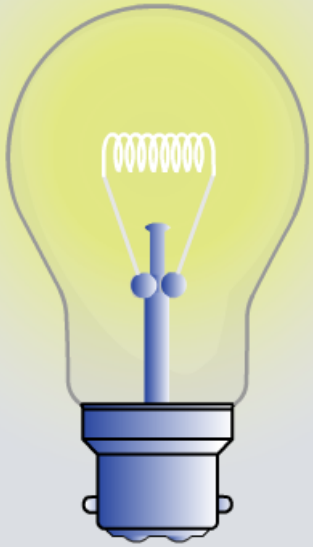
Calculating Resistance



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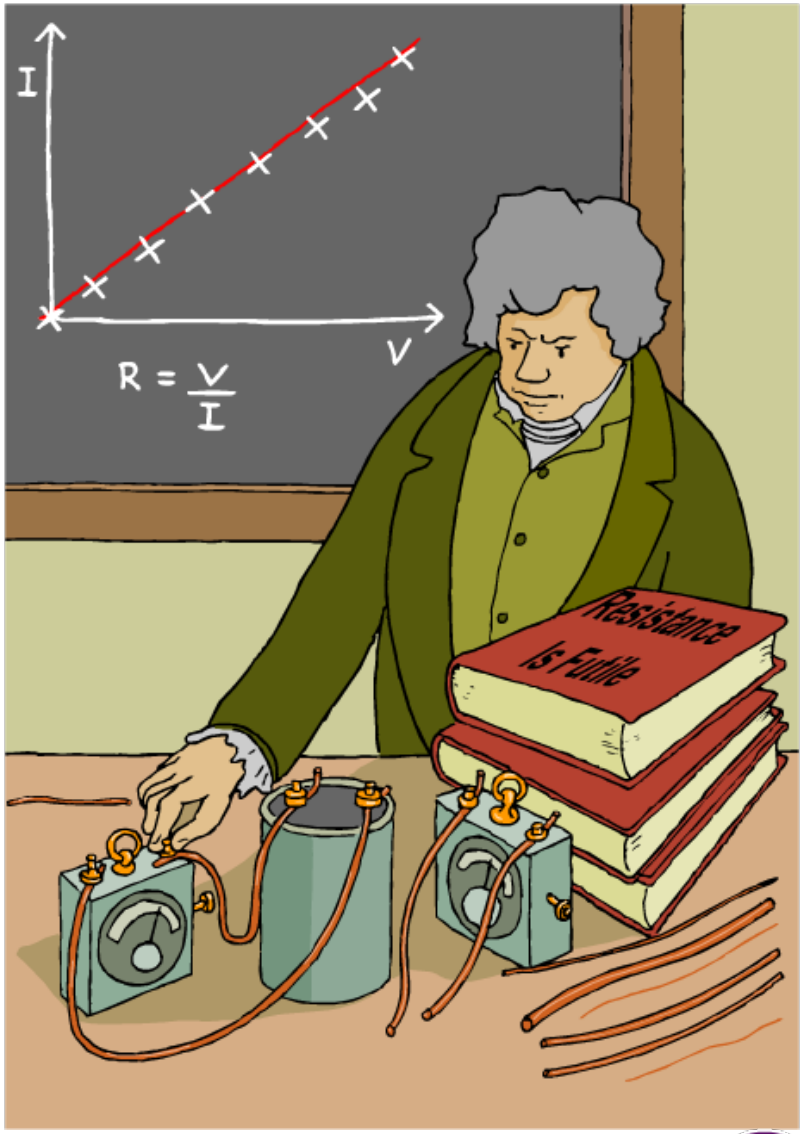
The irresistible Georg Ohm

Resistance is a measure of how hard it is for electrons to move in an electrical circuit.

The connection between current, voltage and resistance was discovered in 1827 by **Georg Ohm**, a German physics and math teacher.

The formula ***V = IR*** is known as **Ohm's Law**. It was such an important discovery in electricity that the unit of resistance is called the **ohm**. This unit is represented by the symbol Ω.



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What is the formula/equation for Ohm's law?

Ohm's law is usually written as:

$$\text{voltage} = \text{current} \times \text{resistance}$$

$$V = I \times R$$

This formula can also be written as:

$$\text{resistance} = \frac{\text{voltage}}{\text{current}}$$

$$R = \frac{V}{I}$$

What are the units of voltage, current and resistance?

