St Aiden's Homeschool

Static Electricity

Activities & Lesson Plans

Physical Sciences K-8 "*Static*" *Electricity* Units

Characteristics of "static" electricity include: 1) The number of positive and negative electric charges within a material may not be equal, 2) voltage is high and current is low, 3) electrical forces (attraction and repulsion) can reach across great distances, and 4) electric fields (as opposed to magnetic fields) become very important. (Electric fields are also called "electrostatic fields" or "e-fields." Units are not listed in a prescribed order.

Museum of Science: Activities to Explore Static Electricity
Written by the Boston Museum of Science
This page links to five lesson plans in static electricity for beginning learners, plus reference material on the topic of electrostatics. Each lesson incorporates common household items and can be set up quickly for either classroom or home use. The lessons are designed to help beginners understand charge, electrostatic induction, and how transfer of electrons occurs. It is part of a larger collection created by the Boston Museum of Science.
http://www.mos.org/sln/toe/staticmenu.html
http://www.compadre.org/Precollege/items/detail.cfm?ID=4641

Static Electricity: Background Information for the Teacher

The topic static electricity has at least two similarities to the topic magnetism: the seemingly magical attraction and repulsion of one object for another and the attraction of people of all ages to the topic. Another common thread between the two subjects is that our understanding of both of them is still based largely on theory. Through observation and experimentation, logical explanations of the phenomena have developed.

An understanding of static electricity must begin with the concept that all matter is composed of atoms, and all atoms are composed of subatomic particles among which are the charged particles known as **electrons** and **protons**. Protons carry a positive charge (+), and electrons carry a negative charge (-). Ordinarily every object carries equal numbers of protons and electrons and is said to have a **neutral charge**.

When two different materials come into close contact -- for example, felt rubbing against a balloon or two air masses in a storm cloud --

electrons may be transferred from one material to the other. When this happens, one material ends up with an excess of electrons and becomes negatively charged, while the other ends up with a deficiency of electrons and becomes positively charged. This accumulation of imbalanced charges on objects results in the phenomena we commonly refer to as static electricity.

Materials that bear imbalances of opposite charge will attract each other and cling together. Materials that bear imbalances of like charge will repel each other. When an object bearing an enormous accumulation of positive or negative charge comes close to another object bearing the opposite charge, a spark may jump across the space between them. This results in both the enormously powerful discharges of lightning and the small yet stimulating shocks we receive when touching something after shuffling across a carpet in our stocking feet.

Because wool cloth is a material that readily gives up electrons, it is used in many activities to produce an accumulation of negative charge on an otherwise neutral object. Human hair is another common material that readily gives up electrons.

A material such as rubber is known as an electrical **insulator**. Accumulations of charge will not move across the surface of a rubber object easily. When one part of a balloon is rubbed with wool, the wool gives up electrons, making that part of the balloon negatively charged even though the rest of the balloon may remain neutrally charged.

When a charged object such as a balloon that has been rubbed with wool is brought near a neutrally charged object such as a piece of Styrofoam, the Styrofoam is said to become positively charged by **induction** and may leap toward the charged balloon. An object charged by induction does not actually have to lose or gain electrons. A negatively charged balloon brought near a neutrally charged piece of Styrofoam repels the electrons on the surface of the Styrofoam. The repelled electrons migrate as far away from the balloon as possible. This leaves the near end of the Styrofoam with an imbalance of positive charge and results in the attraction of the Styrofoam for the balloon.

It is important that elementary students grasp the concept that oppositely charged objects will attract each other and like charged objects will repel each other. It is less important that they are able to recall which materials tend to acquire negative or positive charges.

Do make sure that your students have a chance to make connections between their day-to-day experiences with static electricity -- lightning, receiving shocks after shuffling across a carpet, clothes that cling coming out of the dryer, combing their hair in the wintertime, etc. -- with the static activities conducted in the classroom. Ask them to try to describe and explain their everyday experiences with static in the terms they are learning: repel, attract, static charge, electron transfer.

One final note: static electricity activities can be conducted successfully at any time of the year. However, they will be most successful and exciting on days when there is low relative humidity. When there is a large amount of moisture in the air, some of it forms a coating on the surfaces of objects. This surface coating of moisture can neutralize a build-up of static charge. This is why we can shock ourselves in the dry air of winter more easily than we can during the humidity of summer.

