

Learning Goal: Students will be able to describe how atomic theory developed and explain the modern model of the atom.

Name: Ms. Fihe
 Class: Adv. Sci. 3
 Period/Block: G1, GO3, G4, O4.
 Date: 10/15/12

Topic: **Atomic Theory (Ch. 9, Lesson 4)**

How did atomic theory develop?

There needs to be a question.
 Follow with research.
 Design an experiment / Build a model.
 Test it over and over (repeat & replicate).
 Analyze & conclude.
 Share results.

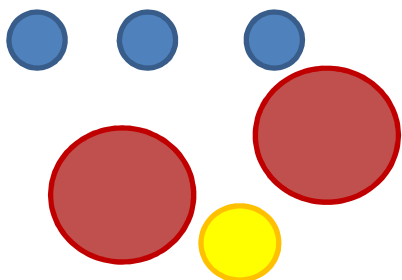
As more and more evidence is discovered and analyzed, the question / model / experiment need to be revised.

	TIME	PERSON	THEORY
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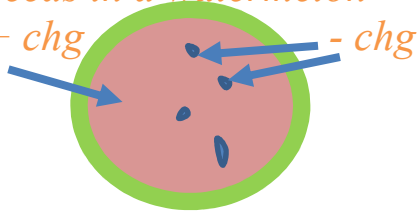
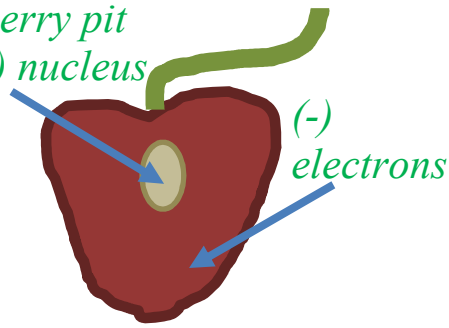
	430 B.C.	Democritus	Matter formed from smaller pieces that could not be broken into smaller parts. <i>Atomos = uncuttable</i>
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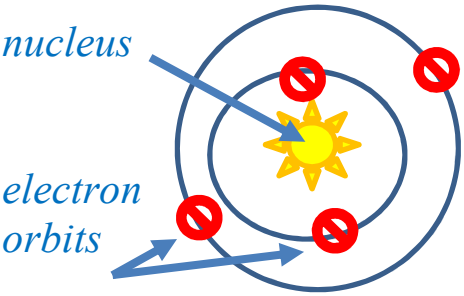
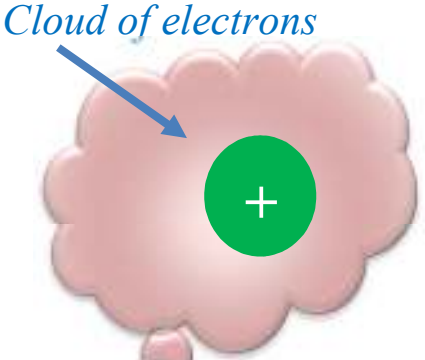
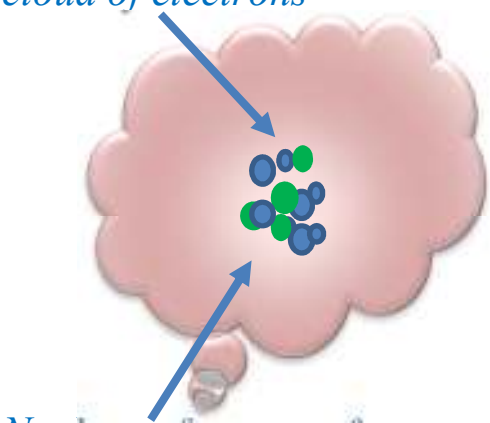
*Dalton's image:
 Smooth, solid, spheres
 (Marbles)*

Each element has a specific design, mass, and physical traits



	1600s	John Dalton	<ol style="list-style-type: none"> 1. All elements consist of atoms. 2. All atoms of the same element are exactly alike and have the same mass. 3. Atom of one element can't be changed into an atom of another element 4. Compounds form when atoms of more than one element combine in a specific ratio
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<p><i>Thomson's image:</i> Spherical with negative charges placed randomly throughout</p> <p><i>Seeds in a watermelon</i> + chg - chg</p> 	1897	J.J. Thomson	<p>1. Atoms contain (-) charged particles called ELECTRONS</p> <p>2. atoms contain some sort of positive charge to make the overall atom neutral</p>
<p><i>Rutherford's image:</i> Small, dense positive charged protons in a central nucleus with negative charges filling the space around the nucleus</p> <p><i>Cherry pit</i> (+) nucleus (-) electrons</p>  <p><i>** Draw a picture to show the motion of the positively charged particles as they passed through the gold foil atoms. Show how the predicted and actual results varied. **</i></p>	1911	Ernest Rutherford	<p>GOLD FOIL EXPERIMENT:</p> <p>If positive charges are shot through a single layer of atoms then they will go straight through or bend slightly because the positive charge of the atom is equally distributed through the atom.</p> <p>Results: Some acted as he predicted, BUT SOME SHOT STRAIGHT BACKWARDS</p> <p>Conclusion: The positive charges were repelled by a small, dense region in the center (nucleus). The rest of the atom is mostly empty space.</p>
Bohr's image:	1913	Niels Bohr	Electrons are only found

<p><i>Electrons must travel in specific orbits around the nucleus</i></p> <p><i>Planets orbiting the sun</i></p> 			<p>in specific orbits around the nucleus.</p>
<p><i>Predict how energy level will determine where within the atom the electrons can be found.</i></p> 	<p>1920s</p>	<p>Cloud Model</p>	<ol style="list-style-type: none"> 1. Electrons don't have specific orbits 2. Electrons move quickly through a cloudlike region around the nucleus 3. Motion is related to its <u>energy level</u>
	<p>1932 "the MODERN Model"</p>	<p>James Chadwick</p>	<ol style="list-style-type: none"> 1. Neutrons are neutral particles 2. The nucleus contains protons & neutrons 3. Most of the volume of an atom is the space (cloud) where electrons can be found
<p>Protons & neutrons have approximately 2000x the</p>			

	<p>mass of electrons.</p> <p>Atomic mass = # protons + # neutrons</p>
<i>Create a memory tool to differentiate atomic mass and atomic number.</i>	Atomic number = # protons
	<p>Isotopes: atoms of the SAME element with DIFFERENT atomic mass</p> <p># protons is the same, # neutrons is different</p> <p>Carbon – 12 (6 protons, 6 neutrons) Carbon – 13 (6 protons, 7 neutrons) Carbon – 14 (6 protons, 8 neutrons)</p>

Summary, Reflection, Analysis

Scale Rating (1-4):

Models of the atom have changed over time as scientists gather more information and understand more about the subatomic particles.

The results of the Gold foil experiment forever changed the model of the atom because it suggested that the atom had a _____ and was made up mostly of _____.

Find the atomic mass and atomic number on the periodic table for each of the following elements:

<u>Element</u>	<u>Atomic Number</u>	<u>Atomic Mass</u>
Hydrogen		
Helium		
Argon		
Gold		
Mercury		
Tungsten		
Potassium		