Home learning activities

Years 7, 8 & 9

Subject
Science
Year Group
Year 8
Unit of work / Knowledge organiser
Electricity and Magnets
Activities
• Read through Sections 1-5 of the 'Electricity and Magnets' 'Knowledge Organiser' on 'Static Electricity', 'Electricity', 'Voltage', 'Circuit Components' and 'Current'. • Make careful and detailed notes on Sections 1-5, including writing out the key words from Section 2 and their meanings. • Copy the circuit component symbols from Section 4. • Read Sections 6-8 of the 'Electricity and Magnets' 'Knowledge Organiser' on 'Series and Parallel Circuits', 'Magnetic Fields' and 'Magnetic Fields and Electromagnets'. • Makes careful and detailed notes on Sections 6-8, including drawing the circuits in Section 6. • Summarise the rules for magnetic poles (Section 7) and describe how to make an 'electromagnet' (Section 8).
Where do you complete the work?
In Study Books.
What to do if you finish the work? (Extension activity)
• Complete 'Test Yourself 1 & 2' sets of Questions.
These websites might help:
• BBC Bitesize -> Secondary -> KS3 -> Science -> Physics -> Electricity/Magnetism

Year 8—Electricity and magnets

SMITH'S WOOD ACADEMY

1. Static electricity

The motion of charged particles causes electrical effects, small shocks,lightning and sparks. Electrical fields cause forces to act on charged particles.

When insulating materials rub against each other, they may become electrically

charged. Electrons, which are negatively charged, may be 'rubbed off' one material and on to the other. The material that gains electrons becomes negatively charged. The material that loses electrons is left with a positive charge.

Opposite charges attract. Like charges repel.

Connecting a static charge to earth using a conductor (earthing) will remove the excess charge as electrons will move to cancel out the charge.

2. Electricity

Electricity is the flow of electrons through conductors such as wires, it can flow either as direct or alternating current, and is used in homes to power electrical appliances. The National Grid distributes electricity throughout the country.

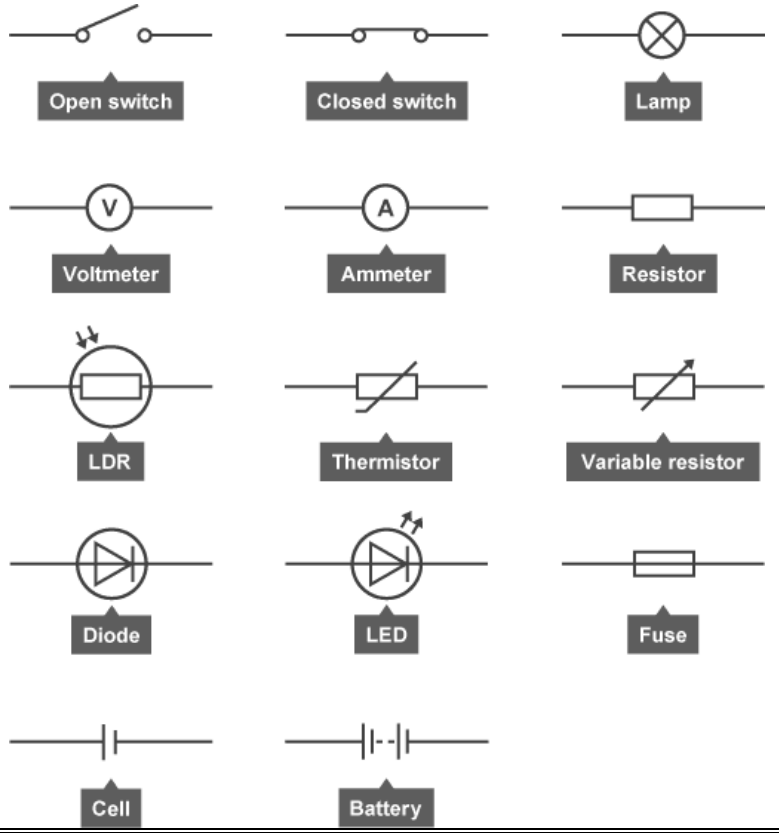
Conductor—A material or an object that conducts heat, electricity, light, or sound. Electrical **conductors** contain electric charges (usually electrons) that are relatively free to move through the material; a voltage applied across the **conductor** therefore creates an electric current.