Your Admirer is a balloon!

Materials

- Balloons
- String
- Felt-tip markers (permanent)
- Adhesive tape
- Wool cloth

Background

Wool cloth readily gives up electrons to other materials it touches. Rubbing a balloon with a wool cloth allows the balloon to accumulate an excess of electrons, and it will become negatively charged. The rubbed portion of the balloon will then be attracted to positively or neutrally charged objects (by induction), and repelled by other negatively charged objects. If the balloon is permitted to touch an object that is not negatively charged, some of the excess electrons will be transferred and the degree of attraction will decrease.

Procedure

Although this activity is an excellent teacher demonstration, students will gain more from the opportunity to make and experiment with their own "admirers."

- Inflate a balloon and draw a face on it with a permanent marker. (Caution: some types of permanent marker may weaken the balloon and cause it to pop.)
- Tie off the balloon and suspend it from a doorway or ceiling using tape and string. The balloon should hang at the level of your head when you stand on the floor.
- Rub the face of the balloon with a wool cloth. The balloon will now face you and move toward you whenever you approach it. You now have an admirer!
- Try to determine how far away the attractive force is able to act. Is the balloon still attracted toward you if you position a piece of cardboard between the balloon and your face? Can you wind up the string without touching it by making the balloon follow you round and round in a circle?

- How do you think your admirer will react if you create another admirer? Draw a face on a second balloon, rub its face with wool, and suspend it near the first admirer. Describe the way they react to each other.

What Will a Charged Balloon Attract?

Materials

- Balloons
- Styrofoam packing pellets or puffed rice cereal
- Wool cloth
- Salt and pepper (loose tea can be substituted for pepper) the tiny packets of salt and pepper from fast food restaurants are perfect

Background

A balloon rubbed with a wool cloth becomes negatively charged. When this balloon is held a few inches above a pile of Styrofoam pellets, the neutrally charged pellets become positively charged by induction and leap upward to cling to the balloon. After several minutes, some of the electrons may drain off the balloon onto the pellets. This will cause the pellets to become negatively charged and be repelled by the balloon. When this happens they may actually leap off the balloon and back to the table. The repelled Styrofoam pellets may then transfer their excess electrons to the table after a few minutes and once again leap toward the balloon. Grains of salt and pepper will react toward a charged balloon in much the same way, resulting in an amazing (if small-scale) display.

Procedure

- Give each student a balloon and a handful of Styrofoam pellets. After the students have inflated and tied off their balloons, rub the surface of each balloon with a wool cloth.
- Now have the students bring the balloons close to the Styrofoam and observe what happens. After the Styrofoam clings to the balloon, students who are patient and wait several minutes may see some of the Styrofoam leap forcibly away from the balloon back to the table.
- After the students have experimented with the Styrofoam and balloons, have them predict what might happen if a charged balloon is held a 2 - 3 inches above a pile of salt and pepper.

- Give each student a small pile (1/4 teaspoon) of mixed salt and pepper on his or her desk, recharge the balloons with the wool cloth, and let them do an experiment to find out. Students who observe very closely will notice that the same grains of pepper and salt will alternately leap toward and away from the balloon.

Dancing Paper Bunnies

Materials

Copy of Dancing Bunnies (next page)

- A piece of thin Plexiglas® supported on two textbooks, or the clear plastic top of a take-out salad container
- Wool cloth
- Scissors

