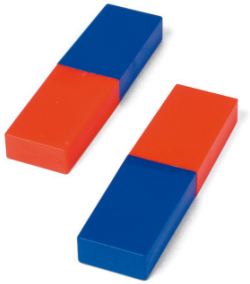
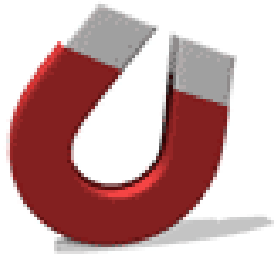
43 - Magnetism



What is a magnet?

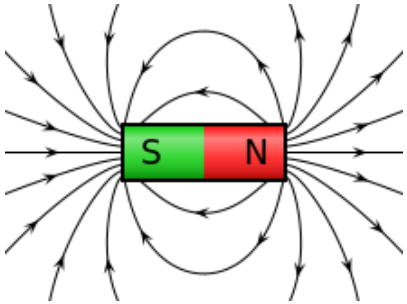


A magnet is a piece of metal that can attract other substances to it.

Only **Iron**, **Nickel** and **Cobalt** can be magnetised.
Magnets can also be made out of Steel (Iron in it) and Alnico.

Attraction and Repulsion

The strongest part of a magnet are at it's **ends.**



These ends are called

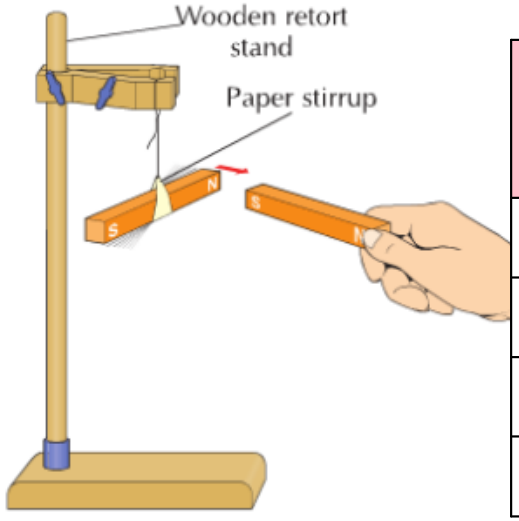
Iron in your food?

Iron is added to some of your foods, e.g. **cereals.**
This helps form **haemoglobin.** This chemical carries **Oxygen**.
If you're low in Iron you can be **anemic.**
This means you are usually **pale** and **dizzy**.

We can test for Iron in your food using a magnet!

Attraction and Repulsion

We can set up an experiment to investigate Poles. We **hang a magnet** so it can move freely and then we put another magnet near it to see what happens.

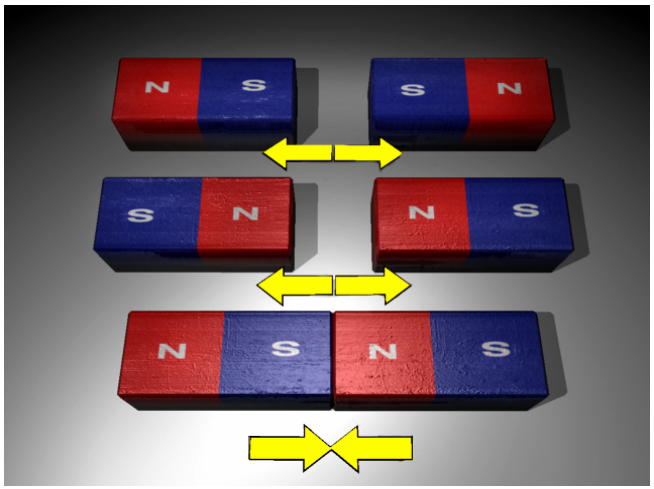


Hanging Magnet	Second Magnet	Result
North Pole	South Pole	
North Pole	North Pole	
South Pole	South Pole	
South Pole	North Pole	

Results

Opposites Attract but similar things repel!

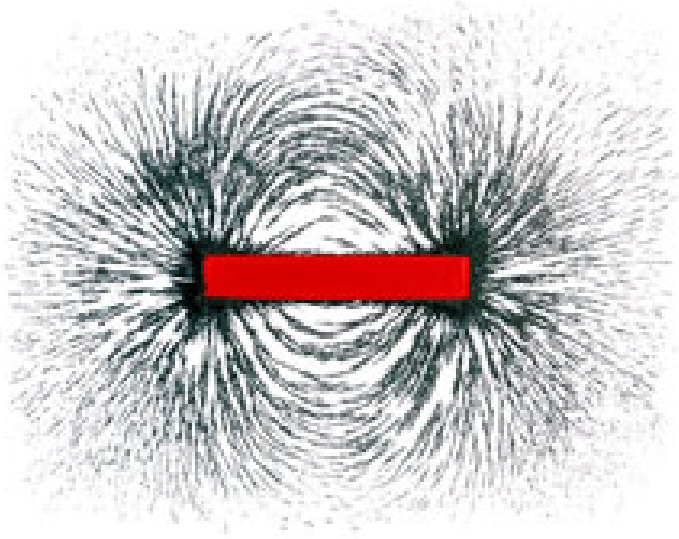
Like poles repel each other; unlike poles attract.



