

Science Benchmark: 05: 04

Electricity is a form of energy. Current electricity can be generated and transmitted through pathways. Some materials are capable of carrying electricity more effectively than other materials. Static electricity is a result of objects being electrically charged. Without touching them, materials that are electrically charged may either push or pull other charged materials.

Standard 04: Students will understand features of static and current electricity.

Shared Reading Shocking News!



Scientists and inventors have long been fascinated by what electricity can do. Thomas Edison was a determined inventor who experimented for many years to make electricity work for us. When asked about his many unsuccessful attempts to refine the light bulb, Edison said, “I have not failed. I have just found 10,000 ways that will not work.” He invented or improved devices such as the light bulb, phonograph telegraph and a talking doll. Electrical energy is used in hundreds of ways all around us every day. Understanding electricity helps us use it wisely and safely.

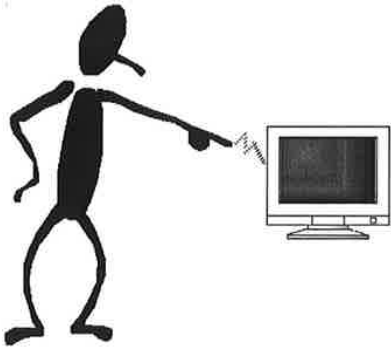
Static Electricity is the collection of electrical energy (charge) in one spot. We know a static charge has collected when it moves or discharges. During a discharge, static electricity is changed to current electricity. When you touch a doorknob after dragging your feet across the carpet, you will see and hear the discharge of static electricity as it travels as current electricity. Have you ever experienced a little shock? Although it is far more powerful, a lightning bolt is an example of the same type of electrical discharge.

Before we see a lightning bolt strike, static electricity charges are building in the clouds. The lightning bolt that you see is a discharge just like the one you see when you touch a doorknob, only much bigger. The lightning bolt is actually current electricity.



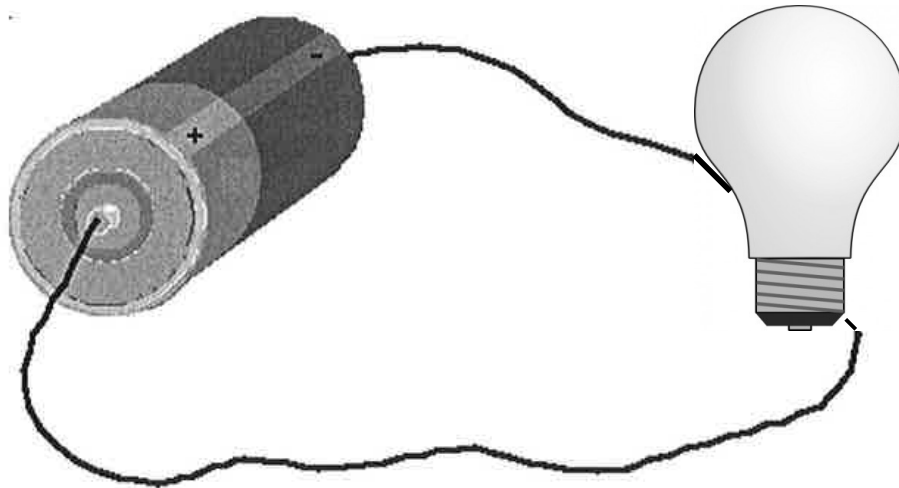
static electricity: the collection of electrical energy (charge) in one spot.

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Some things will produce a much greater static charge than others. Rabbit fur rubbed on a balloon will have a much greater charge than cotton fabric rubbed on the balloon. A wool sweater pulled over clean, dry hair will cause a greater static charge than a cotton sweater. Charges will collect more readily on a glass rod than on a metal rod. Objects charged with static electricity can *attract* or *repel* other objects. For example, when your hair is charged with static electricity, the hairs repel each other. Static electricity can also cause items to attract. When a sock sticks to your clothing because of static electricity, the socks and clothing are attracting each other. Plastic food wrap sticks to bowls of food because of static electricity.

Current electricity is a flow of electricity that is organized for our use. Current electricity requires a specific *pathway* to control the electricity and make a *complete circuit*. Current electricity cannot continue if there are any gaps in the flow. A battery, bulb, and wire connected together can make a simple complete circuit. If the wires are not connected properly it causes a gap. Electricity cannot flow through the gap so you have an *incomplete circuit*.



Complete Circuit

attract: to draw together

complete circuit: a connected pathway through which electricity can flow; includes a power source, load, and pathway

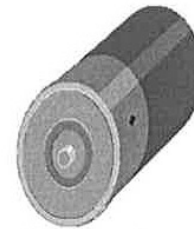
current: (electricity) flow of electricity along a path

incomplete circuit: a circuit with a gap through which electricity cannot flow

pathway: a course through which electricity can flow

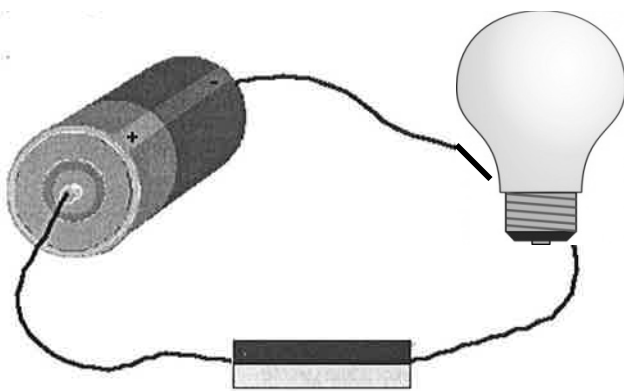
repel: to push apart

A *power source* is a device that supplies electricity to a circuit. The safest power source for you to use in a circuit is a *battery*. Other power sources could include a generator, a solar panel, or electricity from a wall outlet. **You should never experiment with electricity from a wall outlet.**

