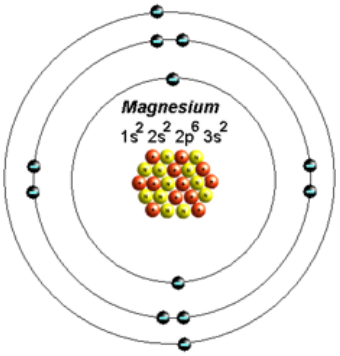
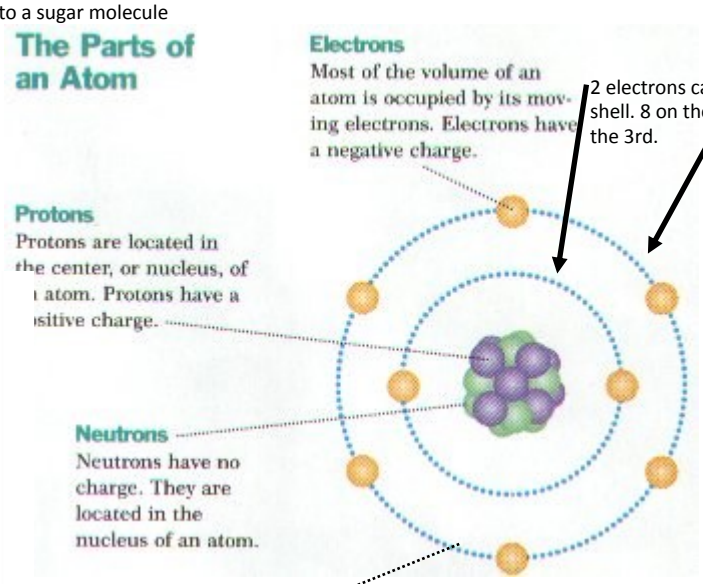
Study Guide for Atoms and Molecules

- I can define matter as something made of atoms that has mass and takes up space. Matter can be found everywhere in the universe except for in empty space.
- I can define what an atom is and what it looks like and can label its parts.
- I can explain that atom model in a book or class is not to scale.
- I know that even though we can't see atoms, scientists have inferred how they look and behave because they have done many experiments that give us evidence. (You know air is there even if you can't see it)
- I can match the Scientists to their contributions in the discovering the atom.
- I can define what a molecule is and what it is made of. I can show that $C_6H_{12}O_6$ is made of 24 atoms and that it is a bigger molecule than NcCl which has only 2 atoms. I can also explain that NH_3 is made of 4 atoms.
- I can explain that $3H_2O$ means 3 molecules of water.
- I can draw and label a model of a water molecule.
- I can identify the major atoms and molecules that make up our air as: Nitrogen, Oxygen, Carbon Dioxide, Argon and Methane
- I know that it took 100's of years, numerous scientists and many experiments to discover what an atoms looks like and how they behave
- I can explain that pure gold is made of gold atoms, pure silver is made of silver atoms, and pure oxygen is made of oxygen atoms etc.
- I can identify the molecule NaCl as salt. Na is sodium and is a gray metal. Cl is chlorine and is a yellow gas. Mixed together, they make salt.
- I can describe a chemical reaction as the tearing apart of molecules and recombining into new molecules. Baking soda and vinegar tear each other apart and recombine into new molecules like carbon dioxide. Burning paper tears apart the paper molecules are recombines them into smoke and ash.
- I can describe atomic movement in that atoms are ALWAYS moving
- I know that atoms are too small to see, even with microscopes
- I know what atoms the following common household items are made of:
    - Jewelry: Can be made of gold or silver
    - Tin Foil: Made of Aluminum
    - Pencils: the lead is made of Graphite
    - Birthday Balloons: Filled with Helium
    - Salt: Made of sodium and chlorine bonded into a molecule
    - Ozone: Made of 3 oxygen atoms bonded into a molecule
    - Plant Fertilizer: made of phosphorus and nitrogen
    - Sugar: made of carbon, hydrogen, oxygen bonded into a sugar molecule
    - Lighted signs: Neon
    - Silverware: Silver
    - Coins: Copper, Nickel, Zinc
    - Steel: Mostly Iron
- I can identify information from the periodic table to draw a picture of an atom.





2 electrons can fit on the 1st shell. 8 on the 2nd and 18 on the 3rd.

Shells
Areas where the electrons orbit the nucleus

Atomic # (aTOPic)
# of protons and the # of electrons

Mass #
Is the # of protons + the # of neutrons
Round the #.

Mass # - # of protons = # of neutrons
24-12=12

Standard 1: Objective 1 Name _____Per _____Score_____

Standard 1: Students will understand the structure of matter.
Objective 1: Describe the structure of matter in terms of atoms and molecules.

Enduring Understanding: All matter is made up of atoms that are too small to see; they are in perpetual motion. Atoms can combine to form molecules. Scientific knowledge about atoms has changed over time and all models of atoms have limitations.

Essential Questions

1. How can we understand something we cannot see? By doing experiments and inferring our data
2. How has our idea of the atom changed? We added to each new model as we got new technology, giving us our current model. We did not throw out old ideas.
1. How are an atom and a molecule different? A molecule is made of atoms
2. What limitation do models of atoms have? They are not to scale. If we could "blow up" an atom and the nucleus was the size of an apple, the 1st electron would be 5 football fields away.

Vocabulary:

Atom: the smallest unit of matter that has its own unique properties. There are 92 naturally occurring.

Proton: the positively charged particles in the nucleus-the # determines which atom is which

Neutron: a particle in the nucleus that does not have a charge

Electron: the negatively charged particles in an atom that spin around the nucleus

Element: fancy nancy name for atom

Matter: Made of atoms and has mass and takes up space. Matter is everything and everywhere, except empty space.

Molecule: two or more atoms bonded together

Model: something that represents something else, can be bigger or smaller

Democritus: Ancient scientist that came up with the idea of atoms: Called Atomos

John Dalton: 1st modern day scientist. Thought atoms were solid balls (Think John Stockton-basketball)

J.J. Thompson: Discovered negatively charged electrons: Thought they were spread out like a blueberry muffin (Think JJ is like BB for blueberry muffin)

Ernest Rutherford: Discovered the positively charged nucleus (center) of an atom. (Think, "I am POSITIVE I will never name my baby Ernest Rutherford)

Neils Bohr: Proposed that electrons spun around the nucleus like planets around the sun (Think, it is so BORING (Bohring) to watch electrons spin round and round and round)

James Chadwick: Discovered neutrally charged particles in the nucleus called neutrons (Think Chapstick is a neutral color)

My child studied for at least 15 minutes and taught me the information on the test:

X_____