Name _____ Class _____ Date _____

Skills Worksheet

Directed Reading A

Section: Inside the Earth

1. The Earth is composed of several _____.

THE COMPOSITION OF THE EARTH

_____ **2.** A substance composed of two or more elements is a(n)

a. mix.
b. amalgam.
c. compound.
d. complex.

3. Why do less dense compounds make up Earth's crust while the densest compounds make up the core?

_____

_____

4. List the three layers of the Earth, based on their chemical composition.

_____

_____

_____

5. What three elements make up most of the Earth's crust?

_____

_____

_____

6. Oceanic crust is denser than the continental crust because it contains more of which three elements?

_____

_____

_____

7. The mantle is composed of more of the element _____ than the crust is.

8. Why do scientists look to the ocean floor to research the mantle?

_____

_____

9. The mantle has less aluminum and less _____ than the crust does.

10. What element makes up most of the Earth's core?

_____

_____

11. How much of the Earth's mass is made up by the core?

_____

_____

THE PHYSICAL STRUCTURE OF THE EARTH

Match the correct description with the correct term. Write the letter in the space provided.

_____**12.** the outermost, rigid layer of the Earth

_____**13.** a layer of slowly flowing rock in the mantle

_____**14.** the liquid layer of the core

_____**15.** the solid layer of the core

_____**16.** the strong, lower part of the mantle

a. asthenosphere
b. lithosphere
c. mesosphere
d. outer core
e. inner core

TECTONIC PLATES

_____**17.** Large pieces of the lithosphere that move around on the asthenosphere are called
a. mantle pieces.
b. crust pieces.
c. tectonic plates.
d. puzzle pieces.

18. Why are tectonic plates like the pieces of a jigsaw puzzle?

_____

_____

19. What are the two kinds of crust that a tectonic plate may contain?

_____

_____

20. List three ways in which tectonic plates floating on the asthenosphere are similar to ice cubes filling a punch bowl.

_____

_____

_____

MAPPING THE EARTH'S INTERIOR

_____**21.** What do scientists use to study Earth's interior?

- **a.** sea-floor spreading rates
- **b.** magnetic reversals
- **c.** global positioning system
- **d.** seismic waves

_____**22.** What are seismic waves?

- **a.** movements in the outer core
- **b.** pictures of the Earth's interior
- **c.** vibrations from an earthquake
- **d.** vibrations from a seismograph

23. Will a seismic wave traveling through a solid go faster or slower than a seismic wave traveling through liquid? Explain your answer.

_____

_____

_____

Name _____ Class _____ Date _____

Skills Worksheet

Directed Reading A

Section: Restless Continents

WEGENER'S CONTINENTAL DRIFT HYPOTHESIS

_____ **1.** What hypothesis by Alfred Wegener explains why continents seem to fit together?

a. continental spreading
b. plate tectonics
c. Wegener's puzzle
d. continental drift

_____ **2.** According to Wegener, how many landmasses did all continents once form?

a. one
b. six
c. seven
d. ten

_____ **3.** What did Wegener hypothesize happened to the continents?

a. They broke up and re-formed.
b. They drifted together to form a single continent.
c. They broke up and drifted to their current locations.
d. They sank into the ocean.

4. Does fossil evidence support Wegener's theory? Explain your answer.

_____

_____

_____

5. List three kinds of evidence found on both sides of the ocean that support Wegener's theory.

_____

_____

_____

THE BREAKUP OF PANGAEA

6. Wegener thought that all of the present continents were once joined 245 million years ago in a landmass he called _____.

7. The single landmass split into two huge continents he called Gondwana and _____, about 180 million years ago.

8. When those two continents split 65 million years ago, what were formed?

_____

SEA-FLOOR SPREADING

9. Why did many scientists reject Wegener's hypothesis?

_____

_____

10. In the process of sea-floor spreading, what happens when magma rises to Earth's surface and solidifies?

_____

_____

Match the correct definition with the correct term. Write the letter in the space provided.

