Make a compass

British Science Week 2019 is all about journeys. Embark on an adventure and build your own compass.

What you need

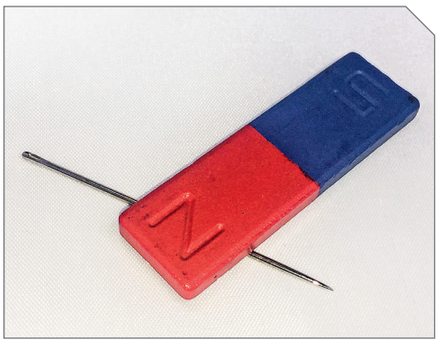
- Needle or pin
- Bar magnet
- Cork
- Craft knife
- Plastic or glass bowl (do not use a metal bowl)
- Water
- Real compass or compass app

WARNING! Ask an adult to help you push the needle through the cork.

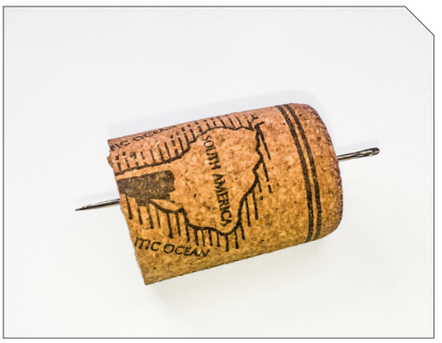
How does it work?

When you pass a magnet along the needle, it becomes magnetised. The needle is made of steel, which means it contains small magnetic fields within it. When the metal is magnetised, all these magnetic fields point in the same direction and the needle now acts like a bar magnet. The cork moves freely in the water, so the needle will line itself with Earth's magnetic field. The Earth's magnetic north pole attracts the needle's south pole.

WARNING! Do not allow magnets, or the compass, close to any technology, such as smartphones.



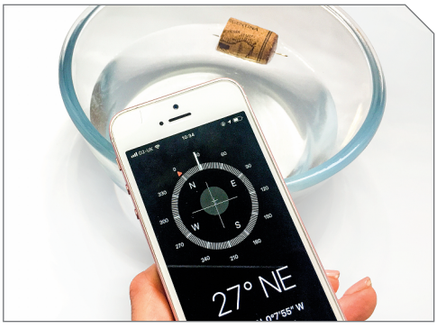
1 Hold the needle at one end. Pass one end of the magnet along the length of the needle as if you were rubbing it. Repeat about 30 times.



2 Carefully push the needle through the cork. Trim the cork with a craft knife if the needle is not long enough to poke out from both ends.

3 Fill a bowl with water. The bowl must be plastic or glass and not metal (this experiment won't work with a metal bowl).

4 Place the needle and cork on the water gently. Once the water settles (a minute or so), the needle should turn to point north–south.



5 Use a real compass or compass app to check that your homemade compass is pointing in the correct direction.

The Earth's magnetic field

A magnetic field is a zone of force around something magnetic. You cannot see it, but you can see its effects on magnetic material. Earth's magnetic field is made by currents within the planet's liquid-metal outer core.