Magnetism and Electricity Unit

Parents: Young students will need help reading through the handouts and understanding how magnetism and electricity work. This is a somewhat difficult unit to understand, but classtime experiments should help students to visualize concepts. I highly recommend the brainpop movies to show concepts to your child.

www.brainpop.com
**username: risthailand *password: Bangkok*

Brainpop titles to watch during this unit: electricity, electric circuits, current electricity, electromagnets, and batteries. There is one on brainpop junior called –energy sources. Please note that there was one other related title that I did not list here because of some objectionable content when I previewed them—(Leslie)

Jan. 5

Topic:
Review games over material from first semester on motion/flight, ecology, & oceanography/marine science.

Jan. 16

Topic:
Static Electricity/ everything is made of atoms/ parts of an atom/ electrical charge
Homework due today:
Read handouts for today labeled “electricity studies” highlighted in yellow p1-3.
Class work:
Experiments on static electricity

Jan. 23

Topic:
How do magnets work? Attraction and Repulsion
Homework due today:
Read handouts for today, pages 1-3
Using the magnets you received for this unit, complete the page titled magnetic and non-magnetic. Color in the faces to show if each item is magnetic or not.
Complete the page titled “attract or repel”.
Optional: the page that lists “can, have, are” can be answered by reading the pages of this handout.
In Class Work:
Experiments with magnets

Jan. 30

Topic:
Electrical Safety
Homework due today:
Website suggestion: Website suggestion: e-SMARTkids
Watch episode 1: Electricity Basics, episode 2: Conductors and insulators 3: outdoor electrical safety 4: indoor electrical safety
No written homework for today.
In Class Work:
Electrical safety presentation by Dominion Power

Feb. 6

Topic:
Electromagnetics and Hexbug nano electricity
Homework due today:
Read handout for today titled “electromagnets”
Complete the drawing described in the handout.
In Class Work:
Making an electromagnet & creating the best hexbug maze!

Feb. 13

Topic:
How does a flashlight work? Series and Parallel Circuits
Homework due today:
Read handout for today titled series and parallel circuits.
Complete the drawing described in the handout.
In Class Work:
How does a flashlight work? Series & Parallel circuits

Static Electricity

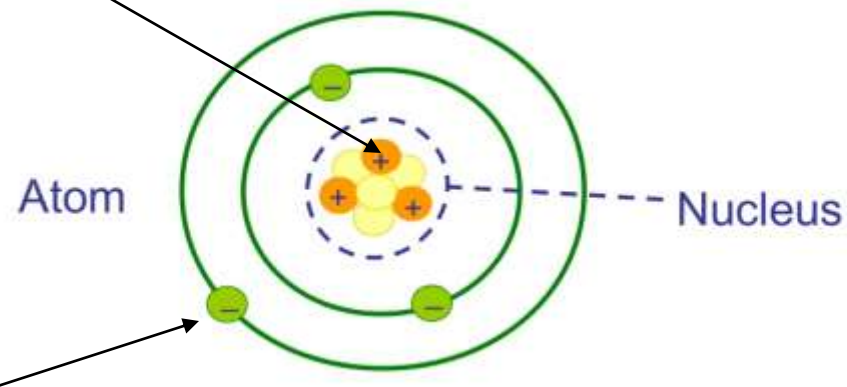
Static Electricity

- WHAT IS ELECTRICITY ?
- WHAT IS STATIC ELECTRICITY
- DIFFERENCE BETWEEN THEM ?

Static Electricity

- **WHAT IS ELECTRICITY**

Electricity is a form of energy. Electricity is the flow of electrons. All matter is made up of atoms, and an atom has a center, called a nucleus. The nucleus contains positively charged particles called protons and uncharged particles called neutron



Electrons are negatively charged and they orbit around the nucleus

Static Electricity

- **WHAT IS STATIC ELECTRICITY**

Static electricity occurs when there is a build up of electric charge on the surface of a material.

It is called static electricity because the charges don't move.

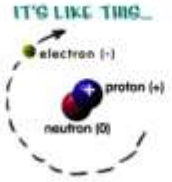
The electricity we use everyday involves moving charges.

Static = Charge does not move or flow

Static Electricity

Where do charges come from?.