_____**11.** process of forming new oceanic lithosphere as magma rises to the surface

_____**12.** areas where sea-floor spreading takes place

_____**13.** process that happens when Earth's magnetic poles change place

_____**14.** theory that explains how continents reached their current locations

a. continental drift
b. mid-ocean ridges
c. sea-floor spreading
d. magnetic reversal

15. Rock on the ocean floor provided the final proof of sea-floor spreading with a record of _____.

Name _____ Class _____ Date _____

Skills Worksheet

Directed Reading A

Section: The Theory of Plate Tectonics

1. The theory that Earth is divided into plates that move around is

_____.

TECTONIC PLATE BOUNDARIES

_____ **2.** The place where tectonic plates touch is known as the
- **a.** continental plate.
- **b.** tectonic boundary.
- **c.** magma zone.
- **d.** tectonic ridge.

_____ **3.** Which of the following is NOT a type of tectonic plate boundary?
- **a.** convergent boundary
- **b.** fault-block boundary
- **c.** divergent boundary
- **d.** transform boundary

_____ **4.** The three ways that tectonic plates can move relative to each other are
- **a.** collide, separate, and slide.
- **b.** collide, fuse, and slide.
- **c.** drift, separate, and slide.
- **d.** collide, fuse, and drift.

5. When two plates with continental crust collide, what happens to the continental crust?

_____

_____

Match the correct definition with the correct term. Write the letter in the space provided.

_____ **6.** boundary formed when tectonic plates collide

_____ **7.** boundary formed when tectonic plates separate

_____ **8.** boundary formed when tectonic plates slide past horizontally

- **a.** transform boundary
- **b.** convergent boundary
- **c.** divergent boundary

9. Which type of boundary produces strike-slip faults?

_____

10. Which type of boundary produces earthquakes?

_____

POSSIBLE CAUSES OF TECTONIC PLATE MOTION

_____**11.** When rock is heated, it becomes less dense and tends to
- **a.** rise.
- **b.** sink.
- **c.** move sideways.
- **d.** erupt.

_____**12.** When rock cools, it becomes more dense and tends to
- **a.** rise to the surface.
- **b.** sink below the surface.
- **c.** move sideways.
- **d.** push against the surface.

13. Density changes in the asthenosphere are caused by the flow of _____ energy from deep within the Earth.

Match the correct definition with the correct term. Write the letter in the space provided.

_____**14.** plate motion due to higher densities

_____**15.** plate motion due to gravity

_____**16.** plate motion due to the heating and cooling of rocks

- **a.** ridge push
- **b.** convection
- **c.** slab pull

TRACKING TECTONIC PLATE MOTION

_____**17.** How fast do tectonic plates move?
- **a.** kilometers per year
- **b.** meters per year
- **c.** meters per month
- **d.** centimeters per year

_____**18.** What do scientists use to measure the rate of tectonic plate movement?
- **a.** clinometers
- **b.** the global positioning system
- **c.** densitometers
- **d.** seismographs

Name _____ Class _____ Date _____

Skills Worksheet

Directed Reading A

Section: Deforming the Earth's Crust

_____ **1.** What is the amount of force placed on a given material called?

a. bending
b. stretching
c. stress
d. breakage

DEFORMATION

_____ **2.** The process by which the shape of a rock changes because of stress is called

a. seismology.
b. elasticity.
c. deformation.
d. re-formation.

_____ **3.** When stress squeezes an object it is called

a. compression.
b. re-formation.
c. convergence.
d. tension.

_____ **4.** When stress stretches an object it is called

a. compression.
b. re-formation.
c. convergence.
d. tension.

5. What can form when compression squeezes rocks at a convergent place boundary?

_____

6. What type of stress occurs at a divergent plate boundary?

_____

FOLDING

_____ **7.** The bending of rock layers due to stress is known as

a. faulting.
b. folding.
c. divergence.
d. convergence.

Match the correct definition with the correct term. Write the letter in the space provided.

