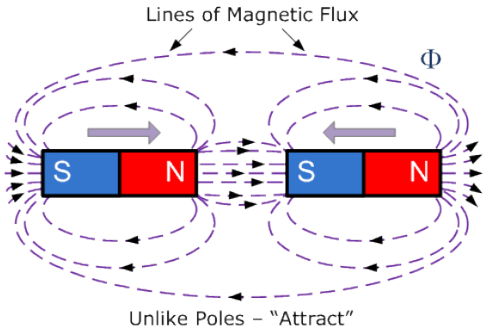
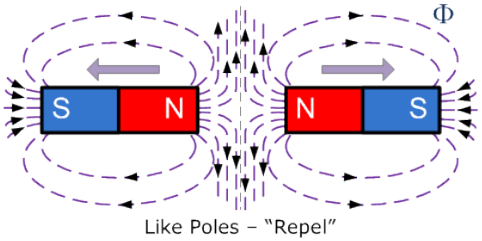
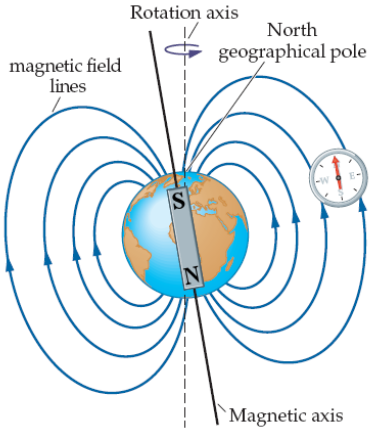
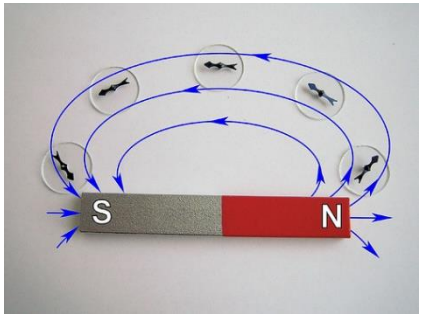


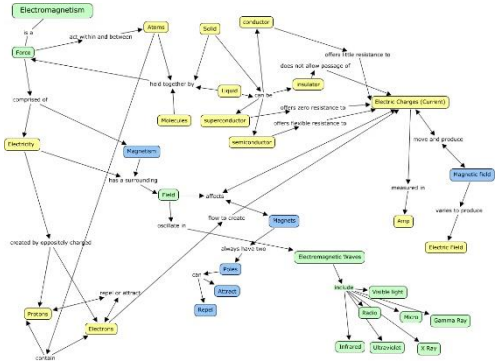




## 30 Quick questions: Answer these in your book

1 Where are the magnetic forces strongest in a magnet?
2 What happens when two north poles are brought near each other?
3 Which poles attract each other?
4 Is magnetism a contact or non-contact force?
5 What does a permanent magnet do that an electromagnet doesn't?
6 A material that becomes a magnet when placed in a magnetic field is known as what?
7 Can induced magnetism be both attractive and repulsive?
8 Which metal is useful as an induced magnet?
9 Is steel a good choice to make an electromagnet?
10 How could you make an electromagnet in a school laboratory?
11 A region around a magnet where a force acts on another magnet or on a magnetic material is known as what?
12 What 3 elements can be magnetised?
13 Can a magnetic field repel a magnetic material?
14 What happens to the strength of a magnetic field as you move further away from a magnet?
15 In which direction do magnetic field lines point?
16 What does a navigating compass contain?
17 Why does a navigating compass work?
18 Draw the magnetic field lines around a bar magnet. Include arrows to show the direction of the field.
19 How could you produce a magnetic field around a conducting wire?
20 How is the strength of an electromagnet related to the current flowing through the wire?
21 What is a solenoid?
22 How does making a coil (solenoid) out of a piece of wire affect the strength of the magnetic field?
23 How could the strength of a magnetic field be increased in a solenoid?
24 What do we call a solenoid with an iron core?
25 Draw the magnetic field lines around a solenoid
26 Draw the magnetic field pattern around a current carrying wire
27 Why is copper wire used in electromagnets?
28 How could you plot the shape of a magnetic field?
29 When testing an electromagnet with paper clips, why do some of the clips cling on when the current is switched off?
30 Where are electromagnets used?

