

Geology Topics Unit Notes

Name: _____

(PLEASE DO NOT LOSE!)

- Continental Drift: The gradual _____ of the _____ across the earth.
- Plate tectonics - The earth's _____ and upper mantle are broken into _____ called plates. These plates float on the mantle like rafts (moving very slowly)

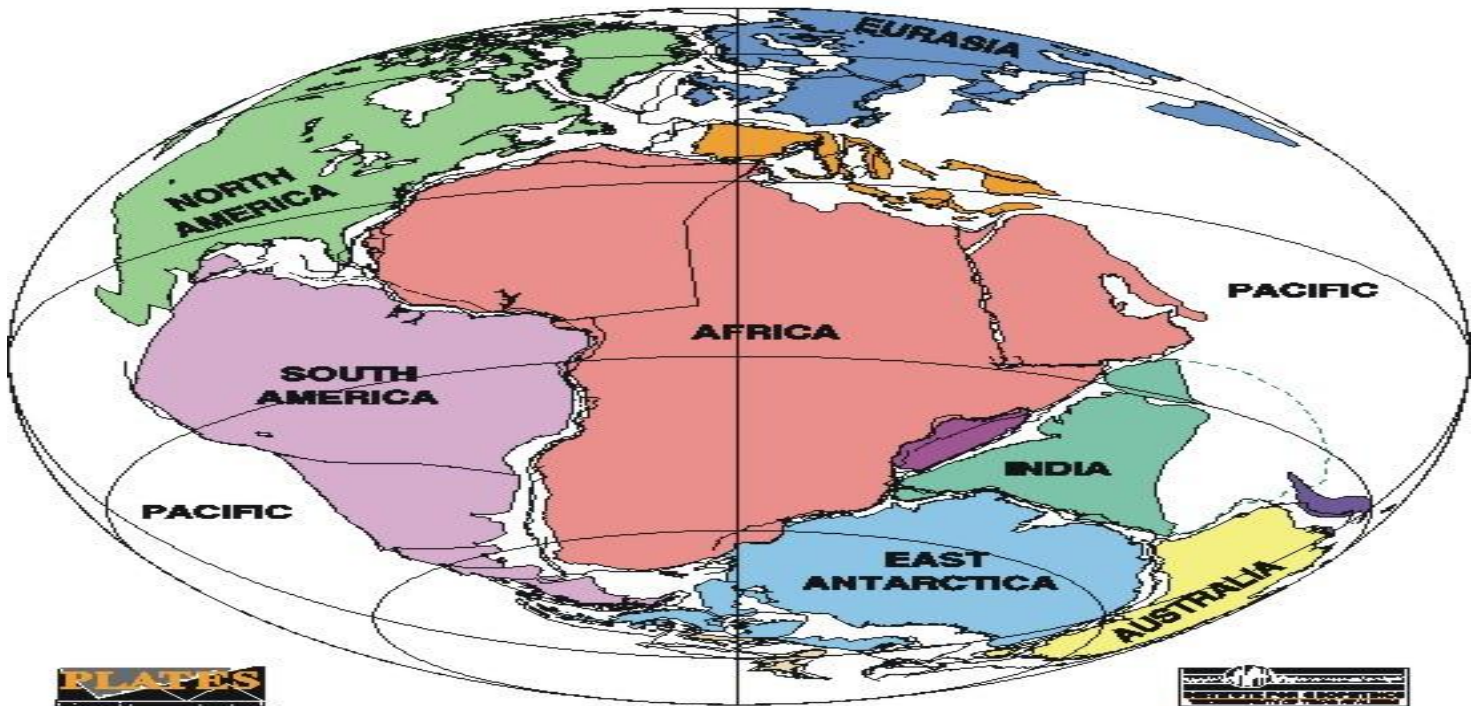
Evidence for Continental Drift

- The Shapes _____
- Same _____ found on different continents
 - These are the pictures on the puzzle pieces.
- The _____ rock structures on different continents
- Fossils of _____ and Animals in Antarctica
- M_____ layers in sea floor spreading

Gondwondaland and Laurasia were two mega _____ before P_____.

Pangea – The “Super Continent” All of the plates were once _____.

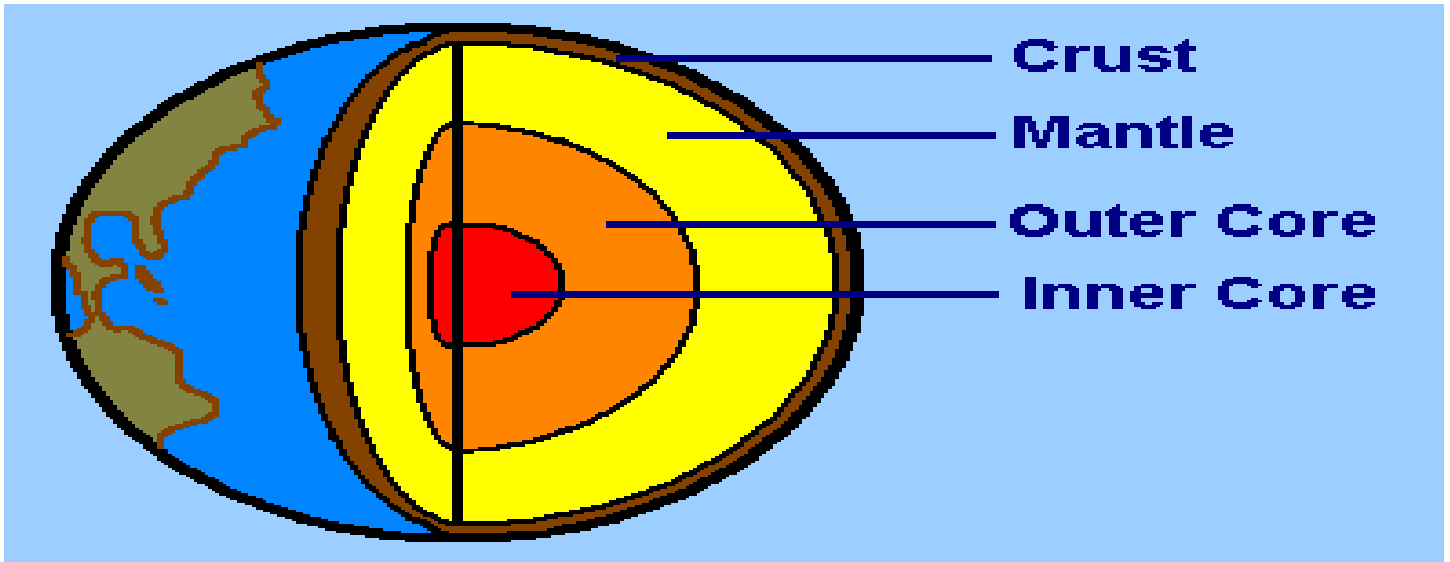
PANGAEA



We know the material of the interior of the earth based on how ___ and _____ waves move through planet.
(Both Body Waves)

