Physics — Electricity and Magnetism — KS3

Atomic structure	Static Electricity	Insulators and Conductors	Circuit Symbols & Drawing Circuits	Current and Potential Difference	Current in series and parallel	Resistance	Check 20

Key Words

Key Word	Definition
Nucleus	The centre of the atoms contains protons and neutrons.
Charge	A property of some particles, either positive (+) or negative (-). Electrically charged particles are often just called “charges”
Repel	Push away by force.
Attract	Pull towards by force.
Insulator	An object through which charge **cannot** flow.
Conductor	An object through which charge **can** flow.
Electric Field	The area around a charged particle where another charged particle may feel a force.
Ion	An electrically charged atom formed from the loss or gain of electrons.

Misconceptions

- Atoms are not the smallest particles. They are made of protons, neutrons, and electrons
- Conventional current flows from positive to negative.
Electrons flow from negative to positive.
- In a series circuit, if the switch is open, then no current flows.

Current does not flow to the switch and then stop. No current flows at all.
- Data sets like shoe size, and year group are NOT continuous.

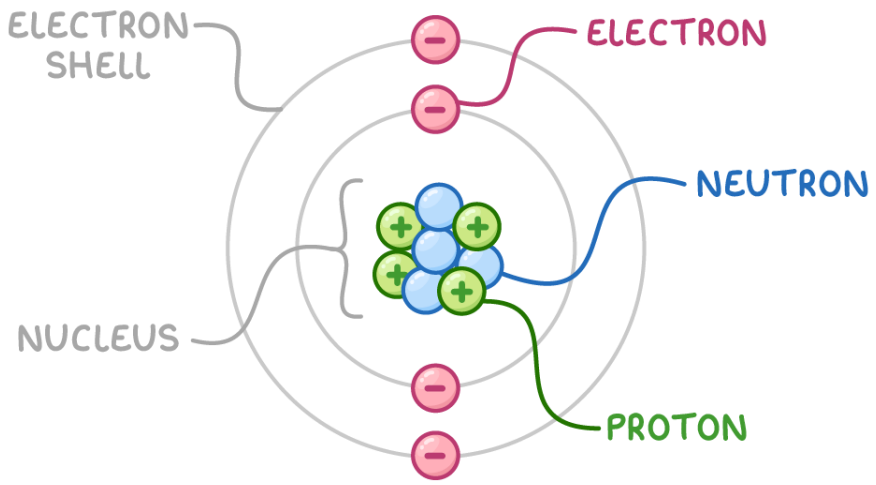
They may be numbers but they are categorized. We don’t have a year 7 ½ group.

Key questions

- What makes up atoms?
- What gives objects an electrostatic charge?
- How do we get current to flow and bulbs to light up?
- What different things can we measure in a circuit?

Physics | Waves 1 | KS3

Atom

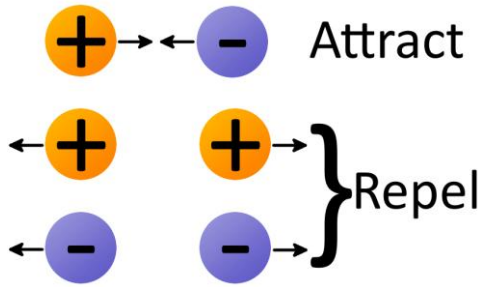


Static Electricity

Insulators can gain or lost electrons on their surface.
Protons and neutrons cannot be transferred as they are bound in the nucleus of atoms.

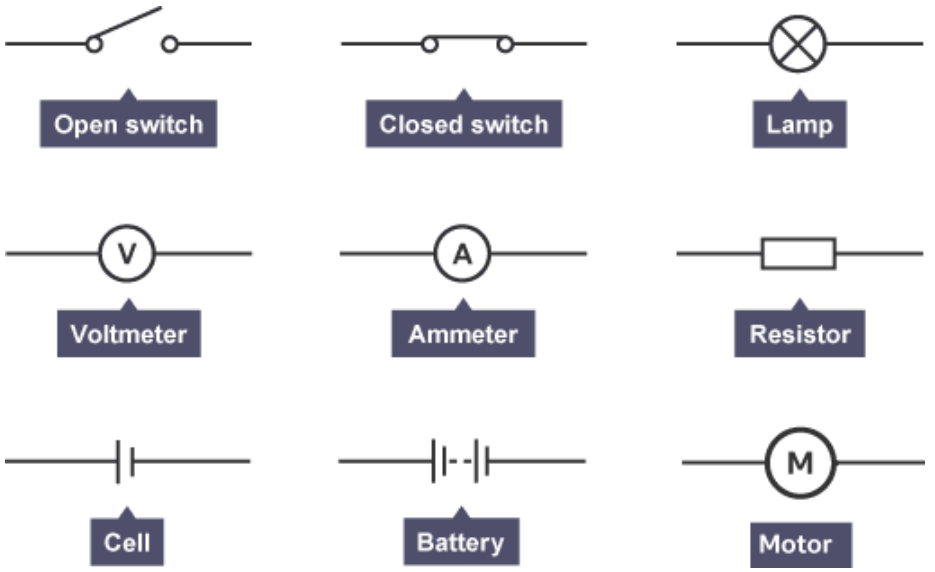
Gaining electrons makes the surface negative.
This is because there are more negatively charged electrons compared to positively charged protons.

