5.6 simple phenomena of magnetism

Properties of magnets

Magnets can attract to any material that's has either iron, cobalt, nickel or their alloys(steel). They are called ferrous (ferromagnetic) materials. Other materials that do not contain magnetic dipoles are non-ferrous materials.
Magnets have poles and in the magnet we have small molecular magnets/ dipoles.
Domains are a area where magnetic dipoles are. (they are dived).
Like poles repel each other , domains within point in different directions.
Unlike poles face each other magnetic effect of the domains reinforced each each other.
When dipoles are aligned are induced magnetism.

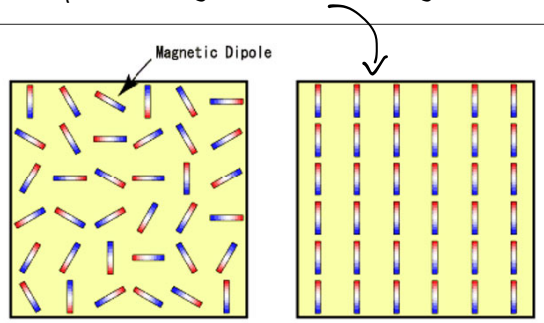


Figure (a) on the left
All materials are to some degree are magnetic as they include magnetic dipoles
Figure (b) on the right
Magnetic materials exhibit strong magnetism, lining all dipoles in one direction

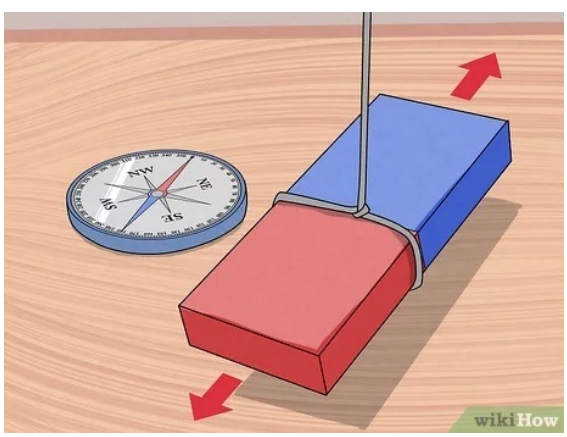
You can destroy a magnet by:

- Heating it or by
- Continually dropping it.
- Hitting it very hard

A magnet has two poles, nort-seeking pole (north Pole) and south-seeking pole (south Pole).

When a bar magnet is suspended from a piece of string , the magnet comes to rest in a north- south direction. Due to the magnetic field of the earth. Magnetic poles repel one another and unlike magnetic poles attract one another.

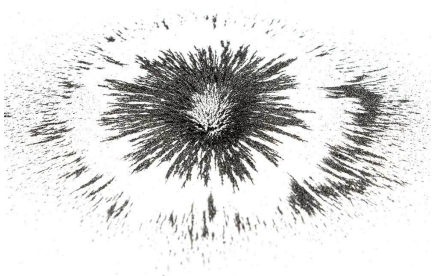
The working of a compass on this behavior of a magnet.



Magnetic field lines

Around any magnet there is a space in which it can attract ferrous materials. The space is called the magnetic field of a magnet.

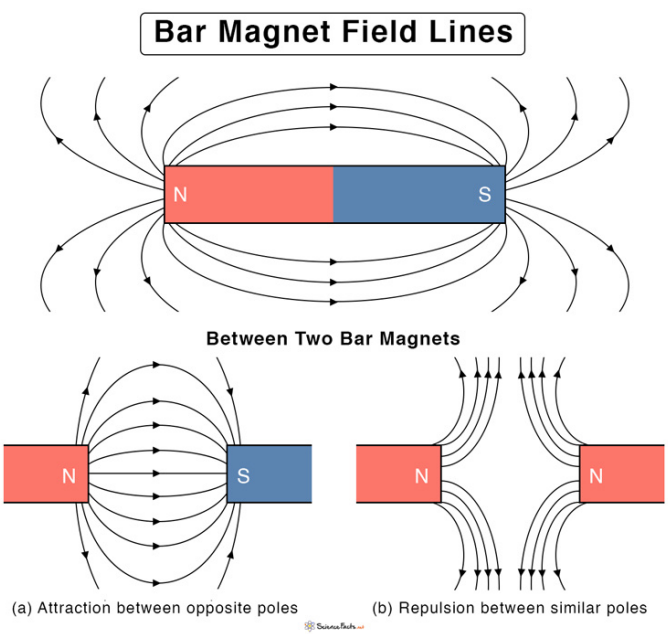
To illustrate this you can place a paper over a bar magnet and sprinkle some iron fillings onto the paper. You will notice that the iron fillings from a very particular pattern, which indicate the magnetic field lines.



