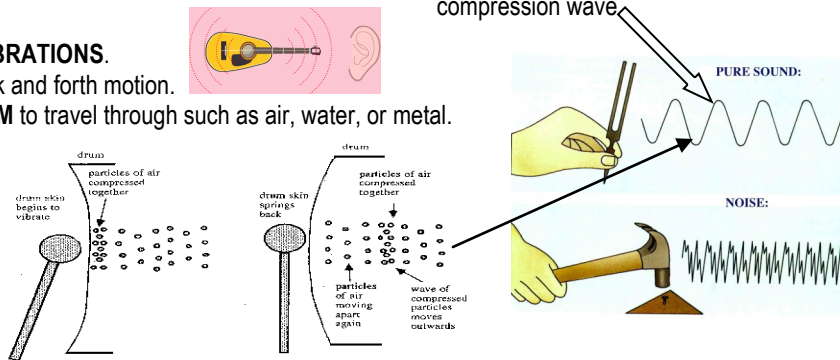
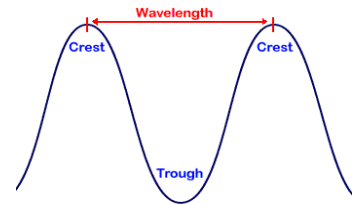


# SOL 5.2- Sound

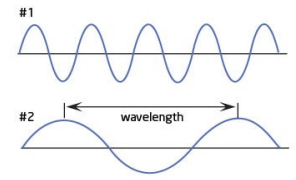
- Sound is caused by **VIBRATIONS**.
- A **VIBRATION** is a back and forth motion.
- Sound needs a **MEDIUM** to travel through such as air, water, or metal.
- A **MEDIUM** is a substance (gas, liquid, or solid) that carries sounds
- A **SOUND WAVE** is a disturbance moving through a **MEDIUM**.



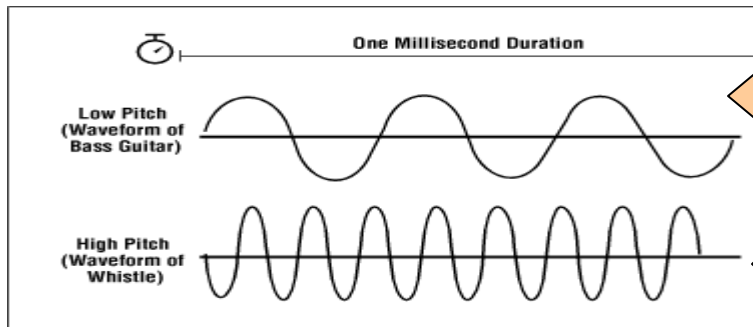
## Sound Wave Diagram



- **WAVELENGTH**- the distance between two sound waves (determines **FREQUENCY**)
- **FREQUENCY**- the number of sound waves in a given unit of time (determines **PITCH**)
- **PITCH**- how high or low a sound is



because the wavelength of wave #2 is longer than that of wave #1, wave #2's frequency is lower

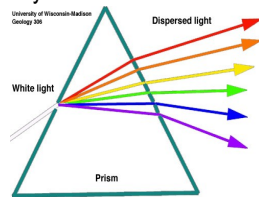
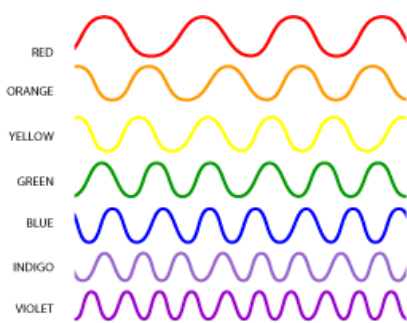


A bass guitar has a low pitch (not as many vibrations).

A flute has a high pitch (lots of vibrations).

