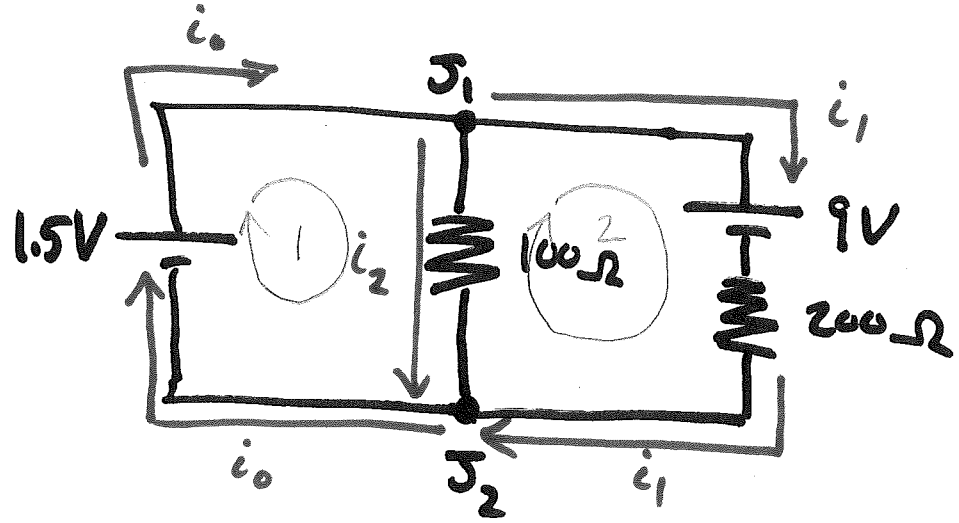
Ex 1



JR: $i_0 = i_1 + i_2$

LR: $-i_2(100\Omega) + 1.5V = 0$

$-9V - i_1(200\Omega) + i_2(100\Omega) = 0$

$i_2(100) = 1.5 \Rightarrow \boxed{i_2 = 0.015\ A}$

$-9 - i_1(200) + (.015)(100) = 0$

$-i_1(200) = +7.5$

$\boxed{i_1 = -0.0375\ A}$

$i_0 = -0.0375 + 0.015 = \boxed{-.0225\ A = i_0}$

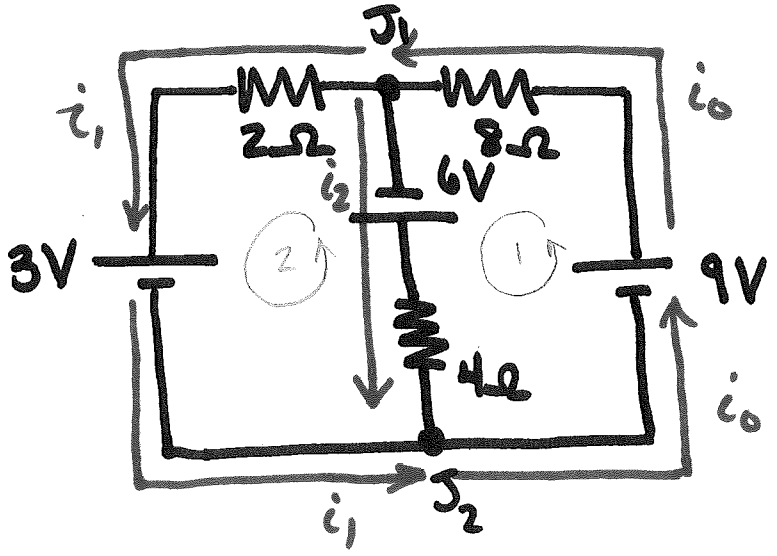
$V_{100\Omega} = (0.015A)(100\Omega) =$ **1.5 V**

$V_{200\Omega} = (0.0375)(200\Omega) =$ **7.5 V**

$P_{100\Omega} = (0.015A)(1.5\ V) =$ **0.0225 W**

$P_{200\Omega} = (0.0375)(7.5V) =$ **0.281 W**

ex 2 - Have them do prob 20.85



Find P dissipated across each resistor.