Background

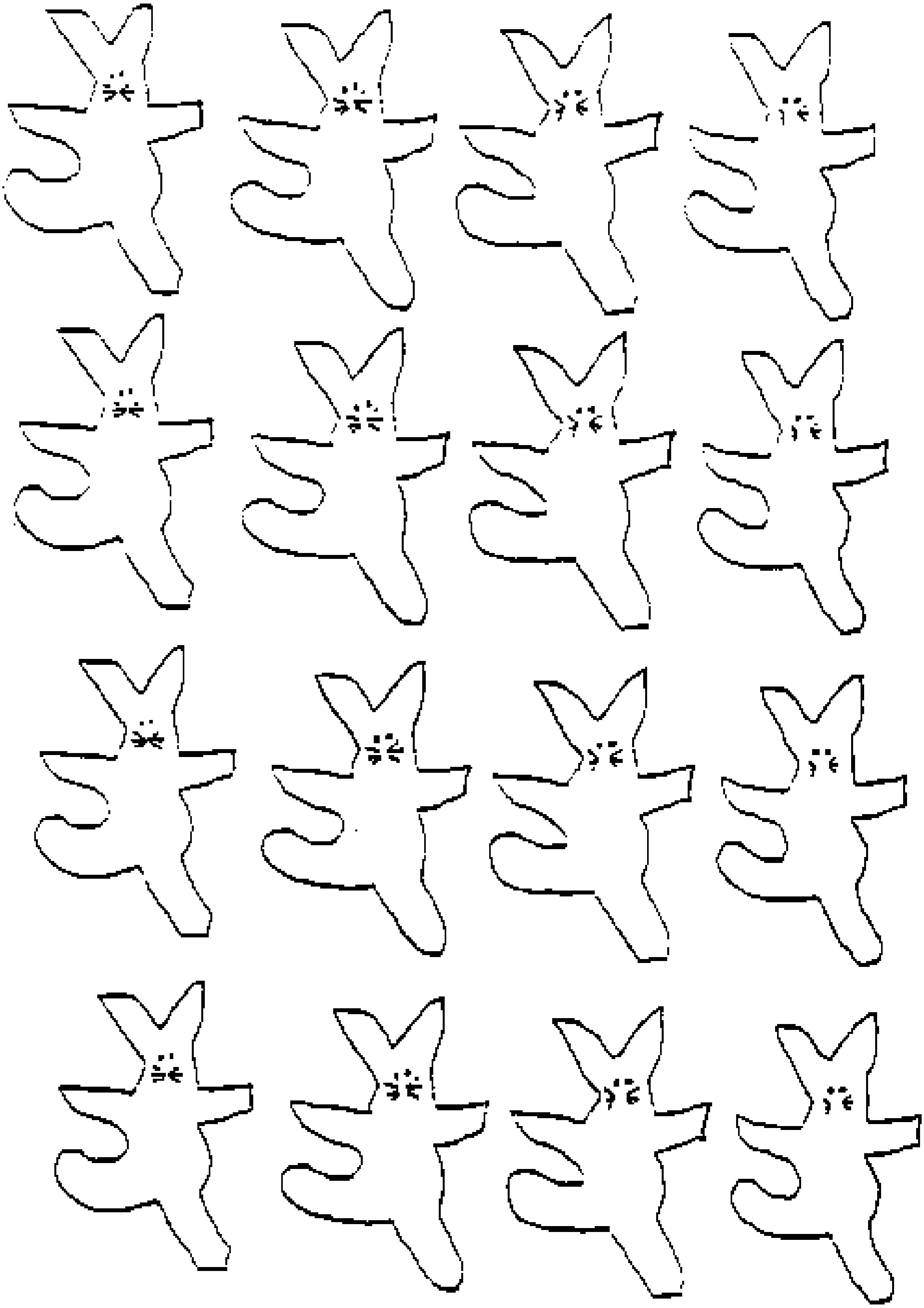
This activity works for much the same reason as the What Will a Charged Balloon Attract? activity. The behaviour of the paper bunnies will be similar to that of the Styrofoam pellets.

Plastic will collect some electrons from wool when rubbed and will become negatively charged. This negative charge will induce a positive charge in the paper bunnies. They will then jump up to the underside of the plastic. After a few minutes they may pick up electrons from the plastic and fall back down to the table.

Procedure

- Cut out the paper bunnies on the Dancing Bunnies page. Support a piece of Plexiglas¨ between two textbooks as shown so that the distance between the plastic and the table is about equal to the height of a paper bunny. Alternatively, you can place the bunnies under the inverted top of a clear plastic take-out salad container, which has its own supports.
- Place the bunnies under the plastic and rub the top of the plastic vigorously with the wool cloth. Continue rubbing for 2 to 3 minutes and observe what happens.
- What do the students predict will happen if you stop rubbing the plastic and wait for 10 or 15 minutes? What do they think will happen if you then rub the plastic again?

Dancing Bunnies



Static tubes

Materials

- Clear plastic tubes with end caps
- Styrofoam peas (filling from bean bag chairs) or tiny broken-up pieces of Styrofoam pellets
- Empty bowl, shoe box, or large can
- Wool cloth

Background

This activity will be most instructive if taught following other activities that involve experiences with induced charge such as Dancing Paper Bunnies and What Will a Charged Balloon Attract?

