Electromagnetic Energy

Electricity and Magnetism

Sketch your thinking here.

Name____________ #_________

What I Think I Know About Electromagnetic Energy and Electricity

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What I Wonder About Electromagnetic Energy and Electricity

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Draw your practice circuits here.

Label parts and note whether they worked or did not work.

Draw your practice circuits here.

Label parts and note whether they worked or did not work.

Draw your practice circuits here.

Label parts and note whether they worked or did not work.

Electricity and Magnetism

- Explain how electrical energy is transferred and changed through the use of a simple circuit.
- Construct simple, useful electrical circuits.
- Demonstrate magnetic effects in a simple electric circuit.
- Identify objects that are good conductors or poor conductors of heat and electricity.
- Demonstrate magnetic field by observing the patterns formed with iron fillings using a variety of magnets.
- Demonstrate that magnetic objects are affected by the strength of the magnet and the distance away from the magnet.

static electricity- a buildup of electrical charge, will discharge and empty into something

discharge- when a buildup of electrical charge empties into something

current electricity-a moving electrical charge (**electric current**)
Electricity can produce heat, light, sound, and magnetic effects.

load- the part of a circuit that does work when electricity is applied to it (the part that does something). For example, a light **bulb** lighting up is a load.

power source- the part of a circuit that provides the electromagnetic energy to power the load. This can be a **battery**. It can also be a **generator** which creates electricity.

path or pathway-the part of a circuit on which the electrons travel, usually made of **wire**

switch- a device that can open or close a circuit

A **simple circuit** is made up of a load, path, switch and power source.

electrons-the negatively charged part of an atom

open or incomplete circuit-a circuit in which no electrical current flows

closed or complete circuit- a circuit which is able to have a working load

conductor/ conductivity- a material through which electricity flows easily. Example: metal (especially copper and aluminum), water

insulator - a material through which electricity resists or does not flow. Example: rubber, plastic, wood, cloth, cork

magnet - an object that attracts iron and steel

electromagnet- magnet create by electrical current

magnetic field - the space around a magnet where its magnetic force can be felt

magnetic pole - either the North or South of a magnet where the magnetism is the strongest

- opposite poles attract
- like poles repel, or push away from each other

lines of force - imaginary lines used to illustrate and describe the pattern of the magnetic field

iron filings - small shavings of iron, a highly magnetic metal, used with magnets to show lines of force

<u>Electric current</u> creates a weak <u>magnetic field</u> which can be show using a compass. The stronger the magnet, the more magnetic objects it can attract. The <u>distance</u> between the magnet and the magnetic object will also effect the strength of the force.

<u>How electricity gets to our homes:</u>
Generator at power plant (A generator generates or creates electricity),
Power lines, Transformer, Utility pole,
Electric meter on house, Wires within walls to outlet and plug (load)

9-6-10

Frayer Model Diagram

Name: ____________________ Date: ____________________

Definitions	Characteristics
Examples	Non-Examples

Frayer Model Diagram

Name: ____________________ Date: ____________________

Definitions	Characteristics
Examples	Non-Examples

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Frayer Model Diagram

Name: ______________ Date: ______________

Definitions	Characteristics
Examples	Non-Examples

Frayer Model Diagram

Name: ______________ Date: ______________

Definitions	Characteristics
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Frayer Model Diagram

Name: ______________________ Date: ______________________

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Frayer Model Diagram

Name: ____________ Date: ____________

Definitions	Characteristics
Examples	Non-Examples

Frayer Model Diagram

Name: ____________ Date: ____________

Definitions	Characteristics
Examples	Non-Examples

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Static Magic

<u>Materials:</u> plastic comb, salt/pepper mix, small paper plate, piece of wool

<u>Hypothesis:</u>
Circle one prediction.
I think the items will attract.
repel.

I think the salt only / pepper only / salt and pepper will move.

<u>Investigate:</u>
1. Now charge up the plastic comb. Hold on to the bristles and rub the wool briskly over the comb for 10 seconds.

2. Slowly lower the comb towards the salt and pepper mix without touching it. Make sure you are looking straight across the plate and not looking down from above it.

<u>Record results:</u>
The items attracted.
repelled.

The salt only / pepper only / salt and pepper moved.

Describe what you observed.

____

____

____

____

<u>Conclusion:</u>

____

____ 10/08

Lighthouse Plan

Draw your ~~plan~~ here.

Label parts – including all parts of your circuit

CLOZE EVALUATION QUESTIONS
HOT LINE: ALL ABOUT ELECTRICITY
DIRECTIONS: Select the answer from the four choices given by circling the correct letter.

1. In our homes we have toasters, clocks, and refrigerators. All of these appliances use _________ in order to run.

1. (A) sparks
(B) motors
(C) electricity
(D) lightning

2. There are different types of electricity. When we rub two balloons together, we are making________ electricity which is a form of electricity that is not moving.

