











Year 10 Physics Unit One: Electricity

General Knowledge

Electricity is a form of energy. Can be transformed into different forms of energy by transducers. The movement of electric charges generates electricity. Atoms contain electrons, which are negatively charged. These are the only parts of atoms that move around. The continual movement of electrons results in electric current.

Circuit Components

Component Diagram	Component Name	Component Diagram	Component Name
	Ammeter		Battery
	Single Cell		Closed Switch
	Fuse		Light Bulb
	Open Switch		Resistor
	Variable Resistor		Voltmeter

Conductors: Objects that conduct energy well, and allows current to pass through it.

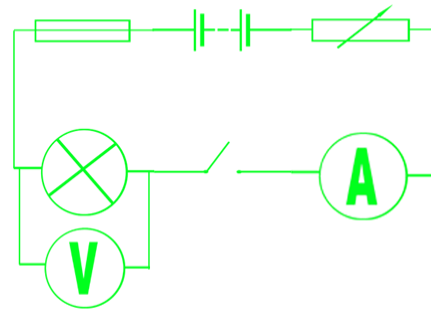
Insulators: Objects that do not conduct energy well, and do not allow current to pass through.

Circuit Diagrams

There are many aspects of circuit diagrams to consider, and many possible circuit diagrams to draw. Basically, there are three rules with circuit diagrams. They are:

- Always use straight lines when drawing circuit diagrams (USE A RULER!!)
- Never connect components on corners of a circuit (make sure to place components in the MIDDLE of a line.)
- Wires are straight lines (remember this - you WILL be marked down if your lines are crooked). Wires must also connect to components (if they don't, you risk shorting the circuit - not good).

Here is an example of a circuit diagram I have drawn, using as many components as I can. You will notice that the voltmeter is connected in parallel, and the ammeter is connected in series. This is because the voltmeter is measuring the voltage only one component, while the ammeter is measuring the current through the whole circuit, but at that one point.



A correct circuit drawing [Fig. 1]

Alternating and Direct Current, Voltage and Resistance

Current: Conventional current (also known as Direct Current), is when electrons flow in only one direction, while Alternating current is when the current flows in multiple directions (alternating forwards and backwards). Current is measured in Amperes (A), and an ammeter is used to measure it. Ammeters are always placed in series in a circuit.

Voltage: Voltage is the amount of energy carried by the electrons in a circuit, as it travels through components. It is measured in Volts (V). a voltmeter is used to measure Voltage, and is (as said before) always connected parallel to a battery.

Resistance: Some components are made of materials that prevent the flow of electricity. This process is called resistance. The components that are used to reduce the current are called resistors (surprising, really). There is a way you can find out the values of current, voltage and resistance using Ohm's Law.

Ohm's Law: States that you can find values for Resistance, Current and Voltage, if you know 2 of the 3, with the following formulae:

$$\text{Resistance} = \text{Voltage} / \text{Current}$$

$$\text{Voltage} = \text{Current} \times \text{Resistance}$$

$$\text{Current} = \text{Voltage} / \text{Resistance}$$

There are two types of circuit, and each deal with voltage and resistance differently.

Series and Parallel Circuits

Series: Series circuits are circuits that only have one line of components. Current is the same at any point in the circuit, however the sum of the voltage at each of the two lamps in the circuit equals the voltage at the battery. So, using the picture [Fig 2], if the first lamp had 4V and the second lamp had 4.5V, the battery would have 8.5V

Parallel: Parallel circuits have multiple lines of components, and consequently, where there is only one line of components, the current is the same, but where there are multiple lines of components, the current is less, but also the same. Say, using the picture [Fig 3], if at the battery, current is 1.2A and in the second line it is 0.9A, the first line will also have a current of 0.9A. Voltage in a parallel is always the same, no matter where you are in the circuit.

