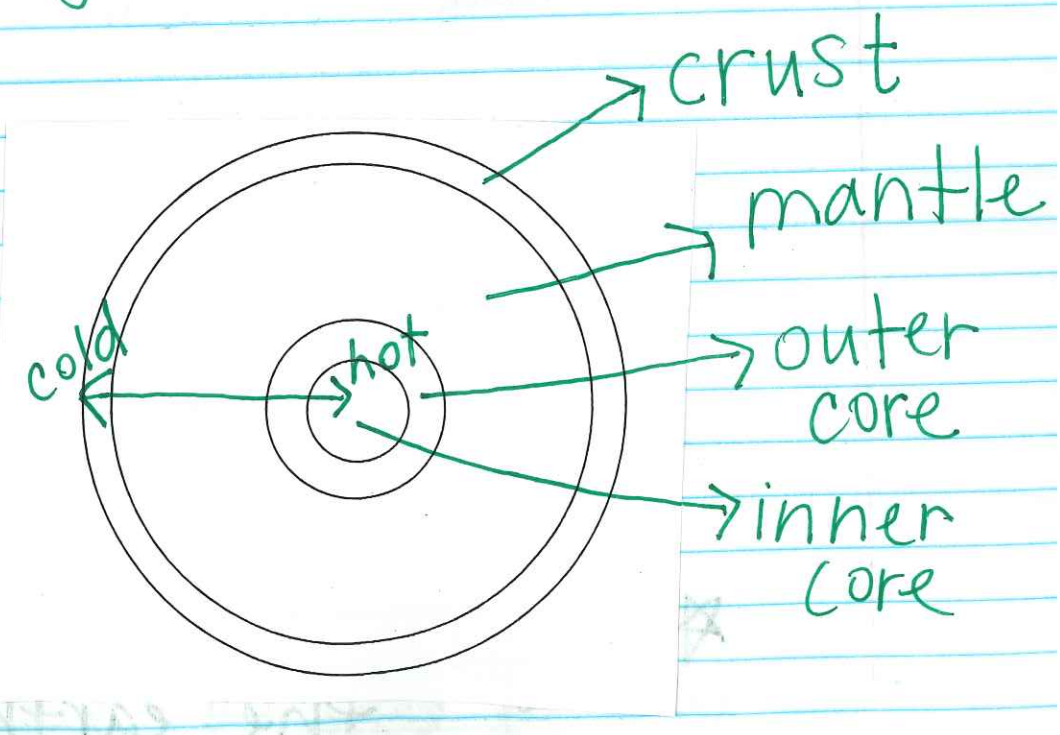
Earth ← **Geology** → The study of

Geology - The study of the Earth

Geologist - The scientist that studies Earth.

Interior Structure of the Earth (Layers of the Earth)



The Crust

The crust is the hard layer of rock that surrounds the Earth. It makes up 1% of Earth's volume.

The crust can range from 3-30 miles thick. The crust is less thick on the ocean floor.

★ where we live and walk.

The Mantle

The mantle is a large layer of very hot, partially melted rocks. It makes up 84% of the Earth's volume.

The mantle is about 1,800 miles thick. The lava that comes out of a volcano comes from the mantle.

★ magma - inside the earth

The Outer Core

The outer core is hotter than the mantle.
It is made of liquid iron and nickel.

The liquid spins and causes our Earth to have a magnetic field.

The Inner Core

The inner core is the hottest part of our planet. It is believed to be solid iron and nickel.

The core makes up 15% of our Earth's volume.

