Electrodinámica

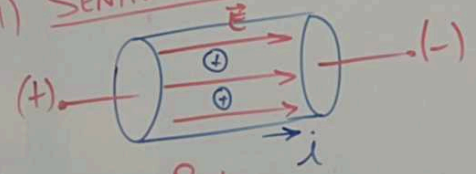
Estudia las cargas eléctricas en movimiento.

Corriente eléctrica:

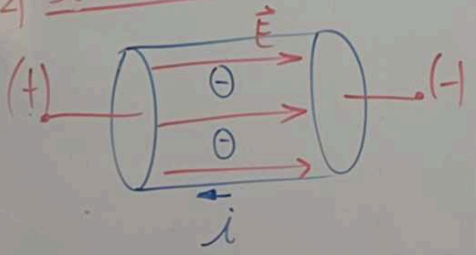
Flujo de carga eléct. que pasa por el conductor

Sentido de la corriente eléct.

1) Sentido Convencional



2) Sentido Real:



Intensidad de la Corriente Eléctrica: (i)

$$i = \frac{q}{t}$$

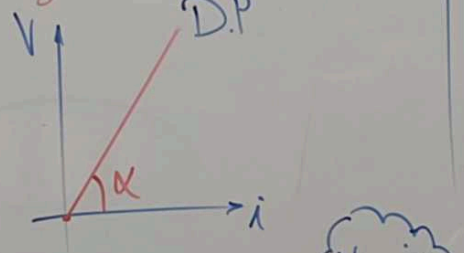
S.I: i (Amperio = A)

q: carga eléct. (C)

t: tiempo (s)

Nota: $1\,A = 1\,\frac{C}{s} = 6{,}25 \times 10^{18}\,\frac{e}{s}$

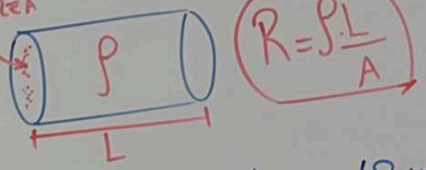
Ley de Ohm



$$tg\alpha = \frac{V}{i} = R \rightarrow V = i \cdot R$$

- V: Voltaje o Dif. de Potencial (Voltio = V)
- R: Resistencia eléctrica (Ohmio = Ω)

Ley de Poulliet



$$R = \rho \frac{L}{A}$$

ρ: Resistividad eléctrica ($\Omega \cdot m$)

L: longitud (m)

A: Área de la sección transversal (m^2)

Potencia Consumida (P)

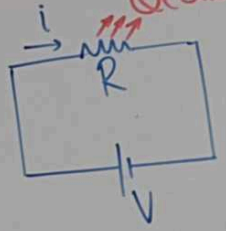
$$P = V \cdot i \qquad P = i^2 R$$

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

S.I: P (Watt = Voltio = W)

Efecto Joule:

Q (calor)



$$Q = Pot \cdot t$$

$$Q = i^2 R \cdot t \ (J)$$

$$Q = 0{,}24\, i^2 R t \ (cal)$$

Joule:

Q (calor)

V

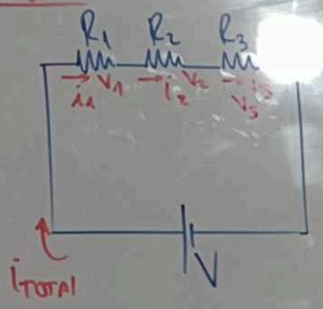
r.t

$\frac{V^2}{R}.t$ (J)

$24 i^2 R t$ (cal)

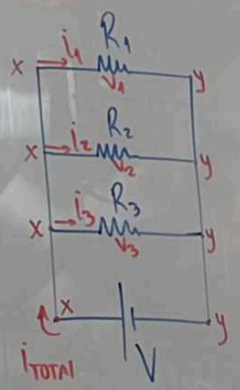
Asociación de Resistencias

1) Serie:



- ✓ $i_1 = i_2 = i_3 = i_{TOTAL}$
- ✓ $V_1 + V_2 + V_3 = V$
- ✓ $R_1 + R_2 + R_3 = R_{equiv.}$

2) Paralelo:



1) $V_1 = V_2 = V_3 = V$

2) $i_1 + i_2 + i_3 = i_{TOTAL}$

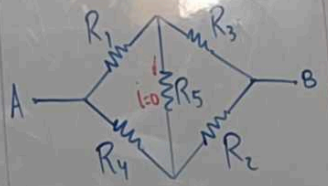
3) $\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} = \frac{1}{R_{equiv.}}$

4) Si son 2 Resist. en Paralelo

- ✓ $R_{eq} = \frac{R_1 \times R_2}{R_1 + R_2}$
- ✓ Si son "n" Resist. iguales.

