to shrink slightly or get smaller (**63**)

3. **ultimately**, ***adv.*** finally; at the end of a process (**65**)

4. **pepper**, ***v.*** to sprinkle or cover (**67**)

5. **deposit**, **1. *v.*** to put or leave something in a particular place; **2. *n.*** material laid down or left by a natural process (***v.*** **deposited**, ***n.*** **deposits**) (**69**)

6. **state**, ***n.*** the condition of being a solid, liquid, or gas (**67**)

7. **silt**, ***n.*** very small sediments deposited by water (**69**)

8. **canyon**, ***n.*** a deep valley with steep sides and often a stream or river flowing through it (**canyons**) (**70**)

Word(s) from the Chapter	Pronunciation	Page
Yunnan	/yoo*nan/	65
Shilin	/shee*leen/	65

NAME: _____

DATE: _____

Earth's Powerful Forces of Change

The following words were used in Chapter 7, "Earth's Powerful Forces of Change." For each word, pick an activity and complete the chart below.

sweep finest accumulate countless deposit massive	**Vocabulary Activities** 1. Write a definition in your own words. 2. Provide a synonym (similar meaning). 3. Provide an antonym (opposite meaning). 4. Use the word in a sentence. 5. Provide another word that the word or phrase makes you think of and explain why. (*Apple* makes me think of bananas because they are both fruits.) 6. Think of an example of the word or phrase and write about it. (An example of *fruit* is cantaloupe. It is a melon that is white on the outside and orange on the inside. They are really tasty in the summer.)

Word	Activity	Activity Response

NAME: _____

DATE: _____

11.1 TAKE-HOME

Sequencing Multiple Adjectives

Article	Adjective(s)					Noun
	General → Specific					
	Opinion/ Observation	Physical Description (size, shape, age, color)	Material	Origin	Purpose	

Reorder the words in the sentence so they are ordered correctly. Be sure to use proper capitalization and punctuation.

Example: wears she pretty a green dress

She wears a pretty, green dress

1. the underwater round data little vessel collects

_____

_____

2. big red a round apple fell

_____

_____

3. we farm old visited a small

_____

_____

4. old the erupted Hawaiian tall volcano

_____

_____

Write a sentence using at least two adjectives and an article. Be sure to order the words appropriately and to use proper capitalization and punctuation.

_____

_____

NAME: _____

DATE: _____

11.2 TAKE-HOME

Review Suffixes *–ly* and *–y* and Roots *graph* and *rupt*

Write the correct word to complete each sentence. Words will not be used more than once.

messy	taste	interrupt	mess
kindly	biography	tasty	busily
abruptly	busy	kind	photograph

1. It was _____ of the stranger to pick up the money I dropped and return it to me.

2. Scientists received warning of a tsunami wave far out in the ocean, so they were _____ working to warn people before it reached land.

3. She didn't want to _____ the discussion but it was time for her to leave, so she said they would talk again later.

4. Someone wanted to write a(n) _____ about the geologist, but he declined because he was writing his own life story in an autobiography.

5. My dad and my sister do not like the _____ of tomatoes but my mom and I love it.

6. They had to leave the soccer game _____ and seek shelter when an announcement was made of an approaching storm.

7. She _____ agreed to take care of our dog while we went on vacation.

8. My favorite _____ from the slideshow was the one that showed the Grand Canyon.

9. The bookshelf at the library was so _____ and disorganized that I couldn't find the book I wanted to check out.

10. Her dinner was very _____, so she ate it all and even asked for more.

For each word remaining in the word bank, write a sentence using the word.

1. _____

_____

_____

2. _____

_____

_____

NAME: _____

DATE: _____

11.3 TAKE-HOME

Spelling Words

The following is a list of spelling words. These words are related to the content of the Reader, The Changing Earth.

During Lesson 15, you will be assessed on how to spell these words. Practice spelling the words by doing one or more of the following:

- *spell the words out loud*
- *write sentences using the words*
- *copy the words onto paper*
- *write the words in alphabetical order*

When you practice spelling and writing the words, remember to pronounce and spell each word one syllable at a time.

1. fault
2. tsunami
3. geyser
4. erosion
5. glacier
6. tectonic
7. molten
8. seismograph
9. epicenter
10. conclusion

The following chart provides the meanings of the spelling words. You are not expected to know the word meanings for the spelling assessment but it may be helpful to have them as a reference as you practice the spelling words.

Spelling Word	Definition
fault	a crack in Earth's crust
tsunami	a gigantic wave of seawater caused by an earthquake in oceanic crust
geyser	an underground hot spring that periodically erupts, shooting hot water and steam into the air
erosion	any process or force that moves sediments to new locations
glacier	an enormous, slow-moving mass of ice found in polar regions and near tops of tall mountains
tectonic	relating to the process of plate movement on Earth's surface
molten	melted
seismograph	an instrument used to track seismic waves traveling through the earth
epicenter	the point on Earth's surface directly above an earthquake's focus
conclusion	a decision or opinion formed based on information you have

NAME: _____

DATE: _____

Practice Spelling Words

Write each spelling word under its definition. Then identify the word's part of speech.

epicenter	tsunami	seismograph	glacier	geyser
conclusion	molten	erosion	fault	tectonic

1. an underground hot spring that periodically erupts, shooting hot water and steam into the air

   Spelling Word: _____

   Part of Speech: _____

2. melted

   Spelling Word: _____

   Part of Speech: _____

3. any process or force that moves sediments to new locations

   Spelling Word: _____

   Part of Speech: _____

4. the point on Earth's surface directly above an earthquake's focus

   Spelling Word: _____

   Part of Speech: _____

5. relating to the process of plate movement on Earth's surface

   Spelling Word: _____

   Part of Speech: _____

6. a crack in Earth's crust

   Spelling Word: _____

   Part of Speech: _____

7. an instrument used to track seismic waves traveling through the earth

   Spelling Word: _____

   Part of Speech: _____

8. an enormous, slow-moving mass of ice found in polar regions or near tops of tall mountains

   Spelling Word: _____

   Part of Speech: _____

9. a decision or opinion formed based on information you have

   Spelling Word: _____

   Part of Speech: _____

10. a gigantic wave of seawater caused by an earthquake in oceanic crust

    Spelling Word: _____

    Part of Speech: _____

NAME: _____

DATE: _____

12.1 ACTIVITY PAGE

Vocabulary for "Earth's Mighty Mountains"

1. **sea level**, ***n.*** the average height of the ocean's surface (**73**)

2. **sheer**, ***adj.*** very steep, almost straight up and down (**78**)

3. **bulge**, ***v.*** to stick out or swell (**80**)

Word(s) from the Chapter	Pronunciation	Page
Tethys Sea	/teth*ees/ /see/	74
Eurasian	/yer*ae*zshən/	74
Urals	/yer*əlz/	75
Navajo	/nov*ə*hoe/	80
Gutzon Borglum	/gootz*un/ /bor*glum/	81

