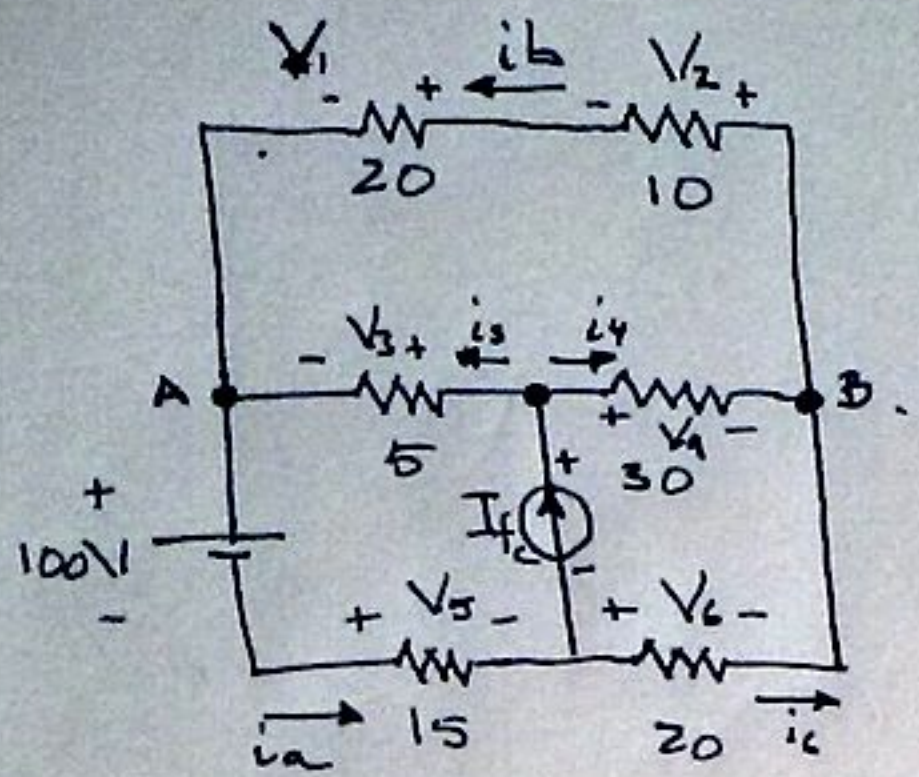
# Solución Parcial #1.

(1)




$I_1 = I_2 = ib.$
$I_5 = ia$
} Datos.

Sol

$I_1 = -2A$, $\Rightarrow$ $V_1 = 20\Omega * (-2A) = \underline{-40\,Volt}$ $\quad P_1 = V_1 I_1 = 80W$ Pasivos

$I_2 = -2A$, $\Rightarrow$ $V_2 = 10\Omega * (-2A) = \underline{-20V}$ $\quad P_2 = V_2 I_2 = 40W$ Pasivos

$I_5 = 4A$, $\Rightarrow$ $V_5 = 15\Omega * (4A) = \underline{60V}$ $\quad P_5 = V_5 I_5 = 240W$ Pas.

En el nodo A tenemos $ib + i_3 = ia \Rightarrow i_3 = ia - ib = 4A - (-2A) = \underline{6A}$

$I_3 = 6A$, $\Rightarrow$ $V_3 = 5\Omega . 6A = 30V$ $\quad P_3 = V_3 . I_3 = \underline{180W}$ Pas

Para conocer $i_4$ Buscamos primero $V_4$, ya que conocemos $V_1$, $V_2$ y $V_3$.

LKV en la malla de arriba.

$$-V_3 + V_4 + V_2 + V_1 = 0 \Rightarrow V_4 = V_3 - V_2 - V_1 = 30V + 20V + 40V.$$

$\underline{V_4 = 90V}$ $\Rightarrow$ $I_4 = \frac{V_4}{R_4} = \frac{90V}{30\Omega} = \underline{3A}$ $\quad P_4 = V_4 . I_4 = \underline{270W}$

En el nodo B. tenemos. $i_4 + i_6 = ib \Rightarrow i_6 = ib - i_4 = -2A - 3A = \underline{-5A}$

$I_6 = -5A \Rightarrow$ $V_6 = 20\Omega * (-5A) = \underline{-100V}$ $\quad P_6 = V_6 . I_6 = \underline{500W}$ Pas.