The plastic tube, when rubbed with wool, picks up electrons and becomes negatively charged. This induces a positive charge in the Styrofoam peas which will cling to the plastic, pick up electrons, and later leap away.

When your finger approaches the negatively charged tube, the finger becomes positively charged by induction, just like the Styrofoam peas. Therefore, your finger and the Styrofoam have like charges, and you will find that you can chase the peas around inside the tube by moving your finger on the outside.

Procedure

- If you can tolerate the possibility of having Styrofoam peas floating around in your classroom, your students will have a wonderful time making their own static tubes. You may find it works well to set up one corner of the room in which students will come to make their static tubes in small groups.
- Give each student a clear plastic tube and two end caps. Have them insert one cap into one end of the tube.
- Place all of the Styrofoam peas inside a large container such as a bowl, shoe box, or can. Challenge the students to get about two tablespoons of Styrofoam peas inside their static tubes through the end that they have left uncapped. This is not always

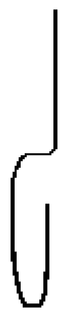
easy, because the plastic tubes take on a charge with minimal handling and will attract and repel the Styrofoam peas.

- When the students have placed their peas inside the tube, have them insert the other end cap, and remove any Styrofoam clinging to the exterior of the tube with a cupped hand. Rub the exterior of each tube with the wool cloth.
- Let the students experiment with their closed static tubes. Can they pour all of the peas from one end to the other? How can they move any peas along that seem to be stuck? Using terms they have learned through other activities, such as attract, repel, static charge, and induction, can they describe what happens when they bring a finger close to the outside of the tube?

Simple Electroscope

Materials:

- Glass Jar or Glass
- Aluminium Foil
- Index Card
- Paperclip
- Tape



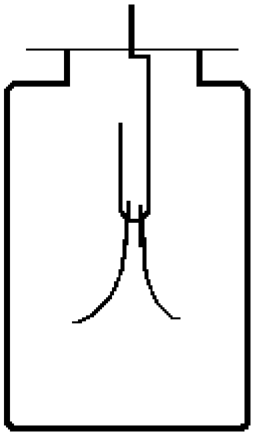
Background:

An electroscope is an instrument for detecting the presence of static electricity. It consists of two thin metal leaves suspended from a metal hook. When the hook is brought near a source of static electricity, some of the electrons in the hook are pushed to the leaves (if the source is negative) or pulled up to the hook from the leaves (if the source is positive). Either way, the leaves are now charged the same way as each other and so they repel each other. The amount they open up is proportional to the charge of the source (if the sources are always held at the same distance from the hook).

Procedure:

Cut two strips of foil lcm by 4cm (1/3" by 1 1/2") Open out the paperclip to form the shape at right. Push the hook through the middle of the index card and tape so that it is at right angles to the card. Lay the two foil strips on top of one another and hang them on the hook by pushing the hook through them. Lay the card over the jar so that the strips hang inside (see picture below).

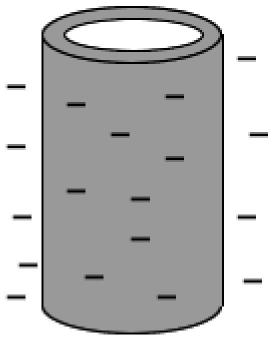
Bring various charged objects near the hook and observe what happens. Notice what happens to the strips when the sources are removed. Does anything different happen if the source actually touches the hook? If the strips do not fall back together, gently touch the hook with your finger.



Description of static electricity

Static electricity is the accumulation of electrical charges on the surface of a material, usually an insulator or non-conductor of electricity. It is called "static" because there is no current flowing, as there is in alternating current (AC) or direct current (DC) electricity.

Typically, two materials are involved in static electricity, with one having an excess of electrons or negative (−) charges on its surface and the other material having an excess of positive (+) electrical charges. Atoms near the surface of a material that have lost one or more electrons will have a positive (+) electrical charge.



Negative (-) charges collect on PCV pipe surface

If one of the materials is an electrical conductor that is grounded, its charges will drain off immediately, leaving the other material still charged.

Cause of static electricity

Static electricity is usually caused when certain materials are rubbed against each other—like wool on plastic or the soles of your shoes on the carpet. It is also caused when materials are pressed against each other and pulled apart.

