Name: _____**KEY**_____ Date: _____ Period: _____

# Study Guide for Test: Plate Tectonics, Earthquakes & Volcanoes

Copy of Class Notes at http://feldmannscience.weebly.com. Access website by computer or mobile device! Tutoring offered after school on Wednesday December 10th. **Test on Thursday December 11th**

**Turn in your completed study guide on the day of test to receive extra credit points on your test**

**11-24-14 and 11-25-14 Drifting Continents --- Textbook Help: pages 443-447**

**Word Bank**

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

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

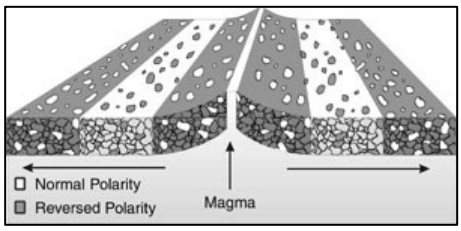
**12-01-14 and 12-02-14 Plate Tectonics --- Textbook Help: pages 449 – 459**

**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***_____
Plates are moving apart from each other

_____***Convergent***_____
Plates are moving towards each other

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

**__C___ Divergent Plate Boundaries**: Where plates are moving away from each other. This movement is found along the mid-ocean ridges where new crust material is being created.

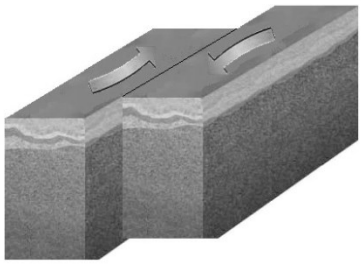
**Convergent Plate Boundaries** are where one plate dives (subducts) under less dense crust to be recycled back into the asthenosphere. There are *three types* of convergent plate boundaries:

**__B___** ***Type I Ocean – Ocean***: when the ocean crust of two plates meet usually forming island arcs

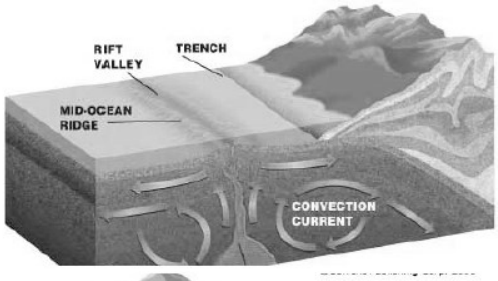
**__D___** ***Type II Ocean – Continental***: when ocean crust subducts under continental crust forming mountain chains and volcanic activity

**__E___** ***Type III Continental – Continental***: when two continental plates meet and buckle up forming large mountains.

