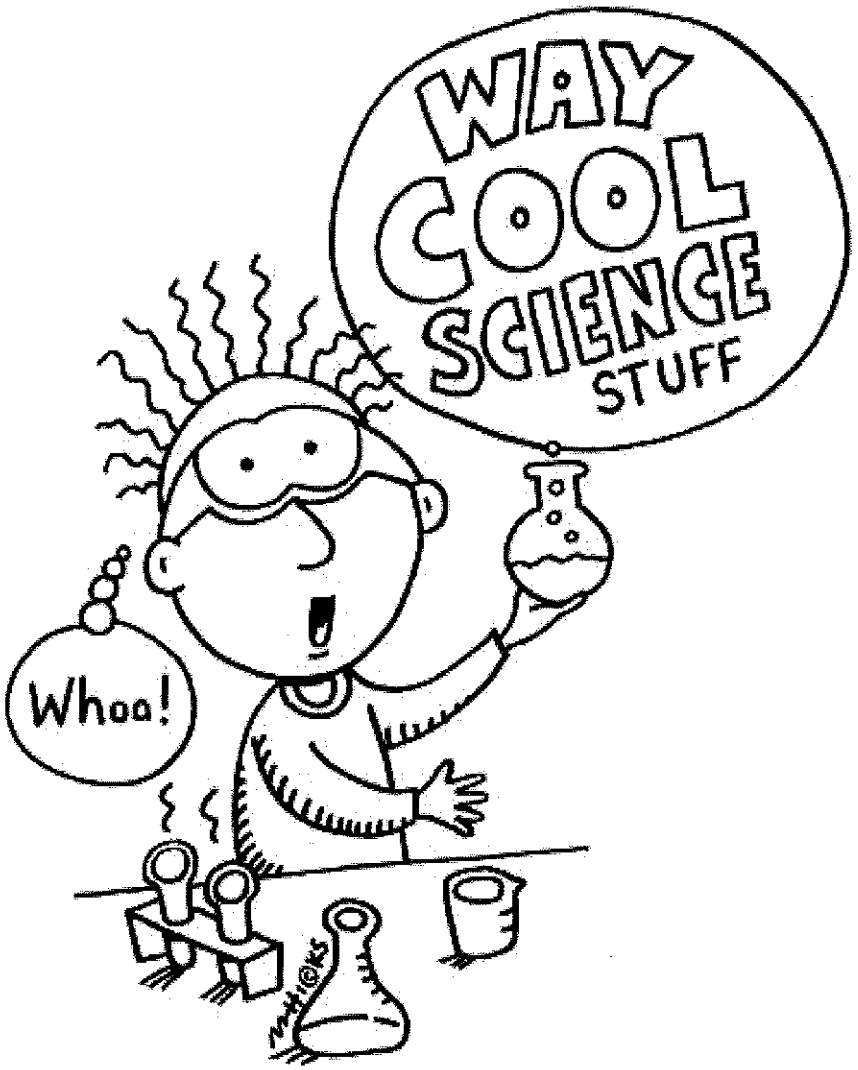
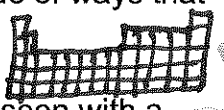
First & Last Name _____



Unit A - Matter, Properties and Change

6.P.2.1 *Recognize that all matter is made up of atoms and atoms of the same element are all alike, but are different from the atoms of other elements.*

- There are more than 100 elements that combine in a multitude of ways that make up all of the living and nonliving things that we encounter.



- Matter is composed of extremely small particles, too small to be seen with a classroom microscope, called atoms.
- Atoms have all of the properties of matter. Meaning that ALL atoms have mass and occupy space (volume).
- Atoms are the smallest part of an element that has the same chemical & physical properties of the element.
- All atoms of the same element have the same properties. This means that all iron atoms have the same mass and occupy the same amount of space. Same element = same properties
- Also, all iron atoms are different from carbon atoms or from any other element.