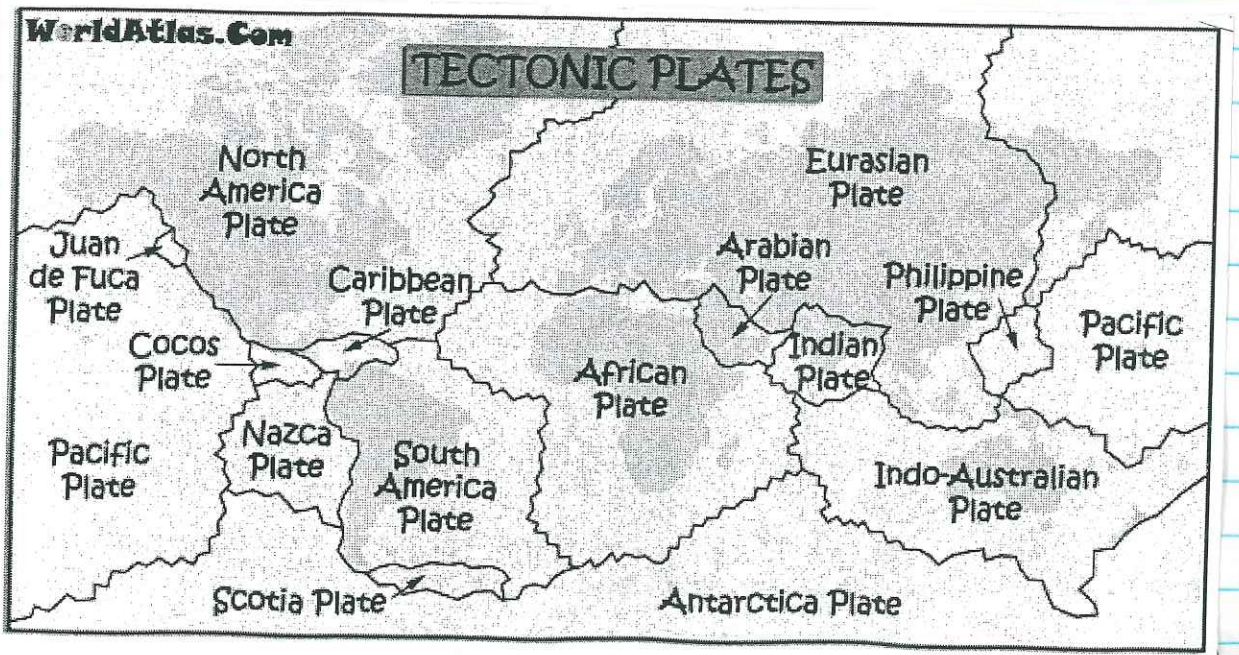
inner and outer

* The inner core is as hot as the outside of the sun.

Plate Tectonics

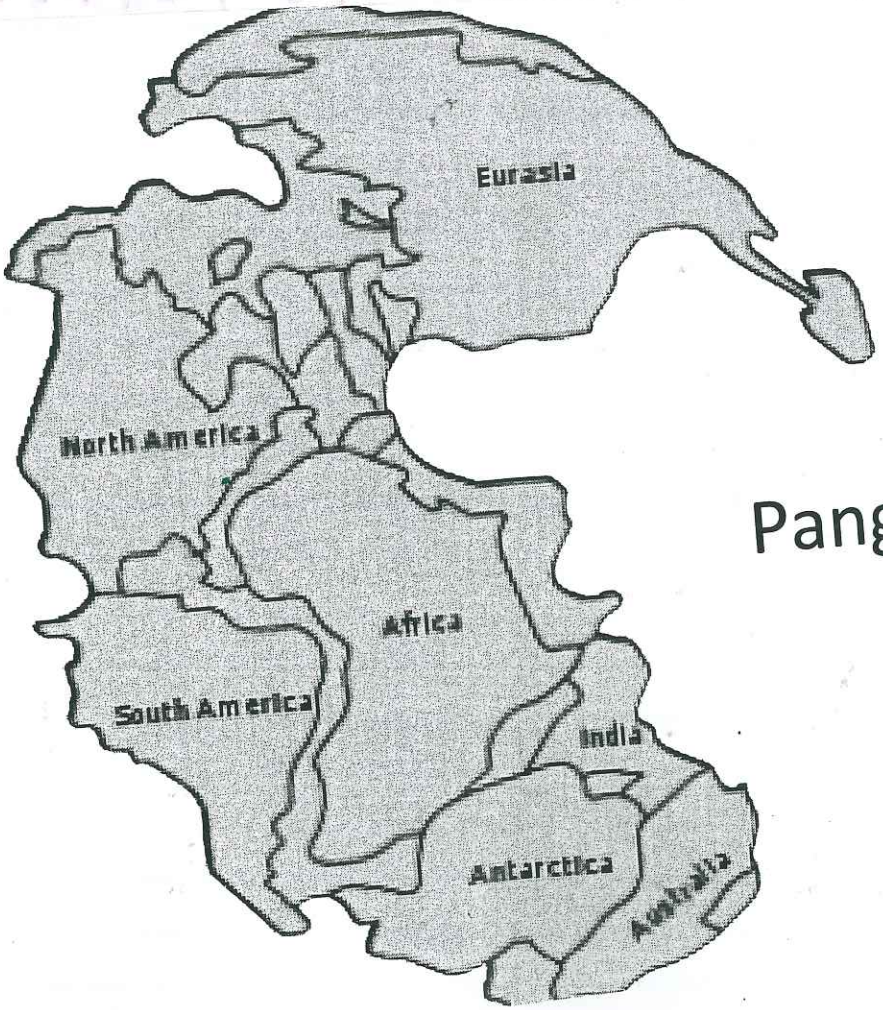
The theory that the crust is made of large "plates" that move slowly. (about 1in per year)

- Fit together like a puzzle.
- Move because of the heat from the mantle.



