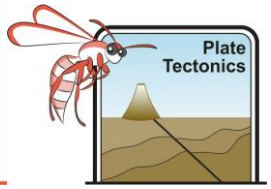
Make Your Own Compass – Teacher Notes



We can find our way using a compass, a map or street directory or even an app in our mobile phone.

How else can you tell where North is? Bush wise students can also tell North by the Sun and shadows, the stars and using the hands of their watches

Navigators and adventurers such as Genghis Khan used to find their way by floating a magnetised needle on a piece of paper or parchment on a dish of water. As long as the paper remains dry the needle will respond to the lines of magnetic force generated from the Earth's core. It will always align North/South.

Temporary magnetism can be induced by stroking a metal object with a bar magnet. The needle should be stroked in one direction only. The magnet will align the outer electron "sea" of the metal.

AIM **To make a simple compass**

MATERIALS per student or group

- A pin or safety pin
- A small piece of paper
- A beaker half full of water or half a Petri dish full of water
- A bar magnet
- Masking tape
- Thread

METHOD

1. Half fill the beaker with water.
2. Thread the pin through the paper.
3. Gently stroke the pin twenty times with the bar magnet.
4. Let your needle float and note the direction to which it points.
5. Turn the beaker through 90 degrees and note what happens.
6. Turn through a further 90 degrees.

OBSERVATIONS

First position	Turned through 90^0	Turned further 90^0
N S	N S	N S

What happened to the magnetised needle when the beaker of water was rotated?

The beaker rotated but the needle maintained its alignment

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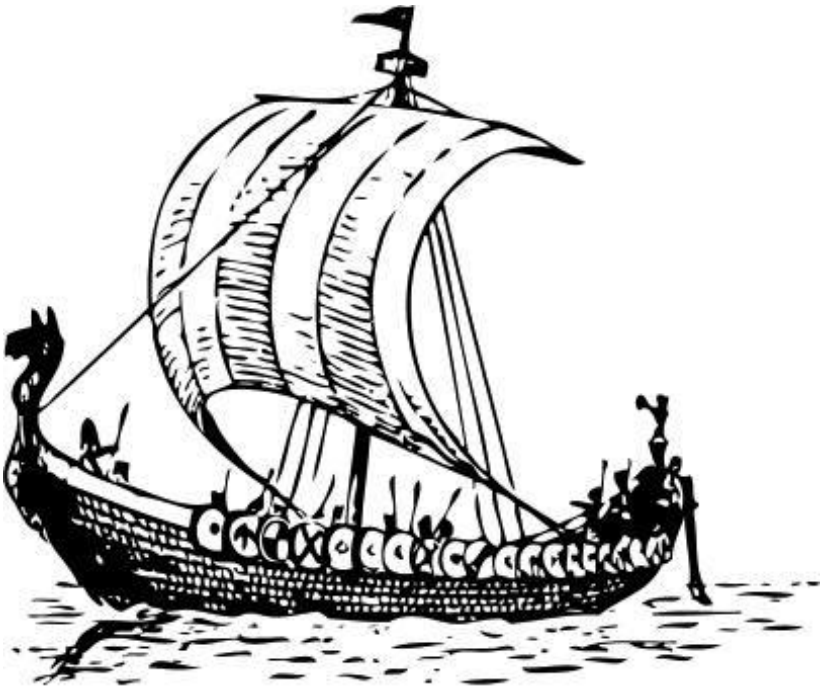
Explain why we had to push the needle throught the paper. A metal needle will sink if placed on water. It is denser than water. The paper increased the apparent surface area of the needle to decrease its pressure on the surface of the water. Surface tension was maintained and the needle was able to float.



Early seafarers used this technique to find magnetic North and calculate their direction of travel. They used a magnetised piece of metal or a piece of the mineral magnetite. The device was called a lodestone (leading stone)

Extension

By measuring the orientation of magnetic minerals in rocks we can locate the position of the poles at the time they crystallised.

Our magnetic poles are not the same as our fixed geographic poles. Magnetic poles "wander" in loops of about 80 km a day. Presently our "North Pole" has changed position by 1120km over the last 150 years. Interestingly out poles have "flipped" over hundreds of times in our geological past, most recently during the Stone Age about 780,000 years ago and there is some evidence we may be entering another reversal. The exchange of North and South poles takes between 1,000 and 10,000 years to occur. These events have been mapped and no relationship between them and catastrophic events such as extinctions has been noted. NASA has modelled the effect on our magnetosphere, which shields Earth from cosmic radiation, because any change in the magnetosphere would affect global communications. Interested students may wish to research "The Carrington Solar Storm"

The recent Aceh earthquake caused measurable movement of both our axis and magnetic poles.
The Sun's magnetic poles flip every 9 to 12 years.
Information on Polar Reversals can be found at:
http://www.livescience.com/18426-earth-magnetic-poles-flip.html