Atoms

- An atom is the smallest particle in matter that has all the properties of that material.
- Atoms are the building blocks of all matter.
- One grain of sand on a typical beach contains more atoms than there are grains of sand on the entire beach.
- Atoms can not be broken into smaller pieces.

Put me together, I can't be broken apart ♡ -says the atom

Elements

- All the different kinds of matter in the universe are made from approximately 100 different types of atoms called elements.
- An element is a substance that cannot be broken down into other substances by chemical or physical means.
- In any element, all of the atoms are exactly the same.
- Each element can be identified by its specific chemical and physical properties.

ALL ATOMS ARE THE SAME

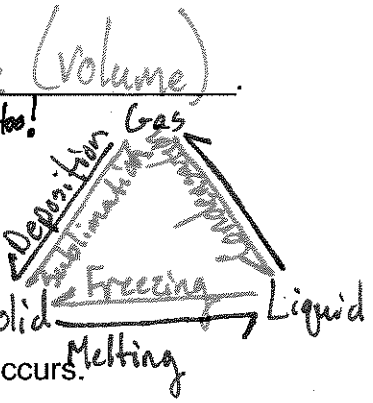
- An element is a pure substance represented by a chemical symbol.

- The elements oxygen, carbon, hydrogen and nitrogen make up 96% of all living matter.
- Elements can be represented through graphics. Because elements are pure, they will be represented by one shape or two or more of the same shape.

6.P.2.2 *Explain the effect of heat on the motion of atoms through a description of what happens to particles during a change in phase.*

1. Matter and Energy

- Matter is anything that has Mass and takes up space (volume).
- Matter makes up everything in the universe. That means you too!
- Energy is the ability to do work or cause change.
- Energy can move matter from one place to another (motion).
- Change can also be a change in state / phase (solid to liquid).
- Temperature/Heat is always involved when a change in matter occurs.
- Energy appears in different forms. Kinetic energy is in the motion of molecules. Atoms and molecules are in constant motion.
- Increased temperature means greater energy of motion so most substances expand when heated and contracted when cooled.



2. States of Matter

- Particles of matter move more quickly when heated.
- This change in particle speed/temp. is what causes the change in state of matter
- The three states of matter are solid, liquid, and gas.

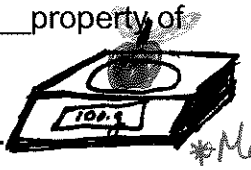
State of Matter	Solid The particles in a solid are packed tightly together and have the least energy. They vibrate but stay where they are.	Liquid The particles in a liquid move more freely, enough to slide past one another.	Gas The particles in a gas are the farthest apart and have the most energy.
Example	*Most Dense		*Least Dense
Facts	has a definite shape & volume	has no definite shape but has definite volume	has no definite shape and no definite volumes
	Examples *Answers will vary. Ice, wood, metal	Examples *Answer will vary. Soda, shampoo, Bojangles Sweet Tea	Examples *Answers will vary. Oxygen, Air, Carbon Dioxide

Thermal Contraction (Cooling)
Particle: Distance Decreases
Energy Decreases
Speed Decreases
Temp. Decreases
Particle: Distance Increases
Energy Increases
Speed Increases
Temp. Increases
Thermal Expansion (Heating)

6.P.2.3 *Compare the physical properties of pure substances that are independent of the amount of matter present including density, melting point, boiling point, and solubility to properties that are dependent on the amount of matter present to include volume, mass and weight.*

1. Mass

- Mass is the amount of matter in an object. It is also a physical property of matter.
- A pebble has less mass than a boulder of the same type rock.
- The mass of a specific object never changes.
- An object on Earth would have the same mass on the Moon or on Jupiter.



*Mass by grams

2. Weight (Note: Be very careful not to confuse weight with mass)

- Weight measures the force of gravity on an object.
- Weight for a specific object changes whenever gravity changes. Jupiter has stronger gravity than Earth. Therefore, you or any object would weigh more on Jupiter than Earth. The Moon has weaker gravity than Earth. Therefore, you or any object would weigh less on the Moon than on Earth.
- Use this chant to remember the difference between mass and weight.

