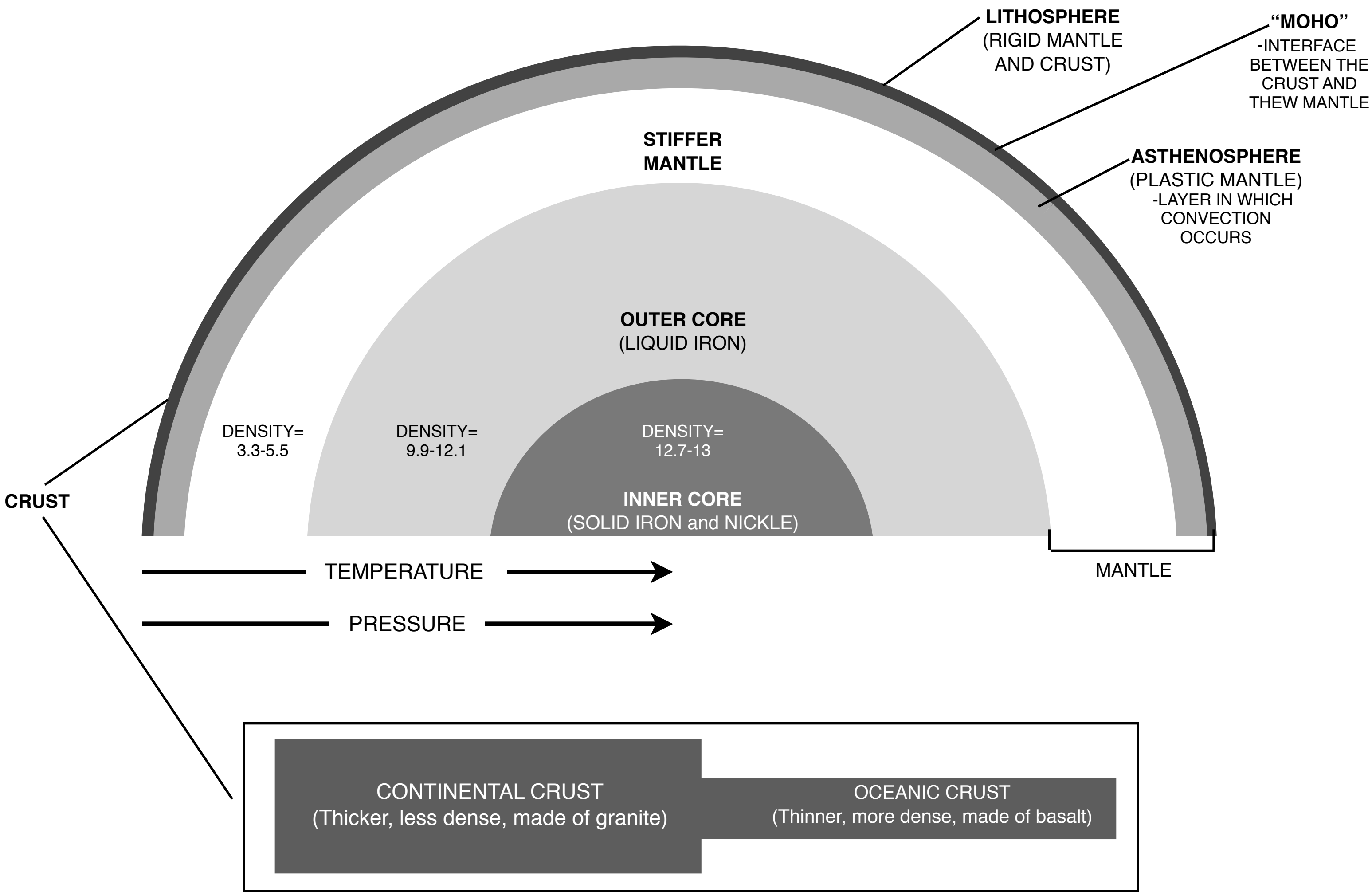
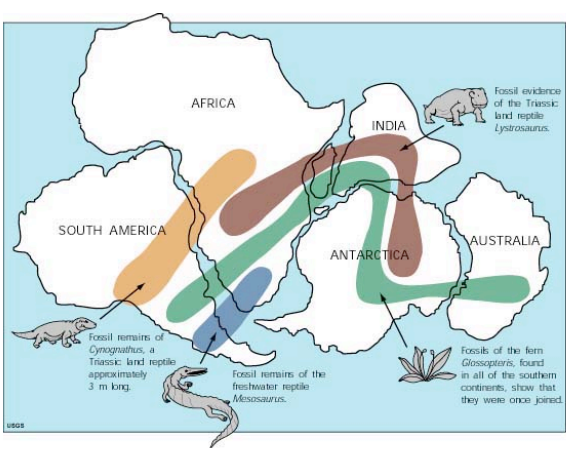
EARTH'S INTERIOR



