

# Magnetic Poles

Unlikes attract, Likes repel

## Introduction

Two magnets can attract each other or repel each other depending on how they are oriented.

## Material

- Two identical magnets. Use them in the [Where's North](#) exploration first so that each is marked with a dot.( donut magnets, available from Radio shack work well)
- A compass

## Assembly

Remove the string used in the Where's North activity from the magnets leave the dots on.

## To Do and Notice

Bring the magnets near each other and feel the forces they exert on each other.

Turn one of them until it is attracted by the other. Let them come together slowly until they touch. Release one magnet. The other will attract it strongly enough to hold it in place against gravity.

Rotate one magnet to find the position in which it is most strongly repelled by the first magnet.

Let the magnets attract one another again.

Rotate the other magnet until the two magnets repel each other.

Note the attraction and repulsion of the magnets when two "dot" faces are close together.

Notice it when two "nodot" faces are together.

Notice it when a "dot" faces a "nodot."

Fill-in the following table with the words attraction or repulsion. Such a table is an important way to keep track of scientific data

	dot	nodot
dot	?	?
nodot	?	?

A compass is a magnet which is pivoted and free to rotate. Hold the compass away from all magnets and look at it. The red end of the compass needle points toward the north geographic pole of the earth. (This end of the compass was originally called the north seeking pole. Its name was eventually shortened to the north pole of the compass.)

Bring the compass near one of the magnets, the red end of the compass is its north pole and will be attracted to the south magnetic pole of the magnet. The red end of the compass needle will be repelled by the north pole of the magnet. Identify whether your dot is a north pole or a south pole by using the compass. Redo your table replacing the names dot and nodot with the names north and south.

### What's Going On?

The north pole of one magnet attracts the south pole of the other, and vice-versa.

This is the origin of the expression: "unlike poles attract". (Dots attract nodots)

When two magnets are allowed to approach, unlike poles attract, if they are allowed to rotate freely they will rotate until the unlike poles are next to each other.

The north pole of one magnet repels the north pole of the other magnet, likewise the south poles repel. This is the origin of the phrase, "like poles repel."

	North	South
North	repel	attract
South	attract	repel

### So What?

One pole of your magnet pointed north, such a pole was originally called a north seeking pole which was eventually shortened to north pole. When it was discovered that the earth was a magnet the north pole of the compass was attracted to the opposite magnetic pole on the earth. Unfortunately this magnetic south pole was located in the northern hemisphere of the earth. So we ended up with the magnetic south pole near the geographic north pole. This has caused confusion ever since. In fact even today the magnetic south pole of the earth is marked on maps as the "north magnetic pole." Beware!

### Etc

Peter Perigrinus made spheres from naturally magnetic lodestone in 1269. These stones were composed of magnetite,  $\text{Fe}_3\text{O}_4$ . Small iron rods sprinkled onto this sphere clustered around and formed a radial spoke pattern around two points on opposite sides of the sphere. This is just like lines of longitude which radiate from the two poles on a map of the earth. The similarity between the magnetic sphere and the earth sphere inspired the name of "polus" or today "poles" for the two ends of the magnet. The pole of a magnet which was attracted to the north pole of the earth became known as the Boreal or north seeking pole, which was later shortened to north pole. In 1600 William Gilbert noted that the earth was a magnet with poles of its own. The basic rule that "opposite poles attract" means that the magnetic pole of the earth that is currently located near the north geographic pole of the earth is actually a magnetic south pole. (To add to the confusion, geologists call this pole the North magnetic pole.)