$R_{eq} = \frac{R}{n}$ //

Puente de Wheatstone



Si: $R_1 \times R_2 = R_3 \times R_4$

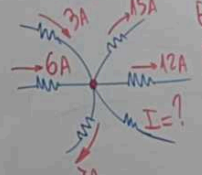
→ R_5 se elimina

Leyes de Kirchoff

1) Ley de los Nodos:

$\sum i_{\text{entra al nodo}} = \sum i_{\text{sale del nodo}}$

Ej:



Entra = 9 + 25

Sale = 34

2) Ley de los Voltajes o Mallas:

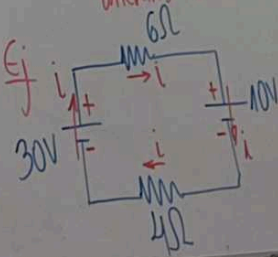
$\sum V = \sum iR$ → $30 - 10 = i(6) + i(4)$

(Baterías / Resistencias)

$20 = 10i$

$i = 2A$ ✗

Ej:



② $i = 30A$
$t = ?$ (min)
$q = 4500C$

$i = \frac{q}{t}$

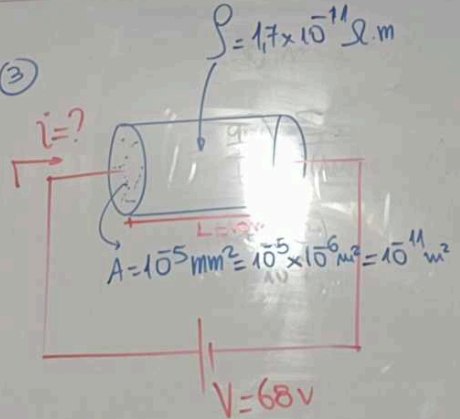
$30 = \frac{4500}{t}$

$t = 150\,s$

$t = \frac{150}{60}\,min$

$t = 2{,}5\,min$

③ $\rho = 1{,}7 \times 10^{-11}\,\Omega.m$



✓ $R = \rho \frac{L}{A}$

$R = \frac{1{,}7 \times 10^{-11} \times 10}{10^{-11}}$

$R = 17\,\Omega$ ✗

✓ $V = iR$

$68 = i(17)$

$i = 4A$

④ $t = 1\,min = 60s$
$i = 10A$
$R = 5\,\Omega$
$Q = ?$ (kJ)