*Remember: Gravity is always a pull — never a push!

I have the same MASS on the moon & earth ♥ so True

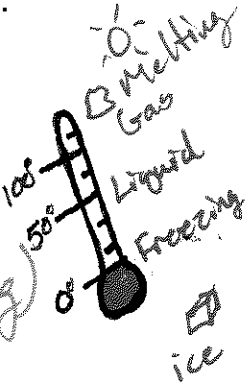
The mass of an object always stays the same.
Weight depends on gravity and it can change.

3. Volume

- Volume is the amount of space that something takes up.
- Scientists use a centimeter ruler to measure the volume of a solid rectangular object.
- The formula is volume = length x width x height and the volume is recorded in cm^3.

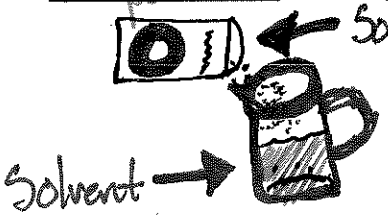
4. Freezing, Melting, and Boiling Points

- Liquids change to solids at their freezing point.
- Solids change to liquids at their melting point.
- Liquids change to gases at their boiling point. This is called evaporation (boiling)
- Condensation is the process of a gas (like water vapor) changing to a liquid
- Different substances have different freezing and boiling points.



5. Solubility

- Solubility means the amount of solute that can be dissolved in a specific volume of solvent under certain conditions.
- A solute's solubility depends on the chemical nature of the solvent.
- Another important factor that influences solubility is the temperature of the system (the solute and the solvent).
- The most common solvent is water (H_2O).



→ What you can observe using your 5 senses (taste, smell, see, touch, hear)

6. Physical Properties

- A physical property is a characteristic of a substance that can be observed without changing the substance into something else. *Remember - Phase changes are physical changes

7. Physical Changes

- A change that alters the appearance or texture/shape of a material but does not make the material into a new substance is a physical change.
- Give 3 examples of physical changes: (Answers will vary.)

1. tearing paper 2. phase changes (ie. solid → liquid) 3. breaking a window

8. Chemical Properties

- A chemical property describes matter based on its ability to change into a new kind of matter with different properties.

C.C. Chemical Creates

9. Chemical Changes

- A change in matter that produces a new substance is a chemical change.
- Unlike a physical change, a chemical change produces new substances with properties different from the original substances

Unit B - Energy: Conservation and Transfer

6.P.3.1 *Illustrate the transfer of heat energy from warmer objects to cooler ones using examples of conduction, radiation and convection and the effects that may result.*

1. Energy can be transferred from one system to another (or from a system to its environment) in different ways:

A. Thermal when a warmer object is in contact with a cooler one

B. Mechanical when two objects push or pull on each other over a distance

C. Electrical when an electrical source such as a battery or generator is connected in a complete circuit to an electrical device