The process causes electrons to be pulled from the surface of one material and relocated on the surface of the other material. It is called the triboelectric effect or triboelectric charging.

The material that loses electrons ends up with an excess of positive (+) charges. The material that gains electrons ends up an excess of negative (−) charges on its surface.

Dry air preferred

Static electricity is formed much better when the air is dry or the humidity is low. When the air is humid, water molecules can collect on the surface of various materials. This can prevent the build-up of electrical charges. The reason has to do with the shape of the water molecule and its own electrical forces.

Rainstorms

But when there is extreme turbulence among water drops, such as in a thunderstorm cloud, static electric charges can build up on the water drops.

Benjamin Franklin showed that static electricity in created in a thunderstorm cloud by flying a kite in a storm. He detected the static electricity by seeing the hairs on the kite string stand on end and by creating a static electric spark with a metal key. This was dangerous experiment, and Franklin was lucky not to be killed.

(*For more information, see the biography of Ben Franklin's life.*)

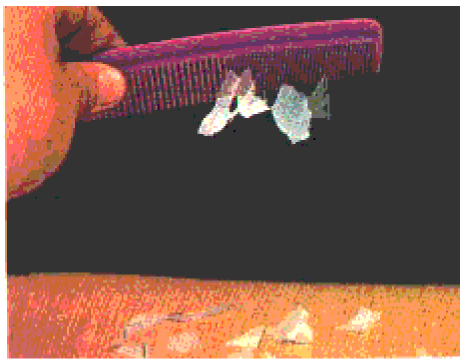
Properties or effects of static electricity

Static electricity can cause materials to attract or repel each other. It can also cause a spark to jump from one material to another.

Attraction

Rub a balloon on a wool sweater. The balloon collects negative electrical charges on its surface and the wool collects positive charges. You can then stick the balloon to the wall, which does not have an excess of either charge. The balloon will also stick to the wool, although the charges may jump back to the original material in a short time.

You can also run a comb through your hair to charge the comb with static electricity. The comb can then be used to attract neutral pieces of tissue.



Using static electricity to pick up tissue with a comb

Repulsion

Comb your hair on a dry day or after using a hair drier. The plastic comb collects negative charges from the hair, causing the hair to have an excess of positive charges. Since like charges repel, the hair strand will tend to push away from each other, causing the "flyaway hair" effect.

Sparks

If there are enough positive (+) electrical charges on one object or material and enough negative (−) charges on the surface of the other object the attraction between the charges may be great enough to cause electrons to jump the air gap between the objects.

Once a few electrons start to move across the gap, they heat up the air, such that more and more will jump across the gap. This heats the air even more. It all happens very fast, and the air gets so hot that it glows for a short time. That is a spark.

The same thing happens with lightning, except on a much larger scale, with higher voltages and current.

Summary

Rubbing certain materials together can cause the build-up of electrical charges on the surfaces. Opposite charges attract and same charges repel. Either charge will be attracted to something of neutral charge. Sparks are an extreme case of electrons being attracted to an object that has a positive charge and jumping across an air gap, thus heating the air for a fraction of a second.

Source: http://www.school-for-champions.com/science/static.htm

Understanding Electricity

This is a really well done lesson plan from the Discovery Channel. It is complete with resource materials to teach your child the basics of electricity. Your child can also explore different professions relating to electricity. There are writing lessons and more. You can use links to the Internet which are included, and also use the Discovery Channel video which you can borrow from the library.

GRADE LEVEL: Appropriate for grades 1-5

TITLE: Brown Bag Science

AUTHOR: Judy Adair, Spring Creek Elementary,
Broken Arrow, OK

OVERVIEW: This is a hands-on science investigation on electricity. Students learn through the discovery method how electricity works. The student's natural curiosity and sense of exploration will enable them to explore and learn on their own with little input from the teacher.

PURPOSE: The purpose of this investigation is to introduce students to the concept of electricity and dispel any fears they may have that they don't understand the concept. This is excellent for girls, who often feel that they don't or shouldn't understand electricity as well as boys.

OBJECTIVES: As a result of this activity, the students will:

1. Be able to draw and explain how an electrical circuit works.

2. Be able to define and use vocabulary associated with electricity. Vocabulary: circuits, electrons, force, conductors, switch, insulation

3. Be able to construct a simple circuit and a parallel circuit.

4. Be able to make an electrical motor work and add a switch to turn it on and off.

RESOURCES/MATERIALS: All items can be bought very inexpensively at Radio Shack or from Edmond Scientific Elementary Catalogue.

