**Properties of Matter**

1. Classify and/or compare substances on the basis of their physical properties and/or explain that these properties are independent of the amount of the sample.
	1. Physical property – characteristic of a pure substance that can be observed without changing it into another substance.
		1. Ex. appearance, texture, color, odor, melting point, boiling point, density, solubility, magnetism, conductivity
2. Describe density and/or calculate and compare the densities of various materials using the materials’ masses and volumes.

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* 1. Density - the ratio of mass to volume of a substance
1. Conductivity, magnetic properties
	1. Conductivity – the rate at which heat and electricity pass through a substance
		1. Most common are metals
	2. Magnetic properties – the characteristics of a substance to be attracted to a magnet
		1. Iron nickel, cobalt – are only metals that have magnetic properties.
2. Describe how elements combine in a multitude of ways to produce compounds that make up all living and nonliving things.
	1. Compound – a substance made of two or more elements that are chemically combined.
		1. Ex. CO2, H20
3. Solubility (solvent, solute, and saturation)
	1. Solubility – how much solute can dissolve in a solvent at a certain temperature
		1. Solute - substance that is being dissolved
		2. Solvent – substance the solute is dissolving in
		3. Saturation – the point at which no more solute will dissolve
4. Describe the motion of particles in solids, liquids, and/or gases.

 Solid Liquid Gases

* Particles farthest apart
* Particles move much to fill a space
* No definite shape
* No definite volume
* Particles farther apart
* Particles move much freely (flow)
* No definite shape
* Definite volume
* Particles close together
* Particles don’t move much (vibrate)
* Definite shape
* Definite volume
1. Explain that elements are grouped in the periodic table according to similarities of their properties.
2. Explain that atoms are the smallest unit of an element and are composed of subatomic particles (protons, neutrons, and electrons).
3. Identify common examples of acids, bases, and/or salts.
	1. Acids – acetic acid, vinegar, hydrochloric acid
	2. Bases – soap, antacid, baking soda
	3. Salt – (neutral substance) sodium chloride, potassium iodide, calcium carbonate
4. Compare, contrast, and/or classify the properties of compounds, including acids and bases.
	1. Compounds have different properties than any of the elements that are in them
	2. Acids react with metals and carbonates, taste sour and turn blue litmus paper red
	3. Bases taste bitter feel slippery and turn red litmus paper blue
5. Differentiate among pure substances, mixtures, and solutions.
	1. Pure substance – made of only 1 type of element
	2. Mixtures- two or more substances that are together in the same place but not chemically bonded (joined)
	3. Solution – a mixture containing a solvent and at least1 solute and that has the same properties throughout

**Changes in Matter**

1. Differentiate between physical and chemical changes.
	1. Physical change – alters the form or appearance of a material but doesn’t make it another substance
	2. Chemical change – a change in which one or more substances combine or break apart to form new substances
2. Explain that mass is conserved when substances undergo physical and chemical changes, according to the Law of Conservation of Mass.
	1. Law of Conservation of Mass(Matter) – mass is neither created nor destroyed
3. Describe how temperature influences chemical changes –
	1. Increase temp = increase speed of reaction
	2. Decrease temp = decrease speed of reaction

**Forms of Energy**

1. Identify, compare and/or contrast the variety of types of radiation present in radiation from the Sun.
	1. Ultra violet shorter wavelength/higher frequency
	2. Visible light (ROYGBIV)
	3. Infrared (heat) longer wavelength/lower frequency
2. Identify and/or compare characteristics of the electromagnetic spectrum. 
	1. Wavelength – distance from 1 point of a wave to the same point on the next wave
	2. Frequency – how many waves pass a point in 1 sec.
3. Identify common uses and/or applications of electromagnetic waves.
	1. Microwaves
	2. Heat lamps (infrared)
	3. Xrays, gamma rays (medical)
4. Order of frequencies and wavelengths in the electromagnetic spectrum - see chart above
5. Describe and/or explain that waves move at different speeds through different materials.
	1. Waves move fastest in solids and slowest in gases
6. Explain that light waves can be reflected, refracted, and/or absorbed.

**Energy Transfer and Transformations**

1. Identify and/or describe the transformation of energy from one form to another.
	1. Law of conservation of energy – energy can neither be created nor destroyed it can only change form
	2. Ex. Lamp (electrical to light and heat); bicycle (chemical to mechanical to kinetic)
2. Differentiate between potential and kinetic energy.
	1. PE stored energy
	2. KE energy of movement
3. Identify and/or explain situations where energy is transformed between kinetic energy and potential energy.
4. Identify and/or describe examples of the Law of Conservation of Energy. – see pendulum
5. Describe how heat flows in predictable ways.
	1. Law of thermal Equilibrium Thermal energy travels from hot toward cold seeking balance
6. Explain that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.
7. Heat transfer (conduction, convection, radiation)
	1. Conduction – transfer by contact
	2. Convection – transfer by movement (hot rises, cold sinks)
8. Specific heat - the heat required to raise the temperature of the unit mass of a given substance 1 degree celcius

**Forces and Changes in Motion**

1. Identify and/or describe types of forces.
	1. Balance force
	2. Unbalance force
2. Describe the relationship among distance, mass, and gravitational force between any two objects.
	1. Increased distance decreased gravitational force
	2. Increased mass, increased gravitational force
3. Differentiate between mass and weight.
	1. **Mass** is a measurement of the amount of matter something contains,
		1. measured by using a balance comparing a known amount of matter to an unknown amount of matter
	2. **Weight** is the measurement of the pull of gravity on an object
		1. measured on a scale.
4. Law of Universal Gravitation (mass/distance)
	1. **ALL** objects attract each other with a force of gravitational attraction.
	2. force of gravitational attraction is directly dependent upon the masses of both objects
	3. inversely proportional to the square of the distance that separates their centers.
5. Describe and/or explain that an unbalanced force acting on an object changes its speed and/or direction.



1. Interpret and/or analyze graphs of distance and time for an object moving at a constant speed. Ex. relative speed of an object at various points or sections of the graph and the direction of motion
2. Net force (direction)
3. Changes in speed (positive acceleration and negative acceleration)
4. Friction (sliding and stationary)
	1. Sliding = moving
	2. Stationary = not moving