Name: **KEY**

Date:

Period:

**Study Guide for 6.E.2.2 Assessment**

**Plate Tectonics, Earthquakes & Volcanoes**

**Drifting Continents**

**1.** Alfred Wagener’s hypothesis of ***continental*** drift suggests that at one time all

**Word Bank**

|  |  |
| --- | --- |
| mountain | continental |
| Pangea | animals |

land formed a supercontinent, named ***Pangea*** .

**2.** The evidence of fossils, ***mountain*** chains, certain plants and

***animals*** support Wagener’s hypothesis.

**3.** It is generally considered that dinosaurs lived in warm climates, yet fossils remains are found in Antarctica. How can this be explained?

***At one time Antarctica’s landmass was in a warmer part of the Earth, closer to the equator. With continental drift the land moved over time and now rests in the cold area at Earth’s south pole.***

**Plate Tectonics**

**Word Bank**

\_\_\_\_\_\_\_

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| spreading | tectonics | young | dense | old |
| asthenosphere | transform | oceanic | divergent | plates |
| trenches | convergent | mountains | suduction |  |

**4.** The main reason why Wegener’s hypothesis was originally rejected was because he could not satisfactorily explain

what was causing the ***plates*** to move.

**5.** Years later the evidence of seafloor ***spreading*** supported Wegener’s hypothesis on how land masses move due to magma creating new ocean floor at divergent boundaries. Scientists discovered ocean ridges which are underwater

***mountain*** , and ocean ***trenches*** which are narrow, long depressions with very steep sides.



**6.** They discovered ***young*** rock near ocean ridges and ***old*** rock near ocean trenches. There was also strips of reversed polarity rocks symmetrically, supporting growth in both directions away from the ridge.

**7.** The Theory of plate ***tectonics*** states that the earth’s surface (crust) is broken into about a dozen enormous pieces called plates.

**8.** The tectonic plates move about on the fluid-like upper mantle called the ***asthenosphere*** . There are two types of tectonic plates, continental (land) crust and ***oceanic*** (water) crust.

**9.** When a plate descends beneath another plate it is called \_***subduction*** . Oceanic crust is more ***dense*** and can subduct under continental crust.

**10.** The Earth’s tectonic plates interact at boundaries. Name the three types of boundaries:



\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_



|  |  |  |
| --- | --- | --- |
| ***Divergent*** | ***Convergent*** | ***Transform*** |
| Plates are moving apart from each  other | Plates are moving towards each other | Plates are moving side by side each  other |

**Diagrams**

**11.** Match the following boundaries with their diagram (from graham cracker lab)

**A**

**Transform Plate Boundaries** are when **C**

**Divergent Plate Boundaries**: Where plates are moving

plates move side by side with each other resulting in frequent earthquakes.

away from each other. This movement is found along the mid- ocean ridges where new crust material is being created.

**Convergent Plate Boundaries** are where one plate dives (subducts) under less dense crust to be recycled back into the asthenosphere. There are *three types* of convergent plate boundaries:

**B**

***Type I Ocean – Ocean***:

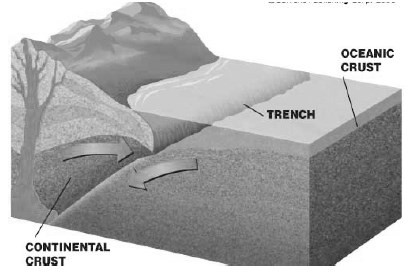
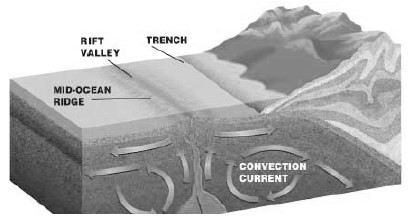
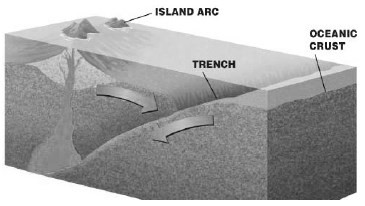
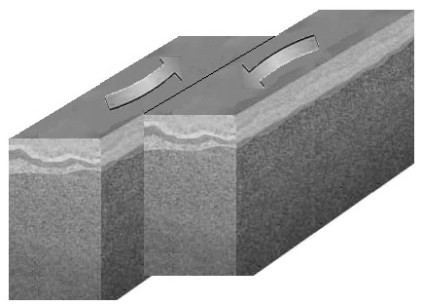
**D *Type II Ocean – Continental***: **E *Type III Continental –***

when the ocean crust of two plates meet usually forming island arcs

when ocean crust subducts under continental crust forming mountain chains and volcanic activity