$I_{fc} = i_3 + i_4$ (Nodo Centro) $\Rightarrow$ $I_{fc} = 6A + 3A = \underline{9A}$

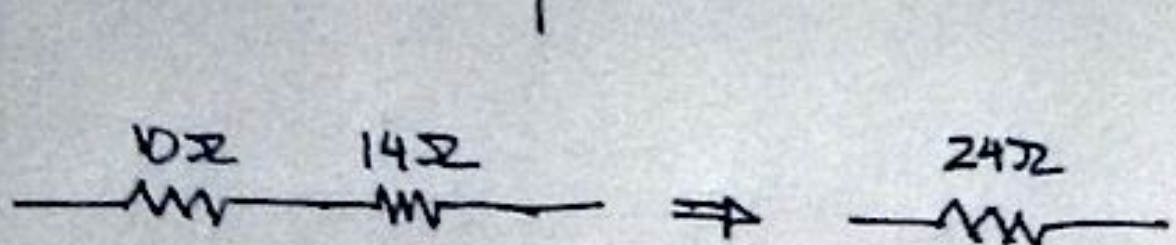
$V_{fc} + V_6 - V_4 = 0$ (Malla inferior) $\Rightarrow$ $V_{fc} = 90V + 100 = \underline{190V}$

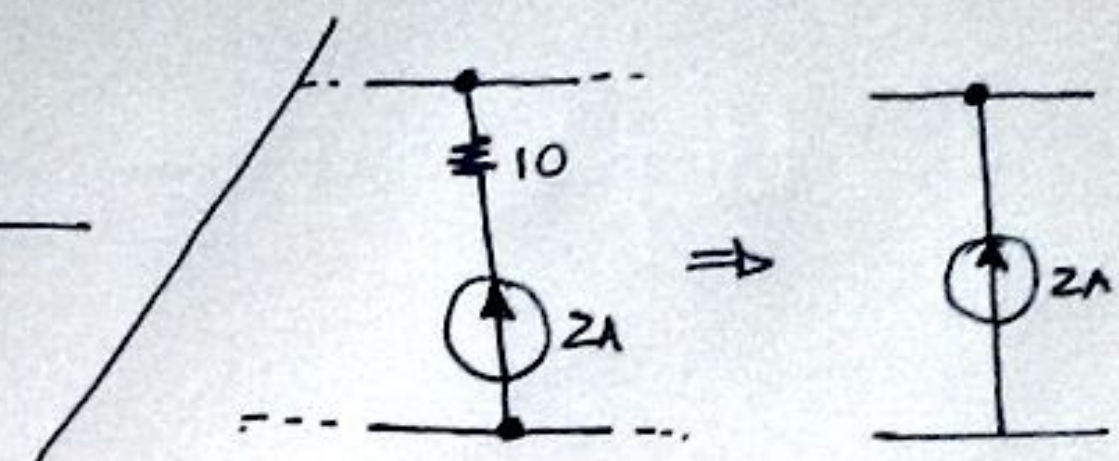
$\Rightarrow P_{fc} = 1710\,W$ Activos

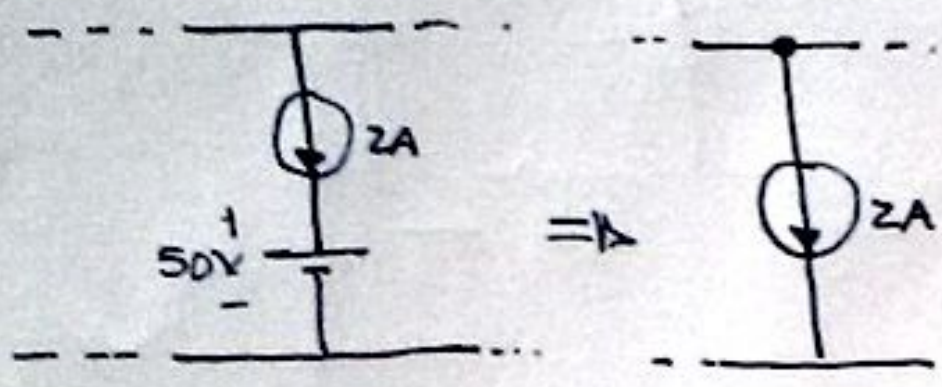
$I_{fv} = ia \Rightarrow \underline{I_{fv} = 4A}$ $\quad P_{fv} = V_f . I_f = 100 * 4A = \underline{400W}$ Pasivos

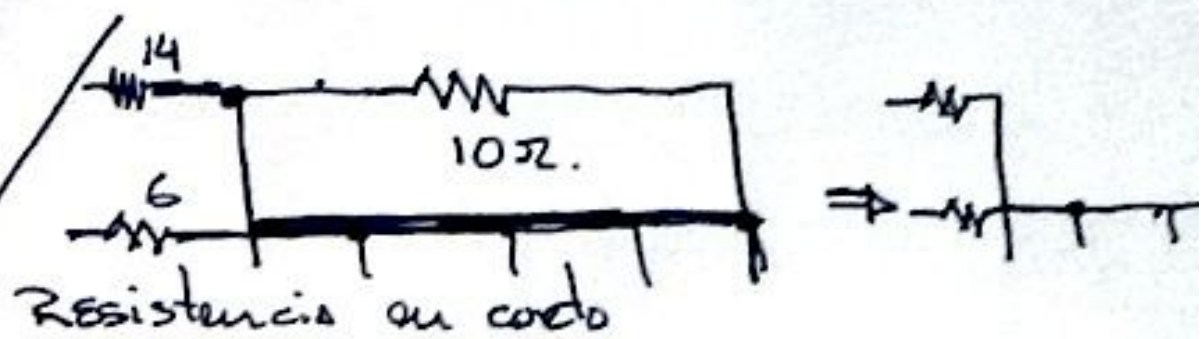
$\Sigma_{act} = \Sigma_{pas} = 1710\,W$

(2) Algunas simplificaciones directas:

