Saturday Science: Grades 2-4 Week 1

Learning Objectives:

1. The students will be able to show how electrons transfer in their drawings, and explain how this affects the static electricity of a balloon on the wall and a moving coke can.
2. Students will be able to record their predictions, observations, and results in their journals as they record the times of their negatively charged balloons attracting to the wall.
3. Students will be able to describe an atom and its various parts including; protons, neutrons, nucleus, and electrons when reflecting with the whole class.

Indiana Academic Science Standards:

Process Standards 4th Grade:

- Make predictions and formulate testable questions.
- Keep accurate records in a notebook during investigations and communicate findings to others using graphs, charts, maps and models through oral and written reports.
- Identify simple patterns in data and propose explanations to account for the patterns.

Core Standards

Design and assemble electric circuits that provide a means of transferring energy from one form or place to another.

- 4.1.4 Experiment with materials to identify conductors and insulators of heat and electricity.

- 3.1.3 - Keep and report records of investigations and observations using tools, such as journals, charts, graphs, and computers.

- 2.1.5 - Demonstrate the ability to work with a team but still reach and communicate one's own conclusions about findings.

- 4.3.16 - Investigate and describe that without touching them, material that has been electrically charged pulls all other materials and may either push or pull other charged material.

Teacher Content Knowledge:

Electricity is a form of energy produced by the movement of electrons. It was discovered by Benjamin Franklin in the 1740's. His hypothesis concluded that lightning was composed of a natural flow of electrons. During his key experiment he discovered that he was indeed correct; electricity and lightning are the same thing!

Static electricity is the buildup of electrons on an object when it is rubbed with another object that gives them up easily. This is what causes your hair to stick up from a balloon rubbing on your head. Atoms make up everything and they consist of a nucleus (center) and an outer shell of electrons. Some materials can have a tight hold on their electrons and not give them up easily. Electrons do not move through them very well. These things are called insulators. Plastic, cloth, glass and dry air are good insulators. Other materials let go of their electrons easily and they can move through them very easily. These are called conductors. Most metals are good conductors. Positive and negative charges (opposite) attract and like charges repel.

Materials:

- Small spiral notebooks for each student
- Variety of different fabrics for each small group: cotton, polyester, silk, wool – for each group
- Empty coke cans - 2 for each group
- Plastic Comb, Plastic Spoon, PVC Pipe, Straw, Glass Rod, Magnet - for each small group
- White board & markers for each group
- Balloon for each student
- Computer to share website activity: http://phet.colorado.edu/en/simulation/balloons

Lesson Description:

Introduction:

To start the day off we will introduce ourselves and let the kids get know us. We will tell the kids our interests and background with science. We will then start by briefly discussing classroom expectations of sharing, working together (Why is important to work together?, What does working together look like?), and active listening (What is active listening? and student models of what active listening looks like). After classroom expectations are discussed we'll play a get-to-know-you

circle game as a community building activity. We'll introduce our guiding question for the session, "How are static and current electricity similar and different?"

Then fill in a KWL chart with the class to assess their previous knowledge and questions about static electricity. "What do we already know about static electricity?" (If kids have no experience with KWL chart then we will explain it to them.)

Engage: Balloon Activity on the wall (Predictions, Observations, Reflections in notebooks)

To start off the balloon activity we shall give each student a balloon that has already been filled up. We will then ask the students to make predictions of what will happen when they rub their balloons on their heads and stick them to the wall. (Students will discuss in small group their predictions and record them in their notebooks.) When students do put them on the wall they will see that they stick to the wall and we will then ask them to time how long their balloons stay up and record their times in their notebooks. As we come back together to discuss what happened and the predictions made, we will ask the students whether there is anything else that they would like to add to the W (What do we want to learn) part of the KWL.

Explore:

Showing the students an example of an egg that has an inside (yolk) and an outer shell (egg shell), we will ask the students to think of as many things that have an outer part and an inner part (e.g. donut, tire, peanut, etc). As they discuss with their group, we will further the question to, "What is the smallest example you can think of?" As the students draw the smallest thing their table can think on their white boards we will transition to a book which might show what the smallest thing in the world is.

Explain:

To explain what to the class what an atom is we will read a book to them which investigates the smallest thing in the world. Towards the end of the book as it refers to electrons and protons we will add the positive and negative aspect of them. In finishing the book we will ask the students what they think is happening to the atoms that causes static electricity. We will then show the students a website on the smart board which shows how electrons and protons work when the balloon is statically charged and stuck to the wall. Students will then be asked to discuss in

their groups what they think is happening and why. After groups have had time to discuss their ideas with each other we will discuss as a class.

Elaborate: Can Activity (Predict, Observe & Reflect in notebooks)

We will give each table a container that contains one aluminum can, various fabrics, and various utensils. Each group will be given the task to move the can using the materials and only the materials. The students won't be able to move the can with their hands or breathe. Before they start they will discuss their predictions and record them in their notebooks. Before they start we will go back to our expectations for the class and how to collaborate so that everyone in the group is contributing. Students will record their observations as they explore the materials. Once all the groups have completed the task (some may not have figured it out yet) we will reflect on what is happening to the can and what they used to move it. We'll ask the groups to draw on their white board a picture showing what the electrons are doing as their utensil was rubbed with the fabric and share with the class.

Evaluate:

To evaluate the students' knowledge we shall go back to our KWL chart and ask them what we have learned, seeing if we have answered any of our questions yet. We might add more to the W if students have more questions they have thought of.

Extra Activity: Energy Balls activity in a circle

If time is still available and the students get the concepts taught about static electricity, we will do an activity with the students that let all the students create a circuit through touch which then lights up an energy ball. During this activity we will ask students to get into a circle and hold hands to see the ball light up then one of us (James, Amanda, or Heidi) will open the circuit and have the students think and try to trouble shoot why the energy ball won't light up. After this activity we will create a new KWL chart for current electricity.

Assessment: Our forms of assessment will include a KWL Chart that we will elaborate on with the students as a large group and keep throughout the entire session, individual notebooks in which the students will record any predictions, observations and reflections, as well as general class discussion.

Handouts/Journals: None for this week.