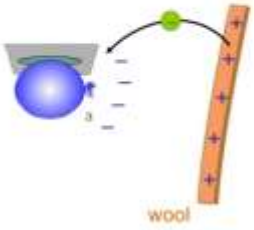
If electrons = protons ⇒ **neutral**
If electrons > protons ⇒ gaining electrons, **negative** charge
If electrons < protons ⇒ losing electrons, **positive** charge



Static Electricity

Where do charges come from?

When a balloon rubs a piece of wool...



electrons are pulled from the wool to the balloon.

The balloon has more electrons than usual.

The balloon: – charged,
The wool: +charged

Static Electricity

Where do charges come from?

Rubbing materials does NOT create electric charges.
It just transfers electrons from one material to the other.

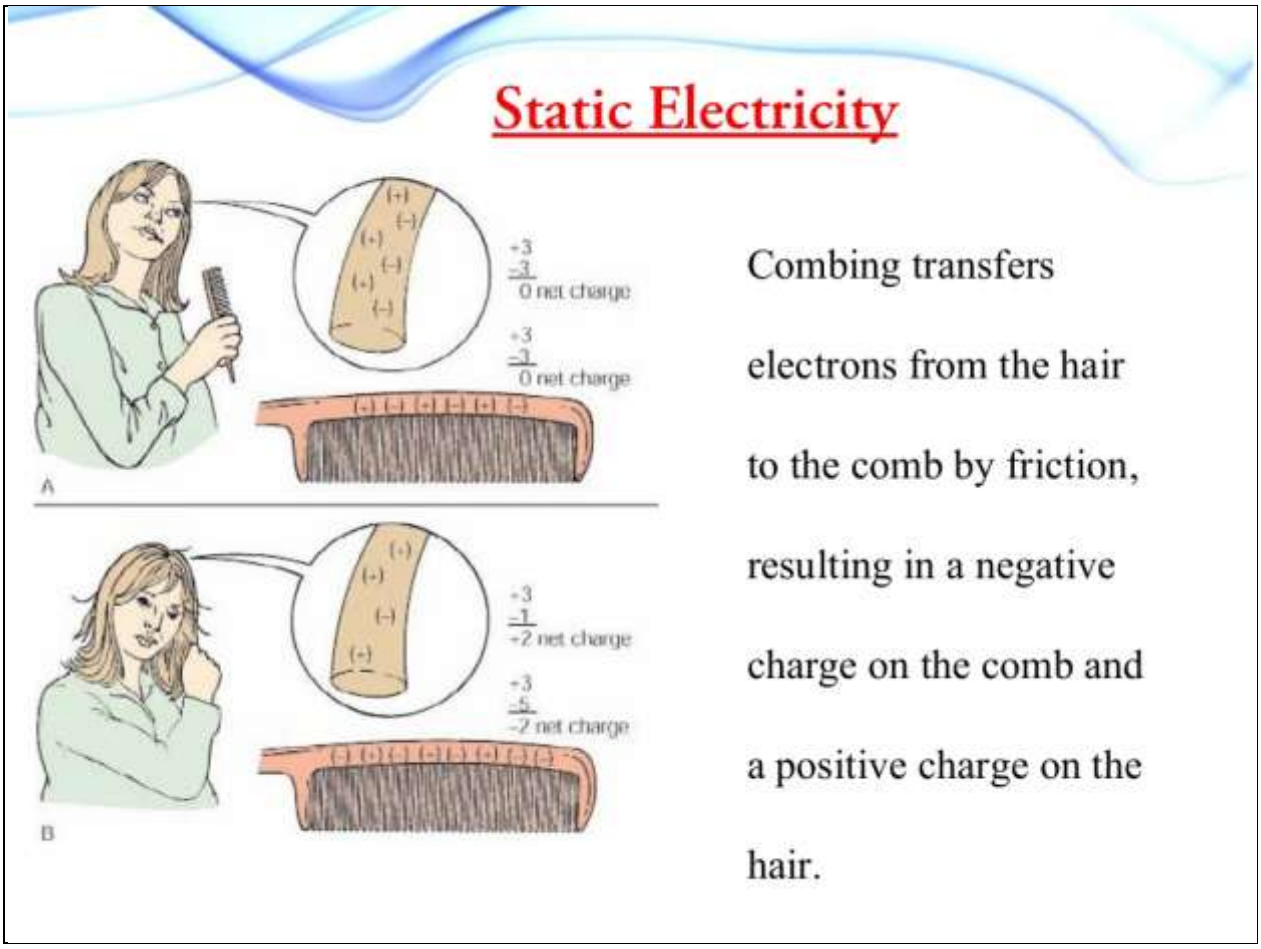
Static Electricity

Examples of static electricity:

- Rubbing a balloon on your hair
- Walking across carpet
- Clothes tumbling in dryer

What do these have in common?