_____ **8.** a fold where both ends of the rock layer are horizontal

_____ **9.** a downward, troughlike fold in a rock layer

_____ **10.** an upward-arching fold in a rock layer

a. anticline
b. monocline
c. syncline

FAULTING

_____**11.** When rock layers break, the resulting surface they break and slide on is a
- **a.** wall.
- **b.** slide.
- **c.** fault.
- **d.** fold.

_____**12.** When tension pulls rocks apart, it creates a
- **a.** normal fault.
- **b.** fold.
- **c.** reverse fault.
- **d.** strike-slip fault.

_____**13.** When compression pushes rocks together, it creates a
- **a.** normal fault.
- **b.** mid-ocean ridge.
- **c.** reverse fault.
- **d.** strike-slip fault.

_____**14.** When opposing forces cause rock to break and move horizontally, they create a
- **a.** normal fault.
- **b.** fold.
- **c.** reverse fault.
- **d.** strike-slip fault.

15. When a fault is not vertical, a hanging wall and a(n) _____ are formed.

16. The hanging wall moves down relative to the footwall in a(n) _____.

17. The hanging wall moves up relative to the footwall in a(n) _____.

PLATE TECTONICS AND MOUNTAIN BUILDING

_____**18.** When tectonic plates collide, folds and faults can become
- **a.** volcanoes.
- **b.** transform boundaries.
- **c.** mountain ranges.
- **d.** divergent boundaries.

_____**19.** What kind of mountain range is formed when rock layers are squeezed and forced upward?
- **a.** folded mountains
- **b.** fault-block mountains
- **c.** volcanic mountains
- **d.** strike-slip mountains

_____**20.** What kind of mountain range is formed when tension causes large blocks of crust to drop down?
- **a.** folded mountains
- **b.** fault-block mountains
- **c.** volcanic mountains
- **d.** strike-slip mountains

_____**21.** What kind of mountain is formed when magma rises to the surface and erupts?
- **a.** folded mountains
- **b.** fault-block mountains
- **c.** volcanic mountains
- **d.** strike-slip mountains

Match the correct description with the correct term. Write the letter in the space provided.

_____**22.** Appalachian Mountains

_____**23.** Tetons

_____**24.** Ring of Fire

- **a.** volcanic mountains
- **b.** folded mountains
- **c.** fault-block mountains

UPLIFT AND SUBSIDENCE

_____**25.** The rising of Earth's crust to higher elevations is called
- **a.** uplift.
- **b.** deformation.
- **c.** subsidence.
- **d.** uprise.

_____**26.** The sinking of regions of the Earth's crust to lower elevations is called
- **a.** uplift.
- **b.** rebound.
- **c.** subsidence.
- **d.** uprise.

_____**27.** When the Earth's crust slowly springs back to its original elevation, it is called
- **a.** uplift.
- **b.** rebound.
- **c.** subsidence.
- **d.** uprise.

28. What happens to the ocean floor the farther the oceanic lithosphere is from a mid-ocean ridge?

_____

_____

_____

29. A set of cracks that forms when two tectonic plates are pulling away from each other is known as a(n) _____.

Name _____ Class _____ Date _____

Assessment

Section Quiz

Section: Inside the Earth

Write the letter of the correct answer in the space provided.

_____ **1.** Tectonic plates consist of
- **a.** continental crust.
- **b.** oceanic crust.
- **c.** both continental and oceanic crust.
- **d.** mesosphere.

_____ **2.** The deep interior of the Earth can be mapped using
- **a.** seismic waves.
- **b.** sonar.
- **c.** information from drilling expeditions.
- **d.** ocean waves.

Match the correct description with the correct term. Write the letter in the space provided.

_____ **3.** the layer of rock that comprises 67% of Earth's mass

_____ **4.** the layer of Earth made mostly of iron

_____ **5.** the thin, solid outermost layer above the mantle

_____ **6.** the rigid layer made up of crust and upper mantle

_____ **7.** the layer made of solid rock that slowly flows

_____ **8.** the lower part of the mantle

- **a.** asthenosphere
- **b.** core
- **c.** crust
- **d.** mantle
- **e.** lithosphere
- **f.** mesosphere

Name _____ Class _____ Date _____

Assessment

Section Quiz

Section: Restless Continents

Write the letter of the correct answer in the space provided.

