electric

Skills :

- ☐ Learn about atoms and electricity
- ☐ Complete an electric service project
- ☐ Improve technology skills
- ☐ Explore magnets through experimentation
- ☐ Gain knowledge about electricity terms
- ☐ Discover additional electric/magnet activities
- ☐ Develop leadership skills

If you've ever experienced a power outage during a thunderstorm or ice storm, then you realize just how much we all depend on electricity. Electricity provides us with light, heat and power. It also allows us to enjoy television, video games, radio, and phones. In the intermediate electric activity pages, you will learn about the basics of electricity and magnets. Some of the new skills that you can learn are listed on the left. Check your favorites and then work with your 4-H leaders and parents to make a 4-H project plan of what you want to do and learn this year.

Life Skills: Responsibility

Atoms and Electricity

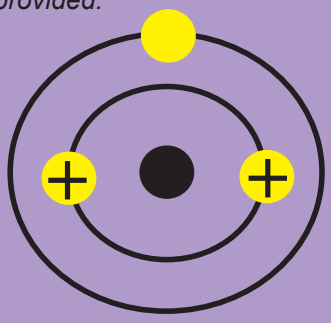
Everything around us is made up of particles called atoms. Atoms are so small you can not see them with your eye. Atoms are made up of even smaller particles called protons, neutrons and electrons. The protons and neutrons form the nucleus of the atom. Electrons, which are smaller than protons and neutrons, move around the nucleus much like how the planets revolve around the sun.

Protons and electrons are electrical in nature. An electron is a negative particle of electricity. A proton is a postive particle of electricity. Neutrons have no charge. For the most part, an atom has an equal number of electrons and protons. Their electrical charges cancel and the atom has no electrical charge. This is a neutral ion.

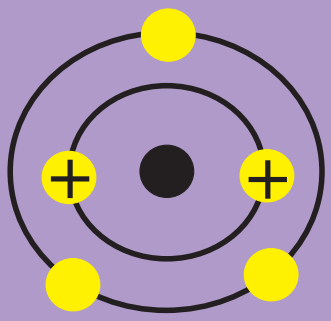
Sometimes, electrons are far from the nucleus and not held very tightly by the protons. When this is the case, the electrons may be "knocked off." The rubbing of two materials together causes some electrons to be torn away from one object and adhere to another.

Losing an electron causes the atom to have a net positve (+) charge. This atom is then called a positive ion. If the electron attaches itself to a normal atom, the atom then has a net negative (-) charge and is called a negative ion. When an object has more or less electrons than normal, it has static electricity and is considered electrically "charged."

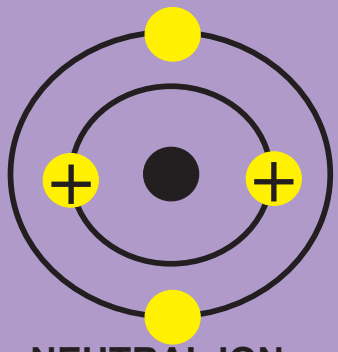
Directions: Using the information in the section "Atoms and Electricity," can you identify which of the following atoms is a neutral ion, positive ion and negative ion? Write the type of atom in the line provided.



POSITIVE ION



NEGATIVE ION



NEUTRAL ION

Summer Static

Materials Needed:
- Balloon
- Stop watch

Directions:
Part I:
- Inflate the balloon
- Rub the balloon on your hair to generate an electric charge
- Stick the balloon to a wall
- Time how long the balloon sticks to the wall before falling

Part 2:
- Repeat the above steps in a bathroom immediately after someone has taken a hot, steamy shower.

What Happened?

Describe what happened on the lines below. Did the balloon stick to the wall longer during Part I or Part 2 of this experiment? Why do you think this happened?

IN THE BATHROOM, WATER IN THE AIR AND ON THE WALLS HELPED TO MOVE ELECTRONS AWAY FROM THE BALLOON MORE QUICKLY. IN THE SUMMER, THE AIR IS MORE HUMID, AND STATIC ELECTRICTY DOES NOT BUILD UP AS MUCH AS DURING THE WINTER, WHEN THE AIR IS VERY DRY.

Water Attraction

Materials Needed:
- Balloon
- Sink and water faucet

Directions:
- Inflate the balloon
- Turn on the faucet so that there is a small, steady stream of water [about 1/8 inch in diameter]
- Rub the balloon on your hair to generate an electric charge
- Slowly bring the balloon near the water

What Happened?

Describe what happened on the lines below. What happened to the water as the balloon approached the stream of water. Why do you think this happened?

WHEN YOU RUBBED THE BALLOON ON YOUR HAIR, TINY PARTS OF THE ATOMS IN YOUR HAIR, CALLED ELECTRONS, COLLECTED ON THE BALLOON. THESE ELECTONS HAVE A NEGATIVE CHARGE. SENSE THE BALLOON HAS A NEGATIVE CHARGE, IT IS ATTRACTED TO THINGS THAT HAVE A POSITIVE CHARGE. WHEN YOU BRING THE NEGATIVELY CHARGED BALLOON NEAR THE FAUCET, IT IS ATTRACTED TO THE POSITIVELY CHARGED WATER. THE ATTRACTION IS STRONG ENOUGHT TO ACUTALLY PULL THE WATER TOWARDS THE BALLOON AS IT IS FLOWING.

