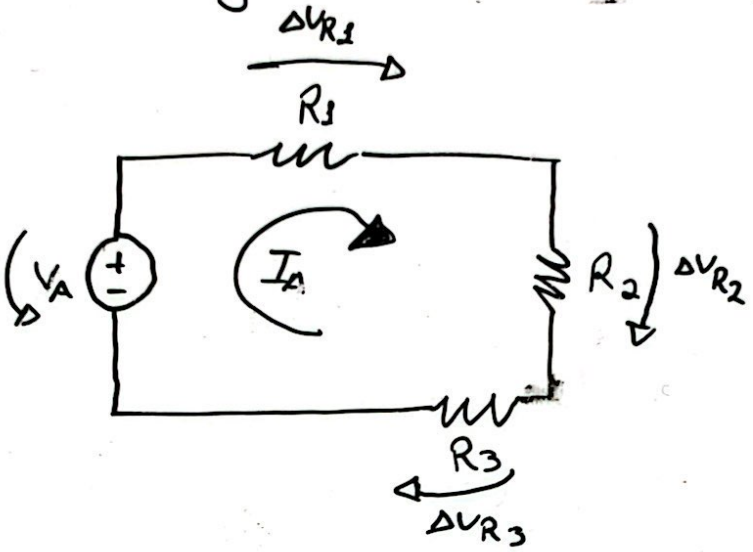
Divisor de tensões

→ Imaginando um circuito só com 1 malha.



$$\Delta V_{R1} + \Delta V_{R2} + \Delta V_{R3} - V_A = 0$$

$$\Leftrightarrow R_1 \cdot I_A + R_2 \cdot I_A + R_3 \cdot I_A - V_A = 0$$

$$\Leftrightarrow I_A \cdot (R_1 + R_2 + R_3) = V_A$$

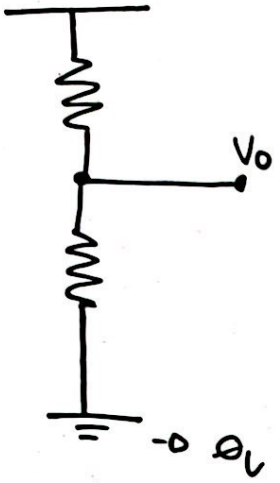
$$\Leftrightarrow I_A = \frac{V_A}{R_1 + R_2 + R_3 \ldots}$$

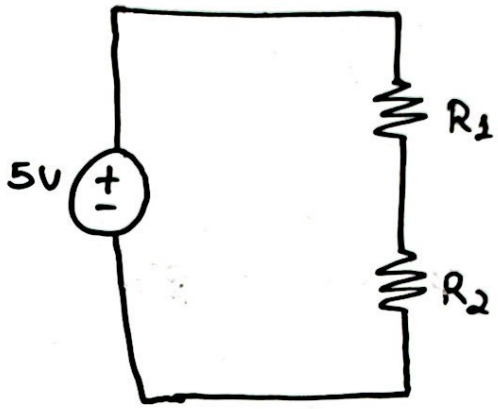
→ $\Delta V_{R2} = R_2 \cdot I_A = \frac{R_2}{R_1 + R_2 + R_3 \ldots} \times V_A$

Generalizando:

$$\Delta V_{R_i} = \frac{R_i}{\sum_{j=1}^{N} R_j} \times V_A$$

Exemplo:

