

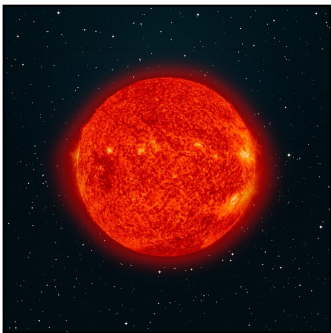
Energy Transfer and Electric Currents

Reflect

How many different appliances have you used today that plugged into an electrical socket? Any item that has a plug like this runs on electric current. Electric current is a steady flow of energy particles with an electrical charge. When the flow of energy runs through a device, the electrical current makes the appliance work.



When an appliance is turned on, the electrical energy can be transformed into other forms of energy. What did the electrical devices do today? Was there light or sound? Did something move? Was heat produced?



The Sun's light energy travels to Earth.

Energy can transfer from place to place and transform from one type to another. Light energy can travel through space from one place to another. You observe this energy movement when you grow plants in sunlight or when you lie in the grass and get warm on a sunny day. This is evidence that light and heat energy from the Sun are transferred to our planet through space.

What Do You Think?

What is happening to all the matter in the sky during a thunderstorm? Lightning is a naturally occurring jolt of electricity that flows between the clouds and ground. This flow of energy, in the form of electricity, creates light that we can see from miles away. Some of the electrical energy in a lightning bolt is changed to heat energy, which can burn the ground where it strikes. When lightning bolts crackle through the sky, they push air out of the way. When the air comes back together, we hear thunder. The thunder you hear during a storm is caused by the lightning that is transferring energy to all the air around it.



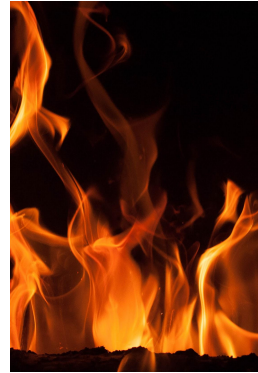
Lightning bolts light up the sky during a thunderstorm.

Energy Transfer and Electric Currents

Reflect

How can we use different energy forms?

Thermal energy: Thermal energy is the energy that can be felt as heat. Thermal energy is sometimes called *heat energy*. Using an oven to bake a cake or using fire to roast marshmallows are examples of using thermal energy. You can release thermal energy by rubbing your hands together very quickly or by burning something.



Light energy: Light energy can travel through empty space, air, and even some objects, such as windows. People can see some forms of light energy. To sense or detect other forms of light energy, we need special tools.



Sound energy: Sound energy travels through matter by vibrations. Sound energy cannot travel through empty space, like light energy can. Sometimes we can hear sound energy. Think about a television. You can see the light energy from the screen and hear the sound energy from the speakers.



Electrical energy travels through the wires of this toaster and generates thermal energy to toast the bread.

Electrical energy: Many household appliances, such as washing machines, refrigerators, and dishwashers, need electrical energy in order to work. In machines and things powered by electrical energy, the electricity moves along a path called a *circuit*. Electrical energy is often used to generate other forms of energy. Look at the toaster. When you turn it on, what happens? The electrical energy moves through the wires and heats up the toaster to cook your food.

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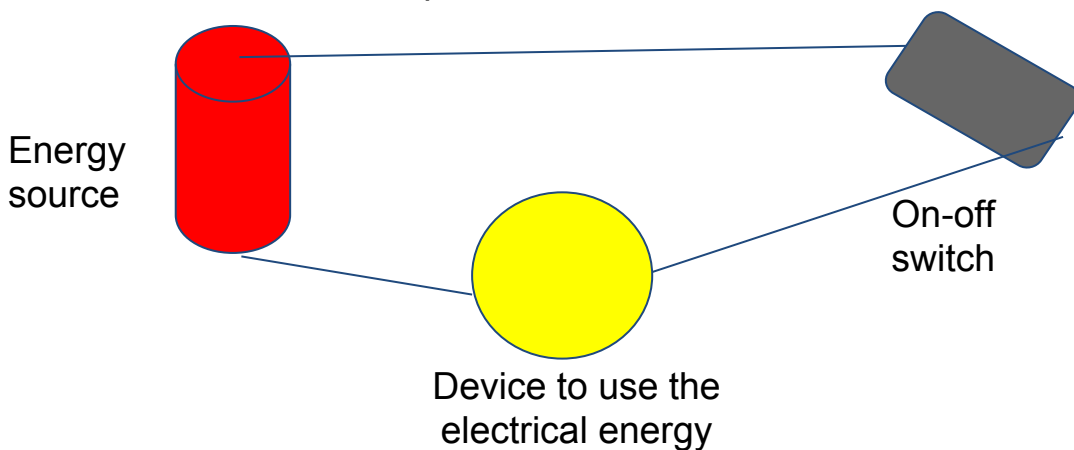
What Do You Think?

What is a circuit?

Take a look at the plug on the end of an electrical cord. Notice that it has at least two metal prongs. One prong is part of a wire that brings energy into the electrical device. The other prong is connected to a wire that carries energy out of the device. The wire is metal because it easily carries the electrical current. The wire is wrapped in plastic or rubber so the electricity doesn't leave the wire in the wrong place.



For electricity to be useful, it must always travel in a complete, unbroken circle. That circle is called an *electrical circuit*. A circuit has several basic parts. It has a source of electrical power and something that uses the electrical power. It also has at least two wires to connect the source to the device. Most circuits also include a switch. The switch controls whether the circuit is open (off) or closed (on). Broken wires or bad connections can also cause an open circuit.



The city power grid is a very large electrical circuit. The power source is usually an electrical power plant. Electrical energy does not flow in an open circuit. If something goes wrong, the city power grid may become an open circuit. How might the city's circuit be opened? What would happen to the city and its residents if this happened?



Each building in a city gets its electricity from the city's power grid.

Energy Transfer and Electric Currents

What happens to electrical energy when it enters a device?

Look at the different devices or appliances below. They all use electrical energy to work correctly. The electricity then gets transformed into other types of energy. What forms of energy are being released by the different devices? Are they releasing light, sound, heat, or motion? Discuss with a partner. Each device may release more than one form of energy!



Try Now

The diagram shows one or more complete circuits. It also shows one or more incomplete circuits. The diagram also includes four light bulbs. Circle the bulbs that will light up when electric current flows from the battery.

Hint: Do you think rubber transfers electrical energy well?

