Ohm’s Law states that the voltage through a circuit is directly proportional to the current.

$$V \propto I$$

In Other words, Ohm’s Law states the relationship between Current, Voltage and Resistance.

Triangle for Ohm's Law

Ohm's Law

$$V = IR$$

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

The symbol for **voltage** is V, it is measured in volts (V).

The symbol for current is I, it is measured in amperes (A).

Resistors in Series

Resistors in series circuits

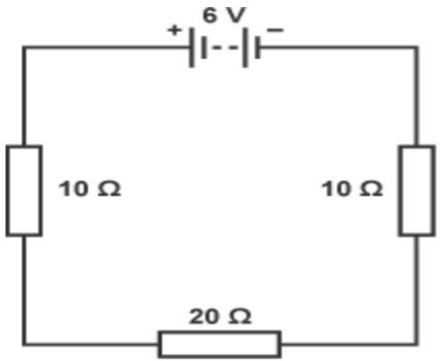
When resistors are connected together in series, we can add their resistances together to find the total resistance in the circuit.

We write this relationship as;

$$R_T = R_1 + R_2 + R_3 + \ldots$$

Question

Calculate the total resistance (R_T) in the series circuit shown below.



Answer

Total Resistance= 10 + 10+ 20= 40 Ω

Voltage= 6V

Current I = 6/40 = 0.15 Amp

Total Resistance in Parallel

Resistors in parallel circuits

When resistors are connected in parallel, we can calculate the total parallel resistance (R_T) using the relationship;

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

Let's use the same three resistance values as the previous example and calculate the total resistance when the resistors are connected in **parallel**.

Complete questions from the following BBC bitesize link

https://www.bbc.co.uk/bitesize/guides/z8b2pv4/test

Easy	Medium	Hard
Calculate voltage if current is 20 A and resistance is 0.5 Ohms.	Calculate voltage if current is 20 A and resistance is 7 ohms.	Calculate resistance if current is 7 A and Voltage is 9 V.
Calculate voltage if current is 10 A and resistance is 15 Ohms.	Calculate voltage if current is 60 A and resistance is 7 ohms.	Calculate resistance if current is 9 A and Voltage is 9 V.
Calculate voltage if current is 300 A and resistance is 0.5 Ohms.	Calculate voltage if current is 3 A and resistance is 2 ohms.	Calculate resistance if current is 18 A and Voltage is 9 V.
Calculate voltage if current is 20 A and resistance is 1.5 Ohms.	Calculate voltage if current is 70 A and resistance is 7 ohms.	Calculate resistance if current is 7 A and Voltage is 20 V.
Calculate voltage if current is 150 A and resistance is 0.2 Ohms.	Calculate voltage if current is 30 A and resistance is 9 ohms.	Calculate resistance if current is 8 A and Voltage is 2 V.
Calculate voltage if current is 30 A and resistance is 5 Ohms.	Calculate voltage if current is 1.5 A and resistance is 7 ohms.	Calculate resistance if current is 13 A and Voltage is 4 V.
Calculate voltage if current is 210 A and resistance is 0.7 Ohms.	Calculate voltage if current is 40 A and resistance is 8 ohms.	Calculate resistance if current is 21 A and Voltage is 6 V.

Resistance problems

Aim

To apply your knowledge to a variety of resistance calculations.

1. a) The current through a 12 V lamp when it is connected to a 12 V battery is 2.0 A. Calculate the resistance of the lamp at this current.

   .....

   b) The current through a 12 Ω resistor in an electric circuit is 1.5 A. Calculate the potential difference across the resistor.

   .....

   c) A 50 Ω resistor in an electric circuit has a potential difference across it of 20 V. Calculate the current through the resistor.

   .....

2. Complete the following table.

	Current (A)	Potential difference (V)	Resistance (Ω)
a)	4.0	20	
b)	3.0		15
c)		50	200
d)	0.50	12	
e)	0.25		60
f)		6.0	30