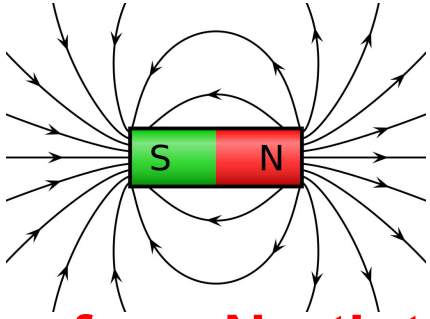
The true test for a magnet is repulsion

Magnetic Fields

A magnetic field is the space around a magnet over which it has a magnetic effect.



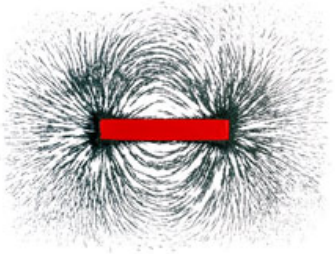
To Plot the Field of a bar magnet using Iron Filings



Which way are the field lines flowing?

Field lines always flow from North to South (like Santa!)

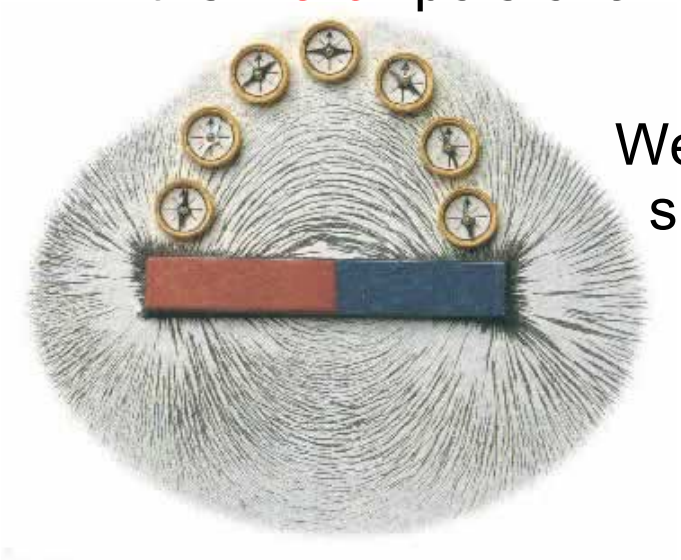
1. We can place a magnet under a piece of paper.
2. We then carefully pour iron filings onto the paper and tap it.
3. The iron filings should then show the **magnetic field lines**.



To Plot the Field of a bar magnet using Compasses

A compass is a magnet, which is free to rotate and indicate direction.

A compass will always point towards the **North** pole of a Magnet

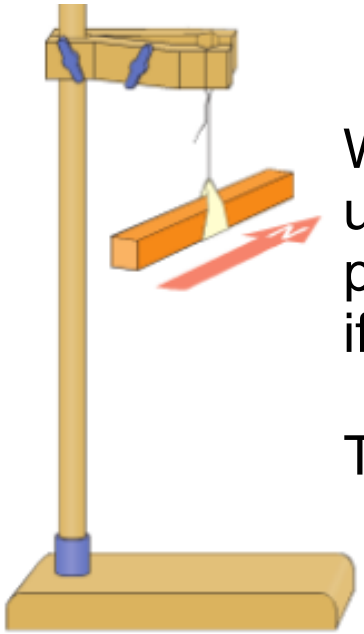


We can repeat the experiment using lots of small **compasses** instead of Iron Filings.

Simulation

Compass

To make a compass you need a magnetised **needle**.
Attach it to some cork and float the
cork in water. The needle should point north.