- Voltage is measured in **volts** (V).
- Current is measured in **amps** (A).
- Resistance is measured in **ohms** (Ω).

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What does Ohm's Law show?

What do the different arrangements of Ohm's law show about the links between current, voltage and resistance?

$V = I \times R$

This version of Ohm's Law shows that as the voltage increases, the current increases. The voltage and current are proportional, while the resistance remains constant.

$R = V / I$

The voltage and current are proportional, so the resistance of a material is constant, as long as the temperature does not change.

$I = V / R$

For a low resistance material, more current will flow for a given voltage.
For a high resistance material, less current will flow at the same voltage.

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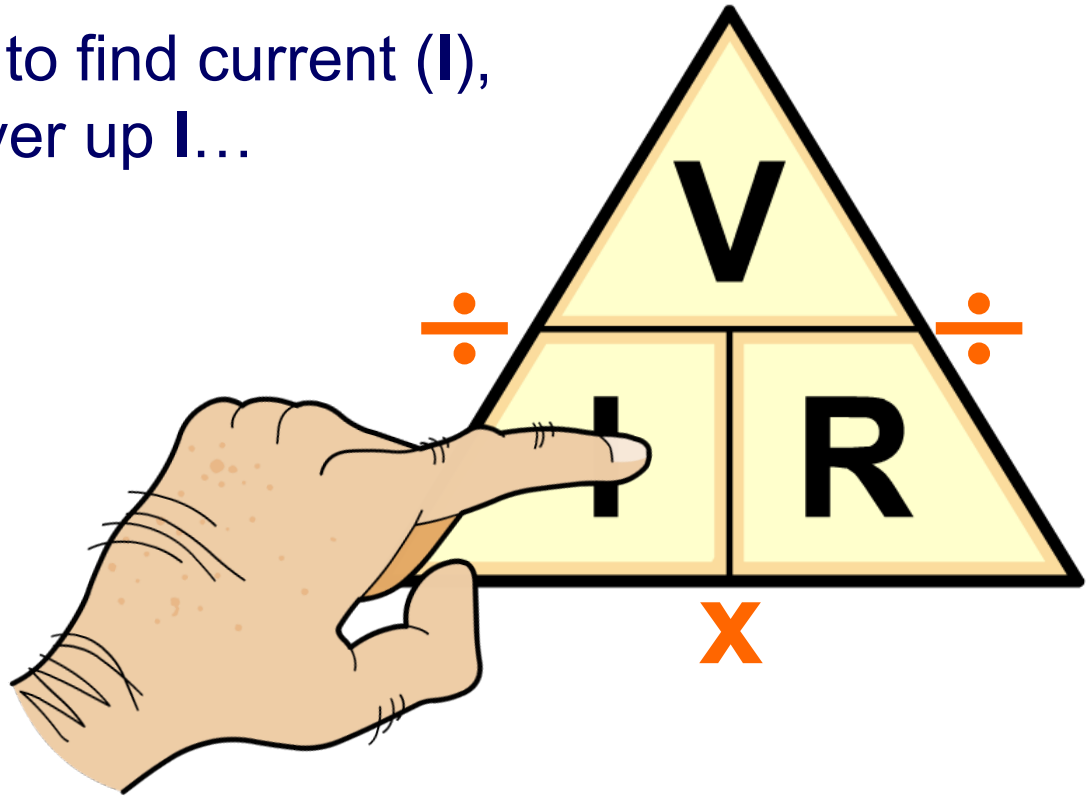
Resistance formula triangle

A formula triangle helps you to rearrange a formula.
The formula triangle for ***V = IR*** is shown below.

Cover up the quantity that you have to find. This gives the formula needed.

So to find current (**I**), cover up **I**…



…which gives the formula…

$$I = \frac{V}{R}$$

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Calculating the resistance of a bulb

A filament bulb has a current of 0.2 A running through it, with a potential difference of 5 V across it.

What is the resistance of the filament in the bulb?

$$V = IR$$

$$R = \frac{V}{I}$$

$$= \frac{5\,\text{V}}{0.2\,\text{A}}$$

$$= 25\ \Omega$$

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Resistance calculations

You will need this equation to answer the following questions about resistance.

voltage = current x resistance

Click "start" to begin.

start

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