Electromagnets

Electricity and magnetism arise from the same fundamental force.

WHAT TO DO

Try to pick up the paper clips, nuts and other metal items using the coils of copper wire. Connect a battery to the coil and try again.

WHAT'S HAPPENING?

When electricity (from the battery) flows through a wire it creates a magnetic field that circles around the wire, i.e. the wire acts like a magnet and can attract metal objects that contain iron. Winding the wire into a coil makes this magnetic field much stronger, especially inside the coil. You can detect this field using a compass. Finally, placing an iron bolt inside the coil temporarily magnetizes the bolt (it lines up the iron atoms of the bolt such that they act like little magnets), making the total magnetic field created much stronger. Now your electromagnet is strong enough to pick up several of the metal objects. If you disconnect the battery the magnetic field in the coil instantly disappears, but the bolt inside may remain slightly magnetized for a little while, as the iron atoms slowly lose their alignment. You might be able to pick up a paper clip or two, but no more. Compare the strength of the electromagnet for coils of different lengths.