Bell Ringer

- Pick your new seats!
- Make sure you have your new Volcano notes.
- In your science journal answer the following

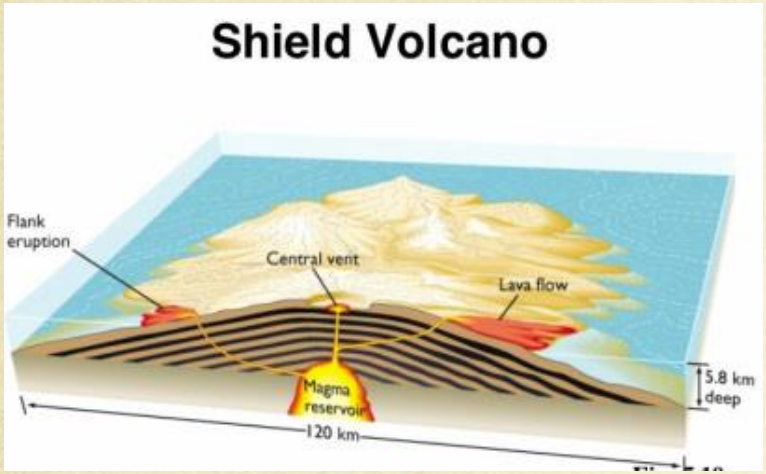
1. What causes a volcano?
2. What do you think was the biggest volcano eruption in all of Earth's history?

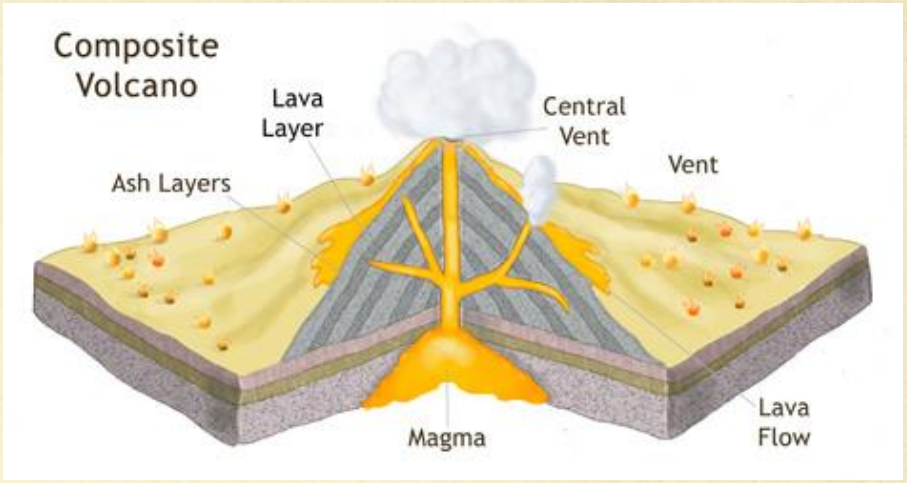
Volcanoes Teacher Copy

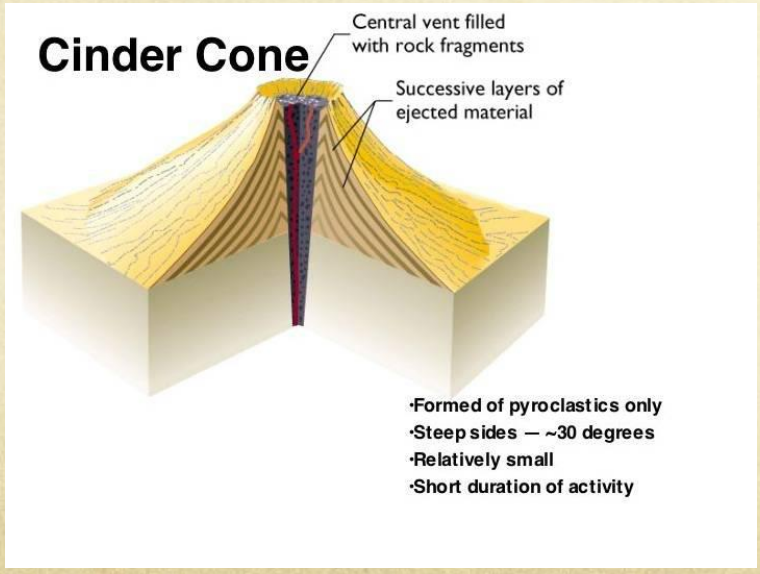
- Volcanoes in history
- Yellowstone

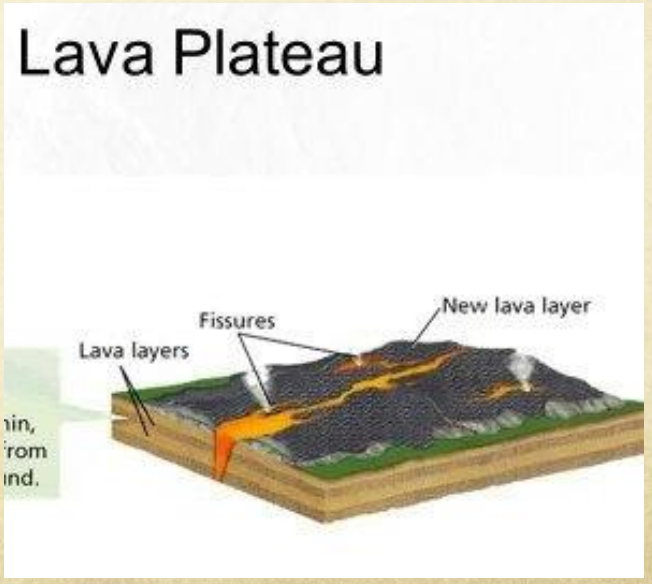
Volcano Landforms From Lava & Ash

There are 4 types of volcanos!



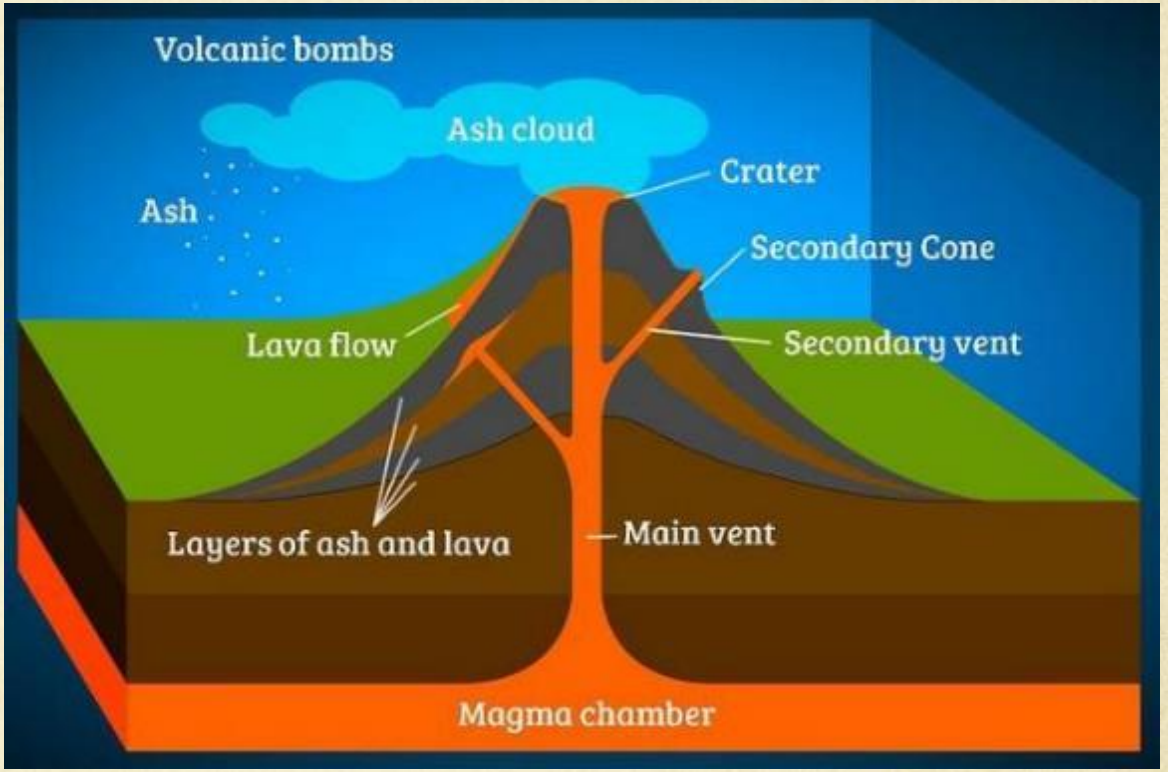






Volcanoes & Plate Tectonics

- Volcano- a weak spot in the crust where molten material called magma comes to the surface
- Magma is a molten mixture of rock-forming substances, gases and water from the mantle
- When magma reaches the surface it is called Lava



