More Resistance → Less Current → Dimmer Bulb

P12 - 9.0 - Circuit VIR Review

Method: Choose Arbitrary $R = \#\Omega's$

Electric Current (I): A stream of charged particles, measured by the charge (Q) passing a point in a circuit at a given time, by an Ammeter.

$$I = \frac{Q}{t} \quad ; \quad Amps\ A\ \frac{C}{s}$$

$1\ ampere\ (amp)\ is\ the\ current\ of\ 1C\ per\ second.$

Resistance: a measure of the opposition to current flow in an electric circuit in Ω Ohms

Ie: a light bulb

$1\ \Omega\ (Ohm)\ is\ the\ resistance\ in\ a\ circuit\ to\ 1\ amp\ and\ 1\ \Delta V.$

1 V : the potential difference to push 1A of current across 1Ω of resistance.

$V = IR$ *Ohm's Law* R: *Resistance* (*Ohms*; Ω) $I = \frac{V}{R}$ Useful thought

See Graphs Below

Ohms Law: Current through a conductor between two points is directly proportional to the voltage across the two points.

$P = IV$ *Power in Watts W*

$P = I^2R \quad P = \frac{V^2}{R}$ Useful Substitution

Power Lines
- High Voltage
- Lower Current/Power loss

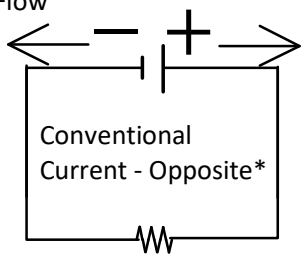
Terminal Voltage (V_t) Battery Internal Resistance (Ir_{int})

$V_t = \epsilon - Ir_{int}$ V_t : sum of the voltage drop in non-internal resistors ($Not\ Ir$)

$V_t = \epsilon \ ; \ Ir = 0$ ϵ : *Electromotive Force* (*emf*) ; V

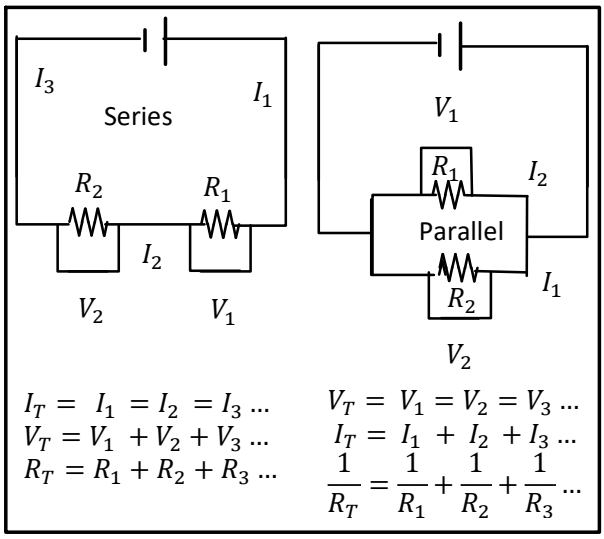
Electron Flow

Math $+ \rightarrow -$



Conventional Current - Opposite*

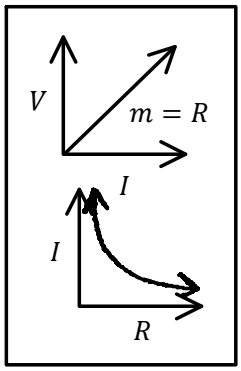
Current is like river flow*



$I_T = I_1 = I_2 = I_3 \ldots$ $V_T = V_1 = V_2 = V_3 \ldots$

$V_T = V_1 + V_2 + V_3 \ldots$ $I_T = I_1 + I_2 + I_3 \ldots$

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



Add a resistor in:
Series R_T *I*ncreases
Parallel R_T Decreases

Two Resistors$_{||}$

$R_T^* = \frac{R_1 R_2}{R_1 + R_2}$

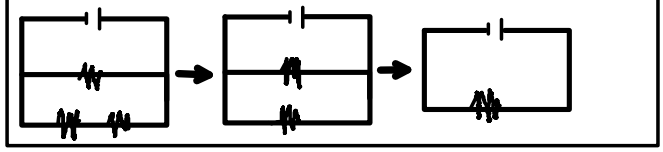
Circuits

R_T 1*st*

Parallel 2*nd*
Series 1*st*

Series 2*nd*
Parallel 1*st*

Redraw!



Kirkoff's Laws

$\sum V = 0$ $-V + V \ldots = 0$ *Loop Rule*: *Sum of the voltages in a loop equals zero*

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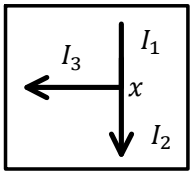
$*\ -ve\ (drop)\ if\ through\ resistor\ with\ current, +ve\ if\ against\ current\ through\ resistor$

$*\ +ve\ (rise)\ \ if\ through\ battery\ with\ current, -ve\ if\ against\ current\ through\ battery$



$I_A + I_B = I_C$ *Junction Rule*: *Current into a junction equals current out*

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Electron Volt (eV): Energy to move an electron across 1 Volt.

Transformer