# Module 7 Electromagnetism
# FOUNDATION

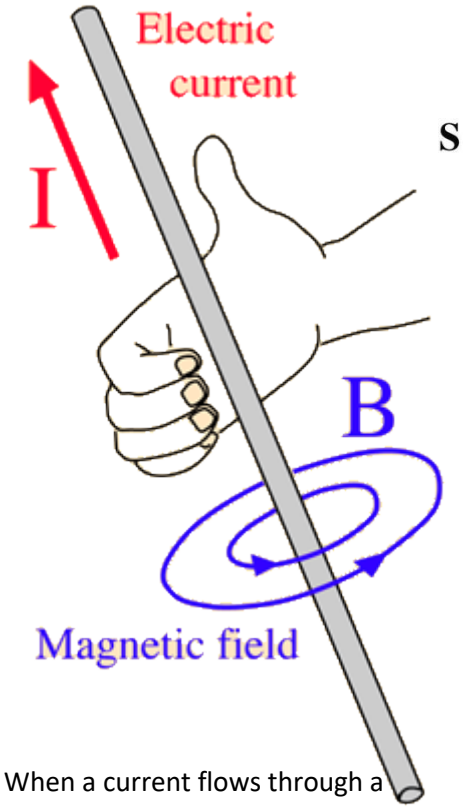
## Knowledge Organiser



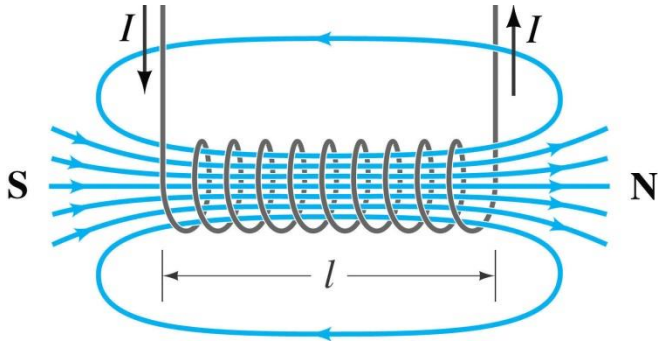
Name:

**KEY WORDS/IDEAS TO REMEMBER**

**Attract**
**Repel**
**Induced magnet**
**Permanent magnet**
**Poles**
**Magnetic field**
**Electromagnet**
**Solenoid**
**Compass**
**Current**
**Strength**

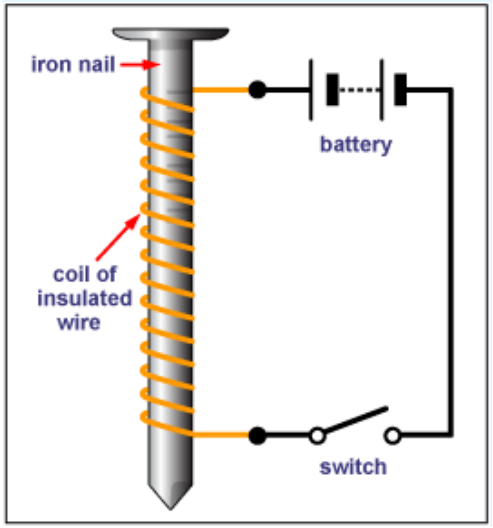



When a current flows through a conducting wire a magnetic field is produced around the wire. The **strength** of the magnetic field depends on the **current** through the wire and the **distance** from the wire. You don't need to remember this bit but as the picture shows, if you use your right hand and point your thumb in the direction of the current (positive to negative), the field will be shown by the curve of your fingers. Cool eh!? Is the field above going clockwise or anti-clockwise?




There is a strong and uniform magnetic field inside the **solenoid**. Compare this field shape with the one around a bar magnet on the other side of this sheet. They are very similar.

Iron is a material that can become an induced magnet if it is in a magnetic field. An electromagnet used in a scrapyard can lift up to 15 tonnes of metal! When the current is switched off the magnetism will also 'switch off' and whatever the electromagnet was holding will be released. Steel is an alloy that contains iron and can therefore be magnetised but it does not lose its magnetism easily so is not a suitable metal to use in an electromagnet.




Electromagnets are used in motors and motors are used in most things that have moving parts!

Diagrams on the front flap:

The magnetic field lines (known as magnetic flux) around magnets that are attracting and repelling.

The Earth's magnetic field showing how it behaves as if there is a gigantic bar magnet inside it.

Plotting compasses showing how the field lines go from north to south.


A simple electromagnet can be made by coiling a copper wire (solenoid) round an iron core (like a nail or bolt shown above). This induces magnetism in the core. The strength of the magnetic field can be increased by: i) increasing the current in the wire; ii) increasing the number of turns on the coil*; iii) Adding the iron core in the first place.

*A **common mistake** is that students say "increase the number of coils." There is only one coil, you need to <u>increase the number of turns</u> on the coil.

Permanent magnets are made from **nickel**, **cobalt** and most **steels** (an alloy of iron and carbon).