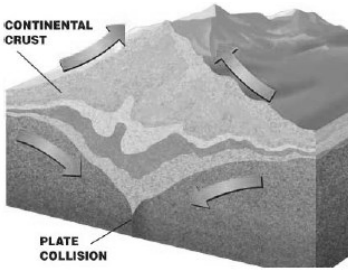
**A**



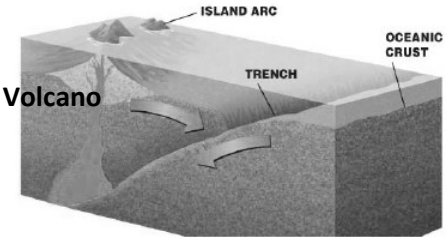
**C**



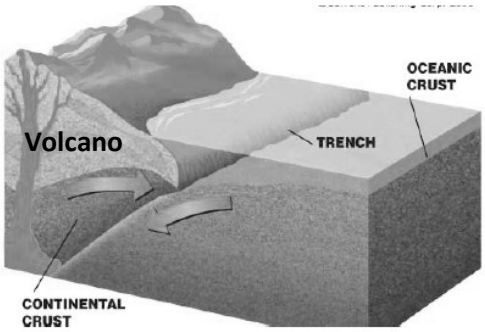

**E**




**B**

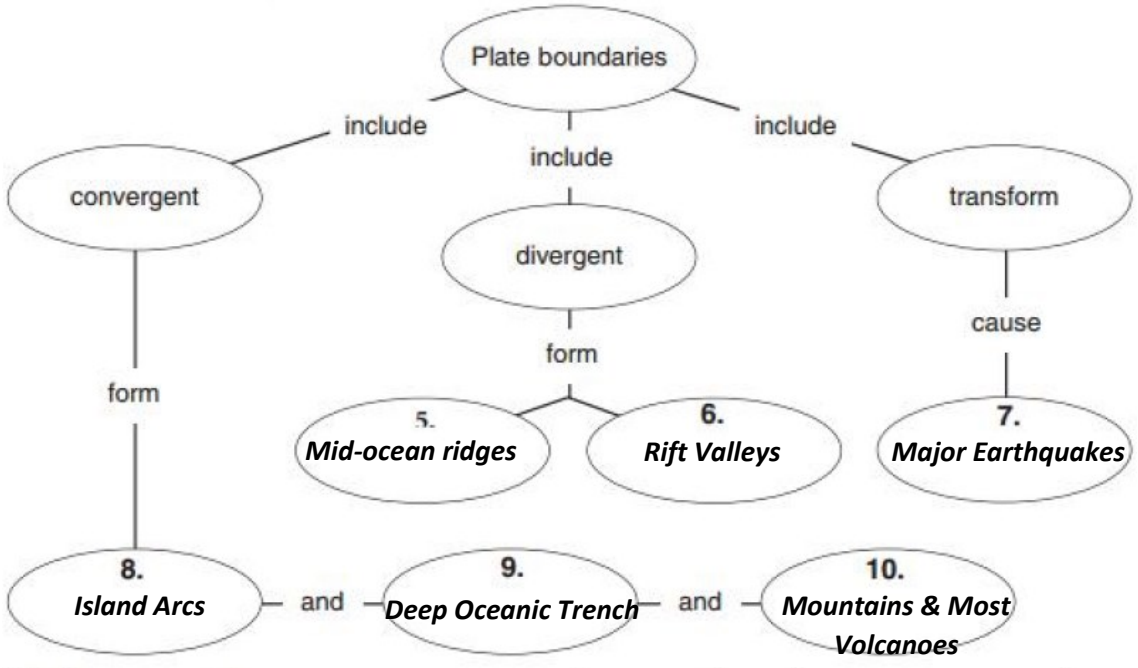



**D**

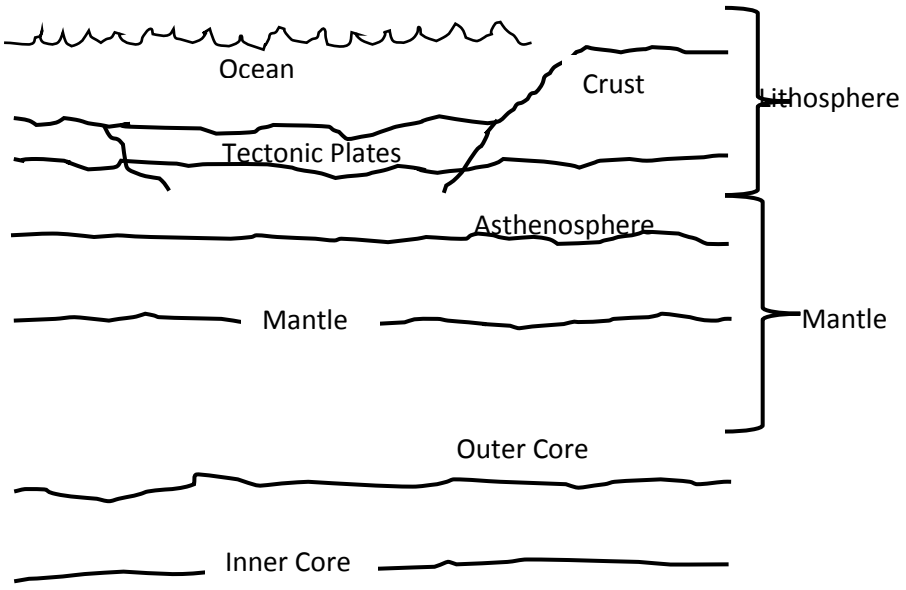



**12.** Complete the concept map below using the word bank (from quiz review!)

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



