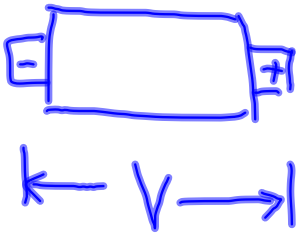
Electromotive Force (EMF)

EMF = Potential difference between terminals of a battery with zero internal resistance

$V = \mathcal{E} - Ir$

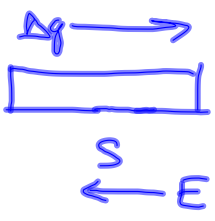
small resistance



EMF is not a force

EMF units are Volts

Power in a circuit



$$P = \frac{\Delta W}{\Delta t} = \frac{F \cdot s}{\Delta t}$$

$$= \frac{\frac{F}{\Delta q}\Delta q\, s}{\Delta t} = E \cdot s \underbrace{\frac{\Delta q}{\Delta t}}_{I}$$

$$= E \cdot s\, I$$

$$= V I$$

$$\boxed{P = IV}$$

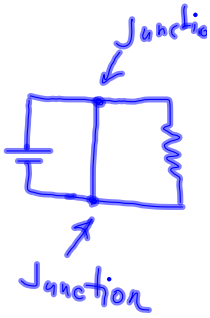
$$V = IR$$

$$P = \frac{V}{R} V = \frac{V^2}{R}$$

Kirchhoff's Rules

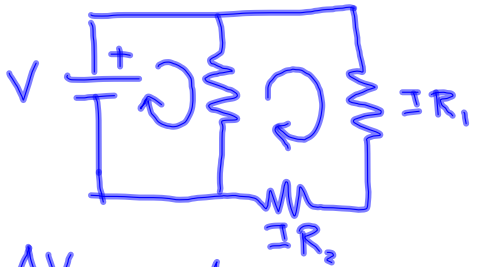
① Junction Rule

$$I_1 + I_2 + I_3 = 0$$



② Loop Rule

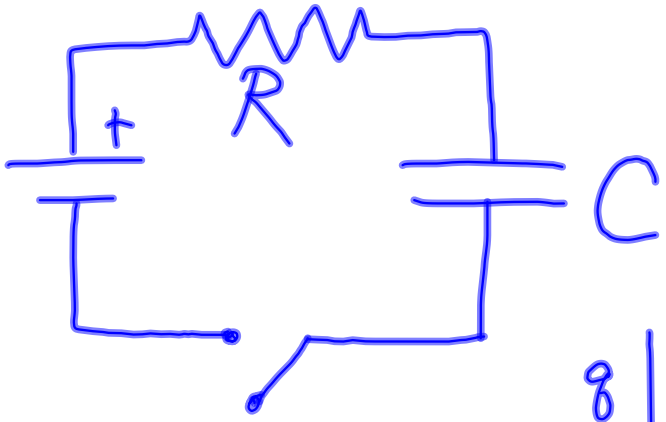
$$I_1 + I_2 = I_3$$

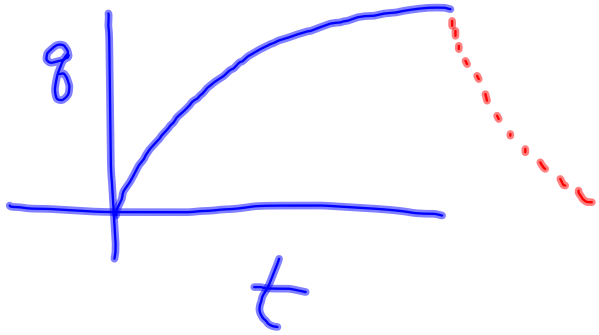


ΔV around any circuit loop = 0

$$V - IR_1 - IR_2 = 0$$

RC Circuit





Time to charge or discharge the capacitor = RC