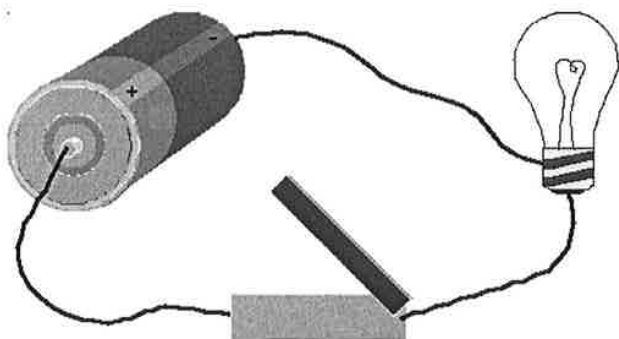


Any device that uses electricity is a *load*. A light bulb is one type of load. Other examples are fans, motors, computers, TVs, and can openers. How many more can you name?

These three basic parts, power source, pathway, and load, can be arranged to do many different things. However, organizing the current electricity to make a circuit work requires a lot of planning and effort. For example, using one battery, but adding two or more light bulbs will result in dimmer lights. Using just one light bulb, but adding two or more batteries will result in a brighter light. To turn a circuit on or off requires a *switch*. When we turn the lights on in our classroom the circuit is complete. With a flip of the switch the lights are off and the circuit is incomplete.



This is a complete circuit. The switch completes the pathway and the light is on.



Switch

This is an incomplete circuit. The switch is open so the pathway is not complete. The light is not on.

battery: a device that generates electricity by combining certain chemicals

load: an item that uses electricity to do work/ for example, a light bulb or fan

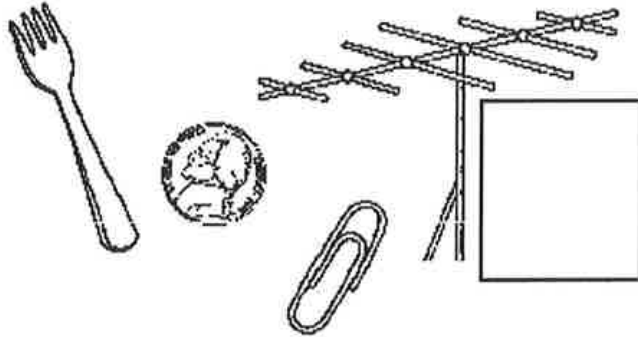
power source: a device that supplies electricity to a circuit; such as a battery, a solar cell, or a generator

switch: a device that immediately changes a circuit from complete to incomplete

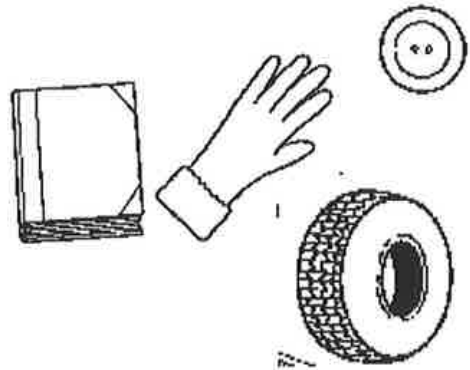
Current electricity flows more easily through some things than others. A *conductor* allows electricity to flow through it easily. Wires and the metal parts of a light bulb are good conductors. Pennies, keys and nails make good conductors, but conductors are not always metal. Some conductors are liquids and gases.

Insulators are things that don't allow electricity to pass through them. Plastic is an insulator. Wires are coated with plastic to keep the electricity from flowing to an unsafe place.

Conductors



Insulators



Electricity is an important part of life. Thanks to people like Thomas Edison we know many things about electricity. Investigating and experimenting can lead to more knowledge about electricity. What will you discover someday?

conductor: material that allows electricity to pass through easily
insulator: material that does not allow electricity to pass through

Science Language Students Need to Understand and Use

1. **attract:** to draw together
2. **battery:** a device that generates electricity by combining certain chemicals
3. **complete circuit:** a connected pathway through which electricity can flow; includes a power source, load, and pathway.
4. **conductor:** material that allows electricity to pass through easily
5. **current (electricity):** flow of electricity along a path
6. **incomplete circuit:** a circuit with a gap through which electricity cannot flow
7. **insulator:** material that does not allow electricity to pass through
8. **load:** an item that uses electricity to do work; for example, a light bulb or fan
9. **pathway:** a course through which electricity can flow
10. **power source:** a device that supplies electricity to a circuit; such as a battery, a solar cell, or a generator
11. **repel:** to push apart
12. **static electricity:** the collection of electrical energy (a charge) in one spot
13. **switch:** a device that immediately changes a circuit from complete to incomplete