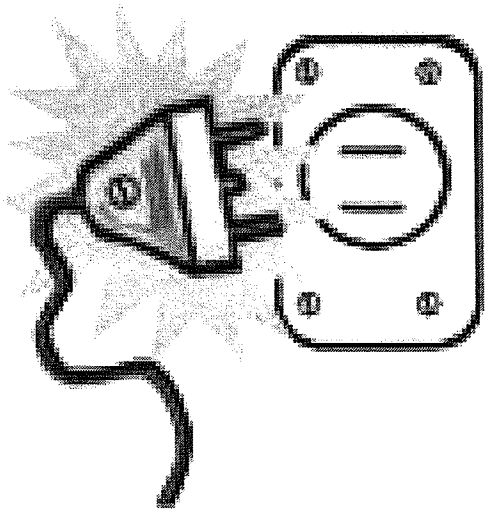
Mc CAIG ELEMENTARY SCHOOL

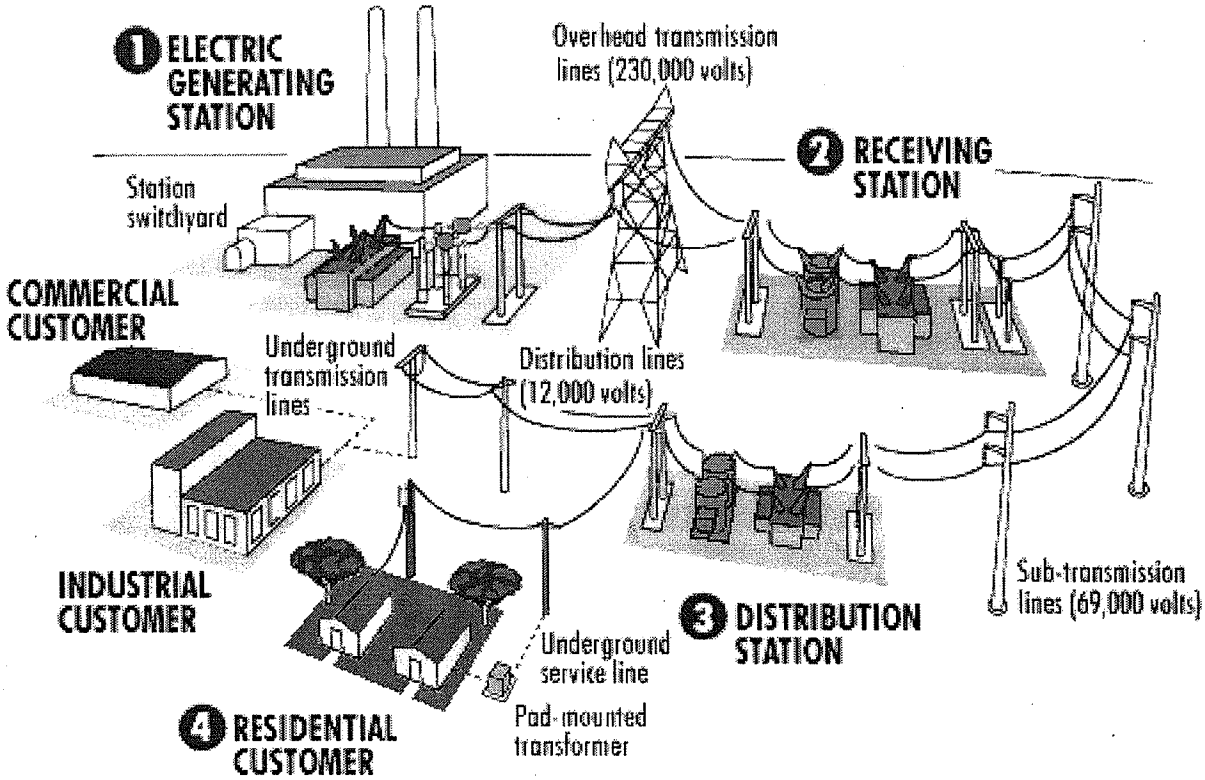
ELECTRICITY



SCIENCE Cycle 3

ELECTRICITY

STUDENT: _____

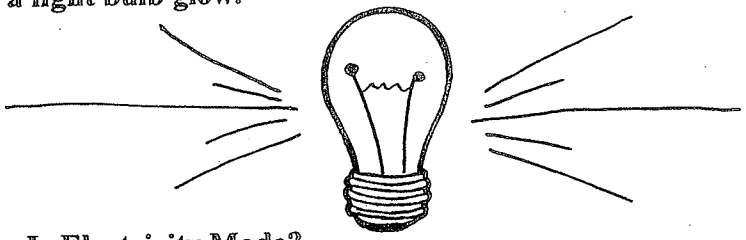


Teacher: Mr. D. Strina

EVERYTHING YOU WANTED TO KNOW ABOUT ELECTRICITY (But were afraid to ask)

