



READING SCIENCE!

Name: _____

Date: _____

Tectonic Plates

- 1 On March 11, 2011, an earthquake measuring 8.9 on the Richter Scale shook the ocean floor. It made a giant wave which grew up to 30 feet (9.14 meters) tall. The huge wave, called a tsunami, sped towards the coast of Japan. It hit the coast, tearing apart buildings and homes. The wave flooded rice fields. The tsunami also took human lives with it.



Sadly this wasn't the first time that a disaster like this has happened. It won't be the last time, either. Over Earth's history, tectonic plates have always moved. This movement has reshaped continents, made and destroyed ocean basins, and caused earthquakes. Tectonic plate movements have also formed many landforms. These include volcanoes, mountain ranges, and oceanic trenches. Earth scientists wanted to learn how and why these things happen. Earth scientists have studied the movement of plates to find out.

- 2 Earth is made of three different layers: crust, mantle, and core. The top section of the mantle is solid but thin. Joined with the crust, it forms the lithosphere. Under the rigid lithosphere is a part of the mantle called the asthenosphere. The asthenosphere is soft and putty-like. The lithosphere is broken into pieces much like a cracked egg shell. These pieces are called plates. There are seven major tectonic plates. North of the equator are the Eurasian and North American plates. Most or all of the South American, Indo-Australian and Antarctic plates lie south of the equator. The equator crosses the middle of the Pacific and African plates.



- 3 The plates glide on the flexible asthenosphere. They creep along, moving in different directions and different speeds. Plates move toward (or away from) one another very slowly. They may move closer (or farther apart) by less than one centimeter per year. Top speed is only as much as ten centimeters per year. This is about as fast as fingernails grow. Plates move in different directions, so there is a lot of tearing and crunching where plates meet. Thus scientists study plate boundaries in order to understand tectonic movement.
- 4 There are three types of plate boundaries: divergent, convergent, and transform. Boundary type is based on the way the plates move compared to one another. Different landforms result from different boundary types. Different sets of events, such as earthquakes, tsunamis or volcanic eruptions can happen at each boundary. What the plate is made of also matters. The plate could be made of denser, ocean basin rock. Or the plate could be made of less dense, continental rock. Both direction of movement and type of plates control what happens at a boundary.
- 5 Divergent boundaries occur when two plates pull away from each other. This makes a tear in the lithosphere. Earth scientists call this kind of tear a rift. Magma from the asthenosphere seeps up through the rift. As magma cools, new crust is made. The new rock builds up along the rift. It forms volcanic ridges or individual volcanoes. This type of boundary is found in the mid-Atlantic Ridge. This type of boundary can form a new ocean.
- 6 Convergent boundaries occur when two plates run into each other. When both are made of continental rock, the land is pressed together and pushed upward. This can form huge mountain ranges like the Himalayan Mountains. It is different if a plate is made of dense ocean basin rock. Then, the denser plate will dive under the other one. This is how deep ocean trenches are made. Volcanic mountain chains can form as some of the lower plate heats up and melts. This is the type of boundary found along the coast of Japan. Earthquakes can occur in either type of convergent boundary.

- 7 Transform boundaries occur when two plates slide horizontally past one another. Transform boundaries are different than the other boundary types. They do not usually form mountains, volcanoes, or trenches. However, movement along transform boundaries can trigger earthquakes. The San Andreas Fault in California is a transform boundary. There have been many San Andreas earthquakes. These have caused a great loss of life and property over history. Transform faults also are found in ocean basins as part of mid-oceanic ridge structures.
- 8 The broken pieces of Earth's plates are like a puzzle in motion. Over the past fifty years, Earth scientists have learned many things about tectonic plate movement. They can better explain how Earth's crust has changed over time. Scientists also understand more about how plate movements can result in earthquakes, tsunamis, and volcanic eruptions. Scientists still must learn more before they can predict these events before they happen.



- 1** What is the difference between a divergent boundary and a convergent boundary?
 - A** Divergent boundaries slide past each other horizontally and convergent boundaries form mountain ranges and ocean trenches
 - B** Divergent boundaries run into each other and convergent boundaries pull away from each other
 - C** Divergent boundaries pull away from each other and a convergent boundaries run into each other
 - D** Divergent boundaries form mountain ranges and convergent boundaries slide past each other horizontally
- 2** What is a tsunami?
 - A** An earthquake caused by plates sliding past each other
 - B** A volcano that has been formed from magma seeping out of the asthenosphere
 - C** The layer of earth under the crust
 - D** A giant wave caused by an earthquake in the ocean basin
- 3** If a convergent boundary involves a continental landmass and an ocean basin what is the result?
 - A** A chain of volcanic mountains will form on the edge of the continent or just off shore; a deep ocean trench will form off shore
 - B** The land will fold and fault, forming high mountain ranges
 - C** The land at the edge of the continent will buckle, causing the formation of a trench
 - D** There will be frequent earthquakes but no other evidence of crustal movement
- 4** Which of the statements is not true?
 - A** The lithosphere is fractured into giant pieces called plates
 - B** The asthenosphere is a liquid and the lithosphere is soft and putty-like
 - C** The asthenosphere is soft and putty-like
 - D** The lithosphere is composed of the upper part of the mantle and the crust

- 5 The point of this passage is to explain how —
- A scientists can predict earthquakes but not tsunamis.
 - B tectonic plates have moved and reshaped continents, created and destroyed ocean basins, and caused earthquakes.
 - C meteorologists can broadcast news quickly about approaching disasters.
 - D shifting of tectonic plates can change people's lives.

