

CLASS NOTES---

Atom

An atom is the smallest particle characterizing an element. All matter in the universe is made up of a combination of different atoms. Atoms are made up of protons, neutrons and electrons.

Electrical charge

An electrical charge is produced when an atom loses or gains an electron. When there are more electrons than protons, the charge is negative. When there are fewer electrons than protons, the charge is positive. The unit of electrical charge is the coulomb (symbol: C).

Electrical current

An electrical current is the movement of negative electrical charges (electrons) through a conductor (electrical wire, metal foil, etc.). In an electrical circuit, the current flows from the point where the electrical potential is highest to the point where it is lowest.

Electrical circuit

An electrical circuit is the complete loop through which an electrical current flows. It is made up of a series of electrical components and conductors (e.g., batteries, electrical wires, light bulbs, etc.). The current only flows in an electrical circuit when the path is completely closed, forming a loop.

Types of electrical circuit

There are two types of electrical circuit, parallel circuits and series circuits. Parallel circuits provide several different paths for the electrical current. Series circuits force the current through a single path; in other words, the electricity flows through all the electrical components of a series circuit one after the other.

Conductors of electricity

Conductors are bodies or materials that allow an electrical current to pass through them. Copper, aluminum, brass, zinc, iron and pewter are examples of metal that conduct electricity well. Salt water is also a good conductor.

Resistance

Resistance is the part of an electrical circuit that resists the flow of electricity (for example, by transforming it into heat or light, as in a light bulb or a buzzer).

In an electrical circuit, the presence of a resistor limits the current and prevents damage related to short circuits. The unit used to measure resistance is the ohm (symbol: Ω).

Ampere

The ampere (symbol: A) is the unit used to measure current intensity.

Voltage

Voltage (symbol: V) is the unit used to measure electrical tension, also called “difference of electrical potential.”

Short circuit

A short circuit occurs when two live (i.e., carrying current) conductors accidentally come into contact, either directly or through a conducting object (e.g., when the blade of an electric lawn mower cuts the electrical wire). When this happens, the current can flow with very little restriction because the resistance of the loop formed by the two conductors is very weak. The high amount of current heats up the wires and can cause a fire. Fuses and circuit breakers detect unusually high currents and break the circuit, which helps to prevent fires.

Battery

Batteries are reserves of chemical energy that can be transformed into electrical energy. Small electric cells (commonly called batteries, as in AA batteries) are examples of simple batteries for everyday use.

Insulator

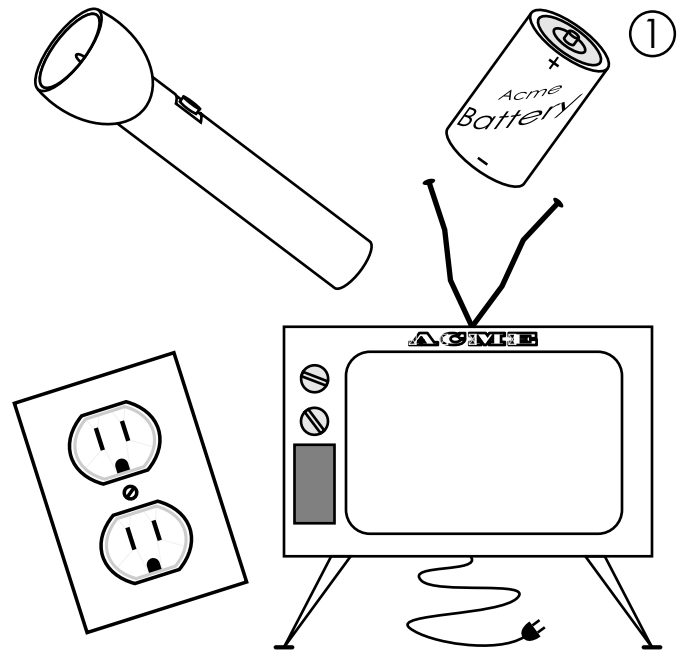
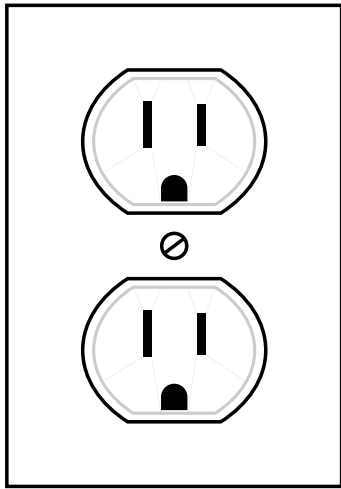
Insulators, such as wood and plastic, are materials that do not easily transmit heat, cold or electricity. Electrical wires are covered with an insulator to prevent electrical shocks and short circuits that could cause fires.

