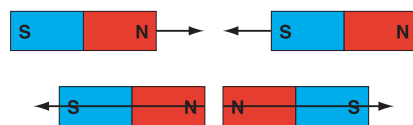


Magnets

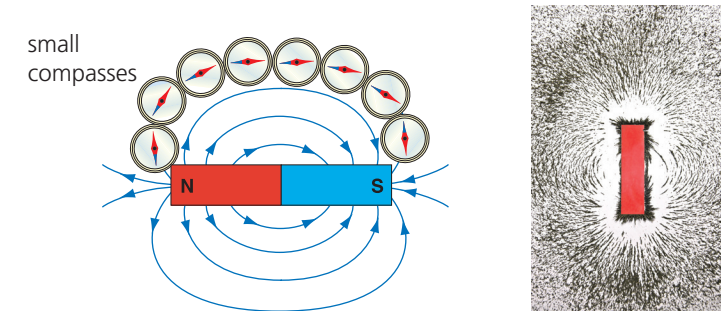
- A **magnet** has two poles, a north and a south pole
- North poles **attract** south poles
- South poles **attract** north poles
- South poles **repel** south poles
- North poles **repel** north poles



- Magnetic materials** will experience a magnetic force when placed near a magnet, this is a type of non-contact force as the materials do not have to touch for the force to be apparent
- The three magnetic metals are iron, nickel and cobalt

Magnetic fields

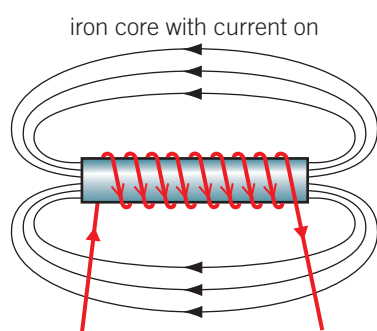
- A **magnetic field** is an area where a magnetic material will experience a force
- A **permanent magnet** will have its own magnetic field
- Magnetic field lines** represent the field, these always travel out of the north pole of the magnet, and into the south pole
- The closer together the magnetic field lines are, the stronger the magnetic field will be
- We can find out the shape of a magnetic field in two ways:
 - Using plotting compasses
 - Using iron filings



- The Earth has its own magnetic field, which acts like a giant bar magnet inside the centre of the Earth
- This magnetic field allows compasses to work when navigating around the Earth

Electromagnets

- Electromagnets** are made by wrapping a coil of wire around a magnetic **core**
- Electromagnets only work when electricity is flowing through the coil, which means that they can be turned on and off
- Electromagnets are also stronger than **permanent** magnets
- The electromagnet will produce the same magnetic field shape as a bar magnet

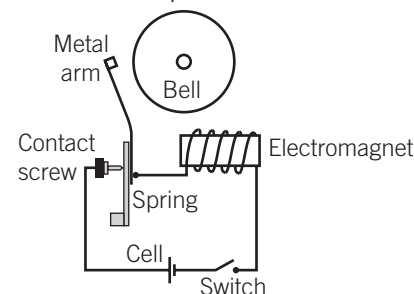


- You can increase the strength of an electromagnet by:
 - Increasing the number of turns on the coil around the core of the electromagnet
 - Increasing the current which is flowing through the coil of wire
 - Using a more magnetic material for the core, e.g. iron rather than aluminium

Using electromagnets

Electric Bells

The electromagnet attracts the iron armature
 ↓
 When it moves, it breaks the circuit, no longer allowing current to flow
 ↓
 The coil and core are no longer magnetic meaning the spring is no longer attracted and returns to its original position
 ↓
 The bell is rung once
 ↓
 The circuit is complete again, restarting the process

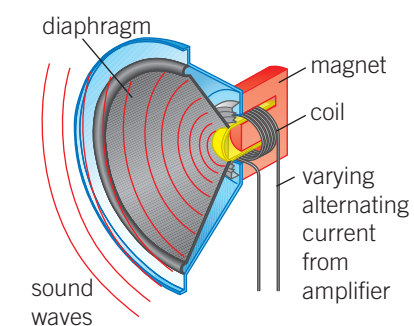


Circuit breakers

- Circuit breakers detect large changes in current in a house, and will break a circuit
- When a large current flows, the electromagnet becomes strong enough to attract an iron catch which will break a circuit
- They can then be reset and used again
- This makes them suitable as an electrical safety device in a home

Loudspeakers

- Loudspeakers use an electromagnet in order to generate sound
- A current passes through the coil and creates an electromagnet, this repels another permanent magnet which moves the cone in and out creating sound



Key terms

Make sure you can write definitions for these key terms.

attract core circuit breaker electromagnet electric bell loudspeaker magnet magnetic pole magnetic field lines magnetic material permanent magnet repel