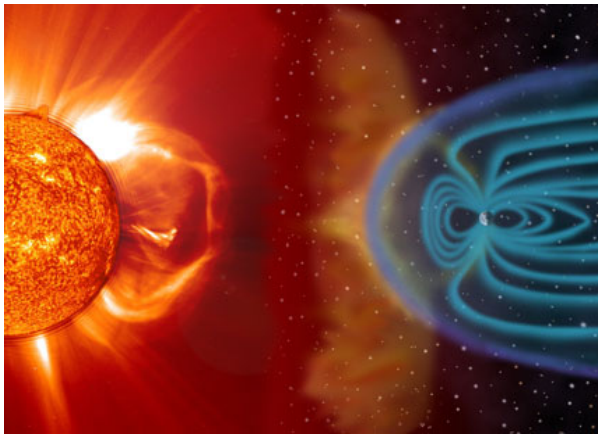


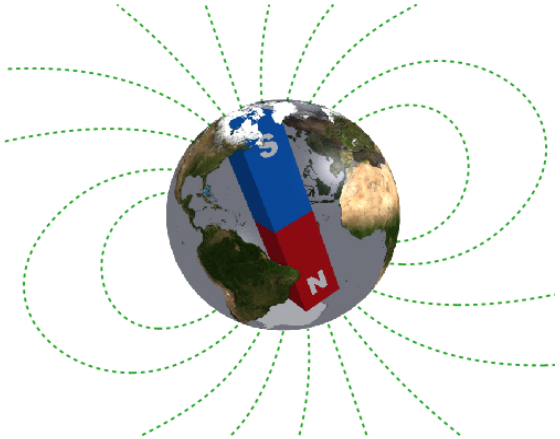
We can repeat the experiment using a magnet instead. It will point in a north/south direction if allowed to move freely.

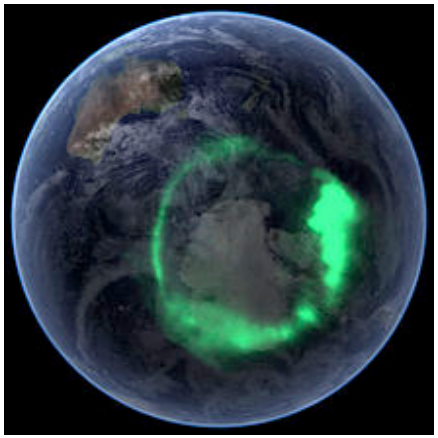
The magnet is responding to the **earths magnetic field**.