Nat Geo Volcanoes 101

Twig Volcano

Dr. Bionics

RING OF FIRE

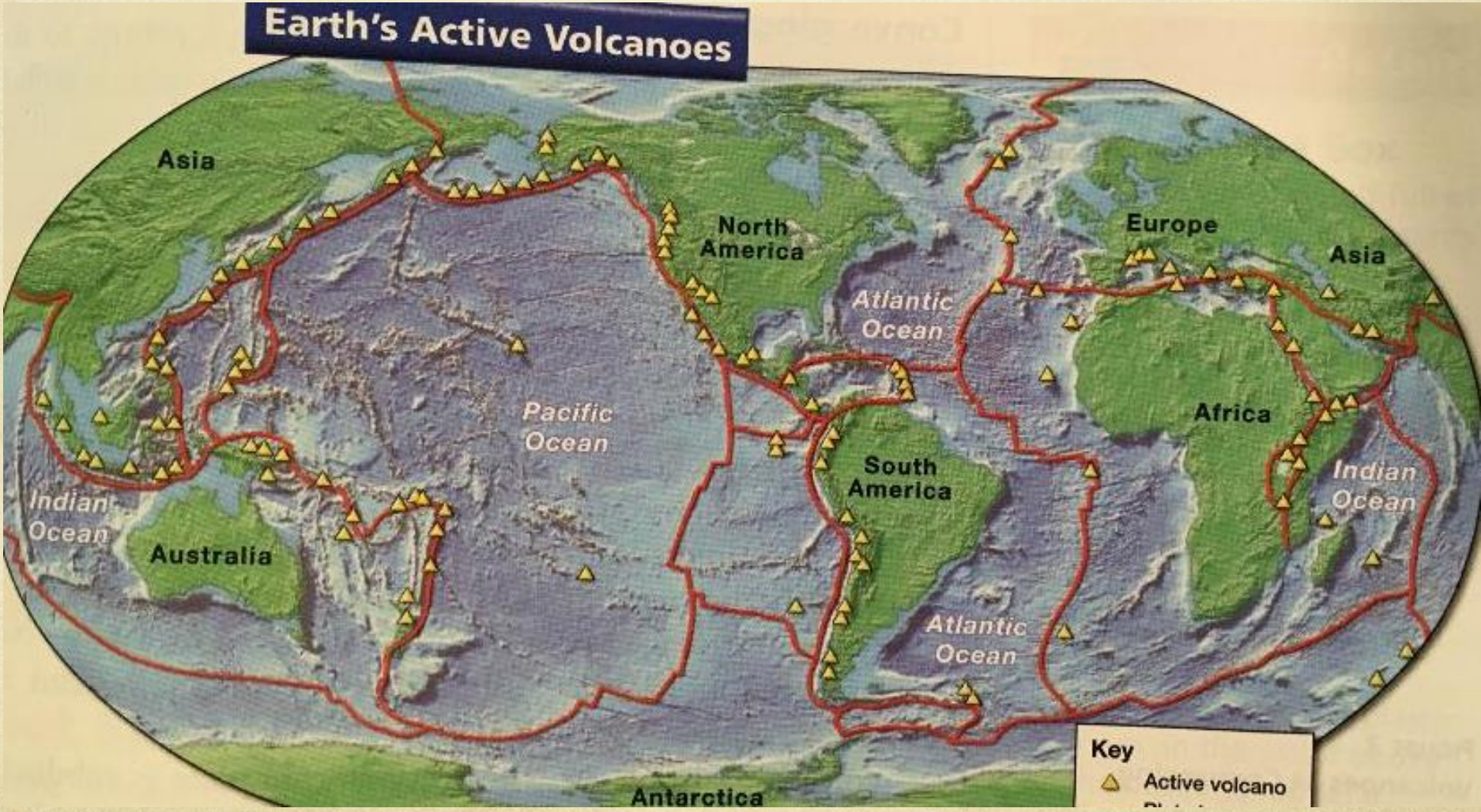
- The Ring of Fire is a major volcanic belt that is formed by the many volcanoes that rim the Pacific Ocean

75% of the worlds active volcanos are found in the ring of fire

Ring of Fire at Plates

Volcanoes & Plate Boundaries

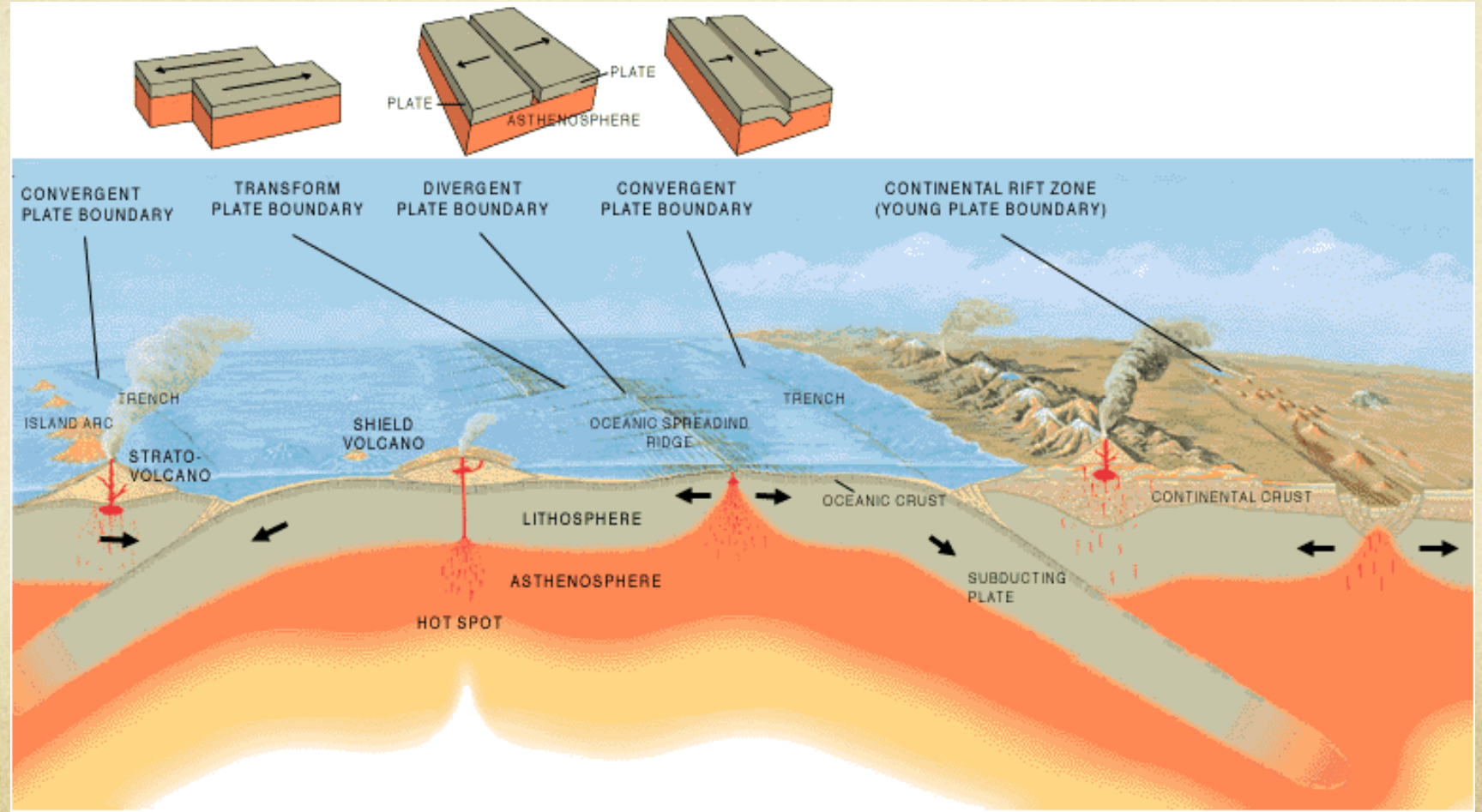
- What do you notice about where volcanoes and plate boundaries are?



