LEARNING RESOURCE

MAKE A COMPASS

MAGNETISM RESOURCE 2

MATERIALS

- Corks or craft foam
- Sewing pins (1 per child)
- (Bar) Magnets (1 per child)
- Dish or paper plates
- Felt pen of marker
- Strong glue
- Water

PREPARATION

If using cork, you will need to slice up in advance. A craft knife is usually fine to do this.

If using craft foam (usually available in A4 sheets) we recommend cutting into squares, approx. 2cm x 2cm, then giving the children a penny each to place on top and draw around.

You may wish to spend some time at the beginning talking about north and south poles attracting each other and north and north, or south and south, repelling each other.

Let the class know that the Earth is like a giant magnet, with a north and south pole and a magnetic field.

COOL FACTS:

- It is the Earth's magnetic field (called the Geomagnetic field) that protects us from solar flares; we can sometimes see when solar flares are active as it lights up the magnetic field. We call this phenomena "The Northern Lights" or Aurora Borealis.
- Although we call the top of the globe the North pole, magnetically speaking it is actually the South Pole.
- The Earth's magnetic field is not actually at true north; it is about 10 degrees out of sync from our rotational axis, with the geomagnetic pole being somewhere near Greenland.

ACTIVITY INSTRUCTIONS

If using the craft foam, start by getting the children to use a penny to draw around to create a circle, then cut it out.

1. Leave foam or cork to one side for a moment and give each child a magnet and sewing pin/needle.
2. Demonstrate that they will need to hold one end of their pin/sewing needle and choose which end of their bar magnet that they want to use – remind them that we want our magnet to point north!
3. To magnetise a piece of metal we should always stroke the magnets along the same direction; not rub it back and forth, and we should always use the same pole of our bar magnet. We recommend that they hold the south pole of their bar magnet, so that they can rub the north pole along the sewing pin/needle. Start with the magnet next to the tips of fingers holding pin/needle and rub away from hand to the tip of the needle, then lift up and away and start again with magnet near finger tips.
4. The reason for the above method is that the molecules of magnetic materials are like tiny little magnets, but their poles are all pointing in different directions, working against each other. We need to coax them all into facing the same direction, using our magnets, which is why we need to keep stroking it the same way, over and over again.
5. Repeat many, many times – you can have paperclips on tables to test magnetism; they won't be able to lift paperclip with magnetised needle but it will "stick" momentarily. The longer you repeat this the longer and stronger the magnetism of your needle will be. They will need to do this for at least 5min. (There are some great YouTube videos about magnetism that can be a great way of occupying the class while doing this bit of the activity).

6. Once the needles are magnetised use a small drop of strong glue, as close to the centre of the circle of foam as possible, then place the needle onto of the glue, so that an even amount sticks off either end of the shape. Leave to dry.

7. Will the glue be drying the children can prepare the base of their compass – paper plates are good for this bit, or see below for further suggestions. Get the children to mark 4 points on their plate, each of them 90 degrees around from the next one; they can use protractors, or guesstimate according to your time frame.

8. Draw in the N, E, S and W, moving clockwise around the markers/plate.

9. Pour a small amount of water onto each plate, just enough to level out at the lip.

10. Once needle is dried and stuck to the foam shape, place needle side up into the centre of the plate (make sure the water is deep enough for the foam to float) and see what happens.

SUGGESTED EXTENSIONS

- There are always experiments that you can try with this activity.
- Try moving a magnet around the edge of your dish, does it make the needle move? How close does it need to be to work?
- Try different shaped foam shapes, do they work as well as a circle? Can it float in other liquids as well as it does water?
- If you add oil, soap or food colouring to the water, does it change the way the needle moves? Does it need to be in liquid at all/ Would it work as well if it was suspended on a piece of thread?
- Does it have to be a sewing pin or needle that you use of could something else work better – gardening wire, paperclip etc.
- Does anything happen if your compass gets close to another compass? (if using petri dishes you can try stacking them up, to see if they all point in the same direction).
- Can you use your compass to help you follow a set of instructions (treasure hunt or orienteering) and follow an invisible route around the school – can you make notes about each of your destinations to make sure you were on the right track?

- What sort of things, other than magnets, might interfere with the way your compass works? How can you test this?

- If after your experimenting, you wanted a more durable compass that you could take outside (maybe try using them for orienteering around the school field or playground) then you could try enclosing them in a petri dish.
- Use the bottom of the petri dish to draw around to create a circle (on which can draw the 4 points of the compass, or 8, or more), then using tape, stick to the outside bottom of the petri dish, so that the writing is in contact with the bottom of the dish and can be seen from the inside.
- Carefully pour water into the bottom of the petri dish, until it is ¾ full then place needle and float on top.
- Carefully apply silicon or bathroom sealant to the inside edges of the lid of the petri dish. It may require 2 people for this jobs as the line of sealant needs to be fairly thick and steady and it is difficult to turn the lid while applying squeezy sticky stuff.
- Immediately place lid on base and leave overnight (at least) to dry.