

PLATE TECTONICS - BONUS NOTES: Earth: A Unique Planet

Earth is covered by _____ water and about _____ of that water is in the _____.

We have learned about Earth's interior by studying _____, which are vibrations that travel through the earth. These can be caused by earthquakes or explosions near the surface.

Zones of the Earth:

_____ (1% of mass)

thin, solid outermost covering
(both oceanic crust & continental crust)

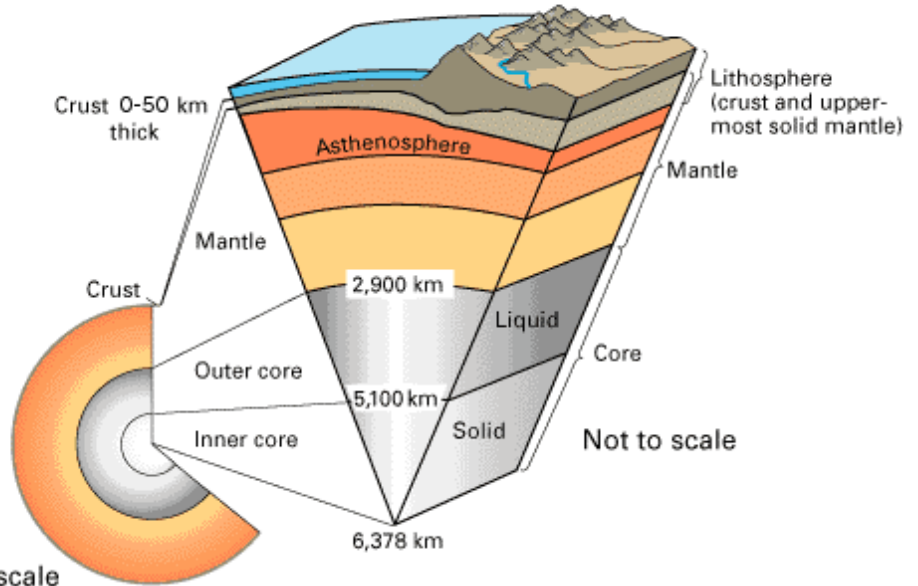
_____ (2/3 of mass)

Upper part is solid, lower part is
plastic-like

_____ (1/3 of mass)

Outer core is liquid and inner is solid

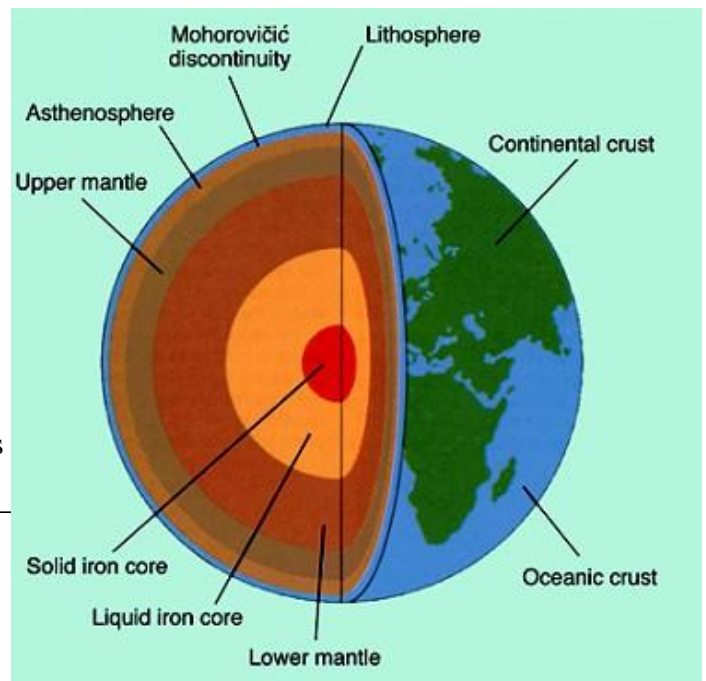
Made mostly of iron



Another way to look at it:

- Rigid layer
- Crust and solid portion of the mantle

- Just below lithosphere
- Due to extreme heat & pressure, the solid rock has the ability to flow, known as _____



In 1909 a Croatian scientist, Andrija Mohorovičić, used the information from seismic waves to determine that all layers of Earth weren't _____. He is credited with finding the _____, which is a boundary between the crust and the mantle.

Plate Tectonics

Continental Drift

The idea that the continents have changed locations throughout history is known as _____.

- _____ - Single landmass, means “all lands”
- _____ - One huge ocean, means “all seas”

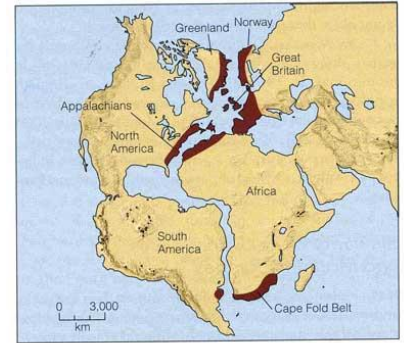


Figure 2.5

When continents are brought together, their mountain ranges form

Evidence of Continental Drift:

_____ proposed the theory of continental drift. In addition to

_____ Wegener soon found other evidence to support his hypothesis.

1.) Fossil Evidence:

- _____, a small, extinct land reptile was found on both South America and Africa.
- There was no evidence of _____ and the animal could not have swam across the _____.