# SOL 5.3- Light

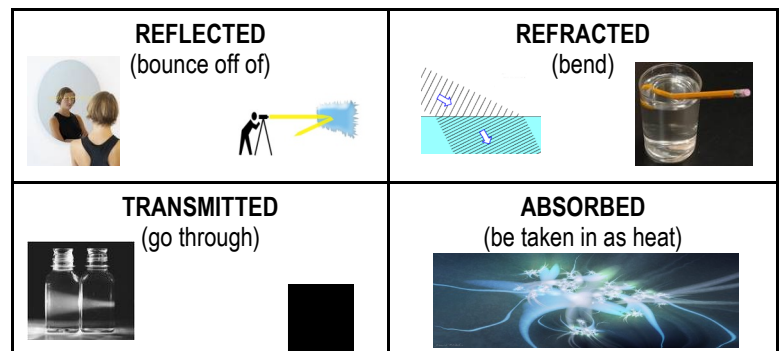
- Light travels in straight lines called **RAYs**
- **WHITE LIGHT** is made of different wavelengths of color
- You can see the different colors when **WHITE LIGHT** passes through a **PRISM** and the colors are separated by **FREQUENCY**
- With **LIGHT**, the **FREQUENCY** and **WAVELENGTHS** determine the **COLOR**



Red has the longest wavelength and violet has the shortest wavelength.

**ROY G. BIV** helps you to remember the order.

When **LIGHT** hits an object, there are 4 things that can happen:



Different materials transmit light differently

Light reflects better off of **SMOOTH, FLAT** surfaces.

- Light travels **FASTER** than sound
- Light **DOES NOT** need matter to travel through.
- It takes light 8 1/2 minutes to go from the Sun to the Earth

There are two types of lens that are used to bend light:



CONCAVE



CONVEX

You **SEE** the color that is **REFLECTED** off of an object.

White **REFLECTS** all colors.

Black **ABSORBS** all colors

**Transparent**  
(light passes through easily)



GLASS

**Translucent**  
(some light passes through)



PLASTIC CUPS



GLASS

**Opaque**  
(no light passes through)



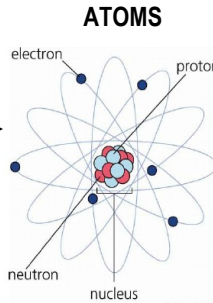
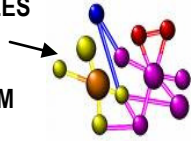
MARBLES



CUPS

- **MATTER** is anything that has **MASS** and takes up space
- **MASS** is how much **MATTER** an object has
- **MATTER** is made up of particles (**ATOMS AND MOLECULES**) that are too small to see without a powerful microscope
- The smallest particle of **MATTER** is an **ATOM**

- When **ATOMS** combine, they form **MOLECULES**
- **MOLECULES** are made up of two or more **ATOMS** of the same substance
- The smallest part of a **MOLECULE** is an **ATOM**

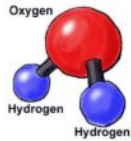


- **PROTONS** have a **POSITIVE CHARGE** and are located in the **NUCLEUS**
- **ELECTRONS** have a **NEGATIVE CHARGE** and are located in the **ELECTRON CLOUD**
- **NEUTRONS** have a **NEUTRAL CHARGE** and are located in the **NUCLEUS**
- The **NUCLEUS** is the center of the **ATOM**
- The **ELECTRON CLOUD** surrounds the **NUCLEUS**

- When two or more **MOLECULES** combine and make a new substance, it is called a **COMPOUND**
- The smallest part of a **COMPOUND** is a **MOLECULE**
- Some common examples of **COMPOUNDS** are table salt and water

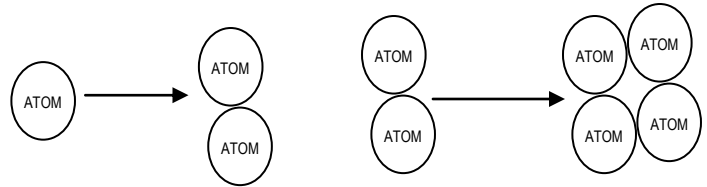


Table Salt (NaCl)



Water (H<sub>2</sub>O)

Think of **ATOMS**, **MOLECULES**, and **COMPOUNDS** like this:



**Atom + Atom = Molecule**

**Molecule + Molecule = Compound**

## MIXTURES AND SOLUTIONS

- A **MIXTURE** is made up of two or more substances that **CAN BE SEPARATED** and will not lose their characteristics when combined



- A **SOLUTION** is made up of two or more substances that **CANNOT BE SEPARATED** and that will lose their characteristics when combined or dissolved to form a new substance

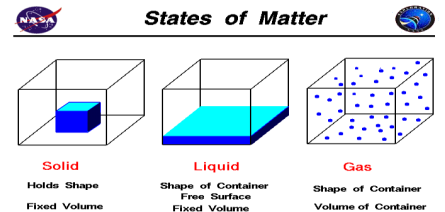


## SOLIDS, LIQUIDS, AND GASES

- **SOLIDS** keep their shape and have a fixed size, shape, and volume. The particles in a solid are packed tightly together (touching) and vibrate back and forth.