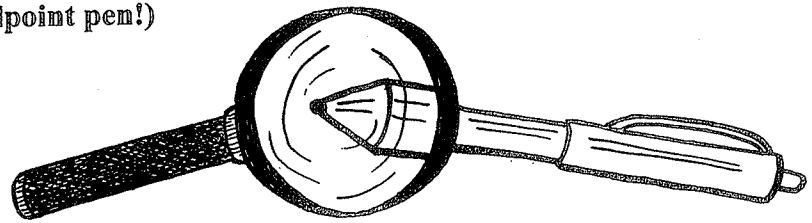
1. What Is Electricity?

Electricity is a type of energy. It is hard to understand because you can't touch it, hear it, smell it or see it. What people can see are the things that electricity can do - make a toaster burn bread, make a person have a bad hair day or make a light bulb glow.



2. How Is Electricity Made?

Electricity is made any time that small particles called electrons move from one object or place to another. (Electricity is invisible because electrons are too small to see - one billion electrons can fit into the ball at the tip of a ballpoint pen!)



3. Two Types of Electricity

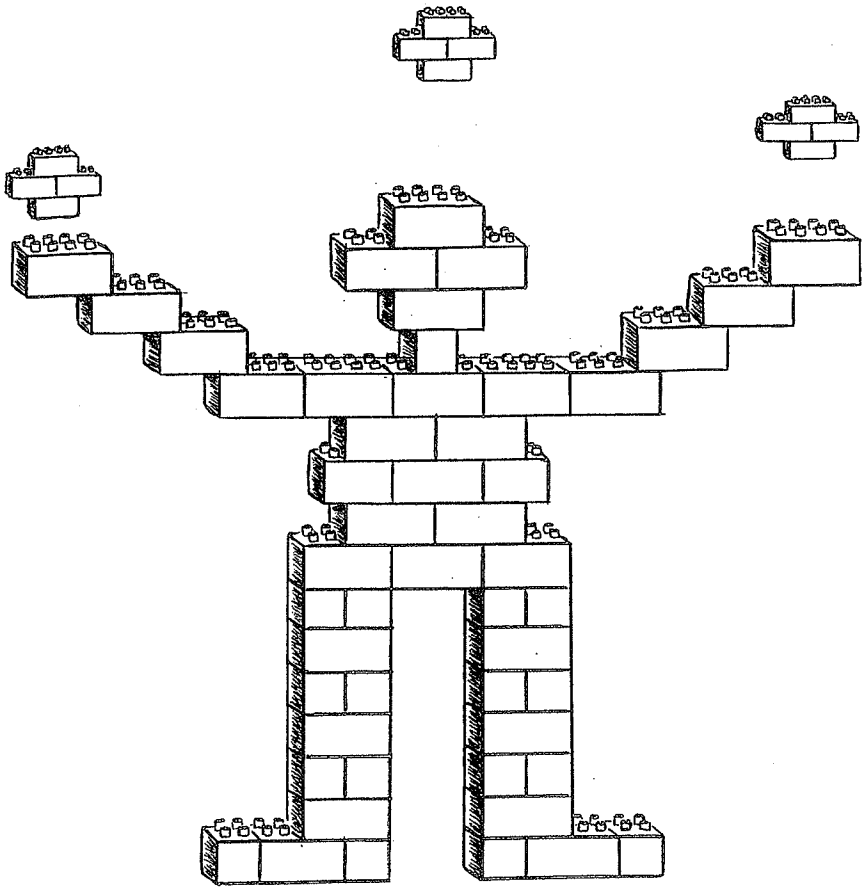
There are two types of electricity:

1) static electricity
2) current electricity.