People

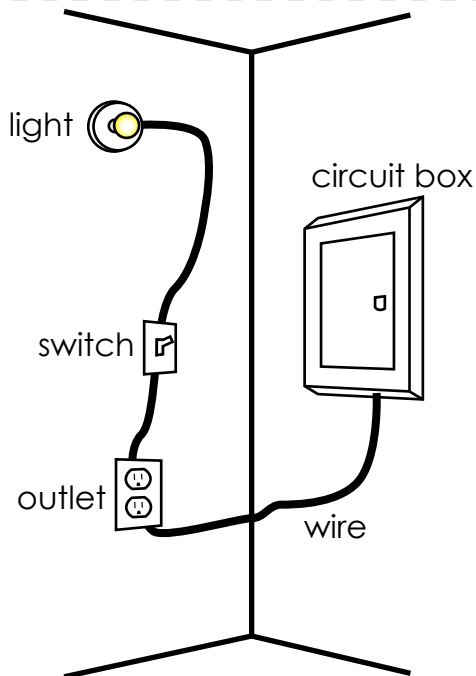
Thomas Alva Edison (1847-1931), a U.S. inventor who designed the first electric light bulb. He also invented many other devices, including the phonograph, ancestor of the gramophone.

Alessandro Volta (1745-1827), an Italian physicist, invented the first electric battery.

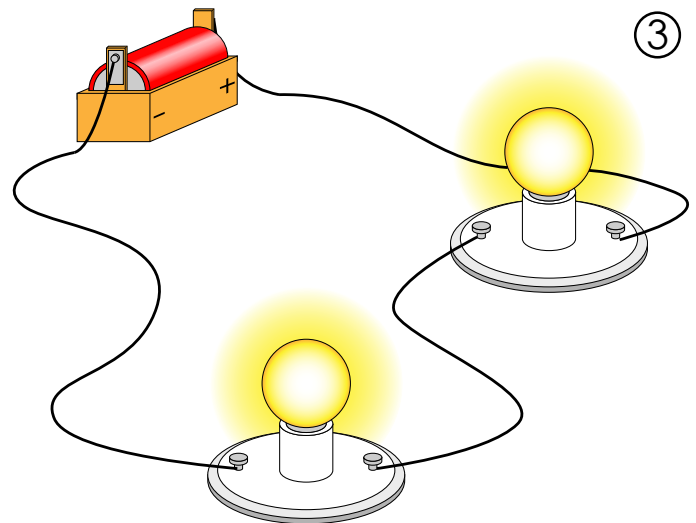
CURRENT ELECTRICITY



Electricity from the wall outlets in your house powers your television, computer, lights, and microwave. Cell phones, flashlights, and even a car's headlights are powered by the electricity in batteries.