- **LIQUIDS** take the shape of their container. They have a movable surface, but their volume is fixed. The particles in a liquid are spread out a little and are able to slide past each other.

- **GASES** spread out to fill their container. The size, shape, and volume of gases changes depending upon the size of the container. The particles in a gas are very spread out and move very quickly in all directions.



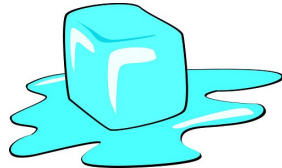
**Solid**  
Holds Shape  
Fixed Volume

**Liquid**  
Shape of Container  
Free Surface  
Fixed Volume

**Gas**  
Shape of Container  
Volume of Container

- **PHYSICAL CHANGE** is a change in matter in which no new substance is produced. It may involve a change of state and it can usually be reversed.

- **EXAMPLES** of a **PHYSICAL CHANGE**: melting, freezing, dissolving

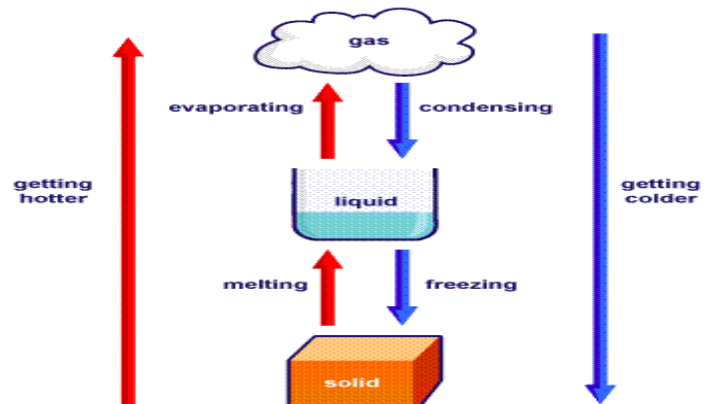


- **CHEMICAL CHANGE** is a change in matter in which one or more new substances are produced. It is difficult to reverse.

- **CLUES** to a **CHEMICAL CHANGE** are:
  - heat or light might be given off
  - smell
  - color change
  - gas may be formed

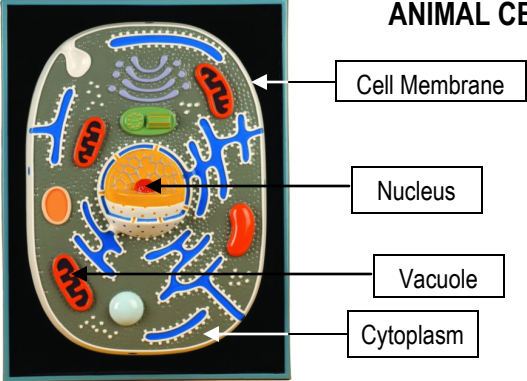


- **EXAMPLES** of a **CHEMICAL CHANGE**: cooking, burning, rusting



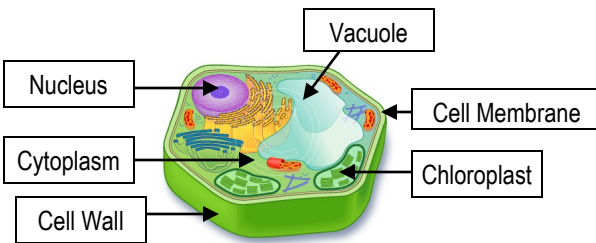
# SOL 5.5- Living Systems

### ANIMAL CELLS



- Animal cells are round or have uneven edges.
- Animal cells DO NOT have a cell wall or chlorophyll.
- **NUCLEUS** (the brain) – controls everything in the cell
- **CELL MEMBRANE** (the muscles) – it holds the cell together
- **VACUOLE** ( the stomach) – stores food, water and waste
- **CYTOPLASM** – fills the rest of the space in the cell. It's clear & like jelly.