NAME: _____

DATE: _____

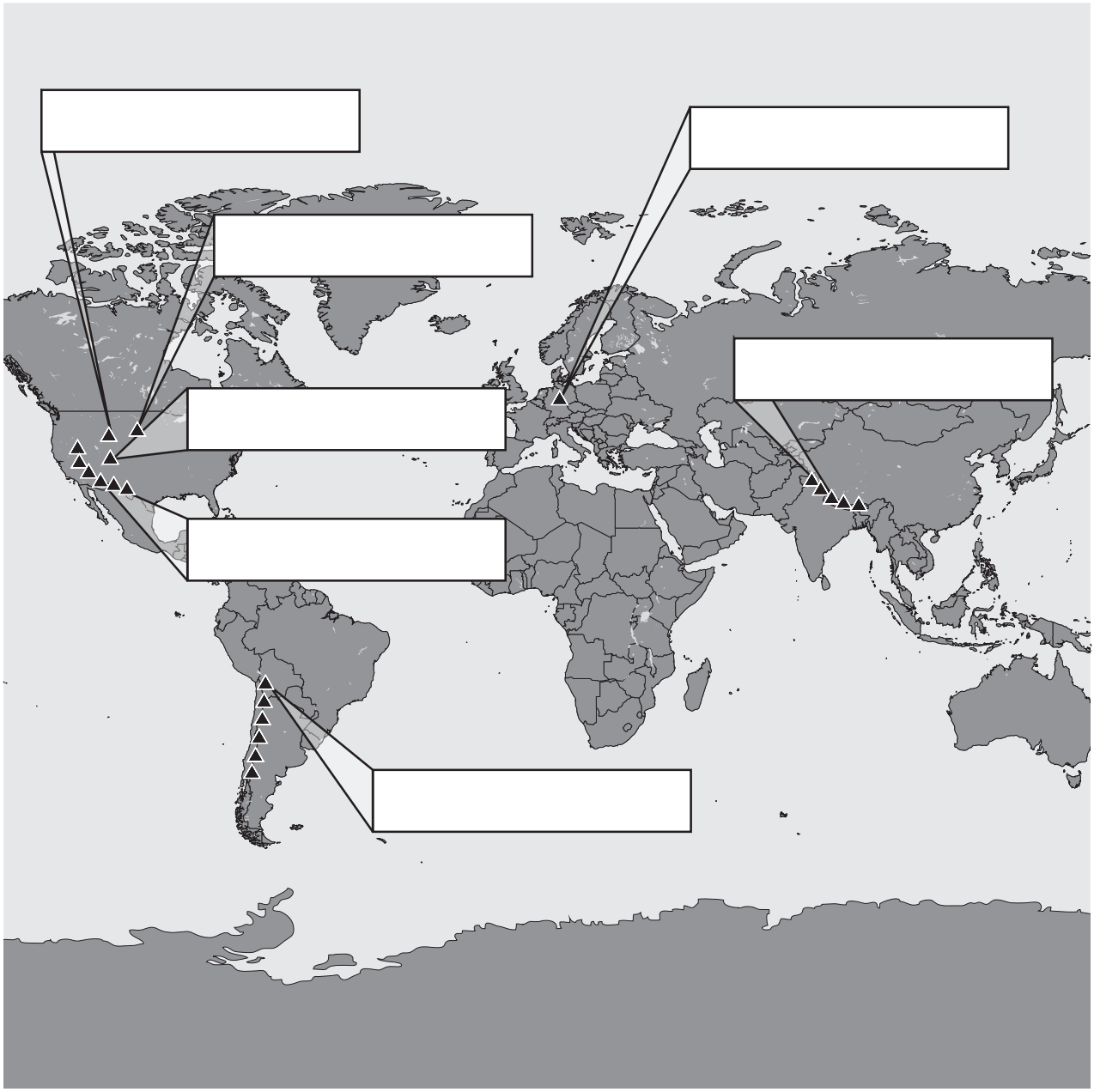
Earth's Mighty Mountains

Answer each question thoughtfully, citing the page number(s) where you found evidence for each question. Answer in complete sentences and restate the question in your answer whenever possible.

	Fold Mountains	Fault-Block Mountains	Dome Mountains
How are they formed?			
Page(s)			
What are common features or characteristics?			
Page(s)			
What are some examples and where are they located?			
Page(s)			

Use the following word bank to correctly label the map.

Himalayas	Harz Mountains	Black Hills	Andes Mountains
Grand Tetons	Navajo Mountain	Basin and Range Province	



NAME: _____

DATE: _____

Planning a Descriptive Paragraph

Complete the following items to plan for writing your descriptive paragraph about a rock or other item in the rock cycle.

1. Read the following chart listing rocks and items in the rock cycle. Choose one that will be the focus of your paragraph and write it on the line following the chart.

Rock Type	Characteristics
magma	partially melted rock in the earth's mantle; very hot
igneous rock	**1.** formed when magma cools and becomes solid; the most common type of rock; smooth and shiny (obsidian) or dark colored (basalt); **2.** formed when magma cools below the Earth's surface; large grains (granite)
lava	red-hot melted rock that has erupted above Earth's crust from deep underground; flows down the side of an active volcano
metamorphic rock	forms when sedimentary rocks are exposed to extreme heat and pressure; hard; found deep in Earth's crust; marble is a metamorphic rock
sediments	tiny bits of rock and sand combined with fragments of once-living things
sedimentary rock	made of tiny pieces of rocks, sand, and once-living things; forms layers that over time become compressed into rock; easily broken; sometimes contains fossils (limestone)

Paragraph Focus:

_____

2. Give the item a first and last name. Consider using the rock or item name as part of the name. For example, you might use *Igneous Isaac*. Be creative! Write the name on the line.

_____

3. Think about the characteristics of your item. Complete the sentences below:

My surface feels like:

_____

I look like:

_____

I form when:

_____

4. Use the following lines to write two more details you will include in your paragraph.

_____

_____

_____

_____

5. Write the last sentence of your paragraph. Consider using a vivid image, a funny piece of dialogue, a question, or a statement that engages the reader.

_____

_____

NAME: _____

DATE: _____

13.1 ACTIVITY PAGE

Vocabulary for "Earth's Undersea World"

1. **submersible**, ***n.*** a small vehicle that can travel deep under water for research (**submersibles**) (**82**)

2. **rugged**, ***adj.*** having a rough, uneven surface (**83**)

3. **hydrothermal vent**, ***n.*** a deep-sea geyser that forms as seawater sinks down through cracks in the oceanic crust and then releases extremely hot, mineral-rich water back up through cracks in the crust (**hydrothermal vents**) (**85**)

4. **seamount**, ***n.*** an underwater volcano that forms wherever magma is erupting through oceanic crust (**seamounts**) (**87**)

5. **underlie**, ***v.*** to be located under something (**underlies**) (**87**)

6. **firsthand**, ***adv.*** coming directly from actually seeing or experiencing something (**87**)

7. **school**, ***n.*** a large number of ocean animals of one type swimming together (**schools**) (**88**)

Word(s) from the Chapter	Pronunciation	Page
anemones	/ə*nem*o*nees/	88
Jacques Piccard	/jok/ /pee*kar/	89
Trieste	/treest/	89

NAME: _____

DATE: _____

13.2 TAKE-HOME

Excerpt from "Earth's Undersea World"

Imagine you are a geologist searching for a hydrothermal vent as you read the following excerpt. Answer the questions following the excerpt in complete sentences.

Hydrothermal Vents

At first glance, it looks like a fire. Black smoke is billowing up from a spot in the ridge. It's not smoke, though. It's searing hot, dark water gushing out of cracks in the rock. It's a **hydrothermal vent**.

Hydrothermal vents are a bit like geysers in Yellowstone National Park. These deep-sea geysers are much, much hotter than anything on land. Hydrothermal vents form as seawater sinks down through cracks in the oceanic crust. As it nears the magma lying below the crust, the water is heated to incredibly high temperatures. It can reach an astonishing 750°F! The water is so hot that it dissolves minerals from the surrounding basalt. The minerals become part of the hot liquid, like salt does when it's stirred into a glass of water.

At a hydrothermal vent, the super-heated, mineral-rich water comes roaring back up through cracks in the crust. It shoots out of the rock with the force of water blasting out of a fire hydrant. When hot vent water meets cold seawater, the dissolved minerals in vent water become solid again. They form tiny particles. The particles make the vent water look like dark smoke.

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Hunting for Hydrothermal Vents

Hydrothermal vents

How do scientists find hydrothermal vents? They hunt for them from ships at sea. Hot, mineral-rich vent water moves slowly away from hydrothermal vents. It forms a plume, or cloud, of mineral particles that drifts away from the vent, like smoke from a chimney. If the scientists locate a plume, they send down a robot vehicle. When it locates the vent, the robot sends pictures back to the scientists.

There is more to hydrothermal vents than clouds of hot, black water. Communities of amazing and unusual animals live around many of these deep-sea geysers. Red-topped giant tube worms are the largest animals near vents. Some types of giant tube worms can grow as tall as a person. The vents are also home to ghostly white crabs, football-sized clams, and pale, blind shrimp.

Scientists believe there are tens of thousands of hydrothermal vents along the world's mid-ocean ridges. Scientists, however, have explored only a handful of them. Finding a new one is always exciting. Scientists often discover new types of animals as well.

Giant tube worms near a hydrothermal vent in the Pacific Ocean

1. What clues tell you that you are close to a vent?

2. How would you get close enough to observe the vent?

3. What would you discover on the seafloor near the vent?

4. Why is it important to conduct your underwater mission?

NAME: _____

DATE: _____

14.1 ACTIVITY PAGE

Earth's Undersea World

As you and your partner read Chapter 9, "Earth's Undersea World," answer the following questions.

1. Seafloor spreading explains which of the following?
   A. the presence of mid-ocean ridges on the seafloor
   B. Wegener's theory of continental drift
   C. the formation of hydrothermal vents
   D. All of the above
   E. A and B only

   Page(s) _____

2. Which phrase describes the Mid-Atlantic Ridge?
   A. a warm, dark area on the sea floor
   B. a long, rugged underwater mountain range
   C. a cluster of seamounts
   D. a cluster of hydrothermal vents

   Page(s) _____

The following question has two parts. Answer Part A and then answer Part B.

3. **Part A**: Fill in the following chart to indicate which seafloor feature the animals live around, hydrothermal vents or seamounts.

Animals	Where they live
white crabs	
brittle stars	
schools of fish	
pale, blind shrimp	
sponges	
deep-sea corals	
giant tube worms	
anemones	
football-sized clams	

Page(s) _____

Part B: Why might these animals live near these particular seafloor features?

_____

_____

_____

_____

4. Match each cause to its effect by writing the correct letter for the effect next to the correct cause.

Causes	Effects
_____ Seamount emerges from the ocean's surface	a. continental drift
_____ One tectonic plate slides under another	b. seafloor spreading
_____ Tectonic plates move apart very slowly	c. islands are formed
_____ Seafloor spreading	d. a trench is formed
_____ Water seeps into the earth's crust and is heated by magma	e. mountains are formed
_____ Tectonic plates collide	f. hydrothermal vents are formed

5. On page 84, the author uses a simile when describing the mountain chain formed by mid-ocean ridges, saying it is *like the stitching on a baseball*. Explain what this simile means.

