* Chapter 4
* Elements, Compounds, and Mixtures
* Section 1 - Elements
* Terms to Learn
  + Element
  + Pure Substance
  + Metals
  + Nonmetals
  + Metalloids
* Elements
* Element is a pure substance that cannot be separated into simpler substances by physical or chemical means
* Has only one type of particle
* A hunk of gold is made of many particles but they are all the same
* A Meteorite has the same iron in it as your pans
* Elements
* Every element has a unique set of properties (characteristic properties)
  + Characteristic properties do not depend on the amount of the substance
  + Can be either physical or chemical properties (boiling point, melting point, reactivity with acid, density)
  + Used to identify the element
* Groups
* Categories – metals, nonmetals, metalloids
* Grouped together by their shared properties. (music store)
* Metals
* Shiny and good conductors of thermal energy and electric current.
* Malleable (can be hammered into thin sheets)
* Ductile (they can be drawn into thin wires)
* Non Metals
* Dull (not shiny) and are poor conductors of thermal energy and electric current
* Solid non metals tend to be brittle and unmalleable (graphite)
* Metalloids
* Also called semiconductors
* Have properties of both metals and nonmetals.
* Some are shiny while others are dull
* Somewhat malleable and ductile
* Some conduct thermal energy and electricity
* Examples – Silicon, Antimony, Boron
* Section 2 - Compounds
* Terms to Learn
  + Compound
* Compounds
* Compound is a pure substance composed of two or more elements that are chemically combined
* In order for a compound to be made the two elements have to react (undergo a chemical change)
* Water
* Water is always H2O. It is always 1 gram of Hydrogen to 8 grams of Oxygen. If it were different mass ratio then it could not be water.
* Compounds
* Like elements each compound has a unique set of characteristics like boiling point, melting point, density, and color
* A compound has different properties from the elements that formed it
* Table salt (NaCl) is formed from sodium which reacts violently with water and chloride which is poisonous.
* Some compounds can be broken down into simpler substances through chemical changes
* Table salt if electrified breaks into sodium and chloride
* Compounds cannot be broken down by physical changes
* Compounds in your World
* Nitrogen is needed for life and you get nitrogen from animals that eat it in plants that obtain it from the soil.
* Aluminum that is used in cans is not found alone in nature it is broken down by humans from aluminum oxide
* Section 3 - Mixtures
* Terms to Learn
  + Mixture
  + Solution
  + Solute
  + Solvent
  + Concentration
  + Solubility
  + Suspension
  + Colloid
* Properties of Mixtures
* All mixtures share certain properties
* A mixture is a combination of two or more substances that are not chemically combined
  + Two or more materials together form a mixture if they do not react to form a compound
* Properties of mixtures
* Substances in a mixture keep their chemical makeup, they are just mixed together
* Mixtures can be physically separated whereas compounds can only be broken down through chemical changes
* Ways to separate mixtures
* Distillation – separates based on the boiling points of the components
* Magnets – can be used to separate anything iron
* Centrifuge – Separates using the densities of the components
* Mixtures
* Components of a Mixture do not have definite ratios whereas compounds have specific mass ratios
* Mixtures vs Compounds
* Components are elements, compounds, or both
* Components keep their original properties
* Separated by physical means
* Formed using any ratios
* Components are elements
* Components lose their original properties
* Separated by chemical means
* Formed using a set mass ratio of components
* Solutions
* Solution is a mixture that appears to be a single substance but is composed of two or more substances that are evenly distributed.
  + Often called homogenous mixture because they have the same appearance and properties
  + Solutions
* Dissolving is the process where particles of substances separate and spread evenly throughout the mixture
* Solute is the substance being dissolved
* Solvent is the substance doing the dissolving
* If it is soluble then it is able to be dissolved if it in insoluble then it would be a mixture not a solution
* Example of a Solution
* Salt water
* Which is the solute
* Which is the solvent
* Substance with the greater volume is the solvent
* Solutions
* Solutions can also be air, Gasoline, and soda
* Alloys are solid solutions of metals and nonmetals dissolved in metals
* Particles in solutions are extremely small and never settle out
* Concentration
* Concentration is a measure of the amount of solute dissolved in a solvent (g/mL)
* Solutions can be concentrated or dilute
* It is saturated if it can not hold any more solute, if it can hold more then it is unsaturated
* Solubility
* Solubility is the amount of solute needed to make a saturated solution with a given amount of solvent
* Mixing, Heating, or Crushing the solid helps it dissolve faster
* Suspension
* Suspension is a mixture in which particles of a material are dispersed throughout a liquid or a gas but are large enough to settle out
* Also called Heterogeneous mixtures because you can see the particles
* Colloids
* Have properties of both solutions and suspensions
* Particles are dispersed throughout but are not heavy enough to settle out
* Particles are smaller and well mixed