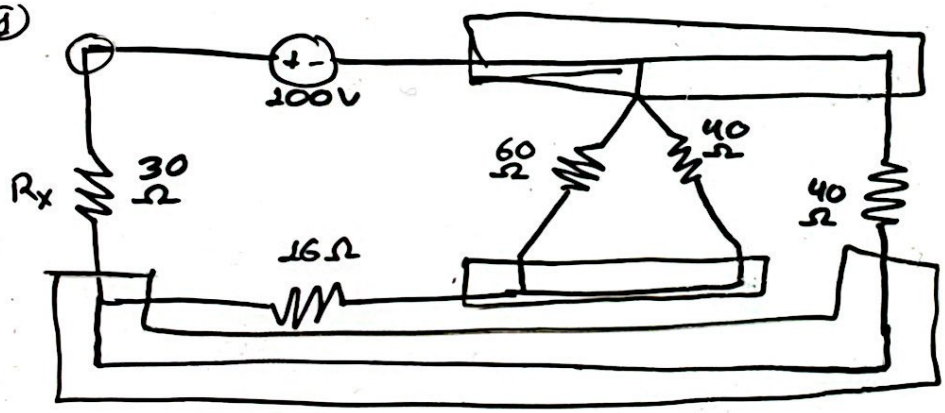




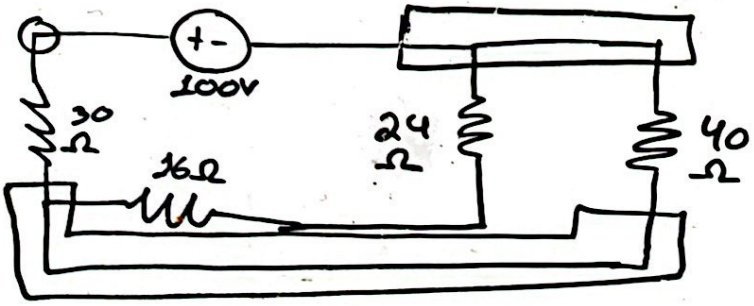
$$\Delta V_o = \frac{R_2}{R_1 + R_2} \times V_{cc}$$

Exercícios:

①



(=)



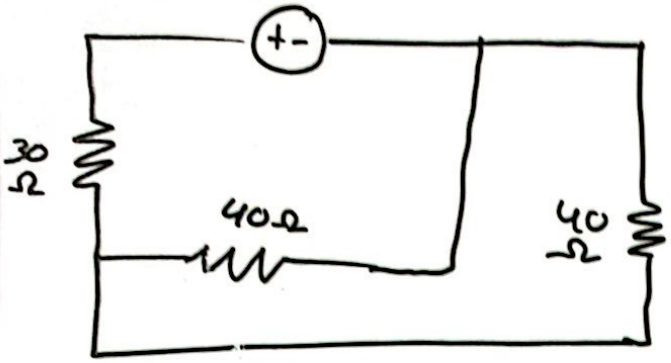
$$\left(\frac{1}{60} + \frac{1}{40}\right)^{-1}$$