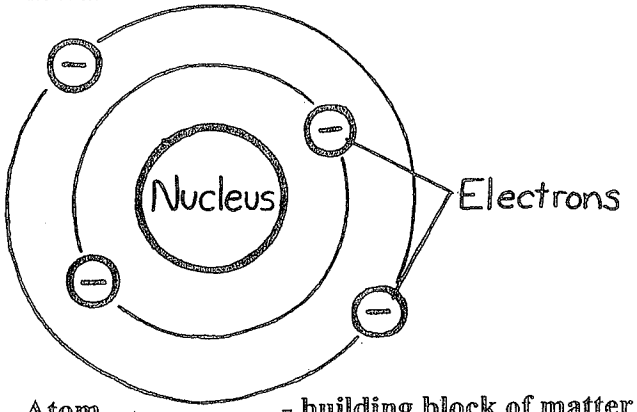
AMAZING ATOMS

1. The Atom

The atom is the basic building block of all matter. Everything living or dead, solid, liquid or gas is made up of atoms. They can be thought of as "mini-Legos" which all things are made of.



2. Parts of the Atom



Atom	- building block of matter
Nucleus	- heavy, central part of the atom - positive part of the atom - not able to move easily
Electrons	- lightest and smallest part of the atom which circle the nucleus in "clouds" - have a negative charge - able to move which causes electricity
Negative Charge	- objects with extra electrons have a negative charge (-)
Positive Charge	- objects that have a shortage or have lost electrons have a positive charge(+)
Attraction Laws	- opposites attract and likes repel (the same as for magnets)

+ → ← - ← + + →

- → ← + ← - - →

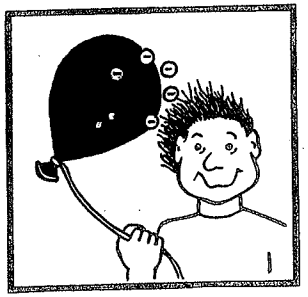
STATIC ELECTRICITY

1. How Does It Work?

When you rub your head with a balloon, the balloon will stick to the wall - why? The reason is that the friction made when two different objects are rubbed together creates static electricity. Three ways to tell if static electricity is present are:

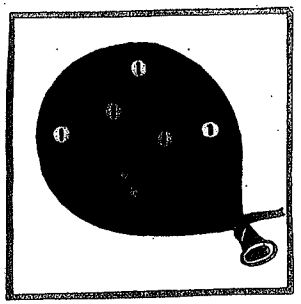
1) it sparks and can shock you
2) it makes a crackling sound
3) it causes things to stick together.

Step 1



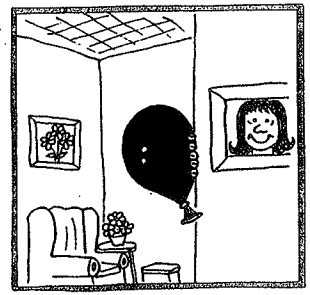
Rubbing causes the balloon to "steal" electrons from your hair.

Step 2



The balloon has a buildup of electrons so it has a negative charge. Your hair has lost electrons so it becomes positively charged.

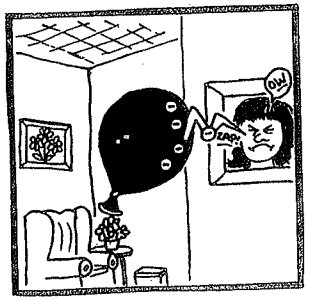
Step 3



Because opposites attract, the negatively charged balloon will stick to the wall.

or

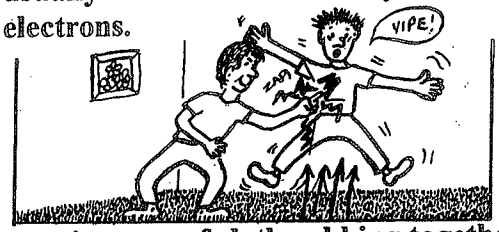
Step 4



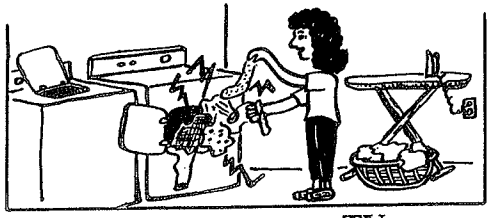
If there are enough electrons on the balloon, they will try and "jump" to the wall and will make a small spark. ZAP!

