Electricity Basics

An understanding of the basics of electricity requires the understanding of three fundamental concepts

Voltage Current Resistance

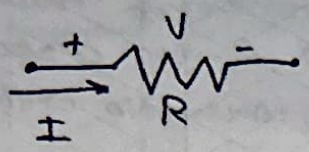
A direct mathematical relationship exists between voltage, resistance, and current in all electronic circuits.

Voltage, Current, and Resistance

Voltage is the electrical force that causes current to flow in a circuit.

Voltage is measured in volts

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



Current is the flow of electrical charge through an electronic circuit.

Current is measured in amperes (amps)

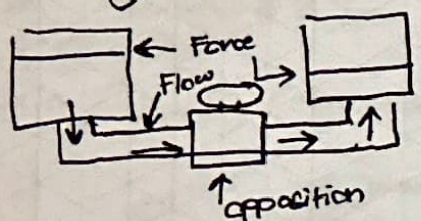
$$I = \frac{V}{R}$$

Resistance is a measure of opposition to the flow of electricity through a circuit.

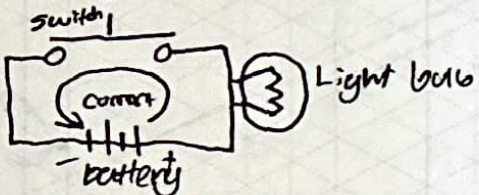
Resistance is measured in ohms.

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

Current Analog



Flashlight



Switch determines current flow

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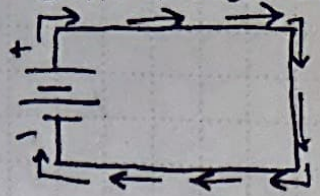
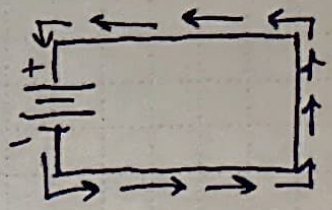
Current Flow

Conventional Current



Assumes that current flows from positive to negative

Electron Flow



Electrons actually flow from negative to positive

As long as you are consistent with whatever convention you choose, it doesn't matter which convention you use.
However, engineering uses conventional current

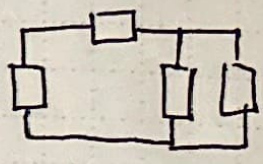
Ohm's law

Current in a resistor varies in direct proportion to the voltage applied to it and is inversely proportional to the resistor's value.

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

I = current
V = voltage
R = resistance

Circuit Combination



Combination Circuit
A circuit that contains both components connected in both series and parallel

Series Circuit
Current flow through every series component is equal

$$R_T = R_1 + R_2 + R_3$$
$$V_T = V_{R1} + V_{R2} + V_{R3}$$

Parallel Circuits

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

$$I_T = I_{R1} + I_{R2} + I_{R3}$$

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