



Make a Magnet

Hands-On Activity

Background Information

In 1820, Danish physicist Hans Christian Oersted discovered that a compass was affected when a current flowed through a nearby wire. Not long after that, André Marie Ampère discovered that coiled wire acted like a bar magnet when a current was passed through it. He also found that he could turn an iron rod into a temporary bar magnet when he coiled electric wire around the rod. In 1831, Michael Faraday proved that magnetism and electricity are related. He showed that when a bar magnet was placed within a wire coil, the magnet produced an electric current. In this activity, you are going to use electricity to turn a nail into an electromagnet.

What You Need

- ◆ 4-inch iron or steel nail
- ◆ 24-inch piece of thin-gauge wire with 1-inch of insulation removed from each end
- ◆ D-cell flashlight battery
- ◆ 10 steel paperclips

What To Do

1. Is the nail magnetic? See if you can use it to pick up the paper clips. Write your observations on the attached worksheet.
2. Wrap the center portion of the wire around the nail 10 times so that it forms a coil. You should have extra wire at both ends.
3. Attach one end of the wire to the (+) terminal of the battery. Then, attach the other end of the wire to the (-) terminal.
4. Is the electrified nail magnetic? Bring the end of it close to the paper clips, making sure that the wires stay attached to the battery. Write your observations on the worksheet.
5. Repeat steps 2 – 4, but this time wind the wire around the nail 20 times. Record your observations on the worksheet.
6. Repeat steps 2 – 4, but this time wind the wire around the nail 30 times. Record your observations on the worksheet.
7. Answer the remaining questions on the worksheet.

Make a Magnet Worksheet

Name _____

1. Can you pick up the paperclips with the nail? What does this tell you about the nail's magnetic properties?

2. Test Your Electrified Nail

Coils	Nails Picked Up	Other Observations
10		
20		
30		

3. How did the number of coils affect the number of paperclips you could pick up? What does this tell you about how the number of coils changes the strength of an electromagnet?

4. One way to make an electromagnet stronger is to increase the current. What do you think would happen if you repeated the experiment using two batteries?