2. (A) current
(B) static
(C) slow
(D) insulating

3. Another type of electricity allows us to use any electrical device like a radio as long as wewant to. This type of electricity is called _______ electricity which means that it is moving constantly through a wire until we turn off a switch.

3. (A) current
(B) static
(C) vibrating
(D) alternating

4. When we turn on any electrical device we see what electricity does. However, we can not see the tiny _______ which is what electricity is actually made up of.

4. (A) protons
(B) particles
(C) current
(D) electrons

5. Some dramatic forms of electricity can be seen during a thunderstorm. The best example is lightning which is a huge _______ of electricity that travels from the clouds to the earth.

5. (A) spark
(B) shower
(C) line
(D)sound

6. We use a great amount of electricity in our homes, schools, and factories. In order to supply this electricity a large _______ using overhead cables carry this electricity to us.

6. (A) generator
(B) battery
(C) machine
(D) power plant

7. A battery such as found in flashlights and radios can provide smaller amounts of electricity.
At the ends of every battery are two _______ which when connected by a wire to a source such as a light bulb will allow electricity to flow.

7. (A) connectors
(B) terminals
(C) charges
(D) points

8. Electricity can pass through some substances better than others. Things made of metal are called ________ and pass electric current through them very well.

8. (A) solids
(B) sources
(C) conductors
(D) sensors

9. Other materials made of plastic or rubber do not let electricity pass through them. These materials are called ________ or non conductors of electric current.

9.(A) insulators
(B) holders
(C) sources
(D) switches

10. Electricity travels from its source through wire into the device using it and then back through the wires to its source. This path of travel is called a ______.

10. (A) short circuit
(B) complete circuit
(C) open circuit
(D) incomplete circuit

Name ______________________________ TOPIC PRACTICE 1

It's Shocking!

Fill in the blanks.

1. Similar charges ______________ each other.
2. Electricity is the energy caused by the flow of particles with ______________ electrical charges.
3. Metal is a good ______________ of electrical charge.
4. Static electricity is the buildup of electric ______________.
5. Lightning forms because negative particles settle at the ______________ of a cloud.
6. In the balloon experiment, the wall provided a(n) ______________ charge.
7. Lightning also gives off ______________________ energy.
8. Electrical wires are often covered with rubber, because rubber is a good ______________.

Answer each question.

9. Would a lightning rod mounted on the first floor of a tall building work? Why?

____

____

10. Name one thing you could do to keep safe from lightning.

____

____

____

11. If you had to choose one thing powered by electricity that you could not do without, what would it be? Why?

____

____

15

Name ______________________________ TOPIC PRACTICE 2

Electrical Pathways

Fill in the blanks.

1. Flowing electricity is called ______________ electricity.
2. In order for electricity to flow, the path it follows must be ______________.
3. A complete path that electricity can move through is called a(n) ______________.
4. A device that can open or close a circuit is called a(n) ______________.
5. A cell changes chemical energy into ______________ energy.
6. The filament in a light bulb is a poor conductor called a(n) ______________.
7. An incomplete electrical path is called a(n) ______________ circuit.
8. Current always follows the path of least ______________.

Answer each question.

9. How does a dry cell work?

____

____

____

____

____

10. What is a short circuit? Why does it sometimes occur?

____

____

____

____

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Name____ Date______________

4Science Studies Weekly: (20 points possible) 1st quarter **Week 7**

True/False (1 point each)

___________1. Every time you drop a magnet, it gets a little stronger.
___________2. Magnetic fields are invisible.
___________3. The first compass was invented in China about AD 1000.
___________4. Benjamin Franklin invented bifocals.

Matching (1 point each)

______5. magnetic field	a. the magnetic field around the Earth
______6. lodestone	b. the area where the force of a magnet is felt
______7. magnetosphere	c. the fourth state of matter
______8. plasma	d. eyeglasses with two kinds of lenses
______9. bifocals	e. a naturally magnetic rock

Multiple Choice (2 points each)

10. Which of these things is NOT part of a closed circuit?
    a. a wire or other conductor
    b. a power source
    c. a magnet
    d. a light bulb

11. The interaction between two objects that have mass is a(n) ___________.
    a. magnetic force
    b. magnetosphere
    c. electric force
    d. positive charge

12. The interaction between two objects that have a positive or negative charge is a(n) ________.
    a. magnetic force
    b. magnetosphere
    c. electric force
    d. positive charge

13. An object that is attracted to iron is a(n) ___________.
    a. positive charge
    b. negative charge
    c. generator
    d. magnet

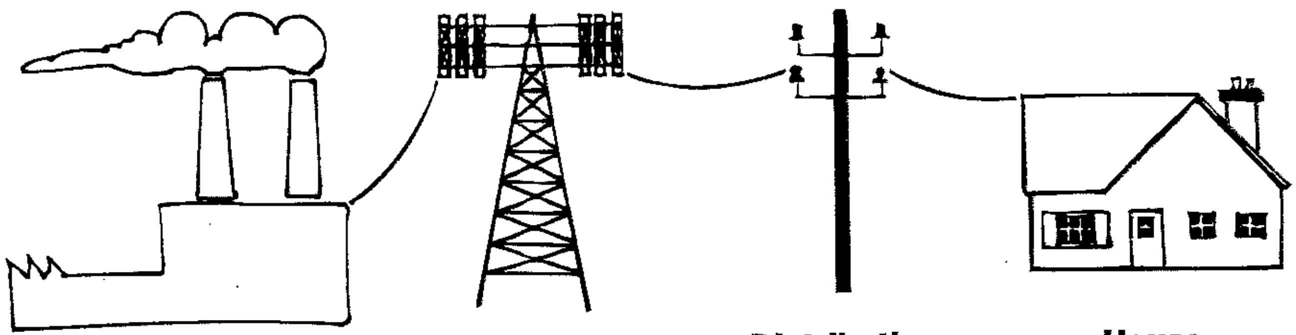
Short Answer (2 points)

14. What is the relationship between the poles on a magnet?

____

____

The Electric Light Bulb



It's nighttime. You hop into bed. You grab a book. Then you turn on a reading lamp. You stop to wonder. How does electricity make the light bulb glow? It all starts at a power plant.

Electricity is made at a power plant. The power plant uses energy to make electricity. Some power plants use energy from moving water. Some power plants use energy from steam.

The energy is used to spin a machine. The spinning machine moves a wire through magnets. The magnets make a current of electricity flow in the wire. Now electricity is made.

The current of electricity leaves the power plant. It flows through large wires called transmission lines. Transmission lines bring electricity to cities, where people can use it. The transmission lines stretch a long way. Large metal towers hold them up.

The current reaches a city. It goes to a substation. From there, it flows through distribution lines. Electric poles hold up the distribution lines. The distribution lines carry the current to different places in the city.

The electric current goes to your home. This is where you are lying in bed. It travels to your lamp. It flows into the light bulb.

The light bulb has a thin coiled wire inside. It is called a filament. The filament is made from strong metal called tungsten. Tungsten can withstand high temperatures. An electric current heats the tungsten filament. The electric current heats the filament to more than 4,500°F (2,500°C). The high temperature makes the filament light up. This is how the light bulb glows.

The electricity had a long journey. It started at the power plant. It traveled to a city. The electric current passed through a light switch. It ended up inside your light bulb. The journey might have been many miles. But it's a very fast journey. It happens in an instant.

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Name ______________________________

The Electric Light Bulb

Fill in the bubble to answer each question or complete each sentence.

1. The power plant uses energy to make ________.
   - Ⓐ water
   - Ⓑ electricity
   - Ⓒ plants
   - Ⓓ towers

2. The ________ at the power plant make a current of electricity flow.
   - Ⓐ wires
   - Ⓑ heaters
   - Ⓒ magnets
   - Ⓓ light bulbs

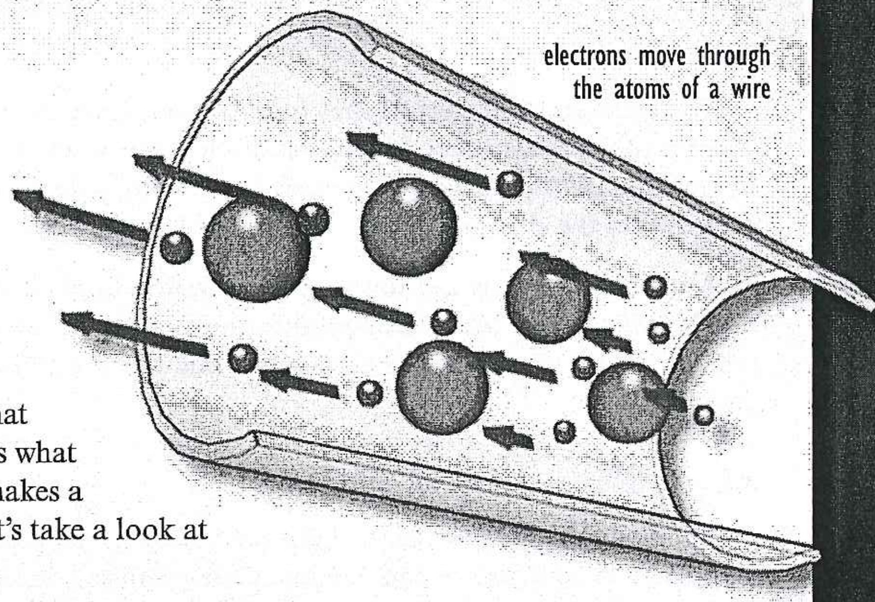
3. What do transmission lines do?
   - Ⓐ They use energy to make electricity.
   - Ⓑ They bring electricity to cities, where people can use it.
   - Ⓒ They create steam for the power plant.
   - Ⓓ They spin magnets at the power plant.

4. The ________ lines carry the current to different places in the city.
   - Ⓐ small, fine
   - Ⓑ long wire
   - Ⓒ current
   - Ⓓ distribution

5. The journey from the power plant to a home happens in ________.
   - Ⓐ an instant
   - Ⓑ 30 seconds
   - Ⓒ 2 to 3 minutes
   - Ⓓ about 10 minutes

Bonus: On the back of this page, explain why power plants are important.

Electrical Circuits



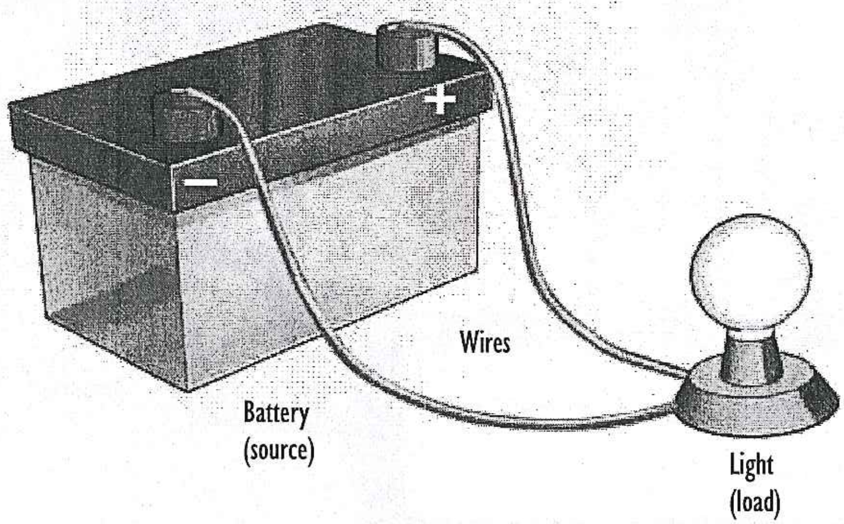
What is a generator? How does it work? Generators give us electrical energy. It starts with energy from other things. It turns that into electricity. This energy is what makes a light bulb glow. It makes a television show the news. Let's take a look at how it works.

First, electricity moves through conductors (KON-duck-tors). Conductors are materials that share electrons easily. The electrons move between the atoms. Copper wire is a good choice. Aluminum, gold, and silver are other metals that can also be used.

Electricity also needs a push to get it moving. That is what a generator is for.

Generators move the magnets along a wire. The magnets push the electrons inside the wire. They do not have to touch them. This creates a flow of electrons. That is electricity.

Imagine a pipe. This is like the wire. It is filled with Ping-Pong balls. What would happen if you pushed one more ball into the end? All the balls would move along the pipe and bump the last one out. This is like electrons moving along the wire.



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Amps and Volts

The generator's magnet pushes the electrons down the wire. Two things happen. The magnet pushes a certain number of electrons along the wire. This is measured in amperes (AM-peers). They are also called amps for short. The magnet also puts pressure on the electrons. This is measured in volts.

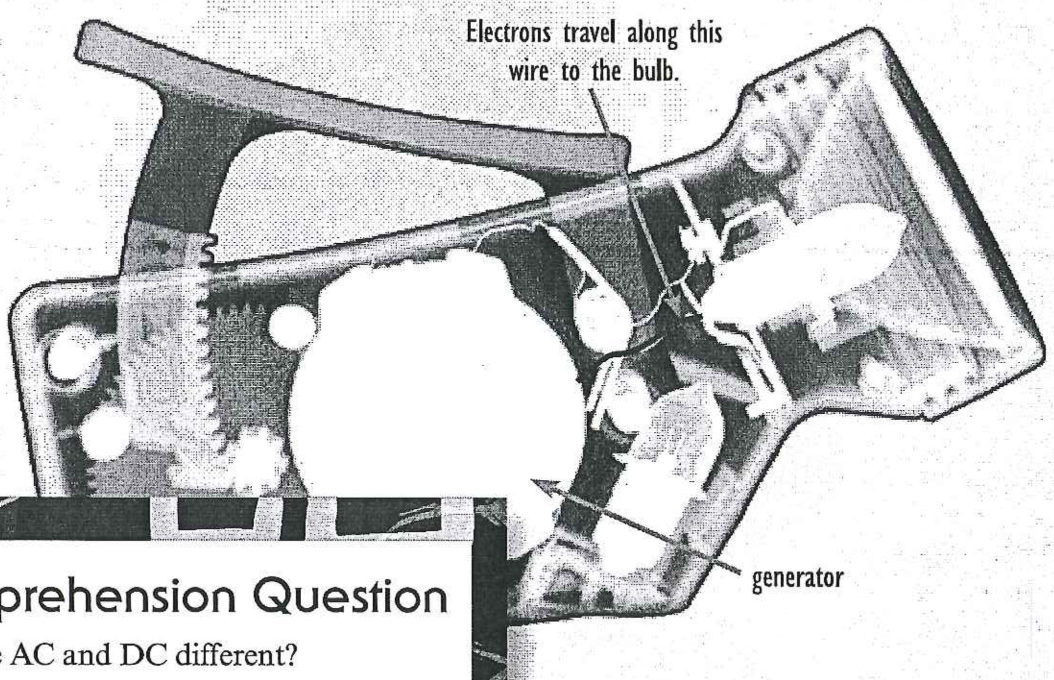
Amps and volts are put together to see how much power is being used. This is measured in watts. Watts are found by multiplying the amps and volts together. That tells you how many electrons are moving and how much force is behind all those electrons.

AC vs. DC

Thomas Edison invented the light bulb in 1879. He wanted to sell electricity. He wanted to bring it into people's homes. He promised to light up New York. There was a problem, though. The electricity for homes was direct current, or DC for short. The electrons always went in the same direction down the wire. DC cannot travel long distances. The electrons fall out of the wire. DC is not good for homes.

Nikola Tesla worked for Thomas Edison. He had an idea. He wanted to use another kind of current. Alternating current, or AC, makes electrons go back and forth very fast. They change direction many times in one second. This makes it easy for electricity to travel over long distances.

The two men argued. Edison wanted DC. Tesla wanted AC. In the end, Tesla's ideas worked best. Today, we use AC in our homes.



Comprehension Question

How are AC and DC different?

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Name ___________ #____

Magnet lab checklist & scores

Date_____________

- 1.___ Making an Electromagnet
- 2.___ The Power of Magnets
- 3.___ Make Your Own Compass
- 4. ___ Read "Charging in Time"
- 5.___ Read "How Magnets Are Made"
- 6.___ Ultimate Attraction
- 7.___ Making Magnets
- 8. ___Conductors and Insulators

Name: ______________________ #______

Date:____________

Ultimate Attraction

What types of objects are magnetic? Find out by observing which objects your magnet can pull.

Hypothesize: Put a check in the box next to the objects you think will be attracted to your magnet.

- steel paperclip
- aluminum can tab
- rubber eraser
- wooden bead
- brass hex nut
- bronze penny
- aluminum foil
- plastic die
- steel wool
- nickel ball chain
- plastic straw
- tungsten key
- steel paper clamp
- steel nail
- bronze safety pin

Experiment:

1. Empty your bag containing all of the above objects.

2. Use your magnet to try to pull each object.

If you are able to pull an object with your magnet, the object is attracted to your magnet. This means the object has magnetic properties.

3. Put all of the objects that are attracted to the magnet in one pile and all of the objects not attracted to the magnet back in the bag.

Collect Data: Fill in the chart below to organize your data.

Ultimate Attraction Page #2

magnetic objects	non magnetic objects

Make a Conclusion:

All of the magnetic objects are made out of

____

____

Test items you think will be magnetic.

The Power of Magnets

Different variables affect how powerful a magnet is. What do you think these variables are?

Hypothesize: Circle *will* or *will not* to complete each statement below.

The distance between the magnet and the magnetic object **will** **will not** affect the r

The pole pointed toward an object (N Pole or S Pole) **will** **will not** affect the magnet's strength upon the object.

The part of the magnet (N/S pole or middle) pointed toward the object **will** **will not** affect the magnet's strength upon the object.

Experiment:

1. Put a paperclip on two pieces of soda straw so the back end of the paperclip is at the left edge of this paper. Put your bar magnet at the right edge of this paper. Slowly move your magnet toward the paperclip. As soon as the paper clip starts to move, stop moving the magnet. Mark where the front end of the magnet is.

2. Repeat step one with the other pole of the magnet pointed toward the paperclip.

3. Repeat step one with the middle of the magnet pointed toward the paperclip.

The Power of Magnets Page #2

Draw Conclusions:

1. Are both poles of a magnet equally powerful? How do you know?

____

____

____

2. Do all parts of a magnet attract the paperclip? ____________________

Which part of the magnet is strongest? the pole (ends) the middle

Which part is weakest? the pole (ends) the middle

3. If you had a stronger magnet, would the paperclip move sooner, later, or at the same place? Explain.

____

____

____

Name: ______

Make Your Own Compass

Materials:

- magnet
- Styrofoam chip
- pen
- sewing needle
- Petri dish
- paper towel

Procedure:

1. Place Petri dish on a paper towel. (A teacher will come by and fill it for you)

2. Use your pen to create a narrow groove in the Styrofoam chip by simply drawing a line. You may need to go back over the line to make sure the Styrofoam dips in.

3. Magnetize your sewing needle: Stroke it 10 times, moving from the thick end to the point, with the magnet's **South Pole.**

4. Carefully lay the needle in the groove on the Styrofoam chip.

5. Float the Styrofoam chip and needle on the surface of the water.

6. In what direction does the tip of the needle point? ______________

Important Concept:
Move the needle gently so that it points somewhere else. Wait a few seconds. What happens? Why?

When the needle was made to point in a different direction, it

____

This happened because ____

____

Making Magnets

Part 1

Names ______________________

____

____

____

How can you make a magnet ?

Try to pick up staples with a pair of scissors. Record how many staples you get in the 0 strokes box. Do the scissors act like a magnet ? ______________________

2. Stroke the scissors 10 times in one direction. How many staples will the scissors attract ? Record.
3. Stroke the scissors 10 more times, Test and record for 20 strokes.
4. Stroke the scissors 10 more times. Test and record for 30 strokes.
5. Continue stroking, testing, and recording in the same way for 40 and 50 strokes.

50 strokes	
40 strokes	
30 strokes	
20 strokes	
10 strokes	
0 strokes	

What did you observe ?

____

____

____

CHARGING IN TIME

Many people have contributed to our understanding of electricity today. The ancient Greeks first discovered that amber rubbed with cloth would attract bits of straw and other light objects. This phenomenon, which was caused by static electricity, was known for over two thousand years before it was studied in any great depth. In the early 1600's William Gilbert, a physicist from England, was the first to study static electricity in a scientific way. He is credited with coining the word electricity, which comes from the Greek word for amber. It was more than 100 years later that research on electricity progressed much farther.

In the summer of 1752, Benjamin Franklin performed his famous kite experiment which proved that lightning was an electric phenomenon. Franklin was lucky not to have been killed, a fate which fell on some who tried to duplicate his experiment. The same year, he made the first lightning rod and placed it on the top of a house. When the lightning struck, it hit the rod and was short circuited to the ground, sparing the house.

In 1800, Alessandro Volta of Italy, made the first wet-cell battery which produced an electrical current. He placed zinc and silver discs in an acid solution and an electric current flowed through a wire which was connected to the discs.

In 1820, Hans Oersted from Denmark, discovered the connection between electricity and magnetism. He noticed that an electric current in a wire deflected a compass needle that was near by. He discovered that whenever an electric current flows through a wire a magnetic field is created. Oersted's discovery led John Schweigger to invent the first galvanometer, a device to detect electric currents, in 1821.

In 1821, Michael Faraday from Great Britain, invented the first basic electric motor. He placed a wire carrying an electric current between the poles of a magnet. When the two magnetic fields met, they caused a force that made the wire turn around creating the first electric motor.

In 1823 W. Sturgeon, a scientist from Great Britain, made the first electromagnet by passing an electric current through a wire which was wrapped around an iron bar. The iron bar became a powerful magnet when an electric current was going through the wires wrapped around it.

In 1831 Michael Faraday invented the first transformer, a device which could change the voltage of an electric current. When a current with a low voltage entered the transformer, it was transformed into a current with a high voltage coming out.

In 1844, Samuel Morse successfully transmitted a message by magnetic telegraph. This invention allowed people to communicate over great distances.

In 1866, G. Leclanche from France, made the first dry-cell battery by combining different chemicals in a small round container. The dry-cell battery made it possible to have a convenient, easy-to-use source of power.

For the next few years, Thomas Edison was very busy inventing many different products. In 1877, he developed the first phonograph. Two years later, in 1879, he invented the first successful electric light bulb. It was a glass bulb which burned for only 13 1/2 hours. Luckily, a year before in 1878, J. Swan had developed a vacuum pump to remove the air from a bulb so the filament would not burn away.

In 1907, the electric vacuum cleaner and washing machine were invented which made house cleaning much easier.

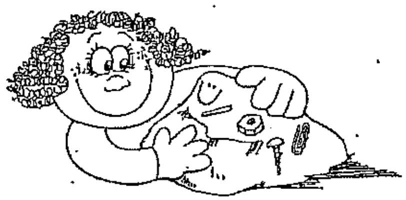
It wasn't until 1910 that G. Claude, France, produced the first neon light. He passed an electric current through a neon gas tube which made the gas glow red.

In 1925, J. Baird from Scotland, demonstrated the first television set but it was many years later before it became available to many families.

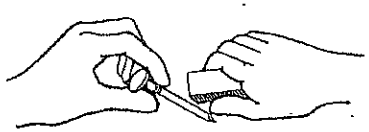
How Are Magnets Made?

There are three different kinds of magnets: natural, temporary, and permanent. Each kind is made in a different way.

Natural magnets are rocks with a lot of iron in them. Magnetite is an example of rock that is naturally magnetic. Natural magnets are magnetic when they are found in the ground. No one has to do anything to them, because they are already magnets.



Temporary magnets are called that because they are weak and last only a short time. They are made from pure ("soft") iron. One way to make a temporary magnet is to stroke a soft iron object (like a nail) with a magnet.

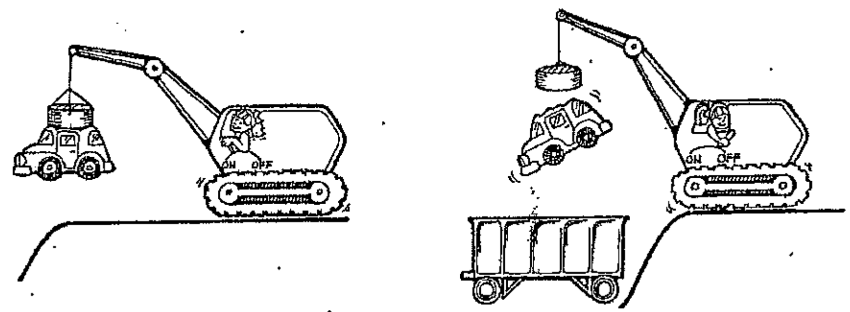


temporary magnet

electromagnet

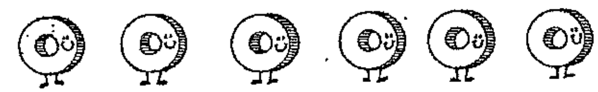
Another way is to use an electromagnet, which is a coil of wire through which electric current can be passed. The iron is put inside the coil. When the electricity is turned on, a strong electric

charge is sent through the wire. This creates a strong magnetic field and turns the iron into a magnet. This kind of magnet is called temporary because the magnet loses most of its magnetic power when the electricity is turned off.



Permanent magnets are made from "hard" iron, which is iron plus some other special materials. Steel is a hard iron, so it makes good permanent magnets. If we stroke steel scissors they will be magnetized. These are called permanent magnets because they are strong and because they hold their magnetism for a long time.

A ceramic magnet is a special kind of permanent magnet. The ring magnets we use in school are ceramic magnets. They are made from a form of iron called strontium ferrite.



This powder is pressed into molds. Then it is put into a very hot oven where it is heated to 2250 degrees Fahrenheit. As these future magnets cool, they shrink slightly. Then they are magnetized in an electromagnet to align the domains. The flat sides of ring magnets become their poles.

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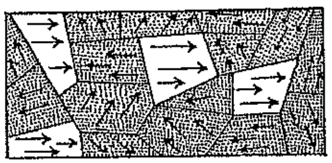
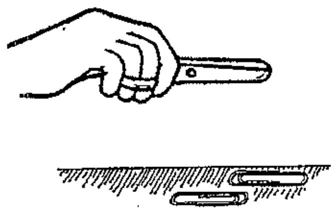
WHAT MAKES A THING MAGNETIC?

Many magnets are made of steel, which is iron plus some other things. Iron and steel are made up of many magnetic domains. Each domain is a very small area with billions of atoms. In an ordinary scissor blade, these domains face in different directions.



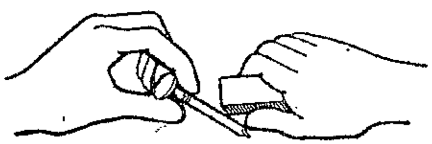


North pole of a magnet

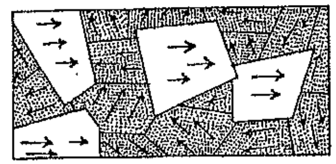
We would say:

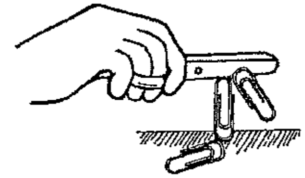
The domains are unaligned.
The scissor blade does not have a magnetic field
It will not attract magnetic objects.

One way to change the steel into a magnet is to stroke the scissor blade with a magnet. When you do this, the domains change and the scissor blade starts to develop a magnetic field of its own. In the drawing above, find a domain that already faces north. Now look below. What happened to that domain? Now look at another domain that faces some other



direction. How did it change? This is what happens inside the scissor blade when it becomes slightly magnetized. 2



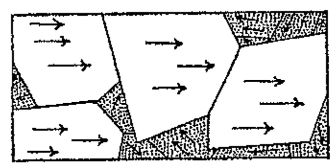


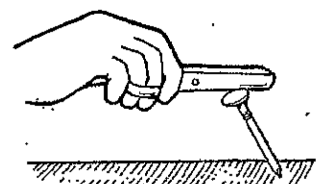
North pole of a magnet

We would say:

The domains are partly aligned.
The scissor blade has a weak magnetic field.
The scissor blade is a weak magnet.
It will pick up iron bits and other objects of small mass.

As these north-facing domains grow larger, the scissor blade becomes a still stronger magnet.





North pole of a magnet

We would say:

The domains are mostly aligned.
The scissor blade has a strong magnetic field.
The scissor blade is a strong magnet.
It will pick up more massive objects.

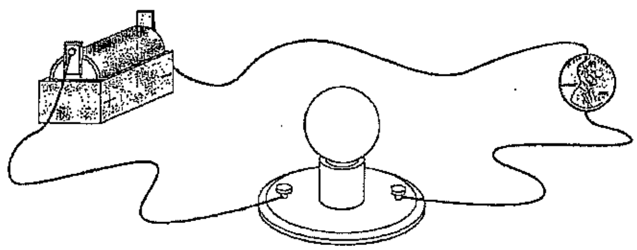
32

Name: ____________________

Conductors and Insulators

A **conductor** is a material that allows electricity to flow through it.
An **insulator** is a material that electricity cannot flow through.