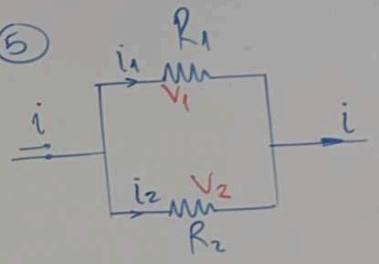
$Q = i^2 R t$

$Q = 10^2 (5)(60)$

$Q = 30000\,J$

$Q = 30kJ$ ✗

⑤



$V_1 = V_2$

$i_1 R_1 = i_2 R_2$

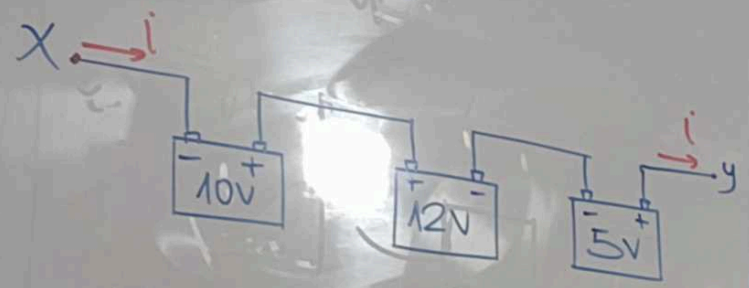
$i_1 (3R_2) = i_2 (R_2)$

$\frac{i_1}{i_2} = \frac{1}{3}$ ✗

⑥

$x =$

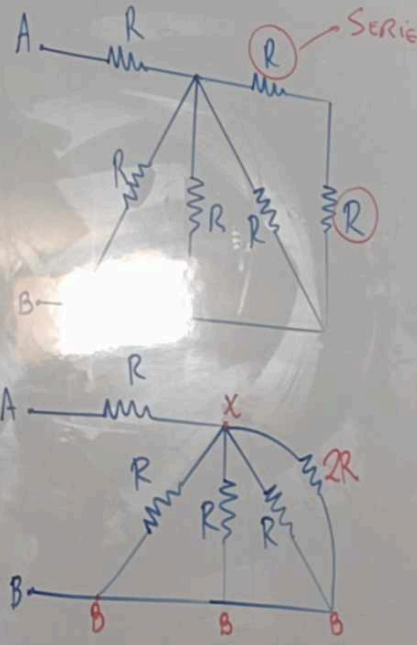
⑥ $V_x - V_y$

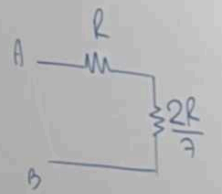


$V_x + 10 - 12 + 5 = V_y$

$V_x - V_y = -3V$ →

⑦





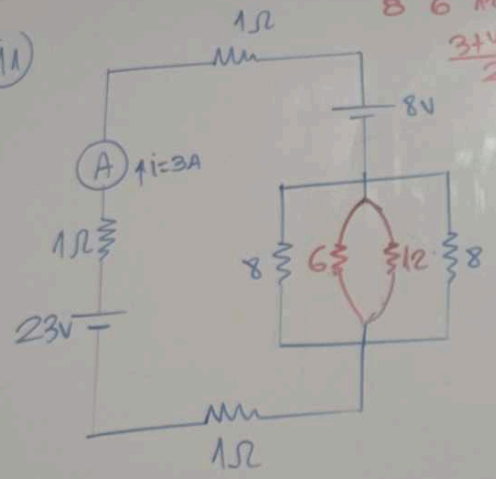
$R_{eq} = R + \frac{2R}{7}$

$= \frac{9R}{7}$ →

$\frac{1}{R} + \frac{1}{R} + \frac{1}{R} + \frac{1}{2R} = \frac{1}{R_{eq}}$

$\frac{7}{2R} = \frac{1}{R_{eq}} \rightarrow R_{eq} = \frac{2R}{7}$ ←

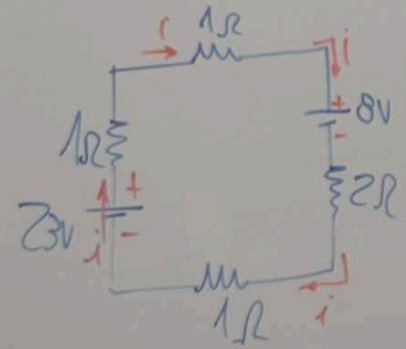
(11)



$\frac{1}{8}+\frac{1}{6}+\frac{1}{12}+\frac{1}{8}=\frac{1}{R_{eq}}$

$\frac{3+4+2+3}{24}=\frac{1}{R_{eq}}$

$R_{eq}=2$



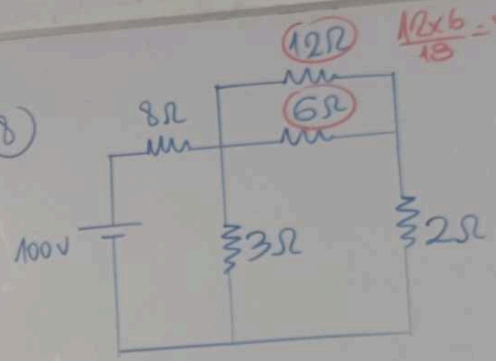
$\sum V=\sum iR$

BAT. RESIST.

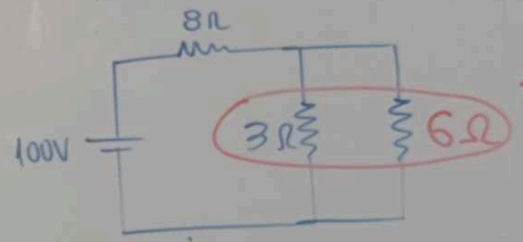
$23-8=5i$

$i=3A$

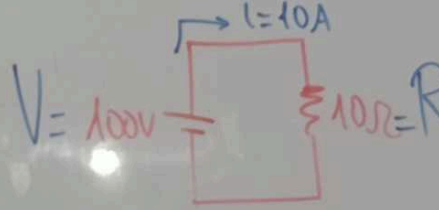
(8)