2. Where Does Static Electricity Occur?
Everyday examples include:

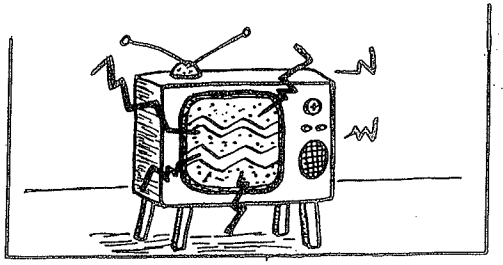
1) dragging rubber-soled shoes can "steal" electrons from the carpet and you can usually shock someone with your buildup of electrons.



2) certain types of cloth rubbing together in the dryer will "steal" electrons causing clothes to stick together (static cling).

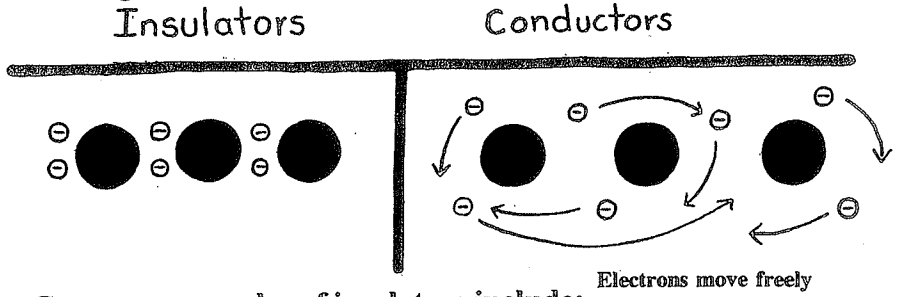


3) electrons collect on your TV screen and produce static electricity. (This why there is so much dust on most TV screens)



INSULATORS AND CONDUCTORS

Certain types of atoms like rubber or plastic atoms will hold onto their electrons very tightly. Other kinds of atoms, like most metals, allow their electrons to move more freely from one atom to the next. Materials that hold their electrons tightly do not permit electricity to flow and are called <u>insulators</u>. <u>Conductors</u> are just the opposite with freely moving electrons that allow electricity to flow easily.



Common examples of insulators include:

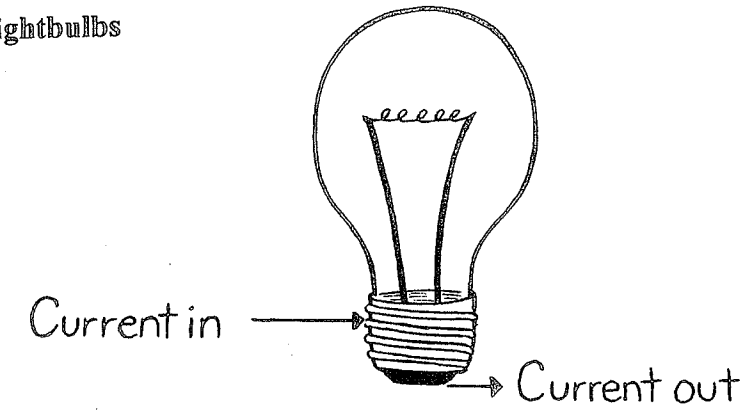
1) rubber (used to make gloves for electrical workers)
2) glass (used to make insulators on the tops of electrical poles)
3) plastic (used to insulate wires in most appliances)

Common examples of good conductors are:

1) copper (used in most wiring)
2) silver (used in special wiring)
3) water with salt in it (don't swim during an electrical storm since most lakes and pools have some salts dissolved in them)

BULBS, FUSES, AND BREAKERS

Lightbulbs



1) Electrons flow in through the metal at the bottom of the bulb.

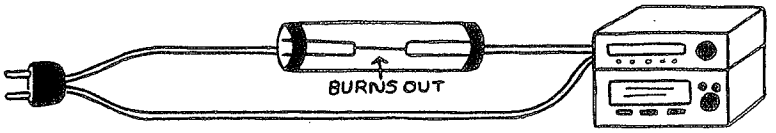
2) Electrons flow through the filament (thin, curly wire) which glows. Electrical energy is changed into light energy.

3) Electricity flows out through the metal bump at the very bottom of the bulb.

4) The air inside the glass bulb has been taken out at the factory and replaced with a gas called argon. This will stop the filament from burning up so quickly.