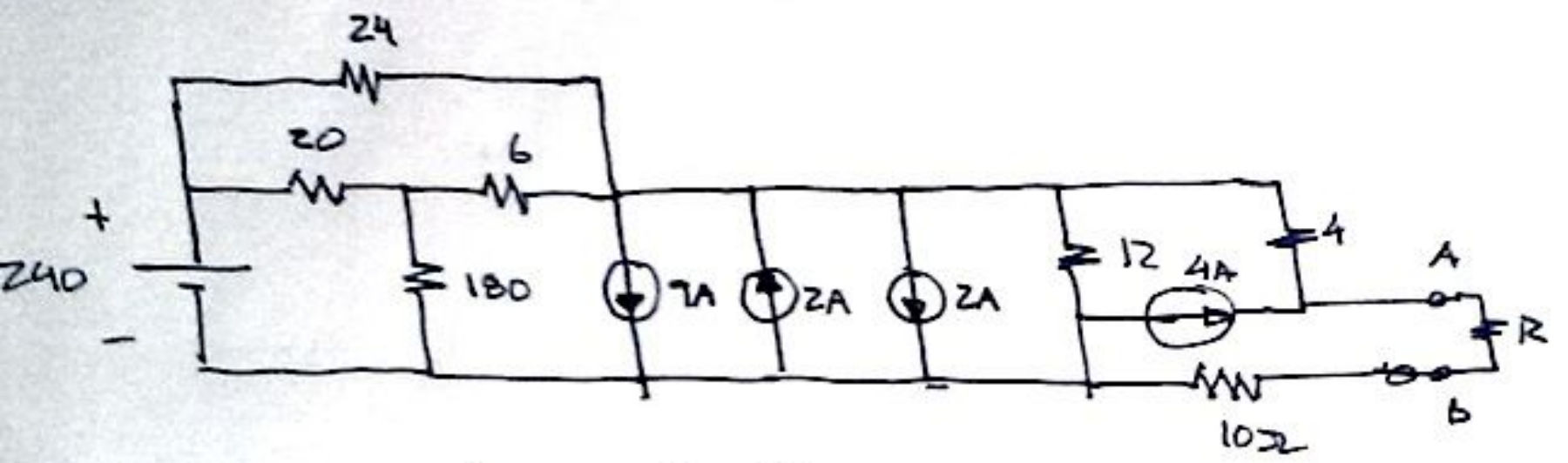


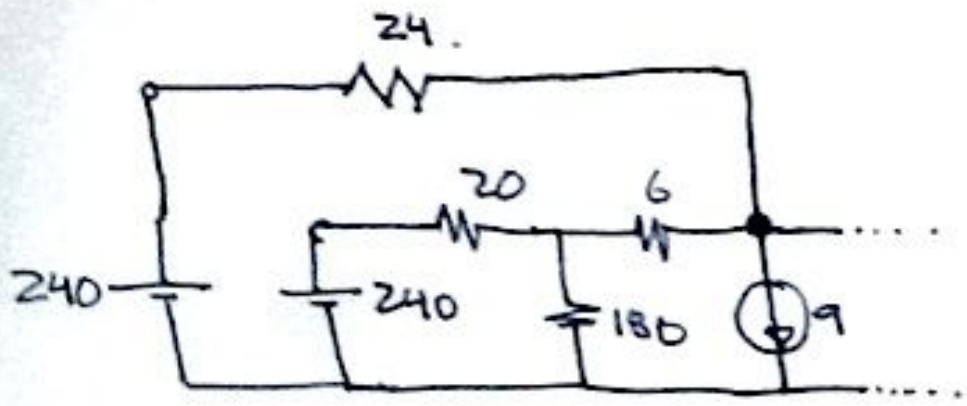

Por lo que el circuito Queda.