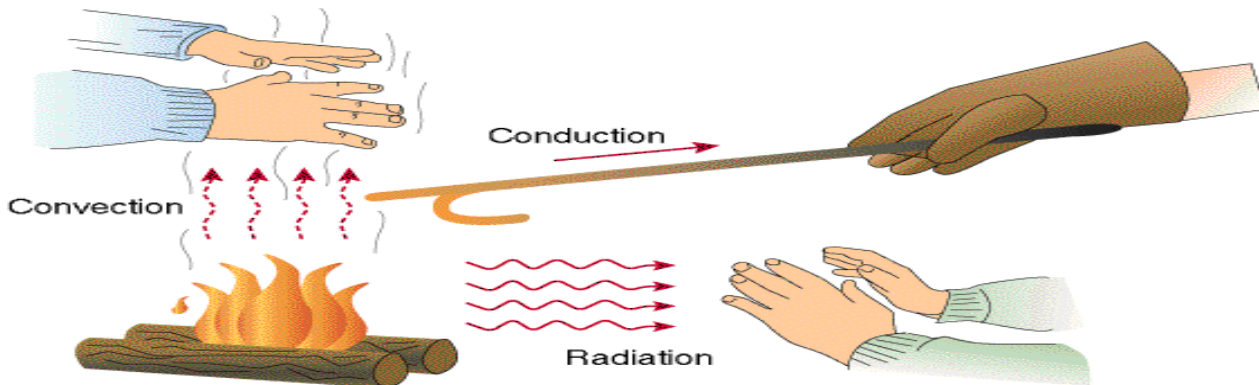
- P Wave: P_____ wave. Moves lateral and faster.
- S Wave: S_____ waves. Stronger and moves back and forth (Slower moving than P)

Layers of the Earth



- Layers formed _____ in Earth System History (Archean Eon) G_____ pulled heavy elements toward the middle.
- Inner Core: S_____ Iron and Nickel (Dense).
- Outer Core: L_____ Iron and Nickel
- Mantle: Composed of Magnesium Silicates, _____, Calcium
 - Outer Mantle (asthenosphere)
- Lithosphere: The outer part of the earth, consisting of the _____ and upper _____.
- Lithosphere is broken into tectonic _____.

Pictures for heat transfer



Convection: Vertical circulation in which warm _____ and cool _____.

--Flow of heat by this circulation.

Conduction: The movement of _____ from one molecule to another.

Radiation: _____ that is radiated or transmitted in the form of rays or waves or particles.

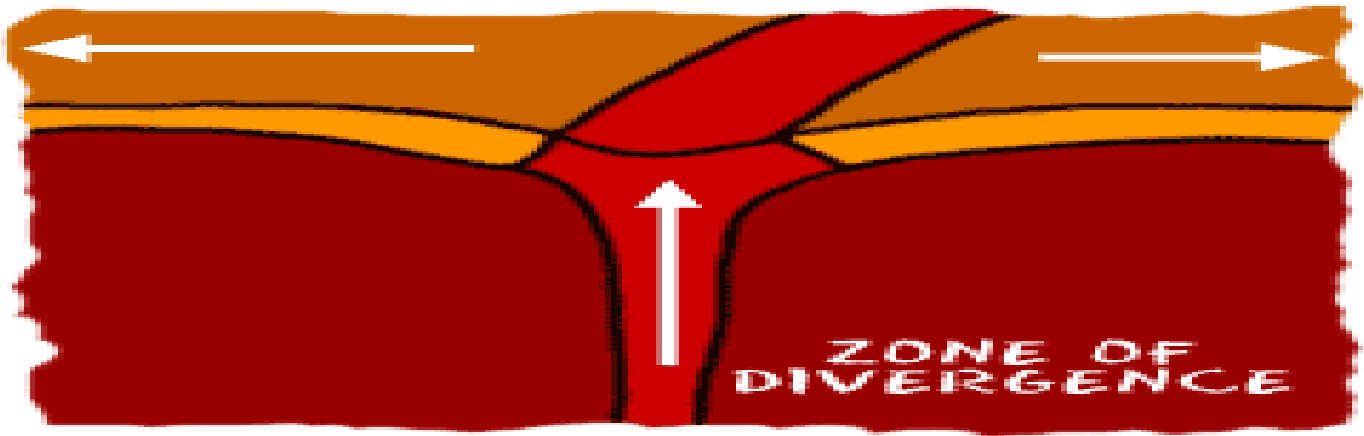
The two types of Crust

O _____ Crust (Basalt) Denser

C _____ Crust (Granite) Less Dense

PLATE BOUNDARIES

Divergent Boundaries: At divergent boundaries new crust is created as two or more plates _____ away from each other.