Insulator—A material or an object that does not easily allow heat, electricity, light, or sound to pass through it. Air, cloth and rubber are good electrical **insulators**; feathers and wool make good thermal **insulators**.

3. Voltage

A potential difference across an electrical component is needed to make an electric current flow in it. Cells or batteries often provide the potential difference needed. Potential difference is often called **voltage**. It is also known as electromotive force. Note that this is not really a 'force', and it is measured in **volts** (not newtons).

4. Circuit components



5. Current

Electric current is the rate of flow of electric charge. No current can flow if the circuit is broken - for example, when a switch is open.

An electric current flows when electrons move through a conductor, such as a metal wire.

Year 8—Electricity and magnets

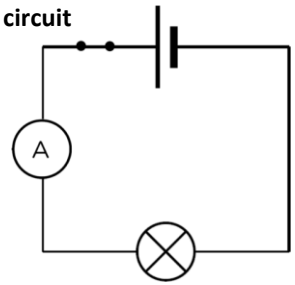
6. Series and parallel circuits

Series circuits:

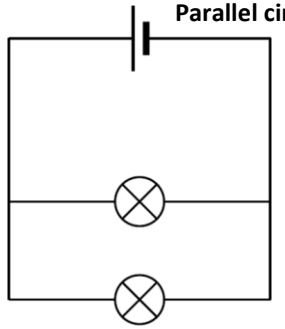
An electron will pass through every component on its way round the circuit. If one of the bulbs is broken then current will not be able to flow round the circuit. If one bulb goes out, they all go out. In a series circuit:

- current is the same through each component
- the total potential difference of the power supply is shared between the components
- the total resistance of the circuit is the sum of individual resistors

Series circuit



Parallel circuit



Parallel circuits:

In parallel circuits, electrical components are connected alongside one another, forming extra loops. An electron will not pass through every component on its way round the circuit. If one of the bulbs is broken then current will still be able to flow round the circuit through the other loop. If one bulb goes out, the other will stay on. In a parallel circuit:

- the total current supplied is split between the components ondifferent loops
- potential difference is the same across each loop
- the total resistance of the circuit is reduced as the current canfollow multiple paths

7. Magnetic fields

A magnet can exert a force on another magnet. Magnets have tw o poles: a

North (N) pole and a South (S) pole. The magnetic force is strongest near the magnet's poles.

Two magnets will either repel or attract each in the following way: Like poles (North—North or South—South) will **repel**

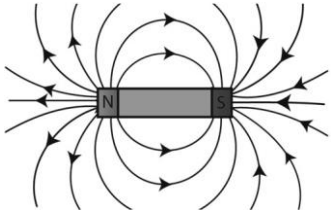
Unlike poles (North—South or South—North) will **attract**

Magnetic forces are non—contact forces meaning the magnets affect each other without touching.

Iron, steel, nickel and **cobalt** are magnetic materials. They are affected by magnets and are

8. Magnetic fields and electromagnets

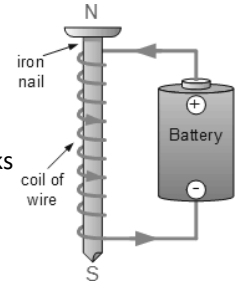
A **magnetic field** is the region around a magnet where a force acts on another magnet or on a magnetic material. the magnetic field lines never cross each other



- the closer the lines, the stronger the magnetic field
- the lines have arrowheads to show the direction of the force exerted by a magnetic north pole the arrowheads point

from the north pole of the magnet to its south pole

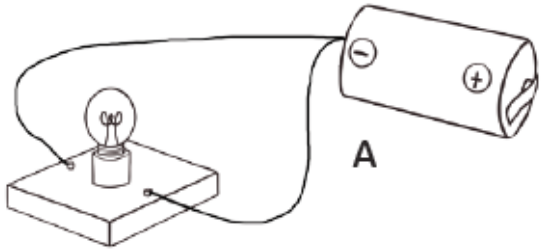
A solenoid with an iron core is called an **electromagnet**. The iron core increases the solenoid's magnetic field strength. A simple electromagnet is made by coiling wire around an iron nail. Electromagnets are used in devices such as electric bells, and door locks that can be controlled remotely.



