

Magnetism – Lines of Force

Here's a clean way to view lines of force.

Materials:

- Pop bottle (500 mL clear plastic)
- Masking tape
- Iron Filings
- Plastic test tube or thin plastic pill bottle that fits inside the pop bottle
- Drinking straw
- Cylindrical Neodymium (Rare Earth), Ceramic, or cow (Alnico) magnet that fits inside the plastic test tube



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

- Remove the label from the pop bottle.
- Fill the bottle about one-fifth full of iron filings.
- Wrap the top of the test tube with masking tape so that the tube fits snugly into the mouth of the bottle, plugging the opening completely.
- Jam the tube into the mouth of the bottle.
- Slide the cylindrical magnet into the test tube and put the bottle cap back on.
- Turn the bottle on its side and rotate it. Watch what happens to the iron filings.
- Pay particular attention to what happens at the end of the magnet.
- Slowly remove the magnet from the test tube and observe what happens while you do this.

What's Happening:

Magnets attract iron? Did all the filings equally cover the test tube containing the magnet? What happened when you removed the magnet?

Iron filings will trace out the lines of a magnetic field. Iron filings will line up parallel to a magnetic field, making the pattern of the field visible. Each atom of iron is a magnet, with a north pole and a south pole. However most iron objects are not magnetic, since the atoms (micro-magnets) all point in different directions. When you bring a magnet near a piece of iron, the iron-atom magnets line up with the applied magnetic field: The north poles of the iron atoms all point in the same direction. Because the iron atoms line up, the piece of iron becomes a magnet and is attracted to the original magnet.

Extension:

If you use a plastic bottle and sealed it well the sides of the bottle will begin to collapse inward. This happens because the iron filings are rusting and as the iron rusts, it removes oxygen from the air trapped in the bottle. To prevent the bottle's collapse, simply punch a small hole in the plastic with a pin.

This activity is based on our Magnetism kit. The source for this lab was: http://www.exploratorium.edu/snacks/magnetic_lines/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

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