Pangea

- Scientist believe that at one time, all the continents were together.
- They broke apart in what we call "Continental Drift"



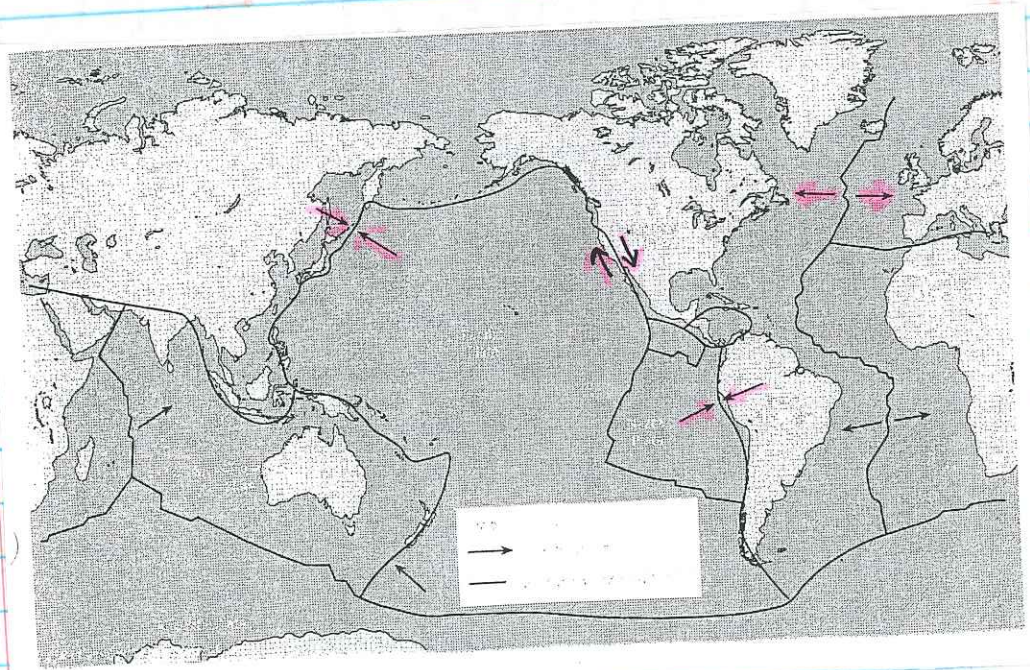
Pangea

Types of Plate Boundaries

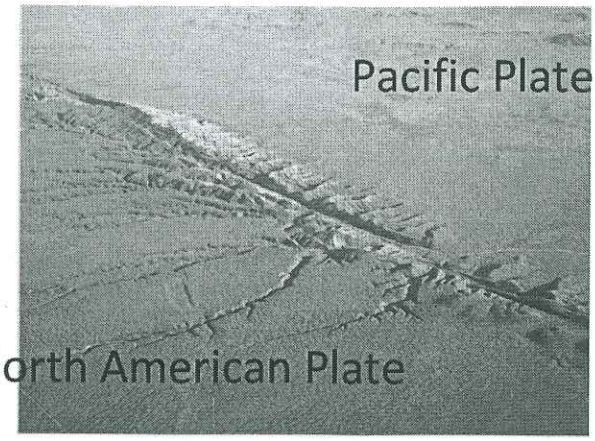
Boundary: edge/border

1. Divergent: plates that pull apart.
2. Convergent: plates that push together.
   - ☆ Subduction - one plate gets pushed under another.
   - ☆ mountain building
3. Transform/Sliding Plates that slide past each other.
   - Most common for creating earthquakes

Divergent	← →
Convergent	→ ← (subduction; mountain building)
Transform	↑ ↓



San Andres Fault (California)



* The San Andres Fault shows a place where 2 tectonic plates meet.
* This is a transform boundary.

Earthquakes

- Seismology - study of earthquakes.
- seismologist - scientist

* Caused by shifting earth.
* Most movement is happening on the boundaries of tectonic plates.
* Earthquakes are measured on the Richter Scale. (Rick-ter)

A scale from 1-10.

Tsunami- a large wave caused by an underwater earthquake.

→ The wave starts small, but gains power as it gets closer to land.

Volcanoes

* most common on the boundaries of tectonic plates.

