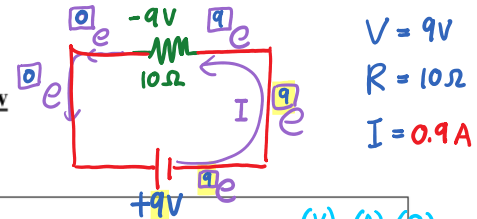


Science 9 – Topic 3.4 Topic 1: Ohms Law

Voltage, current, and resistance in a circuit are related by Ohm's law.



- The relationship between voltage, current and resistance is known as

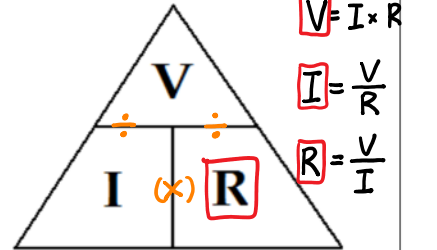
Ohm's Law:  $V = IR$

**Voltage** (V) = **Current** (I) x **Resistance** (R)

Volts (V)      amps (A)      ohms (Ω)

Fixed  $V = I \times R$

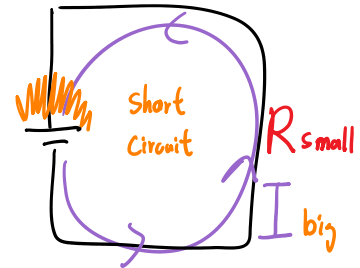
↓ ↑



- The higher the amount of resistance, the lower the current

- Resistance = Voltage ÷ Current       $R = \frac{V}{I}$

- Current = Voltage ÷ Resistance       $I = \frac{V}{R}$



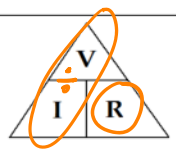
Example 1)

A television that is plugged into a wall socket has an electrical potential difference of 120 V. If a current of 1.25 A is flowing through the television, what is its resistance?

$V = 120 \text{ V}$   
 $I = 1.25 \text{ A}$   
 $R = ?$

$R = \frac{V}{I} = \frac{120 \text{ V}}{1.25 \text{ A}} = 96 \Omega$

$R = 96 \Omega$



Example 2)

The filament of a flashlight bulb has a resistance of 40 Ω. if a 6.0 V battery is used in the circuit, what is the current?

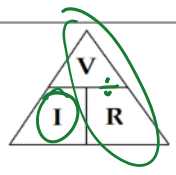
$R = 40 \Omega$

$V = 6 \text{ V}$

$I = ?$

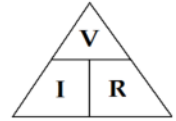
$I = \frac{V}{R} = \frac{6 \text{ V}}{40 \Omega} = 0.15$

$I = 0.15 \text{ A}$



Example 3)

A circuit board has a resistance of  $12 \Omega$  and requires a current of  $0.25 \text{ A}$ . What electrical potential difference is required to operate the circuit board?



$$R = 12 \Omega$$

$$I = 0.25 \text{ A}$$

$$V = ?$$

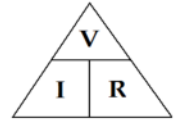
$$V = I \times R = 0.25 \text{ A} \times 12 \Omega = 3$$

$$V = 3 \text{ V}$$

Try

Example 4)

A desktop computer is plugged into a standard  $120 \text{ V}$  outlet. If the computer has a total resistance of  $50 \Omega$ , what is the current that is passing through the computer?

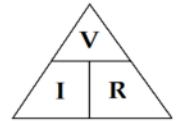


$$I = \frac{V}{R} = \frac{120 \text{ V}}{50 \Omega} = 2.4$$

$$I = 2.4 \text{ A}$$

Example 5)

A current of  $0.2 \text{ A}$  is passing through an ink jet printer that is plugged into a  $120 \text{ V}$  outlet. What is the resistance of the printer?

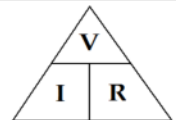


$$R = \frac{V}{I} = \frac{120 \text{ V}}{0.2 \text{ A}} = 600$$

$$R = 600 \Omega$$

Example 6)

A current of  $0.001 \text{ A}$  is passing through a hearing aid that has a resistance of  $1500 \Omega$ . What electrical potential difference is supplied by the battery?

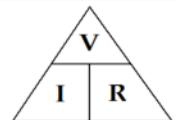


$$V = I R = 0.001 \text{ A} \times 1500 \Omega$$

$$V = 1.5 \text{ V}$$

Example 7)

A hair dryer is plugged into a  $120 \text{ V}$  outlet in the bedroom. If the resistance of the hair dryer is  $8.0 \Omega$ , what is the current to the hair dryer?



$$I = \frac{V}{R} = \frac{120 \text{ V}}{8 \Omega}$$

$$I = 15 \text{ A}$$

Battery.

Topic 3.3 Review.

HW : WB P. 134 - 137