Ohm's Law V=IR, where V=voltage in volts, I=current in amperes, and R=resistance in ohms

DC Circuits

Resistors in Series: The same current goes through all of the resistors.

The equivalent series resistor to 3 resistors in series has the resistance

$R_{series} = R_1 + R_2 + R_3$

Resistors in Parallel have the same voltage.

For 3 resistors in parallel, $V = V_1 = V_2 = V_3$

$$I = I_1 + I_2 + I_3$$

$$\frac{V}{R_{par}} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$$

$$\frac{1}{R_{par}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

Kirchhoff's Laws

1. **Current Law :** from charge conservation at a node
   a. $\sum I_{in} = 0$, i.e., the sum of all currents coming into a node =0.
   b. $\sum I_{in} = \sum I_{out}$, i.e., the sum of all currents into node = the sum of all currents leaving
2. **Voltage Law**: from energy conservation around a closed loop
   a. $\sum_{around\ closed\ loop} \Delta V = 0.$