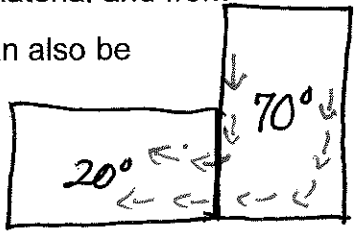
Let's ride on the Energy

D. Or by its most common form which is Electromagnetic waves.

Pavement gets warm due to Radiation

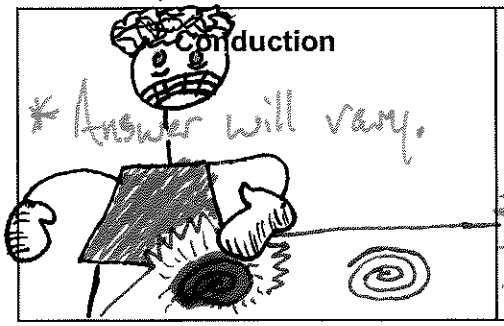
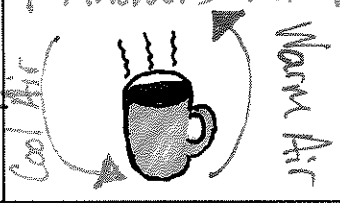
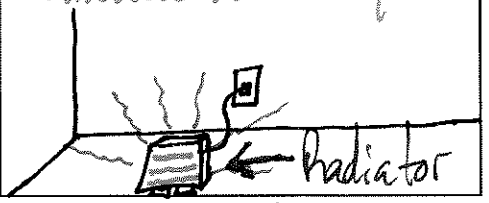
2. Thermal energy is transferred through a material by the collisions of atoms within the material. *Heat **flows through materials or across space from** warm **objects to** cooler **objects**, until both objects are at equilibrium. Heat travels through solids, primarily by conduction. Heat is circulated in fluids, both liquids and gases, through the process of convection. Radiation is energy that travels across distances in the form of electromagnetic waves. Over time, thermal energy tends to spread out through a material and from one material to another if they are in contact (conduction). Thermal energy can also be transferred by means of currents in air, water, or other fluids (convection).

Heat Flow is From HOT to COLD



6.P.3.3 *Explain the suitability of materials for use in technological design based on a response to heat (to include conduction, expansion, and contraction) and electrical energy (conductors and insulators).*

1. Draw a picture which illustrates the three ways of heat transfer in matter.

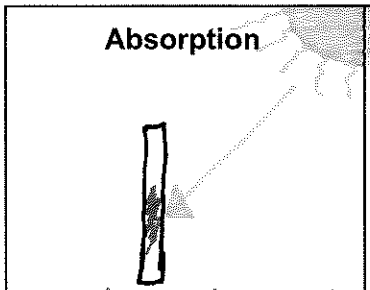
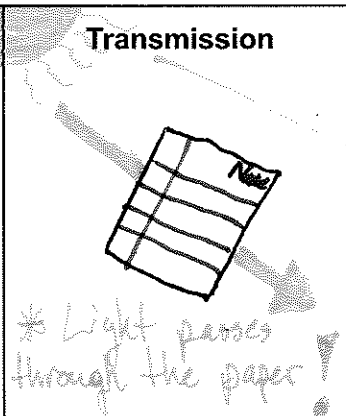
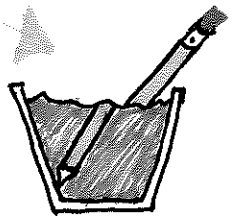
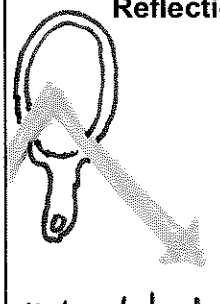
Conduction	Convection	Radiation
* Answer will vary. 	* Answers will vary. 	* Answers will vary. 

2. There are some things that we use daily that we want to conduct heat easily. Most of these items are made of materials that conduct heat readily: aluminum, steel, copper. We call these materials thermal conductors. Similarly, there are things that we do not want to conduct heat (pot handles, spatula, cooking utensils) and these items are generally made of materials that limit heat transfer. We call such materials thermal insulators. For example, expansion joint strips in bridges allow for the bridge to expand in hot weather and not break. These same joint strips allow for the bridge to contract in cold weather and not break.

3. Electrical energy also passes through conductors. An electrical conductor is a material through which an electrical current can flow easily. An electrical conductor is a material through which electrical current does not readily flow. Electrical conductors include most metals, while most nonmetallic solids (rubber, glass, porcelain, ceramic) are insulators.