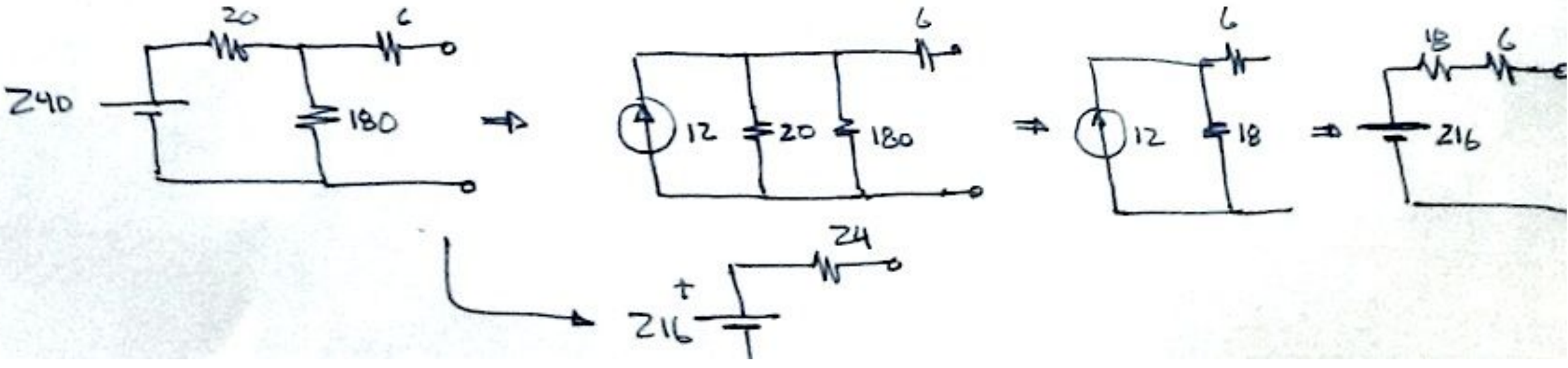

Fuentes de corriente en Paralelo se suman ⟹ $I = 9 - 2 + 2 = \underline{9A}$

Podemos aplicar Blakesley de Voltaje a la fuente de 240 V