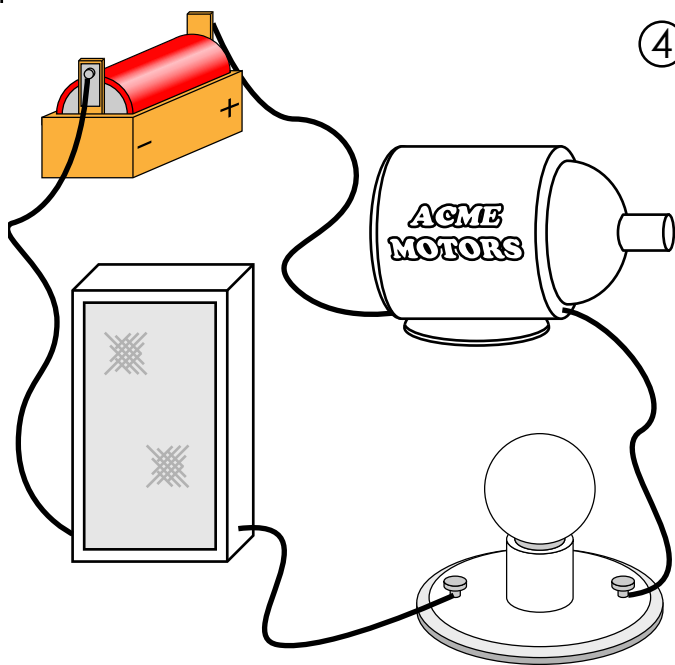


The type of electricity that is used to power things we use is called *current electricity*. Current electricity is electricity that flows through wires. The path that electricity follows is called a *circuit*.



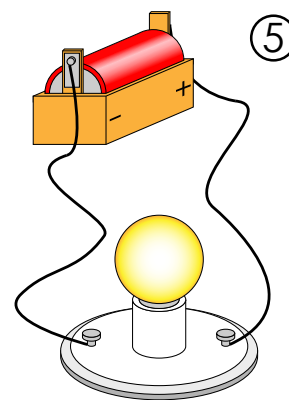
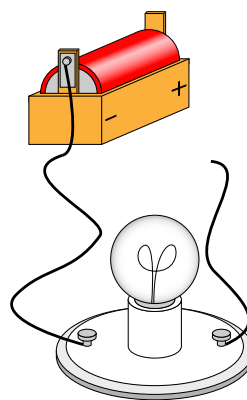
The picture above shows a circuit. Electricity flows from the negative side of a battery, through the wires, and lights the bulb. The electricity continues to travel around to the positive side of the battery.

Draw arrows on the picture to show the path of the electricity.



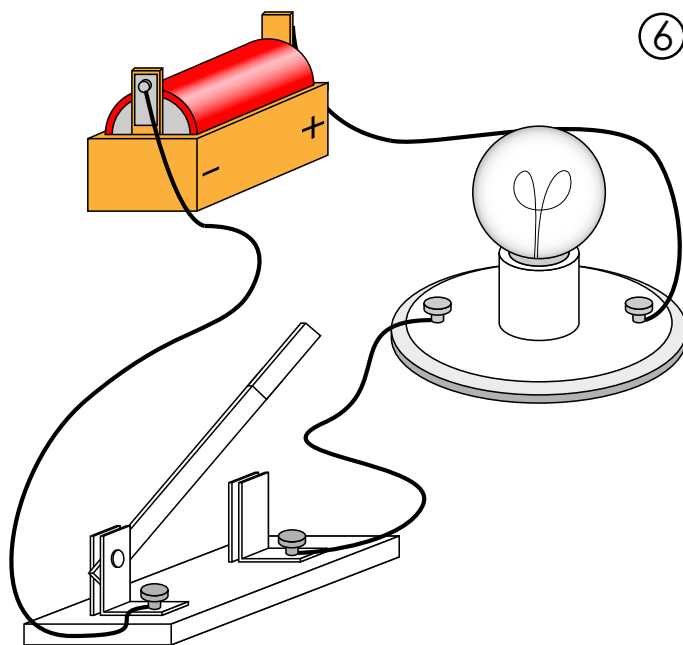
Something that uses some of the electricity in a circuit is called a *resistor*. Resistors could also be things like light bulbs, motors or speakers.

Color the resistors in the circuit above.