*Our understanding of the earth's interior is based entirely on the study of earthquake waves. Be sure to understand and know how to use page 10 of the ESRTs, the inferred properties of the earth's interior.

CONTINENTAL DRIFT

- Suggested that the continents have been moving across the earth's surface for millions of years.



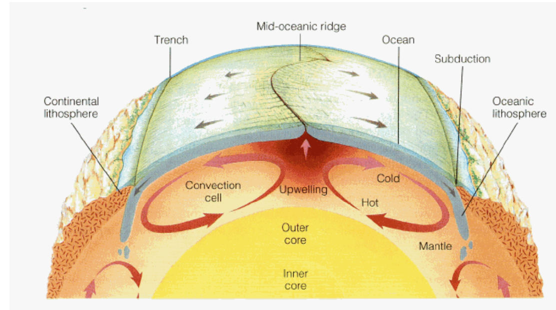
- Suggested that continents were once together in a super-continent called Pangaea about 250 million years ago
- Presented the following pieces of evidence:

✳ The apparent fit of the continents
✳ Fossil correlation
✳ Rock/Mountain correlation
✳ Paleoclimate data (coal in Antarctica, Glaciers in the tropics)

- Wegener's theory was rejected because he failed to explain what force was driving the motion

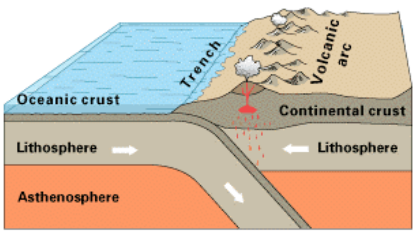
PLATE TECTONICS

- Theory developed in the mid-1900's that explained all geologic observations including mountains, earthquakes, volcanoes, and trenches
- The lithosphere of the earth is broken up into plates which "float" on the plastic asthenosphere below



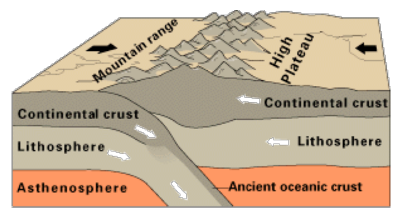
- Convection currents in the asthenosphere move the plates around
- Plates interact with each other in three ways:
  - ✳ Move towards each other (CONVERGENT)
  - ✳ Move away from each other (DIVERGENT)
  - ✳ Slide past one another (TRANSFORM)

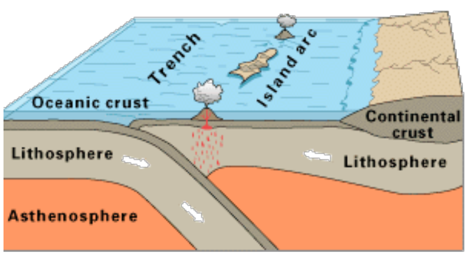
CONVERGENT PLATE BOUNDARIES



- **Subduction zone** (continental crust and oceanic crust)
- Oceanic crust is forced down because it's more dense
- Volcanoes, mountains, earthquakes and trenches are common
- Example: Western South America

- **Collision zone** (continental crust and continental crust)
- Both plates have the same density and therefore crumple up as they collide
- Mountains and earthquakes are common
- Example: Himalayas