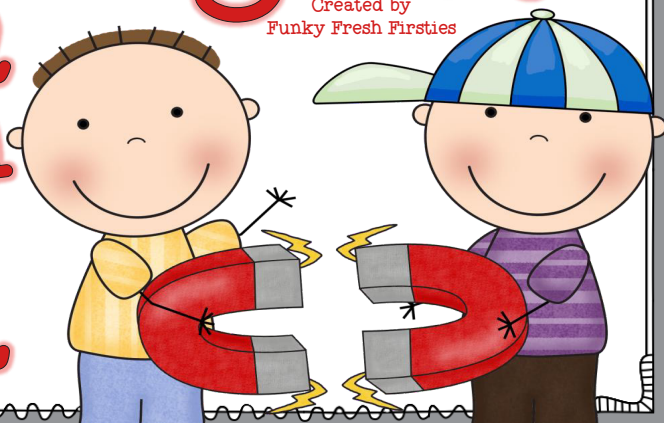
Friction!!!!



Objects with the same (like) charges repel, but objects with unlike charges attract.

Magnet mania

Created by
Funky Fresh Firsties



MAGNETS ARE MADE OF METAL

MAGNETS PUSH AND PULL OTHER METAL.

MAGNETS HAVE NORTH AND SOUTH POLES.

MAGNETS CAN MOVE THINGS WITHOUT TOUCHING THEM.

MAGNETS CAN MAKE ELECTRICITY.

Attract- to pull something

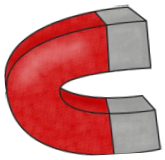
Pole- near the ends of a magnet where the pull is strongest

Repel- to push away

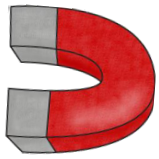
Magnet- an object that will attract things made of iron

Magnetic Force- A magnet's pull

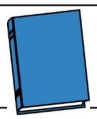
A strong magnet can attract objects through other things, such as cloth, water, or even your hand!



MAGNETIC AND NON-MAGNETIC

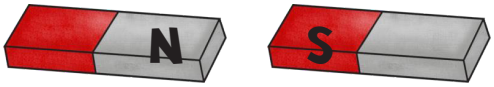
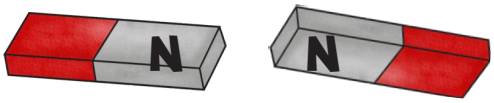
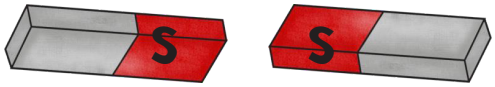
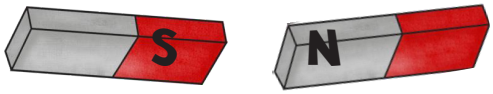


Test each object with a magnet. Color the faces to show whether the objects are magnetic or non-magnetic.

OBJECT	MAGNETIC	NON-MAGNETIC
 pencil	☺	☹
 coin	☺	☹
 paper clip	☺	☹
 scissors	☺	☹
 eraser	☺	☹
 nail	☺	☹
 book	☺	☹

Attract or repel?

Try the different combinations to see if they are attracted or repelled by each other!

COMBINATION	ATTRACT OR REPEL
	
	
	
	

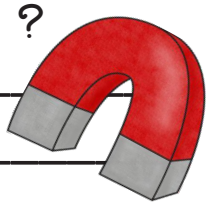
What did you discover?

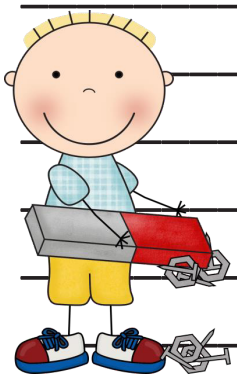
_____

MAGNETS

CAN	HAVE	ARE

What have you learned about magnets ?