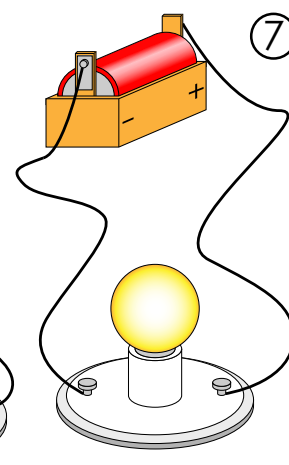
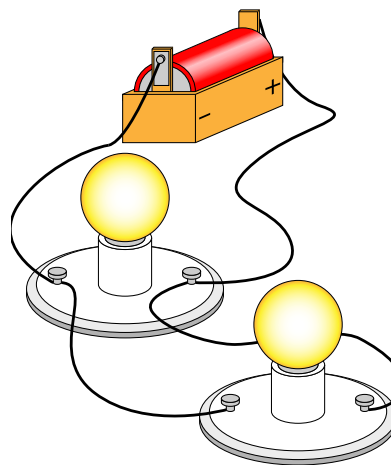
A circuit can be *open* or *closed*. When a circuit is closed, it is complete and there is no break in the path that the charges must follow. When a circuit is open, it is incomplete and charges can't flow through.

Label the two circuits above with the words "open circuit" and "closed circuit."



A *switch* is sometimes added to a circuit. The switch opens and closes a circuit to turn resistors on and off.

Color the switch in the circuit above.



In a *series circuit*, electricity can follow only one path. In a *parallel circuit*, electricity has more than one path to follow.

Label the two circuits above with the words "series circuit" or "parallel circuit."

Name: _____

Electricity

Choose the best answer for each question. Write the letter on the line.

- _____ 1. What supplies energy in an electric circuit?
- a. a conductor
 - b. light bulb
 - c. a wire
 - d. a battery

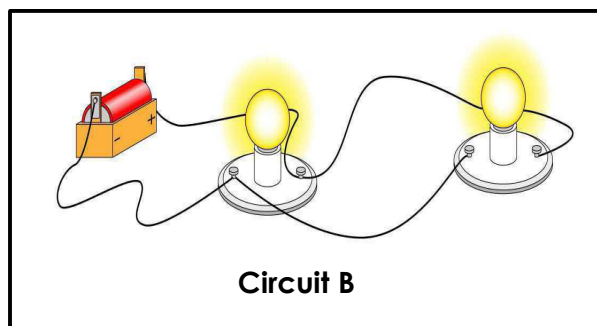
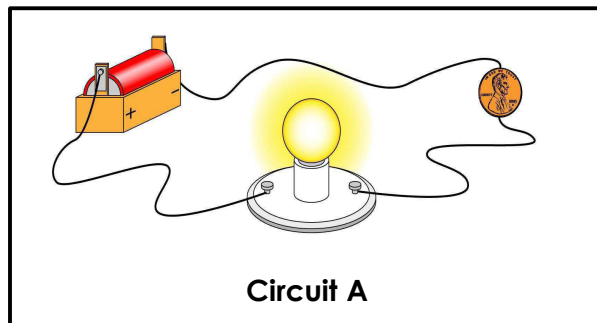
- _____ 2. Which material is a conductor?
- a. plastic
 - b. silver
 - c. glass
 - d. wood

- _____ 3. Which type of circuit is Circuit A?
- a. series
 - b. parallel
 - c. perpendicular
 - d. current

- _____ 4. Which item is a resistor in Circuit B?
- a. light bulb
 - b. wire
 - c. battery
 - d. screws

- _____ 5. Why did the person who made Circuit A probably connect the wires to a penny?
- a. They needed to use a penny to make the bulb light.
 - b. They were testing to see if the penny conducts electricity.
 - c. They used the penny to supply extra power.
 - d. The penny will prevent sparks.

- _____ 6. Which of these could be used as a resistor in a circuit?
- a. a pencil
 - b. a gas engine
 - c. a rubber eraser
 - d. an electric motor



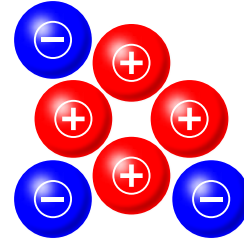
Electrical Charges

If an object has more positive charges (⊕) than negative charges (⊖), its electrical charge is positive (⊕).

If an object has more negative charges (⊖) than positive charges (⊕), its electrical charge is negative (⊖).

If an object has the same number of positive (⊕) and negative (⊖) charges, it has no electrical charge or is neutral.