NAME: _____

DATE: _____

14.2 ACTIVITY PAGE

Sequencing Multiple Adjectives

Complete each sentence by choosing two adjectives from the ones provided and writing them in the correct order in the blanks. Underline the article(s) in each sentence.

Example: **Adjectives**: strong, young, gray, Italian

A **strong** , **gray** horse galloped in the field.

1. **Adjectives**: new, Japanese, fast

   The _____, _____ race car zipped around the track.

2. **Adjectives**: hardcover, good, old, science

   She looked at a _____, _____ book about volcanoes.

3. **Adjectives**: canvas, blue, comfortable, walking

   He loves the _____, _____ shoes he tried on.

Circle the phrase with the adjectives in the correct order.

Example: a black, large, clever cat
clever, a large black cat
(a clever, large, black cat)

1. the tall, rocky mountain
   the rocky, tall mountain
   rocky, tall, the mountain

2. a sharp, wooden pencil
   wooden, a sharp pencil
   a wooden, sharp, pencil

3. old, an bicycle, orange
   an old, orange bicycle
   an orange, old bicycle

Write a sentence using at least two adjectives. Be sure to order the adjectives correctly and to use proper capitalization and punctuation.

NAME: _____

DATE: _____

14.3 ACTIVITY PAGE

Practice Suffixes *–ly* and *–y* and Roots *graph* and *rupt*

Write a complete sentence for each of the following words. Be sure to use correct capitalization and punctuation.

1. *interrupt*

2. *messy*

3. *photograph*

4. *busily*

5. *tasty*

6. *abruptly*

7. *biography*

8. *kindly*

Challenge: *Write a sentence that includes one word with the suffix* –ly *or* –y *and one word with the root* graph *or* rupt.

NAME: _____

DATE: _____

14.4 ACTIVITY PAGE

Practice Spelling Words

For each word, write a sentence using the word.

epicenter	erosion	glacier	fault	tsunami
geyser	conclusion	seismograph	molten	tectonic

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

5. _____

_____

6. _____

_____

7. _____

_____

8. _____

_____

9. _____

_____

10. _____

_____

NAME: _____

DATE: _____

Spelling Assessment

Write the spelling words as your teacher calls them out.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Write the sentence as your teacher calls it out.

_____

_____

_____

Unit Assessment—Geology

Reading Comprehension

Today you will read two selections related to geology. After reading the first selection, you will answer several questions based on it. Then, you will read the second selection and answer several questions based on it. Some of the questions have two parts. You should answer Part A of the question before you answer Part B.

Earth's Forces at Work in Japan

1 Japan shakes when Namazu wiggles his tail. That is the explanation for earthquakes in some of Japan's most famous myths. Namazu is a giant catfish whose nickname is Earth-shaker. The Japanese god Kashima tries to keep Namazu quiet. He holds the catfish down under a large stone. Every now and then, however, Kashima gets tired. The stone slips. Numazu swishes his great tail and causes an earthquake.

2 Japan has a long history of earthquakes but a mythical catfish isn't what causes them. If you look at a picture of Earth's tectonic plates, you'll see that several tectonic plates come together in the Pacific Ocean near Japan. Some of the plates are sliding, or subducting, under others. These moving plates release tremendous amounts of energy as they grind past each other. Each burst of energy generates seismic waves that spread through Earth's crust. Seismic waves cause the ground to shake, creating an earthquake. Plate movements trigger hundreds, even thousands, of earthquakes in Japan every year.

3 Fortunately, most of these earthquakes are small. You might not even notice the slight shaking of the ground they produce. Every so often, however, Japan is hit by large earthquakes that cause terrible damage. In the past hundred years or so, Japan has experienced three major earthquakes. An earthquake that registered 7.9 on the Richter scale struck in 1923. The cities of Tokyo and Yokohama were badly damaged, and many thousands of people died. In 1995, an earthquake with a magnitude of 6.9 on the Richter scale devastated Kobe, a port city southwest of Tokyo. By far the strongest earthquake to hit Japan in many centuries occurred on March 11, 2011. The Great Tohoku earthquake, as many people call it, measured 9.0 on the Richter scale. It was the strongest earthquake known to hit Japan in recorded history. It was one of the strongest ever recorded anywhere in the world. The earthquake's epicenter was on the ocean floor off Japan's eastern coast.

4 The 2011 earthquake caused violent shaking that brought many buildings tumbling down. Streets heaved and bridges collapsed. The worst damage, however, came from an enormous tsunami generated by the earthquake. Towering waves, some higher than a three-story building, crashed ashore and surged far inland. Many thousands of people died in the Great Tohoku earthquake and tsunami. Hundreds of thousands of people lost their homes.

5 As you might expect in a country that has so many earthquakes, Japan monitors Earth's movements very closely. It has one of the most advanced earthquake early warning systems in the world. Earthquake scientists have installed thousands of seismographs across Japan. These instruments detect the slightest movements in the ground beneath them. They send information about these movements to a central location. When an earthquake strikes, a warning is sent out. The idea is to give people time to move to safer places and quickly protect themselves. The problem is earthquakes almost always strike suddenly and happen very quickly. Japan's earthquake early warning system issued a warning for the 2011 earthquake. Sendai, the largest city closest to the epicenter, had just 15 seconds of warning before the shaking began.

6 In addition to frequent earthquakes, Japan also has volcanoes. The country lies along the Pacific Ocean's volcanic Ring of Fire. Japan has more than 100 active volcanoes. People often link volcanoes, like earthquakes, with terrible destruction. But volcanoes can also be creative natural forces. In Japan, you can see this creative power in action.

7 A new volcanic island is forming off Japan's coast. In late November 2013, an underwater volcano erupted near the Bonin Islands, a small island chain south of Japan. Enough lava erupted from the volcano's top to form a dome of igneous rock that stuck up above the ocean's surface. Pictures taken by satellites showed that the seawater around this new, tiny island contained minerals, bubbling gases, and seafloor sediments. All of these things were stirred up by the volcanic activity. More eruptions followed. The island grew bigger with each one. Japanese volcano scientists named the new island Niishima.

8 By January 2014, however, Niishima had expanded not just upward but also outward. It grew large enough to collide with its nearest neighbor, another island called Nishinoshima. The two islands are now one! As long as the eruptions continue, the world's youngest island will keep growing. It is a volcanic work in progress.

Questions

1. What causes earthquakes in Japan every year?
   A. Namazu, the giant catfish
   B. weather patterns
   C. the Richter scale
   D. plate movements

The following question has two parts. Answer Part A and then answer Part B.

2. **Part A**: Using the numbers 1–3, rank the three major earthquakes Japan has experienced in the past hundred years or so in order of strength, numbering the strongest earthquake with the number 1.
   A. 1923, earthquake badly damaged the cities of Tokyo and Yokohama _____
   B. 2011, the Great Tohoku earthquake _____
   C. 1995, earthquake devastated the port city of Kobe _____

   Part B: Why was the earthquake you labeled as the strongest in Part A also the most destructive earthquake?

_____

_____

_____

_____

3. In paragraph 5, what does the word *advanced* mean in the following sentence?

> It has one of the most advanced earthquake early warning systems in the world.

A. traditional

B. out-of-date

C. highly developed

D. simple

4. How does Japan's earthquake early warning system detect movements in the earth?

A. When people feel the earth shake, they tell others around them.

B. Seismographs across Japan send information about the slightest movements to a central location.

C. Scientists wait to see if a tsunami forms off the coast as a result of an earthquake.

D. Scientists look for earthquake epicenters on the ocean floor of the coast of Japan.

5. Why did Japan's earthquake early warning system only give 15 seconds of warning to people in the city of Sendai before the 2011 earthquake?

6. How is the volcano on the island of Niishima off Japan's coast acting as a creative force?

   A. The volcano is causing terrible destruction in Japan, just like earthquakes.

   B. The volcano continues to erupt, creating new rock that makes the island bigger.

   C. The volcano creates new minerals, gases, and seafloor sediments.

   D. The volcano has stopped erupting.

7. In paragraph 8, the author says that the world's youngest island is a volcanic work in progress. What does *volcanic work in progress* mean?

   A. The island is getting smaller due to volcanic activity.

   B. The island is a dangerous place to visit due to volcanic activity.

   C. The island is not done growing due to volcanic activity.

   D. The island is no longer close to Japan due to volcanic activity.

Informational Text Comprehension Score: _____ / 7 points

To receive a point for a two-part question (i.e., 2) students must correctly answer both parts of the question.

Earthquake Myths

1 Earthquakes are unpredictable, terrifying geological events. Scientific discoveries have helped explain how and why earthquakes happen. Along North America's western edge, several tectonic plates are slowly coming together or sliding past each other. These plate movements sometimes trigger earthquakes in the states of California, Oregon, and Washington. This movement has been occurring for thousands of years.

2 In centuries past, people didn't have the scientific knowledge we do today. Native American tribes along the West Coast created myths to help explain Earth's sudden shaking. The main characters in many of these earthquake myths are animals. The myths tell of times when these animals moved or fought, making the earth tremble.