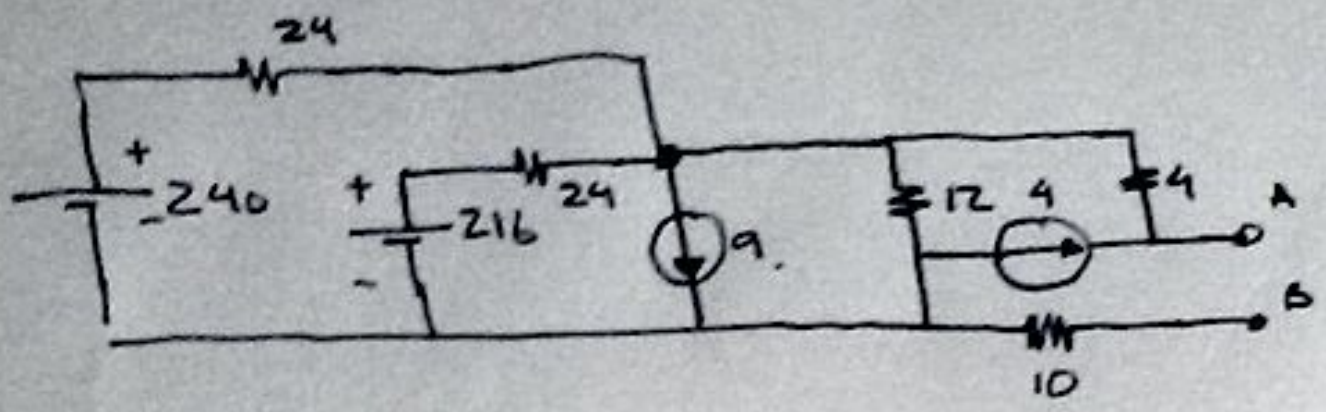
Así



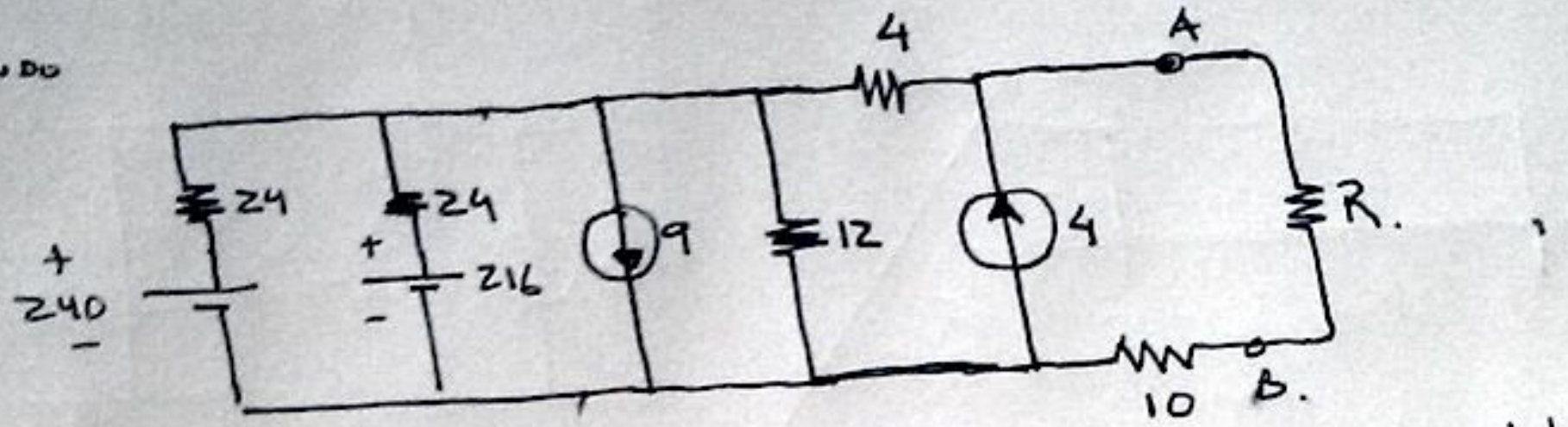

a parte interna tenemos:



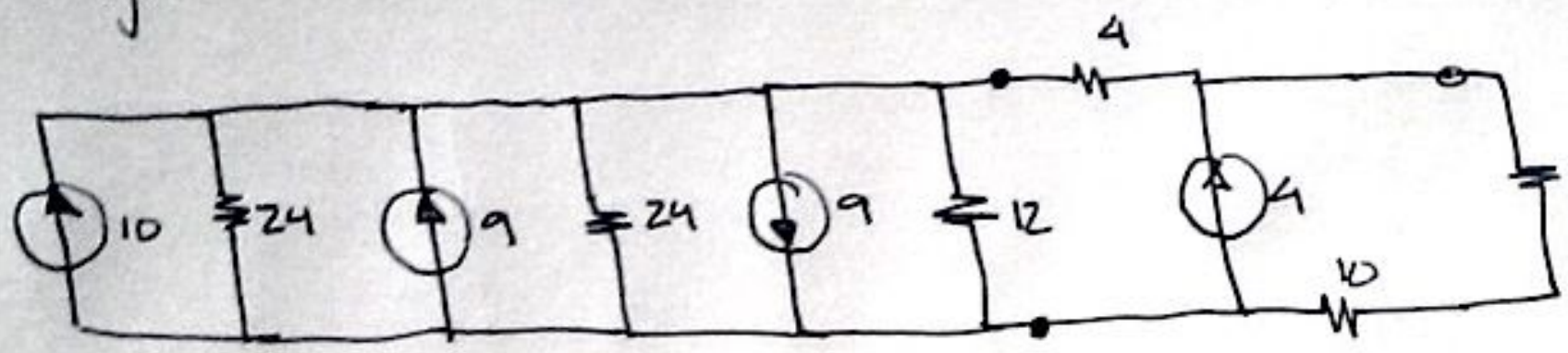
El circuito quedaría.