**13.** The physical structure of the Earth is divided into 5 layers:




**Name the layers of the Earth described below.**

__***Lithosphere***_: Continental and oceanic crust. Divided into tectonic plates.

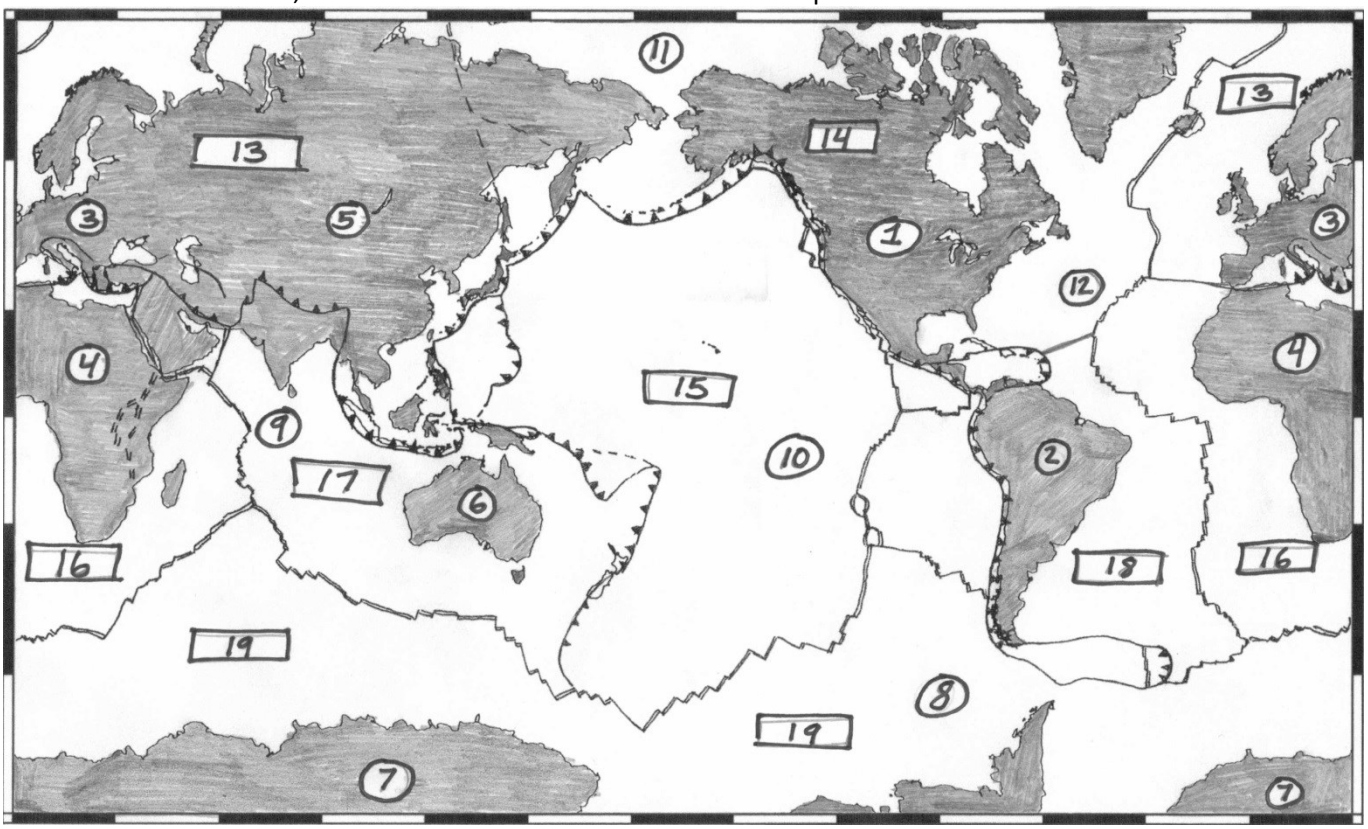
_***Asthenosphere***: Top part of the mantle. Flows like soft plastic, think silly putty!