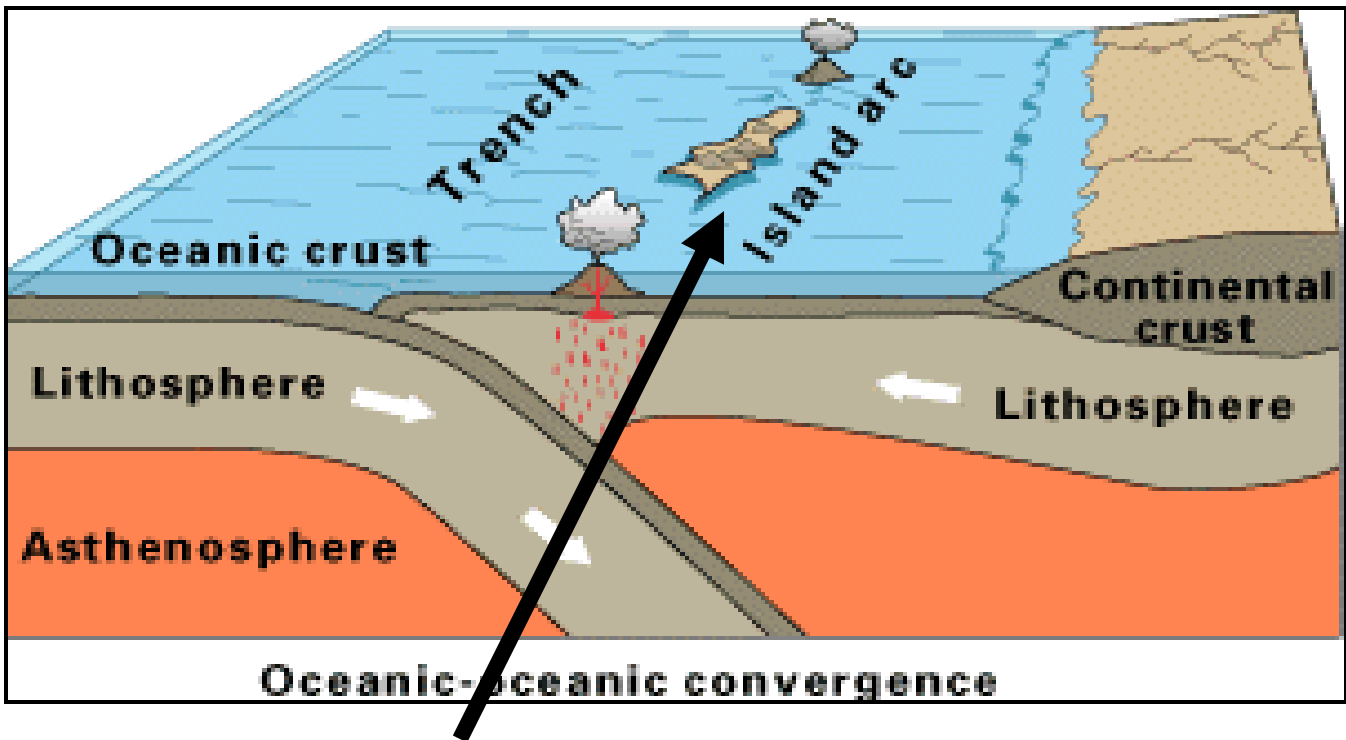


Mid-Atlantic Ridge is like a baseball because it _____ the earth, showing the places where new earth is formed.

Convergent Boundaries: Here crust is destroyed and recycled back into the interior of the Earth as one plate dives _____ another.

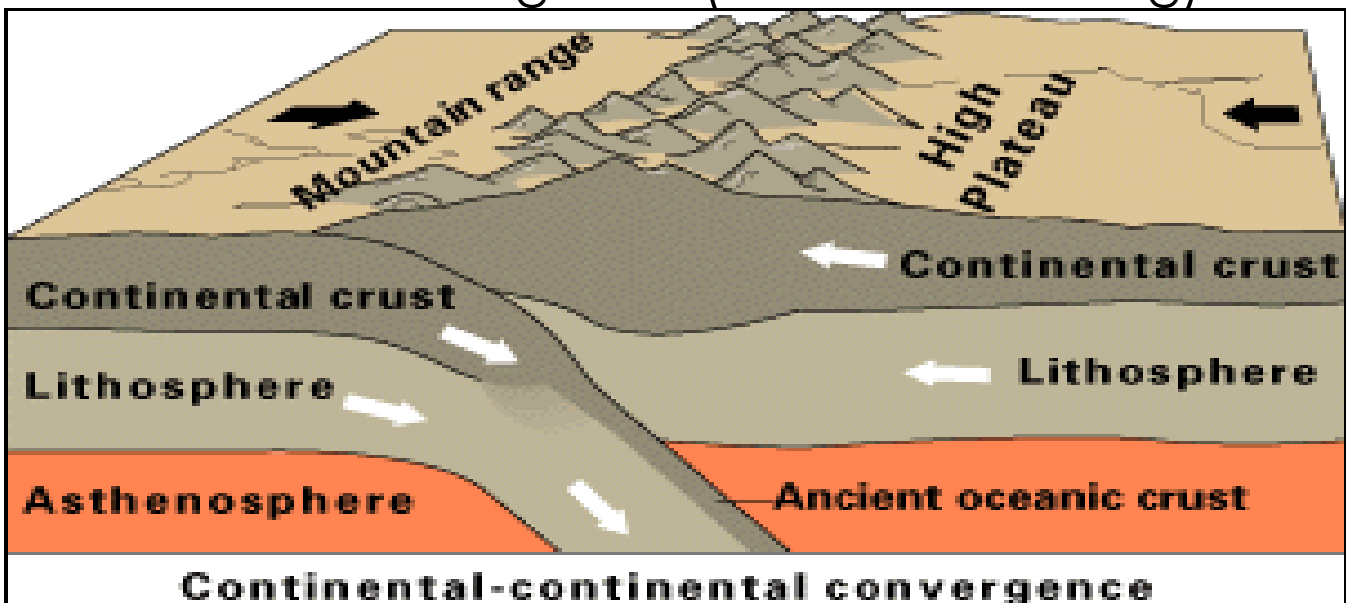


Ocean Convergent: Two ocean plates _____ and one goes under the other.

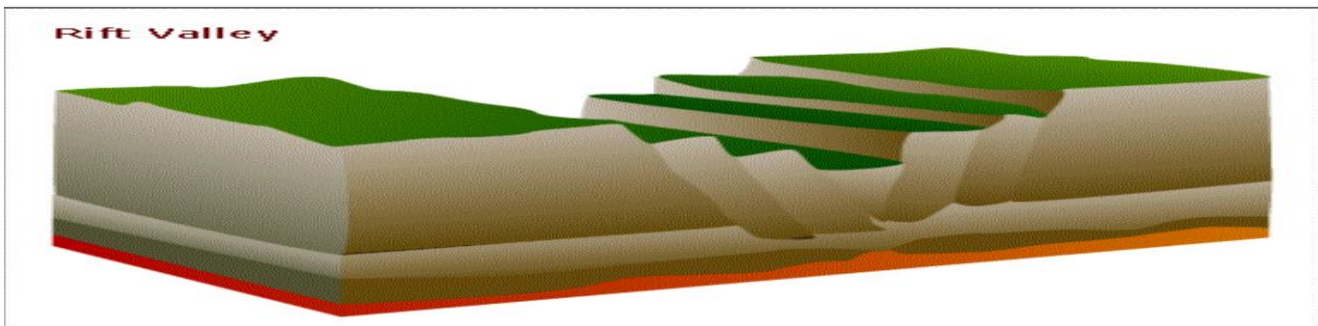


Archipelago (Island Arc) – Group of _____ islands formed from ocean crust convergence.

