Electricity Study Guide

Static Electricity

*When two insulators rub against each other, electrical charges may move from one object to the other. This creates a difference in charge that is known as **static electricity**.*

When objects rub against each other, there is a force between them called **friction**. Friction can cause charges to move from one object to the other. These charges behave somewhat like magnets. Particles with opposite charges attract one another, while particles with like charges repel one another.

Oppositely Charged Particles Attract One Another	Particles with Like Charges Repel One Another
Objects with opposite electrical charges are pulled toward one another, even though the objects may be separated by some distance. In fact, the charged objects can pull any material that has either no charge or the opposite charge. For example, if a glass rod is given an electric charge by rubbing the rod with silk fabric, the rod can be used to pick up pieces of paper without touching the paper.	Electrically charged objects push away any material that has the same charge. One example of static electricity pushing objects away from each other can be seen when a balloon is rubbed against hair. As the balloon becomes negatively charged, the hairs become positively charged. The hairs are pulled toward the balloon, but they are pushed away by one another. The electrically charged hairs will appear to stand up so that they can get as far away from each other as possible.

Human-Harnessed Electricity

Electricity is made at a generating station by huge generators. Some of the most environmentally friendly methods of generating electricity are hydroelectric plants and wind farms, which use moving water or air to rotate turbines which generate electricity.

Electrical Conductors & Insulators

Electrical energy results from the movement of charged particles, such as electrons.

Conductors	Insulators
In a material that conducts electricity, charged particles(electrons) are able to flow easily. Most metals are very good **conductors**. This is why electrical wires are made out of metals, including copper. Common materials that are electrical conductors include: **metal wires, coins, staples, paper clips, iron nails**	In an electrical **insulator**, charged particles (electrons) cannot move well. So electrical energy does not flow easily through the material. Common electrical insulators include: **plastic, wood, glass, rubber, fabric, paper**

Conductivity can be Tested Using Circuits

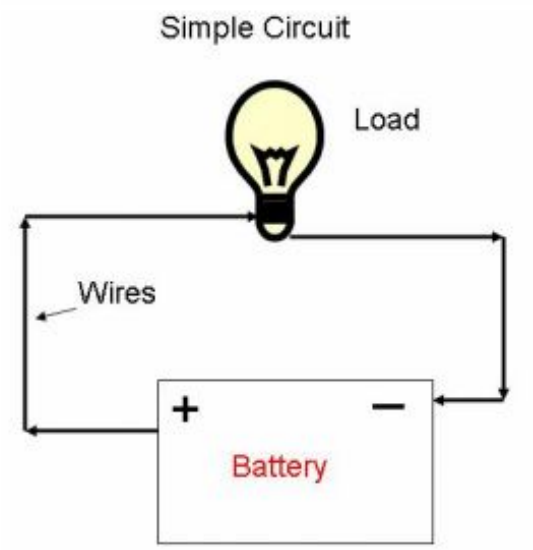
Click on the link to practice building circuits and testing materials for conductivity.

https://phet.colorado.edu/sims/html/circuit-construction-kit-dc/latest/circuit-construction-kit-dc_en.html

Electric Circuits

*A continuous flow of negatively charged particles is an **electric current**. The pathway taken by an electric current is called a **circuit**.*

Electrical circuits must run in complete **loops**. When a circuit's loop is complete, the circuit is called a **closed** circuit. Closed circuits allow the movement of electrical energy. If a circuit's loop is not complete for any reason, then it is called an **open** circuit. Open circuits prevent the movement of electrical energy. Electrically charged particles flow through a circuit as a *current*.



3 Parts of a Circuit		
Energy source— Every circuit must have a source of electrical energy, such as a battery, which pushes the electric current around the circuit.	**Wire**— Every circuit must have a material that connects the parts of the circuit together and carries electric current. Often, this material is metal wire wrapped in a coating of plastic or rubber.	**Load**— The load, or receiver, can be a light bulb, appliance, or any other device that changes electrical energy to another kind of energy (such as light, heat, motion, or sound). Symbols for loads vary, and many devices have their own symbols.

***Switch** (optional)— Circuits usually have switches. The switch completes the circuit and allows current to flow if closed but prevents current from flowing if open. Sometimes, the switch is not shown in circuit diagrams.

The video below shows how current flows through a circuit. In the video, a headlamp is removed from a motorcycle and connected to a battery. In this circuit, the load (the headlamp) is connected to the energy source (the battery) by wires. There is no switch or fuse present in this circuit.

https://cdn.studyisland.com/content/itn/media/cVid_20.mp4

Energy Transfer Through Circuits

Electrical energy can be transferred through circuits. Energy transfer is shown when the receiver (such as a fan, a lightbulb, or a motor), the energy source (battery), and the means of transfer (wires) are connected, and the receiver moves or lights up. This proves that energy is flowing through the circuit and reaching the receiver.

When electrical energy is transferred through a circuit, the energy can be transformed into other forms of energy. The following are some examples of the transformation of electrical energy into other kinds of energy:

- A lamp transforms electrical energy to light energy.
- A fan transforms electrical energy to energy of motion.
- A radio transforms electrical energy to sound energy.