_____ **1.** Wegener thought that all the continents were once together in one large continent called
- **a.** Gondwana.
- **b.** Laurasia.
- **c.** Eurasia.
- **d.** Pangaea.

_____ **2.** New oceanic lithosphere forms as a result of
- **a.** sea-floor spreading.
- **b.** normal polarity.
- **c.** reverse polarity.
- **d.** continental drift.

_____ **3.** Evidence for sea-floor spreading has come from
- **a.** fossils in South America and Africa.
- **b.** magnetic minerals on the ocean floor.
- **c.** ancient climactic conditions.
- **d.** the breakup of Pangaea.

Match the correct definition with the correct term. Write the letter in the space provided.

_____ **4.** hypothesis that states that the continents were once one large mass that broke apart

_____ **5.** process that takes place at mid-ocean ridges

_____ **6.** part of molten rock at mid-ocean ridges

_____ **7.** process of Earth's magnetic poles changing places

_____ **8.** items that provide evidence that the continents were once closer together

- **a.** sea-floor spreading
- **b.** continental drift
- **c.** magnetic reversal
- **d.** magnetic minerals
- **e.** fossils

Name _____ Class _____ Date _____

Assessment

Section Quiz

Section: The Theory of Plate Tectonics

Write the letter of the correct answer in the space provided.

_____ **1.** The global positioning system can map the rate of tectonic plate movement using
- **a.** radio waves.
- **b.** lasers.
- **c.** visual markers.
- **d.** motion detectors.

_____ **2.** A possible result of plates moving along a transform boundary is
- **a.** oceans.
- **b.** convection.
- **c.** earthquakes.
- **d.** sea-floor spreading.

Match the correct description with the correct term. Write the letter in the space provided.

_____ **3.** where two plates collide

_____ **4.** where two plates are moving away from each other

_____ **5.** where two plates are moving horizontally past each other

_____ **6.** process of moving layers of rock by heating and cooling

_____ **7.** where denser oceanic lithosphere sinks beneath continental lithosphere

_____ **8.** where oceanic lithosphere slides downhill due to gravity

- **a.** divergent boundary
- **b.** slab pull
- **c.** convection
- **d.** convergent boundary
- **e.** transform boundary
- **f.** ridge push

Name _____ Class _____ Date _____

Assessment

Section Quiz

Section: Deforming the Earth's Crust

Match the correct definition with the correct term. Write the letter in the space provided.

_____ **1.** stress at a divergent plate boundary

_____ **2.** stress at a convergent plate boundary

_____ **3.** upward-arching rock layer

_____ **4.** downward-arching rock layer

_____ **5.** hanging wall moves down relative to footwall

_____ **6.** hanging wall moves up relative to footwall

_____ **7.** sinking of rock layers

_____ **8.** rising of rock layers

a. uplift
b. subsidence
c. tension
d. compression
e. normal fault
f. anticline
g. syncline
h. reverse fault

Name_____ Cohort____
Date_____

What Would the Mantle Feel Like

Introduction: It is believed Earth's mantle flows like plastic. This "plastic called viscosity, is what allows the mantle to slowly move under the crust. on the activities and readings we have done (look in your binder!) *Why do the mantle moves?*

Objective: In this activity, your group will use a cornstarch and water mix simulate the plasticity of earth's mantle.

Materials: Each group of students will need cornstarch, water, 2 small co a stirring rod or spoon, and an eyedropper.

Procedure:

1. Fill the small cup up half way with cornstarch. Fill the other container h with water.
2. In your observations, record whether the cornstarch is a solid, liquid, or What about the water?
3. Using the eyedropper, gradually add one eyedropper-full of water to the cornstarch. Stir the mixture. Record your observations. Everyone shou recording their observations *while* the activity is happening. Continue a water, one eyedropper-full at a time. Stir the mixture after each additic your observations. **When the mixture becomes difficult to stir, do more water.**
4. Try to pour the mixture into your hand. Is the mixture a solid, liquid, o Record your observations.
5. With the mixture in your hand, try to roll it into a ball. Does the mixtur a solid, liquid, or gas? Record your observations.