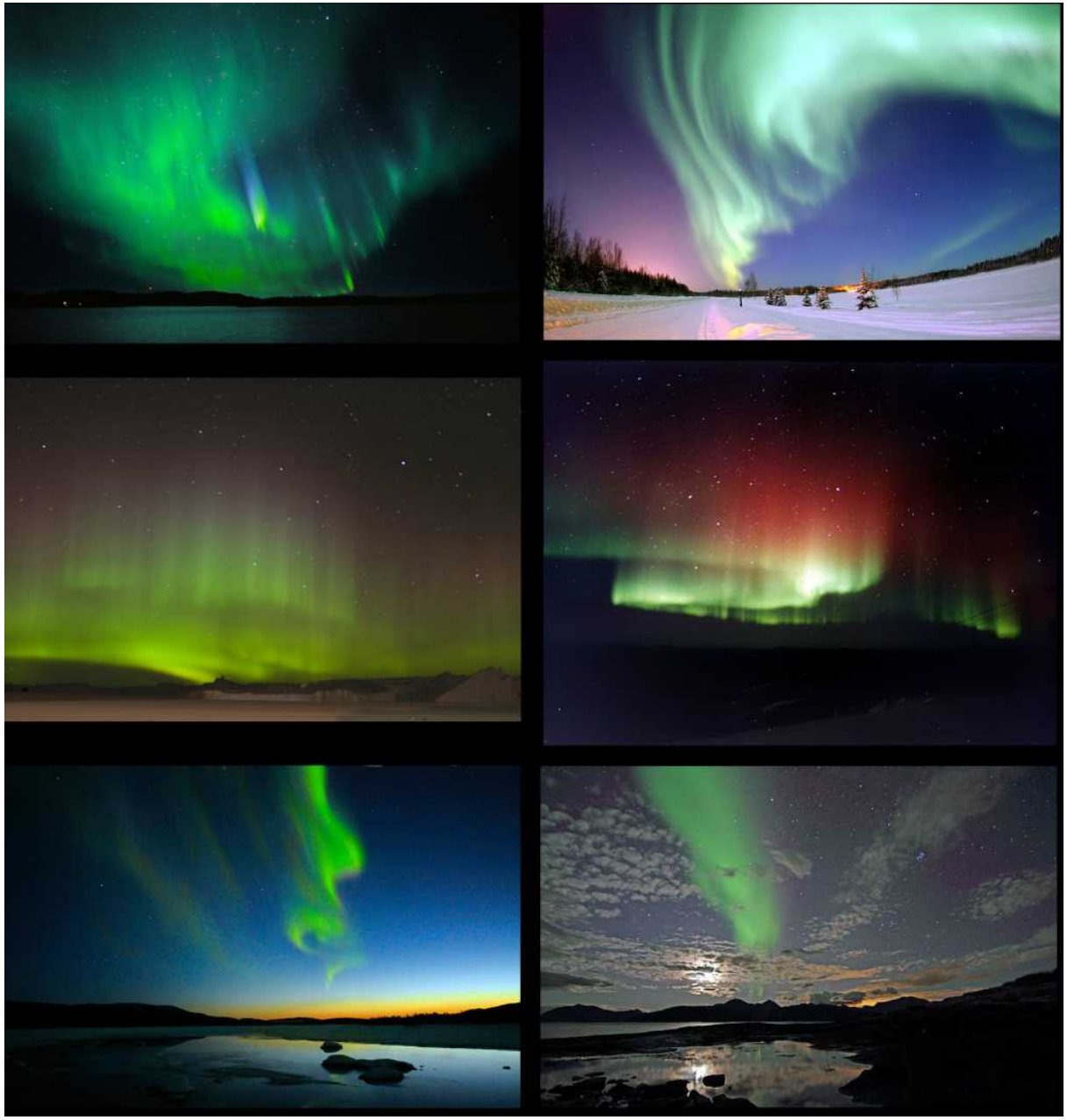
The Earth as a Magnet

The earth has an **iron core** which acts as a magnet.
It seems to have North and South **poles**.
This creates a **Magnetic field** around the earth.
This field protects us from cosmic winds from the sun.
We can see these rays when they hit the Magnetic field
as **Northern** and **Southern Lights**.



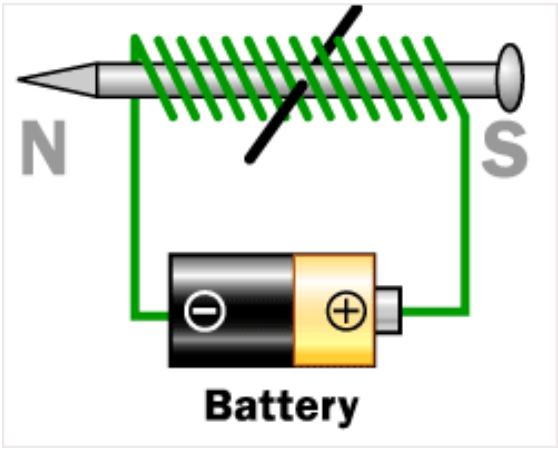




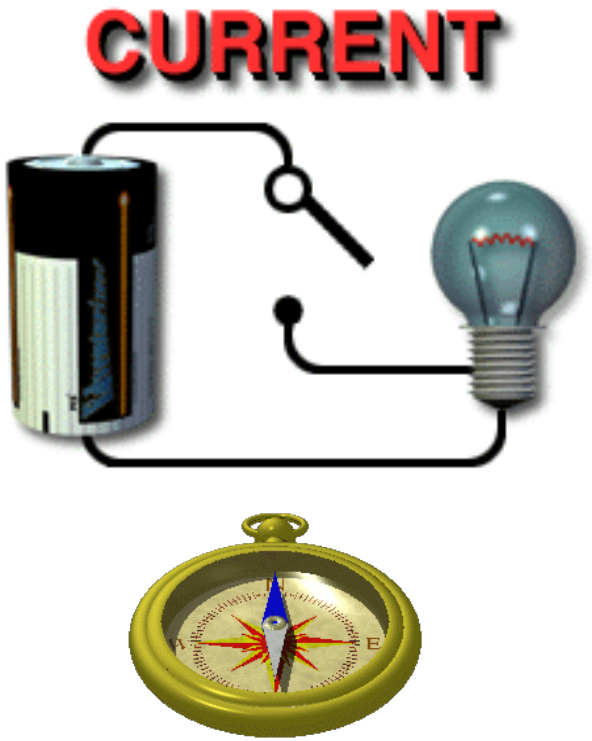


Electromagnets

An electromagnet consists of an **iron rod** (nail) with insulated **wire** wrapped around it.
When the wire is attached to a battery the iron rod becomes a magnet.
When it's switched off, the rod stops being a magnet.



Electromagnets



An electric current flowing through a wire creates a magnetic field.

We can test for this field by putting a compass near the wires.

It should point at 90^{o} to the wire if the current is flowing.

Uses of Magnets

Magnets can be used as **compasses.**
Are used in hospitals to do **scans.**
Electric motors used in doorbells, amplifiers, telephones, **computers.**
Used in fridge doors and motors.
Used in **credit cards**.

Attachments

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