

Make an Electromagnet

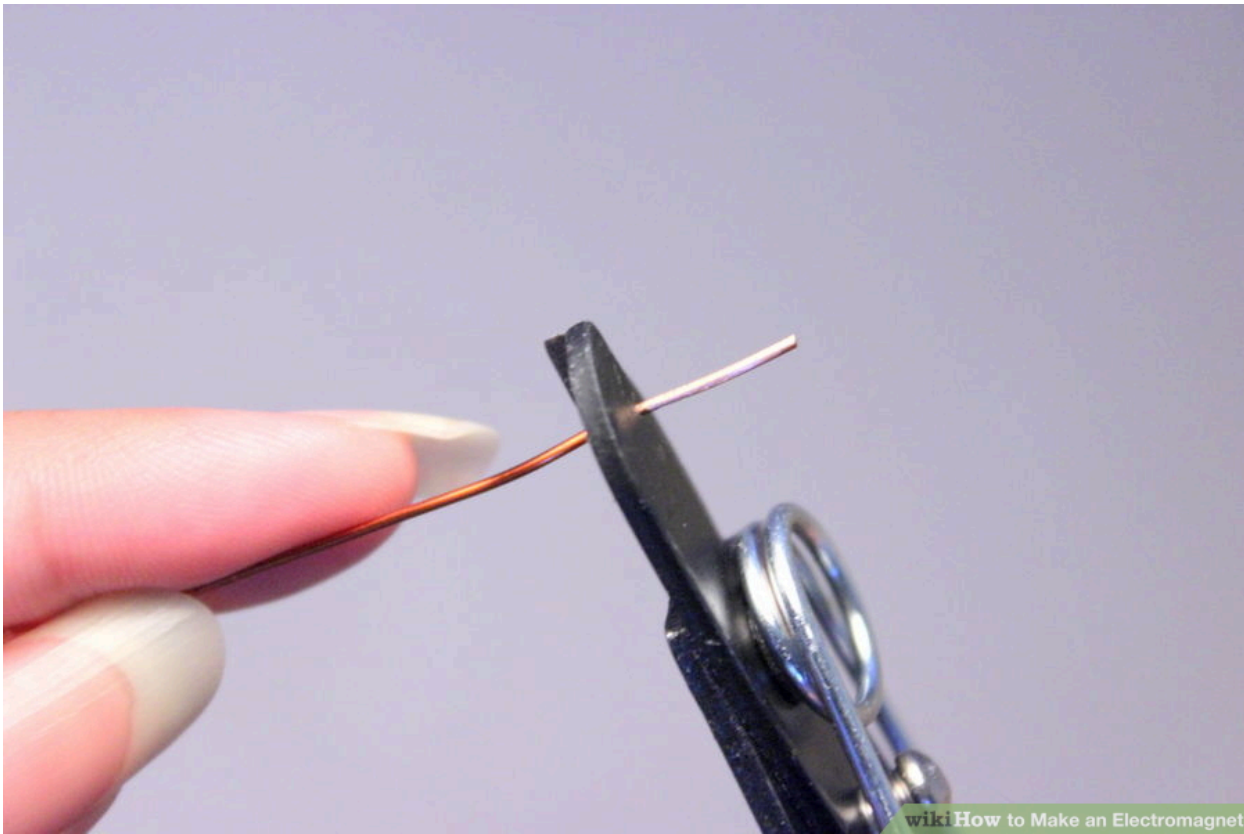
ENERGY from ELECTROMAGNETS

Magnetic fields are produced when all the electrons in a metal object are spinning in the same direction, either as a natural phenomenon, in an artificially created magnet, or when they are induced to do so by an electromagnetic field.



Get magnet supplies. To make an electromagnet, an electric current is run through a piece of metal, which creates a magnetic field. To make a simple electromagnet, then, you'll need a source of electricity, a conductor, and metal. Look around the house or check out the hardware store to get the following supplies:

- A large iron nail
- 3 feet (0.9 m) of thin coated copper wire
- A D-cell battery
- Small magnetic objects, like paperclips or pins
- Wire strippers
- Masking tape
- Small bowl made of plastic or wood



Strip insulation from the ends of the wire. In order for the wire to effectively conduct electricity, its ends must be stripped of their protective insulation. The stripped ends will be wrapped around the two ends of the battery. Use the wire strippers to remove a few centimeters of insulation from either end of the copper wire.



Set up your supplies in a small bowl made of plastic or wood. It's a good idea to contain the energy you're working with in a bowl that won't conduct electricity.