***Continental***: when two continental plates meet and buckle up forming large mountains.

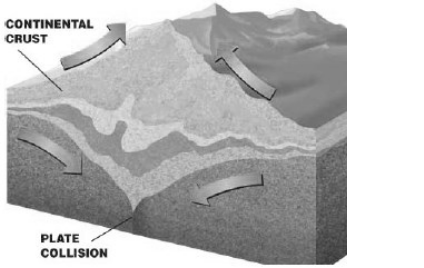
**A C E**



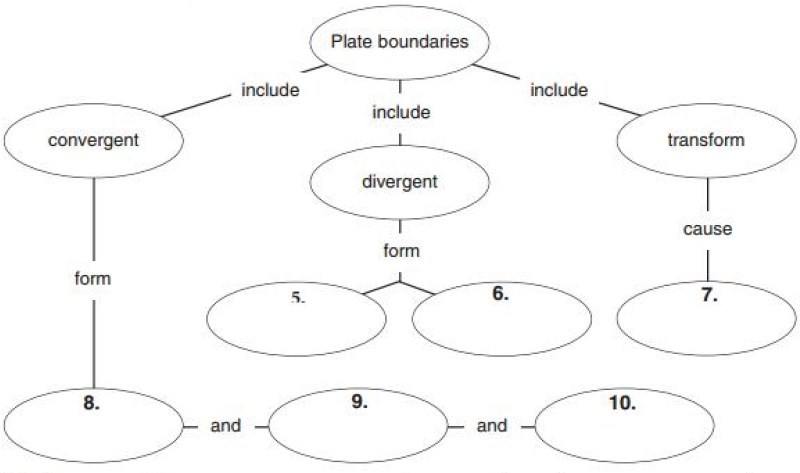
**B D**

**Volcano**

**Volcano**



**12.** Complete the concept map below using the word bank (from quiz review!)



|  |  |  |
| --- | --- | --- |
| **mid-ocean ridges** | **island arcs (volcanic islands)** | **major earthquakes** |
| **rift valleys** | **deep oceanic trench** | **mountains & most volcanoes** |

***Mid-ocean ridges Rift Valleys Major Earthquakes***

***Island Arcs Deep Oceanic Trench Mountains & Most***

***Volcanoes***

**Volcanoes**

**Word Bank**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| convergent | explosive | ocean floor | sedimentary | volcanoes |
| water | hot spots | divergent | Ring of Fire | boundaries |

**24.** Most volcanoes form at plate ***boundaries*** . 80% are found along ***convergent*** boundaries, 15% are found along ***divergent*** boundaries and 5% are found far away from plate boundaries.

**25.** Converging plates form the most ***explosive*** volcanoes! The subduction zone generates magma for the volcano from ***sedimentary*** rock.

**26.** Rift volcanoes form from diverging plates. Most occur under ***water*** where they create new ***ocean floor***\_

**27.** Volcanoes that do not form at plate boundaries rely on ***hot spots*** \_. The Hawaiian islands are a good example because they are located in the middle of the Pacific Plate.

**28.** The ***Ring of Fire***\_ also known as the Circum-Pacific Belt is a 25,000 mile stretch containing 90% of the world’s

active ***volcanoes*** \_.

**Earthquakes**

**Word Bank**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| fault | Seismic | epicenter | Circum | ridge push |
| mantle convection | boundaries | gravity/slab pull | focus | earthquake |

**29.** A ***fault*** is a fracture in the rocks that make up the Earth’s crust. An ***earthquake*** is the shaking of the

ground caused by sudden motions along faults in the Earth’s crust.

**30.** Most earthquakes occur at plate ***boundaries*** . 80% occur in the ***Circum*** - Pacific Belt.

**31**. The ***focus*** is the point within the Earth where an earthquake rupture starts. And the ***epicenter*** is the point at the surface of the Earth directly above the focus.