ACTIVITIES AND PROCEDURES:

1. The teacher will prepare ahead of time a kit for each two or three students. If students work in larger groups, some will not get hands on experience. Each kit will include a brown lunch sack, one C cell battery, two insulated copper wires, one battery holder and two brass battery clips, one small flashlight bulb and socket. All these items must be separate and in random order in the bag. The bag must be closed, sometimes I close it with one of the copper wires like a twisty.

2. Give each pair of students a bag and allow 10 minutes for exploration. During this time the teacher must remain quiet unless asked a question. The students will be very busy trying to find out what to do with the contents of the bag. Do not give any clues as to use of contents. This is exploration time.

3. Before the 10 minutes are up some students will have undoubtedly have made a simple circuit with the contents of the bag. At this time you can stop for discussion. Have the students explain what they did so others can follow. You can now talk about the concept of electricity, the flow of electrons through a conductor, discuss what things are conductors, etc. Discuss where the electricity comes from and where it goes, how does it make the light bulb light. Discuss how the battery stores electricity. How do we know that? electrons are flowing?

4. After all students have been successful with the simple circuit, each pair must draw what they have done in their science log or on a piece of paper. Older kids will label all the parts of the circuit, etc.

5. At this time, I give each pair of students a second battery and let them experiment. Does the second battery change anything? Does the light gets brighter or dimmer? Does the way the batteries are connected make any difference in the way the light works. Try different ways of connecting the batteries. Some students will make a parallel circuit. At this time stop and have the students tell what they did. Discuss the concept of parallel circuits. Each pair of students draws what they have done.

6. A follow up activity if you have time is to have switches available. For those students that finish quickly, they get a switch. See if they can connect it into the circuit to make the light come on and off. Discuss how electricity flows. Why does the electricity not cross over the switch when it is open? Does electricity jump? Again, each pair must draw what they have done. This completes the thinking process and makes the learning more personal.

7. Electrical motors can also be added. Students enjoy making small fans out of the motors. Each pair of students can exchange their light bulb and socket for a small electric motor and try to connect it into the circuit. Torn or cut paper makes great fan blades. Let the students experiment to find the best size and shape to make the fan go very fast.

8. The role of the teacher in this activity is to be a facilitator. Please refrain from your urge to teach. In this activity, students

discover the concept of electricity. The less you show and tell the better.

TYING IT ALL TOGETHER:

1. Check each pair of student's diagrams and leave small personal messages so they will know that you have looked at what they have done.

2. Encourage all students to share what they have learned with other students and parents.

3. I have done this activity with students in grades 1-5 and all have learned and had great fun doing so. For the younger students their drawings will be less sophisticated and you do not need to dwell on vocabulary. With older students, they will need to label and use the vocabulary correctly. Most students are so eager to get hands on experience in science and with this activity, all students can experience success.

Grade 4-5 Lesson Plan

Grade Level(s): 4

Subject(s):

- Science/Physics

Duration: 30 minutes

Description: A learning cycle format for inquiry teaching. Journal about what students think causes a light bulb to light up when rubbed with a plastic bag. Then several activities for students to explore how static electricity works. An opportunity to use knowledge learned and get an accurate assessment of students' understanding of static.

Goals: To teach through inquiry method about static electricity. For students to learn these main points about static electricity:

- Positive and negative charges attract each other.
- *Charges can jump from one object to another when there is a build-up of electrons.
- * This build-up is called static electricity.

Objectives:

Students will be able to explain how static electricity works in journal entry. They will also show how objects can become negatively charged and attract other objects, causing static electricity.

Materials:

balloons, salt, pepper, plastic rulers, cloth or wool, torn up pieces of paper, paper plates, questions for each activity

Procedure:

Concept Assessment: Hold up a light bulb and a plastic sack and say: In your journal describe what you think will happen when I rub the plastic bag up and down the light bulb? Why do you think this happens?

Concept Exploration: Two activities will be given to each group of students (groups of 3-4) in the class.

