

WARNING: Always check your wiring before turning on a circuit. Never leave a circuit unattended while the batteries are installed. Never connect additional batteries or any other power sources to your circuits.

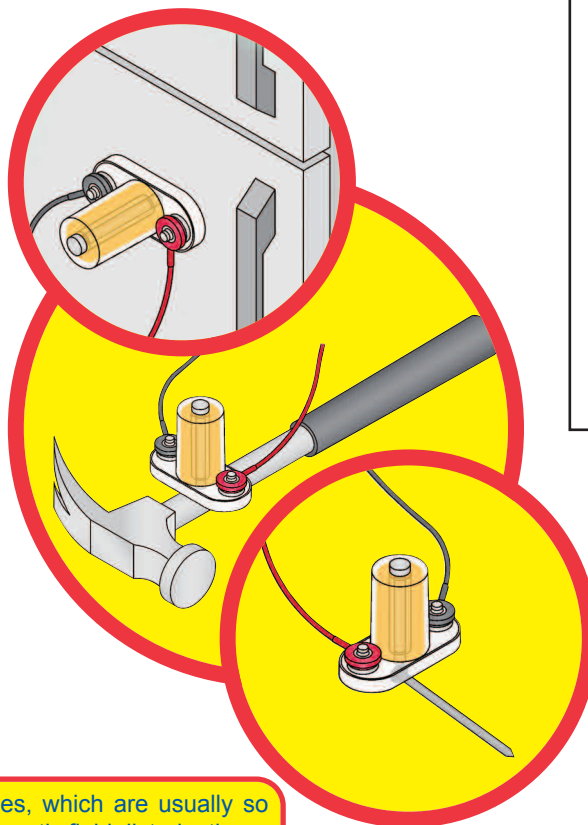
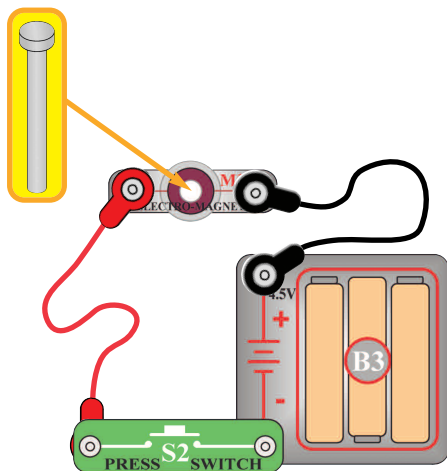
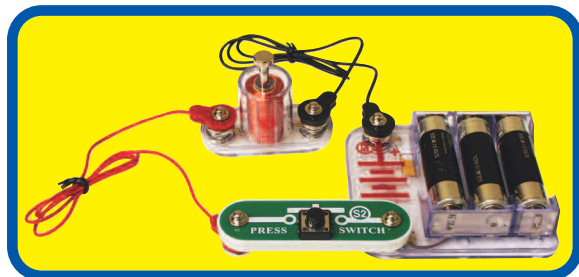
Electromagnetism

Model SCP-08



WARNING: SHOCK HAZARD -
Never connect Snap Circuits® to the electrical outlets in your home in any way!

Project #1 Magnets & Electronic Magnets

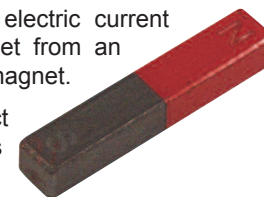


Build the circuit shown. Place the iron core rod inside the electromagnet (M3), and install three (3) "AA" alkaline batteries (not included) into the battery holder (B3).

Hold the electromagnet near something made of iron and push the switch (S2). While pressed, the electromagnet will attract small iron parts like nails or will stick to a hammer or refrigerator. Release the switch and the attraction disappears.

Pressing the switch turns on an electric current which transforms the electromagnet from an ordinary coil of copper wire into a magnet.

Notice that the magnet will attract small iron parts and stick to things like the electromagnet did.



All materials have tiny particles with magnetic charges, which are usually so well balanced that you do not notice them unless a magnetic field disturbs them.

Magnets are materials that concentrate their magnetic charges at opposite ends. One side attracts while the other repels, but the overall material is neutral.

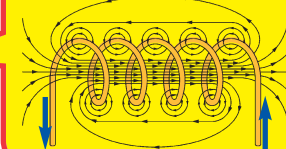
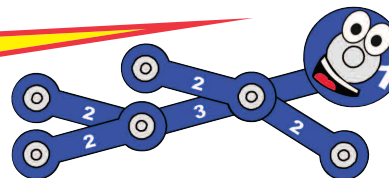
The earth we live on is a giant magnet, due to its iron core. A compass needle always points north because it is attracted to the earth's magnetic field.

An electronic magnet is better than an ordinary magnet because you can turn it on or off with a switch.

