

2 What Is Magnetism?

LESSON GOALS

You will learn

- how magnets act on objects and other magnets.
- the reason a compass points north.

magnet (mag/'nit), an object that pulls iron and steel things to it.

magnetism (mag/'nə tiz/'əm), the force around a magnet.

pole (pōl), a place on a magnet where the magnetism is strongest.

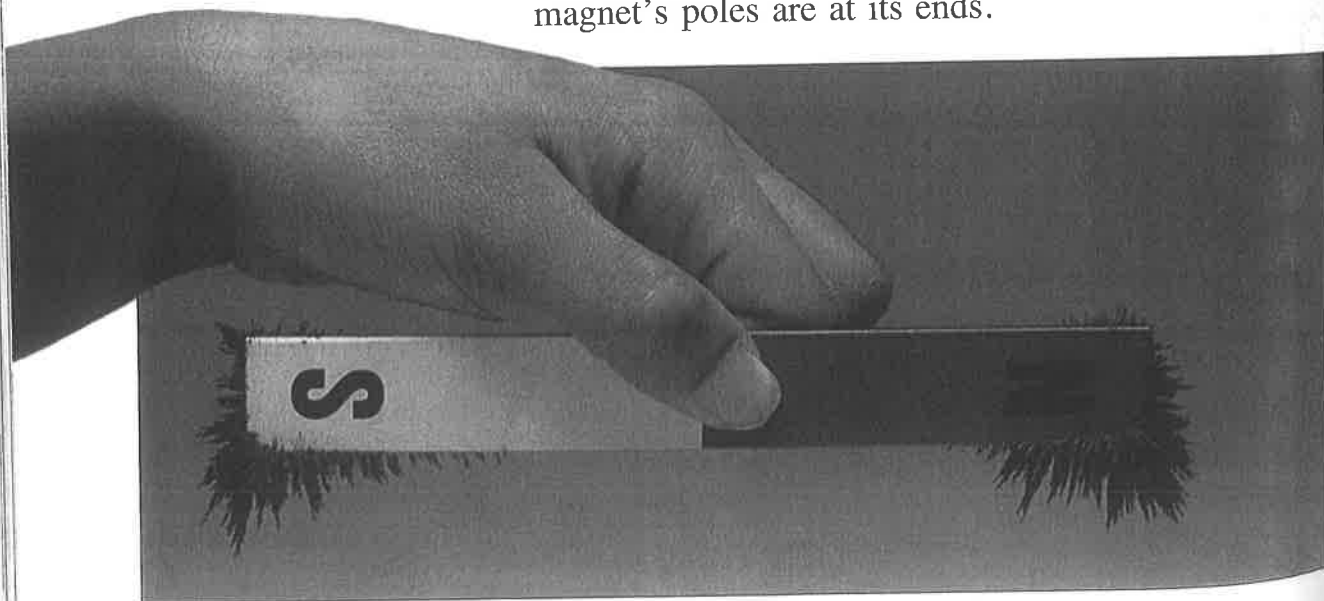
Magnetism is strongest at the poles.

What does the word *magnet* make you think of? Do you think of a toy that can pick up paper clips? Do you think of objects that hold messages on your refrigerator door? You might not know that telephones, computers, and radio speakers all have magnets in them. Magnets have many important uses in your life.

A Force That Attracts Certain Metals

A **magnet** is anything that pulls iron and steel to it. The magnet in the picture is pulling iron filings to it. A force is something that pulls or pushes. **Magnetism** is the force around a magnet.

Magnets can be made in different shapes. However, magnets of all shapes have the same properties. You can see these properties most easily in a bar magnet. Notice where more iron filings stick to the bar magnet in the picture. Do more filings stick to the magnet's ends or to its middle? The magnet picks up more iron filings where magnetism is the strongest. The places on a magnet where magnetism is the strongest are the magnet's **poles**. A bar magnet's poles are at its ends.



Notice that one pole of the bar magnet is labeled *N* and the other pole is labeled *S*. *N* stands for north pole. *S* stands for south pole. If you let a magnet turn freely, the north pole of the magnet always points north. The magnet's south pole always points south.

What happens if you put a north pole of one magnet near a north pole of another magnet? The two north poles push each other away. However, the north pole of one magnet attracts the south pole of another magnet. A north pole and a south pole stick together.