Losing electrons makes the surface positive.
This is because there are fewer negatively charged electrons compared to positively charged protons.



Subatomic particle	Relative mass	Relative charge
Proton	1	+1
Neutron	1	0
Electron	Very small	-1

Circuit Symbols

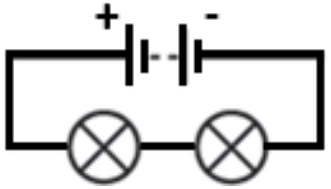


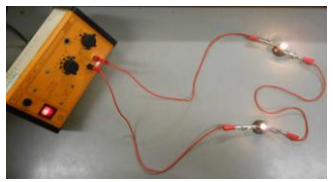
Circuits

Circuit diagrams are drawn to make it easier to see how a circuit is built and works.

Rules:
- ruler - straight lines
- no symbols on corners
- pencil – so you can change if needed

Circuit diagram of two bulbs in series connected to a power supply.





Physics — Waves 1 — KS3

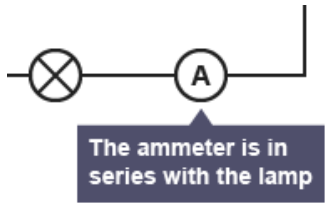
Electric Current

Electric current is the rate of flow of charge.

In wires, electrons flow to carry this charge.

Conventional current flows from the positive terminal of a cell to the negative terminal.

Current is measured using ammeters, connected in series.



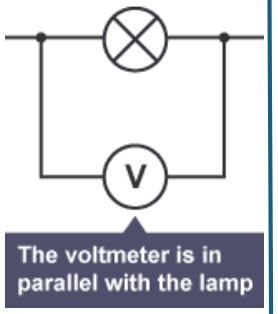
Potential Difference

Potential difference is the energy transferred per unit of charge.

1 volt = 1 joule of energy transferred per second

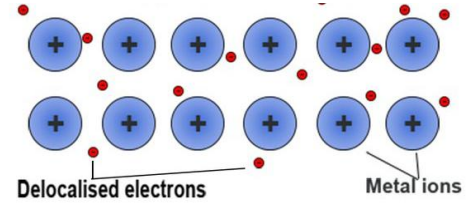
Another term for potential difference is voltage.

Potential difference is measured using voltmeters, connected in parallel.



Resistance

A wire is made up of metal ions, and delocalised electrons. As the electrons flow through the metal, they collide with metal ions.
This slows the electron flow and is called resistance.

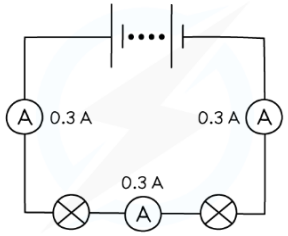


Resistance is affected by the length and thickness of the wire, as well its temperature and material.

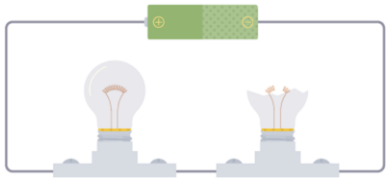
Series

A series circuit is on complete loop.

Current in series is the same.



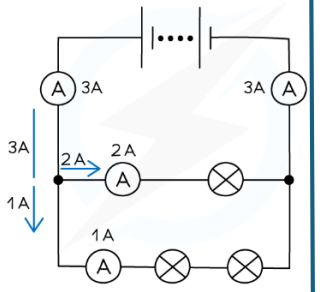
If one bulb breaks in series, current stops flowing and the other bulbs go out.



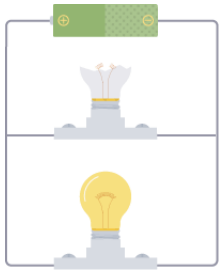
Parallel

A parallel circuit has more than one lamp.

The current splits at the branches.



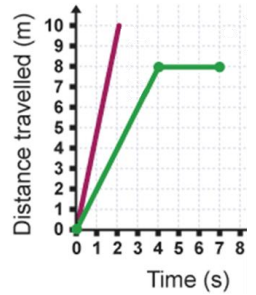
If one bulb breaks in parallel, current can still flow to the other bulb and so it stays on.



Handling Data

Continuous Data – The data can take **ANY** value and produces a **continuous** pattern .
e.g. distance, time, mass, temperature.

We plot line graphs with continuous data (i.e. crosses with lines of best fit)



Categorical Data – The data can be put into different categories and does not produce a continuous pattern
e.g. eye colour, car model, shoe size.

We plot bar charts with categoric data.