### PLANT CELLS

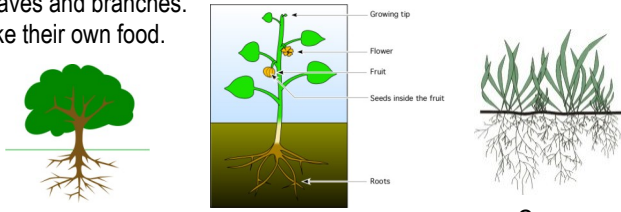


- Plant cells are usually shaped like a rectangle.
- **NUCLEUS** (the brain) – it controls everything the cell does
- **CELL WALL** (the skin) – the wall that goes around the entire cell
- **CELL MEMBRANE** (the muscles) – it holds the cell together
- **VACUOLE** ( the stomach) – stores food, water and waste
- **CHLOROPLAST**– contains chlorophyll that makes the plant green. The plant uses this to make it's own food by photosynthesis.
- **CYTOPLASM**– fills the rest of the space in the cell. It's clear & like jelly.

5 Kingdoms of Living Creatures	
<b>PLANTS</b>	Divided into two groups: vascular and nonvascular. Can make their own food. Reproduce through seeds and spores.
<b>ANIMALS</b>	Divided into two groups: vertebrates and invertebrates. Cannot make their own food. Many cells. Reproduce with eggs.
<b>MONERAN</b>	Small organisms such as algae, bacteria, and viruses. Can make their own food or eat other organisms.
<b>PROTIST</b>	Single-celled organisms found in watery places or inside animals as parasites. Some can make own food from the sun.
<b>FUNGI</b>	Live in dark, damp areas. Grow on their source of food. Examples include mushrooms, yeast, and mold.

### VASCULAR PLANTS

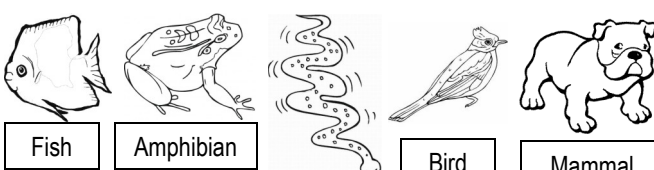
- Have special tissues (tubes) that carry water and food from the soil to other parts of the plant.
- Roots are one of the main sources of food and nutrients.
- Tubes take the nutrients from the soil up through the trunk or stem to the leaves and branches.
- Make their own food.



Trees      Flowers      Grass

### VERTEBRATES


- Animals **WITH** backbones
- 5 subgroups of fish, amphibians, reptiles, birds, and mammals
- Each subgroup has it's own characteristics



Fish      Amphibian      Reptile      Bird      Mammal

### NONVASCULAR PLANTS

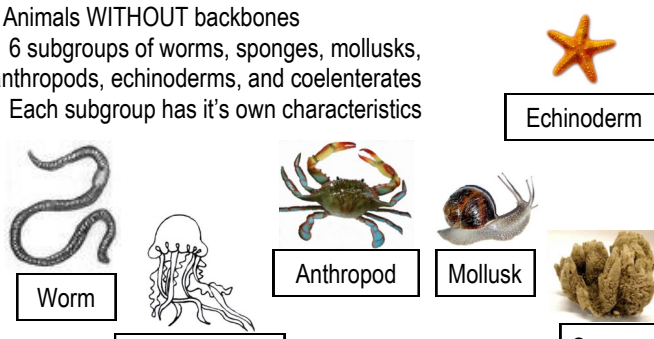
- Do not have tubes to carry nutrients and water from the soil.
- Plants act like sponges to soak up water that forms on them.
- Plants are very small and like to grow in damp, shady areas.