Redibujando

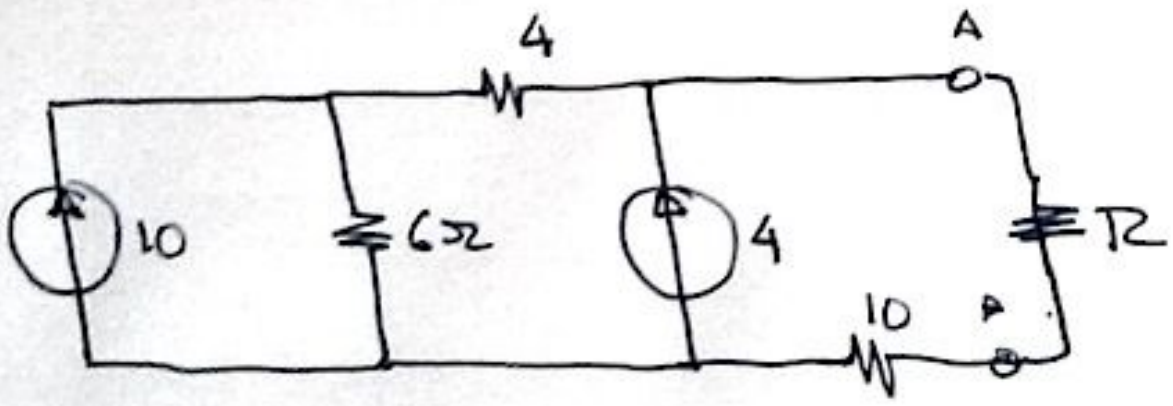


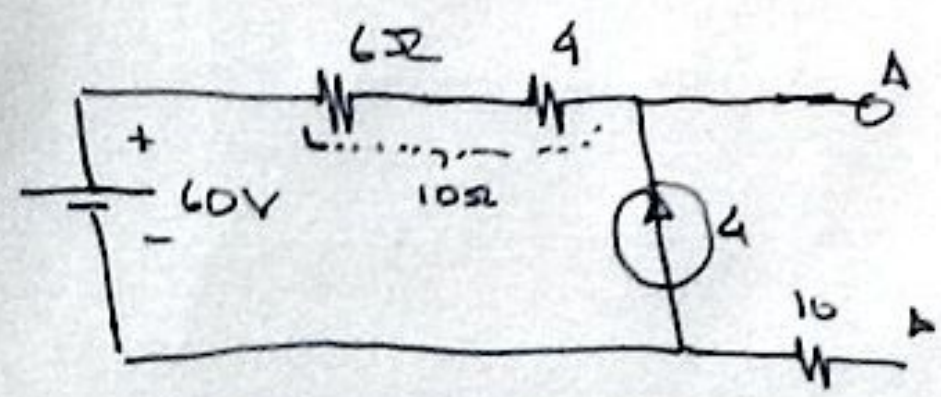

Fuente Voltaje con resistencia en serie ⇒ Fuente corriente, resist paralela.....

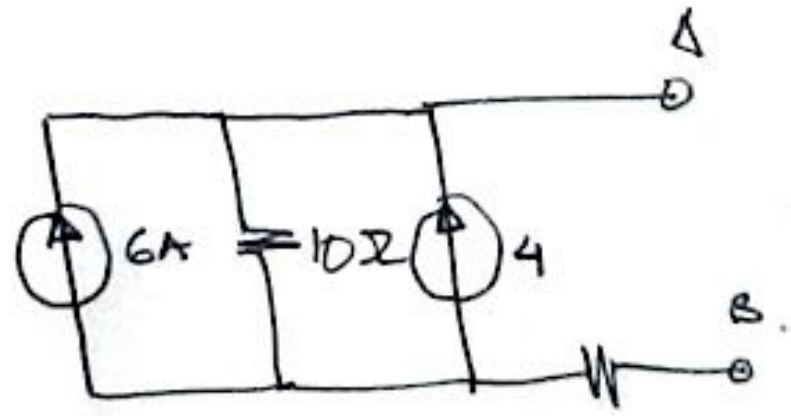


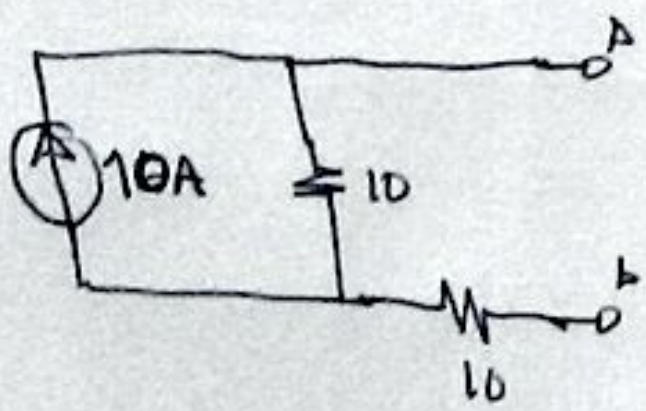

Fuente corriente → $I = 10+9-9 = 10A$ ⇒ Resistencias $24\Omega, 24\Omega$ y $12\Omega$ en paralelo
Paralelas

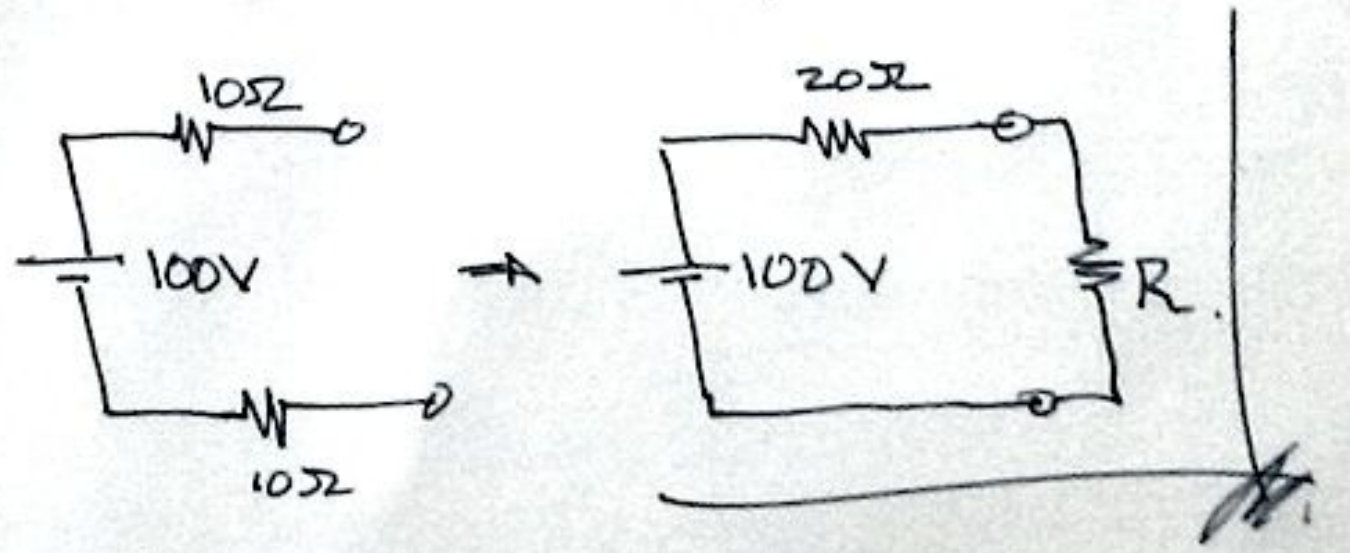
$6\Omega$.