1. This activity is with pepper and salt. A pile of pepper and salt will be on a paper plate. Take a plastic ruler and place it above the pile and see what happens. Then, rub the ruler with the cloth or wool for 5-10 seconds. Then place the ruler one inch above the pile of salt and pepper. Note the reaction.
2. This activity involves the use of a balloon. Students will try to stick the balloon to the wall. Then they will rub the balloon on their head or a piece of cloth and then try to stick it to the wall. They will take note of what happens in both instances.

Closure: Students will then share their results. Discuss as a class:

What happened when you tried to stick the balloon to the wall without rubbing it?

What happened to the salt and pepper when you didn't rub the ruler?

Why don't you think anything happened?

What does rubbing the balloon and the ruler do that causes there to be a reaction?

What were your other findings and why do you think they occurred?

Introduce facts about static electricity. Discuss that electrons are negatively charged and when rubbed with other objects they build up excess electrons from the other object. Those electrons need to be released and thus, when it comes in contact with something else they are released by a zap or an attraction to positively charged protons. Draw on the board the placement of excess electrons on the outer edge of a balloon and then when you stick a balloon to the wall all the electrons jump away and the balloon is held up by the attraction of the positive and negative charges. Talk about getting shocked when you're walking around the house and what is actually happening. Have the students help you explain it by asking: So when I scuff my feet what's happening? What happens when I touch someone else? Why is there a shock?

Assessment:

Concept Application: Students will be asked to find a way to use a balloon to pick up pieces of paper without touching them. All they will be given is a balloon and several torn up pieces of paper. They will have to ask for any objects they might need. Afterwards, we would discuss why they used the method they did and why it worked. Then they'd enter in their journal what they learned about static electricity, and briefly explain what causes static electricity.

http://www.eduref.org/Virtual/Lessons/Science/Physics/PHS0054.html

STATIC ELECTRICITY EXPERIMENTS & PROJECTS

http://www.sciencemadesimple.com/static.html

SAFETY NOTE: Please read all instructions completely before starting the projects. Observe all safety precautions.

Tip: Try to use the part of the charged object that has the biggest charge (the part that was rubbed the most) when doing these experiments. Also, Projects 1-3 work best on dry days.

PROJECT 1 - Swinging cereal

What you need:

a hard rubber or plastic comb, or a balloon
thread, small pieces of dry cereal (O-shapes, or puffed rice of wheat)

What to do:

1. Tie a piece of the cereal to one end of a 12 inch piece of thread. Find a place to attach the other end so that the cereal does not hang close to anything else. (You can tape the thread to the edge of a table but check with your parents first.)
2. Wash the comb to remove any oils and dry it well.
3. Charge the comb by running it through long, dry hair several times, or vigorously rub the comb on a wool sweater.
4. Slowly bring the comb near the cereal. It will swing to touch the comb. Hold it still until the cereal jumps away by itself.
5. Now try to touch the comb to the cereal again. It will move away as the comb approaches.
6. This project can also be done by substituting a balloon for the comb.

What Happened: Combing your hair moved electrons from your hair to the comb. The comb had a negative static charge. The neutral cereal was attracted to it. When they touched, electrons slowly moved from the comb to the cereal. Now both objects had the same negative charge, and the cereal was repelled.

PROJECT 2 - Bending water

What you need:

a hard rubber or plastic comb, or a balloon
a sink and water faucet.

What to do:

1. Turn on the faucet so that the water runs out in a small, steady stream, about 1/8 inch thick.
2. Charge the comb by running it through long, dry hair several times or rub it vigorously on a sweater.
3. Slowly bring the comb near the water and watch the water "bend."
4. This project can also be done using a balloon instead of the comb.

What happened: The neutral water was attracted to the charged comb, and moved towards it.

PROJECT 3 - Light a light bulb with a balloon

You Need:

hard rubber comb or balloon
a dark room
fluorescent light bulb (not an incandescent bulb)

SAFETY NOTE: DO NOT USE ELECTRICITY FROM A WALL OUTLET FOR THIS EXPERIMENT. Handle the glass light bulb with care to avoid breakage. The bulb can be wrapped in sticky, transparent tape to reduce the chance of injury if it does break.

What to do:

1. Take the light bulb and comb into the dark room.
2. Charge the comb on your hair or sweater. Make sure to build up a lot of charge for this experiment.
3. Touch the charged part of the comb to the light bulb and watch very carefully. You should be able to see small sparks. Experiment with touching different parts of the bulb.