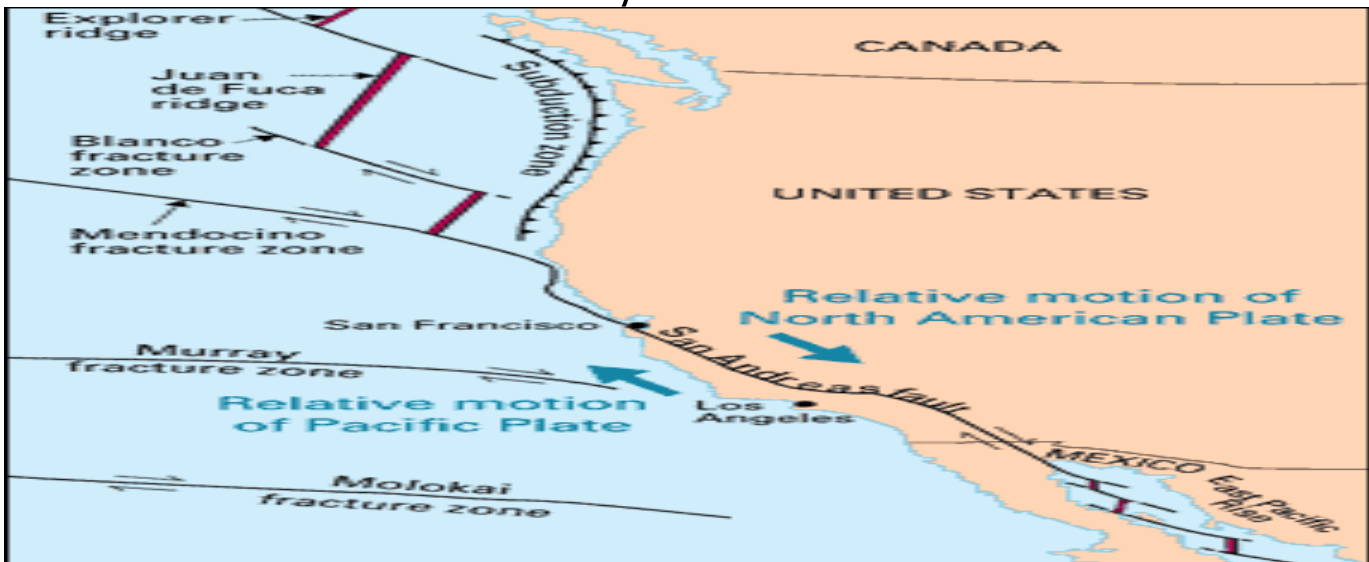
Continental Convergence (Mountain Building)



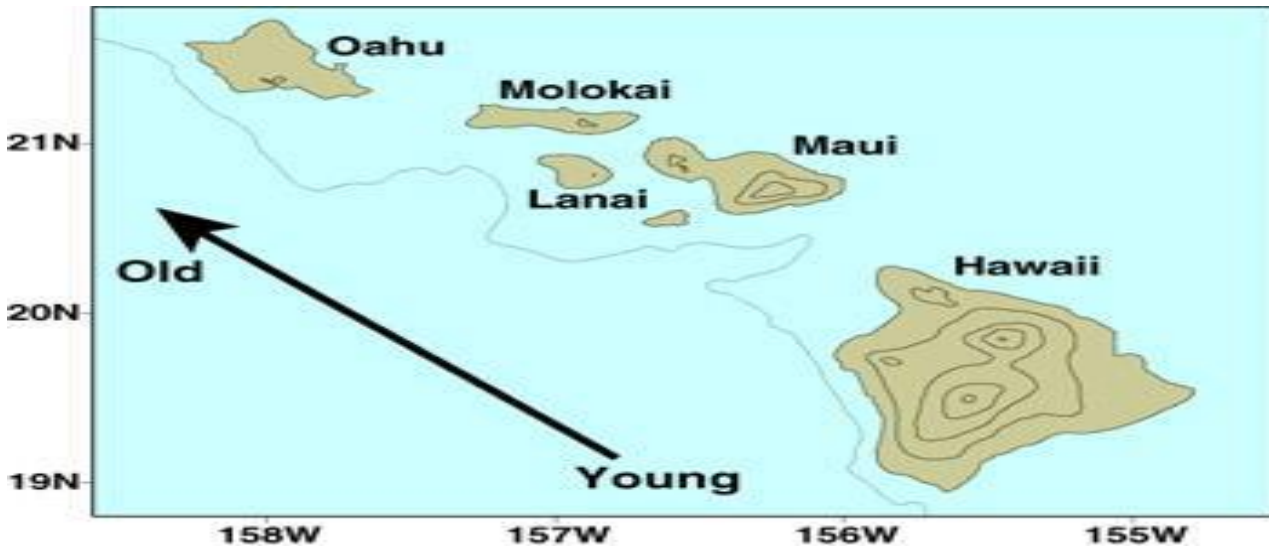
Continent Divergence (Moving _____) Rift Valley



Transform-Fault Boundaries: Where two plates are sliding _____ past one another. (To be discussed more later)



Hawaii is caused by a hot _____: A location above an upwelling of _____ from the mantle.



VOLCANOES

- Volcano - An opening in the Earth's crust through which molten _____ and _____ erupt.

The Negatives of Volcanoes

- D_____ and Destruction
- Loss of land until...?, Permanent loss of structures.
- Release of poisonous and greenhouse _____.
- Eruptions can have a tremendous impact on global _____.
- The positives of volcanoes
 - New _____ is formed
 - Release of healthy _____
 - Many _____ and ores worth \$

-Hominids used obsidian (cutting tools) to advance

-Volcanic ash _____ land

-Volcanic eruptions formed oceans and early

-T_____

Types of Volcanoes

F_____

Shield – Olympus Mons on Mars Ex.