**32.** A ***Seismic*** Wave transmits the energy released by an earthquake.

**33.** The underlying origin for earthquakes is movement of the plates. Earth’s plates can move due to three different

methods:

(1) ***mantle convection*** \_: The slow creeping motion of Earth's solid mantle caused by convection currents

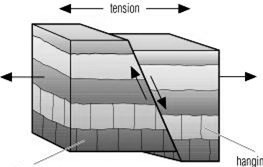
carrying heat from the interior of the Earth to the surface.

(2) ***ridge push*** \_: Weight of an elevated ridge pushes an oceanic plate toward a subduction zone. (3) ***gravity/slab pull*** : Cooled plates become dense and sink into the mantle due to its own weight.

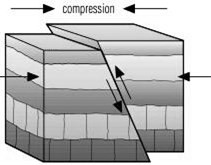
**34.** Identify the following fault types.

**Word Bank**

***Normal***



***Reverse Strike-Slip Fault***

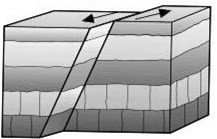


Reverse Fault Strike-Slip Fault Normal Fault

Crust lengthens. Popular at *divergent boundaries.*

Crust shortens. Popular at *convergent boundaries*

No change in crust length.

Popular at *transform boundaries*

**Seismic Waves**

*Since you have turned in your lab with the descriptions of seismic waves please review the following information paying particular attention to the items underlined.*

*Types of Seismic Waves*

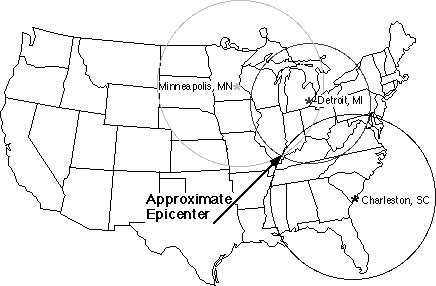
There are several different kinds of seismic waves, and they all move in different ways. The two main types of waves are **body waves** and **surface waves**. Body waves can travel through the earth's inner layers, but surface waves can only move along the surface of the planet like ripples on water. Earthquakes radiate seismic energy as both body and surface waves. Traveling through the interior of the earth, **body waves** arrive before the **surface waves** emitted by an earthquake.

The first type of body wave is the **P wave** or **primary wave**. This is the fastest kind of seismic wave, and, consequently, the first to 'arrive' at a seismic station. The P wave can move through solid rock and fluids, like water or the liquid layers of the earth. Sometimes animals can hear the P waves of an earthquake. Dogs, for instance, commonly begin barking hysterically just before an earthquake 'hits'. Usually people can only feel the bump and rattle of these waves.

The second type of body wave is the **S wave** or **secondary wave**, which is the second wave you feel in an earthquake. An S wave is slower than a P wave and can only move through solid rock, not through any liquid medium.

Travelling only through the crust, **surface waves** are of a lower frequency than body waves, and are easily distinguished on a seismogram as a result as a very large looking wave. Though they arrive after body waves, it is surface waves that are almost entirely responsible for the damage and destruction associated with earthquakes. This damage and the strength of the surface waves are reduced in earthquakes where the focus is deep underground.

*Finding the Epicenter*

The epicenter of an earthquake is determined by **triangulation**. This means that seismic data is needed from at least three different locations, and where this data intersects tells us the epicenter.

When an earthquake occurs, it is recorded on numerous seismographs located in different directions. The seismograms at these locations show when the first

seismic waves, the P waves, arrive and then when the next waves, the S waves, arrive.

Knowing how fast each of these waves travel, scientists can calculate how far away the epicenter was from each seismograph. What they don't know is the precise direction the waves came from–the direction of the epicenter.

Scientists then must use a map. Around each of three seismograph locations, a circle is drawn on the map with a radius that equals the known distance to the epicenter. These three circles intersect at a single point. This point is the location of the earthquake's epicenter.

*Measuring an Earthquake*

|  |  |
| --- | --- |
| **Magnitude**  **(Richter Scale)** | Requires a seismograph.  Seismographs are the most reliable measures of earthquakes. Uses Arabic numbers (1, 2, 3 etc.) |
| **Intensity**  **(Mercalli Scale)** | Based upon the reports of people who experienced the earthquake and observed the  destruction.  Uses Roman numerals (I, II, III etc.) |