



Charge It!

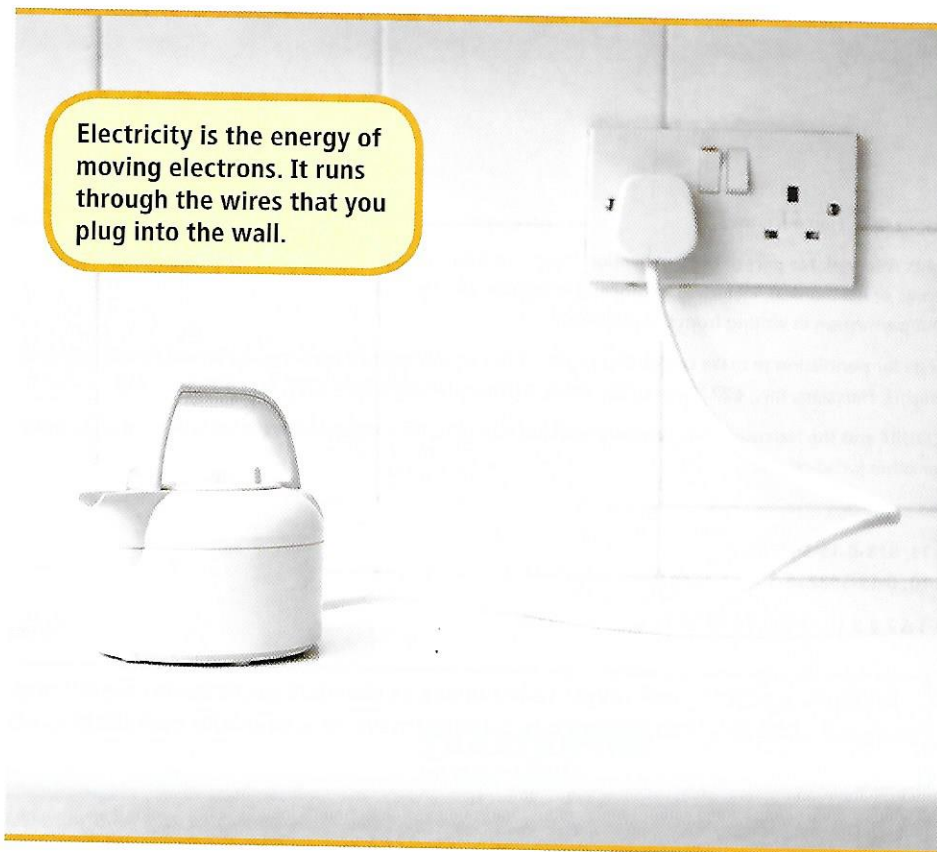
How Electricity Works

What Is Electricity?

You know what electricity does. When you flip on a switch, a light comes on. When you push a button, your computer turns on. Electricity also powers appliances such as washers, dryers, ovens, vacuum cleaners, televisions, and stereos. Electricity runs the traffic lights in the streets and the heating and cooling systems of many buildings and homes. You may know what electricity does, but do you know what electricity really is?

To understand electricity means you have to understand atoms. You may remember that an atom is the smallest unit of a substance that still has the properties of that substance. Atoms contain charged particles called protons and electrons. Protons have a positive charge. Electrons have a negative charge.

Electricity is the energy of moving electrons. It runs through the wires that you plug into the wall.

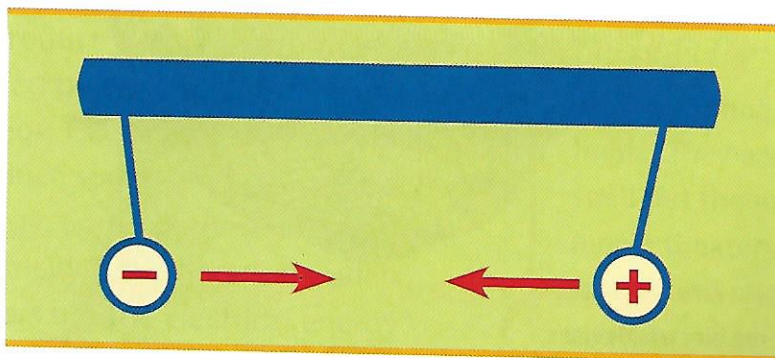
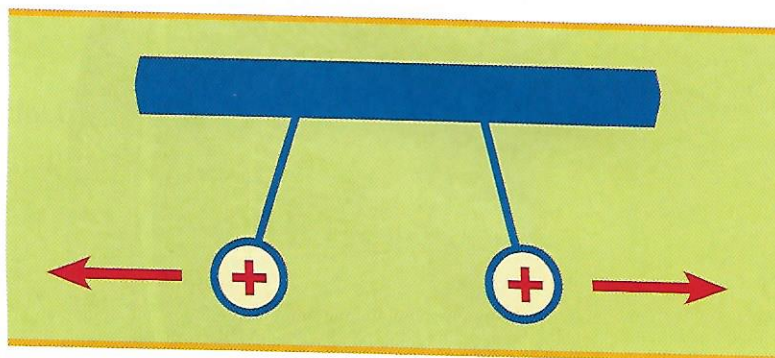


Atoms usually have the same number of protons and electrons. Sometimes atoms have more electrons than protons, and sometimes they have more protons than electrons. An atom with more electrons than protons has a negative charge. An atom with more protons than electrons has a positive charge.

Electrons move around the outside of the nucleus of an atom. Sometimes, these electrons move away from the atom. The movement of electrons away from an atom carries energy. This energy is electricity. **Electricity** is electrical energy carried by moving electrons.



