# Knowledge Organiser: Year 8: - Magnets

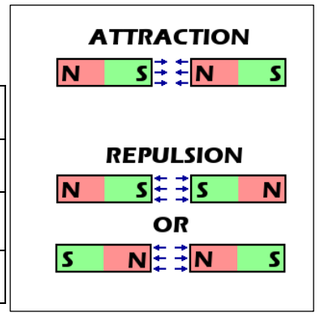
## Section 1: Key Words

| | |
|---|---|
| Magnet | An object that attracts iron, cobalt and nickel |
| Attract | To move towards something |
| Repel | To move away from something |
| Magnetic force | The force exerted between magnets or a magnetic and a magnetic material e.g. iron |
| Magnetic pole | Magnets have a north pole and a south pole. Like poles repel but opposite poles attract |
| Magnetic field | a region around a magnetic material or a moving electric charge within which the force of magnetism acts. |
| Core | the piece of iron, bundle of iron wires forming the central or inner portion in an electromagnet |
| Permanent magnet | a magnet that retains its magnetic properties in the absence of an inducing field or current. |
| Electromagnet | a soft metal core made into a magnet by the passage of electric current through a coil surrounding i |
| Solenoid | cylindrical coil of wire acting as a magnet when carrying electric current |

## Section 2: Bar Magnets and Attraction and Repulsion

Bar magnets are permanent magnets

| | | Attract or repel |
|---|---|---|
| North | North | Repel |
| South | South | Repel |
| North | South | Attract |

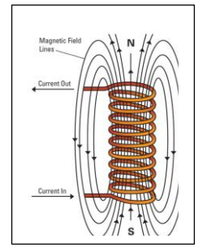



## Section 3: Electromagnets

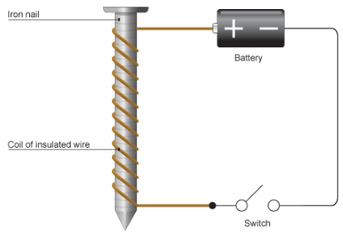
We can pass an electrical current through a wire.

This creates a magnetic field. We call this an electromagnet

Electro = electric magnet = magnet




## Section 4: How to make an Electromagnet




Use a power supply to provide an electrical current to the circuit

Run the current through a coil of metal wrapped around a piece of iron

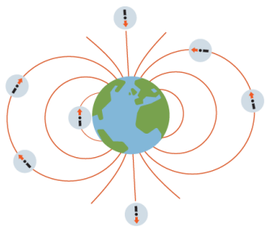
When the current flows the coil will become magnetised.

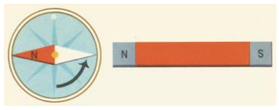
To turn the magnet off, turn the power supply off

## Section 5: Factors Affecting Electromagnets

| Factor | Affect |
|---|---|
| Number of Coils in the wire | Increasing the number of coils will increase the strength of the electromagnet |
| Iron Core | Adding an iron core will increase the strength of the electromagnet |
| Current | Increasing the current through the wire will increase the strength of the electromagnet |

## Section 6: Magnets and Navigation






The Earth behaves like a giant magnet. It produces a magnetic field. The most concentrated magnetic areas are at the north and south poles.

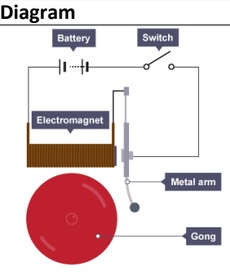
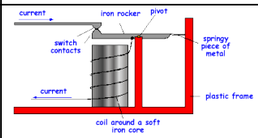
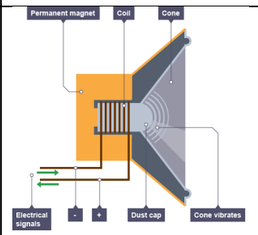
A compass is made using a magnetic needle that is free to move around. The north seeking needle on the compass points towards the Earth's north pole. As a result you always know where North is.

However it points away from the north of a bar magnet

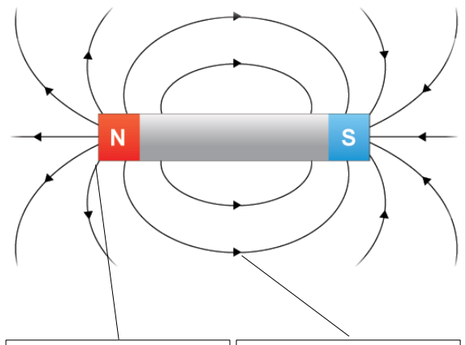
## Section 7: Permanent magnets compared to electromagnets

| Permanent Magnets | Electromagnets |
|---|---|
| Always magnetised | Magnetism can be turned on and off |
| Made from a magnetic material | Magnetism created by passing a current through a wire |
| Constant strength of magnetism | Strength of magnetism can be varied and reverse |
| Doesn't get hot | Gets hot |
| Not affected by power failure | Turn off is power fails |
| | |

## Section 8: Uses of Electromagnets

| Use | Diagram | description |
|---|---|---|
| **Electric bells** |   | When off the metal arm is away from the gong of the bell. When the electromagnet is turned on it attracts the springy metal arm towards the gong. Here is hits the gong and makes a sound. This movement breaks the circuit and turns off the electromagnet. The arm moves away from the gong as it is not being attracted by the electromagnet. The circuit is reset and ready to go again |
| **Circuit breaker** |   | A spring-loaded push switch is held in the closed position by a spring-loaded iron bolt. An electromagnet is arranged so that it can pull the bolt away from the switch. If the current increases beyond a set limit, the electromagnet pulls the bolt towards itself, which releases the push switch into the open position. |
| **Loudspeaker** |   | The electrical current from the amplifier creates the magnetic field around the electromagnet. The changing attraction and repulsion between the permanent magnet's magnetic field and the electromagnet's magnetic field make the electromagnet move back and forth. The speaker cone vibrates back and forth, which generates sound waves. The frequency at which the current changes direction is the frequency of the sound that the speaker produces. |

## Section 9: Magnetic Fields

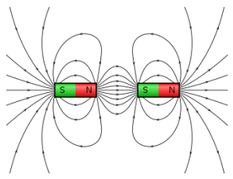



The magnetic field is strongest at the poles, where the lines are most concentrated

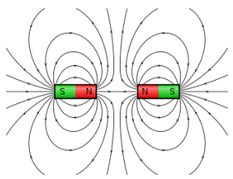
The magnetic field is weakest away from the poles, where the lines are least concentrated

- Magnetic fields can't be seen
- They surround a magnet and attract or repel magnetic materials
- Field lines have arrows on them
- Field likes come out of the north and south poles
- The lines are more concentrated at the poles

## Section 10: Combining Magnetic Fields




When the fields from opposite poles come into contact they attract each other. As a result they combine to form a strong field between the two poles.




When the fields from the same poles come into contact they repel each other. They try to force the objects away from each other