* If a volcano is inside a plate, it's over a Hot Spot.
  ex. Hawaii

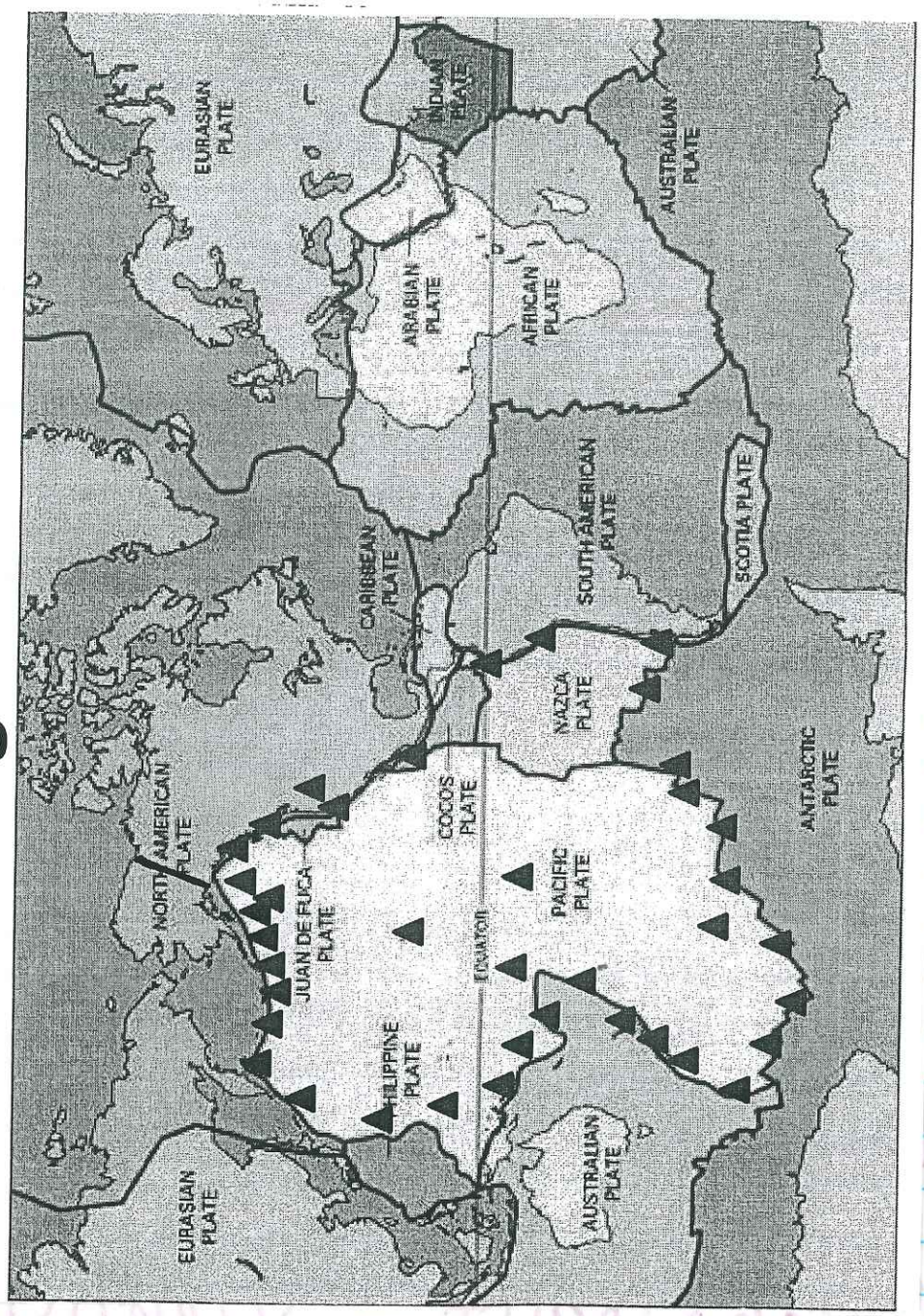
* same substance
  - **Magma** - inside the Earth
  - **Lava** - outside the Earth.