__***Mantle***_____: Thickest layer; most of the Earth's mass. Hot softened rock.

___***Outer Core***_____: Thought to be **liquid** iron & nickel.

____***Inner Core***_____: Thought to be **solid** iron & nickel.

**14.** Label the Continents, Oceans & Plates in the table below the map.




| **Continents** | **Oceans** | **Major Plates** |
|---|---|---|
| _***4***__ Africa | _***11***___ Arctic Ocean | __***16***__ African Plate |
| __***7***__ Antarctica | __***12***__ Atlantic Ocean | __***19***__ Antarctic Plate |
| __***6***__ Australia | _***9***___ Indian Ocean | __***13***__ Eurasian Plate |
| __***5***__ Asia | __***10***_ Pacific Ocean | __***17***__ India-Australian Plate |
| __***3***__ Europe | __***8***__ Southern Ocean | __***14***__ North American Plate |
| __***1***__ North America | | __***15***__ Pacific Plate |
| __***2***__ South America | | __***18***__ South American Plate |

**12-05-14 Geological History of North Carolina:**

**15.** There are 5 Geologic Regions in North Carolina. Name the following region:

**Word Bank**

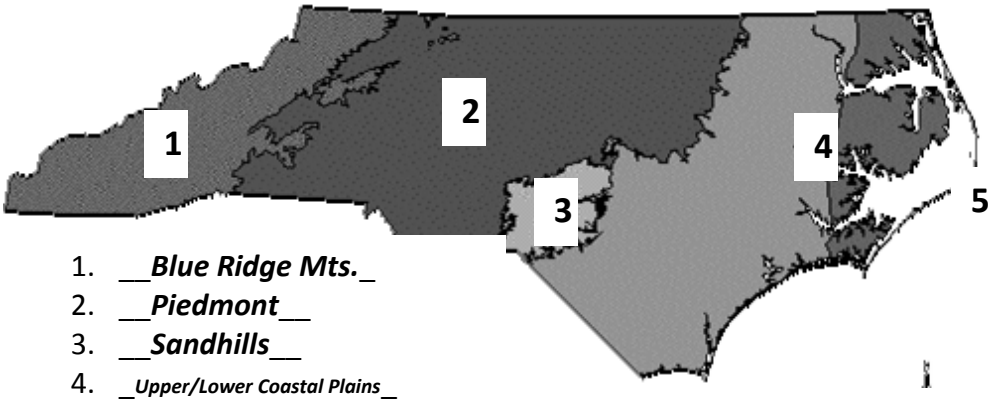
Sandhills

Blue Ridge Mountains

Piedmont

Coastal Islands

Upper/Lower Coastal Plains




1. __***Blue Ridge Mts.***_
2. __***Piedmont***__
3. __***Sandhills***__
4. _***Upper/Lower Coastal Plains***_
5. __***Coastal Islands***___

Complete the story of North Carolina's geologic history….

**Word Bank**

| | | | |
|---|---|---|---|
| foothills | Piedmont | erosion | Atlantic |
| moving | Outer | Appalachian | Fall |

**16.** The Blue Ridge Mountains are a subdivision of a larger mountain range called the __***Appalachian***_____ Mountains.

**17.** The Piedmont is an area less steep than the mountain region, but is more elevated than the coastal plains. It is also called the __***foothills***_____ because of its many rolling hills that start at the base of the mountains.

