




# Knowledge

1. A circuit containing only one possible route from one end of the battery back to the other
2. 
3. LDR, Diode, LED
4.  $Q = I t$
5. Coulombs
6.  $V=IR$
7. One where the resistance is constant – it doesn't change with temperature
8. They get hot

9.

<b>Circuit</b>	<b>Current</b>	<b>Voltage</b>
<b>Series</b>	Same at all points	Shared between components
<b>Parallel</b>	Splits down the 'strands'	Same across all components

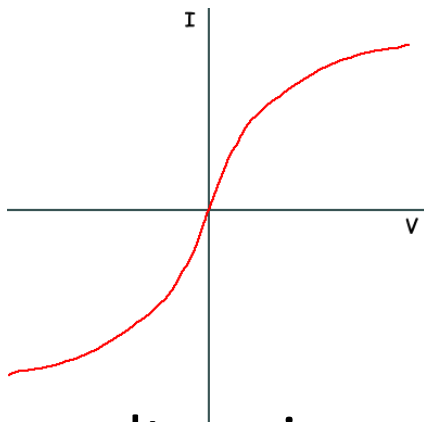
10. Total resistance in series is the sum of all individual resistors

11. When there are multiple components in parallel, resistance is less than the resistance of the smallest resistor

# Application

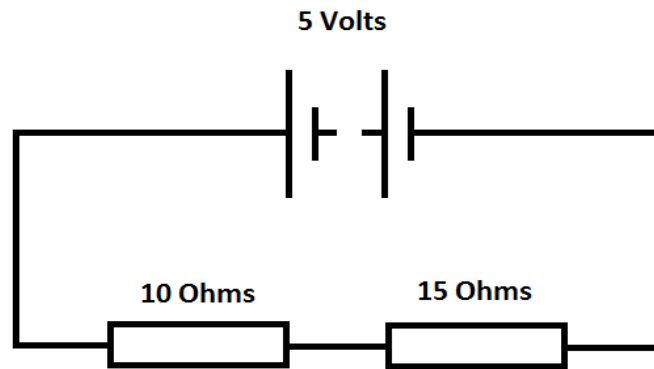
1. The relationship is a proportional one – as the voltage increases, so does the current. It is an ohmic conductor

2.



3. As the voltage increases, the current increases, but then the wire gets hot and resistance increases, so further increases in voltage result in little or no change in current

4.



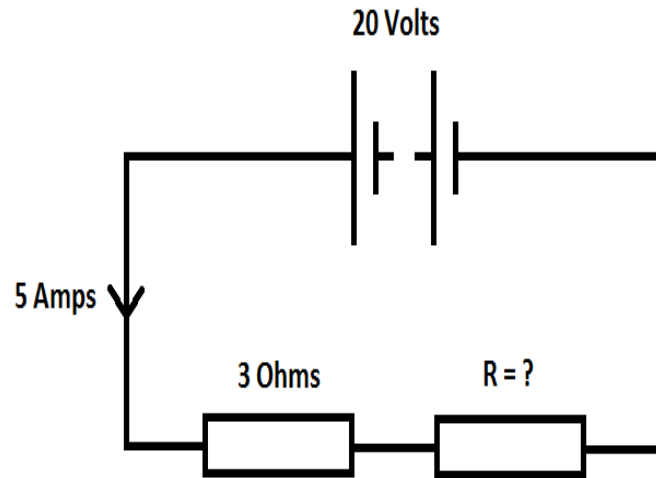
Total resistance = 25 ohms

$$I = V/R$$

$$I = 5/25$$

$$I = 0.2 \text{ Amps}$$

5.



Find total resistance first:

$$R = V/I$$

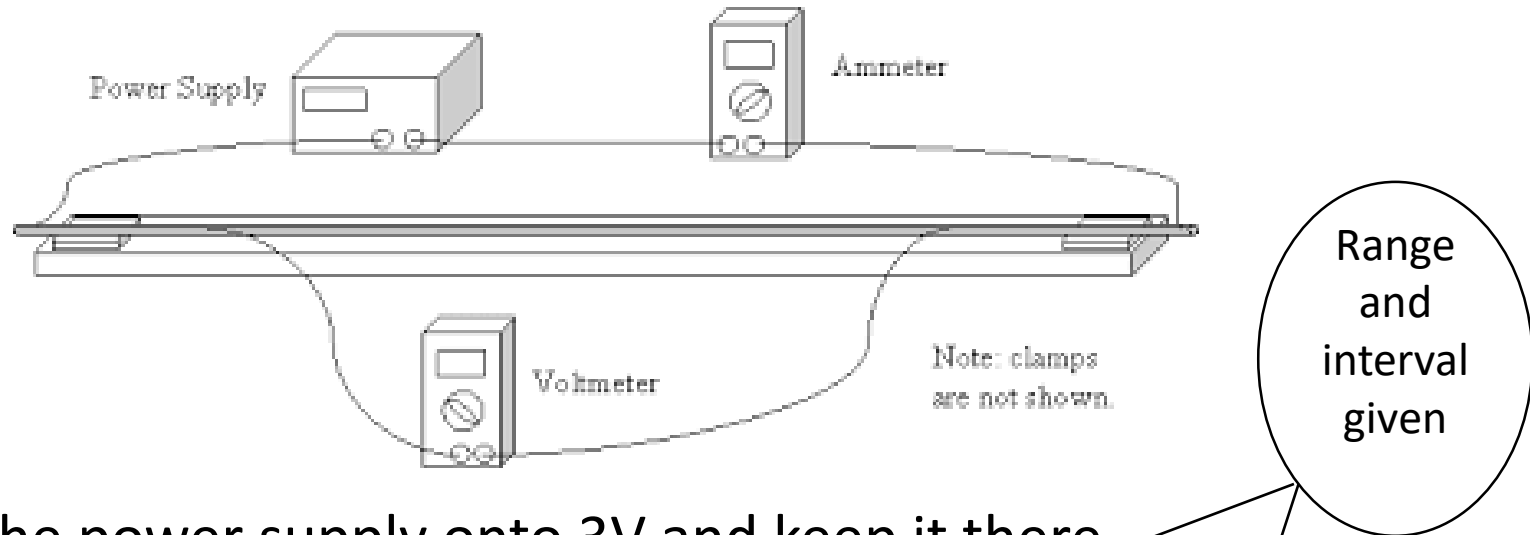
$$R = 20/5$$

$$R = 4 \text{ ohms total}$$

1 resistor is given as 3 ohms, so the unknown one must be 1ohm.

# 'The longer the wire, the higher the resistance'

- Set up a simple circuit with a battery, wires and an ammeter and a voltmeter



- Turn the power supply onto 3V and keep it there.
- Connect the ends of the wires to a nichrome wire of 10cm length and read the ammeter and voltmeter
- Calculate resistance using  $R = V/I$
- Repeat, using different lengths of nichrome wire – 20cm – 60 cm up in 10 cm each time.
- Keep the voltage and the diameter of the nichrome the same

# Extension

A heating unit is supplied with 9000000J energy over an hour. Calculate the average current drawn by the heating unit when it is switched on. Write down both equations you use and give your answer to two significant figures.

- What can you work out with J and time?

$$\text{Power} = e/t$$

$$\text{Power} = 8000000/3600$$

$$\text{Power} = 2500$$

How can we get from power to current?

$$P = I \times V$$

$$I = P/V$$

$$I = 2500/230 \quad (\text{UK mains voltage, you need to know this value})$$

$$I = 10.8869\text{Amps}$$

To 2 sig figs 11 Amps