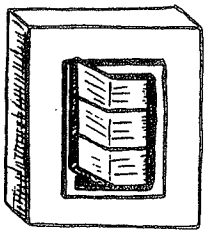
Fuse

A fuse is a safety device that prevents appliances from being ruined when circuits are overloaded. A fuse is just a thin piece of wire that will burn up if a large electric current goes through it. When the fuse burns up the circuit is broken and the electricity will stop. The fuse will have to be replaced but the C.D. player will not be harmed.



Breaker

A breaker is also a safety device. They are mainly used to prevent circuits in houses and buildings from being overloaded.



If too many appliances are plugged into one socket at the same time, the wires could become overloaded and start a fire. To stop this, a breaker has been put into the circuit that will flip off and "break" the circuit if the current is too strong. Once some of the appliances have been unplugged, the breaker can be flipped back on. This is much easier than a fuse which must be replaced with a new one each time it burns out.

CURRENT ELECTRICITY AND CIRCUITS

1. Current Electricity

Current electricity is electricity that is moving or flowing in wires. Current electricity is much more useful than static electricity and is used to operate all of our electrical appliances. Current electricity always moves in circuits. Everyday examples of current electricity are:

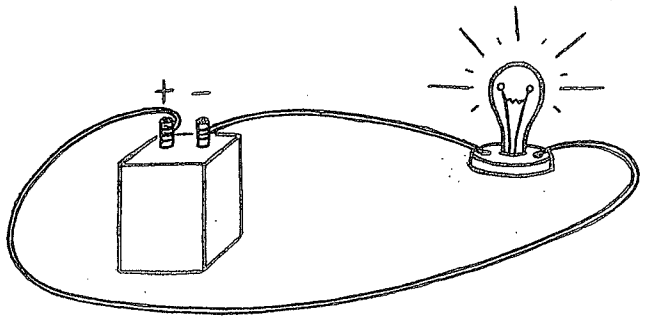
1) electricity used to make a lightbulb shine
2) electricity used to start a vehicle
3) electricity used to run a stereo system.

2. What Are Circuits

A circuit is an unbroken pathway along which electrons can flow. (Circuit comes from the word "circle") If there is a break in the pathway, the electricity will stop.

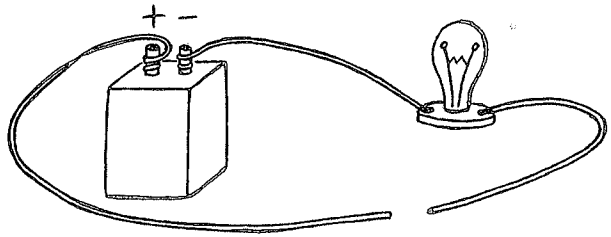
Complete Circuit

The electrical current flows in a complete circle. It flows from the battery, through the light, and back to the battery - a complete circuit.



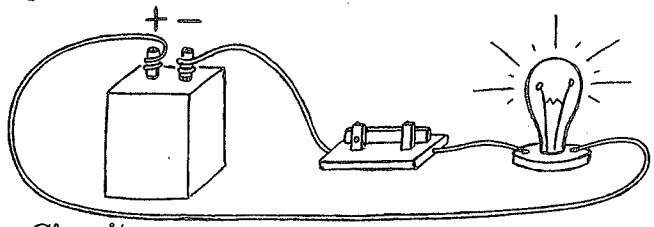
Incomplete Circuit

The path for the electricity to flow has been broken. The electricity will stop and the bulb will not light.



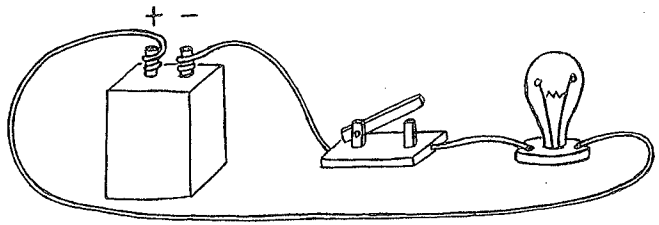
Closed Circuit

A closed circuit is an example of a complete circuit except that a switch has been added. When the switch is closed, the current flows from the battery, through the closed switch, through the light and back to the battery.



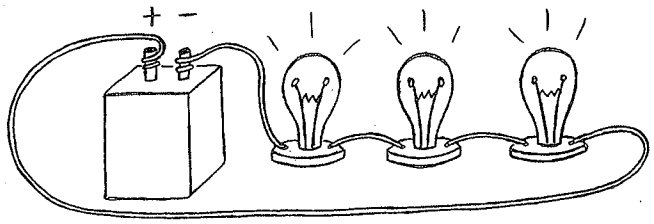
Open Circuit

In this case the switch is open and the circuit is incomplete. The electricity will stop and the bulb will not light.



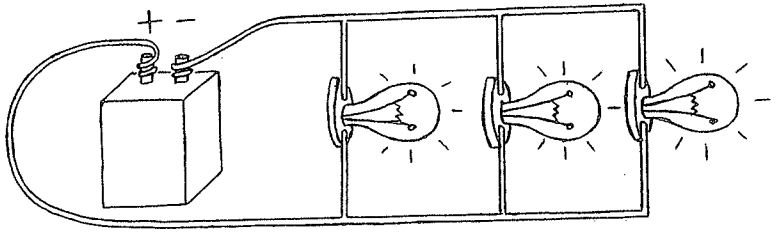
Series Circuit

If there are two or more lights hooked together, one after the other like a train, they are in series. The main problem in a series circuit is that if one of the bulbs burns out, the circuit will be incomplete and the rest of the lights will go out. Series circuits can also be overloaded easily which can lead to wires melting and fires.



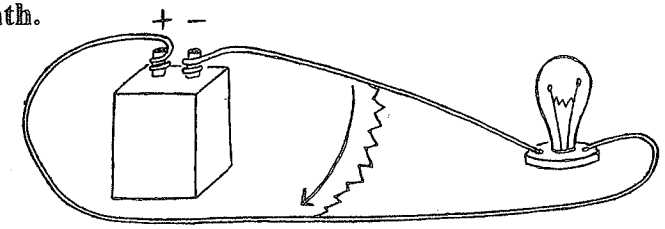
Parallel Circuit

Parallel circuits have all the bulbs connected directly to the power source. All the bulbs will turn on at the same time but if one bulb goes out the others will stay lit. This is a safer way of wiring and is used in all new houses.



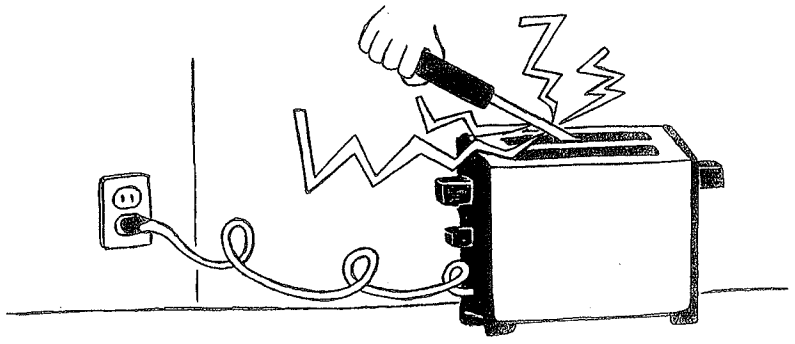
Short Circuit

There is a pathway added to the circuit that lets the electricity take a "short-cut" without going through the light. Electricity will always take the easiest path (just like a student) A short circuit will ruim the battery very quickly and the light will not go on since the electricity takes the easier path.



*** Note *** Death By Short Circuit

Electricity will always take the easiest path or the short circuit. When a person decides to fix an appliance without turning off the electricity first or unplugging it, they risk becoming the pathway for a short circuit. A severe shock or even death can be the result. (Contrary to popular belief this is not how "perms" were invemted)



ELECTRICITY CROSSWORD

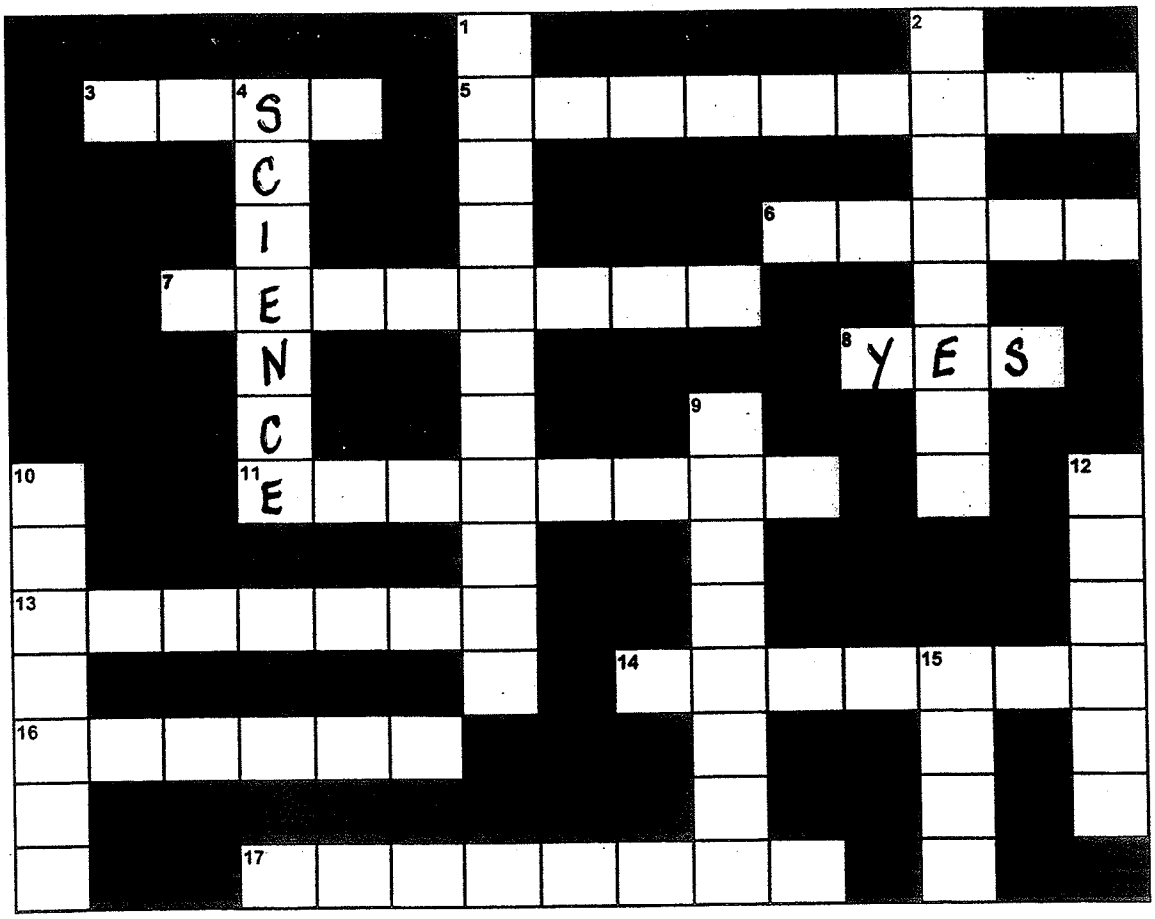
NAME: _____

Across

3. This device will burn out before an appliance is ruined.
5. Static electricity created by friction in the clouds.
6. When a large buildup of electrons "jumps" you get this.
7. Electrons have this type of charge.
8. Is science fantastic?
11. Lightest, mobile part of the atom.
13. Electricity that flows in wires is called _____ electricity.
14. Opposite charges do this.
16. Inventor of the lightbulb.
17. This is the type of wiring found in houses.

Down

1. A kind of energy that you cannot see, hear or touch.
2. The thin, curly wire that glows in a lightbulb.
9. Objects that have lost electrons have this type of charge.
10. Central, heavy part of the atom.
12. Electricity that is created by friction is called _____ electricity.
15. Basic building block of matter.



REVIEW QUESTIONS

NAME: _____

All questions must be answered in full sentences (A.I.F.S.) unless it says to list the answer.

1. List three things that can tell you if static electricity is present.

   1) _____

   2) _____

   3) _____

2. Explain how static electricity is made.

   _____

   _____

   _____

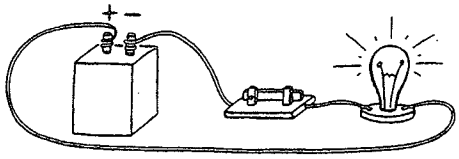
3. Explain two differences between current electricity and static electricity.

