#### **Chapter 36: Magnetism**

**Magnetic Field Lines** 

## **3-D Magnetic Field**

### **Purpose**

To explore the shape of magnetic fields

### **Required Equipment/Supplies**

2 bar magnets iron filings strong horseshoe magnet sheet of clear plastic

5 to 10 small compasses jar of iron filings in oil paper

#### **Discussion**

A magnetic field cannot be seen directly, but its overall shape can be seen by the effect it has on iron filings.

# Procedure 🖺 🔣

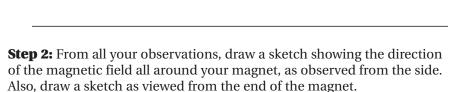




**Step 1:** Vigorously shake the jar of iron filings. Select the strongest horseshoe magnet available. Place the jar over one of the poles of the magnet and observe carefully. Place the jar at other locations around the magnet to observe how the filings line up.

1. What happened to the iron filings when they were acted upon by the

magnetic field of the magnet?		



Sketch magnetic field.

**Step 3:** Obtain two bar magnets and 5–10 small compasses. Note which Observe orientation of end of each compass points toward the north. As you proceed with the compasses. activity, represent each compass as an arrow whose point is the northpointing end. **Step 4:** Trace one of the bar magnets on a piece of paper. Move the com-Trace magnetic field lines. passes around the magnet, and use arrows to draw the directions they point at each location. Link the arrows together by continuous lines to show the magnetic field. Sketch magnetic field lines. **Step 5:** Obtain a small quantity of iron filings and a sheet of clear plastic. Place the plastic on top of one of the bar magnets, and sprinkle a small quantity of iron filings over the plastic. It may be necessary to gently tap or jiggle the plastic sheet. The filings will line themselves up with the magnetic field. In the following space, sketch the pattern that the filings make. Repeat this step using the other bar magnet. **Step 6:** Repeat Step 5 for two bar magnets with like poles facing each Repeat using two magnets. other, such as N and N or S and S, and with unlike poles facing each other. Sketch the pattern of the filings in both situations. 2. Compare the methods of Steps 4 and 5 in terms of their usefulness in obtaining a quick and accurate picture of the magnetic field. Pearson Education, Inc., or its affiliates. All rights reserved **3.** Are there any limitations to either method? **4.** What generalizations can you make about magnetic field lines?

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