Large electromagnets are used to move things around at factories and junkyards.

An electric current flowing in a wire has a tiny magnetic field. By looping a long wire into a coil the tiny magnetic field is concentrated into a large one.

The strength of the magnetic field depends on how much current is flowing in the wire and how many loops of wire.

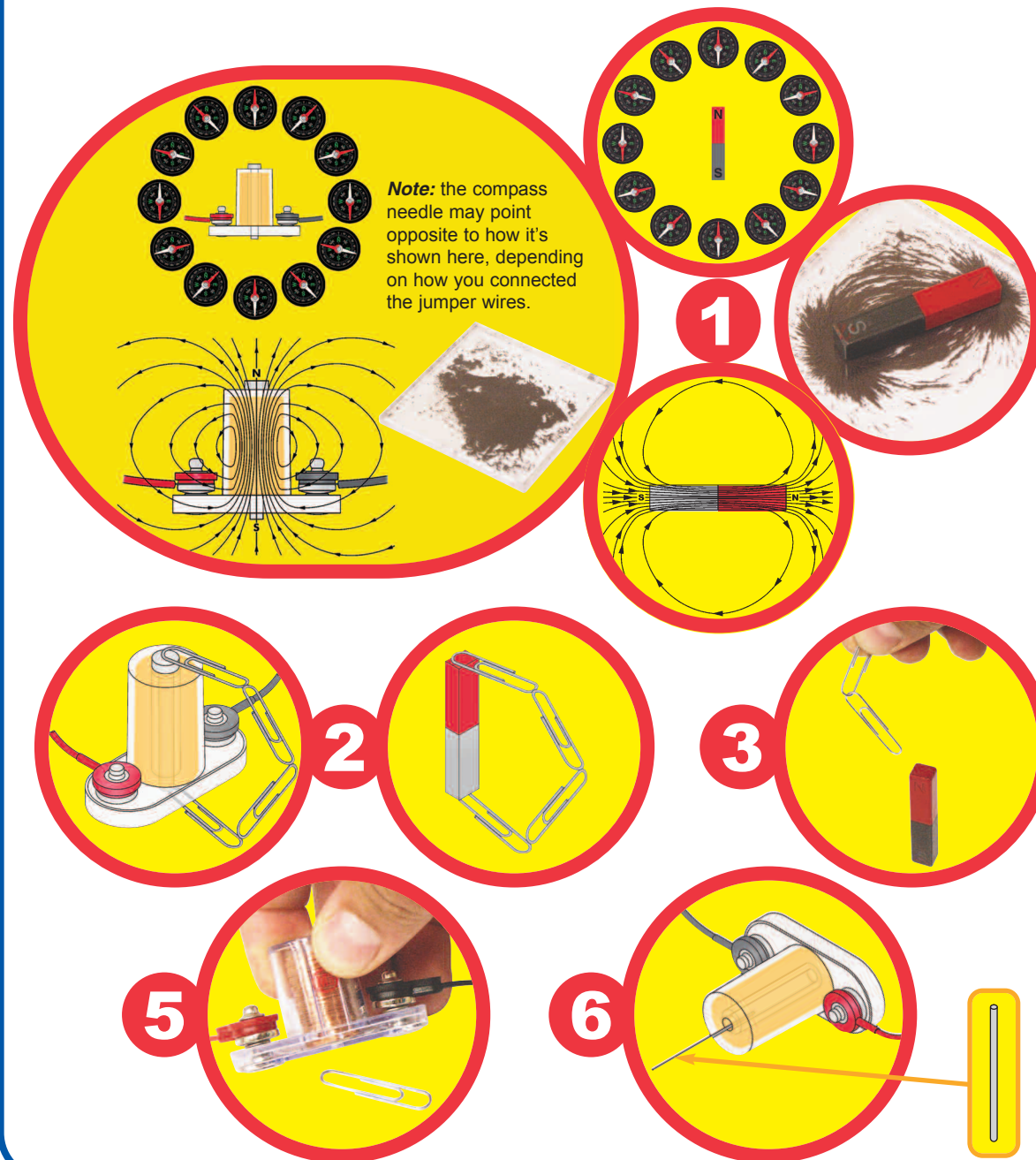


If you have any problems, contact Elenco®

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Project #2 Magnetic Fields



1. The magnetic field is an area around a magnet where it can affect other objects. It is strongest at the ends of the magnet. Use the circuit from the preceding project to compare the magnetic fields of the electromagnet and magnet.

Hold your compass next to the electromagnet and push the press switch (S2). Move the compass all around the electromagnet and watch where the compass points. Shake the iron filings pack to spread the filings evenly, then move the pack around on top of the electromagnet and see how the filings change (fresh batteries are recommended, and the filings may not move much). Do the same with the magnet.