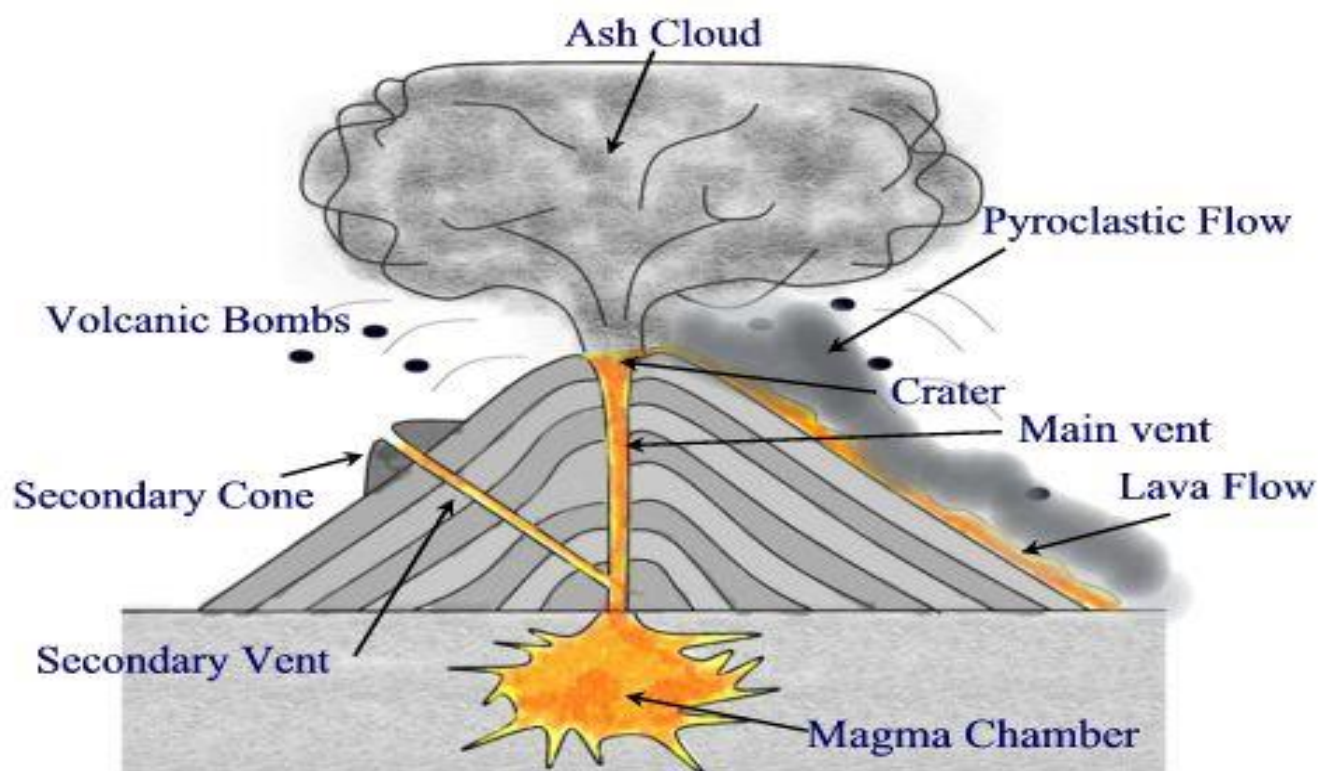
Dome

Ash _____

Composite

Caldera: Large _____ caused by the violent explosion of a volcano that collapses into a depression.

PARTS OF A VOLCANO



Main Features of a Volcano

Pyroclastic rock: Rock _____ from volcano

Lahar - A flow of volcanic ash and water.

Magma is _____ the earth's surface

Lava is above the surface

3 Types of Lava

Felsic lava – High in _____. (sticky and chunky) Highly explosive.

Mafic lava – Flows more, high in _____.

Intermediate – Has a higher amount of silica (Silica = liquid quartz or sand)

Viscosity: Resistance of liquid to _____.

High viscosity = Travels _____ because of high resistance

Low viscosity = travels _____ because low resistance

Types of lava when cooled

'A'ā – R_____ lava, older and has crystalized, Pronounced “ahh ahh”

Pāhoehoe – Fresh lava, (Pa hoy hoy) Basaltic lava that is _____ and flowing.

New Area of Focus: Faults and Folds.

Orogeny: The formation of mountain ranges by intense upward _____ of the earth's crust.

- Usually associated with folding, thrust faulting, and other _____ processes.

Movement of tectonic plates

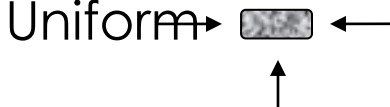
_____ each other causes the plates to fault and fold.

- Stress on a rock can be...

- Compression 

- Tension 

- Shearing 

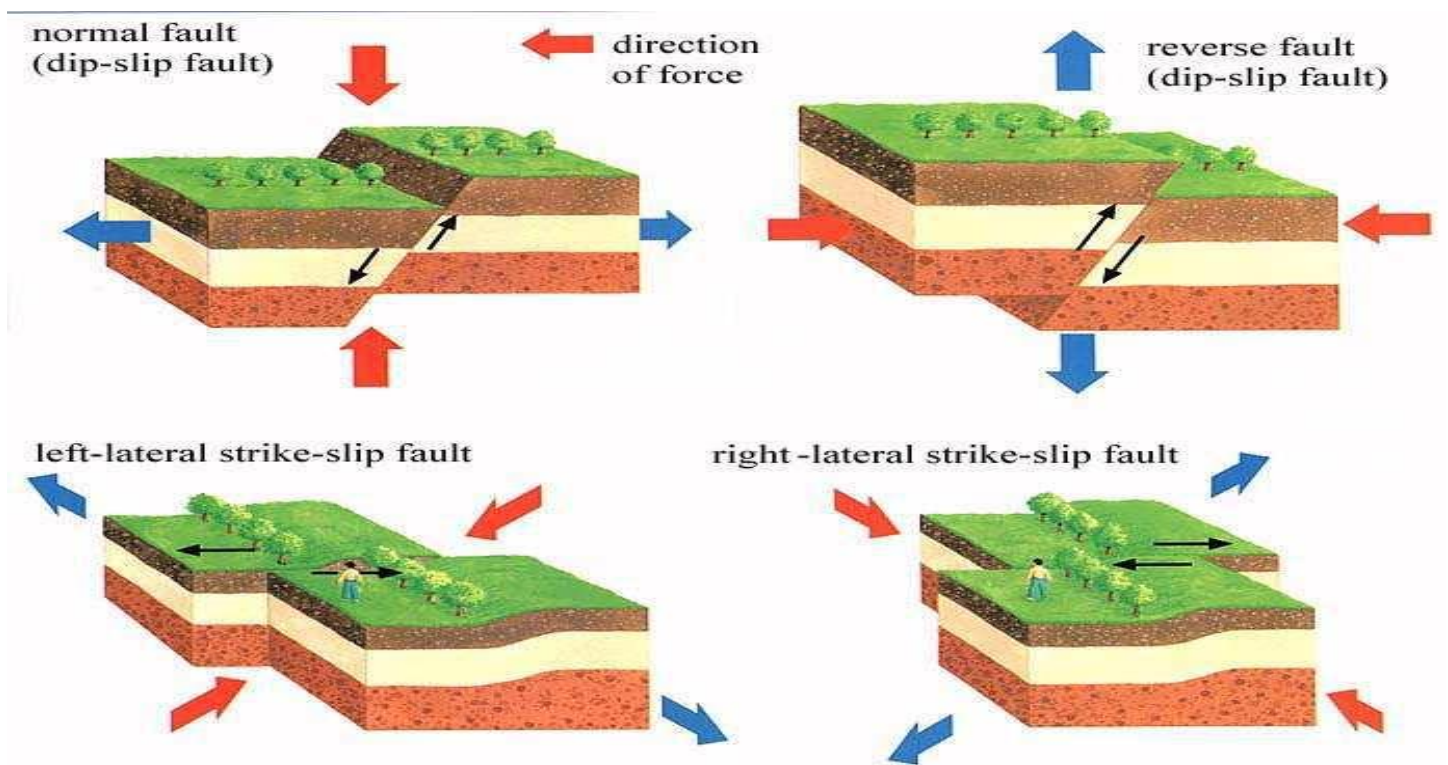
- Confining / Uniform 

- Fault – Break / c_____ where movement occurs.
- Fold – Collision of crust _____ rock layers “stress”