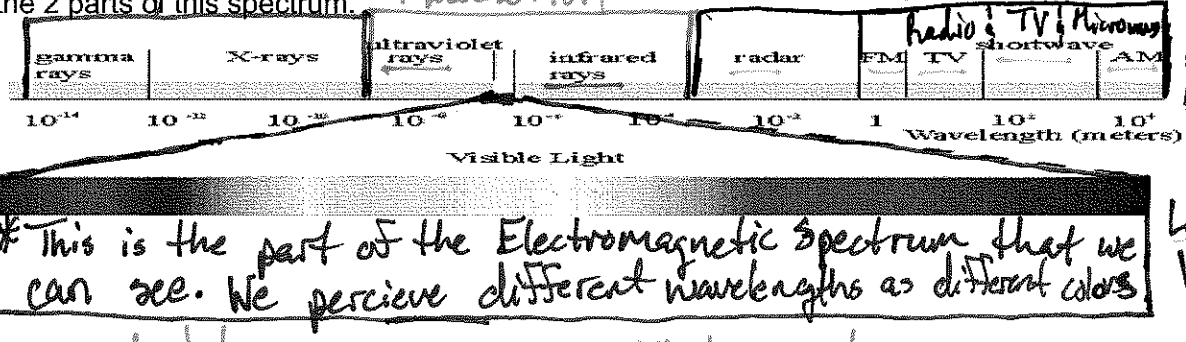
4. Light and other electromagnetic waves can warm objects. How much an object's temperature increases depends on how intense the light striking its surface is, how long the light shines on the object, and how much of the light is absorbed. When light interacts with matter it is either absorbed, transmitted, refracted and/or reflected (scattered).

Draw an example of each type of light interaction.

Absorption	Transmission	Refraction	Reflection
 * Black starts to heat up. Temp ↑	 * Light passes through the paper!	 * Light bends when it hits a medium.	 * Light bounces off of an object

6.P.3.2 *Explain the effects of electromagnetic waves on various materials to include absorption, scattering, and change in temperature*

1. Identify the 2 parts of this spectrum.



High Energy — High Frequency — Short Wavelength

Low Energy — Low Frequency — Long Wavelength

* This is the part of the Electromagnetic Spectrum that we can see. We percieve different wavelengths as different colors

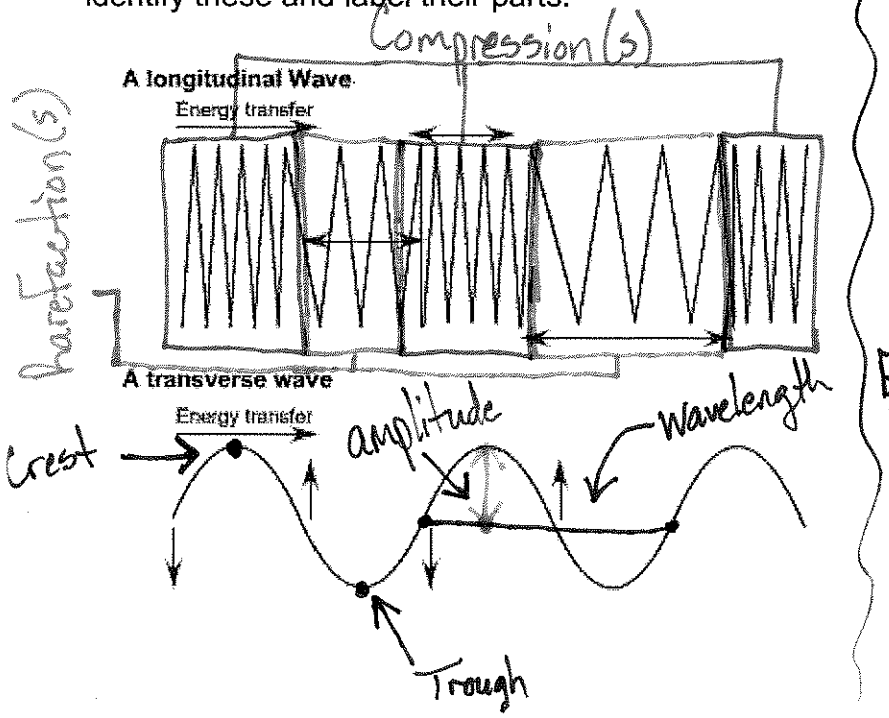
2. Visible Light is the portion of the Electromagnetic spectrum that is visible to (can be detected by) human eyes. Infrared light has a longer wavelength than visible light and is detected most often by its heating effect. Infrared imaging has applications in space exploration and with satellite imaging. Ultraviolet light has shorter wavelengths than visible light. These wavelengths are responsible for causing our sunburns. Most of these waves are blocked from entering Earth's atmosphere by the ozone. Scientists have developed a UV index to help people protect themselves from these harmful ultraviolet waves.

