

MAKE A COMPASS

If you have a compass, hold it flat in your hand so that the needle can turn freely. Try to situate yourself so that other magnets are far away and do not affect the compass needle. Note which part of the room the painted end of the needle is pointing.

You will need the following materials/equipment for this part:

- 2 flat (disk) magnets with holes
- 2 pieces of wire (about 15-20 cm each)
- 1 cup (metal or ceramic preferred—plastic OK)
- 1 soda straw
- 1 straight pin

Using these materials, you will construct a simple compass. You can compare it to the compass you observed above.

Procedure

1. First, bend both of the wires in half around a pencil. Remove the pencil.
2. Insert the free ends of one of the wires into one of the magnets so that the ends stick out about 2-3 cm as shown in Fig. 1 below. Repeat this with the other wire and magnet.
3. With one of the magnets, fold the free ends of the wire around the magnet in opposite directions. Then fold the looped end of the wire over the magnet perpendicular to the way you folded the free ends as shown in Fig. 1. Repeat this with the other magnet.

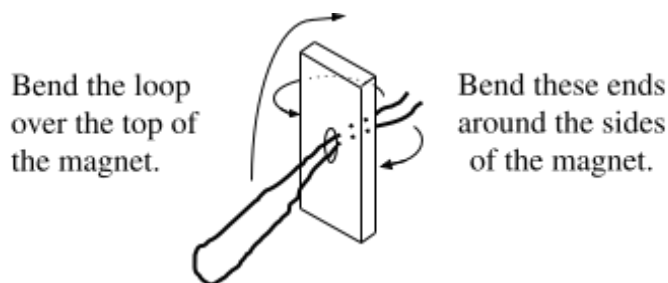


Fig. 1: Folding the wire around the magnet.

4. When completed properly, the two magnets should be able to stick to each other with the looped parts of the wire facing in opposite directions as shown in Fig. 2 on the next page. If this is not the case, remove the wire from one of the magnets, reinsert it in the other direction, and repeat Step 3. Consult your instructor if you are having difficulties.

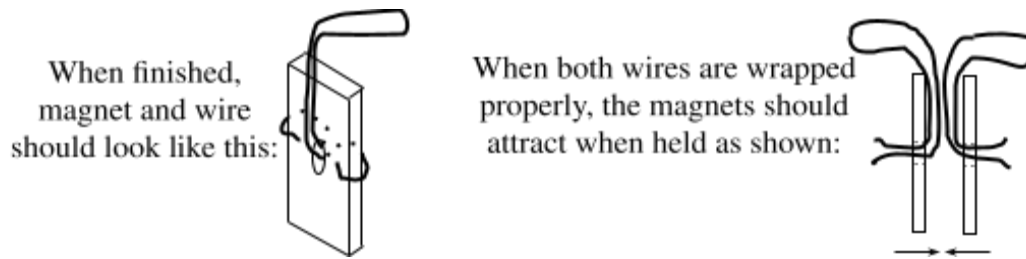


Fig. 2: Magnets with wires correctly wrapped

5. Insert the looped part of the wire of each magnet into opposite ends of the straw.
6. Balance the straw on your finger to locate the center-of-gravity of the straw-magnet system. Once found, carefully insert the straight pin through the straw (Don't poke yourself!) so that the point sticks out about 0.5 cm from the bottom of the straw.
7. Balance the straw on the cup. If using a plastic cup, DO NOT poke the pin into the cup. Small adjustments may be necessary. If the straw tips toward one end, push in or pull out the wire loops slightly until balance is achieved. If the straw tips to the side, rotate the wires in the straw slightly until balance is achieved. When finished your compass should balance horizontally as shown in Fig. 3 below.

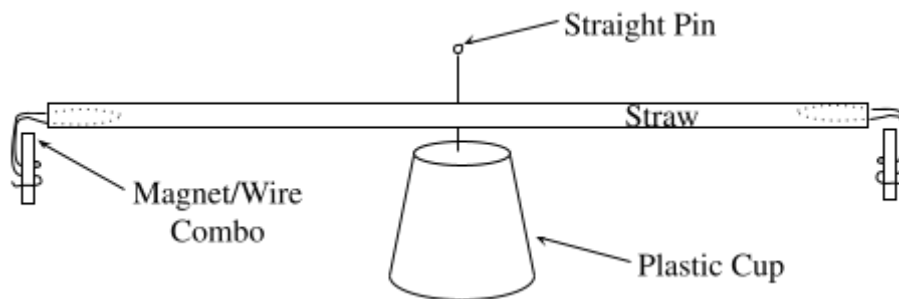


Fig. 3: Constructed and properly balanced compass.

Once balanced and steady, how does the alignment of your newly constructed compass compare with the one you used earlier? If you orient your compass in various positions and let it go, what does it do?