2.) Geological Evidence:

- The _____ and _____ of rock in coastal regions of _____ and _____ matched closely.
- Mountain chains (ex. _____) that ended on one coastline seemed to _____ on the coastline of other landmasses.

3.) Climatic Changes:

- Layers of debris from _____ were found in _____ and _____.
- _____ deposits were found in _____, _____ and _____.

**Many Scientists rejected Wegener's idea because it lacked _____. **

Seafloor Spreading:

- The _____ is an undersea mountain range, with a steep, narrow valley running down its _____.
- Scientists in the 1950s discovered that the ocean floor was _____ than the _____. (!!)
- Harry Hess and Robert Dietz explained this movement, known as _____.

Paleomagnetism:

- When _____ cools and solidifies, _____ minerals become magnetized.
- The magnetic orientation of these minerals becomes _____ and points towards the _____.
- The validity of this idea grew when scientists discovered the _____ of the magnetism of the ocean floor.
- In 1965 scientists discovered a _____ in the earth's magnetic orientation
- This was the evidence that _____ was looking for to support his theory of _____.

The Theory of Plate Tectonics:

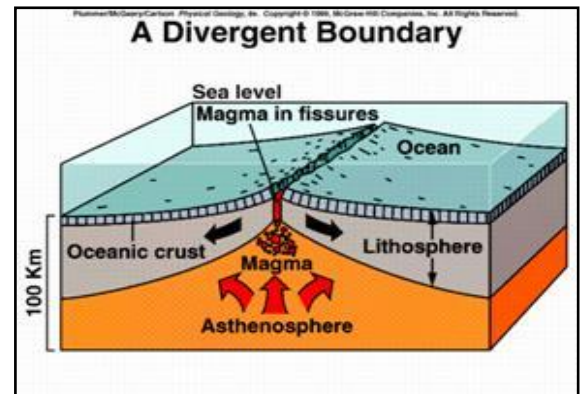
- The _____ describes not only continental _____ but also presents a possible explanation of why and _____ the continents move.
- Two types of crust: _____ and _____. To date _____ plates have been identified.

Oceanic and continental crust AND the rigid upper mantle make up the _____. Under this lies the _____, which is solid rock that flows like melted silly putty due to extreme heat and pressure.

3 Types of Lithospheric Plate Boundaries:

1.) _____

- Two plates moving away from each other
- Forms a _____
 - A narrow valley that forms as two plates separate. (ex: at center of a mid-ocean ridge)
- ex. _____



2.) _____ (warning – there are three variations of this one, based on the types of crust involved)

- Two plates colliding with each other
- _____ - area where one plate slides under another plate
- _____ - this is the feature that you see at a subduction zone

THREE VARIATIONS OF CONVERGENT BOUNDARIES

A. _____:

- 2 plates push together
- fold upward to form folded mts.
- Ex. Himalayas and Appalachians

B. _____:

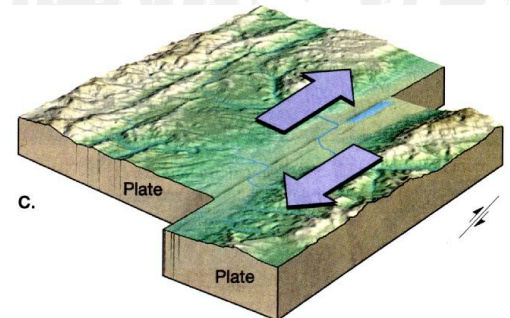
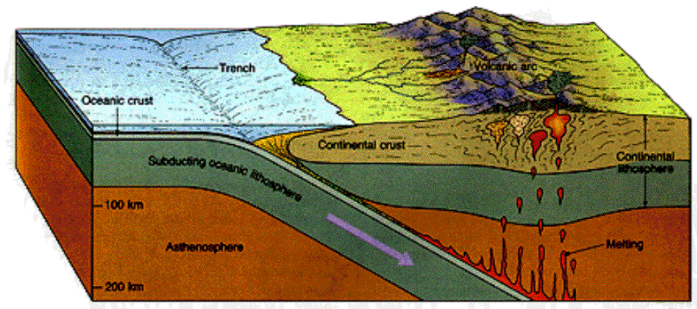
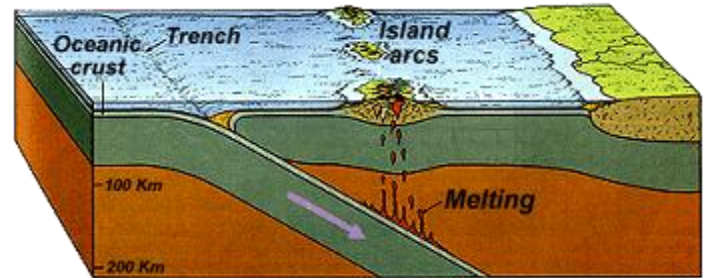
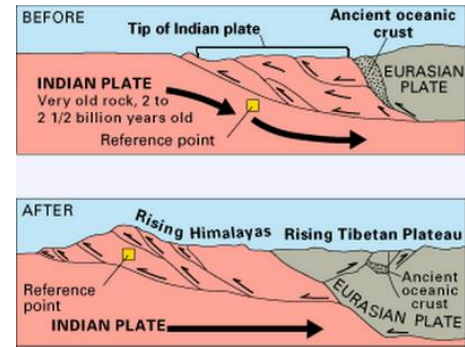
- 2 plates push together
- the older oceanic plate is pushed down (subducts)
- forms volcanic island arc (chain of volcanic islands)
- ex. Aleutian Islands and Japanese Islands

