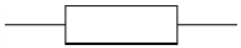
N5 ELECTRICITY & ENERGY

1. Resistance

Resistance is a measure of **how much opposition there is to the current** in a circuit. The more resistance there is, the harder it is for current to flow.

The energy transformation in a resistor is from **electrical to heat**. As the **temperature increases, the resistance increases.**

The symbol for resistance is **R**, measured in **ohms (Ω).**



2. Ohm's Law Equation

$$V = IR$$

Symbol	Name	Unit	Unit Symbol
V	Potential Difference	volts	V
I	Current	amperes	A
R	Resistance	ohms	Ω

3. OHM'S LAW

4. Potential Dividers

The circuit shown below is called a potential divider, or a voltage divider. This is because each resistor takes a proportion of the total potential difference. How big a share of the potential difference each resistor takes depends on the size of the resistor, and the total resistance in the circuit.

In this circuit, for example, the total resistance is 10 Ω, as there is a 6 Ω and a 4 Ω resistor in series. We can say that the 6 Ω resistor should have 6/10 of the supply p.d.
In this case then, V_2 would be 12V.

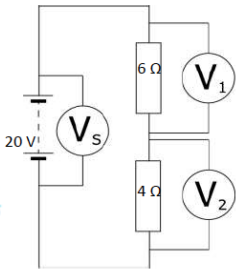
$V_s = IR_T$
$10 = I \times (6+4)$
$I = 20/10$
$I = 2\ A$

$V_2 = IR_2$
$V_2 = 2 \times 6$
$V_2 = \underline{12\ V}$

It is possible to make a relationship which can be used for any potential divider. To calculate the p.d. across a component in a potential divider we multiply the supply p.d. by the fraction of the total resistance.

$$\frac{V_1}{V_2} = \frac{R_1}{R_2}$$

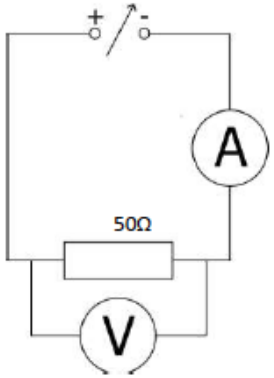
$$V_2 = \left(\frac{R_2}{R_1 + R_2}\right) V_s$$



3.Ohm's Law Experiment

Aim: To determine the relationship between voltage and current.

Method: Set up the circuit as shown and briefly describe the method below:



Results:

Voltage (A)	Current (A)

Processing: Draw a voltage against current line graph of your results and glue into your jotter.

Analysis: Using your graph, determine the resistance of your resistor and compare to resistance quoted.
Hint: use y=mx+c and V=IR

Conclusion: As current increases the voltage increases/decreases.

Evaluation: