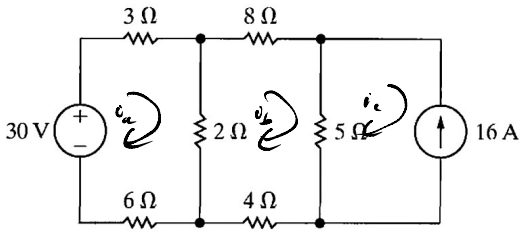
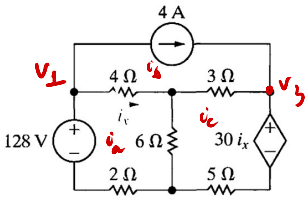
4.10 Use the mesh-current method to find the power dissipated in the 2 Ω resistor in the circuit shown.



Answer: 72 W.

4.14 Find the power delivered by the 4 A current source in the circuit shown.



Answer: 40 W.

$i_b = 4A$

Mesh a: $4(i_a - i_b) + 6(i_a - i_c) + 2i_a = 128$

$\Leftrightarrow \quad 12 i_a - 6 i_c = 144$

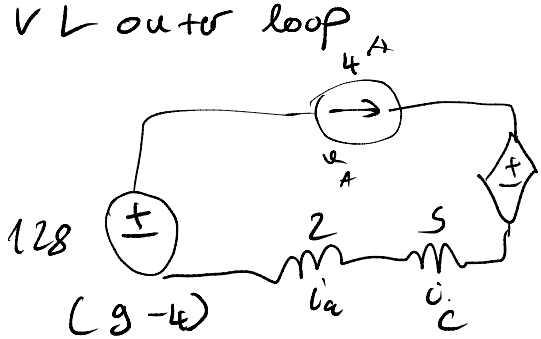
$i_x = i_a - 4 \Rightarrow 30 i_x = 30 i_a - 120$

Mesh c: $6(i_c - i_a) + 3(i_c - 4) + 30 i_a - 120 + 5 i_c$

$\Leftrightarrow \quad 24 i_a + 14 i_c = 132$

$\Rightarrow \begin{cases} i_a = 9 \\ i_c = -6 \end{cases}$

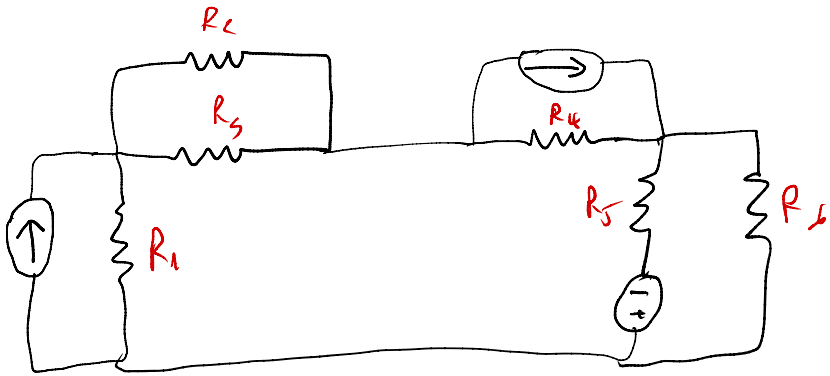
KVL outer loop

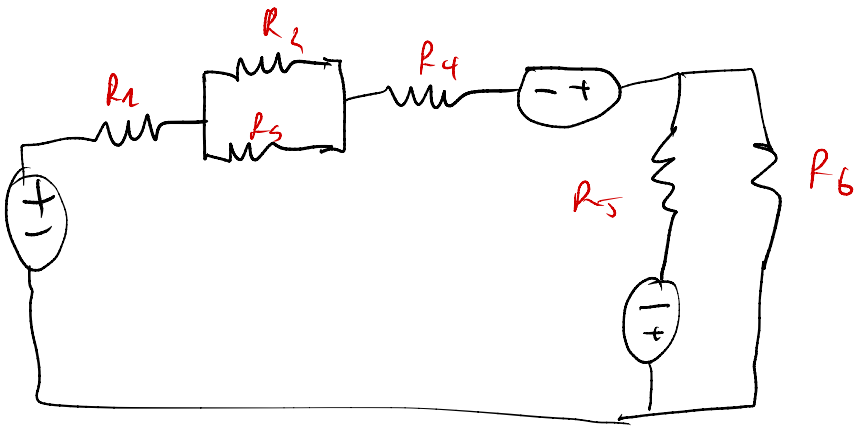


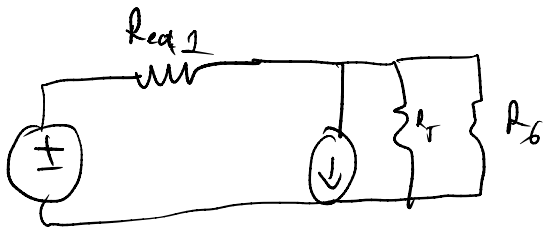
$v_{4A} + 30 i_x + 5 i_c + 2 i_a - 128$

$\Rightarrow v_{4A} = -10\ V \rightarrow P = (-10)4 = -40$

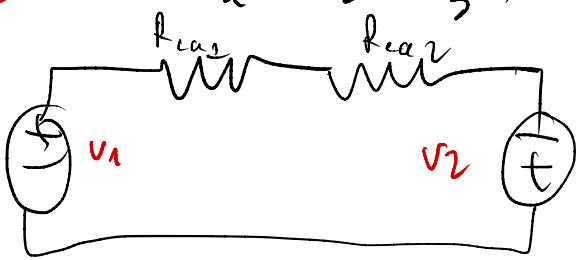
$\rightarrow$ Delivered power $P_{4A} = 40\ W$



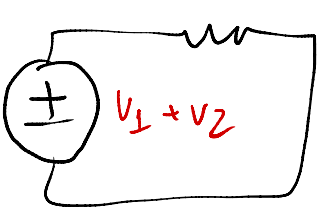




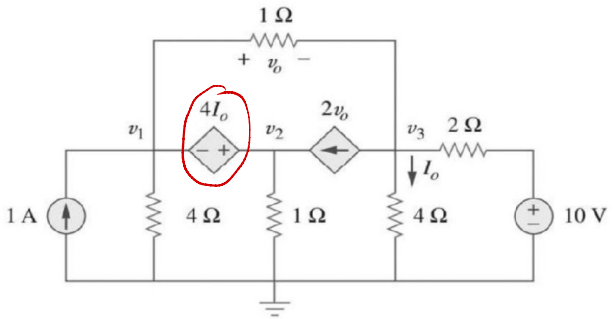
$$R_{eq} = R_1 + R_4 + (R_2 \,//\, R_3)$$



$$(R_5 \,//\, R_6)$$



Problem 3 Find the values of v_1, v_2 and v_3



$$v_o = v_1 - v_3 \quad I_o = \frac{v_3}{4} \rightarrow v_3 = v_2 - v_1$$

(1)(2) $v_1 - v_3 + \frac{v_1}{4} + v_2 - 2(v_1 - v_3) - 1 = 0$

(3) $v_3 - v_1 + 2(v_1 - v_3) + \frac{v_3}{4} + \frac{v_3 - 10}{2} = 0$

$$\Rightarrow \begin{cases} v_1 = \frac{164}{33} \\ v_2 = \frac{160}{33} \\ v_3 = -\frac{4}{33} \end{cases}$$