



Keywords

Word	Definition
Attraction	When two magnetic fields pull towards each other
Electromagnet	A device that becomes magnetic when an electric current is switched on.
Field	A region of space where magnetic force can be felt or detected.
Repulsion	When two magnetic fields push against each other.
Solenoid	A coiled wire with a current flowing that has a magnetic field the same shape as a bar magnet.
Pole	A north or south pole is the end of a magnetic object where the fields lines are closest together and the field is strongest there.
Permanent Magnet	An object which produces its own magnetic field and it is always there.
Induced Magnet	An object that becomes magnetic when it is placed in a magnetic field.

Magnetic Fields

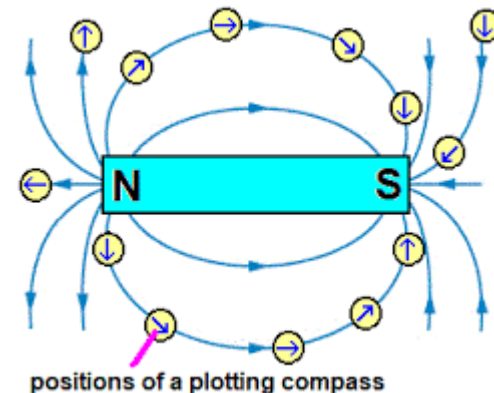
Iron, Nickel and Cobalt are naturally magnetic metals. They produce a magnetic field shown in diagrams by field lines. Field lines show the direction of the force that would act on a north pole at that point. They always point from **NORTH** to **SOUTH**. The closer together the lines are, the stronger the magnetic field is.

Key Skills

Draw the field around permanent and electro- magnets.
Explain how to increase the strength of a magnetic field.

Plotting Magnetic Fields

A magnetic compass contains a small bar magnet that will line up with magnetic field lines pointing from north to south. This can be done around a permanent magnet or electromagnet.



Attraction and Repulsion

The force between an induced magnet and a permanent magnetic is always attractive. (It doesn't matter which pole of the permanent magnet is used).

If the induced magnet is removed from the magnetic field it will quickly lose most or all of its magnetism.

Electromagnetism

If an electric current flows through a wire (or other conductor) it will produce a magnetic field around the wire.

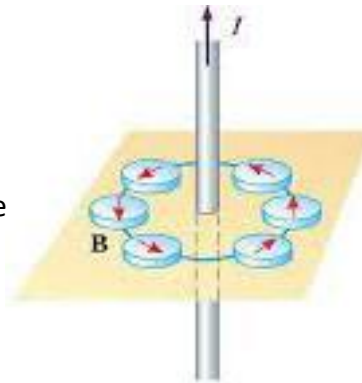
The field strength will increase:
-with greater current
-closer to the wire.

Reversing the direction of current will reverse the direction of the field.

Field around a straight conductive wire

The field around a straight wire takes the shape of concentric circles at right angles to the wire:

If the wire was gripped by someone's right hand so that the thumb pointed in the direction of the flow of current, the fingers would curl round in the direction of the magnetic field.



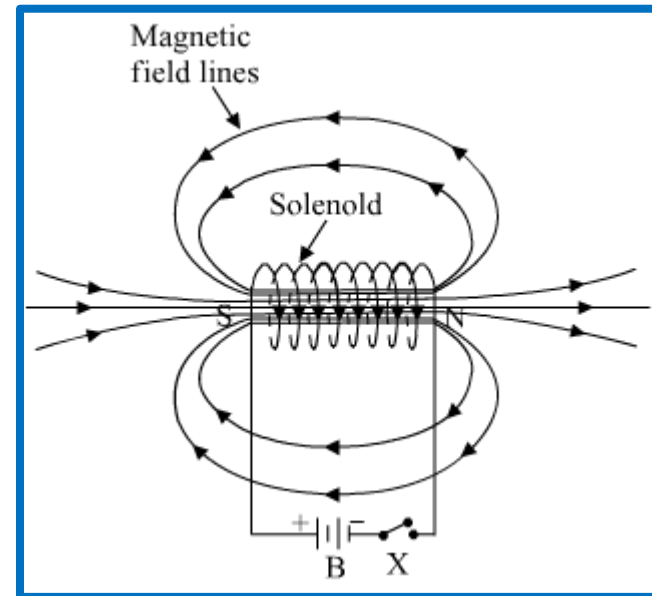
Solenoids

A solenoid is a cylindrical coil of wire. Bending a current carrying wire into a solenoid increases the strength of the magnetic field produced. The shape of the magnetic field around a solenoid is similar to the shape around a bar magnet.

Inside a solenoid the magnetic field is strong and uniform, which means it has the same strength and direction at all points.

The strength of the magnetic field round a solenoid can be increased by putting an iron core inside it.

Electromagnets like solenoids can be turned on and off.



Pathway

Previous knowledge: balanced/unbalanced forces; simple magnetic fields

Future links: Motor rule

Careers: Motor design

Cross curricular links