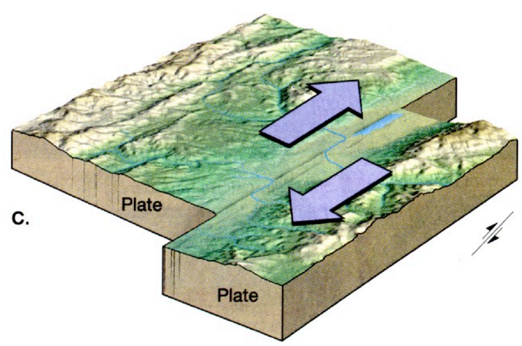




- **Island Arc** (oceanic crust and oceanic crust)
- Two oceanic plates collide and one usually subducts under the other
- Volcanic islands, earthquakes and trenches are common
- Example: Aleutian Islands

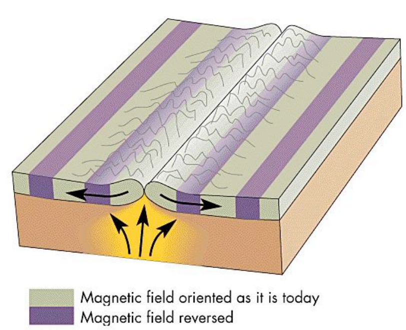
TRANSFORM PLATE BOUNDARIES

- Two plates slide laterally past one another
- Earthquakes are common as friction and pressure builds up
- Example: San Andreas Fault



DIVERGENT PLATE BOUNDARIES

- Two plates move away from one another
- Magma rises at the boundary forming a ridge with a valley and new sea-floor
- Alternating bands of magnetic polarity are locked in the sea-floor
- Sea-floor rock gets increasing older as you move away from the boundary
- Example: Mid-Atlantic Ridge



***HOT SPOTS**

- There are locations on earth, away from plate boundaries, where volcanic activity occurs
- Magma rises from the mantle and forces its way through the lithosphere, forming a chain of volcanoes.
- Example: Hawaii
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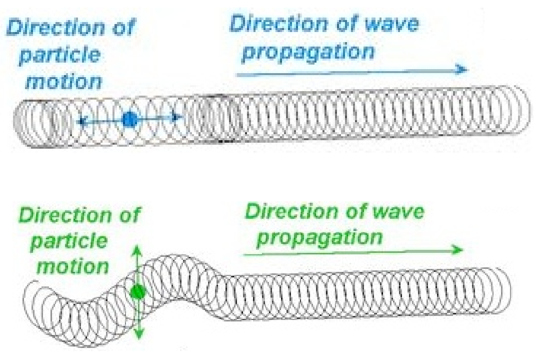
DEFORMATION

- When plates interact, rocks are exposed to intense pressure which cause deformation
- Rock layers are always laid down horizontally; if they are observed in any other position, you can infer that deformation has taken place
- The discovery of marine fossils high in mountains is evidence for **crustal uplift**
- Major types of deformation include **folds**, **faults**, and **tilts**

EARTHQUAKES

P-Waves
- Move fast
- Can travel through liquid and solid
- Push-pull motion

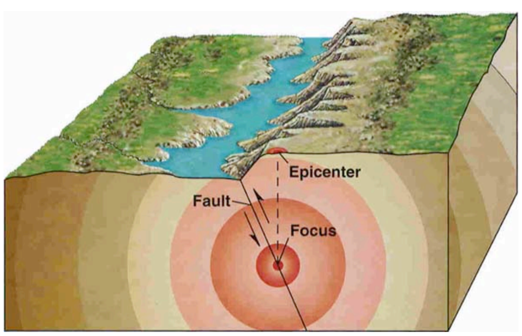
S-Wave
- Move slow
- Can only travel through solids
- Shear wave motion



Focus- The spot *within* the Earth where an earthquake begins.

Epicenter- The spot on the *surface* of the Earth closest to the focus.

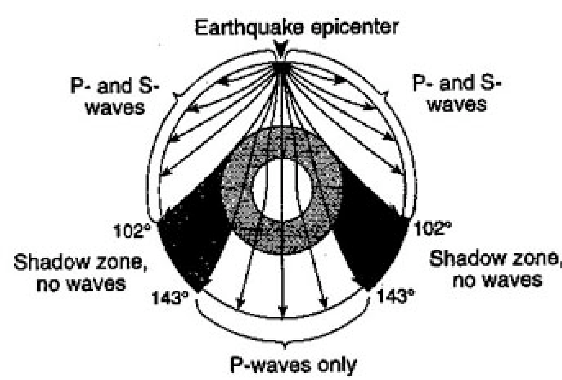
Fault- Crack along which movement takes place.