3 The Gabrielino Indians originally lived in southern California's San Gabriel Valley, where earthquakes are common. The Gabrielino have an earthquake myth about the Great Spirit and seven gigantic turtles. According to this myth, the earth was originally a vast ocean.

4 *Long ago, the Great Spirit lived high above the earth. When he looked down, he saw water and nothing else. After a while, he grew tired of this watery world and decided to create land. But he needed a firm foundation on which to start building.*

5 *Just as the Great Spirit was wondering how to begin, an enormous turtle swam past. The turtle's rounded shell rose above the water's surface. The Great Spirit had an idea. Perhaps the turtle's shell would form a solid base on which to build.*

6 *The turtle was big, but not big enough for the land the Great Spirit had in mind. From the sky, the Great Spirit called down in a loud voice. "Turtle," he said, "swim through the ocean. Find more turtles as big as you are and bring them to me." The turtle slowly nodded and promised he would, then swam off while the Great Spirit waited.*

7 *The turtle was true to his word. He returned with several other turtles, all impressively huge. The Great Spirit asked the turtles to all move close together so their great shells touched. Then he commanded in a powerful voice, "Don't move!" The turtles stopped moving and the Great Spirit went to work. He piled soil on the turtles' shells and patted it firmly down. He created trees and bushes and other plants and stuck them in the soil.*

He added rivers and mountains and lakes. Finally, the Great Spirit looked at the land and was very pleased. "I am finished," he announced to the turtles. "Now just remember. Don't move."

8 *For a while, the turtles obeyed, but eventually their legs grew stiff and their minds grew bored. "We should swim," suggested one turtle. The others thought this was a good idea but the turtles couldn't agree on which direction to go. They argued and argued. Finally, the turtles got so angry that some swam in one direction and the rest in another. The land on their backs rumbled and shook and big cracks appeared in the soil. From high above them a voice boomed out, "I said, don't move!"*

9 *The turtles obeyed. The shaking stopped and the land was peaceful again.*

10 *Every once in a while, the turtles will start arguing again. They want to move, but can't decide which direction to go. So they start moving in different directions, making the ground shake. When that happens, the Great Spirit calls down and reminds them again to be still.*

11 Several tribes from what is now northern Oregon, Washington, and Vancouver Island have myths that tell of a struggle between Thunderbird and Whale. According to a Hoh version of the myth, Whale, a huge killer whale, was destroying all the other whales in the ocean. The Hoh people made their home on the Olympic Peninsula and depended on these whales for food and oil. From high in her mountaintop nest, Thunderbird saw how the Hoh people suffered and she decided to intervene.

12 *Thunderbird flew out over the ocean. She hovered, waiting. When Whale came to the surface for a breath, Thunderbird swooped down. She grabbed him with her sharp claws, yanked him out of the water, and started carrying him to her nest. But Whale was very heavy. Thunderbird needed to rest before she had gone very far. She landed on ground along the coast and released her grip a little. Whale twisted free and began to fight. As Thunderbird and Whale struggled, trees were torn up by the roots. The ground all around rumbled and shook.*

13 *Finally, Whale paused for a breath. Thunderbird saw her chance and caught hold of him again. She took off, carrying Whale farther up the coast. Soon, though, she had to land to rest her wings. The moment Thunderbird's claws relaxed just a little, Whale wriggled*

loose. The two great beasts fought again. As they thrashed and stomped on the ground, it trembled and shivered and shook.

14 *Again, Thunderbird managed to get a grip on Whale once more when he paused to catch his breath. This time she flew all the way up to her mountaintop nest. There, the two great beasts had one last terrible battle. The shaking of the ground could be felt for miles. Huge patches of trees were swept away, leaving bare spots on the mountainside.*

15 *Eventually, Thunderbird triumphed over Whale and the remains of their battle are still visible today on the Olympic Peninsula.*

Questions

8. What does the word *tremble* mean in the following sentence from paragraph 2?

> The myths tell of times when these animals moved or fought, making the earth tremble.

A. remain still

B. be afraid

C. shake

D. sink

The following question has two parts. Answer Part A and then answer Part B.

9. **Part A**: In paragraph 7, the author says the turtle was true to his word. What does this mean about the turtle?

A. The turtle swam away and never returned.

B. The turtle did what he said he would do.

C. The turtle told the truth to the Great Spirit.

D. The turtle didn't listen to the Great Spirit.

Part B: How was the turtle true to his word?

_____

_____

10. Why did the Great Spirit tell the turtles not to move?
    A. If the turtles moved, they would destroy the land the Great Spirit created.
    B. If the turtles moved, they would get angry.
    C. If the turtles moved, their legs would get stiff and their minds would get bored.
    D. If the turtles moved, they would help the Great Spirit create land.

The following question has two parts. Answer Part A and then answer Part B.

11. **Part A**: Why did the turtles get angry?
    A. Their legs got stiff and their minds got bored.
    B. The Great Spirit told them not to move.
    C. They wanted to swim.
    D. They couldn't agree on which direction to go.

    Part B: What happened when they got angry?

    _____

    _____

12. What causes earthquakes according to this Gabrielino Indian myth?
    A. The Great Spirit creates land on turtle shells.
    B. The turtles start moving in different directions.
    C. The Great Spirit tells the turtles not to move.
    D. The turtles agree on which direction to swim in.

13. In the Hoh myth, why does Thunderbird grab Whale out of the water?

    A. Whale provided food and oil for the Hoh people.

    B. Whale got along well with the other whales in the ocean, which helped the Hoh people.

    C. The Hoh people were suffering because Whale was destroying the other whales they depended on.

    D. Thunderbird wanted Whale to live on land instead of in the ocean to help the Hoh people.

14. What caused earthquakes according to this Hoh myth?

    A. Thunderbird grabbed Whale and yanked him out of the water.

    B. Thunderbird stayed high in her mountaintop nest while Whale stayed in the ocean.

    C. Whale grabbed Thunderbird and yanked her into the water.

    D. Whale and Thunderbird fought as Thunderbird tried to keep her claws gripped around Whale.

Literary Text Comprehension Score: _____ /7 points

To receive a point for a two-part question (i.e., 9 and 11) students must correctly answer both parts of the question.

Reading Comprehension total_____ /14 points

Writing Prompt

Write a short answer comparing and contrasting the causes and effects of earthquakes you read about in Japan and in both myths. Discuss how the causes and effects of earthquakes are similar and how they are different, providing at least one example from the text for each similarity and each difference you identify.

Writing Prompt Score: _____ /4 points

Grammar

For each item, insert a comma or commas in the appropriate location(s). When applicable, insert quotation marks in the appropriate locations.

1. The first expedition to the bottom of the Mariana Trench took place on January 23 1960.

2. The text states Earth's tectonic plates have been slowly moving and interacting for billions of years.

3. Mount Rushmore National Memorial
   13000 S Dakota 244
   Keystone SD 57751

4. What if wondered Wegener continents were like enormous pieces of ice?

5. Geologists found fossils of an ancient fern in similar rock layers in Africa India Australia and South America.

Circle the phrase with the adjectives in the correct order.

6. old, large, Hawaiian, a volcano

   a large, old, Hawaiian volcano

   a Hawaiian, old, large volcano

7. smooth, shiny the obsidian rock

   the smooth, shiny, obsidian rock

   the smooth rock, shiny obsidian

8. a powerful, giant tsunami

   powerful, giant a tsunami

   tsunami a giant, powerful

Grammar Score: _____ /8 points

Morphology

Write the correct word to complete each sentence.

1. An earthquake can seem to happen _____ (loudly, carefully, abruptly, accidentally), but it actually happens because pressure has been building up for some time.

2. A volcanic _____ (rupture, eruption, disruption, interruption) can be calm and quiet or sudden and violent.

3. Tsunamis can be very _____ (tasty, easy, temporary, speedy), moving up to 500 miles per hour.

4. It would be interesting to read a(n) _____ (photograph, biography, rupture, eruption) about Alfred Wegener.

5. A mid-ocean ridge can form along a huge _____ (photograph, biography, rupture, eruption), or crack, in Earth's crust.

6. Scientists make conclusions after _____ (careful, carefully, busily, busy) examining evidence.

Morphology Score: _____ /6 points

NAME: _____

DATE: _____

Mid-Unit Content Assessment

1. The study of the makeup of the earth and the processes that change and shape it is called _____.

   A. archaeology

   B. geology

   C. ecology

   D. geography

2. Which statement best explains the theory of plate tectonics?

   A. Earth's tectonic plates have been slowly moving and interacting for billions of years.

   B. Earth's tectonic plates are far apart and are fixed in place.

   C. Earth's tectonic plates are far apart but are slowly moving closer to one another.

   D. Earth's tectonic plates fit tightly together and are fixed in place.

3. Which of the following is the most accurate statement about myths?

   A. Myths are told to teach important life lessons.

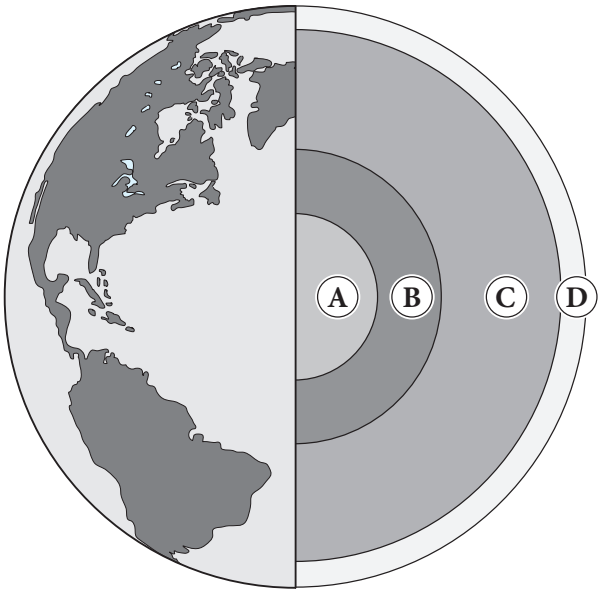
   B. Myths help explain unpredictable natural events.

