Virginia 4-H STEM @ Home Activity

Getting a Charge out of Static Electricity

Supplies:

- Two balloons,
- A piece of string,
- A square of fleece or flannel,
- A plastic comb,
- A piece of mylar, paper scraps or confetti.
- You will need access to a sink and running water for Activity 2.

Time: 30 minutes

Background: All matter is composed of atoms. Even though we can't see the atom, scientists have discovered many interesting things related to the atom and electricity. An atom has both positive and negative charges, which are in balance. The center of an atom, called the nucleus, contains neutrons and protons. Neutrons have no electrical charge—they are neutral. Protons have a positive charge. Moving in an orbit around the nucleus are electrons. Electrons have a negative charge and are free to move about the nucleus.

The movement of electrons makes it possible for atoms to share electrons and is what binds matter together. The electrons farthest from the nucleus are easiest to move. When it is cold and dry and you rub your feet across a carpet, you can rub electrons off the carpet and collect them on your body. This collection of electrons creates a negative charge relative to the things around you—it is called static electricity. After you collect electrons, you can cause an electrical discharge by touching another object. This is what happens when you get a small shock after running across carpet on a cold day.

You saw that with magnets opposite poles attracted each other and like poles repelled each other. This concept applies to electrical charges too. A negative charge is attracted to a positive charge but two negative charges will repel or push away from each other. Now you will have a chance to "collect electrons" and build some negative charges.

Project Goal: Learn about the properties of static electricity through observation.

What to Do:

Activity 1

1. Blow up one of the balloons and tie a knot in the end. Standing in front of a mirror, rub the balloon several times with a piece of cloth or on your hair.
2. Tear a sheet of paper into small pieces, about one-fourth of an inch on each side. Place the pieces of paper on your desk or table. Rub the balloon with the cloth and bring it near the pieces of paper. Write down what happens.

3. Blow up the second balloon and tie a knot in the end. You should now have two inflated balloons. Tie a piece of string to each of the balloons. Rub each balloon several times with the piece of cloth. Hold the balloons by the string, letting them hang down. Bring the balloons close together. Write down what happens.

Activity 2

1. Turn the sink's faucet on. You need a tiny, but steady stream of water.
2. Rub the piece of flannel or fleece back and forth on the comb.
3. Keep rubbing until you hear the static. This will be a soft sound that resembles the buzzing he may hear on the television when the signal isn't good.
4. Once you hear this sound, move the static electricity comb about an inch away from the running stream of water. Do not let the comb touch the water!
5. The flowing water should attempt to move toward the comb. As you slowly shift the comb back and forth, the water should try to follow.

Reflect:

1. What happened when the balloon or comb was rubbed against the flannel cloth?
2. What are other ways -- besides rubbing fabric against a comb -- to make a stream of water move with static electricity.
3. What are some examples of static electricity that you have observed in your own home?

Apply:

1. What different places have you seen static electricity in your house?
2. How can we prevent static electricity in that we see in our house?

Going Further: Could you use static electricity to power something? Why or why not? Try making this static electricity can roller: https://www.exploratorium.edu/science_explorer/roller.html

Additional Resources: https://www.loc.gov/everyday-mysteries/item/how-does-static-electricity-work/ https://www.youtube.com/watch?v=qYM4o7dDh3o

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Notes for Parents or Helpers:

Please keep balloons and small objects that could be choking hazards out of the reach of children under eight years of age, as well as pets!

The flowing water didn't have any charge, but when your child brought the negative comb to the water, it introduced charge to the water! Static Electricity does not flow through a conductor like the electricity that powers our appliances through electrical circuits. Instead it is released all at one time, like a shock or a bolt of lightning. It may be tempting for children to go around trying to shock family members or pets after this activity. While the danger of harming someone with static electricity is fairly low, it can affect persons with pacemakers and it can cause sparks. Discuss safety when exploring anything to do with electricity, as well as being considerate of others and how pranks can be harmful.

References:

https://www.sites.ext.vt.edu/resources/4h/4hpubs/pdfs/388-800.pdf
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