$$= 24\,\Omega$$

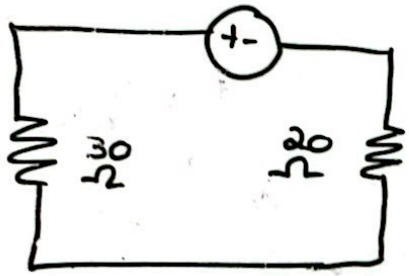
↓

∞

$24\Omega + 16\Omega = 40\Omega$

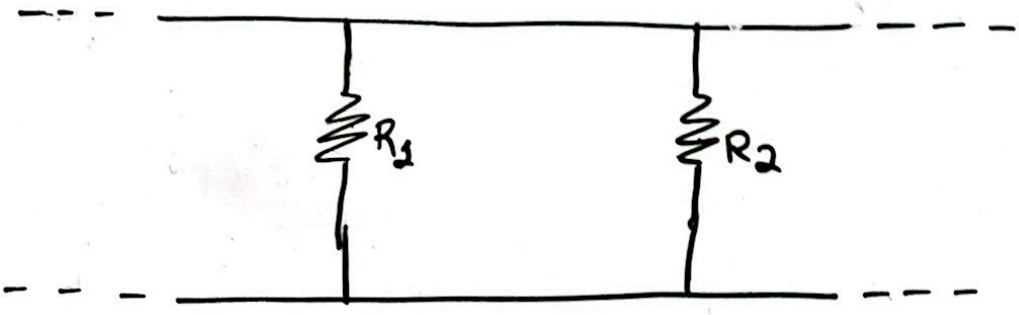


$\left(\frac{1}{40} + \frac{1}{40}\right)^{-1} = 20\Omega$



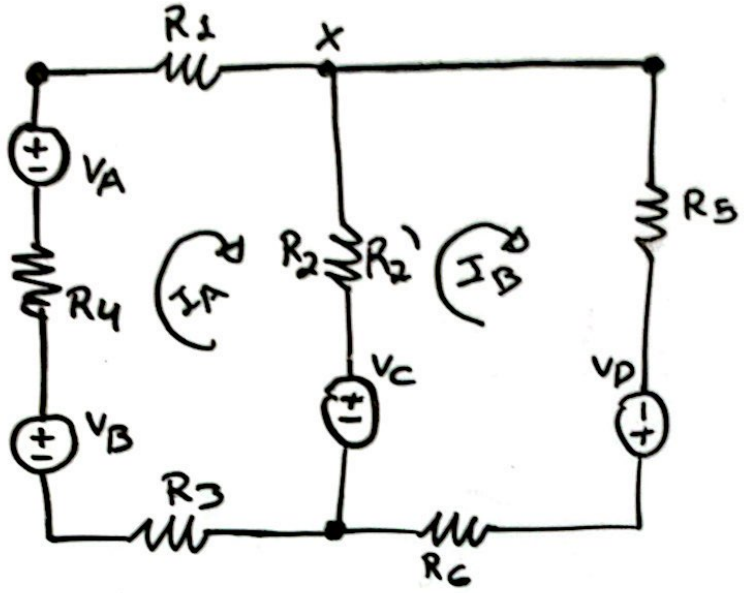
$30\Omega + 20\Omega = 50\Omega$

Em série fazemos $R_1 + R_2 = R_{eq1}$



Em paralelo fazemos $\left(\frac{1}{R_1} + \frac{1}{R_2}\right)^{-1} = R_{eq1}$

②

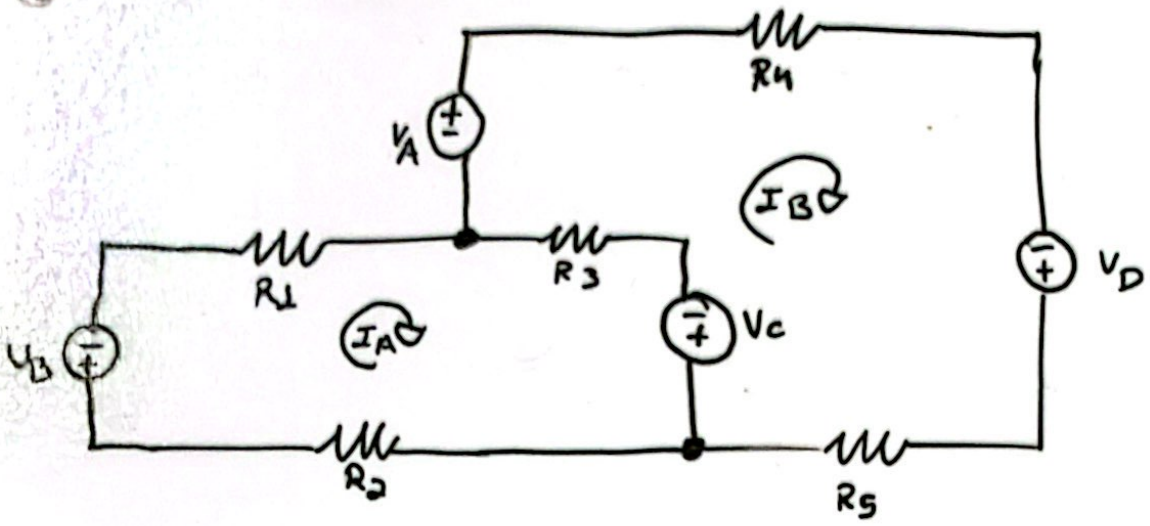


$$\begin{cases} \Delta V_{R1} + \Delta V_{R2} + \Delta V_C + \Delta V_{R3} - \Delta V_B + \Delta V_{R4} - \Delta V_A = 0 \\ + \Delta V_{R5} - \Delta V_D + \Delta V_{RG} - \Delta V_C + \Delta V_{R2'} = 0 \end{cases}$$

