Visualizing Magnetic Fields

Magnetism is an unseen force. To help you visualize a magnetic field, you will observe the alignment of iron filings around a magnet. The iron filings align in the direction of the magnet's field and make the field visible. In this activity, you will try out different shapes of magnets and compare their magnetic fields.

Procedure

1. Choose a magnet and place a piece of paper on it. Lightly sprinkle iron filings onto the paper over the magnet. If you sprinkle the filings on too quickly and can't see the magnetic field, get another piece of paper and try again.
2. On another piece of paper, draw the pattern the iron filings make as they experience the magnet's force. Draw the magnet's shape.
3. Use a compass to determine the direction of the magnetic field lines at various places around the magnet. Draw arrows on your diagram to indicate this direction.
4. Move the compass away from the magnet until the compass no longer points to the magnet. Record this distance and the direction the compass is pointing on your diagram.
5. Predict whether different-shaped magnets will produce magnetic fields shaped like the one you just drew.
6. Repeat steps one to four with the other magnets.

Questions

Write your answers on a separate sheet of paper.

1. How did the shape of the magnet influence its magnetic field?
2. Where are most of the magnetic field lines on each of the magnets? Did your results agree with your prediction? Explain.
3. Where are the north and south poles on the round magnet?
4. What did you learn about the strength of each magnet's magnetic field by moving the compass?
5. When you moved the compass away from the magnet, what happened?
6. How is Earth like a magnet?
7. Look at the illustration of Earth's magnetic field below. How is the shape of Earth's magnetic field similar to that of the magnets you experimented with? How is it different?
8. How might a compass be used in conjunction with Earth's magnetic field?