Instructor: Gale Bohnarczyk (2003 Science Teacher workshop participant)
School District: Ridgefield Park
Lesson Title: Structure of the Atom
Grades: 7,9
Subject: Basic Chemistry
Overview: Using classmates as protons, neutrons, and electrons, a volunteer will construct an atom from the periodic table.
Objectives:

- SWBAT understand the structure of the atom
- SWBAT understand charges of protons, neutrons, and electrons.

Materials and Resources:

- sidewalk chalk,
- student handout with questions,
- cards with string (for around student's neck) of "+", "-", and "0",
- large parking lot that can be written on with chalk

Procedure:

1. Teacher makes index cards with positive, negative, and neutral signs. (these indicate the charges of a proton, neutron, and electron). Place two holes in each corner of the index card and tie string. This will hang over the student's neck like a "necklace."
2. Teacher gives out marked "necklaces" to random students in the class. Those students who are positive are the protons, negative students are the electrons, and zero (neutral) students are the neutrons.
3. Activity is done outside in the parking lot.. Black top is preferred.
4. Teacher assigns one student to draw an atom of the element carbon, for example.
5. Student receives big piece of sidewalk chalk.
6. Student draws and labels nucleus on the blacktop.
7. Student calls up the proper amount of student protons and neutrons to put in the nucleus. The student models actually get up and stand in the nucleus that was just drawn. They have their positive and neutral "necklaces" on.
8. Then, student draws the proper amount of energy levels on the blacktop with the chalk and asks the students who are negatively charged to fill the levels accordingly. (This will vary depending on which atom from the periodic table was selected.)
9. Teacher checks to make sure that "atom" is correct.
10. Students may be asked a variety of questions as they model the atom.
11. Students are asked to sit down and another element is chosen.

12. Once again, students are selected to act as models.
13. You may construct as many as you like.
14. After activity is over, students work on "student worksheet."
15. You can also bring in the concepts of ionic bonding, covalent bonding and ions in the same way!

It's fun, and the students love to get up and be protons, neutrons and electrons.

They also love to draw on the blacktop with sidewalk chalk!

Student Worksheet:

Name: _____ Date: _____

1. What is the nucleus? What subatomic particles belong in the nucleus?

2. What are energy levels? What subatomic particles go in the energy levels?

3. What is the electric charge of
   - Proton
   - Electron
   - Neutron

4. The number of ____ equals the number of ____ in a neutral atom.

5. What is the atomic number? The atomic mass?

6. Look at your periodic table. What is the atomic number of carbon? Hydrogen? Neon? What is the atomic mass of Carbon? Hydrogen? Neon?

7. What is a covalent bond? Give examples of compounds that are covalent bonded.

8. What is an ionic bond?