   C. Myths are told to make children laugh.

   D. Myths are historically accurate accounts of past events.

This question has two parts. Answer Part A and then answer Part B.

4. **Part A**: Place the following labels on the diagram in the appropriate locations: *inner core*, *outer core*, *mantle*, and *crust*.



A.

B.

C.

D.

Part B: Write the name of each of Earth's layers next to its characteristics in the following chart.

inner core	outer core	mantle	crust

Earth's Layer	Characteristics
	Earth's largest and thickest layer; consists of very hot, very dense rock
	solid; made of very hot metal; may be nearly as hot as the sun's surface; innermost layer
	thin; rocky; outermost layer; two types: oceanic and continental
	liquid; made of very hot metal

5. Place a check mark next to each item in the chart that is a characteristic of tsunamis.

Characteristics of Tsunamis	Yes or No?
Tsunamis form when earthquakes occur in oceanic crust, causing the seafloor to shift.	
Tsunamis travel fast—as much as 500 miles per hour.	
Tsunamis are easy to stop as long as scientists have enough warning when they begin to form.	
Tsunamis can grow to become as tall as a three- or four-story building.	

6. Read the statement in the "What is the cause?" column. Choose the statement that best relates to the information in the "What is the cause?" column and write the letter of the statement in the "What evidence is there?" column.

What is the cause?	What evidence is there?
Tremendous pressure and heat in the mantle force magma in a chamber below Earth's crust to move upward through a crack in Earth's surface.	

A. A fault-block mountain forms.

B. Glaciers deposit sediments on Earth's surface.

C. Magma erupts from a volcano's top onto Earth's surface as lava.

D. A tectonic plate subducts beneath another plate.

7. Volcano myths often explain volcanic activity by _____.

A. describing how gods and goddesses cause volcano-related occurrences

B. providing scientific evidence showing how volcano-related events occur

C. telling how occurrences above Earth's surface cause volcanic activity

D. telling how occurrences below Earth's surface cause volcanic activity

8. Label each of the following volcano descriptions with the appropriate word: *active*, *dormant*, or *extinct*.

   A. _____ a volcano that has not erupted for at least 10,000 years and is not likely to erupt again

   B. _____ a volcano that has erupted in the past 10,000 years and is likely to erupt again

   C. _____ a volcano that hasn't erupted for a long time but could erupt again

9. Which of the statements best explains the relationship between earthquakes and faults?

   A. Earthquakes cause faults to form along plate boundaries.

   B. Faults are cracks in Earth's crust that form when earthquakes occur.

   C. *Faults* and *earthquakes* are two words to describe the same geological process.

   D. Earthquakes begin with huge blocks of rock moving along faults.

10. Place a check mark next to each item in the chart that Alfred Wegener's continental drift hypothesis helped explain.

Continental drift hypothesis explained that…	**Yes or No?**
long ago, Earth had one huge landmass called Pangaea	
as continents moved apart, their climates changed	
drifting continents actually moved due to tectonic plates	
groups of plants and animals that once lived together were separated as the continents moved apart	

11. Read the statement in the "What is the cause?" column. Choose the statement that best relates to the information in the "What is the cause?" column and write the letter of the statement in the "What evidence is there?" column.

What is the cause?	What evidence is there?
Water drains down into openings in the ground above a magma chamber. Heat from the magma turns the water scalding hot. As the hot water rises back up through the openings below Earth's surface, it turns into steam, which increases the pressure, forcing the mixture of steam and hot water rushing and bubbling upward.	

A. A tsunami forms and grows as it moves toward land.

B. A geyser explodes above Earth's surface as a hissing fountain of hot water and steam.

C. An igneous rock breaks down into sediments, later forming sedimentary rock.

D. A crater forms at the top of a volcano.

12. Which of the following word pairs completes the statements?

> Seafloor spreading is the process of oceanic plates moving apart very slowly. When the seafloor dips down as one tectonic plate slides under another, a narrow, extremely deep valley called a(n) _____ is created. When oceanic plates move away from one another and form cracks in Earth's crust, an underwater mountain called a(n) _____ is created.

A. geyser; hotspot

B. hotspot; geyser

C. ocean trench; mid-ocean ridge

D. mid-ocean ridge; ocean trench

13. Moving apart, colliding, and sliding sideways past one another are three ways in which _____ move.

    A. continents

    B. tectonic plates

    C. faults

    D. mid-ocean ridges

14. Label the following statements with the appropriate term related to how scientists measure earthquake intensity: *seismograph* or *Richter scale*.

    A. _____ Numbers describe the intensity of earthquakes based on the largest seismic wave recorded.

    B. _____ Jagged up-and-down lines show the energy of seismic waves.

15. Scientists observed that _____, which provided evidence of changes over time on Earth's surface.

    A. land never moved or changed

    B. the same types of rocks and fossils were found in different places

    C. the climate of Antarctica was extremely cold

    D. animals that once lived on land later lived under water

16. Which of the following do geysers, volcanoes, and hot springs have in common?

    A. They form along faults.

    B. Scientists know when they will erupt.

    C. They form both along plate boundaries and above hotspots.

    D. They only form along plate boundaries.

_____ */16 points*

End-of-Unit Content Assessment

1. Geysers, volcanoes, and hot springs all share which of the following?
   A. They form along faults.
   B. Scientists can predict when they will erupt.
   C. They form both along plate boundaries and above hotspots.
   D. They form only along plate boundaries.

2. In which of the following sentences is *conclusion* used correctly?
   A. Inge Lehmann suspected that Earth might have more than three layers, so she came to the conclusion that it did.
   B. In his conclusion, the scientist proposed different possibilities of how earthquakes might occur.
   C. The researcher reached a conclusion after years of collecting evidence.
   D. Once you reach a conclusion, it is set in stone and no other evidence can be examined.

3. Label each of the following rock descriptions with the appropriate word: *igneous*, *metamorphic*, or *sedimentary*.

   _____ a rock that is made of sediments that have been naturally compacted and cemented together

   _____ a rock that forms when magma cools and solidifies

   _____ a rock that forms when minerals in other types of rocks are altered due to extreme heat and pressure

4. What is geology?
   A. the study of relationships between living things and their environment
   B. the study of the makeup of the earth and the processes that change and shape it
   C. the study of the characteristics of the earth's surface
   D. the study of past human life and activities by examining bones, tools, and other objects left behind

5. The theory of plate tectonics states that _____.

   A. Earth's continents were once all joined together as one supercontinent

   B. Earth's continents stay still and do not move

   C. Earth's crust, mantle, and core all form tectonic plates that change very slowly

   D. Earth's crust and part of the mantle are broken up into sections that slowly move

6. Label each of the following descriptions with the appropriate term: *physical weathering*, *chemical weathering*, or *erosion*.

   _____ a process that moves sediments to new locations

   _____ a process that breaks big rocks into smaller rocks without changing the minerals they contain

   _____ a process that breaks down rocks by changing the minerals they contain

Match the item from the column on the left with the description on the right. Write the letter on the line.

7. _____ tsunami	a. a deep-sea geyser that forms as seawater sinks down through cracks in the oceanic crust and then releases extremely hot, mineral-rich water back up through cracks in the crust
8. _____ hydrothermal vent	b. an underwater volcano that forms wherever magma is erupting through oceanic crust
9. _____ seamount	c. a gigantic wave of seawater caused by an earthquake in oceanic crust

10. A mid-ocean ridge is _____; an ocean trench is _____.

    A. an underwater mountain; a narrow, extremely deep valley

    B. a deep-sea geyser; an underwater volcano

    C. a geyser; an underwater mountain

    D. a narrow, extremely deep valley; a deep-sea geyser

11. Seafloor spreading can cause a mid-ocean ridge and an ocean trench to form. Label each of the following causes with the appropriate effect: *mid-ocean ridge* or *ocean trench*.

    A. The seafloor dips down as one tectonic plate slides under another. _____

    B. Magma erupts through huge cracks in Earth's crust as lava. _____

12. Circle the answer that best supports the following statement.

> The rock cycle explains the changes that occur in rocks over very long periods of time.