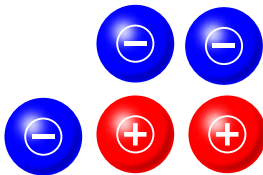
Example:



Electrical charge: **positive charge**

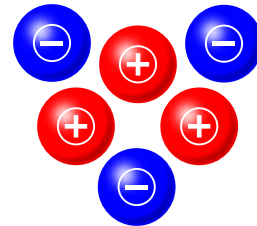
Count the positive and negative charges in each picture. Write positive charge, negative charge, or no charge on each line.

1.



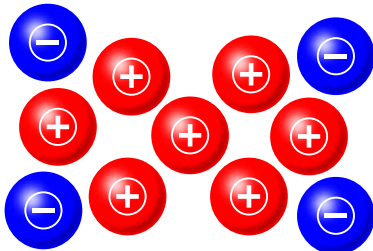
electrical charge: _____

2.



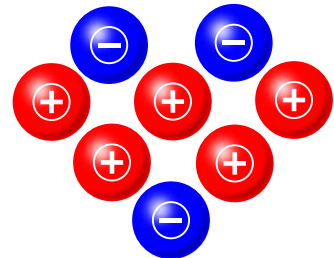
electrical charge: _____

3.



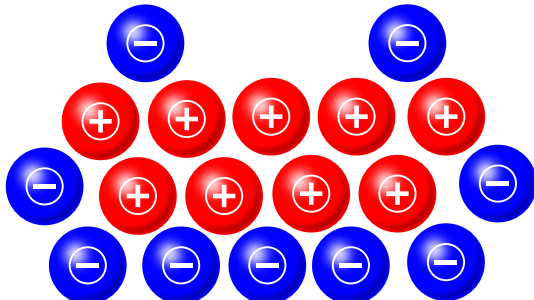
electrical charge: _____

4.



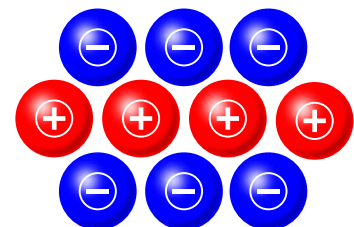
electrical charge: _____

5.



electrical charge: _____

6.

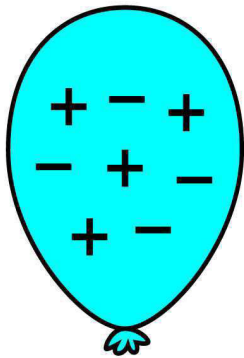


electrical charge: _____

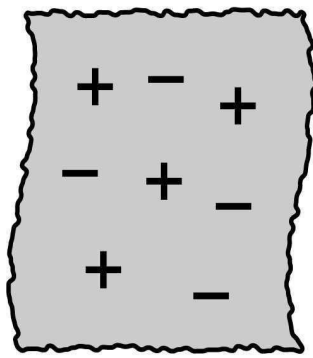
Static Electricity

Rubbing a balloon with wool cloth will create static electricity charges.

This balloon has **not** been rubbed with the wool cloth.



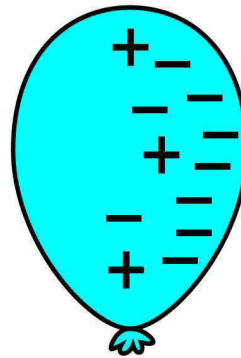
balloon



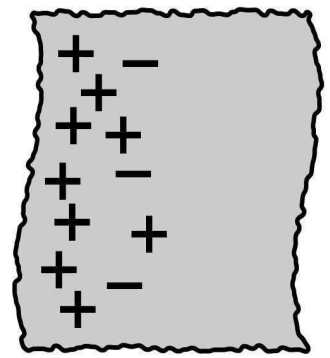
wool cloth

Picture 1

This balloon **has** been rubbed with the wool cloth.



balloon



wool cloth

Picture 2

In Picture 1, does the balloon have a positive charge, negative charge, or no charge? _____

In Picture 1, does the cloth have a positive charge, negative charge, or no charge? _____

In Picture 2, does the balloon have a positive charge, negative charge, or no charge? _____

In Picture 2, does the cloth have a positive charge, negative charge, or no charge? _____

If you place small pieces of tissue paper near the balloon in Picture 2, they would probably stick to the balloon. Explain why.