   _____

   _____

   _____

4. Label each type of circuit.



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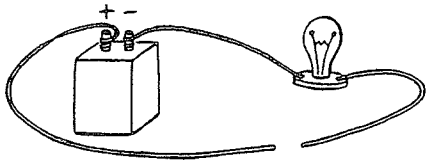

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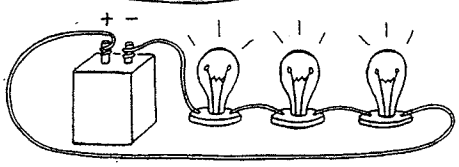
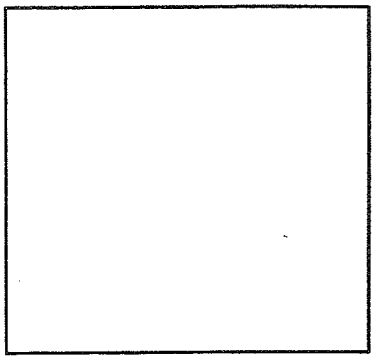


_____

5. Explain how a short circuit works. (Draw a picture to help explain your answer)

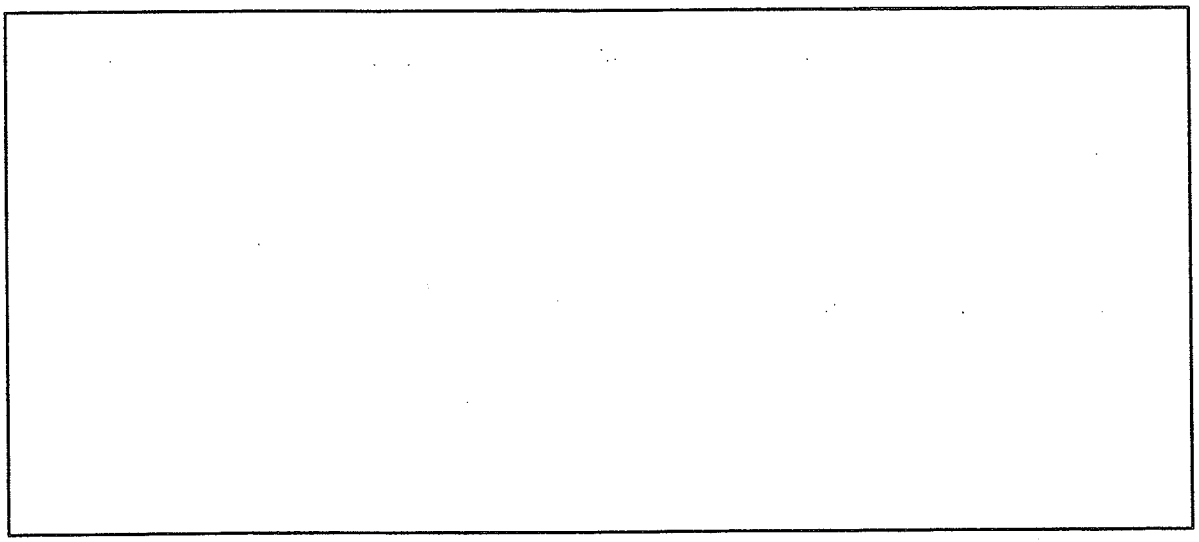


6. List two reasons why parallel wiring is used in houses instead of series wiring.

1) _____

2) _____

7. Draw three lightbulbs and a battery connected in a parallel circuit.



8. Explain how conductors and insulators are different.

_____

_____

_____

9. Beside each substance, put a "C" if it is a conductor or an "I" if it is an insulator.

a) Copper ____

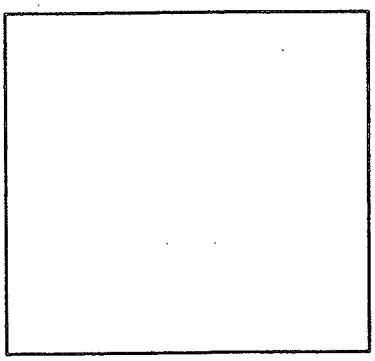
b) Glass ____

c) Rubber ____

d) Nickel ____

e) Ocean Water ____

10. Explain how a fuse works. (Draw a picture to help you explain your answer)



11. Explain what weather conditions help lightning to form.

12. What was Thomas Edison's main problem in inventing the lightbulb and how did he solve this problem?