    A. Rocks are created and then destroyed in a long process that occurs slowly over time.

    B. Rocks are created, destroyed, and recreated in a continuous cycle.

    C. Weathering and erosion change rocks in a long process that occurs slowly over time.

    D. Rocks are solidified from sediments in a continuous cycle.

13. Fill in the "Type of Volcano" column in the chart with the appropriate type being described: *active volcano*, *dormant volcano*, or *extinct volcano*.

Type of Volcano	Description
	a type of volcano that has not erupted for at least 10,000 years and is not likely to erupt again
	a type of volcano that has erupted in the past 10,000 years and is likely to erupt again
	a type of volcano that is considered active but hasn't erupted for a very long time

14. What evidence suggested that the continents' locations were once very different than they are today?

    A. the same types of rocks and fossils were discovered in different parts of the world

    B. maps from long ago showed that the continents were once closer together

    C. ancient records were found describing the climate of Antarctica as being warm

    D. Alfred Wegener introduced the continental drift hypothesis

15. Moving apart, colliding, and sliding sideways past one another are the three different ways in which _____ interact.

    A. faults

    B. mid-ocean ridges

    C. continents

    D. tectonic plates

16. The continental drift hypothesis explains that _____.

    A. all the continents exist on plates

    B. all of the continents were once joined as Pangaea until they broke apart and slowly moved away from each other

    C. hot water under the earth explodes on the surface

    D. climates change and animals evolve over long periods of time

17. Which of the words in the following sentence provides the best clue as to the meaning of the word *fossil*?

> Geologists found fossils of an ancient fern in similar rock layers in Africa, India, Australia, and South America.

A. geologists found

B. similar rock layers

C. in Africa, India, Australia, and South America

D. ancient fern

18. Weathering is the process in which _____; erosion is the process in which _____.

A. rocks are mixed with liquid and completely broken down; rocks are packed together tightly

B. rocks are broken down into smaller pieces; sediments are moved from place to place

C. sediments are moved from place to place; rocks are broken down into smaller pieces

D. large amounts of rocks move down the side of a mountain; rocks are broken down and the minerals they contain change

Match the item from the column on the left with the description on the right. Write the letter on the line.

19. _____ geyser	a. a hill or mountain that forms over a crack in Earth's crust from which lava erupts
20. _____ hotspot	b. a crack in Earth's crust
21. _____ fault	c. the violent shaking of the ground caused by huge blocks of rock moving along a fault
22. _____ rock	d. an underground hot spring that periodically erupts, shooting hot water and steam into the air
23. _____ volcano	e. a very hot region deep within Earth's mantle where a huge magma chamber forms
24. _____ earthquake	f. a naturally occurring nonliving solid made of minerals

25. Read the description and examples in each row and write the correct letter in the "Type of Mountain" column.

    A. fold mountains

    B. fault-block mountains

    C. dome mountains

Type of Mountain	Description	Examples
	mountains formed when rocks are pushed up into huge folds by moving tectonic plates; often contain quite a bit of sedimentary rock	Himalayas between India and China; Alps in Europe; Appalachians of North America; Urals in Russia
	mountains generally formed when magma pushes upward into Earth's crust from the mantle and cools into igneous rock underground, causing the crust above it to bulge; usually occur as isolated mountains on otherwise flat plains	Utah's Navajo Mountain; Black Hills of South Dakota
	mountains formed when gigantic blocks of rock move up and down along faults	Germany's Harz Mountains; Grand Tetons in Wyoming; Basin and Range Province of Utah, Nevada, and Arizona

26. What natural occurrence does the following myth passage explain?

> The Chief of the Above World came to the aid of his people. He fought Monadalkni and the two spirits waged a violent, fiery battle. Sahale Tyee eventually gained the upper hand and forced Monadalkni back down into his mountain. Sahale Tyee caused the top of the mountain to collapse, forever shutting off this entrance to the Below World.

A. an earthquake

B. a volcanic crater being formed

C. a tsunami

D. a volcanic eruption

27. The _____ produces lines to show the energy of seismic waves while the _____ applies numbers to measure the magnitude of an earthquake based on the largest seismic wave recorded.

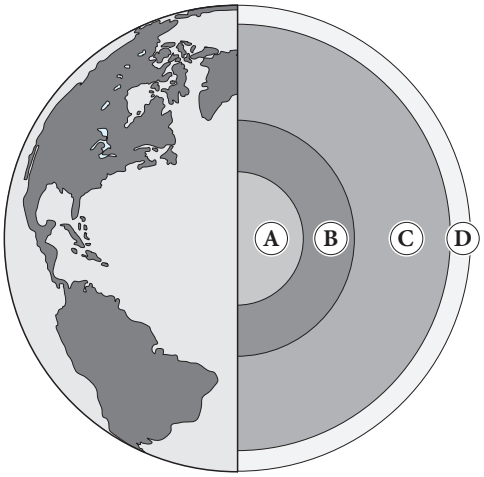
A. Modified Mercalli Intensity Scale; seismograph

B. seismograph; Richter scale

C. Modified Mercalli Intensity Scale; Richter scale

D. Richter scale; seismograph

28. Place the following labels on the diagram in the appropriate locations: *inner core*, *outer core*, *mantle*, and *crust*.



A.

B.

C.

D.

29. Select the most appropriate answer to the following question.

What do myths help explain?

A. everyday occurrences

B. unpredictable natural events

C. cultural customs

D. why people tell stories

30. Which of the following provides evidence of weathering and erosion?

A. Volcanoes like Mount Fuji

B. Geysers like Old Faithful in Yellowstone

C. Island chains like the Hawaiian Island chain

D. Large canyons like the Grand Canyon

_____ */30 points*

NAME: _____

DATE: _____

Commas

For each item, insert a comma or commas in the appropriate location(s).

Examples: I flew to Santa Fe New Mexico on my first plane ride.
I flew to Santa Fe, New Mexico on my first plane ride.

He couldn't choose between vanilla chocolate or peach ice cream.
He couldn't choose between vanilla, chocolate, or peach ice cream.

The Olympic Games in Rio de Janeiro will begin on August 5 2016.
The Olympic Games in Rio de Janeiro will begin on August 5, 2016.

1. The three types of rocks are igneous sedimentary and metamorphic.

2. Willis Tower
   233 S Wacker Drive
   Chicago IL 60606

3. Edmund Hillary and Tenzing Norgay reached the top of Mount Everest on May 29 1953.

4. We visited New Orleans Louisiana on our trip.

5. My favorite fruits are apples peaches and blackberries.

6. One of the worst earthquakes in American history took place in San Francisco on April 18 1906.

7. On February 17 1977, scientists located a hydrothermal vent along a mid-ocean ridge for the first time.

8. Mount Rushmore National Memorial is located in Keystone South Dakota.

9. We learned about fold mountains fault-block mountains and dome mountains.

Write sentences for each of the following items. Be sure to use correct capitalization and punctuation. Each sentence should include at least one comma in its appropriate location.

1. a date

2. a location

3. items in a series

NAME: _____

DATE: _____

PP.4 ACTIVITY PAGE

Commas and Quotation Marks

For each item, insert commas and quotation marks in the appropriate locations.

Example: She told me I'll be back by 5pm before she left.
She told me, "I'll be back by 5pm," before she left.

1. The text states The discovery of seafloor spreading at mid-ocean ridges was a turning point in geology.

2. I wonder he said if we'll get to play outside today.

3. You're out! shouted the umpire to the baseball player.

4. What do you think she asked about seeing a movie this weekend?

5. A volcano according to the text is a hill or mountain that forms over a crack in Earth's crust from which lava erupts.

6. They asked Do you need anything from the grocery store?

7. Mountains says the author are some of Earth's most magnificent features.

8. We both said Chocolate! at the same time when asked what kind of ice cream we wanted.

Read the following passage from Chapter 5, "Mythic Volcano Spirits." Rewrite the sentences marked in bold so they include dialogue. Be sure to use correct capitalization and punctuation.

> ***Pele was pleased with her new home. She sent Hi'iaka to fetch her husband-to-be from Kauai. She told her little sister to be back in less than 40 days. She also warned Hi'iaka not to fall in love with Lohi'au herself. In turn, Hi'iaka made Pele promise to protect a grove of beautiful trees that grew on Kilauea.*** *Hi'iaka adored the trees. She was afraid that if Pele lost her temper, she would send out rivers of lava to burn them down.*

NAME: _____

DATE: _____

PP.5 ACTIVITY PAGE

Sequencing Adjectives

Complete each sentence by choosing two adjectives from the ones provided and writing them in the correct order in the blanks.

Example: **Adjectives**: wooden, big, play, fun

We stay in the **big**, **wooden** cabin during the summer.

1. **Adjectives**: office, brick, new, tall

   We climbed up the stairs of the _____, _____ building.

2. **Adjectives**: American, long, huge, crowded

   We boarded a _____, _____ airplane.

3. **Adjectives**: enormous, Italian, attractive, ancient

   It was an _____, _____ city.

Circle the phrase with the adjectives in the correct order.

Example: a purple, new, umbrella
(a new, purple umbrella)
new, a purple umbrella

1. the fluffy, little, German dog
   little, the German fluffy dog
   the German, little, fluffy dog

2. a blue, long fishing boat
   a long, blue, fishing boat
   a fishing, long, blue boat

3. an oval, ordinary desk
   ordinary, an oval desk
   an ordinary, oval desk

Write a sentence using at least two adjectives and an article. Be sure to order the words appropriately and to use proper capitalization and punctuation.

