

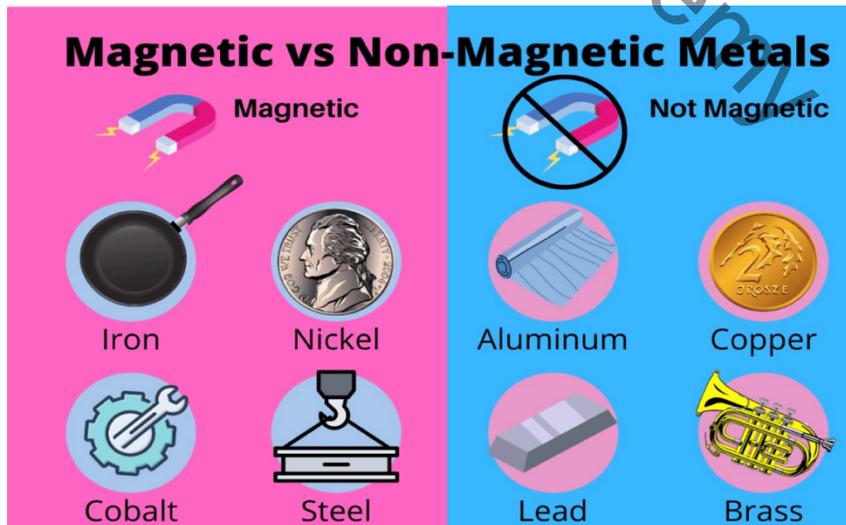
# Magnetism

## Magnetism

Magnetism is the force exerted by magnets when they attract or repel each other.

## Magnetic material

- ▶ Very few metals in the Periodic Table are magnetic. These include:
  - Iron
  - Cobalt
  - Nickel
- ▶ Steel is an alloy which contains iron, so it is also magnetic
- ▶ Magnetic materials (which are not magnets) will always be **attracted** to the magnet, regardless of which pole is held close to it
- ▶ To test whether a material is a magnet it should be brought close to a known magnet
  - If it can be **repelled** by the known magnet then the material itself is a magnet
  - If it can only be **attracted** and **not repelled** then it is a magnetic material



**Types of Magnets**

- There are two types of magnets
  - Permanent magnets
  - Induced magnets

**Permanent Magnets**

- Permanent magnets are made out of permanent magnetic materials, for example steel
- A permanent magnet will **produce its own magnetic field**
- It will not lose its magnetism

**Induced Magnets**

- When a magnetic material is placed in a magnetic field, the material can temporarily be turned into a magnet.
- This is called **induced magnetism**
- When magnetism is induced on a material, One end of the material will become a north pole, The other end will become a south pole
- Magnetic materials will always be **attracted** to a permanent magnet
  - This means that the end of the material closest to the magnet will have the **opposite** pole to magnets pole closest to the material

	<b>Permanent Magnets</b>	<b>Induced Magnets</b>
<b>Magnetic?</b>	Always magnetic	Only magnetic when placed into a magnetic field
<b>Attraction or Repulsion?</b>	Both	Attraction
<b>Can they produce their own magnetic field?</b>	Yes	No

**Table 1. Permanent VS Induced Magnets.**

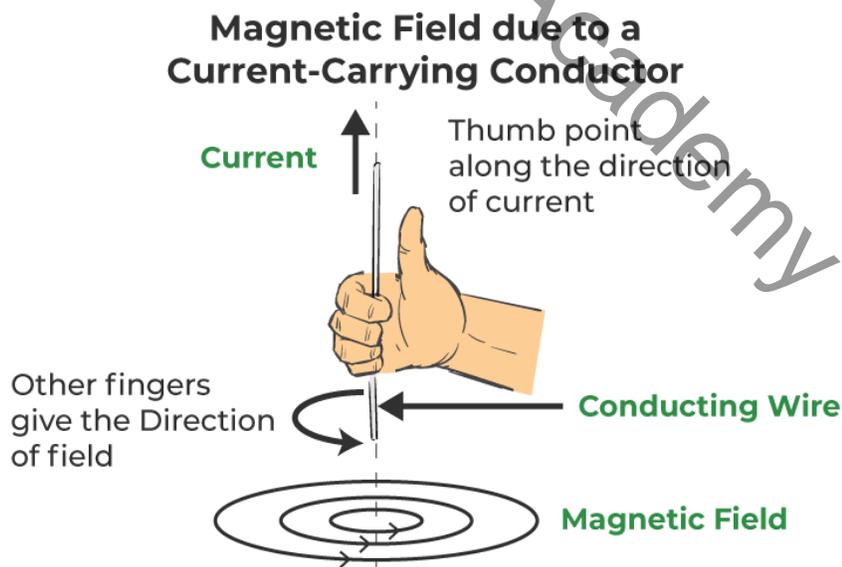
## P7: Magnetism and Electromagnetism ASM Tuition Academy