Normal Fault – Pulling _____ tension causes crust to drop down.

Reverse / Thrust Fault – C_____ forces cause crust to move up.

Lateral or Strike Slip Fault – Crust moves _____ each other in opposite directions.



Types of Folds

- Compression
 - Anticline: ☹️ O _____ layer is at core of fold (Oil)
 - Syncline: ☺️ Y _____ later is at core of fold (Water)
- Tension
- Sh _____

Earthquake – Shaking of the earth's crust from a sudden release of _____.

Seismograph - An instrument used to measure the _____ caused by an earthquake

Richter Scale - Scale for measuring earthquake m_____. A magnitude 7.0 earthquake generates _____ times larger amplitude waves than those of a magnitude 6.0.

Epicenter: The point on the Earth's surface that is directly _____ the hypocenter or focus.

- Just above the earthquake.

Tsunami - An ocean wave generated by a submarine _____, volcano or landslide.

- Can travel across whole oceans.

ROCKS AND MINERALS

Rock – Mass or grouping of m_____

They can be big

They can be small

Used in buildings

In_____ (non-living)

Minerals are natural inorganic (non-living) _____
that join together (c_____) to make unique
compositions.

A crystal is a solid in which the _____ are
arranged in a repeating pattern.

Uses of minerals

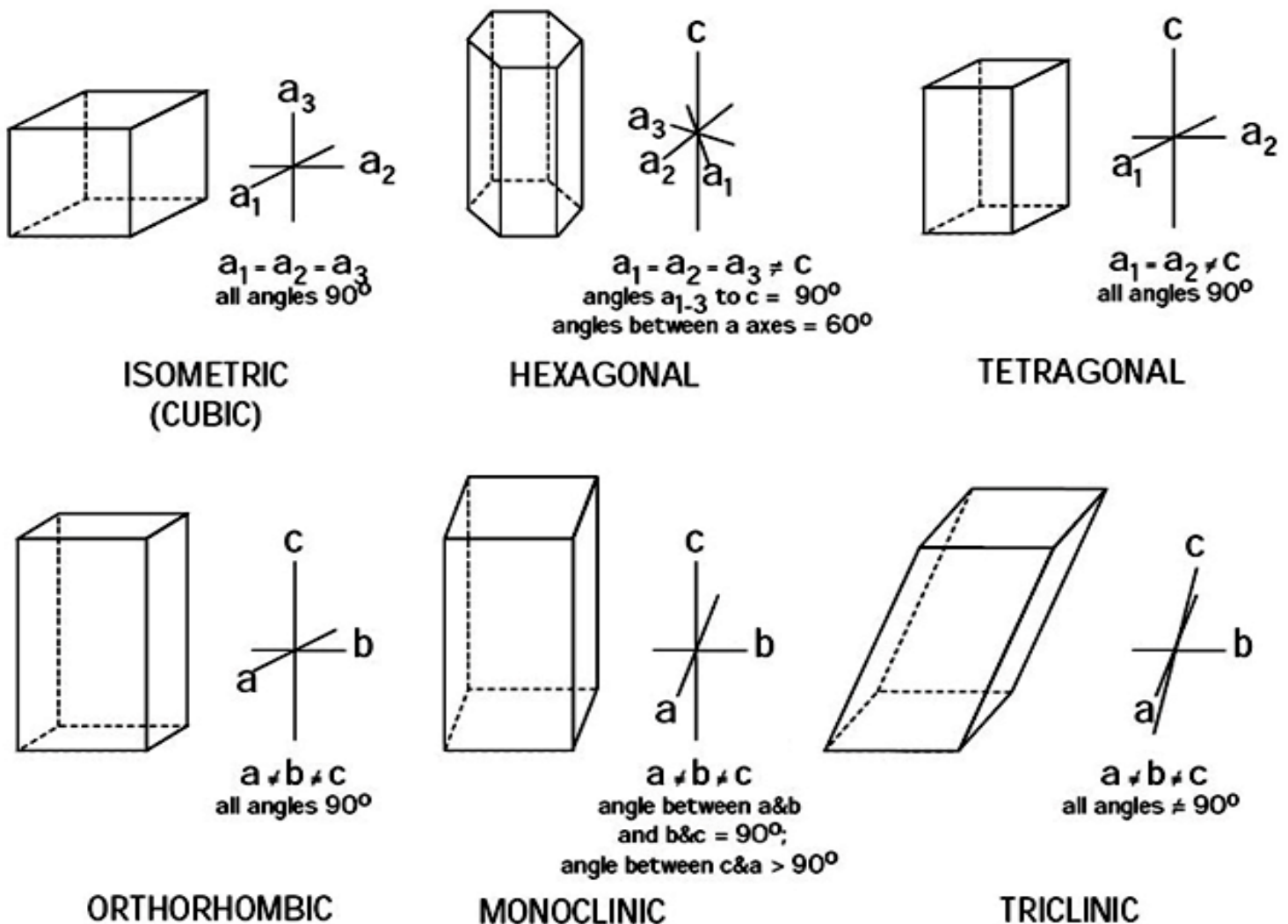
Gems \$

O_____, Mined for \$

Types of crystals.

- H_____. (Four axes, three are equal in length and lie at an angle of 120° from each other).
- T_____ : (3 axis, all unequal and none at 90° angles).

- Or _____: (All axis unequal in length, and 90° degrees from each other).
- M _____: All axis unequal in length. Two of them are at right angles to each other, while the third is lies at an angle other than 90° .
- T _____. (Three axes, two are equal in length, one is unequal.)
- I _____: (All three axes are equal in length an at 90° degrees from each other.)