Observations:			
Step #2	Step #3	Step #4	Step #5

Conclusion:

liquid? Explain.

3. How is the cornstarch-and-water mixture similar to the Earth's mantle? How is it different?

4. Why can't we study the actual Earth's mantle?

Homework: Write an abstract on this lab. This will count as the first HW of 2nd Quarter.
To write an abstract, answer each of these questions with 1-2 sentences. Then, write the sentences together to form 1 well-written, clear paragraph summarizing the lab and what you learned.

What was the problem?
What were we trying to figure out? What question did we ask at the beginning of the experiment? Why is this question important to investigate?

How did we approach the problem?
What did we do to solve the problem, or answer the question? This should summarize the specific procedure you followed.

What data did you collect during the lab?
What are the most important things you observed while we were doing the lab? Facts, only.

What did you conclude?
What *do you think* the data means? What did we figure out? What was the result or conclusion of your experiment? What new information do we have now that we did not have before?

What are some next steps you could take to learn more?
What are follow-up experiments that could be done to learn more about this topic? What is a new question this experiment inspired you to ask?

Extra-Credit for typing your finished abstract!

Include how the make up & or Consistency of the mantle helps to allow the plates move.

Name: _____ Date: _____

Student Exploration: Plate Tectonics

Vocabulary: collisional boundary, convergent boundary, crust, divergent boundary, earthquake, lithosphere, mantle, plate, plate tectonics, subduction zone, transform boundary, volcano

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

1. **Volcanoes** are openings in Earth's **crust** where lava, gas, and ash can erupt. Where are active volcanoes located? _____

   _____

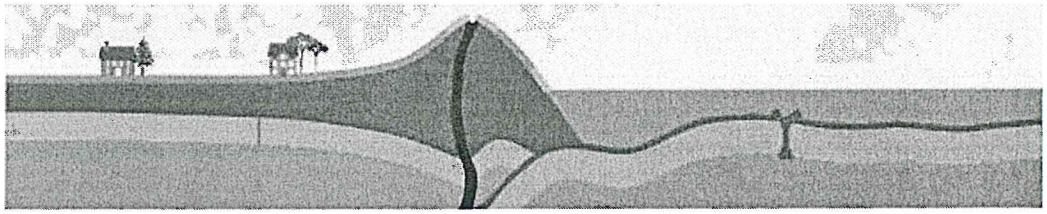
2. An **earthquake** is a violent shaking of Earth's surface. Where are earthquakes common?

   _____

   _____

Gizmo Warm-up

Volcanoes, earthquakes, mountains, and other features of Earth's surface owe their origin to the movements of **plates**: enormous, slowly-moving sections of Earth's crust. At plate boundaries, plates collide, move apart, move under or over each other, or slide past one another. The theory of **plate tectonics** describes how the plates move, interact, and change the physical landscape.



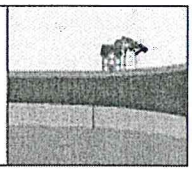
The *Plate Tectonics* Gizmo™ shows a cross-section, or side view, of Earth. (Not to scale.) Above the cross section is a bird's-eye view of the same location.

1. Turn on **Show labels**. What are the layers of Earth that you can see? _____

   _____

2. Turn on **Boundary name**, and click on each boundary. What four boundaries do you see?

   _____

Activity A: Sliding plates	Get the Gizmo ready: • Select BOUNDARY A.	

Question: What happens when plates slide past one another?

1. Observe: Boundary A is a **transform boundary**. The arrows below the BOUNDARY A label will move the plates. Click the left arrow once to see how the plates move.

