

Inspect

Read the passage *Electromagnets and Generators*. Underline the text that tells about the simplest form of an electromagnet.

Find Evidence

Reread the third paragraph. Highlight text evidence that tells you how electromagnets and electric motors work to make a wheel spin.

Notes

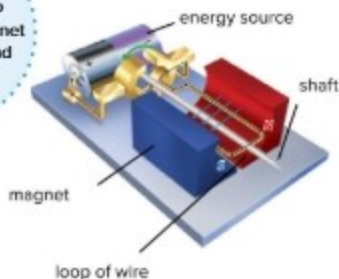
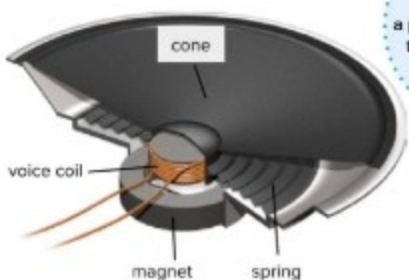
Electromagnets and Generators

Electricity and magnetism are related. When charged particles move, they form magnetic fields, which means we can use electric current to make magnets. An electromagnet is an electric circuit that produces a magnetic field.

The most uncomplicated electromagnet is a straight wire. A magnetic field circles the wire when current is flowing through the wire. The more current, the stronger the magnetic field. You can also increase the magnetic field by looping the wire or adding an iron core.

Electromagnets must be part of a circuit in order to work. This means that they can be turned on and off with a switch. The ability to turn them on and off makes electromagnets useful in many devices. Voice coils are electromagnets that are used in audio speakers. The coil uses the magnets to make vibrations, which produces sound waves in the air. Electric motors also use electromagnets. Simple electric motors have a power source that produces electric current that runs through the wire loop, making it an electromagnet. They have a magnet that pushes and pulls on the electromagnet, causing the loop and shaft to spin. The shaft is usually attached to a gear or wheel.

The voice coil vibrates next to a permanent magnet to produce sound in a speaker.



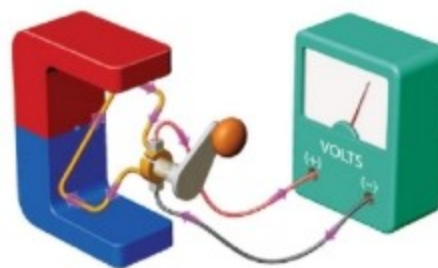
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A motor uses electricity and magnetism to produce motion. Motion and magnetism can also be used to produce electricity. If you turn the axle of a motor by hand, you are rotating a wire coil in a magnetic field. This produces electric current in the wire. Using the motor to produce electricity instead of motion makes it a generator. Power plants use very large generators to produce electricity. That electricity travels through power lines to the electrical circuits in homes and businesses. Like batteries, generators are a voltage source.

How are the energy transformations in electric motors and generators related?

A simple generator has a metal coil in a magnetic field. As the coil rotates, a magnetic field is produced.

Power plants must use some other form of energy to cause the motion that spins the coil in a generator.



Revisit the Page Keeley Science Probe on page 43.

Make Connections

Talk About It

Talk with a partner about how electric motors and generators are related.

GO ONLINE Watch the video *How a Generator Works* to learn how energy of motion is transformed into electrical energy.

Notes