Crystal Properties / Chemical Bonds

- **C**_____ **Crystals:** Covalent bonds between all of the atoms.
Example: Diamond, Zinc Sulfide crystals.
- **M**_____ **Crystals:** Individual metal atoms of metallic crystals sit on lattice sites.
 - Many free electrons. High melting points.
- **I**_____ **Crystals:** The atoms are held together by electrostatic forces (ionic bonds).
 - Ex: (NaCl) table salt
- **M**_____ **Crystals:** Contains recognizable molecules within their structures.
 - Held together by non-covalent interactions, like van der Waals forces or hydrogen bonding.
 - Example – Sucrose in rock candy, ice cube

- Two main types of minerals

Silicate Minerals – Contain _____ and oxygen. 75% of all minerals.

Non-silicate minerals

Non-silicate minerals: All others.

Physical Property of Minerals- a characteristic that can be observed or measured without _____ the identity of the substance.

Luster – How light is _____ from a mineral.

- Metallic (shiny)
- or non-metallic (dull)

Hardness – How easily a mineral can be _____.

Color – Tells what _____ make up the mineral.

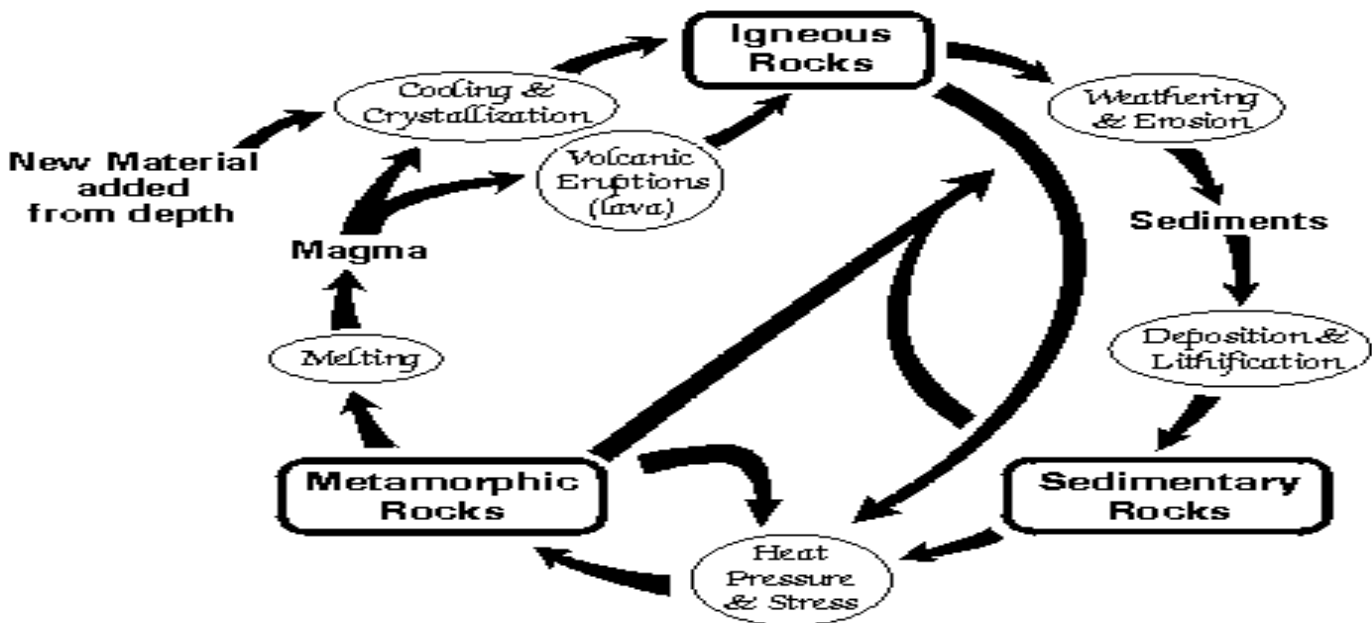
Streak – The _____ of the mineral when it is broken up and powdered

Specific Gravity – How _____ the mineral is?

The rock cycle – How one rocks _____ into another.

- Driven by continental _____ (plate tectonics)

The Rock Cycle



Igneous Rocks: Molten Earth _____.

- Intrusive – Cooled _____ crust (slow)
 - L_____ crystals
- Extrusive – Cooled _____ Earth's surface (faster).
 - F_____ grain crystals or no crystals.
- Igneous rocks
 - Mafic (D_____ in color) is used for silicate minerals, magmas, and rocks which are relatively high in the _____ elements. (Magnesium and Iron)
 - Felsic (L_____ in color) is used for silicate minerals, magmas, and rocks which have a _____ percentage of the

heavier elements. Have more of the lighter elements. (S_____ and o_____, aluminum, and potassium) Feldspar

Classification of Igneous Rocks

B_____ – Dark, heavy (dense), Iron

G_____ – Light colored, less heavy, filled with oxygen

A_____ – Between the two

Common Igneous Rocks

Granite is Igneous Rock types include Q_____ and f_____

Basalt

Ob_____ – Glassy

Gabbro

Rhyolite

Metamorphic – Rock that _____ forms due to extreme _____ and _____.

Common Metamorphic Rocks

Slate

Gniess

M_____

Schist

Sedimentary Rocks

Sediments are c_____ and
c_____ together

Caused by weathering, erosion, and deposition

Usually l_____

Layers can be from old living materials
(_____).