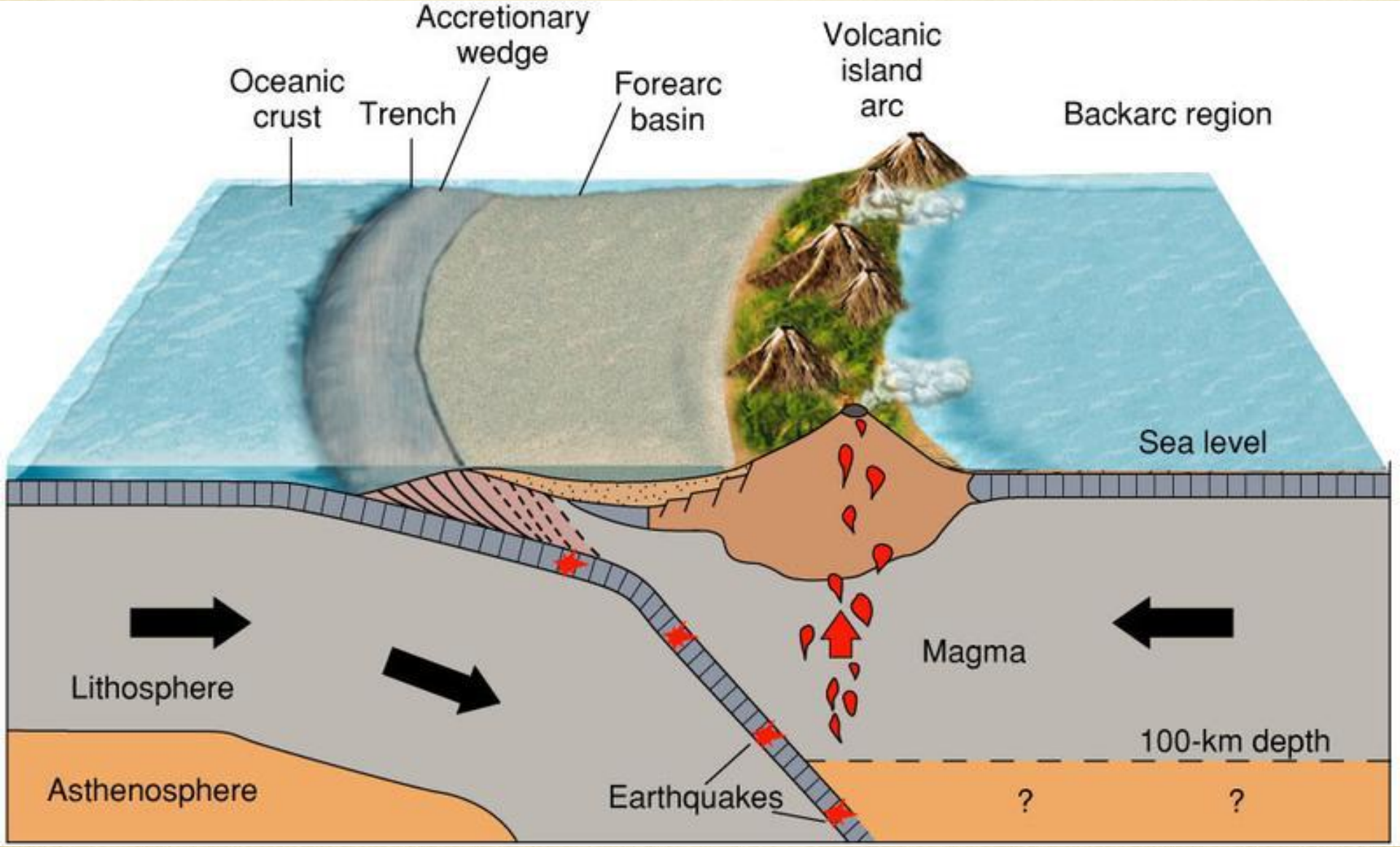
Volcanoes & Plate Boundaries

All about Volcanoes

- **Volcanic belts form along the boundaries of Earth's plates**
- What happens at these Plate boundaries?
- **Huge pieces of the crust diverge or converge. This causes the crust to fracture or break which allows magma to reach the surface**

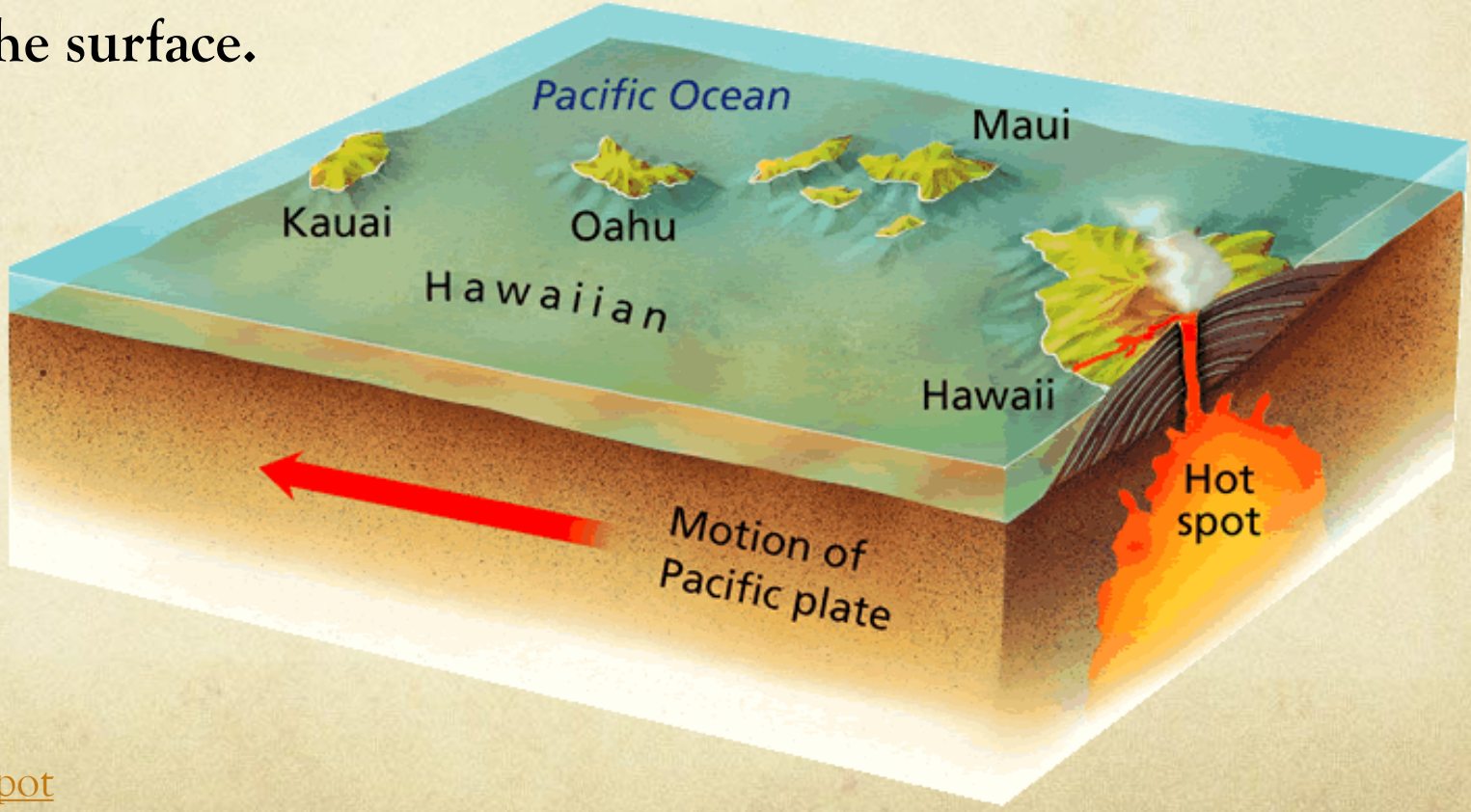


Convergent Boundaries



Hot Spot Volcanoes

- Hot spots are when material from the mantle rises and melts forming magma.
- A hot spot volcano is when magma erupts through the crust and reaches the surface.