Unit C: Waves

6.P.1 Understand the properties of waves to wavelike property of energy in earthquakes, light and sounds waves.

1. **All waves transmit** ENERGY **not matter**. Waves are a disturbance that transmits ENERGY in matter or space. Nearly all waves travel through matter. Waves are created when a source (force) creates a vibration. **Provide 3 examples of waves.**

There are 2 main types of waves. Below you will see examples of both. You will need to be able to identify these and label their parts.



Mechanical Waves (Medium)

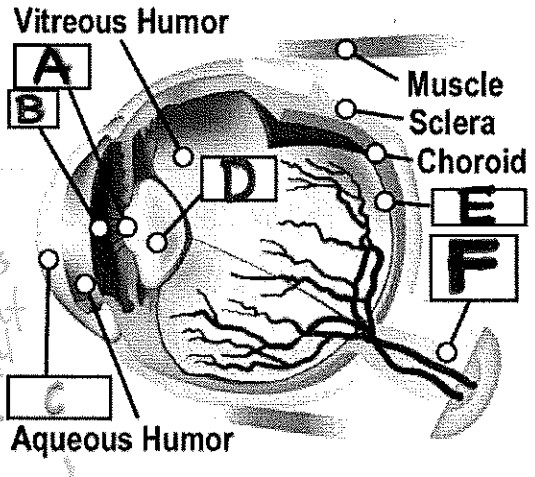
- Require/Need a Medium (solid, liquid or gas)
- Example(s):
  - Sound Waves

Electromagnetic Waves (Exempt)

- Does not need, but can use
- Can travel in a vacuum (like space)
- Example(s):
  - Light Waves
  - Radio Waves
  - X-Rays

3. **Light travels in** transverse **waves**. Something can be "seen" when light waves are emitted or reflected. Human eyes respond to only a narrow range of wavelengths in the electromagnetic spectrum. Differences of wavelength within that range are perceived as different colors of light.

4. Use the diagram below to **identify the different parts of the human eye.** You will need to **know the locations and functions** of the following parts.



A. Pupil - Hole in the eye that allows light to pass through. Controlled by the iris.

B. Iris - Expands & Contracts to regulate the amount of light that enters the eye. *Colorful part of the eye.

C. Cornea - Protects the pupil (the rest of the inner eye)

D. Lens - Bend (refract) & focus light onto the retina.

E. Retina - Transmits info (Changes light into signals)
- Cones -
- Rods -

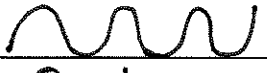
F. Optic Nerve - Carries info to the brain.

6. **Identify the order in which light travels the human eye.**

1) Cornea 2) Pupil 3) Leans 4) Retina

7. **Create a list of conditions which can affect the human eye.**
- Nearsightedness - Farsightedness - Color Blindness

8. **Sound travels in** longitudinal **waves**. Something can be "heard" when waves enter the ear. Sound is a form of energy that is caused when vibrating materials produce waves that move through matter. These waves have different characteristics such as frequency and amplitude, which will determine the properties of sound such as pitch and loudness. **Provide a brief definition for each of the characteristics and properties of sound.** * Sound is caused by vibrations.

