PRESENTED BY: girlstart

deSTEMber

SCIENCE ★ TECHNOLOGY ★ ENGINEERING ★ MATH

Homemade Compass

Can you find north? Discover how to recreate the first manmade compass used over 1,000 years ago using the Earth's naturally occurring magnetic fields. With just a few materials you will be able to find north in no time!

TEKS:

SCI 2.6 B: The student is expected to observe and identify how magnets are used in everyday life.
SCI 3.6 C: The student is expected to observe forces such as magnetism and gravity acting on objects.
SCI 4.6 D: The student is expected to design an experiment to test the effect of force on an object, such as a push or a pull, gravity, friction, or magnetism.

Materials:

- Blunt sewing needle
- Bowl of water
- Compass
- Magnet wand
- Paper
- Pencil
- Small cork (2-3 cm thick)
- Tape

How To:

1. Rub the sharp end of the sewing needle against the magnet wand for at least 10 to 15 seconds to magnetize the needle.
2. Attach the magnetized needle to the cork using tape. To do this, you'll need a piece of tape long enough to wrap around the entire piece of cork. Place the needle on top of the round part of the cork so that the needle is lying flat and aligned with the cork's length. Then wrap the piece of tape around both the needle and the cork to secure it. You'll want to make sure that the needle doesn't come off when you start testing your cork compass!

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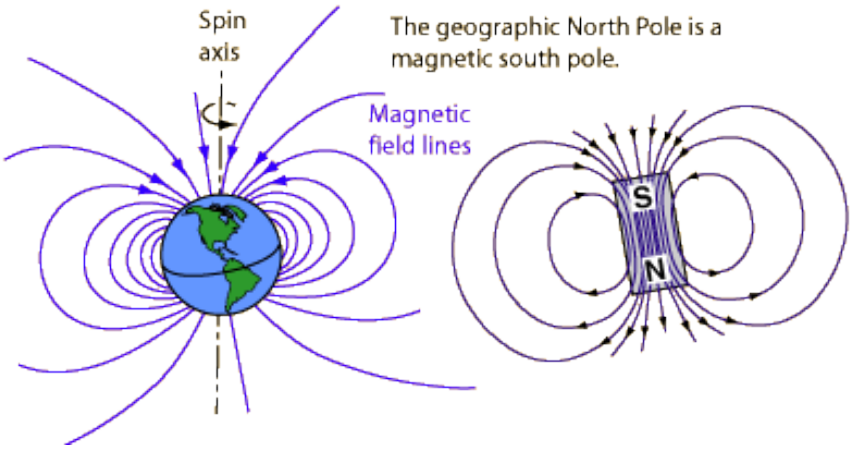
3. Drop your cork compass (the magnetized needle attached to the cork) into the bowl of water. Observe what the needle does. Let the needle settle and then use the regular compass to determine which direction the needle is pointing. (Note: Be careful to keep the magnet wand away from both the compass and the needle when it is in the bowl of water!) Record your results—does your needle point north, south, east, or west?
4. Repeat this process four or five times to see if your results are consistent. Record your results each time. Between each test, you may need to repeat step 1 to re-magnetize your needle. (Note: You don't have to take the needle off the cork to re-magnetize it; you can just rub the needle against the magnet).
5. After you've tested your cork compass, see what happens when you bring the magnet near the needle when it is in the water. Does it change the direction the needle points? Why do you think this happens?

STEM Explanation:

What direction did your needle point most often? It should have pointed north. Compasses work by finding the Earth's naturally occurring magnetic fields. Magnetic fields are the 3D force fields around a magnet, and they are strongest at the ends of a magnet (the poles). The Earth acts like a gigantic magnet, and it has a magnetic north and a magnetic south pole. The magnetic poles are the opposite of the geographic poles that we normally think of. This means that the place we call the North Pole is actually the magnetic south pole! The needle of your compass is a magnet that has the ability to move around, and the needle always points north no matter which way you turn. When you created a compass with the needle and cork, you had to magnetize the needle by rubbing it against a magnet so that it could find the Earth's magnetic fields, just like a compass you find at a store.



http://hyperphysics.phy-astr.gsu.edu/hbase/magnetic/imgmag/mearthbar.gif

Career Connection:

Geophysicists study the Earth using gravity, magnetism, electricity, and seismic waves. They study features of the Earth and often help determine if there are environmental hazards in areas such as dam construction sites. They also study the internal structure of the Earth. These scientists use advanced physics and calculus in their daily research.

Resource:

http://www.giftofcuriosity.com/how-to-make-a-compass/