Hawaii's hotspot

Island Arc

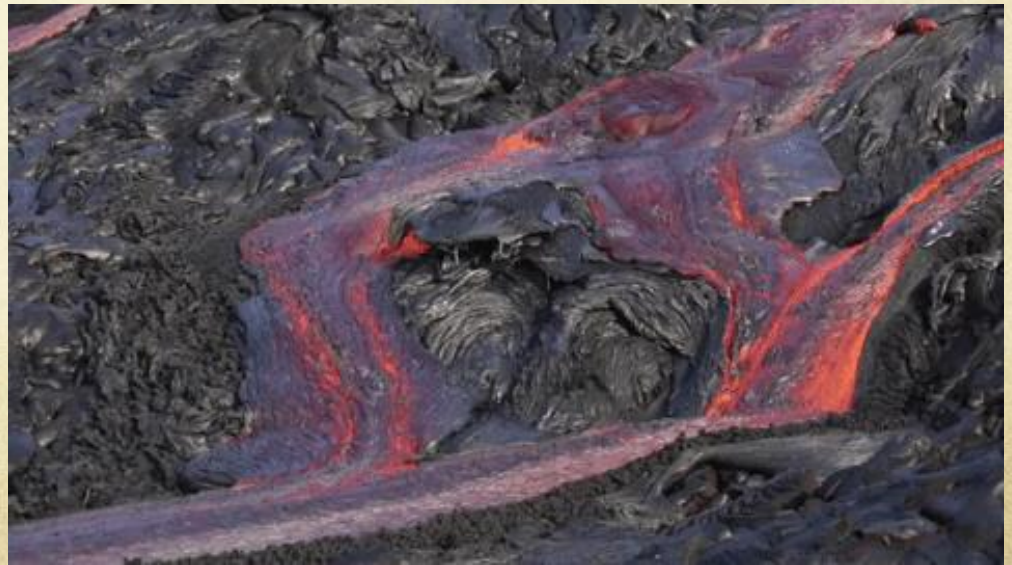

©NewScientist
RUSSIA
CHINA
NORTH KOREA
SOUTH KOREA
EURASIAN PLATE
Sapporo
Sendai
Nagano
TOKYO
Shizuoka
Kyoto
Kobe
Japan trench
Nankai trough
PACIFIC PLATE
PHILIPPINE PLATE
200 km
SUBDUCTION ZONE


Japan
Ōsumi
Tokara
Amami
Okinawa
Miyako
Yaeyama
Taiwan

Bell Ringer

- Please turn in your Epicenter Lab
- Take out your Volcano notes and use them to answer the following questions in your science journal

1. What is the difference between magma and lava?
2. Where are most of the worlds active volcanoes found?
3. What are some differences between the two lava samples below?

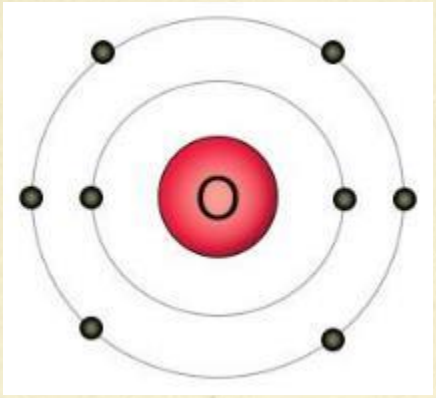


Physical and Chemical properties

- **Element**

  -Substance that cannot be broken down into other substances

  Example = Carbon, oxygen



- **Compound**

  -Substance made of two or more elements that have been chemically combined

  Example = Water (H_2O), table salt ($NaCl$)

- Each substance has a particular set of physical and chemical properties. These properties can be used to identify a substance or to predict how it will behave

Physical Property

- Any characteristic that can be observed or measured without changing the chemical composition of the substance.

Physical Property Examples

- Color
- Solubility
- Odor
- Hardness
- Density
- Melting Point
- Boiling Point
- Viscosity

Chemical Property

- Any property that produces a change in the composition of matter.

Chemical Changes in Matter

- New Matter is formed.
  - Burning
  - Rusting
  - Cooking
  - Film Processing

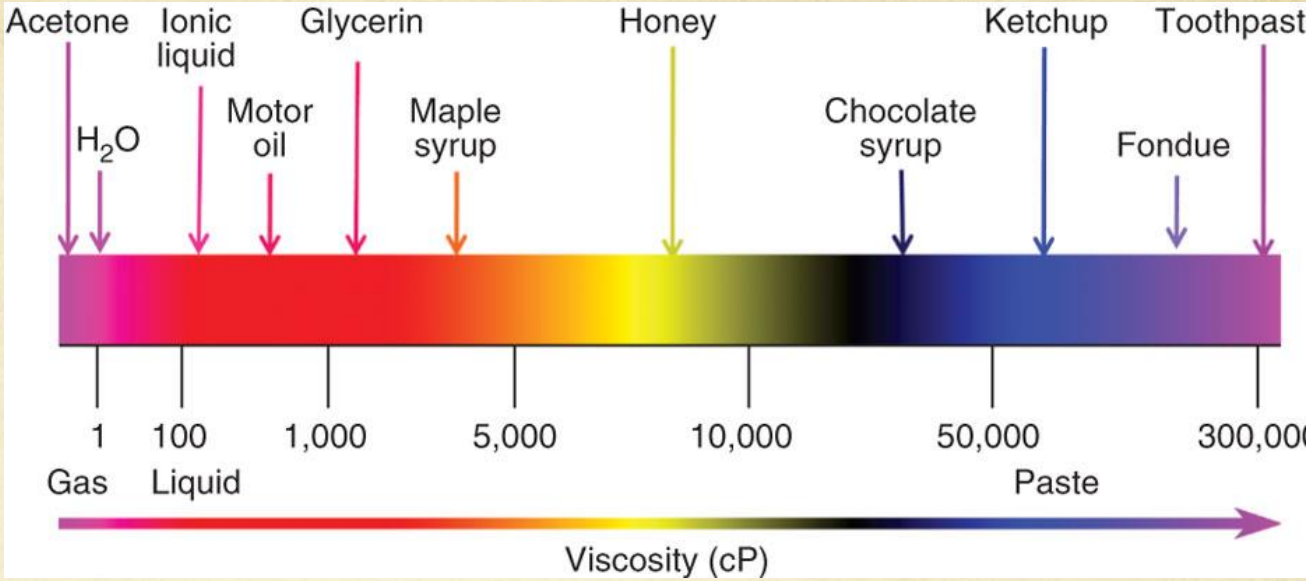
Color Change

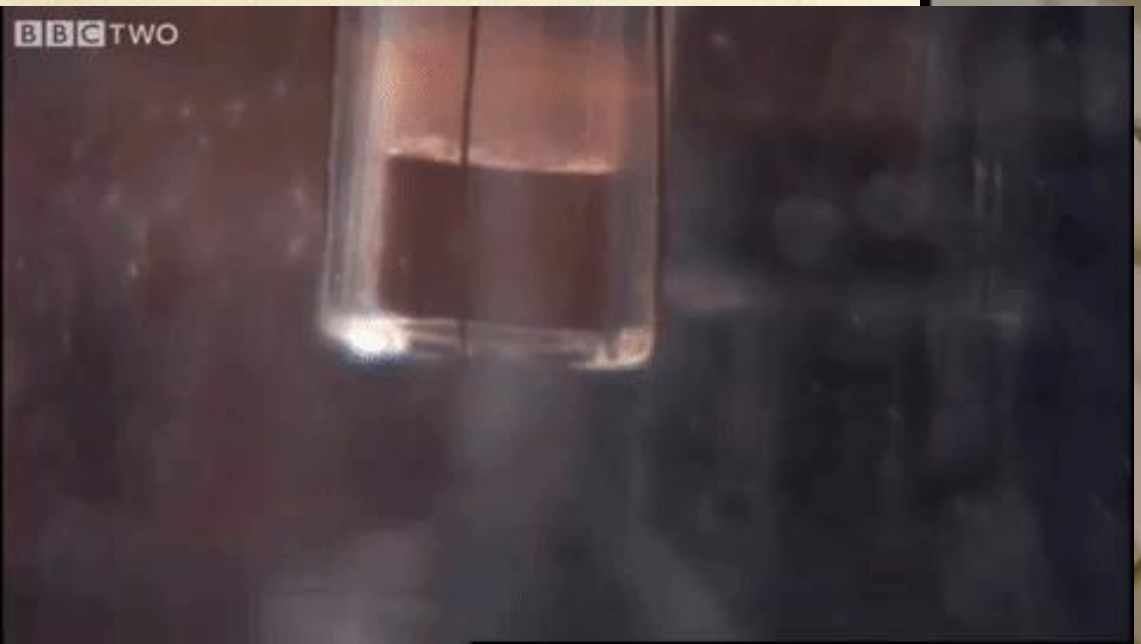
Which is a chemical property which is a physical property?

