35. Plate Tectonics: Mountains, Volcanoes, and Earthquakes

A [1]The earth's entire crust, which includes the continents and ocean basins, is constantly moving. [2]Parts of the crust slowly move into, under, or away from each other. [3]The drift of the continents is so slow (about 1.5 inches per year) that it is not noticeable unless it's viewed over millions of years.

B [4]Have you ever put together a jigsaw puzzle? [5]Think of the continents as large pieces of a puzzle. [6]Do they all fit together? [7]Look closely at their coastlines.

PANGEA

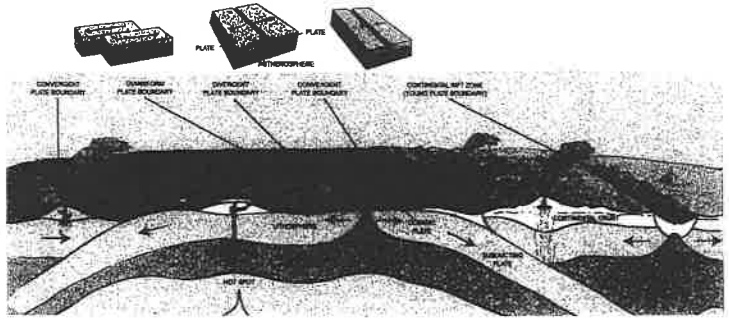
C [8]In 1912, Alfred Wegener, a German scientist, wrote a book called *The Origins of Continents and Oceans*, in which he explained how the earth's continents had fit together at one time as one gigantic continent. [9]He called this huge continent **Pangea**, which means "all lands." [10]His hypothesis is now known as **continental drift**.

D [11]The earth's crust and outer mantle form the **lithosphere**. [12]The lithosphere is broken into pieces called **tectonic plates**. [13]The tectonic plates float on the lower portion of the earth's mantle. [14]What causes these plates to move? [15]Heat from deep in the earth's interior causes the rock in the mantle to become hotter and rise upward. [16]Then it squeezes between the edges of two plates, or **plate boundaries**. [17]This forces the plates apart. [18]This process constantly pushes the plates farther and farther apart.

E [19]Places where plates move apart are called **divergent boundaries**. [20]This type of plate movement is responsible for seafloor spreading, which is how the Mid-Atlantic Ridge and East Pacific Rise were formed.

F [21]At **convergent boundaries**, the plates are actually moving toward each other, causing a collision. [22]When there is a continent on both sides of the plates, the collision causes the crust to crumble, fold, tilt, or lift, forming mountains. [23]The Himalayan Mountains formed along a convergent boundary. [24]**Volcanoes** are also found at convergent boundaries. [25]As one plate slides under another, hot rock material in the upper mantle melts and becomes magma. [26]It can then erupt through cracks, producing volcanic mountains.

G [27]The San Andreas Fault is a famous example of a **transform fault boundary**. [28]Faults are huge cracks in the earth's crust. [29]This type of boundary occurs when plates slide past each other in different directions without moving up or down. [30]Sometimes the motion is very gradual and occasionally it is very sudden. [31]An **earthquake** is the vigorous shaking of the earth due to sudden plate movements.



1. For each statement, circle T for true and F for false. If the statement is false, replace the **bold word(s)** to make the statement true. Then write the number of the sentence(s) that best supports your answer.
   a. T F The earth's crust is **always** moving. ____
   _____
   b. T F The tectonic plates float on the lower portion of the earth's **crust**.
   ____
   _____
   c. T F **Divergent boundaries** are responsible for seafloor spreading.
   ____
   _____
   d. T F Volcanoes are formed at **transform fault boundaries**. ____
   _____

2. The place where the earth's plates move apart is called a(n):
   a. transform fault.
   b. divergent boundary.
   c. convergent boundary.
   d. ocean plate.

   Write the number of the sentence that best supports your answer. ____

3. Most earthquakes are caused by:
   a. magma cooling on the side of a volcano.
   b. the earth's plates spreading apart.
   c. the earth's plates sliding past each other.
   d. lava.

   Write the number of the sentence that best supports your answer. ____

4. Apply what you have read from the lesson to describe three ways that plates interact with each other.
   _____
   _____
   _____

   Write the numbers of the sentences that best support your answer.
   ____, ____, ____

5. Refer to the lesson to explain Pangea.
   _____
   _____
   _____
   _____

   Write the numbers of the sentences that best support your answer. ____, ____

6. What are earthquakes and how are they formed?
   _____
   _____
   _____
   _____

   Write the numbers of the sentence that best supports your answer. ____

The Richter scale is used to measure the magnitude, or strength, of earthquakes on a scale of 1 to 10. The Mercalli scale is another system used to describe the effects of earthquakes from Type I to Type XII. The farther away a place is from the epicenter, or the surface directly above an earthquake, the less the effect will be and the lower the rating will be.

7.-8. Using the graphic on the next page, how would you compare the two scales?
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____

Mercalli Scale

I. Felt by almost no one

II. Felt by very few people

III. Tremor is noticed by many people, but they often do not realize it is an earthquake.

IV. Tremor is felt indoors by many; it feels like a truck has struck the building.

V. Tremor is felt by nearly everyone; many people are awakened. Swaying trees and poles may be observed.

VI. Tremor is felt by all; many people run outdoors. Furniture is moved; slight damage occurs.

VII. Everyone runs outdoors. Poorly built structures are considerably damaged; slight damage elsewhere.

VIII. Specially designed structures are damaged slightly; others collapse.

IX. All buildings are considerably damaged; many shift off foundations. There are noticeable cracks in the ground.

X. Many structures are destroyed. The ground is badly cracked.

XI. Almost all structures fall. Bridges are wrecked. There are very wide cracks in the ground.

XII. There is total destruction. Waves are seen on ground. Large objects are tumbled and tossed.

Richter Scale

2.5 Tremor is generally not felt but is recorded on seismometers.

3.5 Felt by many people

4.5 Some local damage may occur.

6.0 A destructive earthquake

7.0 A major earthquake

8.0 Great earthquake and up

Written Response Questions

For the following questions, apply all of the information you've learned when answering.

9. Why might waves from the same earthquake cause more damage in one area than another?

10. How are the formation of volcanoes and plate boundaries related?