   How would you describe the motion of plates in a transform boundary? _____

   _____

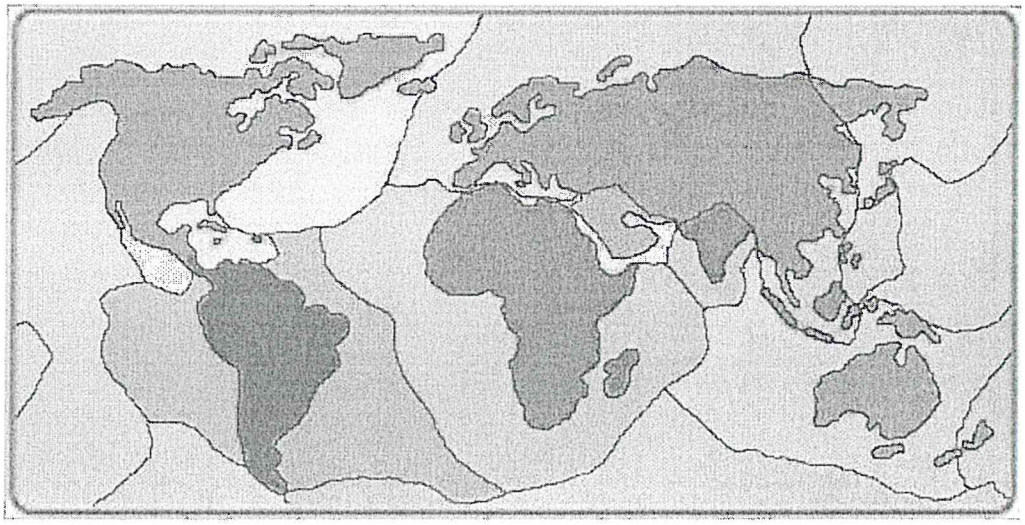
2. Sketch: Draw a bird's-eye view of the plate boundary before and after the plate motion. Draw an arrow to show which way the plate moved.

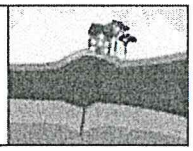
   Before movement After movement

3. Locate: Turn on **Show location**. Where on Earth can you find this type of boundary? (Note: You can refer to a world map or atlas for location names.)

   _____

   Highlight these locations on the map below.



Activity B: Colliding continents	Get the Gizmo ready: • Turn off **Boundary name** and **Show location**. • Select BOUNDARY B.	

Question: What happens when two continents collide?

1. Observe: Boundary B is an example of a **convergent boundary**, where two plates are moving toward one another. When the two plates both contain continental crust, it is called a **collisional boundary**. Click the left arrow four times to see how the plates move.

   How would you describe the motion of plates in a collisional boundary? _____

   _____

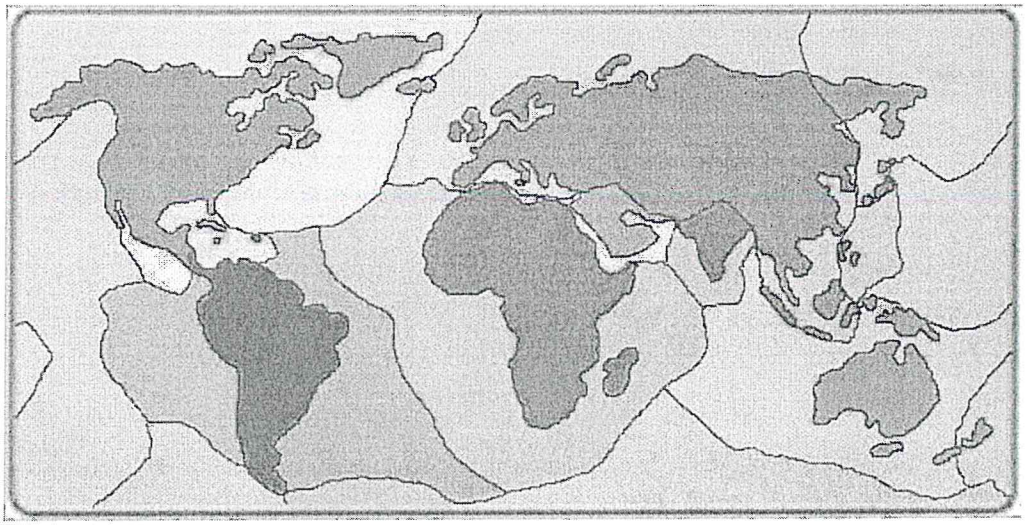
2. Sketch: Draw a side view of the plate boundary before and after the plate motion. Draw an arrow to show which way the plate moved.