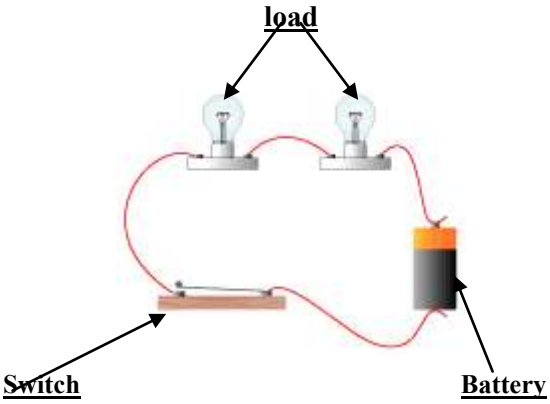


Series and Parallel circuits & Safety Check

- Do not play with electricity.
- Do not place objects on top of electrical cords or wires because the wires may become damaged.
- When using electrical devices, follow all instructions.
- When you remove a plug from a wall outlet, use the plug; do not pull on the cord.
- Do not experiment with voltage from a wall outlet, you could get shocked or hurt badly

Series Circuits

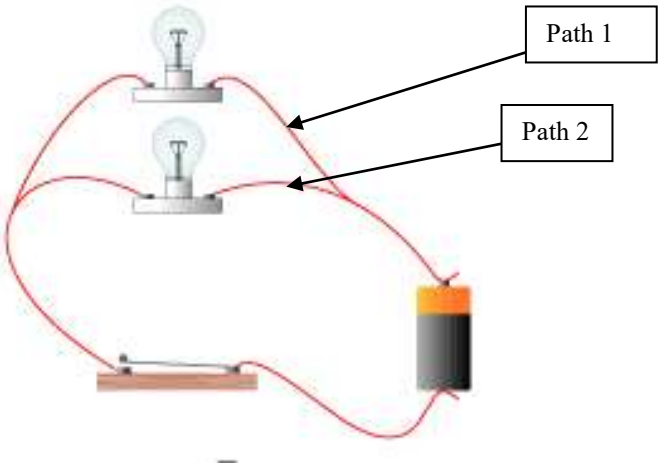
Load= light, heat, or sound given off by the electric circuit.
A series circuit allows electrons to follow only one path. All of the electricity follows path #1. The loads in a series circuit must share the available voltage. In other words, each load in a series circuit will use up some portion of the voltage, leaving less for the next load in the circuit. This means that the light, heat, or sound given off by the device will be reduced.



The picture above shows an example of series circuit. If one light bulb goes out, the other one will too. This is because they are both connected to the same battery.

Parallel Circuits

In parallel circuits, the electric current can follow more than one path to return to the source, so it splits up among all the available paths. In the diagram, some current follows path #1, while the remainder splits off from #1 and follows path #2. Across all the paths in a parallel circuit the voltage is the same, so each device will produce its full output.



Check out this website to see a demonstration of series and parallel circuits!

http://freecircuitdiagram.com/2010/04/04/electricity-series-parallel-circuits-video-tutorial/

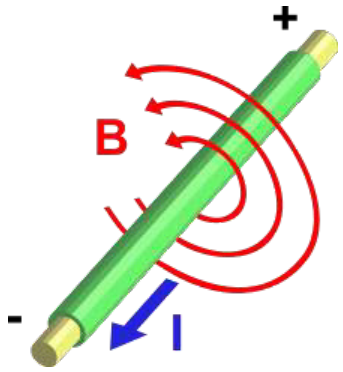
Homework for today: Draw a picture of a series circuit and a parallel circuit in your white book. Be ready to share your drawings with the class.

(K & 1 topic): Electromagnets

An electromagnet is a type of magnet whose magnetic field is produced by the flow of electric current. The magnetic field disappears when the current is turned off. If you have ever played with a really powerful magnet, you have probably noticed one problem. You have to be pretty strong to separate the magnets again!

Making an electromagnet: By simply wrapping wire that has an electrical current running through it around a nail, you can make an electromagnet. When the electric current moves through a wire it creates a magnetic force.