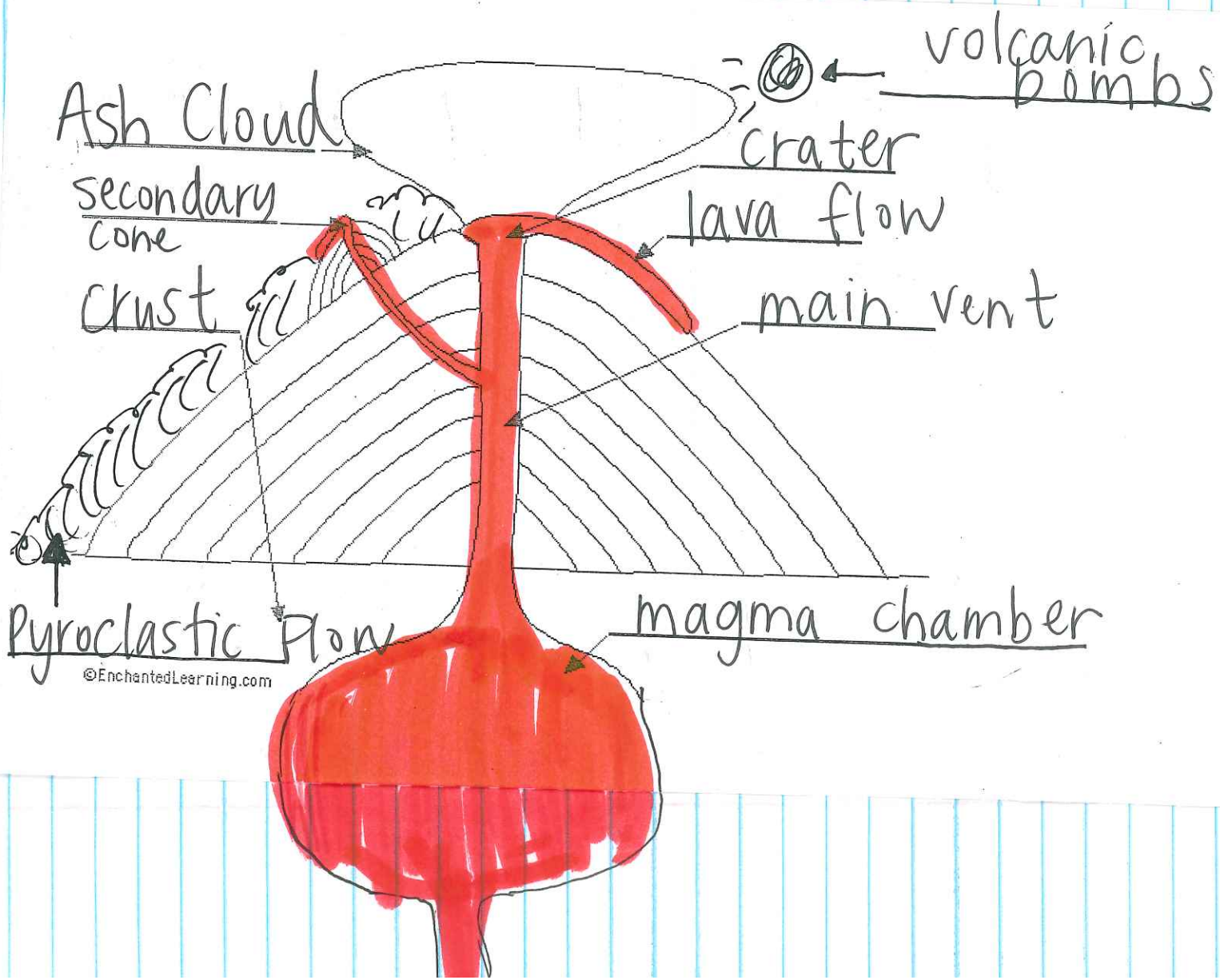
Volcanology - study of Volcanoes

Volcanologist - scientist

Active- recent eruptions
Dormant - have not erupted recently, but they could.
Extinct - magma chamber has turned into rock and can not erupt.

Ring of Fire!!!




volcanic bombs
Ash Cloud
crater
secondary cone
lava flow
crust
main vent
Pyroclastic Flow
magma chamber
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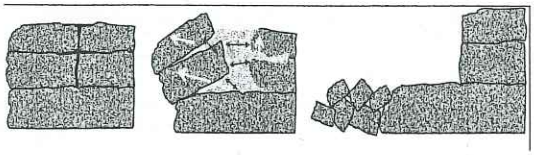
Weathering: the process of breaking down rocks into smaller pieces the action of ice, water, temperature changes, and chemical means.

Mechanical or Physical Weathering – breaks apart rocks without any chemical change to the rock itself.



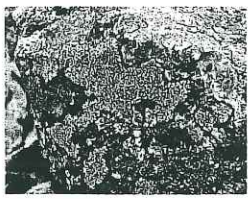
Freeze-thaw

pothole

Burrowing Animals

Tree Roots

Chemical Weathering – acts on the small fragments and rearranges the elements into **new** minerals, which are more easily carried away.



