Name

Geology 12

TA

LG #2: Plate Tectonics

BIG IDEA: The plate tectonic theory explains the changes that occur within Earth and to Earth's crust throughout geological time.

Fundamental Knowledge (I know):

- Outline evidence for plate motion and continental drift
- Explain what is meant by seafloor spreading and outline evidence to support it.
- Describe convergent, divergent and transform types of plate boundaries.
- Suggest possible causes for the movement of plates.
- Describe the origin of magma formed during plate tectonic processes.
- Describe the geologic activities that occur at plate boundaries.

Curricular Competencies (I can)

	Proficiency Scale Teacher and Student self assessment (Circle one)	**Example**	**Evidence (How do you know?)**
Use knowledge of scientific concepts to draw conclusions that are consistent with evidence. Analyze cause-and-effect relationships.	**Emerging (C-/C)** **Initial Understanding**	Completed Activity #1 – Journal with fundamental knowledge and vocabulary (in your words).	
	Developing (C+/B) **Partial/Near Complete Understanding**	Completed Activity #1 – Journal with fundamental knowledge and vocabulary (in your words with details). Completed Activity #2 (Plate Tectonics Inquiry) and Activity #3 (Seafloor spreading worksheet).	
	Proficient (B+/A) **Complete Understanding**	Completed Activity #1 – Journal with fundamental knowledge and vocabulary (in your words, with details). Activities #2 & #3 are completed and well-organized with many details and creativity shown.	
	Extending (A+) **Sophisticated Understanding**		

Student Signature: **Teacher Signature:** **Date:**

Resources can be found at www.THSSscience.com
User: THSS
Password: science

Learning Activities:

RESOURCES

1. Text: **Physical Geology & the Environment**

2. Online Resources: https://education.nationalgeographic.org/resource/plate-tectonics/,

https://www.britannica.com/science/plate-tectonics, https://www.livescience.com/37706-what-is-plate-tectonics.html

Activity #1: Journal

1. Refer to your text **Physical Geology & the Environment** Ch. 2 Plate Tectonics and **Read pages 21 – 64.**

You can also check out the online resources listed above and/or find your own to help research the definitions below.

2. In your journal:

- Define the following terms: *plate tectonics, continental drift, seafloor spreading, convection, plate, lithosphere, asthenosphere, divergent plate boundary, convergent plate boundary, transform plate boundary, magnetic reversals, mid-ocean ridges, rift valley, ocean trench, island arc, orogeny.*
- Provide a list of evidence for continental drift.
- With the aid of a diagram, describe what happens at divergent plate boundaries, at transform boundaries, and the three types of converging plate boundaries (ocean-ocean, ocean-continent, and continent-continent).
- Describe how mountain ranges form.
- Describe what occurs at a hot spot.

Activity #2: Plate Tectonics Inquiry

Choose one option from the list below to complete.

#	Choice	Description
1	Storyteller	Write a short story from the perspective of a tectonic plate. Include interactions with other plates and events experienced.
2	Artist's View	Create an infographic or comic strip showing the different plate boundary types and resulting landforms.
3	Game Designer	Design a simple board or card game that teaches players about tectonic processes and boundary types.
4	Documentary Director	Make a short video or slideshow documentary explaining the theory of plate tectonics, with visuals and narration.
5	Myth Buster	Debunk 3–5 common misconceptions about plate tectonics using research and evidence. Present as a poster or digital slide.
6	Plate Puzzle	Create a puzzle or interactive map showing the current locations and movements of Earth's major tectonic plates.
7	Global Connection	Investigate how plate tectonics affects different parts of the world. Present with a global map and regional examples.