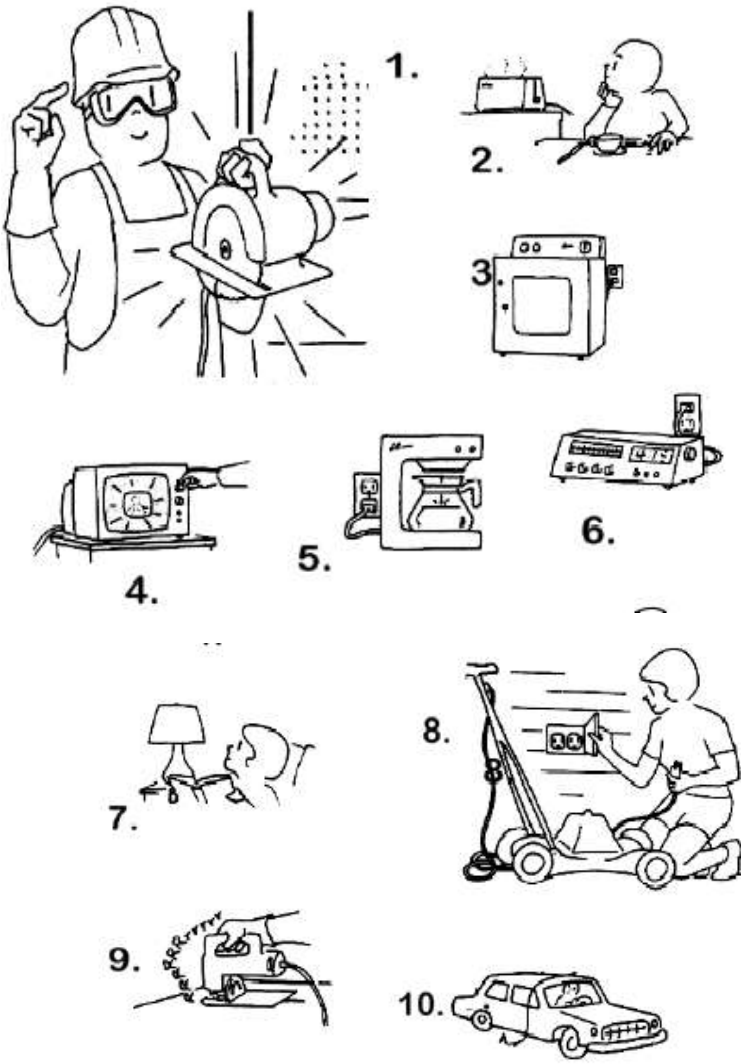
In class today, we are going to make a simple electromagnet using a nail, copper wire and a battery. We will be able to pick up paper clips and other objects with our electromagnets. In the picture below, in our class project, the nail will be in place where the green tube is and where the red arrows are, that will be the copper wire.



Electromagnets are very widely used as components of other electrical devices, such as motors, generators, relays, loudspeakers, hard disks, MRI machines, scientific instruments, and magnetic separation equipment, as well as being employed as industrial lifting electromagnets for picking up and moving heavy iron objects like scrap iron. Iron attaches to the electromagnet and is lifted up onto a truck. The electricity to the electromagnet is turned off in order to get the magnet to release the iron scraps into the truck.

Which items in the picture contain electromagnets?

1. In a hand saw you can find an electromagnet in the motor.
2. In a toaster the electromagnet helps control the intensity of the coils.
3. The electromagnetic is found in the motor on this clothes dryer.
4. The electromagnetic is found in the speaker system and receiver system on a television.
5. **There are <u>no electromagnets</u>** in a coffee maker.
6. The receiver and speaker have electromagnets.
7. **There are <u>no electromagnets</u>** in a lamp.
8. The electromagnet is in the motor.
9. In an electric screwdriver, the motor contains the electromagnet.
10. The motor of a car has an electromagnet. The radio or cellular phone would have an electromagnetic.



There is no reading on hexbug nano electricity. Come to class today for a fun, surprising project with hexbugs!

<u>Homework for today:</u> Draw a picture in your white book of you trying to separate strong magnets. Then, draw a second picture of you using an electromagnet to separate the magnet from iron by turning off the magnet. Bring your drawing to share with your class!