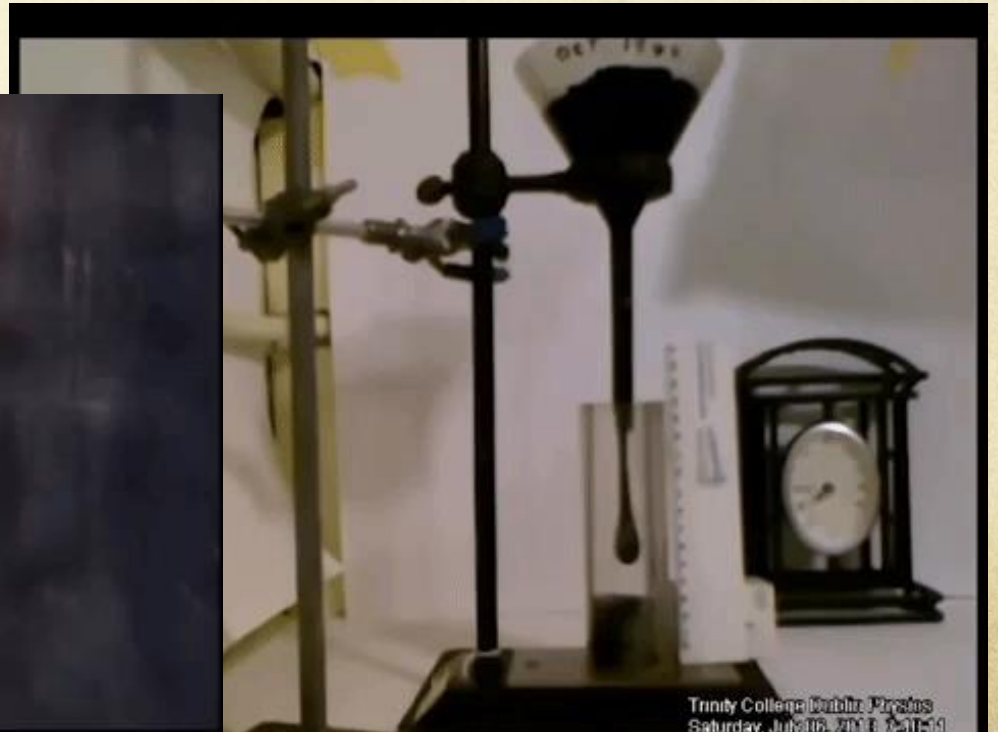
• Red color of blood	➢ Physical property
• Density of a bowling ball	➢ Physical property
• Baking soda reacts with acid	➢ Chemical property
• The melting point of ice	➢ Physical property
• Rusting of a boat	➢ Chemical property
• Bitter taste of soap	➢ Physical property
• Burning of your notes at the end of the school year	➢ Chemical property

Viscosity

- The resistance of a liquid to flowing
- The greater the viscosity of liquid the slower it moves. The smaller the viscosity of liquid the faster it moves.

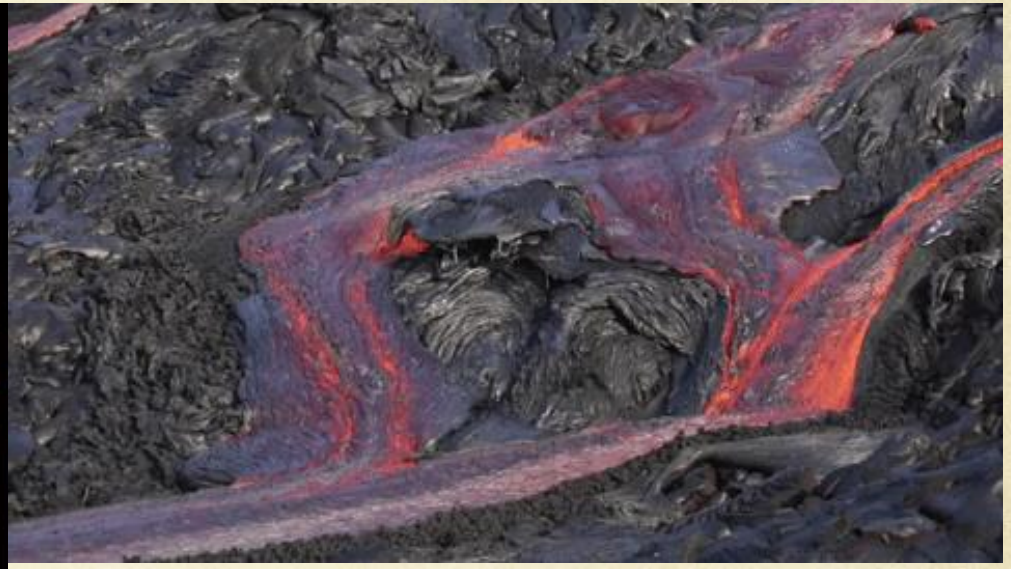






Properties of Lava & Magma

- What is the difference between lava and magma?
- What are some differences between the two lava samples below?



Bell Ringer

- Happy Friday!
- Please take out your Volcano Project Step 1
- Take out your volcano notes and answer the following in your science journal.

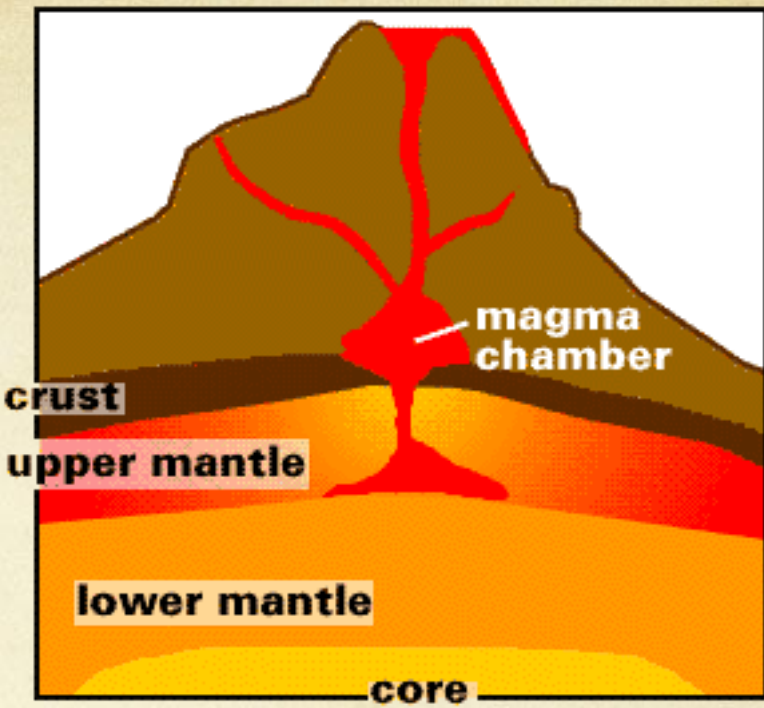
1. Write down whether each of the following is a physical or chemical property

- Red color
- Density
- Reacts with acid to form hydrogen
- Melting point
- Rusting
- Bitter taste
- Viscosity

Viscosity of Magma

- Where do we find Magma?

In the Mantle!



