**Introduction to Electronics**

Electrical energy is the presence and flow of an electric charge. For electrical energy to be produced in a circuit, the circuit must be a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Current (I)**

Electric current is the flow of **\_\_\_\_\_\_\_\_\_\_\_\_\_**.

The unit of electric current is the ampere or amp (A). One ampereof electric current is a flow of charge of 1 coulomb per second or 6.25 x 1018 electrons per second. In most electric circuits, microamps (μA) or milliamps (mA) are used.

Electric current is measured with an **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

A **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** is a material that allows current to flow through it easily. Eg. Copper wire.

**Voltage (V)**

In order for current to flow through a circuit, there must be a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** between different parts of the circuit. A **\_\_\_\_\_\_\_\_\_\_\_** or **\_\_\_\_\_\_\_\_\_\_\_\_\_** produces a potential difference which causes electrons to flow from the negative pole to the positive pole of the battery.

Potential difference is measured in **\_\_\_\_\_\_\_\_\_\_\_** and is measured by a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

Potential difference is often referred to as voltage or electromagnetic force (EMF).

**Resistance (R)**

The flow of electrons is also determined by the resistance of the circuit. Materials that act in opposition to the flow of electrons are known as **\_\_\_\_\_\_\_\_\_\_\_**. Resistance is measured in **\_\_\_\_\_\_\_\_\_\_\_**. Wires in a circuit may act as a form of resistance.

**Ohm’s Law**

The relationship between current, voltage and resistance in a circuit is known as Ohm’s Law.

*The current flowing through a conductor is directly proportional to the potential difference applied across its ends, provided temperature and all physical conditions remain constant.*

***V = IR***

V = I R

Example. If the potential difference of a circuit is 6V and the total resistance of the circuit is 12Ω, what is the current flow through the circuit?

**battery ammeter closed loop cell volts ohms voltmeter conductor electrons resistors potential difference**

**Circuits**

The parts that make up a circuit are called **components**. Circuit diagrams are a shorthand way of showing how components are connected.

**Series circuits**

(Only one possible route for electron flow)



Resistors in series

***R*tot = *R*1 + *R*2 + *R*3 + ......**

**Parallel circuits**

(More than one route for electron flow)



Resistors in parallel



(Note: Although it is now known that electron flow in a circuit is from the negative to the positive pole of a battery, the current is traditionally depicted in circuit diagrams as flowing from the positive to the negative pole (conventional current). )