Lichens, a type of fungus, grow on rocks. They produce an acid that changes the rock chemically.

*Acid Rain

Erosion: the continuous wearing away of land by wind, water and ice.

*Erosion *moves* particles of rock!*

Wind Erosion:

Fences can help dunes fight wind erosion.

Over time, wind can form rocks into interesting shapes.

Water Erosion:

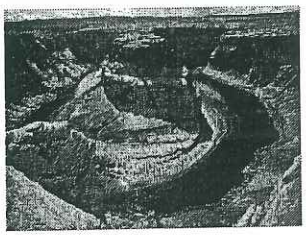
Water can carve arches into stone.

The Colorado River is responsible for one of America's natural wonders: The Grand Canyon!

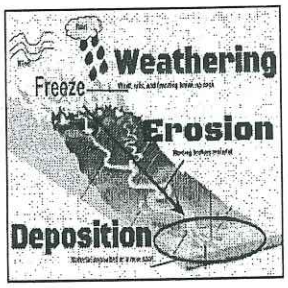
Ice Erosion:

Glaciers, or huge pieces of ice, can drag rocks and soil long distances and can even carve mountains. This is a path left behind by a glacier.

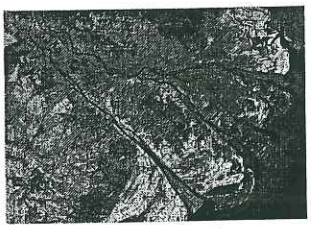
Deposition: where sediments settle after being weathered and eroded.



Sediments deposit along curves of the Colorado River (in the Grand Canyon)



Sediments flow downstream and end up in larger bodies of water.



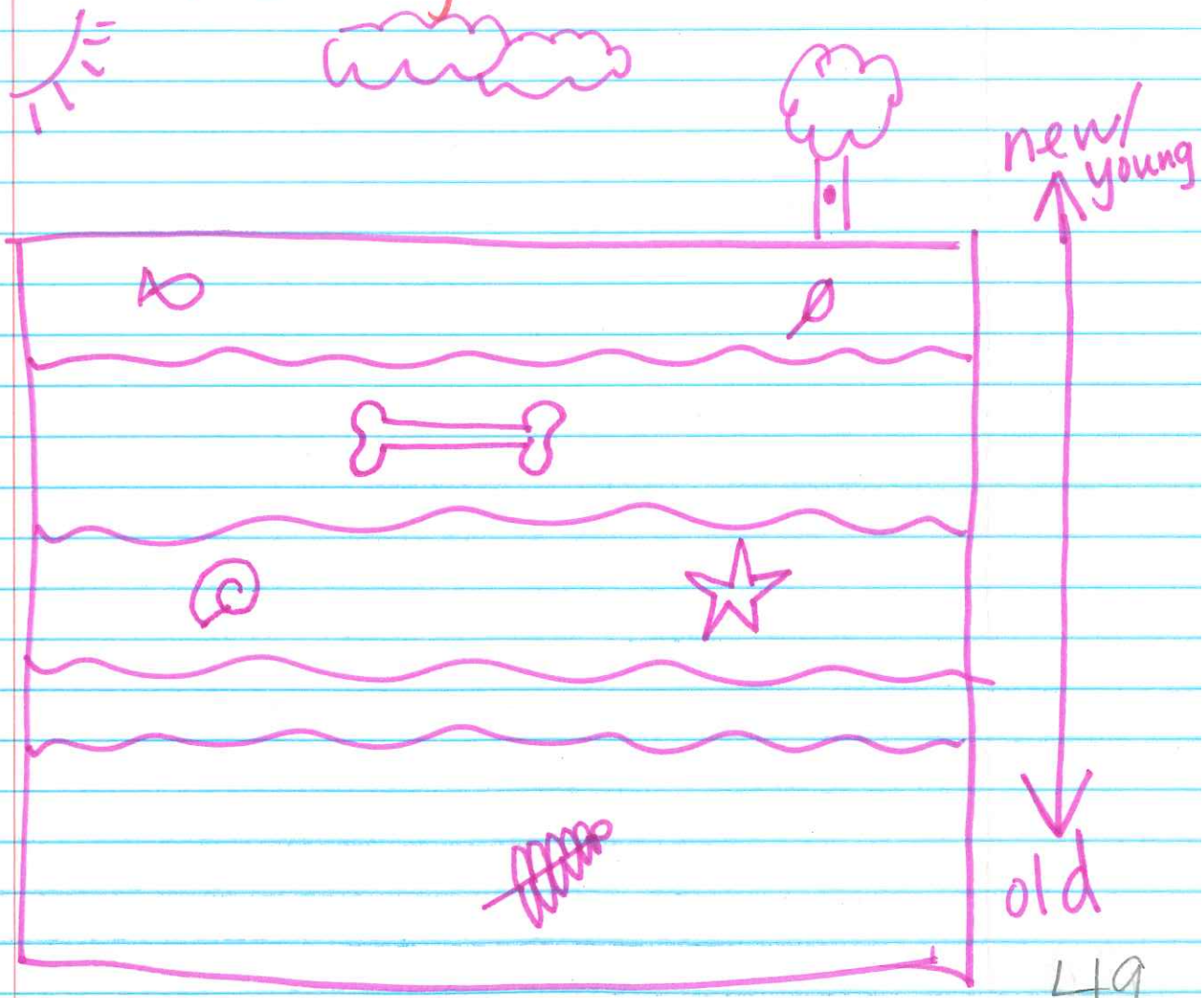
Deltas are examples of how sediments deposit at the mouth of a river.