- Not all Magma have the same viscosity. **The viscosity of magma depends upon its silica content and temperature**

- **Silica is the major ingredient in magma. Its made up of particles of the elements oxygen and silicon**

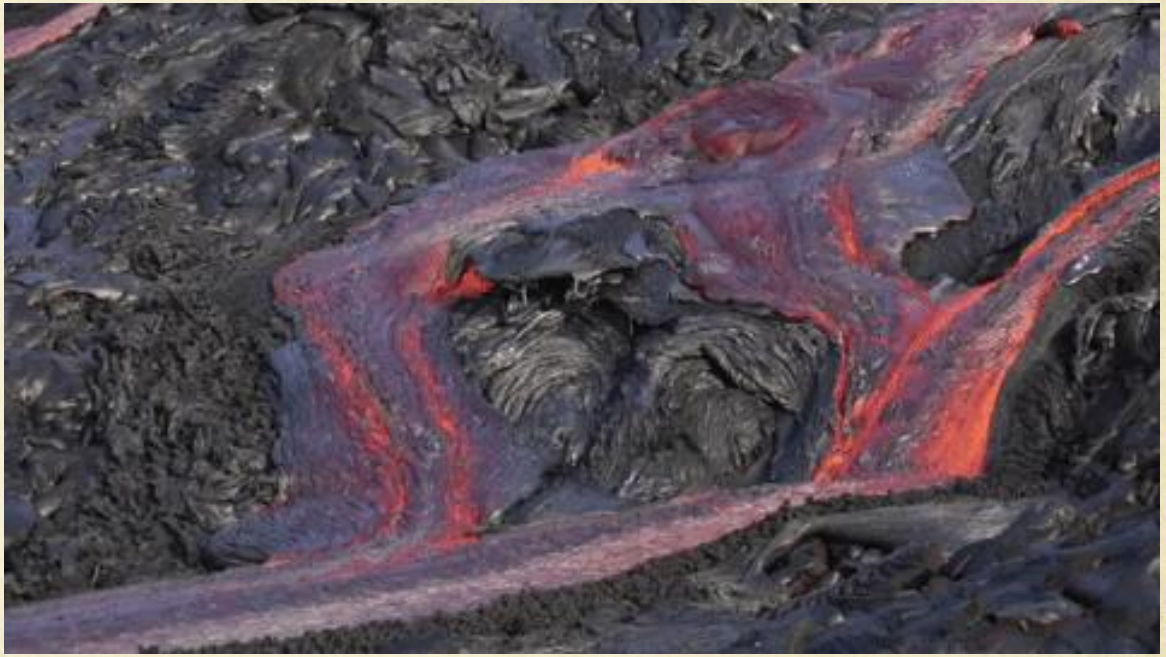
- **The more silica magma contains, the higher the viscosity.**

Slow Moving Lava

- The silica content in magma/lava ranges from 50-70%
- Magma high in silica produces light-colored (yellow) lava
- Moves slowly
- When this lava cools it forms the rock rhyolite

Fast Moving Lava

- The less silica magma contains, the lower the viscosity.
- Magma low in silica produces dark-colored lava (red)
- Fast moving
- When this lava cools it forms the rock basalt



Viscosity of Magma

Complete the following chart using your notes.

Property	Slow moving lava	Fast moving lava
Silica amount		
Speed of lava flow		
Color of lava		
Rock formed		

Temperature and Lava

- The temperature of magma and lava can range from 750 degrees Celsius to 1,175 degrees Celsius.
- The hotter the magma the lower the viscosity and the faster it moves
- Fast moving lava is called Pahoehoe
- Forms wrinkled looking rocks when cooled

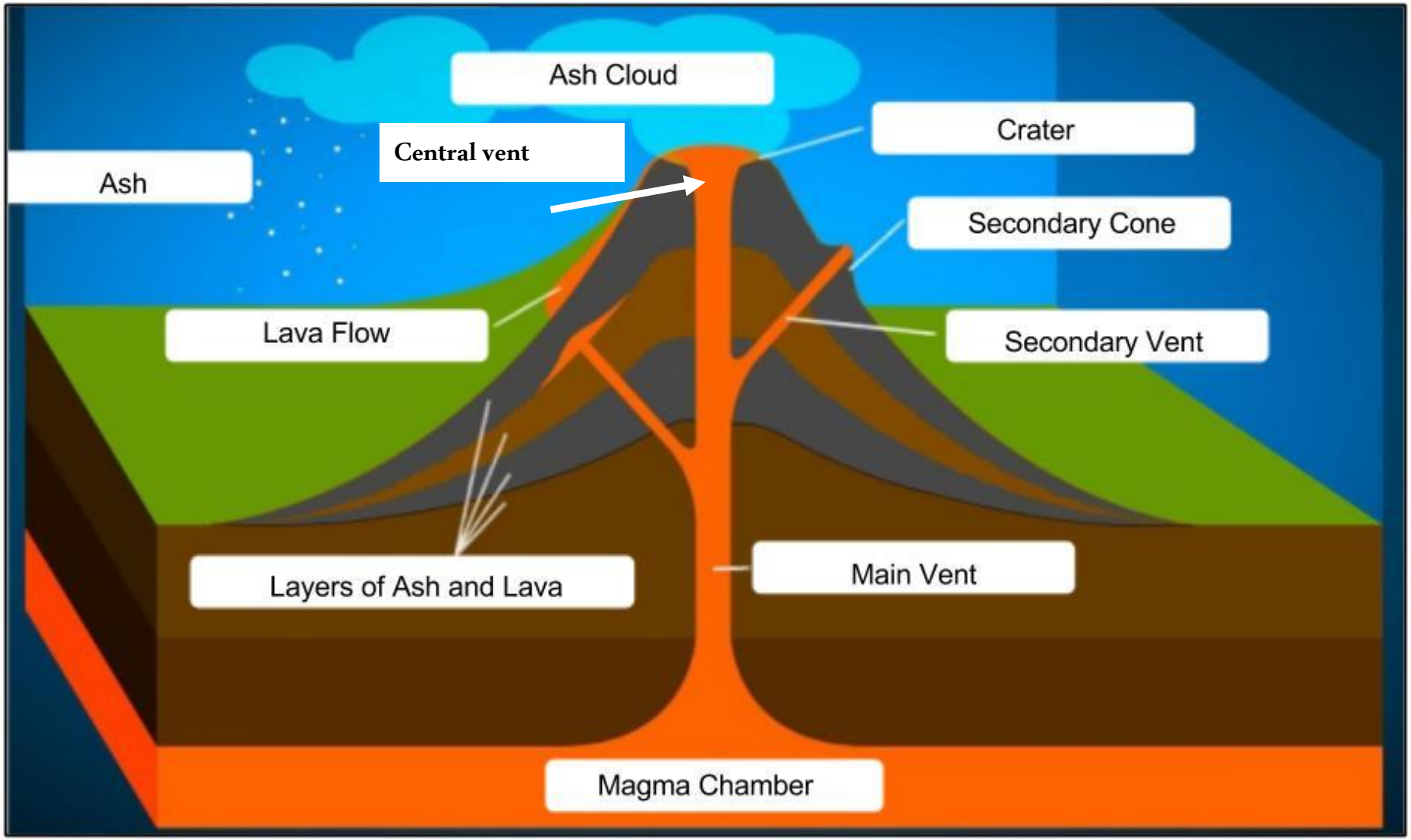
- The cooler the magma the higher the viscosity and the slower it moves
- Slow moving lava is called aa
- Forms jagged lava chunks when cooled

Properties of Lava/Magma

Complete the following chart using your notes.

Properties	Fast Moving Magma	Slow Moving Magma
Silica Content		
Viscosity level		
Color of lava		
Speed of lava flow		
Rock formed after cooling		
Temperature		
Lava name		
Rock description		

Structure of a Volcano



Bell Ringer

- Please answer the following questions in your science journal. Use your notes to help you

1. Fast moving lava has a _____ silica amount which _____ the viscosity and makes the color of the lava _____ and the temperature of the lava _____than slow moving lava.

2. Slow moving lava has a _____ silica amount which _____ the viscosity and makes the color of the lava _____ and the temperature of the lava _____ than fast moving lava.