_____

_____

NAME: _____

DATE: _____

–*ly*: Suffix Meaning "in a _____ way"

Write the correct word to complete each sentence.

1. She did not mean to forget her homework; it was purely _____ that she forgot.
   (accidental, accidentally, careful, carefully)

2. Mountain building is not a _____ process; it takes many years for mountains to form.
   (speedy, speedily, loud, loudly)

3. My cat only weighs 7 pounds, so I can _____ pick him up and carry him around with me.
   (temporary, temporarily, easy, easily)

Write the correct word to complete each sentence.

easy	easily	careful	carefully
speedy	speedily	loud	loudly

4. In looking at a world map, it's pretty _____ to see how the eastern edge of South America fits into the western edge of Africa like pieces of a puzzle.

5. He _____ walked across the room thanks to his squeaky shoes.

6. Seismic waves move more slowly through liquids and more _____ through solids.

Write a sentence using one of the words left in the box.

Write a sentence using one of your own –ly *words.*

Write a sentence using one of the root words and the same root word with –ly *added to the end.*

NAME: _____

DATE: _____

PP.7 ACTIVITY PAGE

Root *rupt*

Write the correct word to complete each sentence.

uninterrupted	erupt	disrupt
rupture	abrupt	eruption

1. If a nearby volcano begins to _____, people who live around the Bay of Naples are encouraged to evacuate.

2. It was clear my brother was studying for an assessment, so I tried not to _____ his concentration.

3. A seamount does not become an island in a(n) _____ way; it is a long, slow process.

Write the correct word to complete each sentence.

4. The classroom _____ in laughter as a student read a funny story.
(erupted, disrupted)

5. Mid-ocean ridges form an almost _____ chain of underwater mountains around the earth.
(abrupt, uninterrupted)

6. My father had to go to the hospital because of a _____ in a blood vessel.
(rupture, eruption)

Write a complete sentence for each of the following words. Make sure to use correct capitalization and punctuation.

1. *erupt*

2. *eruption*

3. *abrupt*

4. *disrupt*

5. *uninterrupted*

6. *rupture*

NAME: _____

DATE: _____

Suffixes *–ly* and *–y* and Roots *graph* and *rupt*

Write the correct word to complete each sentence. Words will not be used more than once. Some words will not be used.

messy	taste	interrupt	mess
kindly	biography	tasty	busily
abruptly	busy	kind	photograph

1. The meal my grandfather prepared for us was very _____.

2. I'm sorry to _____ you while you are writing, but I have a question.

3. It's helpful to see a(n) _____ of each of the different types of mountains to compare them.

4. Our dog is a(n) _____ eater and always gets his food all over the floor.

5. We had guests coming over for dinner, so we _____ cleaned our rooms that afternoon before they arrived.

6. The group members had to _____ stop working on the project when the building started shaking due to an earthquake.

7. Would you _____ hand me the biography of Edmund Hillary?

8. It was _____ of them to send me a birthday card.

Write a complete sentence for each of the following words. Be sure to use correct capitalization and punctuation.

1. *interrupt*

2. *messy*

3. *busily*

4. *abruptly*

5. *biography*

NAME: _____

DATE: _____

E1.1 ACTIVITY PAGE

The Rock Towns of Cappadocia

Word(s) from the Chapter	Pronunciation	Page
Cappadocia	/kap*ə*doe*shə/	90
Mount Erciyes	/mount/ /er*sie*əs/	92
Rapa Nui	/ro*po/ /noo*ee/	98
moai	/moe*wie/	98

As you read the enrichment selection, "The Rock Towns of Cappadocia," answer the following questions using complete sentences.

1. How are most hoodoos formed?

2. Why wasn't it difficult for people to create caves and rock houses in Cappadocia's rock formations?

3. Why did early Christians settle in Cappadocia?

4. What features might you find in the rock dwellings in Cappadocia?

5. Why do you think people wanted to live in these rock dwellings? What were some of the advantages of these unique houses?

The following question has two parts. Answer Part A first and then answer Part B.

6. **Part A**: What are the moai?

   Part B: How did the Rapa Nui move them once they were finished?

NAME: _____

DATE: _____

E2.1 ACTIVITY PAGE

Violent Vesuvius

Word(s) from the Chapter	Pronunciation	Page
Pliny	/plin*ee/	102
Misenum	/mis*en*um/	103

As you read the enrichment selection, "Violent Vesuvius," answer the following questions using complete sentences.

1. Why do scientists monitor Vesuvius so closely?

_____

_____

_____

_____

Page(s) _____

2. What are some signs that might indicate Vesuvius is on the verge of erupting?

_____

_____

Page(s) _____

3. Complete the following chart.

Geological Term	Definition
eruption column	
Plinian eruption	
pyroclastic flow	

Page(s) _____

4. How do we know so much about the eruption of Vesuvius in 79 CE?

_____

_____

_____

_____

_____

Page(s) _____

NAME: _____

DATE: _____

E3.1 ACTIVITY PAGE

A Deep-Sea Detective Story

Word(s) from the Chapter	Pronunciation	Page
Galapagos	/gə*lop*ə*goes/	113

As you read the enrichment selection, "A Deep-Sea Detective Story," answer the following questions using complete sentences.

1. Name two discoveries that changed how people thought about geology.

_____

_____

Page(s) _____

2. What are some clues scientists look for when searching for hydrothermal vents?

_____

_____

Page(s) _____

3. Why do unique animals live near hydrothermal vents but not on most other areas of the deep seafloor?

_____

_____

_____

_____

Page(s) _____

4. Why do you think this chapter is titled "A Deep-Sea Detective Story?"

Page(s) _____

Student Resources

In this section, you will find:

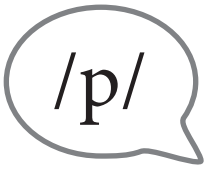
- SR.1—Individual Code Chart
- SR.2—Wiki Entry Rubric
- SR.3—Wiki Entry Editing Checklist

NAME: _____

DATE: _____

SR.1 RESOURCE

Individual Code Chart



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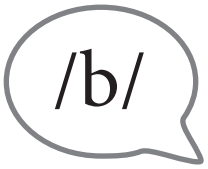
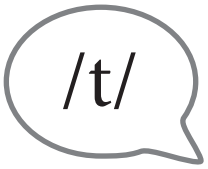


b	bb
bat	rubbing



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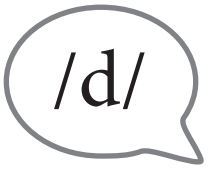

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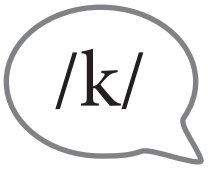
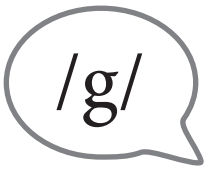
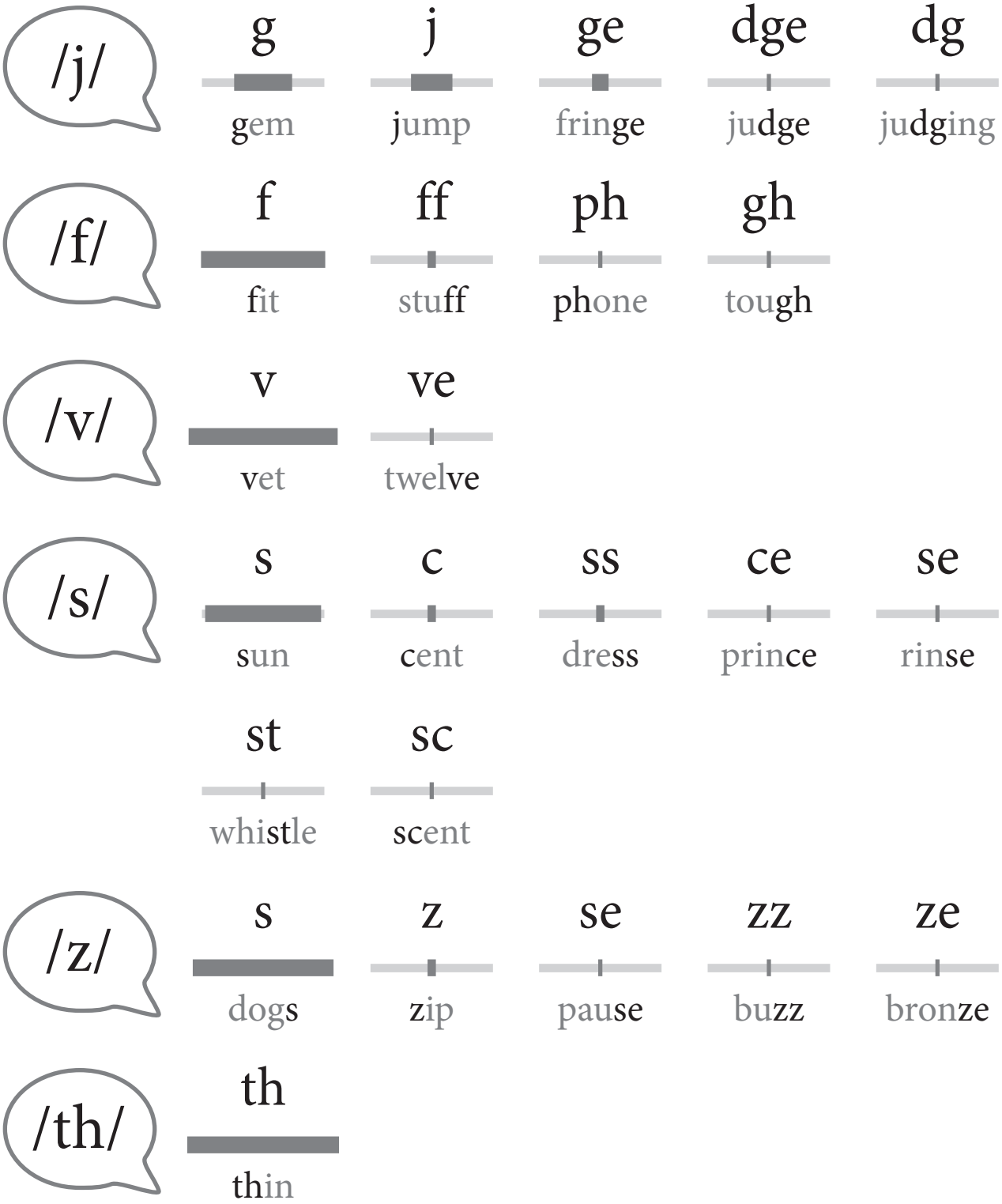