Fossils

A record of a once living thing in rock.

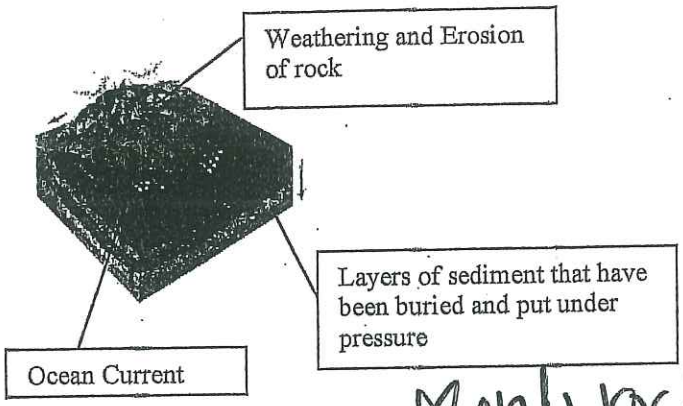
Fossil Record - tells us that the deeper the fossil, the older it is.

Strata - layers of rock



Sedimentary Rock: Rock formed from sediment that has been buried and squeezed solid by pressure from above.

How a sedimentary rock is formed:

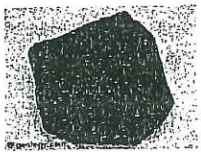


*only rocks that have fossils

Common forms of sedimentary rock

Conglomerate

Sandstone



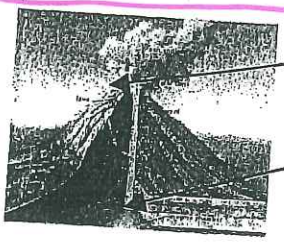
Siltstone

Breccia

50

Igneous Rock: is formed from the cooling and solidification of magma or lava.

Igneus is Latin for 'of fire.'



Lava - Extrusive

Magma - Intrusive

1. Extrusive – Extrusive igneous rocks are formed from lava, which is on the outside of the Earth. When the lava cools the rock can be smooth like obsidian, or porous like pumice. The reason pumice is rough and has holes is because of the carbon dioxide that escaped while it cooled.

Obsidian

Pumice

2. Intrusive – Intrusive igneous rocks are formed from magma, which is still inside the Earth. When igneous rocks cool inside the Earth, it takes longer than if the rocks were on the outside. This cooling process makes rocks with larger grains that can be easily identified. One of the most common intrusive igneous rocks is granite.

Granite

Metamorphic Rock: is formed when a rock comes in contact with intense heat and pressure.

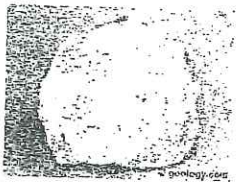
Metamorphosis is Latin for 'changing form.'

Sedimentary, igneous, and even other metamorphic rocks can be changed into metamorphic rocks!

Example:

Limestone
(Sedimentary)

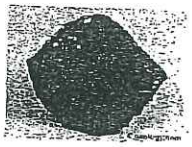
Extreme heat



Marble
(Metamorphic)

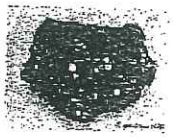
It also depends on how close the rock is to the heat source (magma chamber) to determine what kind of rock it becomes. The following three rocks originated from shale.