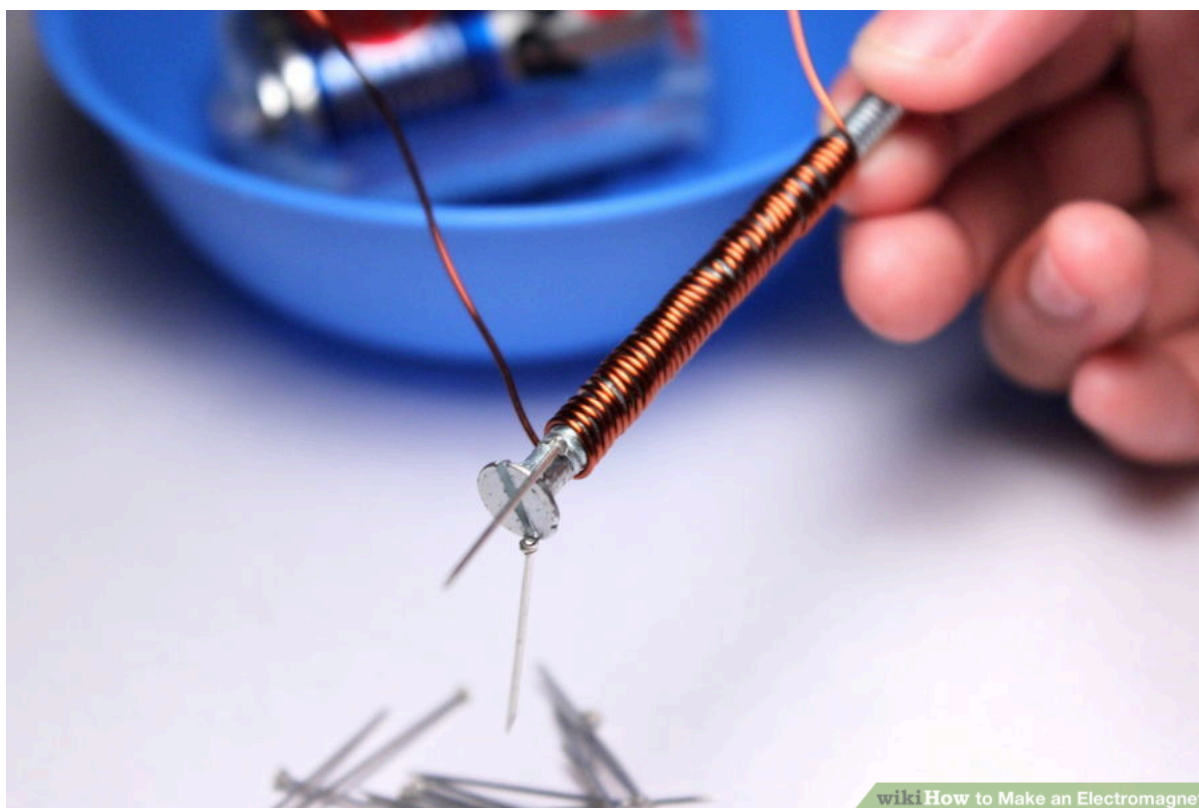
Wrap the nail. Grasp the wire about 8 inches (20.3 cm) from the end. Position it at the head of the nail and wrap it around the nail. Make a second wrap adjacent to the first one; it should touch the first wrap, but not overlap it. Continue wrapping the nail until you've covered it all the way to the tip.

- It's essential to wrap the nail with the wire always running in the same direction, so that the electricity can flow in one direction. If you wrap the wire in different directions, the electricity will flow in different directions, and you won't create a magnetic field.



Connect the wire ends to the battery. Wrap the exposed end of one side of the wire around the metal part of the battery on the positive side. Wrap the other exposed end to the negative side of the battery. Place a small piece of masking tape over the wrapped wire on both sides to keep it in place.

- The side of the battery you attach the wire to will determine the polarity of the magnetic field you are creating. Switching the wires will also switch the poles. Either way, the nail will become magnetized.
- When you attach the second wire end, the battery will begin conducting electricity through the wire coil immediately. The nail will grow hot, so be careful not to burn yourself.



Test the magnet. Once the wires are attached to the battery and the electricity starts flowing, the nail will become magnetized. Test it by placing it against a paperclip or another small piece of metal. If the nail picks up the metal object, the magnet is working.

- When you're finished using the magnet, detach the wire ends from the battery.

Video record your process and write a description of how the process worked for your group. Add the video and the description to your science journal.