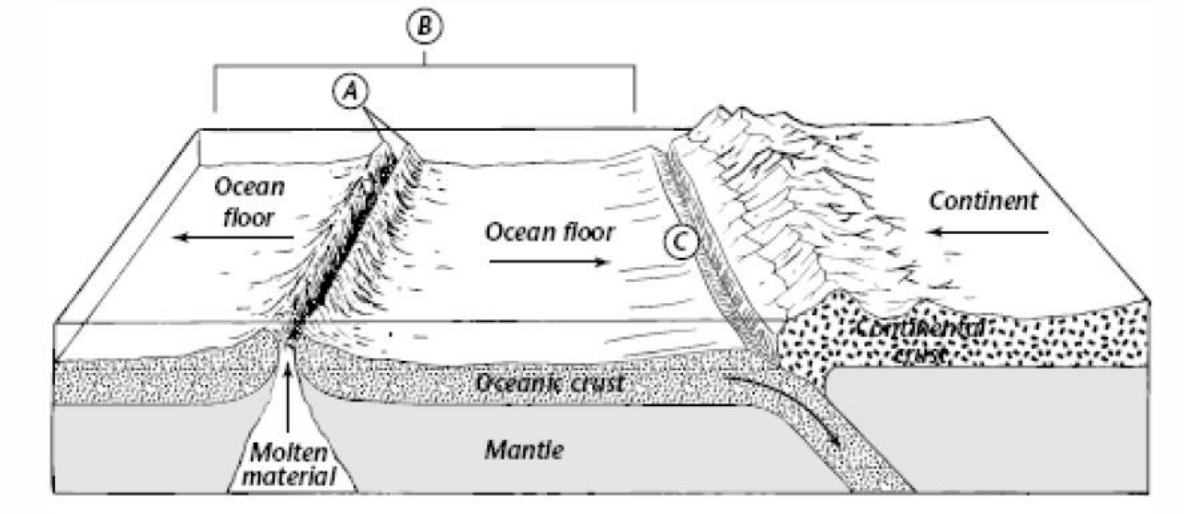
Activity #3: Seafloor Spreading Worksheet

The longest chain of mountains in the world is the system of **mid-ocean ridges.** In the mid-1900s, scientists mapped the mid-ocean ridges using sonar. **Sonar** is a device that bounces sound waves off underwater objects and then records the echoes of these sound waves. The mid-ocean ridges curve along the sea floor, extending into all of Earth's oceans. Most of the mountains in the mid-ocean ridges lie hidden under hundreds of meters of water. A steep-sided valley splits the top of some mid-ocean ridges. The Earth's Ocean floors move like conveyor belts, carrying the continents along with them, as they move. This movement begins at a mid-ocean ridge. A ridge forms along a crack in the oceanic crust. **At a mid-ocean ridge, molten material rises from the mantle and erupts. The molten material then spreads out, pushing older rock to both sides of the ridge.** As the molten

material cools, it forms a strip of solid rock in the center of the ridge. Then more molten material splits apart the strip of solid rock that formed before, pushing it aside. This process, called **seafloor spreading,** continually adds new material to the ocean floor.

Scientists have found strange rocks shaped like pillows in the central valley of mid-ocean ridges. Such rocks can form only if molten material hardens quickly after erupting under water. The presence of these rocks support the theory of seafloor spreading. More support came when scientists discovered that the rock that makes up the ocean floor lies in a pattern of magnetized stripes. The pattern is the same on both sides of the ridge. These stripes hold a record of reversals in Earth's magnetic field. The final proof of seafloor spreading came from rock samples obtained by drilling into the ocean floor. Scientists found that the farther from a ridge the rocks were taken, the older they were. The ocean floor does not just keep spreading. Instead, it sinks beneath deep underwater canyons called **deep-ocean trenches.** Where there are trenches, subduction takes place.

Subduction is the process by which the ocean floor sinks beneath a deep-ocean trench and back into the mantle. **At deep-ocean trenches, subduction allows part of the ocean floor to sink back into the mantle, over tens of millions of years.** The processes of subduction and seafloor spreading can change the size and shape of the oceans. Because of these processes, the ocean floor is renewed about every 200 million years. The Pacific Ocean is shrinking. Its many trenches are swallowing more ocean crust than the mid-ocean ridge is producing. The Atlantic Ocean is expanding. In most places, the oceanic crust of the Atlantic Ocean is attached to continental crust. As the Atlantic's floor spreads, the continents along its edges also move.



Questions:

1. Name and describe the feature of the ocean floor shown at A.

2. Describe the process shown occurring at B and explain what results from this.

3. What happens to old oceanic crust as new molten material rises from the mantle?

4. The arrows on the figure show the ocean floor spreading from the ridge. What are three kinds of evidence scientists have found to support this idea?

1.
2.
3.

4. What process is shown occurring at C, and why does it occur?

5. A device that scientists use to map the ocean floor is _____.

6. The feature on the ocean floor at C is called a(n) _____.

7. The process that continually adds new material to the ocean floor is called _____.

8. The process by which the ocean floor sinks into the mantle is called _____.

10. A chain of underwater mountains along which seafloor spreading occurs is a _____.