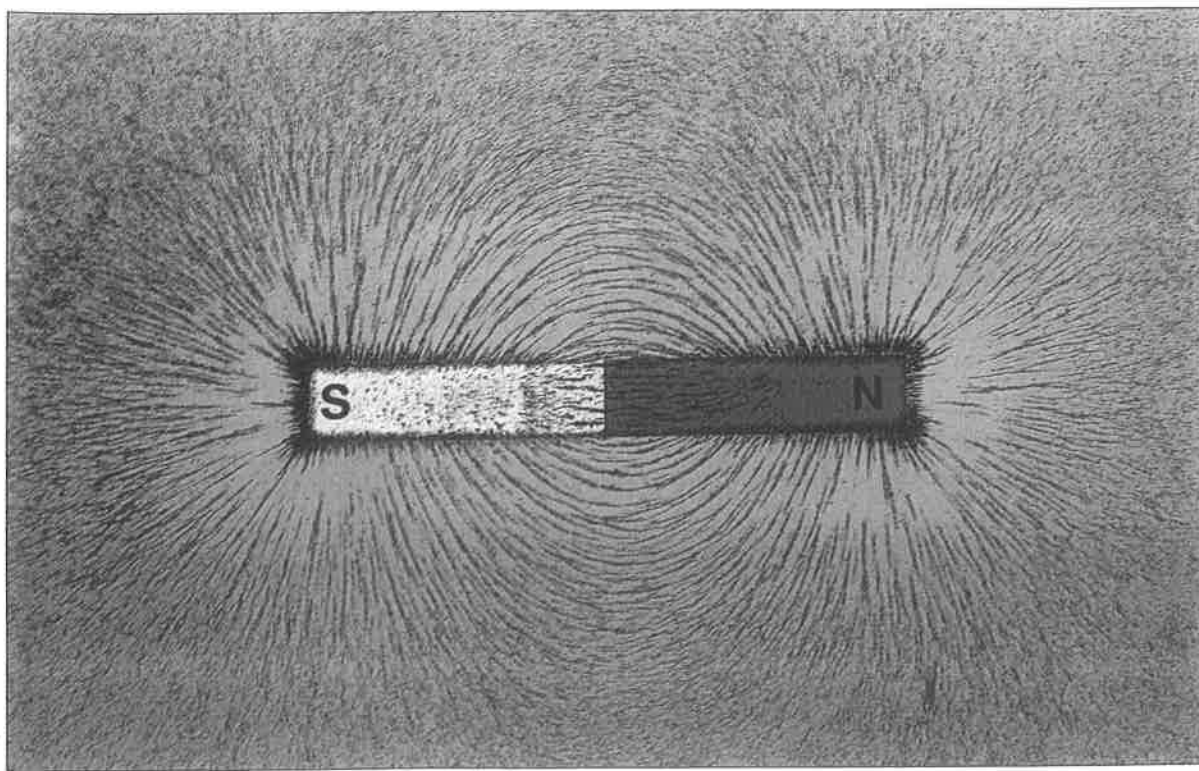
Notice in the picture how tiny pieces of iron are pulled to a magnet. Many of the iron pieces do not touch the magnet. However, they do all line up in a pattern around the magnet. The magnetism is acting on the iron pieces in the space around the magnet. This space around a magnet where magnetism acts is the **magnetic field**. Every magnet has a magnetic field. What places in the magnetic field have the most iron pieces?

INVESTIGATE!

Find out if magnetism can pass through different substances. You might try using a magnet to pick up a paper clip through paper, plastic wrap, and cloth. Write a hypothesis and test your hypothesis with an experiment.

magnetic field, the space around a magnet where magnetism acts.

A magnetic field



SCIENCE IN YOUR LIFE

The place on the earth that people call the North Pole is the place that people use for the direction north. However, the magnetic north pole is about 1600 kilometers from this place. Special maps help people change the compass direction north to north on the earth.

compass (kum/pəs), a small magnet that can turn freely.

The Earth as a Magnet

Did you know that the earth is a magnet? The earth has a north magnetic pole and a south magnetic pole. A magnetic field surrounds the earth.

For almost 1000 years, people have used the earth's magnetic field to help them find directions. They discovered that one pole of a magnet that swings freely always points north. Using this idea, they made the first **compasses**. A compass is a small magnet that swings freely. The north pole of the magnet points to the earth's magnetic north pole. What direction is the compass below pointing?



A compass points north.

Lesson Review

1. What part of a bar magnet could pick up the most iron filings?
2. How does a compass work?
3. **Challenge!** How could you find the two poles of a magnet that has a different shape than a bar magnet?

Study on your own, pages 388–389.

PHYSICAL SCIENCE

FIND OUT ON YOUR OWN

Look up *magnet* in an encyclopedia. Find out what makes something become magnetic. Write a paragraph that explains what you learn.