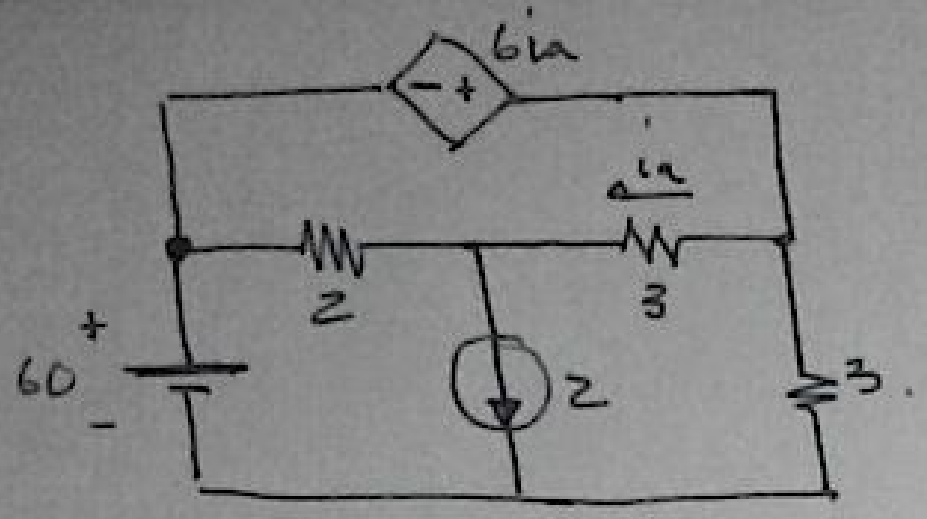



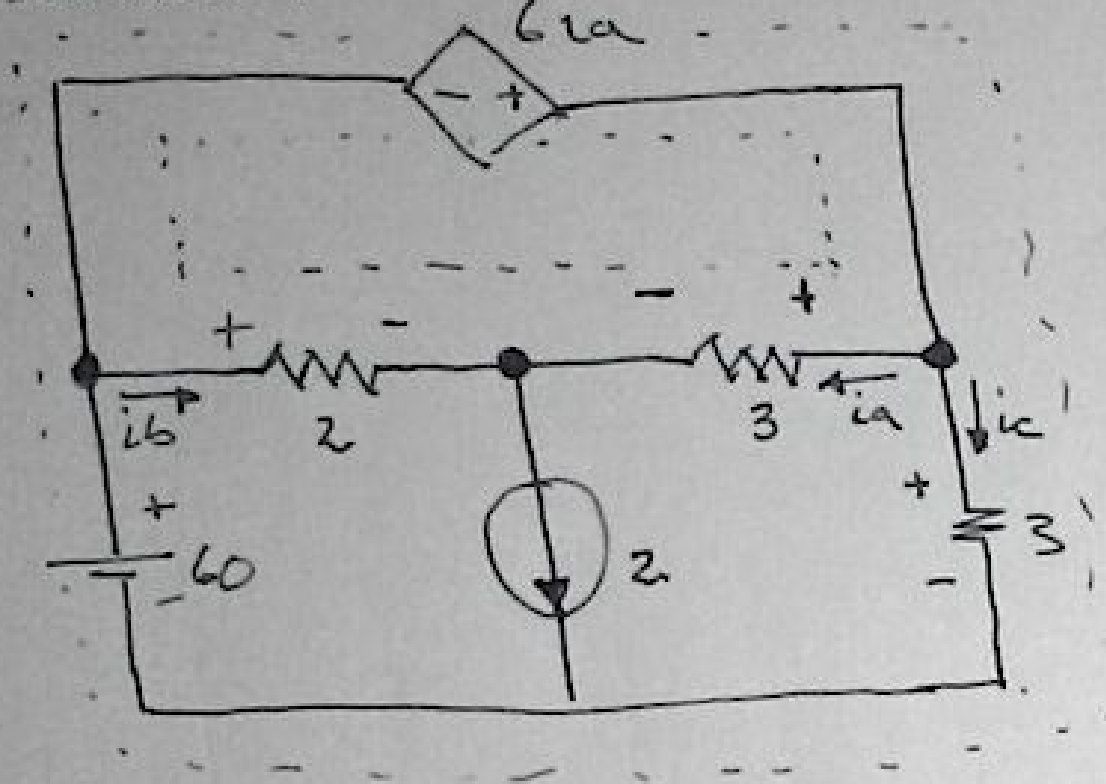



(3)