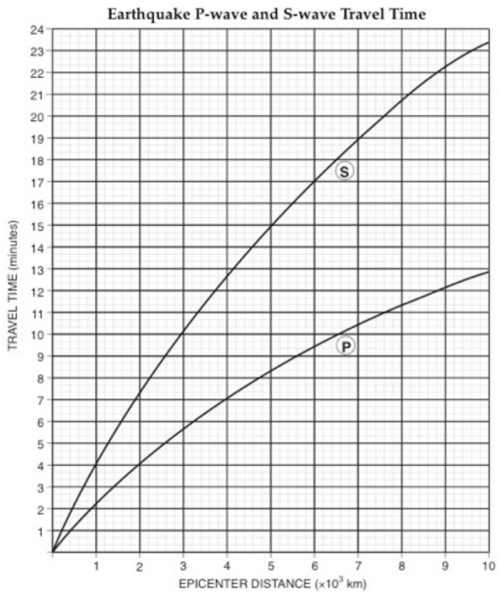
Graphing foci depth can reveal the type of plate boundary. Foci will get deeper as you travel along a subducting plate

Shadow Zone- An area on the opposite side of the Earth from where an earthquake happens that receives no earthquake waves because of refraction of P-waves and absorption of S-Waves into the liquid outer core.

REMEMBER: S-WAVES CANNOT TRAVEL THROUGH THE LIQUID OUTER CORE.



Using page 11 of the Reference Tables

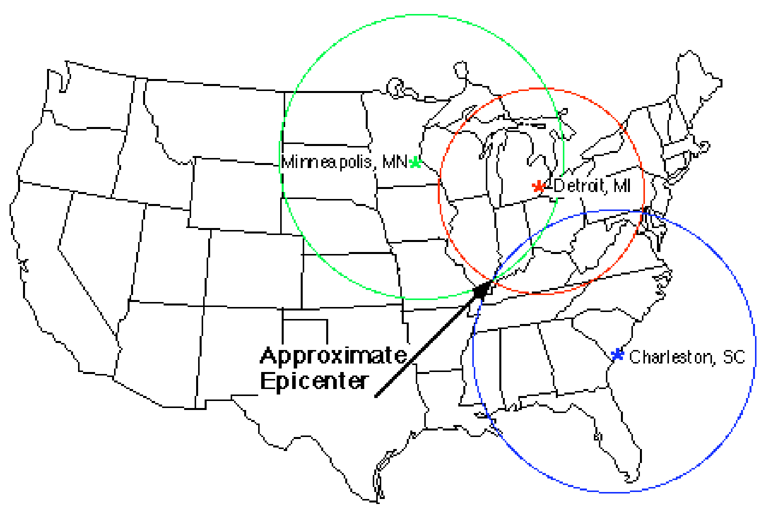


Finding Epicenter Distance
1. Determine the difference in arrival time between the P and S waves
2. Line a piece of scrap paper along the vertical axis of the reference table and mark of the location of zero and the difference in arrival time
3. Slide the paper along the curve until the marks match up perfectly with the P and S curves
4. Follow the paper down to the horizontal axis and read the epicenter distance (it is in thousands!)

Finding Travel Time
1. Find the epicenter distance for the station using the horizontal axis of the reference table
2. Go up to the P or S curve (depending on what you are looking for)
3. When you hit the curve, go to the left and read the time off the vertical axis

Locating the Epicenter Location
1. Determine the epicenter distance for ***three*** different seismograph location (seismic stations)
2. On a map, draw a circle with a radius of the epicenter distance around each seismic station
3. At the location where the three circles intersect is where the epicenter of the earthquake was located

REMEMBER: TO FIND THE LOCATION OF THE EPICENTER, WE MUST HAVE DATA FROM THREE DIFFERENT SEISMIC STATIONS



Don't forget to study the reference tables!!!