$\frac{12\times6}{18}=4$



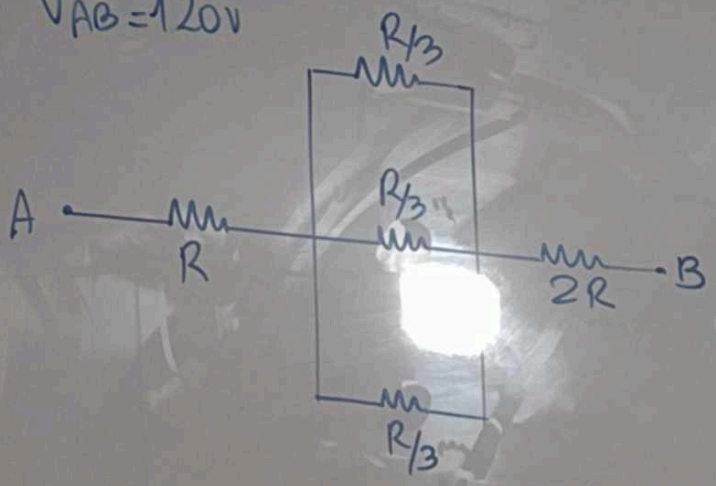
$\frac{3\times6}{9}=2$



$P_{OT.}=Vi=100(10)=1000W$

DATO:

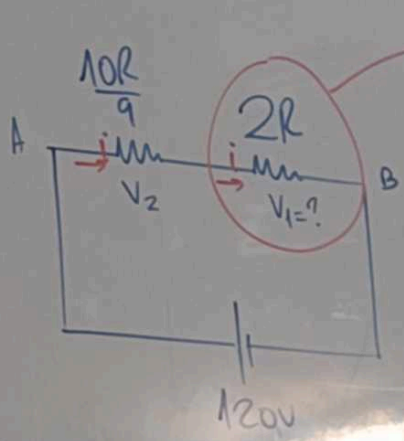
$V_{AB} = 120v$



$$\frac{3}{R} + \frac{3}{R} + \frac{3}{R} = \frac{1}{Req}$$

$$\frac{9}{R} = \frac{1}{Req}$$

$$Req = \frac{R}{9}$$

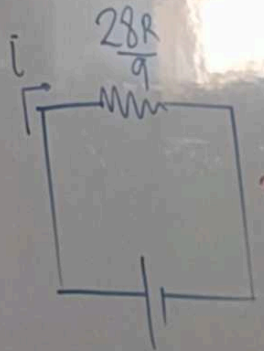


$V_1 = iR$

$V_1 = i(2R)$

$V_1 = 2\left(\frac{270}{7}\right)$

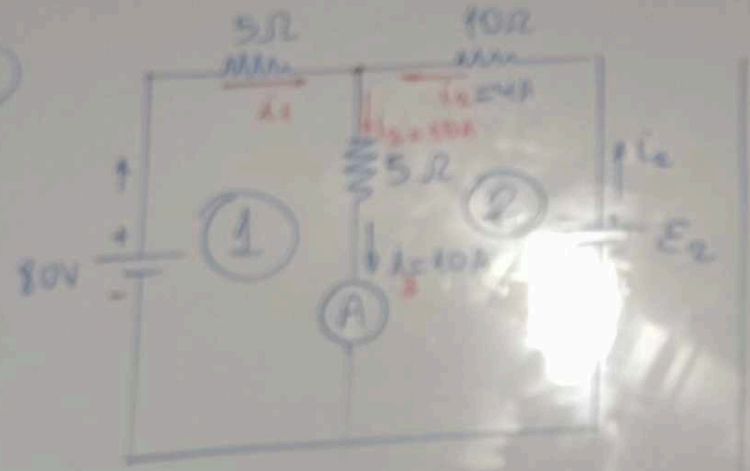
$V_1 = \frac{540}{7} = 77,14\ v$



$V = iR$

$120 = i\left(\frac{28R}{9}\right)$

$\frac{270}{7} = iR$



(2)

Malla ②

$\Sigma V = \Sigma iR$

$\varepsilon_2 = 4(10) + 6(10)$

$\varepsilon_2 = 90V$

$i_1 + i_2 = 10$

MALLA ①: $\Sigma V = \Sigma iR$

$80 = 5i_1 + 5(10)$

$i_1 = 6A$ $i_2 = 4A$