Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Electric Charge Investigation

**Part 1: Determining Charge**

**Set-up**

* Go to http://phet.colorado.edu/sims/html/build-an-atom/latest/build-an-atom\_en.html. Click “Build an Atom”.
* Click on the green + button for Net Charge.

**Procedure**

1. Build an atom with one proton, one neutron and one electron. Draw & label your atom below.
2. What is the net charge of this atom? Why?
3. Add an electron to your atom. What is the net charge of your atom now? Why?
4. Remove the electron and add a proton. What is the net charge of your atom now? Why?
5. Remove the proton and add a neutron. What is the net charge of your atom now? Why?
6. Based on your observations, what is the charge of...
   1. an electron?
   2. a proton?
   3. a neutron?
7. Protons and electrons have opposite types of charge, yet the both carry the same amount of charge. Explain how your observations from above prove this statement is true.
8. Build a stable atom that has a net charge of +2. How many protons, electrons, and neutrons are required to do this?
9. Build a stable atom that has a net charge of -3. How many protons, electrons, and neutrons are required to do this?

**Part 2: Objects Gaining Charge**

**Set-up**

* Go to <http://phet.colorado.edu/sims/html/balloons-and-static-electricity/latest/balloons-and-static-electricity_en.html>.

**Procedure**

1. Draw a picture of what you see on the screen below.
2. Currently, what is the net charge of the balloon, wall, and sweater? How do you know?
3. Rub the balloon on the sweater and observe what happens.
   1. Draw a picture of the balloon and the sweater now.
   2. What happened to the negative charges on the sweater and on the balloon? Be specific.
   3. What happened to the positive charges on the sweater and on the balloon? Be specific.
   4. What is the net charge of the balloon and the net charge of the sweater now (positive, negative or zero)? Why?
4. Why can electrons move from one material to another whereas protons cannot? (*hint: look at the structure of an atom)*
5. Is charge conserved? Explain your answer.
6. Bring the charged balloon near the wall.
   1. Draw a picture of the balloon and the wall below.
   2. What is happening to the wall is a process called polarization. Why do you think that is?

**Part 3: Getting Shocked**

**Set-up**

* Go to <http://phet.colorado.edu/sims/html/john-travoltage/latest/john-travoltage_en.html>

**Procedure**

1. Rub the foot on the carpet 3-5 times and observe what happens.
   1. What do those blue particles represent?
   2. What is the net charge of John? Why?
2. Move the hand towards the doorknob. What happened? Be specific.
3. Based on your observations, explain why people sometimes get shocked when they rub their feet against the carpet and touch metal or another person.