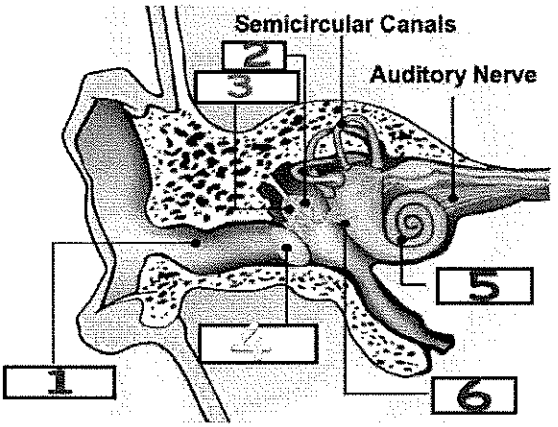
Property/ Characteristic	Definition
1. Frequency 	The # of waves that pass a fixed point in time
2. Amplitude 	Distance from the resting position to crest/trough
3. Pitch	Determined by Frequency: how high/low the sound is.
4. Loudness	Determined by amplitude (Ex. music amplified)

9. The form of the human ear can receive sound waves as vibrations and convert them to signals that are processed by the brain. **Identify the order in which sound travels through the ear.**

1) Outer Ear - Pinna 2) Middle Ear 3) Inner Ear 4) Brain

↳ Captures Sound | Ear Canal, Ear Drum | Hammer, Anvil, Stirrup ↳ Amplify the sound | Cochlea, Auditory Nerve ↳ Transmits signals to the Brain

10 . Use the diagram below to **identify the different parts of the human ear.** You will need to **know the locations and functions** of the following parts.



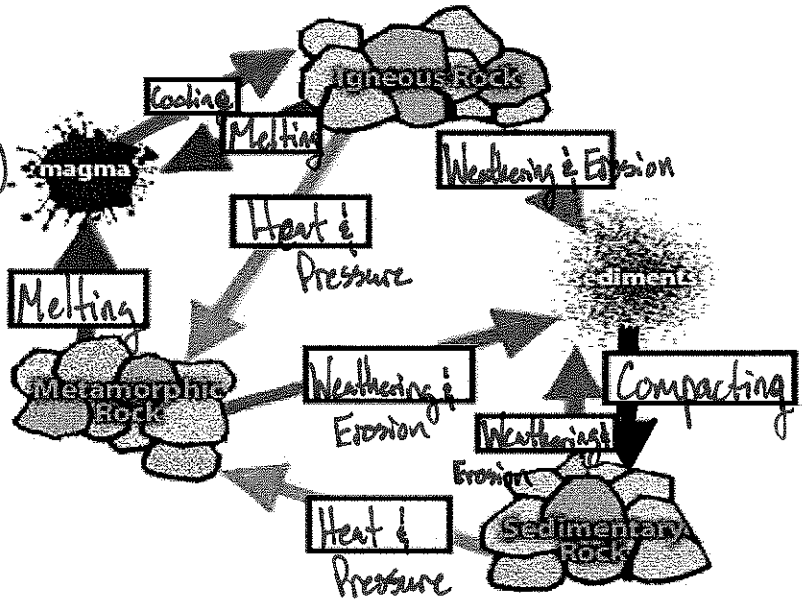
11. **Create a list of conditions which can affect the human ear.**

Unit D: Rock Cycle/Soil Formation/Soil Conservation

6.E.2.3 Explain how the formation of soil is related to the parent rock type and the environment in which it develops.

1. Forces deep inside Earth and at the surface produce a **slow cycle that builds, destroys, and changes the rocks** in the crust. Plate movements start the rock cycle by **helping to form magma, the source of igneous** rocks. Plate movements also cause **faulting, folding and other motions of the crust that help to form sedimentary and metamorphic rock.** You will need to know how each type of rock is **formed**. Correctly label the diagram of the rock cycle.

2. List the **5** components that soil is mixture of:
   1. Rock Particles (Parent Rock)
   2. Minerals
   3. Decayed Organic Matter (Humus)
   4. Water
   5. Air



3. The composition and texture of soil and its fertility and resistance to erosion are greatly influenced by **plant roots and debris, bacteria, fungi, worms, insects, rodents, and other organisms.** Which of the following listed adds air and breaks down organic matter in soil?