### Magnetic Field of a Current-Carrying Wire

- When a **current** flows through a conducting wire a **magnetic field** is produced around the wire
- A conducting wire is any wire that has **current** flowing through it
- The magnetic field is made up of **concentric circles** in a plane **perpendicular** to the wire
- The **distance from the wire increases** the circles get **further apart**. This shows that the magnetic field is strongest closest to the wire and gets weaker as the distance from the wire increases

### Right hand Thumb rule:

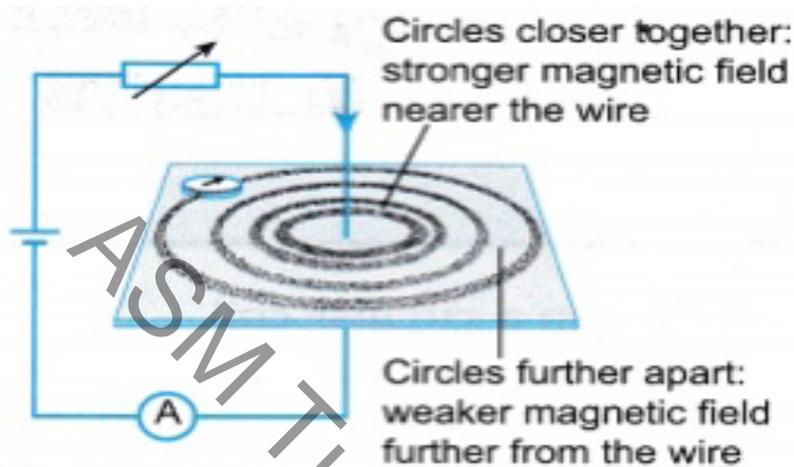
- The **right-hand thumb rule** can be used to work out the **direction** of the magnetic field.
- The **right-hand thumb rule** shows the **direction of current flow through a wire and the direction of the magnetic field around the wire**
- If there is **no current** flowing through the conductor there will be **no magnetic field**
- **Increasing** the amount of **current** flowing will **increase** the **strength** of the magnetic field. This means the field lines will become **closer together**.



## P7: Magnetism and Electromagnetism ASM Tuition Academy

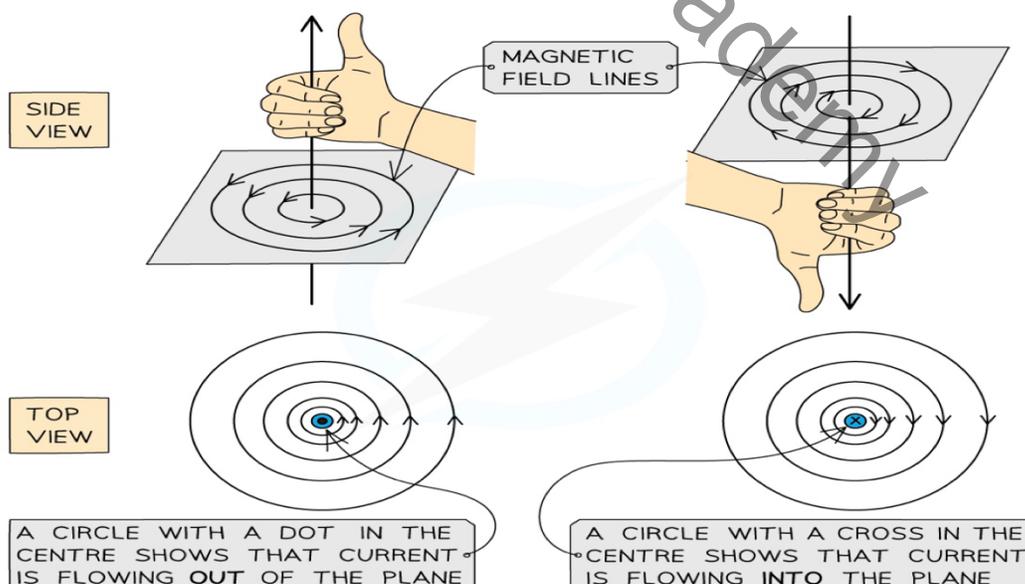
### Increasing the current through the wire

- The greater the current, the stronger the magnetic field. This is shown by more concentrated field lines.



### Changing the direction

- Reversing the direction in which the current flows through the wire will **reverse the direction** of the magnetic field
- This is made by changing the direction of the thumb in the right-hand rule.



ASM Tuition Academy