

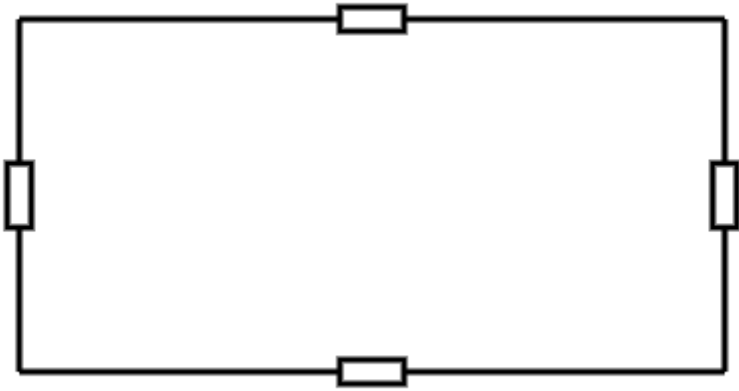
ELECTRONICS TIP'N'TRICKS



ELECTRICAL CIRCUIT

- closed path consisting of a set of components connected by *conductive* material and where there is a flow of **electrical current**

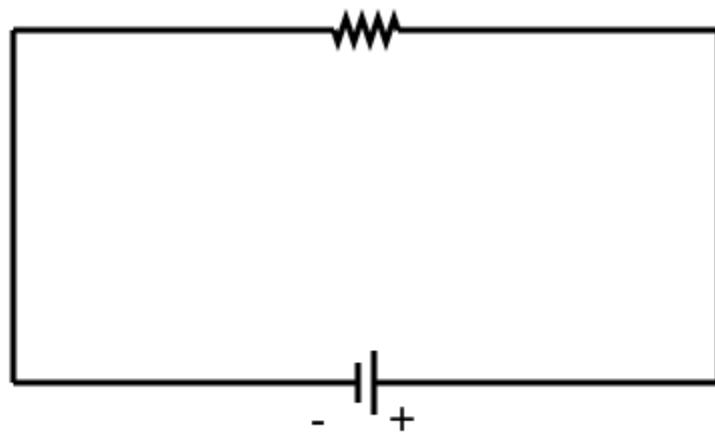




MINIMAL FUNDAMENTALS ELEMENTS OF AN ELECTRICAL CIRCUIT ARE:

1. *voltage generator (potential difference generator)*
2. *resistive components*





- the circuit is populated by electrons (atomic negative particles) that in the absence of force move disorderly, *de facto* remaining stationary
- if a potential difference (voltage) is activated in the circuit, electrons flow *neatly* along the conductors of the circuit

***MINIMAL* CIRCUIT (BATTERY)**

battery + resistor



- a potential difference is achieved through an **imbalance**
- an excess of electrons is created at one pole of the generator, a lack of electrons at the other pole
- the flow of electrons proceeds from the pole with excess toward the pole with lack
- the voltage generator maintains the imbalance

**THE POTENTIAL DIFFERENCE,
OTHERWISE CALLED *VOLTAGE*, IS
MEASURED IN VOLT**

V



- voltage acts as a pressure force for the electrons
- the flow of electrons has a *speed*, determined by the voltage and resistance of the circuit
- this speed is called **current intensity**

***MINIMAL* CIRCUIT (GENERATOR)**

generator + resistor



CURRENT INTENSITY IS MEASURED IN AMPERE

A

OFTEN WE WILL USE MILLIAMPERE

mA



CURRENT INTENSITY AND VOLTAGE ARE PROPORTIONAL:

- if the voltage increases, the intensity also increases



THE THIRD ELEMENT OF AN ELECTRICAL CIRCUIT IS THE RESISTANCE

- Resistance is a measure of the opposition to current flow in an electrical circuit
- you can keep the current constant increasing the resistance



RESISTANCE IS MEASURED IN OHM

Ω

- and its multiples:

$k\Omega$

$M\Omega$

VOLTAGE, CURRENT AND RESISTANCE ARE RELATED

- the ohm law expresses this correlation:

$$V = IR$$

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

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

ohm law



EXAMPLE 1



- In a circuit, if it has a current of $15mA$ (then $0.015A$) and a resistance of 100Ω , what is the voltage?
- for the ohm law we have:

$$V = IR$$

- so:

$$V = 0.015 \cdot 100 \implies 1.5V$$

EXAMPLE 2

- In a circuit , if it has a voltage of $5V$ and a resistance of 220Ω , what is the current?
- for the ohm law we have:

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

- so:

$$I = 5/220 \implies 0.0227A$$

≡ (then $22.7mA$)

EXAMPLE 3

- In a circuit, if it has a voltage of $5V$ and a current of $25mA$, what is the resistance?
- for the ohm law:

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

- so:

$$R = 5 / 0.025 \implies 200\Omega$$

IN A CIRCUIT

- the current is **constant** in every point of circuit
- the voltage presents drops near every component



VOLTAGE DROPS

drops



LED

- diode that produces photons (light)
- LED produces a drop voltage caused by its forward voltage

circuit

CALCULATE RESISTOR FOR A LED

$$R = \frac{(V - V_f)}{I}$$