tenemos 3 corrientes en la resistencia que no conocemos así que necesitamos.

3 ecuaciones




Nodo central

$$i_a + i_b = 2 \quad (1)$$

Malla externa:

$$-60 - 6i_a + 3i_c = 0$$

$$-6i_a + 3i_c = 60 \quad (2)$$

Malla interna. $2i_b - 3i_a + 6i_a = 0$ $\quad 3i_a + 2i_b = 0 \quad (3) \Rightarrow i_b = \frac{-3i_a}{2}$

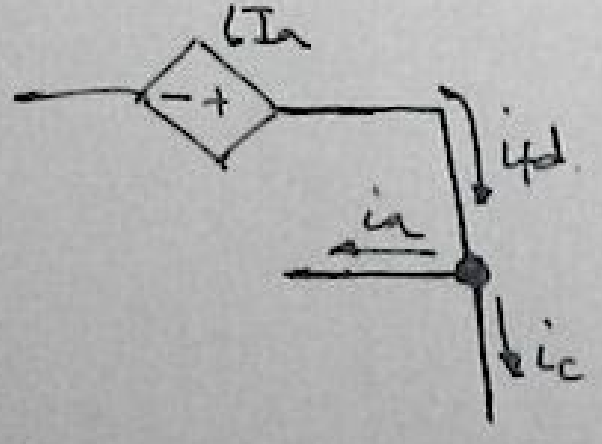
De (1) $\Rightarrow$ $i_a + \left(\frac{-3i_a}{2}\right) = 2 \Rightarrow 2i_a - 3i_a = 4 \quad -i_a = 4 \quad i_a = -4A$

$i_b = -\frac{3i_a}{2} = 6A$

De (2) tenemos $i_c = \frac{60 + 6i_a}{3} = \frac{60 - 24}{3} = \frac{36}{3} = 12A$

$i_a = -4A$
$i_b = 6A$
$i_c = 12A$

$\Rightarrow$




$i_{fd} = i_a + i_c = -4 + 12 = 8A.$

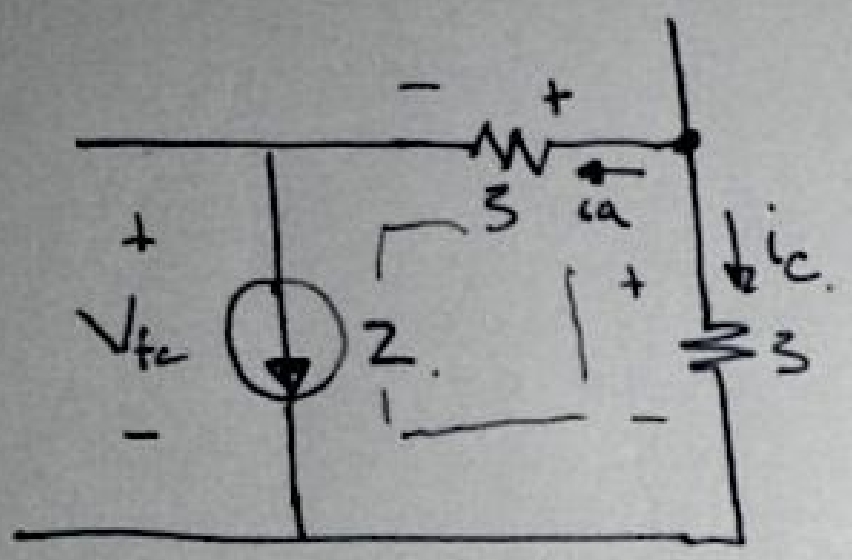
$i_{fd} = 8A$

$V_{fd} = 6i_a = -24V$

$P_{fvd} = (-24)(8A) = -192W$ Act.

La fuente está definida activa $P_f < 0 \Rightarrow$ Pasiva

$P_{fvd} = 192W$ Pasivos




$V_{fc} = ?$ LKV

$-V_{fc} - 3i_a + 3i_c = 0$

$V_{fc} = 3i_c - 3i_a = 3(2) + 12 = 48V$

$P_{fc} = V_{fc} \cdot i_f = 48V \cdot 2A = 96W$ Pasivos