2. The magnetic field created by a magnet occurs in a loop. You can see this using paper clips.

3. Loop two paper clips together. Hold them near the magnet, and move them around it to see the magnetic field. Do the same with the electromagnet, with the switch pressed.

4. Hold the compass near the electromagnet and note the orientation of its arrow. Next, flip the electromagnet around, reversing the wires to it. Now the other side of the compass needed is attracted to the electromagnet (magnetic field is reversed). The direction of a magnetic field from a current flowing in a wire (or coil of wire) depends on the direction of the electric current.

5. Remove the iron core rod from the electromagnet. Now push the press switch again and try to pick up things with the electromagnet. The attraction is now very weak.

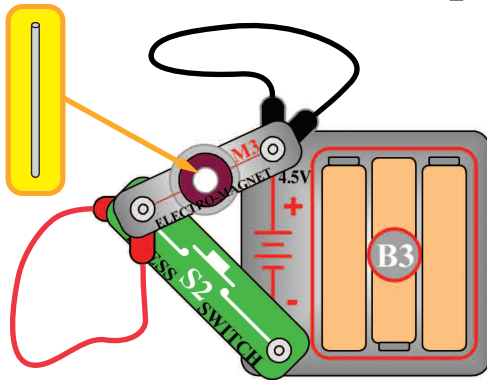
The iron core rod concentrated the magnetic effects of the electromagnet. You can use the compass to see that electronic field is now much weaker.

6. Materials made of iron concentrate their magnetic effects at both ends. The center of the material is magnetically neutral because the attraction from each end is the same.

The magnetic field created by the electromagnet works the same way. It is strongest at both ends but neutral in the center. But the electromagnet is hollow - so iron at one end will be sucked into the middle.

Lay the electromagnet on its side. Hold the thin rod next to the center hole and push the press switch to suck it inside. Hold the switch and gently pull the rod to see how much suction the electromagnet has.

Project #3 Electromagnet Tower



Build the circuit as shown and drop the thin rod into the electromagnet (M3). Push the press switch (S2) several times. The thin rod gets sucked into the electromagnet and can be suspended there, or you can bounce it up and down.

When you push the press switch, the thin rod gets sucked up and wiggles up and down until settling in position just below center. Measure how high

you get the thin rod to go, then try with old and brand new batteries. Also try adjusting the height of the electromagnet.

Part B: With the switch pressed and the thin rod suspended in mid-air, hold the magnet near the thin rod. Notice that one side of the magnet repels the thin rod but the other side attracts it.

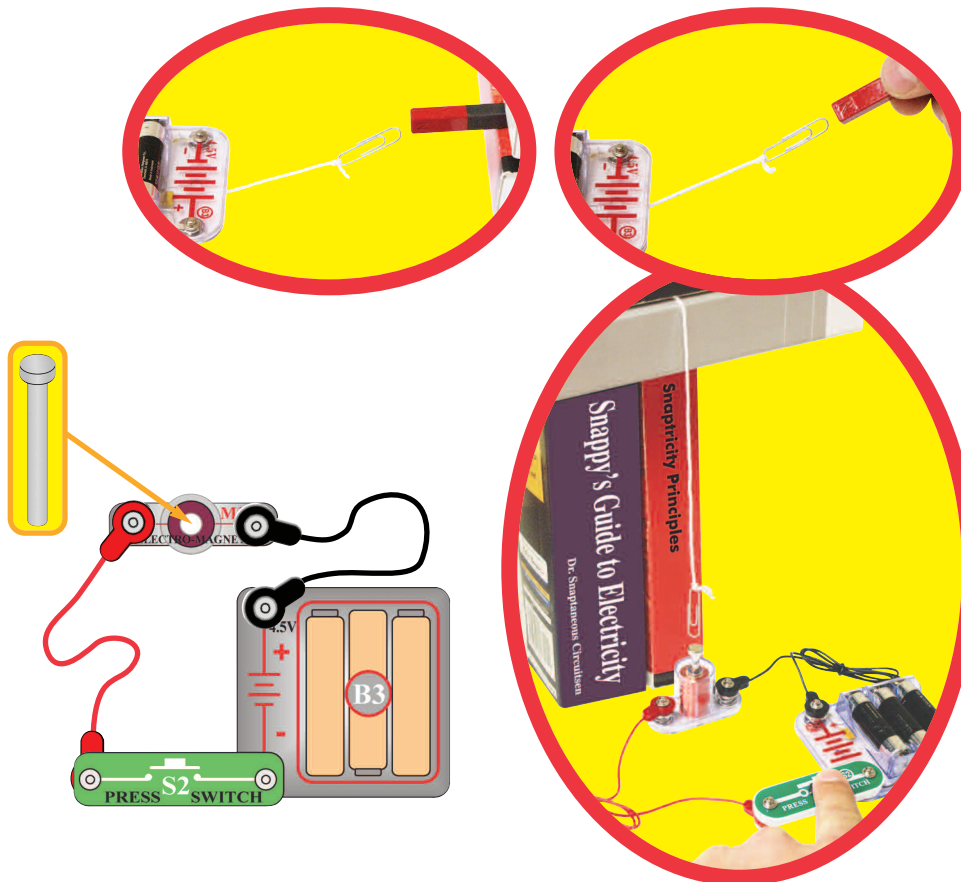


Project #4 Be a Magician

Part A: Secure the magnet in place with nothing beneath it. Tie a paper clip to some string and place it on the magnet. Slowly pull the string away so the paper clip is suspended in air. Hold the paper clip in place with a weight, as shown.