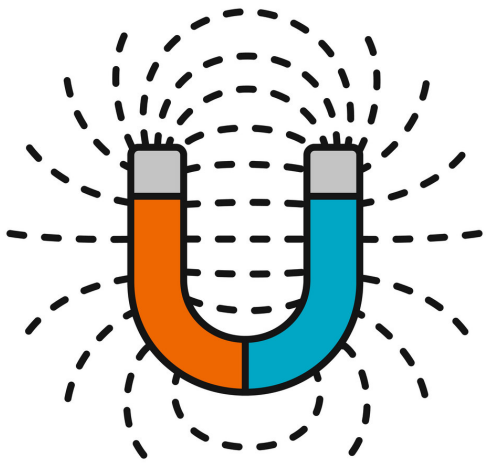
Where the lines are closer, the magnetic filed is stronger.

Field lines for bar magnet:

Like magnetic poles repel one another and unlike magnetic poles attract one another.



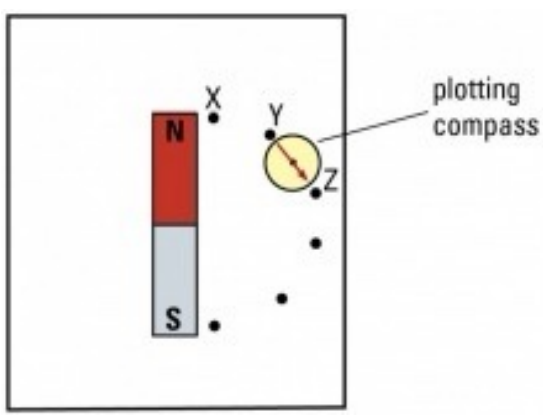
Field lines for a horseshoe magnet:



Magnetic fields can be mapped out using small plotting compasses:

1. place the plotting compass near the magnet on a piece of paper
2. mark the direction the compass needle points
3. move the plotting compass to many different positions in the magnetic field, marking the needle direction each time
4. join the points to show the field lines
5. The needle of a plotting compass points to the south pole of the magnet.

A bar magnet with magnetic field lines curving round from the north to south pole. Five small plotting compasses sit on the top line on either side.



Induced magnetism

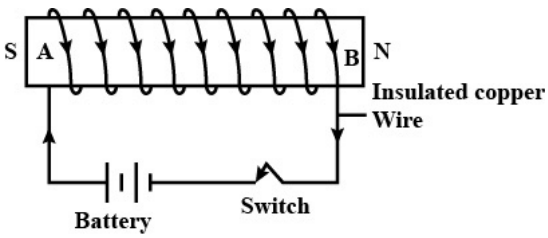
Permanent magnets

Permanet magnets- retain their magnetism once magnetized. Are ferromagnetic materials such as iron, nickel and cobalt. Refferd as a hard magnet.

To make a permanent magnet, a steel rod can be used with another permanet magnet in one direction.

Another way to make a permanent is to put steel rod in a coil of wire (solenoid) and connect it to a d.c. supply which is switched on and off at regular intervals.

To make a strong magnet you cane use a large current, or a long solenoid with many turns.



Electrical method

Some uses of permanent magnets:

- Remove iron objects from people eyes
- Put up notices on magnetic boards
- Keep the refrigerator doors closed by fitting magnetic strips

Temporary magnets

Temporary magnets- materials that perform like permanent magnets when they are in the presence of a strong magnetic field but lose their magnetism once they are removed from the field, such as an electromagnetic, paper lips and nails.

Paper clips made from iron, becomes magnetised when attached by a magnet. Each paper clip behaves like a magnet and can therefore attract the next one. This is called induced magnetism.

When the magnet is removed from the paper clip on top, loses its magnetism quickly and the other paper clip falls off. Steel becomes permanently magnetized.

- Hard magnetic materials
  - Permanent
  - Alloys of ferro materials (steel)

- Soft magnetic materials
  - Temporary (electromagnets)
  - Pure elements