To determine whether an object is a conductor or insulator, you can build a simple circuit with a battery, light bulb, and three pieces of wire.



Touch the free ends of the wire to the object you are testing. If the light bulb lights up, the object is made from a conductor. If it does not, the object is made from an insulator.

Complete the table. Predict whether each item is made from a material that is a conductor or insulator. Then test each item to determine if it is made from a conductor or insulator.

Object	Prediction: Conductor or Insulator?	Result: Conductor or Insulator?
rubber band		
penny		
nickel		
toothpick		
key		
paper clip		
brass paper fastener		
glass microscope slide		
(your choice)		
(your choice)		

Name ______________________________ # ________

<u>Design Challenge</u>

<u>The Power of Magnets</u>

Can you design a way to cause the paperclip to move **sooner?** This means the magnet and the paperclip will be farther apart when the clip begins to move. Try to get the farthest distance between the items. Measure the distance between the clip and the magnet when motion starts. Use **cm** to record your data.

Distance __________cm

Sketch and label your design below.

What I am Curious About- Magnetism (Put sticky notes here)

Magnetism Labs

What I Discovered About Magnetism (Put sticky notes here)

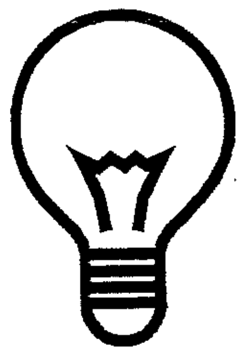
Magnetism Labs

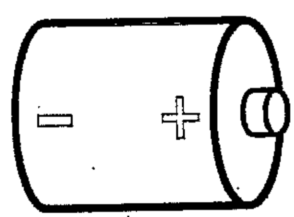
Name: ______________________ Date: ______________ #: ________

Electricity & Magnetism
Study Guide

Complete the diagram of the circuit:

1. Draw in the wires so that the circuit is complete and the light bulb will light up.
2. Use the words in the word box to label the diagram of the complete circuit.





load	positive terminal	negative terminal	pathway	power source

Refer to the above circuit to answer questions 3 and 4.

3. Is this an open circuit or a closed circuit? Explain your answer. ______________

____

____

4. In this circuit, the load is a ____________________, the power source is a ____________________, and the pathways are ____________________. Negatively charged particles that are parts of atoms are called____________________. They move from the power source, through the pathway, into the load, through the next pathway, and then back into the power source. This moving electrical charge is called ______________________________. If there was a break in one of the pathways, the circuit would become an ____________circuit and the load would stop working. If we wanted to be able to turn the light bulb on and off, we could add a __________________ to the circuit. When the switch is in the off position, the circuit is ________________________ and the light bulb will be off. When the switch is in the on position, the circuit is ____________________ and the light bulb will be on.

5. Every once in a while, you would build a complete circuit but the light bulb would not light up. List 3 possible variables that caused this to happen:

1. ____
2. ____
3. ____

6. Another type of electricity is called ____________________ electricity. This occurs when there is a buildup of electrical charge that will ___________________ and empty into something. A very powerful example of this type of electricity is _______________________.

7. Metal and water are both good ________________________ for electricity.

8. Rubber, plastic, and wood are nonconductors. Another word for a nonconductor is ______________________.

9. Describe the path electricity takes to get to your home.

____

____

____

____

____

10. Name four things you use everyday that is run by electricity:

1. ______________________________

2. ______________________________

3. ______________________________

4. ______________________________

11. Magnets attract objects that are made out of ____________ and ____________.

Every magnet has two __________ where the magnetism is strongest. They are called the ____________________ and the ____________________. The space around the magnet where the magnetism is felt is called the ____________________.

________________________________ are imaginary lines used to illustrate and describe this pattern. In class, we used ______________________ in order to see them.

13. Describe how magnetic objects are affected by the strength and distance of a magnet:

____

____

____

____

12. Current running in a wire creates a weak magnetic field. You can make a stronger magnetic field by winding a wire in loops around an iron bar. When current flows this creates a temporary magnet called an ________________________.

13. Name one way an electromagnet is used: ____

True or False?
If the statement is true, write a T next to it. If the statement is false, write an F next to it and then rewrite the statement to make it true.

14. ________ If you hang a magnet from a string, the magnet's south pole will point north.

____

____

15. ________ In electricity, like charges attract each other and opposite charges repel.

____

____

16. ________ In magnetism, like charges repel each other and opposite charges attract.

____

____

17. ________ A load does not work in an incomplete circuit because the electrons flow out of the wire and into the air.

____

____

What I Have Learned About Electromagnetic Energy