What Do You Think?

Magnets have north and south poles. The poles are determined by the arrangement of the atoms inside the magnets. For example, the north pole of a magnet will line up with the North Pole of the earth. Based on what you know about how magnets work, what do you think will happen in the following situations? Draw arrows pointing to each other if you think the magnets will attract. Draw arrows away from each other if you think the magnets will repel.

- Putting the two north ends of each magnet together.

Prediction: 

Observation: 

- Putting the north end with the south end of a magnet.

Prediction: 

Observation: 

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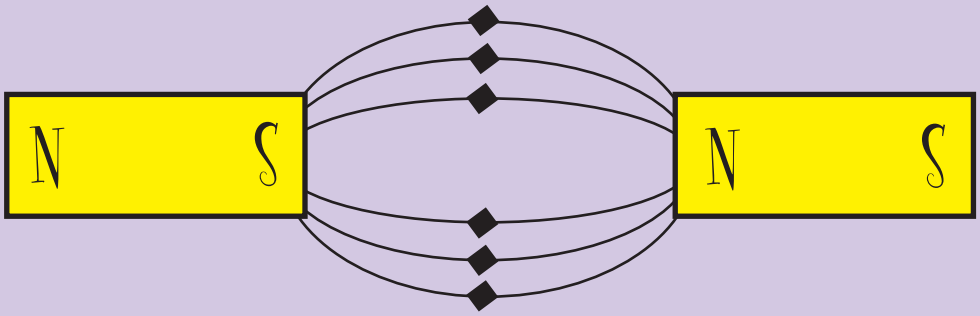
Magical Magnetic Materi-

Materials Needed:

- Bar magnet
- Nails
- Pencil
- Eraser
- Paper clip
- Plastic fork
- Keys
- Nickel
- Cloth
- Paper
- Comb
- Aluminum can



Directions:

Touch the bar magnet to each of the items listed above. Which items are attracted by and stick to the magnet? Which items are not attracted to the magnet? Record your results in the table by checking "yes" or "no" next to each item. Then decide what kind of material each items is made from and write it in the table. Can you think of other items to tests?

OBJECT	YES	NO	TYPE OF MATERIAL
nails	X		steel
pencil		X	wood
eraser		X	rubber
paper clip	X		steel
plastic fork		X	plastic
keys	X		steel
nickel		X	nickel and copper
cloth		X	fabric
paper		X	paper
comb		X	plastic
aluminum can		X	aluminum

Magnetic Mystery

Directions: Draw a line from the word to its definition in one of the blue circles. Use the internet to find your definitions. The number in the blue circle corresponds to the blank in the star design below (i.e. the blue circle with the "3" corresponds to the third blank below). Write the capitalized letter in the blank. Once you have completed this tasks, the blanks spell out the answer to the magnetic mystery at the bottom of the page. An example has been provided.

alternating curr**E**nt (AC)

ba**T**tery

cl**O**sed circuit

con**D**uctor

direct curre**N**t (DC)

e**L**ectromagnet

in**S**ulator

op**E**n circuit

v**O**ltage

7 A circuit which allows current to flow throughout.

9 An electric current in which the direction of flow changes, or alternates from plus to minus and back again 60 times each second.

2 Also known as volts; a measure of the force behind the motion of electrons of electric charge.

6 A device which stores electrical energy in the form of chemical energy; used in toys, cell phones, cars, remote controls, etc.

4 A circuit which has been broken and will not allow the passage of electrons throughout.

8 Electric current in which the direction of flow is always the same; the kind of current produced by batteries.

3 A type of material in which the outermost electrons are loosely held, allowing them to move from atom to atom and thus allow the flow of current.

1 A magnet formed by the magnetic field produced around an electric current.

5 A type of material in which the outermost electrons are held securely, thus preventing the flow of electrons.

Long ago, people discovered the ability of a certain stone to attract certain types of metals. They called this rock a **L O D E S T O N E** which meant "leading stone." These rocks are natural magnets and were used as compasses.

Activities

- Conduct a "Home Hazard Hunt" in your own home or the homes of your friends and neighbors.
- Skill-a-thons
- Create an electrical safety brochure or flyer for display in local store windows or as bill stuffers.
- Visit with a local electrician, utility or electric cooperative to learn more about electricity.

Service Ideas

- Conduct an electric project demonstration on one aspect of electricity. Give your demonstration to younger students.
- Reproduce one of the experiments in these activity sheets for your classmates to teach them about electricity.
- Assist with organizational safety programs.

Resources

- School and public libraries
- www.sciencemadesimple.com/static.html
- www.eia.doe.gov/kids/energyfacts/sources/electricity.html
- http://inventors.about.com/library/inventors/blelectric1.htm
- 4-H project leader/group

The following Websites were used to create this activity sheet. To learn more visit:

- www.utextension.utk.edu/4H/projects/electric.htm
- www.n4hccs.org

Don't forget! For more ideas and info, contact your 4-H office.