C. _____:

- 2 plates push together
- the oceanic plate subducts
- volcanic mountains are formed on the continent's edge
- ex. Andes Mountains and Cascade Mountains

3.) _____

- 2 plates are grinding past each other
- usually move in a series of sudden movement separated by periods of no motion
- Ex. _____



Causes of Plate Motion:

- _____ - the transfer of heat thru the movement of heated material, it is a cycle of warm rising currents and cold currents sinking
- Scientists have measured the amount of _____ leaving rocks at various points in the _____. Hot _____ are rising along these boundaries, thus explaining the temperature difference.

Create a sketch to show convection currents.

Suspect Terranes:

_____ - theory that continents are patches of land that have different distinct geologic histories

- Blocks of _____ are carried along the ocean floor by the action of _____. When they meet a _____, subduction occurs.
- Geologists have found evidence to support this theory in _____.

Deformation of the Crust

How the Crust is Deformed:

_____ - the bending, breaking, and tilting of the earth's crust

_____ - the up-and-down movements of the crust in an attempt to reach isostasy – which is the balance of the upward and downward forces that act on the earth's crust.

Isostatic adjustment and plate movement cause _____ in the rocks that make up the earth's crust. Stress is a force that causes _____ in the rocks of the crust.

This stress causes _____ in crustal rocks. **Strain** is a change in the _____ or _____ of rocks that results from being squeezed, twisted or pulled apart.

Stress – 3 Types

1. _____
when crustal rocks are squeezed together
2. _____
when crustal rocks are pulled apart
3. _____
when crustal rocks are pushed in opposite horizontal directions

Draw & label the 3 types of folds.

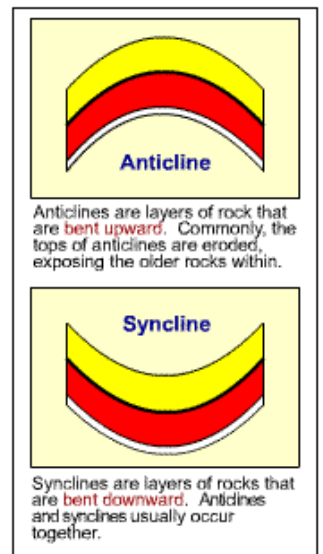
The Results of Stress:

_____ - flat layers of rock are under severe compression and are squeezed from the sides. The layers moved into folded positions without breaking (although some cracks may appear)

- _____ - upward folds
- _____ - downward folds
- _____ - gently dipping bends in

Sketch a monocline

horizontal rock layers



Anticlines and synclines.

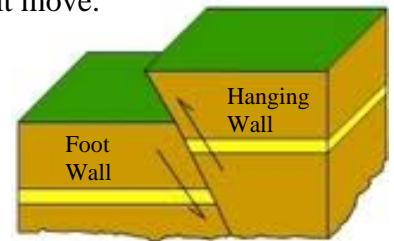
A break in the rock layers along which there is no movement is called a _____.

Once movement occurs, the fracture is known as a _____.

The type of fault is determined by how the blocks of rock on either side of the fault move.

_____ – the block of rock above the fault

_____ – the block of rock below the fault



Three Main Types of Faults:

1. _____
 - occurs along divergent boundaries (tension force present)
 - The hanging wall drops down below the foot wall
2. _____
 - occurs along convergent boundaries (compression force)
 - The hanging wall moves up above the foot wall
 - ❖ _____
 - special type of reverse fault where the hanging wall is pushed at such a low angle (not steep) that it moves UP AND OVER the foot wall
3. _____
 - occurs at transform boundaries (shearing force)
 - The rocks along either side of the fault slide horizontally
 - Ex. _____

Draw & label each of the 4 types of faults.

Mountain Formation:

Four Types of Mountains:

1. _____ - Found where continents have collided.

Ex.

- _____ - areas of flat-topped land high above sea level
 - Ex.

2. _____ - Formed by faults, where part of the earth's crust have been broken into large blocks and then were lifted above the surrounding crust.

Ex.

- _____ - long, narrow valleys formed when blocks of rock slipped downward
 - Ex.

3. _____ - Form when molten rock erupts onto earth's surface.

Ex.

4. _____ - An unusual type that is formed when molten rock rises but does not break through the surface.

Ex.