Electricity and Magnetism **Test Yourself 2**

Will it Work?

Look at the circuits below. State which circuits would not work, and how you would correct them.



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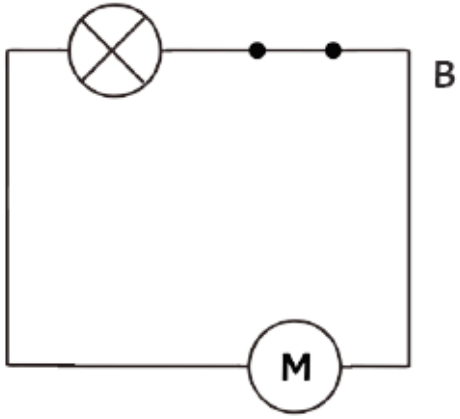

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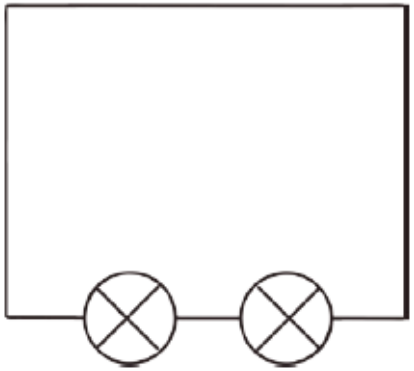

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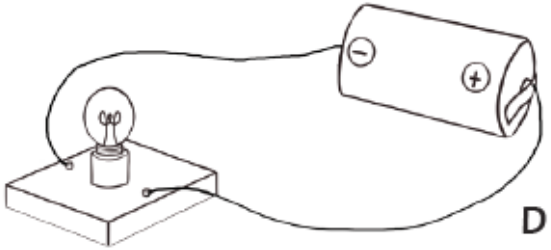

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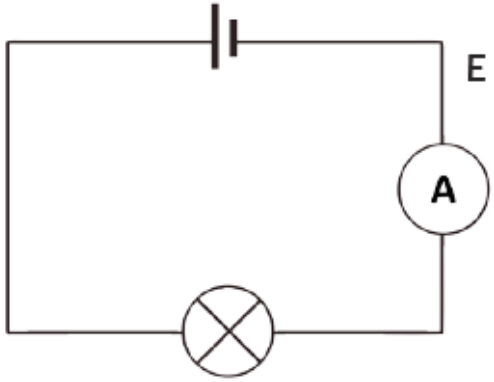
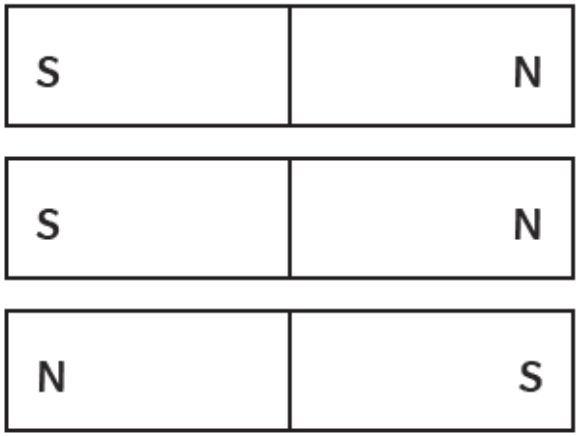


E

Magnets

For each diagram, state whether the magnets would repel or attract.



Potential Difference

A 6v battery and three identical bulbs were used to make a series and a parallel circuit. In the boxes below, draw the circuits and show where the voltmeter would be placed. What would be the voltage in each of the bulbs?

Series circuit

Parallel circuit