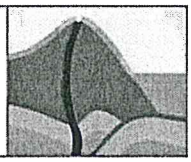
   Before movement After movement

3. Locate: Turn on **Show location**. Where on Earth can you find this type of boundary? (Note: You can refer to a world map or atlas for location names.)

   _____

   Highlight these locations on the map below.



Activity C: **Oceanic crust meets continental crust**	Get the Gizmo ready: • Turn off **Boundary name** and **Show location**. • Select BOUNDARY C.	

Question: What happens when ocean crust collides with continental crust?

1. Observe: Boundary C is another type of convergent boundary called a **subduction zone**. Click the left arrow four times to see how the plates move.

   How would you describe the motion of plates in a subduction zone? _____

   _____

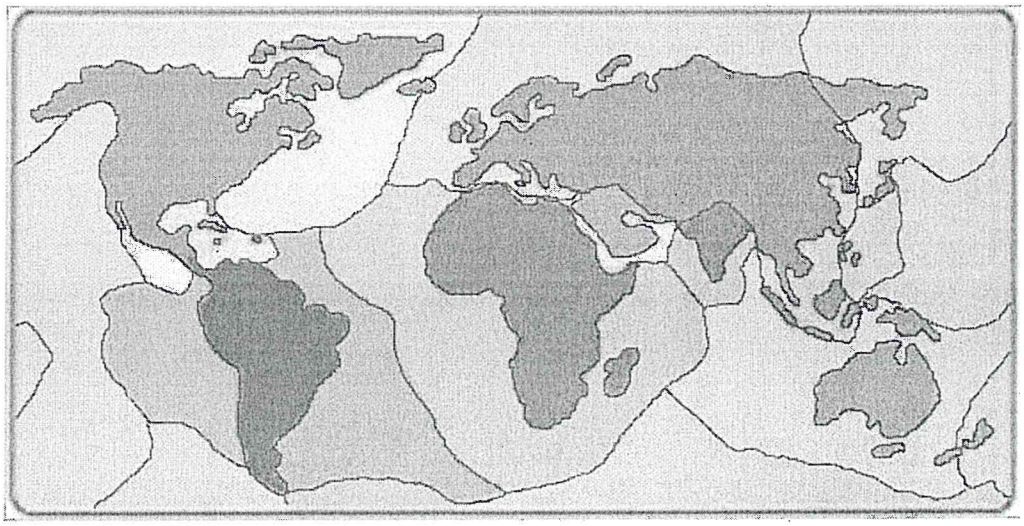
2. Sketch: Draw a side view of the plate boundary before and after the plate motion. Draw an arrow to show which way the plate moved.

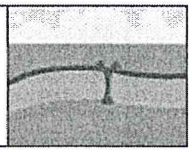
   Before movement After movement

3. Locate: Turn on **Show location**. Where on Earth can you find this type of boundary? (Note: You can refer to a world map or atlas for location names.)

   _____

   Highlight these locations on the map below.



Activity D: Spreading plates	Get the Gizmo ready: • Turn off **Boundary name** and **Show location**. • Select BOUNDARY D.	

Question: How is new crust formed?

1. Observe: Boundary D is a **divergent boundary**. Click the right arrow four times to see how the plates move.

   How would you describe the motion of plates in a divergent boundary? _____

   _____

2. Sketch: Draw a side view of the plate boundary before and after the plate motion. Draw an arrow to show which way the plate moved.

   Before movement After movement

3. Locate: Turn on **Show location**. Where on Earth can you find this type of boundary? (Note: You can refer to a world map or atlas for location names.)

   _____

   Highlight these locations on the map below.