**18.** The Coastal Plains are flatter land than the Piedmont region and they border the __***Atlantic***_____ Ocean.

**19.** The ___***Fall***_____ Line is the border line between the Piedmont and Coastal Plain regions and is caused by the gathering of water into rivers that flow to the ocean.

**20.** Durham is located in the _____***Piedmont***_____ region of North Carolina.

**21.** The Barrier (coastal) islands are long narrow sandy islands that protect the mainland from storms. This area is referred to as the ___***Outer***_____ Banks.

**22.** The two main factors that have accounted for all of the North Carolina regions and their distinct features are ___***moving***_____ plates and ____***erosion***_____, which have occurred over time.

**23.** Geological Timeline. Place the following events in order that they occurred by numbering 1 (oldest) to 6 (most "recent")

__***2***__ Land started to form
__***4***__ Pangea breaks apart
_***1***__ Earth Formed
_***5***___ Appalachian Mts. start to erode creating the Piedmont
__***6***__ Blue Ridge Mts. and Piedmont look as they do today
__***3***__ North America & Europe/Africa collide, creating Pangea

**12-08-14 Volcanoes & Earthquakes --- Textbook Help: pages 460 – 463; 484 – 487**

*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.

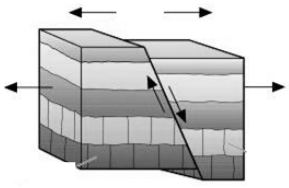
**Word Bank**

Reverse Fault

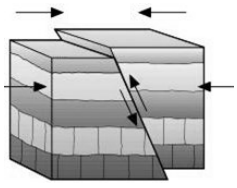
Strike-Slip Fault

Normal Fault

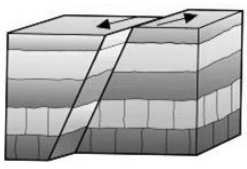
____***Normal***____
Crust lengthens.
Popular at *divergent boundaries.*



_____***Reverse***___
Crust shortens.
Popular at *convergent boundaries*



_____***Strike-Slip Fault***_____
No change in crust length.
Popular at *transform boundaries*



**12-09-14 Seismic Waves Lab -- Textbook Help: pages 495 – 501; 505 - 510**

*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.

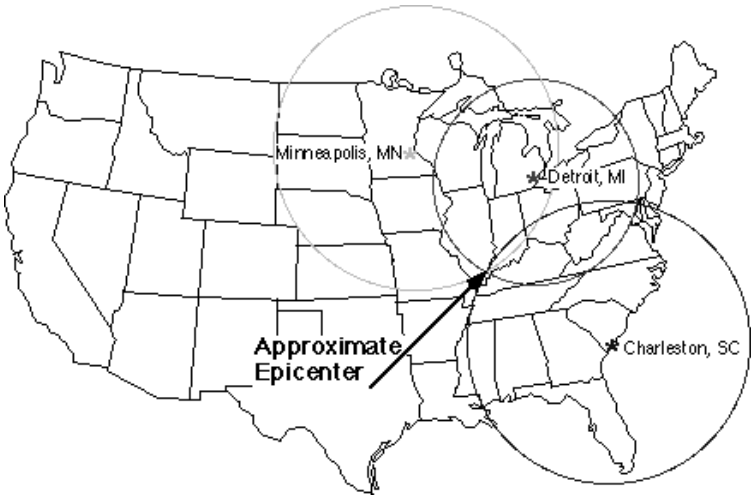
Travelling only through the crust, **surface waves** are of a lower frequency than body waves, and are easily distinguished on a seismogram as a result as a very large looking wave. Though they arrive after body waves, it is surface waves that are almost entirely responsible for the damage and destruction 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.<br>Seismographs are the most reliable measures of earthquakes.<br>Uses Arabic numbers (1, 2, 3 etc.) |
| **Intensity (Mercalli Scale)** | Based upon the reports of people who experienced the earthquake and observed the destruction.<br>Uses Roman numerals (I, II, III etc.) |