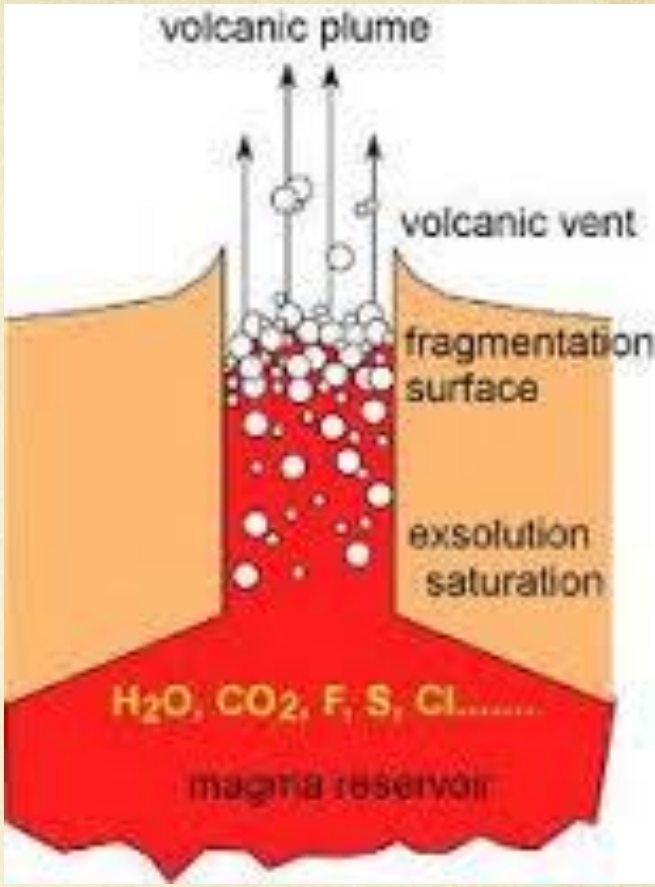
Volcanic Eruptions

- In Hawaii, they believe in the Fire Goddess Pele.
- When she is angry she causes volcanic eruptions
- One result is called “Pele’s Hair”

Pele's Hair

Volcanic Eruptions

- **As magma rises toward the surface, the pressure of the surrounding rock on the magma decreases.**
- **The dissolved gases in the magma expand, forming bubbles. These expanding gases create a HUGE force!**
- **This is just like a Soda bottle!**



Volcanic Eruptions are caused by **the force of the expanding gases pushes magma from the magma chamber through the pipe until it flows or explodes out of the vent.**

Type of Eruptions

If a volcano's magma has low silica it also has _____ viscosity

Low

Therefore if the magma has a lower viscosity it's eruption will be _ _____

quiet

The gases in the magma bubble out gentle and lava can quietly ooze out from the vent and flow VERY FAR

If a volcano's magma has high silica it also has _____ viscosity.

high

The high viscosity magma builds up in the volcano's pipe plugging it like a cork in a bottle until there is an ___ ____ eruption.

explosive

Explosive Eruptions

- **Can produce pyroclastic flow = explosive eruption of hot gases, ash, cinders, and bombs.**
- **Explosive eruptions breaks lava into tiny particles that cools quickly = volcanic ash.**
- This can be even MORE dangerous than lava.

Pyroclastic flow

Volcanic Rocks

- Pumice
  - When gas bubbles are trapped in *fast cooling lava* leaving spaces in the rocks

- Obsidian
  - Form *when lava cools very quickly* giving it a smooth glossy surface

Life Cycle of a Volcano

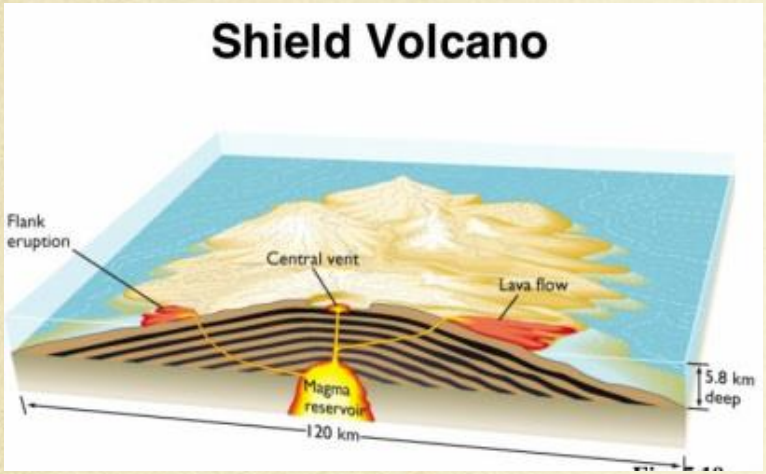
- Active (live)- **one that is erupting or may erupt in the near future**
- Dormant (sleeping)- **may awake in the future and become active**
- **Extinct (dead)- unlikely to erupt again.**

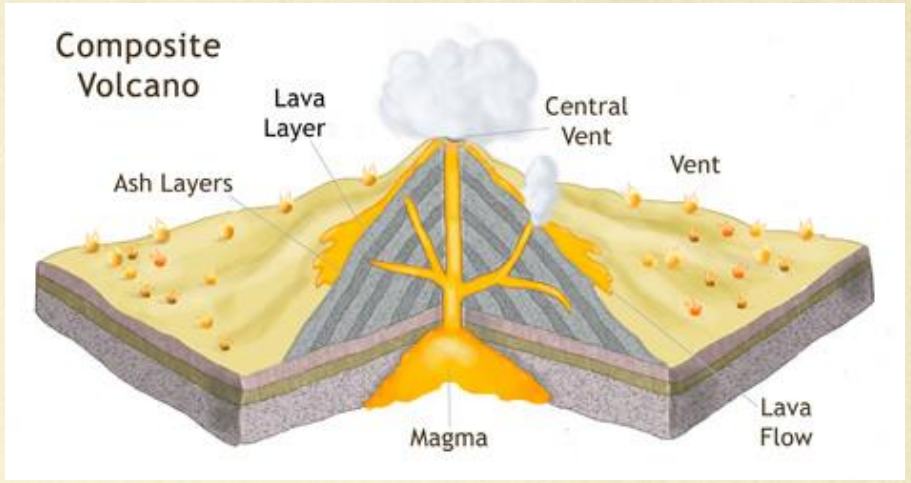
- How might we monitor volcanoes activity?
  - Temperature increases
  - Surface change in elevation
  - Gases escaping from the volcano
  - Earthquakes

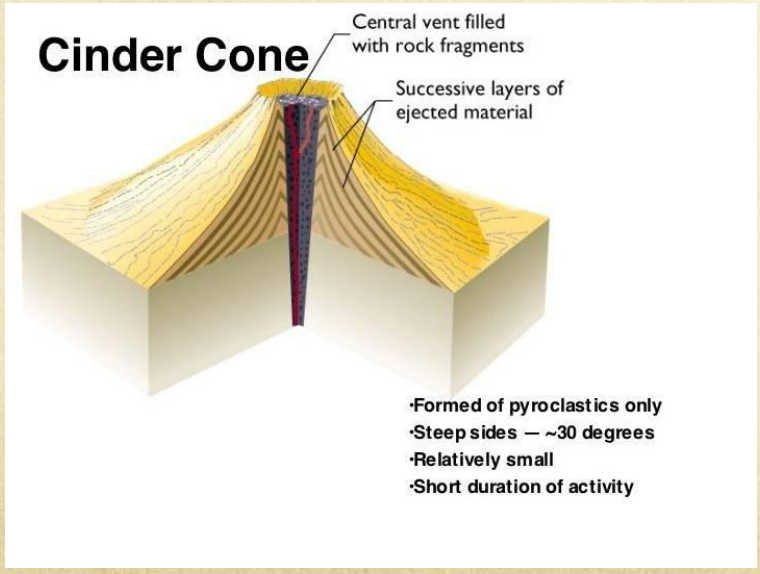
Kohala Hawaii

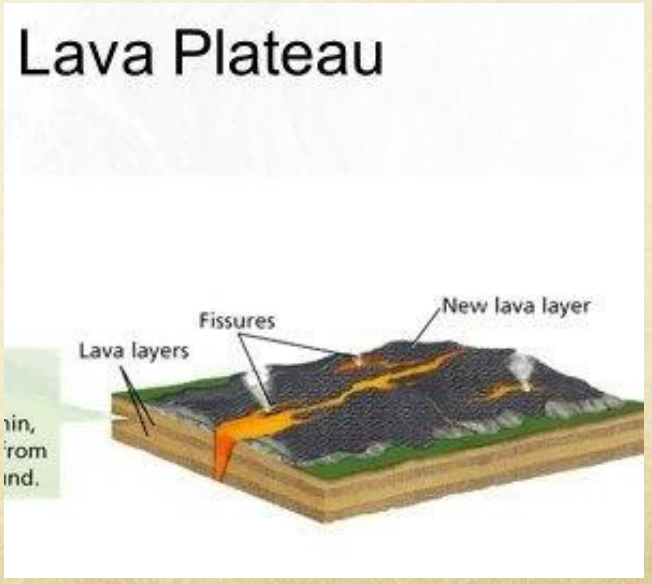
Volcano Landforms From Lava & Ash

- Lets meet our contenders!