Moss      Lichens      Liverwort

### INVERTEBRATES

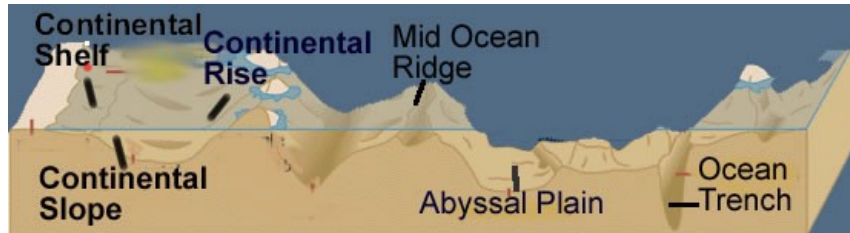
- Animals **WITHOUT** backbones
- 6 subgroups of worms, sponges, mollusks, anthropods, echinoderms, and coelenterates
- Each subgroup has it's own characteristics



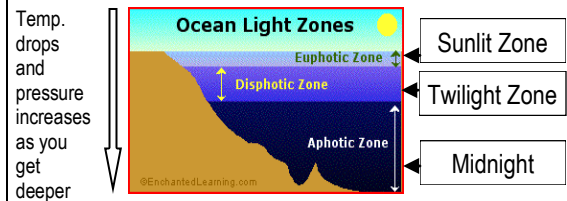
Worm      Coelenterate      Anthropod      Mollusk      Echinoderm      Sponge

## Parts of the Ocean

- **CONTINENTAL SHELF**— Shallow (not deep) part of the ocean on the edges of the continents. Hold the greatest variety of different animals and plants.
- **CONTINENTAL SLOPE**— Steep drop off of the **CONTINENTAL SHELF**
- **CONTINENTAL RISE**— Gently sloping area that connects the steep walls of the **CONTINENTAL SLOPE** to the ocean floor
- **MID OCEAN RIDGES**— Underwater mountains caused by plate movements
- **TRENCH**— Deepest part of the ocean similar to canyons on land
- **ABYSSAL PLAIN**— flat area of the ocean



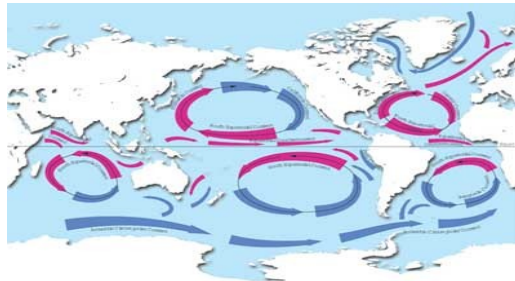
## Layers of the Ocean



- Sunlit Zone**— Sunlight helps the plankton to produce food. Therefore many animals live in this area, as plankton often start the food chain.
- Twilight Zone**— Not enough sunlight for plants, and therefore not many animals live here.
- Midnight Zone**— Intense pressure and freezing temperatures means that barely any animals live here.

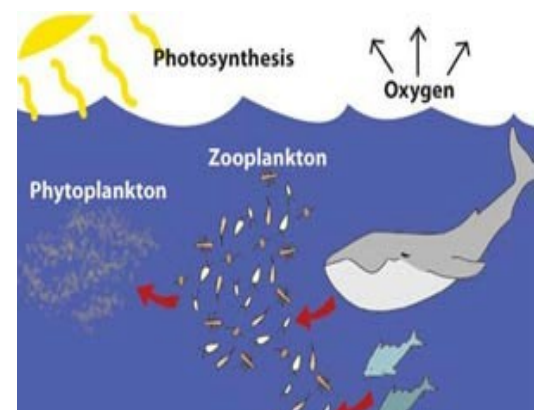
## Ocean Currents

- Caused by wind, temperature, and salinity
- Can be warm or cold currents, depending on what part of the world they come from
- Can run along the surface (wind currents) or churn deep within the ocean (temp. and salinity)
- Mixes up the ocean water



## Ocean Food Webs

- As with any food chain, the key types are the **PRODUCERS, CONSUMERS, and DECOMPOSERS**
- **PRODUCERS**— often phytoplankton which are tiny plants that produce food from sunlight. **PRODUCERS** start the food chain.
- **CONSUMERS**— larger organism that eat other organisms in order to survive, such as zooplankton, fish, and whales.
- **DECOMPOSERS**— live on the ocean floor and feed off of dead or dying organisms that sink to the ocean floor, such as crabs and Lobsters



### Example of a Food Web

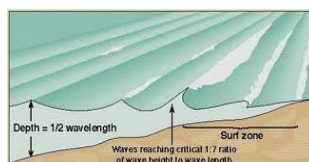
The phytoplankton make food from the sun and are eaten by the zooplankton which are eaten by the fish which are eaten by the whale.