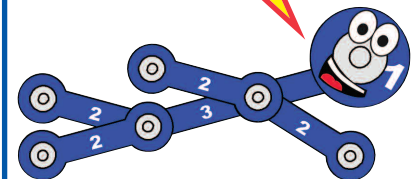
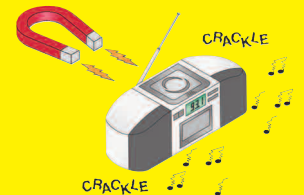
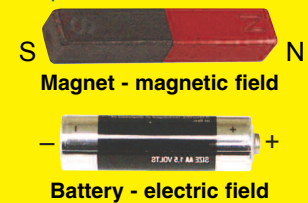
Next, hold the magnet near the paper clip and lift it off the ground, without it touching the magnet. Move it around in mid-air.

Part B: Build the circuit shown and place the iron core rod in the electromagnet (M3). Secure the paper clip-string with a weight above the circuit, as shown. Push the press switch (S2) to pull the paper clip towards the electromagnet. Attract and release the paper clip by pressing and releasing the switch.



A magnet has a magnetic field, and a battery has an electric field. The north and south poles of a magnet are comparable to the positive and negative terminals of a battery.

Electric and magnetic fields affect each other. If you place a magnet next to a radio your reception can be disturbed.



OTHER SNAP CIRCUITS® PRODUCTS!

Contact Elenco® to find out where you can purchase these products.



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Build over 100 projects, contains over 30 parts.



Snap Circuits® Model SC-300

Build over 300 projects, contains over 60 parts.



Snap Circuits® Pro Model SC-500

Build over 500 projects, contains over 75 parts.

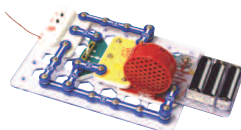


Snap Circuits® Extreme Model SC-750

Build over 750 projects, contains over 80 parts, and PC interface included.



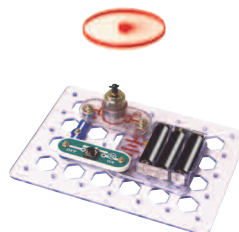
**Musical Recorder
Model SCP-01**



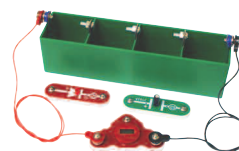
**FM Radio
Model SCP-02**



**Motion Detector
Model SCP-03**



**Flying Saucer
Model SCP-06**



**Water Power
Model SCP-07**

PARTS LIST

Qty.	ID	Name	Part #
<input type="checkbox"/> 1	B3	Battery holder	6SCB3
<input type="checkbox"/> 1		Compass	6SCCOM
<input type="checkbox"/> 1		Iron filings pack	6SCIF
<input type="checkbox"/> 1		Jumper wire, black	6SCJ1
<input type="checkbox"/> 1		Jumper wire, red	6SCJ2
<input type="checkbox"/> 1	M3	Electromagnet	6SCM3
<input type="checkbox"/> 1		Iron core rod	6SCM3B
<input type="checkbox"/> 1		Paperclips	6SCM3P
<input type="checkbox"/> 1		Magnet	6SCMAG
<input type="checkbox"/> 1	S2	Press switch	6SCS2
<input type="checkbox"/> 1		Thin rod	MWK01P5

Important: If any parts are missing or damaged, **DO NOT RETURN TO RETAILER.** Call toll-free (800) 533-2441 or e-mail us at: help@elenco.com.
Customer Service • 150 Carpenter Ave. • Wheeling, IL 60090 U.S.A.

You may order additional / replacement parts at our web site: www.snapcircuits.net

BATTERIES:

Use only 1.5V AA type (not included). Insert batteries with correct polarity. Non-rechargeable batteries should not be recharged. Rechargeable batteries should only be charged under adult supervision, and should not be recharged while in the product. Do not mix alkaline, standard (carbon-zinc), or rechargeable (nickel-cadmium) batteries. Remove batteries when they are used up. Do not short circuit the battery terminals. Never throw batteries in a fire or attempt to open its outer casing. Batteries are harmful if swallowed, so keep away from small children.