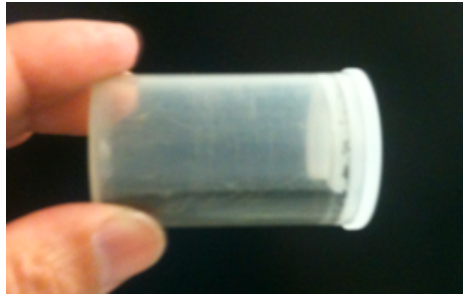


# Making a temporary magnet

*In the end(s), you create magnetic poles*



## Materials:

Clear plastic container that is long and narrow  
(If you can still find them, old clear film canisters work also)  
Iron filings  
Compass  
Magnets (a stack of 3 donut magnets, a cow magnet, or a strong bar magnet)  
Colored 'dot' labels

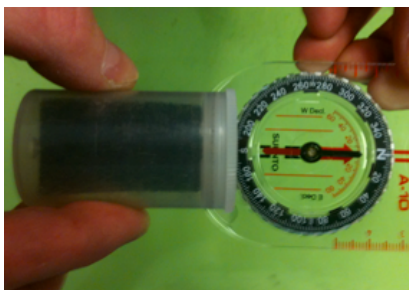
## Procedure:

Use the compass to identify the poles of your permanent magnet(s). **Similar poles repel.** Once you have identified the poles, stick a **colored dot** on the north pole end.

Fill the plastic container about 1/3 full with the iron filings and securely cap it shut. Give the container a few hard shakes to ensure random orientation of the iron filings. **Hold the container in a horizontal position from this point on.** (See picture) When you bring the compass up to both ends of the container, the needle of the compass might respond slightly. (The compass needle is a magnet and both ends of the needle will be slightly attracted to the iron filings in the container.) If you see the needle attracted/repelled strongly by either end of the container, shake it again.



Hold the stack of magnet(s) (with the colored dot/north pole facing up) under the right end of the horizontal laying container. Slowly drag the magnet(s) across the bottom from right to left **ONCE** and notice what happens to the iron filings. Lay the magnet(s) down and bring the compass up to both ends of the container. Notice what happens at both ends. **If the container repels\* the compass needle, you just made a temporary magnet!**



Using the compass needle, determine the poles of your temporary magnet. Which end is north? Shake the container again and re-test with the compass.

## To Do and Notice:

Using the north pole of your magnet(s) as before, drag your magnet(s) in the opposite direction this time (from left to right) and check the container with the your compass. Did you notice anything different?

You might have noticed that the iron filings appeared to stand up directly above the area where the magnet(s) were located. As you moved the magnet(s), the next group of iron filings stood up and the previous group **appeared to fall away**. If you did not see the iron filings stand up, you may need to use a stronger magnet, or add more magnets to make a stack.

## What's Going On?

Magnetic materials are made of many tiny **magnetic domains**. Each domain can be considered a magnet with a north and a south pole. When these domains occur in a random distribution (similar to the shaken container) the domains tend to cancel each other out. The result of this is a non-magnetized material. When you magnetize a material (similar to the container after the magnet(s) was dragged across the bottom), you **align most of the domains**. This directional alignment of the domains results in a net polarity and the object now becomes a magnet!

*The end of the container that was first in contact with the dot (north) facing up magnet(s) will become the north pole and the end of the container that was in contact last with the magnet(s) will become the south pole.*

Original idea for this activity came from:

*Safe and Simple Electrical Experiments.*

*Rudolph F. Graf ISBN: 9780486229508 (Dover Children's Science Books)*

For questions, comments or suggestions email [tien@ligo-la.caltech.edu](mailto:tien@ligo-la.caltech.edu)