WIND	TEMPERATURE	SALINITY
<ul style="list-style-type: none"> <li>- Caused by winds that blow in the same direction year round</li> <li>- Gulf Stream is one example and runs along the east coast of the United States bringing warmer water up from the tropics</li> </ul>	<ul style="list-style-type: none"> <li>- Warm water from near the Equator rises to the surface</li> <li>- Cold water is heavier than warm water and sinks to the bottom</li> </ul>	<ul style="list-style-type: none"> <li>- Salinity is the amount of salt in the water</li> <li>- As water heats up near the Equator, it evaporates and leaves behind the salt, making that water have more salinity.</li> <li>- More salinity means it is denser (heavier) and the water sinks. Less salty water rises.</li> </ul>

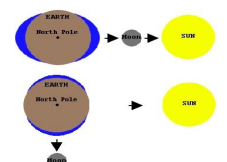
## Effects on Ocean Environments

- **DEPTH** affects where organisms live because most organisms need sunlight. Most organisms live in the upper, sunlit zones.
- **TEMPERATURE** Colder water animals have a thick layer of fat or blubber to keep them warm. Organisms needing warmer water often live near the Equator.
- **SALINITY** -the amount of salt in the ocean varies from place to place and during the times of the year. Runoff from fresh water (such as rivers) also affects how much salt is in the water.

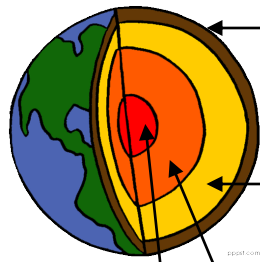
- **WAVES** are caused by the water being pushed upon the shore. When the water hits the shallow beaches and land, the water builds up and falls over itself, often causing **EROSION** of the beaches.



- **TIDES** are caused by the pull of the Moon's gravity. Tides occur every 12 hours. There are high tides (lots of water) and low tides (lower water levels).



## Layers of the Earth



**Crust**– thinnest and outermost layer made up of rocks, soil, and water.

**Mantle**– thickest layer made up of thick magma that flows beneath the crust

**Inner Core**– solid layer with intense pressure

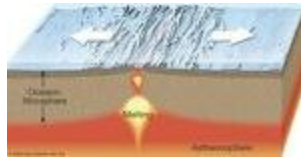
**Outer Core**– hot layer of melted rock

**PLATE TECTONICS**—Earth's crust is divided up into massive parts (plates) that float on top of the mantle and can move around. This constant moving is called **CONTINENTAL DRIFT**.

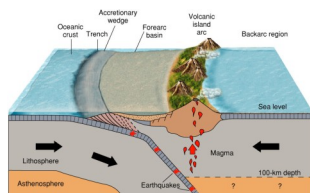
The parts where the plates touch is called a **FAULT**. Plates bump, scrape, and push against each other at the **FAULTS** which causes **EARTHQUAKES** and **VOLCANOES**.

### There are 3 types of plate boundaries.

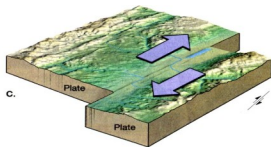
**DIVERGENT**– plates move apart. Usually found under the ocean and causes magma to rise up, cool, and form ridges.



**CONVERGENT**– plates push together. Sometimes one plate starts to go on top of another plate. Can form mountain ranges (and **VOLCANOES**) and can also cause trenches deep down on the ocean floor.

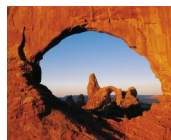


**TRANSFORM**– plates slide, slip, and grind past each other. The sudden release of energy causes **EARTHQUAKES**.



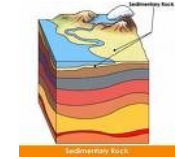
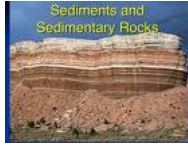
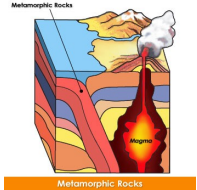



**WEATHERING**– breaking down rock into smaller pieces. Usually caused by wind, rain, and temperature.

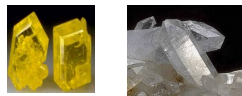
**EROSION**– moving those smaller bits and pieces of rock to another location. Usually caused by water and wind,