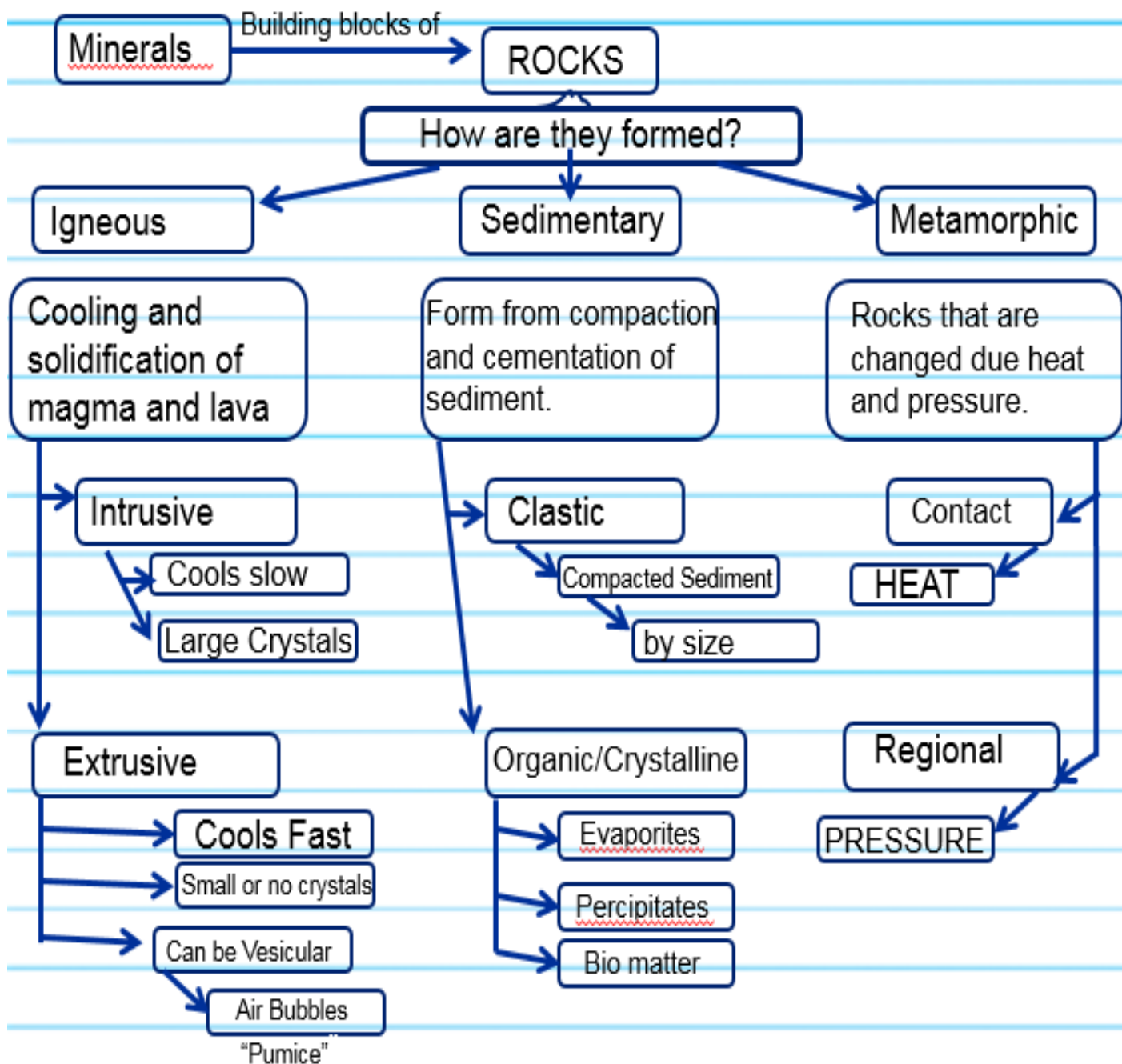
Common Sedimentary Rocks

L_____

Sandstone

S_____

Conglomerate



Earth System History

Earth History Components

- Earth system history has _____, _____, and _____ components

- Uniformitarianism: Laws of nature have n____
c_____ over time.
- The system is fragile. Changes in living conditions for animals have been _____
throughout earth's history.
- 99.5% of all things that have ever lived have become _____.
- **Principle of superposition – O_____ rocks and fossil are on bottom, y_____ on top.**

C - Youngest

B - Middle

A - Oldest

| GEOLOGIC TIME SCALE | | | | | | | | | |
|---------------------------------------|------------|--|---|---|--|-----------------|---|-----|----------------------|
| Time Units of the Geologic Time Scale | | | | Development of Plants and Animals | | | | | |
| Eon | Era | Period | Epoch | | | | | | |
| Phanerozoic | Cenozoic | Quaternary | Holocene | Earliest <i>Homo sapiens</i> Earliest hominids "Age of Mammals" Extinction of dinosaurs and many other species First flowering plants First birds Dinosaurs dominant First mammals | | | | | |
| | | | Pleistocene | | 0.01-1.6 | | | | |
| | | Tertiary | Pliocene | | 5.3 | | | | |
| | | | Miocene | | 23.8 | | | | |
| | | | Oligocene | | 33.7 | | | | |
| | | | Eocene | | 55 | | | | |
| | | | Palaeocene | | 65 | | | | |
| | Mesozoic | Cretaceous | 145 | "Age of Reptiles" | | | | | |
| | | Jurassic | 208 | | | | | | |
| | | Triassic | 248 | | | | | | |
| | Palaeozoic | Carboniferous | Permian | "Age of Amphibians" | Extinction of trilobites and many other marine animals First reptiles Large coal swamps Amphibians abundant | | | | |
| | | | Pennsylvanian | | | 286 | | | |
| | | | Mississippian | | | 320 | | | |
| | | Devonian | 360 | | | "Age of Fishes" | First amphibians First insect fossils Fishes dominant | | |
| | | | Silurian | | | | | 410 | |
| | | | Ordovician | | | | | 438 | |
| | | | Cambrian | | | | | 505 | |
| | | | Vendian | | | | | 545 | "Soft-bodied faunas" |
| 650 | | | | | | | | | |
| Proterozoic | 2500 | Collectively called Precambrian | | First multicelled organisms | | | | | |
| Archean | | comprises about 87% of the geological time scale | | | | | | | |
| Hadean | | 3800 | First one-celled organisms Age of oldest rocks | | | | | | |
| | 4600 Ma | Origin of the earth | | | | | | | |

Precambrian

Hadean, Archean, and Proterozoic Eon's

Earth's M_____ layers form (Denser to middle)
Formation of Earth's Crust (c_____).

- Meteorites bombard the planet and carry with it water molecules and amino acids (building blocks of protein).



M_____ created from protoplanet impact
(Theia)

A_____ originates (No oxygen yet)

Earliest _____ begins (primitive protocells)

- Microbes helped produce an _____ atmosphere through photosynthesis.

First Multi-cellular life (_____ cells)

Explosion of new a_____ (sea)

Paleozoic Era

Vendian, Cambrian, Ordovician, Silurian, Devonian, Carboniferous, and Permian Periods.

M_____ invertebrates dominate

Jawed _____ Evolve

Plants invade _____ (Oxygen to atmosphere)

l_____ emerge

First Amphibian

First R_____

First winged insect

Mesozoic Era

Triassic, Jurassic, Cretaceous Periods

D_____ dominate

First Birds

First Mammals

First F_____

K-T Mass Extinction Event, _____ mya

Cenozoic Era

Tertiary, and Quaternary Periods

M_____ change

Earliest Monkeys

Climate becomes drier

Panama attaches South America to North America

First _____ hominids

Modern Man (Whoa)

Civilization

Age of Exploration, Industrial and Computer Age

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