Slate



phylite

shist



hot → hotter → hottest

Sedimentary

Keywords:
1. weathering/erosion/deposition
2. compaction/cementation
3. sediments
4. fossils

Where are they found?
Under water or where there once was water

Igneous

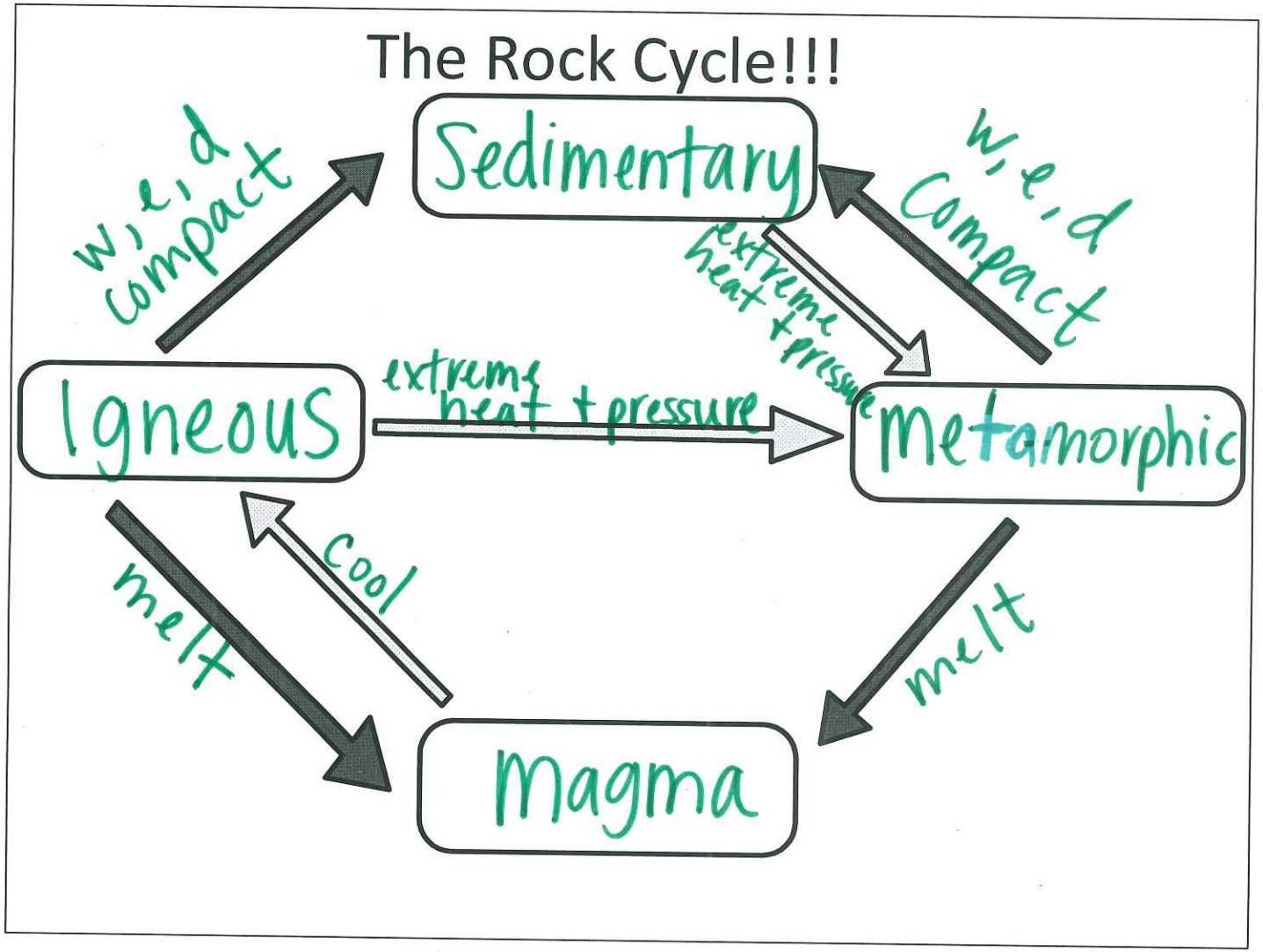
Keywords:
1. lava
2. magma
3. cooling

Where are they found?
Volcanos in/by magma chambers

Metamorphic

Keywords:
1. extreme heat/pressure
2. change
3.

Where are the found?
- close to magma chambers
- near the edge of the crust by the mantle


The Rock Cycle!!!
Sedimentary
Igneous
Metamorphic
Magma
w, e, d
compact
w, e, d
Compact
extreme
heat + pressure
extreme
heat + pressure
melt
cool
melt