## There are 3 different types of rocks found on the Earth

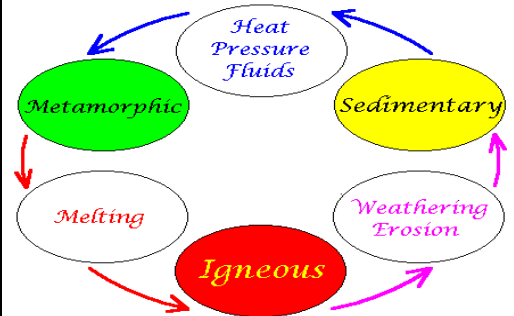
Igneous Rocks	Sedimentary Rocks	Metamorphic Rocks
<ul style="list-style-type: none"> <li>- Formed when hot, melted rock (lava) cools</li> <li>- Often found near volcanoes</li> </ul>	<ul style="list-style-type: none"> <li>- Formed when <b>LAYERS</b> of dirt and sediment build up over time</li> <li>- Layers are <b>COMPRESSED</b> together</li> <li>- Fossils are found in this type of rock</li> </ul>	<ul style="list-style-type: none"> <li>- Formed thanks to <b>HEAT AND PRESSURE</b> beneath the Earth's surface</li> </ul>
 	 	 

**MINERALS** are solid material from the Earth's crust made up of one or more elements. Common types are gold and silver.



An **ORE** is a mineral that is a useful substance such as bronze.

## The Rock Cycle

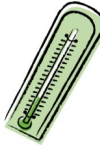


## Characteristics of Rocks and Minerals Help Us Tell Them Apart

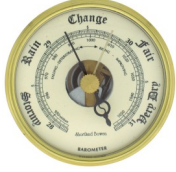
<b>COLOR</b>	What color is it?
<b>LUSTER</b>	Is it shiny or dull? How does light bounce off of it?
<b>STREAK</b>	What color powder is left when it is rubbed on a hard surface?
<b>HARDNESS</b>	How hard is it? (does it break easily?)
<b>CLEAVAGE</b>	When it breaks, does it break into flat sheets?
<b>FRACTURE</b>	When it breaks, does it have a jagged edge?
<b>CRYSTAL SHAPE</b>	What shape are the crystals?

# SOL 5.1- Scientific Process

## Scientists Use Many Different Tools



**THERMOMETER**—a tool that measures temperature



**BAROMETER** —a tool that measures the atmospheric pressure (which can help predict if there will be rain or sunshine)



**MICROSCOPE** —a tool that helps you see objects that are too small to be seen with a magnifying glass



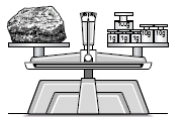
**SAFETY GOGGLES** —are used to protect eyes during experiments



**STOPWATCH** —used to measure elapsed time



**ANEMOMETER** —used to measure wind speed



**BALANCE, PAN SCALE** —a tool that measures the mass (how much matter) of an object



**GRADUATED CYLINDER**— tool used to measure liquid volume (amount of liquid)



**MAGNIFYING GLASS** —a tool that helps to make things look larger and easier to see



**SPRING SCALE** —a tool that measures the weight of an object based on the pull of gravity



**BEAKERS and FLASKS**—hold liquid

**RULER, YARD STICK, METER STICK**— tool used to measure length, height, or width of an object.



**WEATHERVANE**—used to measure wind direction

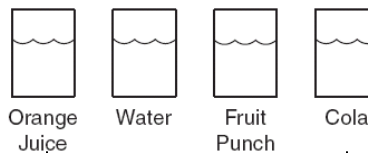
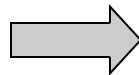


**EYEDROPPER**—used to measure small amounts of liquid by the drop

**INDEPENDENT VARIABLE**— the part of an experiment that you **MANIPULATE** or **CHANGE** in order to try and answer your question.

**CONSTANT/CONTROL**— the part of an experiment that you keep **THE SAME**.

A student thinks that orange juice will freeze faster than any other substance. She fills identical containers with the same amount of different liquids, then places each in the freezer.



The amount of each liquid and the containers are all equal so that is the **CONTROL/CONSTANT**

The **TYPE** of liquid is manipulated, or changed, which makes that the **VARIABLE**