

Objective

- Use a compass to draw the magnetic field around a bar magnet.

Materials

- Paper
- Iron filings case
- Small compass ~20 mm
- Small bar magnet ($\frac{1}{2} \times \frac{1}{2} \times 1$ inch polarized so one end is N and other is S)
- Small piece of tape

Procedure: Iron Filings

The magnetic field around a magnetic is the region where the magnetic force acts. Magnetic field lines can be drawn to visualize the magnetic field. The field lines start at the north pole and end at the south pole. They show the direction of the magnetic force. The spacing of the lines shows the relative strength of the magnetic force, so that the closer the lines are together, the stronger the force.

1. Hold the iron filings case flat and gently shake it until the filings are spread out.
2. Place the magnet under the filings case so that both poles are touching the case.
3. The iron filings should line up along the magnetic field lines. You may need to gently shake the case.
4. Draw a picture of the field lines in the iron filings in a corner on the back of this paper.

Procedure: Compass

1. Use a small piece of tape to secure your bar magnet in the middle of your paper. Draw the outline of the magnet on the paper.
2. Use your compass to find the north pole of your magnet.
 - a. Set the compass near the magnet.
 - b. The red end of the compass needle points towards the north pole.
 - c. The other end of the magnet is the south pole.
 - d. Label these on the paper by the magnet.
3. Draw a dot on the paper near the north pole of the magnet.
4. Place the compass next to the dot and move it around so that the red arrow of the compass points to the point. Draw a dot at the opposite side of the compass.
5. Repeat step 4 with the new dot and continue until you either leave the paper or get to the other end of the magnet.
6. Draw a smooth curve from the north pole of the magnet through the points. Draw arrows on the curve pointing away from the north pole.
7. Repeat steps 3-6 for new dots until you have several magnetic field lines.
8. Repeat steps 3-6 for dots near the south pole to fill in the empty space. Use the white arrow on the compass this time.
9. Consider that the earth has a magnetic north pole and south pole. Draw a sketch of the magnetic field around the earth if it is similar to a bar magnet.

10. Look up where the magnetic north pole in on earth and is it stationary?