c	k	ck	ch	cc
cat	kid	black	school	hiccup



g	gg	gu	gh
gift	egg	guess	ghost

ch	tch
chin	itch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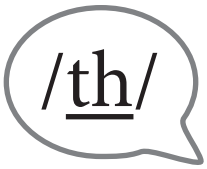
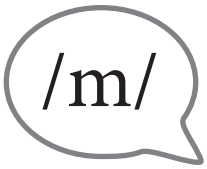


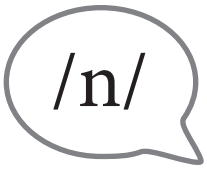
th — them



m — mad

mm — swimming

mb — thumb



n — nut

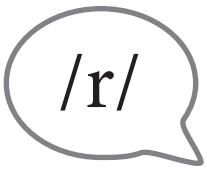
nn — running

kn — knock

gn — sign

ng — sing

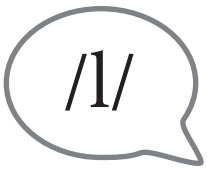
n — pink



r — red

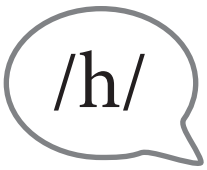
rr — ferret

wr — wrist

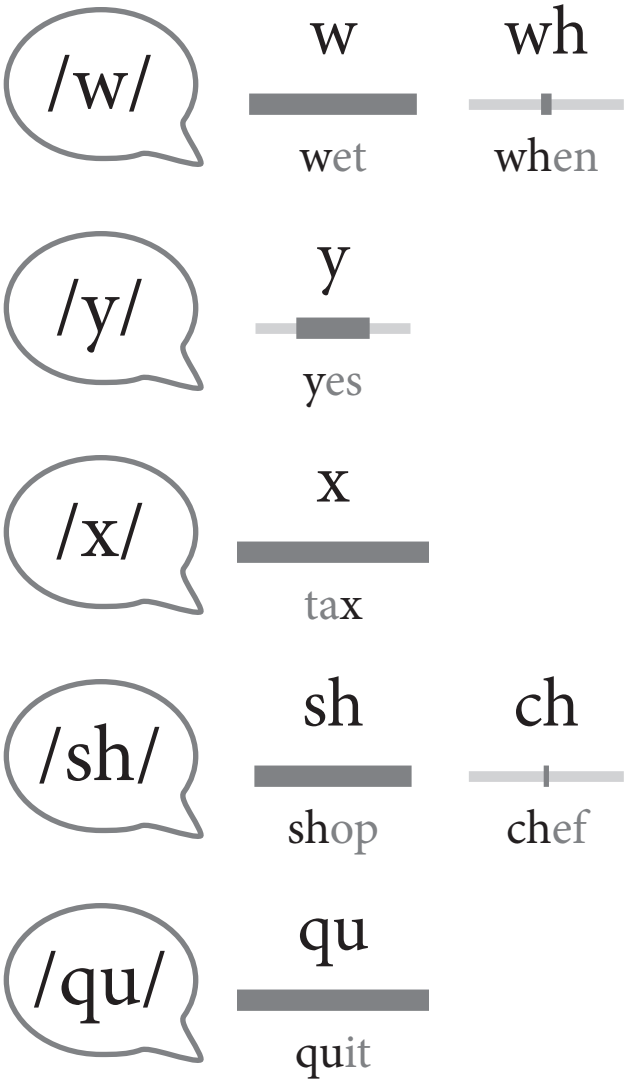


l — lip

ll — bell



h — hot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quit

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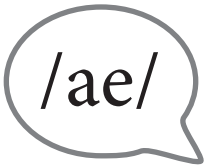
/i/	i it	y myth			
/e/	e pet	ea head			
/u/	u but	o son	o_e come	ou touch	
/o/	o hop	a lava			
/ə/	a about	e debate			
/ə/ + /l/	al animal	le apple	el travel	ul awful	il pencil



a	a_e	ai	ay	ey
paper	cake	wait	day	hey

eigh	ea
weight	great

y	e	i	ea	ee
funny	me	ski	beach	bee

ie	ey	e_e
cookie	key	Pete

i	i_e	y	ie	igh
biting	bite	try	tie	night

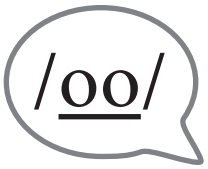
o	o_e	ow	oa	oe
open	home	snow	boat	toe

u	u_e	ue
unit	cute	cue

NAME: _____

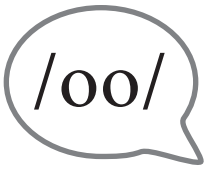
DATE: _____

SR.1 RESOURCE
CONTINUED

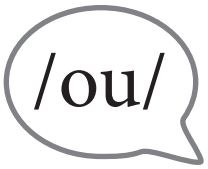


oo	u	u_e	ew	ue
soon	student	tune	new	blue

ou	ui	o	o_e
soup	fruit	do	move



oo	u
look	push



ou	ow
shout	now

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oil	toy

au	aw	al	ough	augh
Paul	paw	wall	bought	caught

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NAME: _____

DATE: _____

SR.2 RESOURCE

Wiki Entry Rubric

	Exemplary	Strong	Developing	Beginning
Introduction	Initial section(s) provide accurate, general information related to location and type of volcano	Initial section(s) provide accurate information related to either location or type of volcano, but not both	Initial section(s) provide information loosely related to location and/or type of volcano	Initial section(s) lack information related to location and type of volcano
Body	Additional sections provide increasingly specific information about the volcano	Additional sections provide more information about the volcano	Additional sections provide some information about the volcano	Additional sections provide little to no information about the volcano
Conclusion	A final statement provides a thought-provoking summative or closing reflection about the volcano	A final statement provides a summative or closing reflection about the volcano	The summative or closing nature of the final statement is unclear	No final statement is provided
Structure of the Piece	All sentences in sections are presented logically	Most sentences in sections are presented logically	Some sentences in sections are presented logically	Connections between sentences in sections are confusing
	All information has been paraphrased	Most information has been paraphrased	Some information has been paraphrased	Little information has been paraphrased

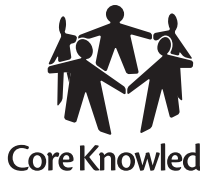
You may correct capitalization, punctuation, and grammar errors while you are revising. However, if you create a final copy of your writing to publish, you will use an editing checklist to address those types of mistakes after you revise.

NAME: _____

DATE: _____

Wiki Entry Editing Checklist

Wiki Entry Editing Checklist	After checking for each type of edit, place a check here.
Meaning	
All my sentences have a subject and predicate.	
I included all the words I wanted to write.	
I took out repeated words or information.	
I have checked how long my sentences are and split run-on sentences into two.	
I have used nouns and adjectives, verbs, and adverbs correctly.	
Format	
The volcano name is the title at the top.	
Each section of the entry has a heading.	
Indenting is not used.	
If lists are included, they are bulleted or numbered.	
There is a reference list at the end in the appropriate format.	
Capitals	
I began each sentence with a capital letter.	
I used capital letters for all proper nouns.	
I used capital letters for all words in titles or headings.	
Spelling	
I have checked the spelling for any words I was unsure of or my teacher marked.	
Punctuation	
I read my writing piece aloud to check for commas at pauses and periods, question marks, and exclamation points at the ends of my sentences.	
I used commas and quotation marks in places where they belong.	
The titles in my reference list are underlined or in italics.	



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