Shield Volcanoes

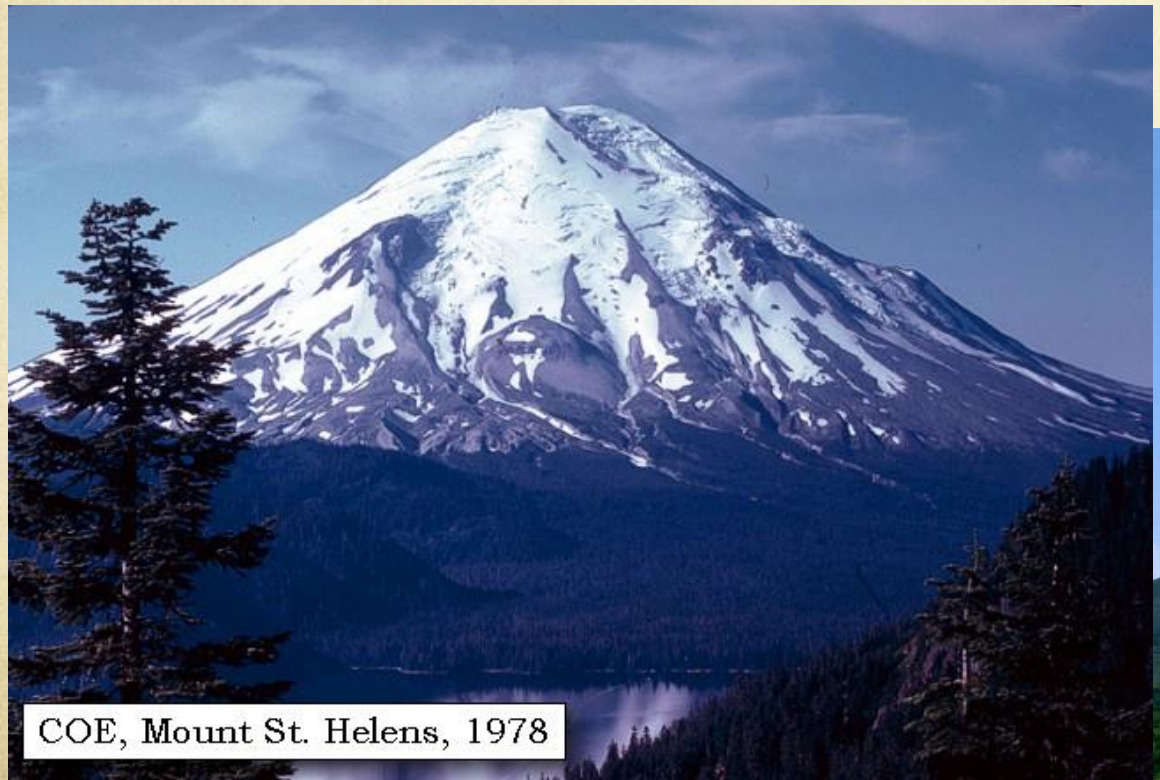
- Wide gentle sloping mountain.
- Formed from thin layers of lava pouring out their vent and hardening on previous layers.
- Quiet eruptions

Cinder Cone Volcanoes

- **Cone shaped peaks from ash cinders and bombs erupting explosively.**

Composite Volcanoes

- Alternating between lava flow and explosive eruptions of ash, cinder, and bombs
- Tall cone-shaped mountains


COE, Mount St. Helens, 1978

Lava Plateaus

- Lava flows out of several long cracks
- Thin runny lava travels far before cooling and solidifying.

Caldera

- **Huge hole left by the collapse of a volcanic mountain**
- Enormous eruptions may empty the main vent and magma chamber and the mountain becomes a hollow shell.
- Nothing is supporting it and therefore it collapses inward.

Geothermic Activity

- **Magma heats underground water and creates hot springs and geysers**

Hot Springs

- Ground water is heated by magma underground. The hot water rises to the surface and collects in a natural pool

Snow Monkeys in Japan

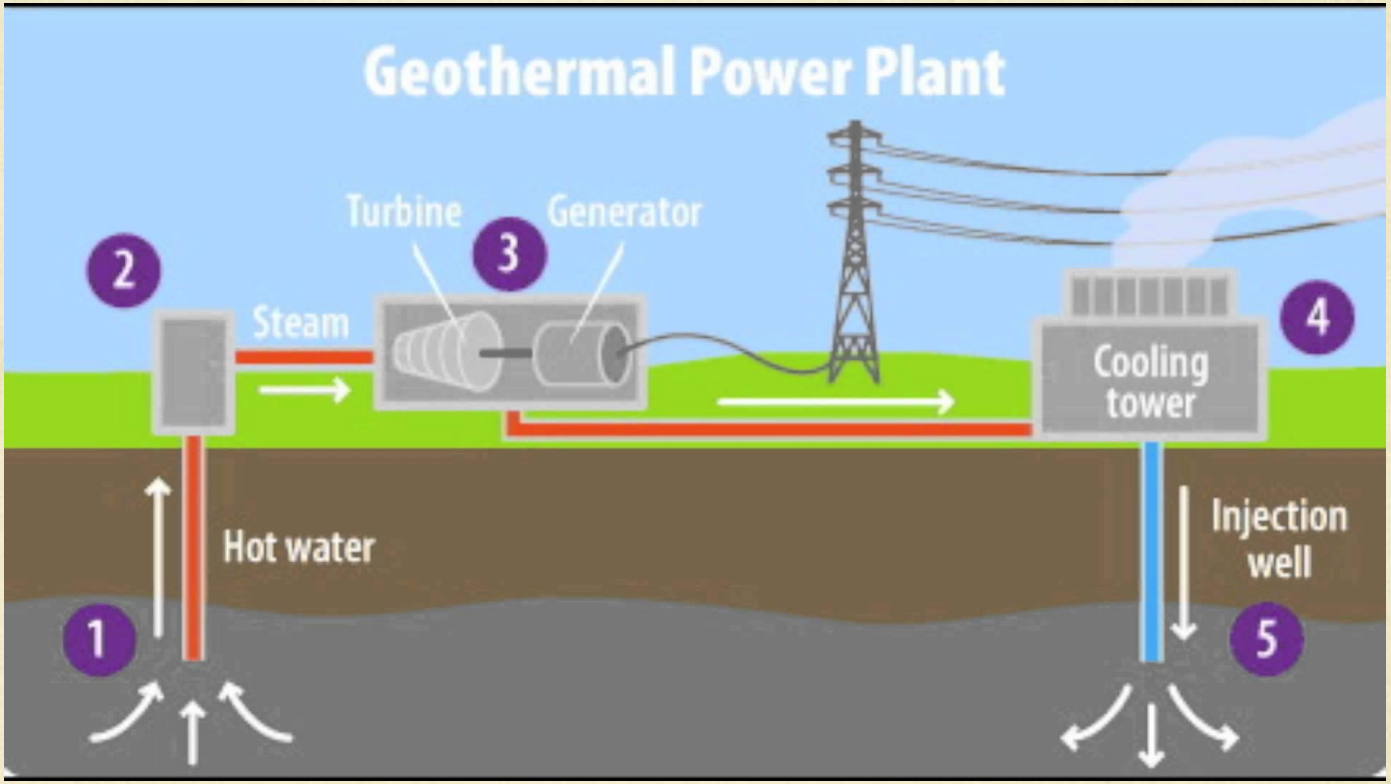
Geysers

- Rising hot water and steam become trapped underground.
- Pressure builds until the mixture sprays above the surface.

Yellowstone

Geothermal Energy

- In some volcanic areas, water heated by magma can provide an energy sources



Renewable energy 101

Geothermal Energy