MAIN IDEA AND DETAILS What is electricity? Explain.



When the number of protons and electrons is not equal, matter becomes charged. Like charges repel each other. Opposite charges attract each other.

Converting Electrical Energy

You know that electricity makes your toaster toast bread and your refrigerator keep things cold. Electrical energy can be converted, or changed, into other forms of energy. For example, lamps, street lights, and traffic lights convert electricity into light energy. Electrical energy can be changed into mechanical energy, too. Electricity is converted into mechanical energy through an electric motor. Electric motors are at work in fans, electric toys, and water fountains. They also produce motion in appliances and tools like blenders, mixers, and electric saws and drills.



Some electric devices, like this fan, produce motion when electrical energy is converted to mechanical energy.

This computer changes electrical energy into light energy (the screen), mechanical energy (playing the DVD), and sound energy (the sounds from the movie).



Electricity can also be changed to heat energy and sound energy. Toasters, electric ovens, hair dryers, and electric space heaters use electrical energy to produce heat. Some homes are heated by electricity, too. Radios, stereos, CD players, and doorbells all produce sound energy from electrical energy. Some of these devices use electricity from electrical outlets. Others use the electrical energy produced by batteries.



MAIN IDEA AND DETAILS

What are some other forms of energy that electrical energy can be converted into?

Fast Fact

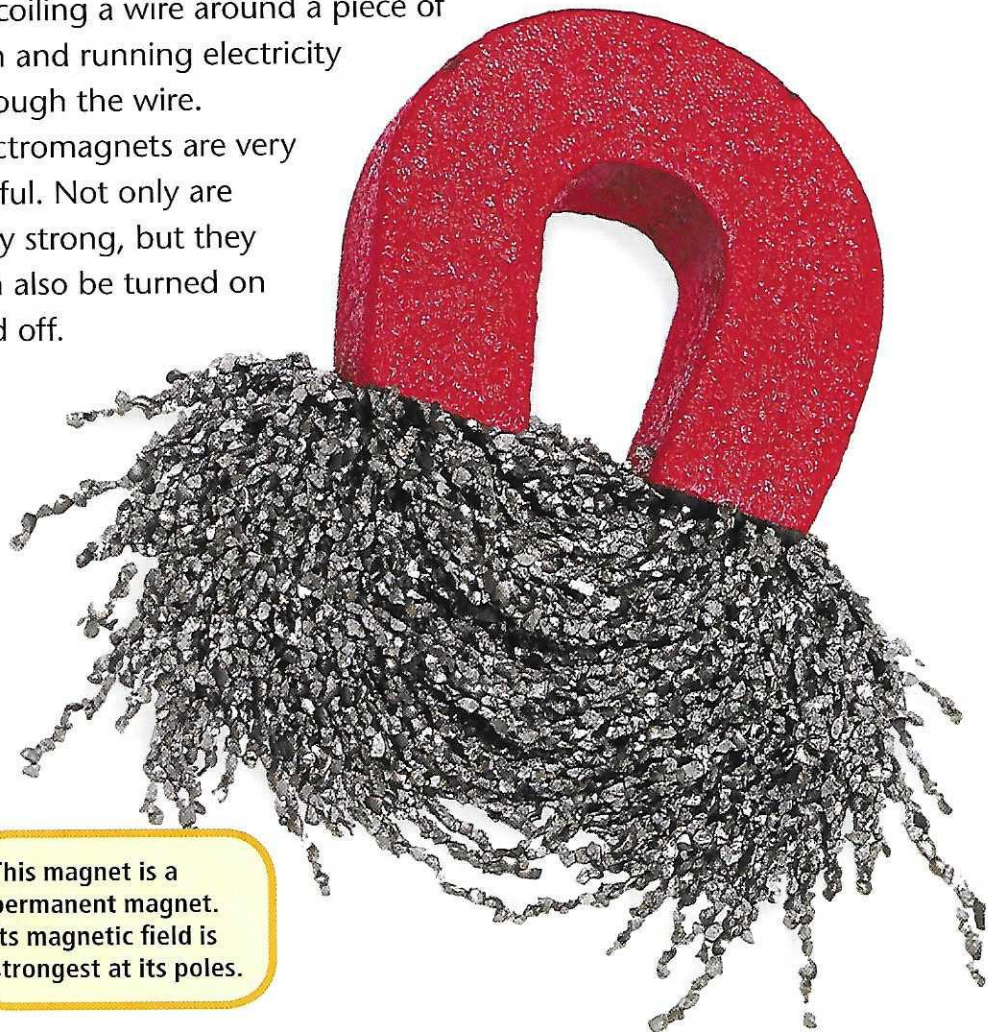
You've probably seen neon lights. They are used to spell out the names of movie theaters, stores, and restaurants. Neon lights contain gases, including neon. These gases glow when electricity flows through them.

Magnets and Electricity

A *magnet* is a material or device that attracts items containing iron or certain other metals. Magnets produce an area called a magnetic field. A magnetic field is a region of magnetic force around a material. Natural magnets come from a rock called magnetite. Magnetite is not very strong. Permanent magnets, which are made from metals like iron and steel, are usually stronger than magnetite.

Electrical energy can be used to produce magnets that are even stronger than permanent magnets. These magnets are called **electromagnets**. An electromagnet is a magnet made by coiling a wire around a piece of iron and running electricity through the wire.

Electromagnets are very useful. Not only are they strong, but they can also be turned on and off.



This magnet is a permanent magnet. Its magnetic field is strongest at its poles.