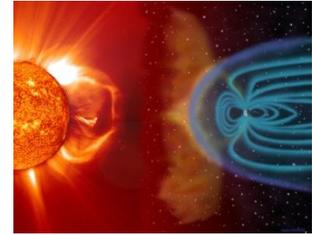


## Magnetism – Shields UP!

Strong magnets can cause problems with electronics such as pacemakers and even “erase” the strip on the back of a credit/debit card. Can you insulate against it?



### Materials:

- Flat test objects:
  - Popsicle stick (wood)
  - Plastic ruler
  - Cloth (stiff)
  - Steel knife
  - Other objects
  - Coins
- 5-10 steel paper clips
- Hot glue gun
- Two pieces of cardboard (5x7 cm)
- Neodymium (Rare Earth), Ceramic, or cerium (Alnico) magnet
- Two pencils (spacers)

**Procedure:** (Remember to have your parent’s permission and have them watch and help you.)

- Using the magnet test each of the flat objects to see whether or not they are attracted to the magnet. You should have at least one magnetically attracted and one not.
- Construct the test device:
  - Glue one pencil to cardboard near its edge and parallel to it.
  - Similarly glue the other pencil to the opposite edge.
  - Now glue the other piece of cardboard on top of the pencils forming a cardboard/pencil/cardboard sandwich with an open space where we can insert the test materials.
  - Glue the magnet to the top of the top cardboard in the middle but near to one of the open ends.
- Hold your device and add the paper clips to the bottom of the bottom cardboard directly below the magnet. If no paper clips stick, add another magnet.
- Insert each test object, move it around and observe.

### What’s Happening:

The magnetic field of the magnet passes through the cardboard and the air. Materials like the popsicle stick allow the magnetic force to pass through them (nonpermeable). Permeable materials like steel are attracted to magnets and the lines of force travel into the steel but not through it. To prevent strong magnet fields from disrupting sensitive electronics they are often surrounded by a ferrous metal container. See: [http://en.wikipedia.org/wiki/Magnetic\\_shielding#Magnetic\\_shielding](http://en.wikipedia.org/wiki/Magnetic_shielding#Magnetic_shielding).

### Extension:

The Earth generates its own magnetic field which protects all life by shielding us from the charged particles given off by the Sun. The Earth’s magnetic field in effect is the shield on Earth. Read more about magnetic shielding here:

[http://en.wikipedia.org/wiki/Earth's\\_magnetic\\_field](http://en.wikipedia.org/wiki/Earth's_magnetic_field).

This activity is based on our Magnetism kit. The source for this lab was: <http://www.exploratorium.edu/snacks/magshield/index.html>. Our teaching kits (described on our website) are loaned out FREE to provide classroom teachers and parents of home schooled children an opportunity to explore Science in interesting ways. Please consider volunteering as a classroom guest speaker or allow your business as a field trip location.

Lorne Cooper, Regional Executive Director

PRAXIS, “Making Science Fun”. Contact Praxis at [praxis@praxismh.ca](mailto:praxis@praxismh.ca), [www.praxismh.ca](http://www.praxismh.ca), Tweet or follow us @PraxisMedHat, or friend us on Facebook. Address: c/o 200 7th Street S.W., Medicine Hat, AB, T1A 4K1 Phone: 403-527-5365, Fax: 403-527-6570.