What happened: When the charged comb touched the bulb, electrons moved from it to the bulb, causing the small sparks of light inside. In normal operation, the electrons to light the bulb come from the electrical power lines through a wire in the end of the tube. (Fluorescent and incandescent light bulbs will be discussed in a future issue.)

PROJECT 4 - Static in the Summer

What you need:

a balloon, and a watch or clock

What you do:

1. Rub the balloon on your hair or sweater. Stick it to a wall and time how long it stays before falling down.
2. Repeat step (1) in the bathroom, just after someone has taken a hot, steamy shower.

What happened: In the bathroom, water in the air and on the walls helped move electrons away from the balloon more quickly. In the summer, the air is more humid, and static electricity does not build up as much as during the winter, when the air is very dry.

Resources:

Please preview all links before sharing in class with students.

Title:	Physics: Static Electricity
Description:	These sites explain what static electricity is and how it works. Covers the topics of atoms, electrons, and protons. Includes several illustrations, an animated movie, a radio talk, and many hands-on science experiments. There are links to eThemes resources on general overview of electricity, current electricity, circuits, conductors, and batteries.
Grade Level:	4, 5, 6, 7, 8
Resource Links:	Electricity and Static Electricity These sites explain what static electricity is and how it works. Covers the topics of atoms, electrons and protons. Includes several illustrations, animated movies, lesson plans, and many hands-on science experiments. NOTE: This site includes ads. Internet Plasma Physics Education Experience This interactive site explains electricity and static electricity. You can manipulate graphics online to better understand the concepts. Click the arrow to start. Theatre of Electricity Explore these links to see photos of sparks and to find out more about this generator at MIT. Basics of Static Electricity Read more about the basics of static electricity and what causes it. Includes a quiz at the end. Scroll down the page and click on the "Experiments with Static Electricity" link for hands-on practice. NOTE: This site includes ads. Enchanted Learning: Static Electricity This site gives an overview of static electricity and includes helpful illustrations. NOTE: The site includes ads. Kids: What Causes Static Electricity? Listen to a three-minute radio show produced by two fifth

graders. Use the "Download" link to download the show onto your computer. NOTE: The site includes blogs.

BrainPop: Static Electricity
Watch the movie and learn about static electricity with Tim and Moby. Do not forget to take a quiz, conduct an experiment, and practice new scientific words on the "Activity Page". NOTE: The web site is available by subscription only.

Static Activities
This site has an overview for teachers, plus hands-on activity ideas. There are also instructions for using an electroscope.

PBS: Lightening!
This is another hands-on activity about static electricity. This one explains how it is similar to lightning.

The Power of Static Electricity
In this lesson plan, students can examine static electricity by using an electrically charged comb to attract things.

Exploratorium: Charge and Carry
Try this science activity and see how static electricity can produce sparks.

Exploratorium: Remote Control Roller
Follow these instructions and use static electricity to have a race with cans and balloons.

Exploratorium: Electrical Fleas
This fun science experiment shows you how to make plastic "fleas" jump by using static electricity.

Lesson Plan for Introduction to Electricity
This 14-pages PDF lesson plan is designed for forth-graders and includes suggested discussions, activities, worksheets, and illustrations on atoms and static and current electricity.

Static Electricity: Introducing Atoms
Here is the first four lessons on static electricity that are meant to help students understand that static electricity is a phenomenon involving positive and negative charges.

eThemes Resources: Electricity: Overview

These sites provide basic information and an overview about electricity. Learn what electricity is, where it comes from, and what the sources of electrical energy are. There are also topics on electrical safety and electricity consumption as well as statistics. Includes lesson plans, online activities, experiments, games, and quizzes. There are also links to eThemes Resources on electrical safety, static and current electricity, and circuits, conductors, and batteries.

Physics: Current Electricity

These sites explain nature of current electricity. Here kids can learn about directions of electrons' flow, differences between direct current (DC) and alternating current (AC) electricity, and compare current to static electricity. The sites include photos, videos, hands-on activities, lesson plans, and simulations. There are links to eThemes resource on overview of electricity, static electricity, and circuits, conductors, and batteries.

eThemes Resources: Electricity: Circuits, Conductors, and Batteries

These sites have lots of illustrations and animations that demonstrate how electricity, circuits, and batteries work. Learn the difference between conductors and insulators. Includes suggested activities, hands-on experiments, and online quizzes. There is a link to an eThemes Resource on electrical safety.