Static Hair

Overview: Greetings, and welcome to the study of electricity! This first lesson is simply to get you to play with static electricity and decide what it is that you want to learn about electricity so we can do the really cool stuff later on.

What to Learn: When you are done today, you will need to know that electrons are too small for us to see with our eyes, but there are other ways to detect something's going on. You'll also get to learn that inside the atom, the proton has a positive charge, and the electron has a negative charge. By doing your experiments, you'll discover how like charges repel and opposite charges attract each other.

Materials

- 1 balloon
- Clock with second hand (or stopwatch)

Lab Time

1. Blow up your balloon and tie it off (if this isn't already done for you.)
2. Scrub your nearest lab partner's head with the balloon until you can get it to stand up. If it doesn't work, try another lab partner.
3. After a few laughs, look around the room and find eight things to try sticking your charged balloon to. Write them down on your worksheet under "Item/Object" before you start. You'll find your worksheet on the next page.
4. Important: Find the best lab partner head to use during the *entire* experiment that you collect data for. Be sure to charge your balloon the same way before testing each object. This means you use the same number of rubs on the same head for all ten items. Start timing as soon as the balloon sticks to your chosen object.

Static Electricity: Balloon Experiment

Item/Object	Did It Stick?	How Long Did It Stick? *(measure in seconds)*

Name of Head Used for Experiment_____

Lab Partners_____

Reading

Electrons are strange and unusual little fellows. Strange things happen when too many or too few of them get together. Some things may be attracted to other things or some things may push other things away. Occasionally you may see a spark of light and hear a sound. The light and sound may be quite small or may be as large as a bolt of lightning. When electrons gather, strange things happen. Those strange things are static electricity.

Different parts of the atom have different electrical charges. The proton has a positive charge, the neutron has no charge (neutron, neutral get it?) and the electron has a negative charge.

These charges repel and attract one another kind of like magnets repel or attract. Like charges repel (push away) one another and unlike charges attract one another. So if two items that are both negatively charged get close to one another, the two items will try to get away from one another. If two items are both positively charged, they will try to get away from one another. If one item is positive and the other negative, they will try to come together.

Blow up a balloon. If you rub a balloon on your head, the balloon is now filled up with extra electrons, and now has a negative charge. Try the following experiment to create a temporary charge on a wall: Bring the balloon close to the wall until it sticks.

Opposite charges attract, right? So, is the entire wall now an opposite charge from the balloon? No. In fact, the wall is not charged at all. It is neutral. So why did the balloon stick to it?

The balloon is negatively charged. It created a temporary positive charge when it got close to the wall. As the balloon gets closer to the wall, it repels the electrons in the wall. The negatively charged electrons in the wall are repelled from the negatively charged electrons in the balloon.

Since the electrons are repelled, what is left behind? Positive charges. The section of wall that has had its electrons repelled is now left positively charged. The negatively charged balloon will now "stick" to the positively charged wall. The wall is temporarily charged because once you move the balloon away, the electrons will go back to where they were and there will no longer be a charge on that part of the wall.

This is why plastic wrap, Styrofoam packing popcorn, and socks right out of the dryer stick to things. All those things have charges and can create temporary charges on things they get close to.

Exercises

1. Why does the hair stick to the balloon?
2. How do you get rid of electrons?
3. Can you see electrons? Why or why not?
4. Does it matter what kind of hair you rub the balloon on?
5. How long does the hair continue to stand up after you remove the balloon?
6. Does it matter what kind of balloon you use?
7. How fast or slow do you need to rub for the biggest charge on the balloon?
8. Does hair color matter?
9. This evening, find an article or story that describes how electricity improves our lives. Bring the article to school. If you bring in an article that no one else brings in, you get extra points.

Answers to Exercises: Static Hair

1. Why does the hair stick to the balloon? (The balloon steals electrons from your head, making your head positively charged, which is now attracted to the negatively charged balloon.)
2. How do you get rid of electrons? (Ground the balloon by touching it to something metal.)
3. Can you see electrons? Why or why not? (No – they are too small!)
4. Does it matter what kind of hair you rub the balloon on? (Yes – fine hair without any hair products added works best.)
5. How long does the hair continue to stand up after you remove the balloon? (Anywhere between 2 seconds and 2 minutes.)
6. Does it matter what kind of balloon you use? (Yes and no. Yes: material that the balloon is made out of, and thickness of the rubber. No, the shape does not matter.)
7. How fast or slow do you need to rub for the biggest charge on the balloon? (Fast, as in vigorously.)
8. Does hair color matter? (No. The texture of the hair, how fine the hair is, and whether you've gooped it up or not *will* affect this experiment.)