Handout on Atomic Models to try keep in your mind.

Democritus: philosopher who thought up the idea of the atom approximately 2400 years ago. He had no concept of elements combining into compounds or subatomic particles. He was a good thinker but not a scientist. His idea of an ultimate particle that can't be divided (in Greek it was called the "Atomos" remain important. Most high school students understand much more chemistry (even in October) than he could have grasped.

Dalton: a scientist who finally started to experiment with the idea about atoms as the basic building blocks of matter. His thoughts led to first real atomic theory, which included:

A. All matter is made of atoms. Atoms are indivisible and indestructible.
B. All atoms of a given element are identical in mass and properties
C. Compounds are formed by a combination of two or more different kinds of atoms.
D. A chemical reaction is a rearrangement of atoms.

Thompson: the scientist credited with the discovery of the electron, which was the first subatomic particle described. Using a "cathode ray" tube with a positively charged cathode and a negatively charged anode, he measured negatively charged particles, which he named electrons. It placed these electrons into his plum pudding model of the atom. He was wrong about the model, but he it was a real step forward.

Rutherford: discovered that the nucleus of an atom was central, surrounded by mostly empty space. He postulated that the nucleus was a positively charged dense mass of protons, that the electrons flew around. He was correct that electrons flew around the nucleus and were much smaller than the nucleus. He could not explain how electrons would not fall into the nucleus or fly away.

Chadwick: In 1932, James Chadwick discovered a third subatomic particle, he named the neutron. Neutrons seem to help stabilize the protons in the atom's nucleus. Because the nucleus is so tightly packed together, the positively charged protons would tend to repel each other normally. Neutrons help to reduce the repulsion between protons and stabilize the atom's nucleus. Neutrons always reside in the nucleus of atoms, and they are about the same size as protons. However, neutrons do not have an electrical charge, they are neutral. He is added here to show how work builds over time.

Bohr: determined that the electrons which are flying around the central nucleus must be in up to 7 special orbits or energy levels. Although closest to the modern concept of the atom, it lacked an explanation of how electrons in elements larger than Hydrogen worked. He also explained how electrons could move up into higher energy orbits, if given exactly the right amount of energy (the proper quantum of energy). This exact amount of energy is emitted when electrons return to the ground state, and this emission is called spectra.

The Modern Atomic Model: Erwin Schrodinger's most important contribution to the modern atomic theory was his development of the mathematical description that described the paths electrons would most likely follow around nucleus. The formulas that Schrodinger developed in 1926 would be later called the basis of quantum mechanics and awarded him a Nobel Prize. Eventually, Schrodinger determined that instead of electrons following Bohr's orbits (like the moon orbits the Earth), rather the electrons were actually in shells. Instead of the idea of the electrons following a pre-determined path, the electrons would be moving around in a "zone", but they could be anywhere. From a statistical model, the electrons could be anywhere, but more more likely to be in these shells. These ideas, including the quantum mechanical formulas, were presented in his "Wave Mechanical formula." This model eventually became the basic modern atomic theory.

The modern model of the atom has come from the work of many scientists (many more than those above), over a long period of time.