$$\begin{cases} R_1 \cdot J_A + R_2 \cdot (J_A - J_B) + \Delta V_C + R_3 \cdot J_A - \Delta V_B + R_4 \cdot J_A - \Delta V_A = \\ R_5 \cdot J_B - \Delta V_D + R_G \cdot J_B - \Delta V_C + R_2' \cdot (J_B - J_A) = 0 \end{cases}$$

$$\begin{cases} J_A \cdot (R_1 + R_2 + R_3 + R_4) = -\Delta V_C + \Delta V_B + \Delta V_A + R_2 J_B \\ J_B \cdot (R_5 + R_G + R_2') = +\Delta V_D + \Delta V_C + R_2 I_A \end{cases}$$

(2)



$$\begin{cases} \Delta U_{R1} + \Delta U_{R3} - V_C + \Delta U_{R2} + V_B = \emptyset \\ \Delta U_{R4} - V_D + \Delta U_{R5} + V_C + \Delta U_{R3} - V_A = \emptyset \end{cases}$$

$$\begin{cases} R_1 \cdot I_A + R_3 \cdot (I_A - I_B) - V_C + R_2 \cdot I_A + V_B = \emptyset \\ R_4 \cdot I_B - V_D + R_5 \cdot I_B + V_C + R_3 \cdot (I_B - I_A) - V_A = \emptyset \end{cases}$$

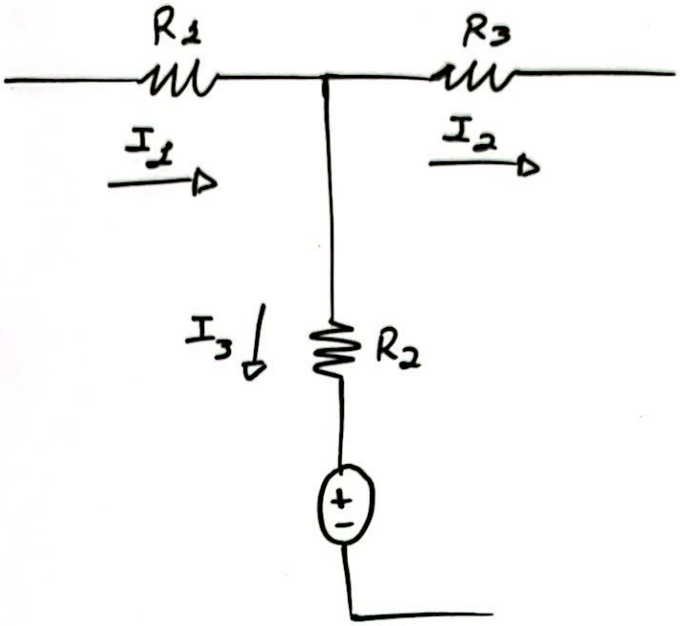
$$\begin{cases} I_A \cdot (R_1 + R_3 + R_2) = V_C - V_B + R_3 \cdot I_B \\ I_B \cdot (R_4 + R_5 + R_3) = V_D - V_C + V_A + R_3 \cdot I_A \end{cases}$$

Nota:

$P = \Delta V \cdot I$

$\Delta V = R \cdot I$

$P = R \cdot I^2$ → Apenas nas resistências.



$R_1 = 10\Omega$

$R_2 = 20\Omega$

$R_3 = 30\Omega$

$I_1 = 4A$

$I_2 = 2A$

$I_3 = ?$

$P_{diss.\ R_2}$?

$P_{forn.\ V_A}$?

$$I_1 = I_2 + I_3$$

$$I_3 = I_1 - I_2$$

$$I_3 = 4A - 2A$$

$$I_3 = 2A$$

$$P_{dissipada\ R_2} = R_2 \cdot I_3^2$$

$$= 20 \times 2^2$$

$$= 20 \times 4$$

$$= 80W$$

$$P_{fornecida\ VA} = V_A \times I_3$$

$$= 10 \times \underline{(-2)} \rightarrow$$

$$= -20W$$

temos de trocar o sentido, se não não calculamos a Pot. fornecida.