JR: $i_0 = i_1 + i_2$

LR: $-i_0(8\Omega) + 6V - i_2(4\Omega) + 9V = 0$

$-i_1(2\Omega) - 3V + i_2(4\Omega) - 6V = 0$

$4i_2 = 9 + 2i_1 \Rightarrow i_2 = \frac{9}{4} + \frac{1}{2}i_1$

$-i_0 8 = -15 + 4i_2 \Rightarrow i_0 = \frac{15}{8} - \frac{1}{2}i_2$

$-2i_1 = 9 - 4i_2 \Rightarrow i_1 = -\frac{9}{2} + 2i_2$

$\frac{15}{8} - \frac{1}{2}i_2 = -\frac{9}{2} + 2i_2 + i_2$

$\frac{15}{8} + \frac{9}{2} = \frac{7}{2}i_2 \Rightarrow \boxed{i_2 = 1.82\,A}$

$$-i_o 8 + 15 - (1.82)4 = 0$$

$$\boxed{i_o = 0.965\ A}$$

$$0.965 = i_1 + 1.82$$

$$\boxed{i_1 = -0.855\ A}$$

~~$P_{2\Omega} = (0.855\ A)$~~

$$V_{2\Omega} = (0.855\ A)(2\Omega) = \boxed{1.71\ V}$$

$$V_{4\Omega} = (1.82\ A)(4\Omega) = \boxed{7.28\ V}$$

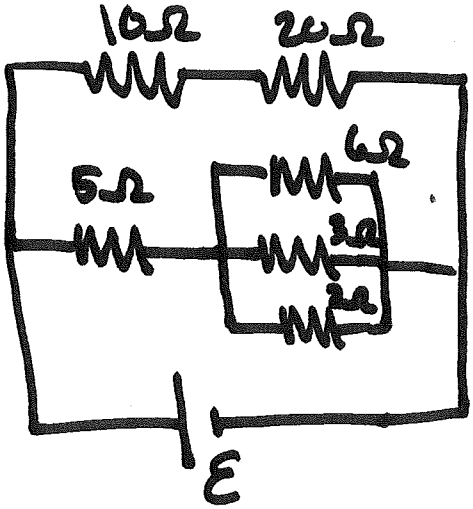
$$V_{8\Omega} = (0.965\ A)(8\Omega) = \boxed{7.72\ V}$$

$$P_{2\Omega} = (0.855A)(1.71V) = \boxed{1.46\ W}$$

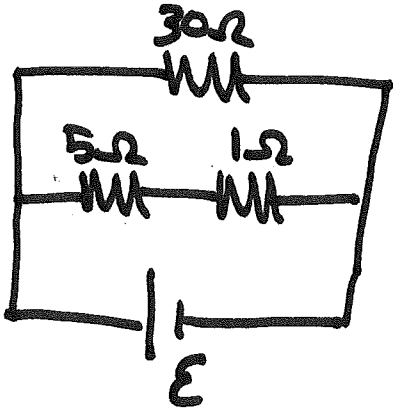
$$P_{4\Omega} = (1.82A)(7.28V) = \boxed{13.25\ W}$$

$$P_{8\Omega} = (0.965A)(7.72V) = \boxed{7.45\ W}$$

ex 3

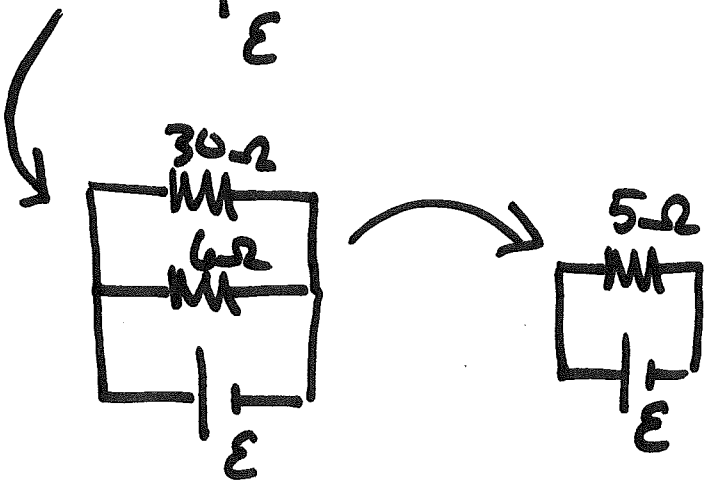


A) Determine the Equivalent Resistance



$$\frac{1}{R} = \frac{1}{6} + \frac{1}{3} + \frac{1}{2} = \frac{1}{6} + \frac{2}{6} + \frac{3}{6} = 1$$

$$R = 1\,\Omega$$

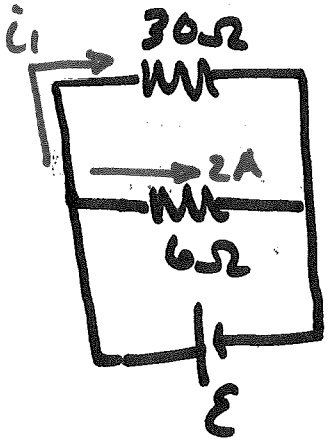


$$\frac{1}{R_{eq}} = \frac{1}{30} + \frac{1}{6} = \frac{6}{30}$$

$$R_{eq} = 5\,\Omega$$

$$\boxed{R_{eq} = 5\,\Omega}$$

B) If the current through the 5Ω resistor is 2A, find all the other currents.



$$V_{6\Omega} = \mathcal{E} = (2A)(6\Omega) = 12V$$

$$\boxed{\mathcal{E} = 12V}$$

- Find $i_{battery}$ $\quad \mathcal{E} = i_0 R_{eq}$

$$12V = i_0(5\Omega)$$

$$\boxed{i_0 = 2.4A}$$

$$i_0 = i_1 + 2A$$

$$\boxed{i_1 = 0.4A}$$

$$\boxed{i_{10\Omega} = i_{20\Omega} = 0.4A}$$

$$V_{5\Omega} = (2A)(5\Omega) = 10V \Longrightarrow V_{2\Omega} = V_{3\Omega} = V_{6\Omega} = 2V$$

$$i_{6\Omega} = \frac{2V}{6\Omega} \Rightarrow \boxed{i_{6\Omega} = \frac{1}{3}A}$$

$$i_{3\Omega} = \frac{2V}{3\Omega} \Rightarrow \boxed{i_{3\Omega} = \frac{2}{3}A}$$

$$i_{2\Omega} = \frac{2V}{2\Omega} \Rightarrow \boxed{i_{2\Omega} = 1A}$$

c) Find the total power dissipated by the resistors.

$V_2 = V_3 = V_6 = 2V$ $\quad V_{10} = (0.4A)(10\Omega) = 4V$

$V_5 = 10V$ $\quad V_{20} = 8V$

$P_2 = (1A)(2V) = \boxed{2W}$

$P_3 = (\frac{2}{3}A)(2V) = \boxed{\frac{4}{3}W}$

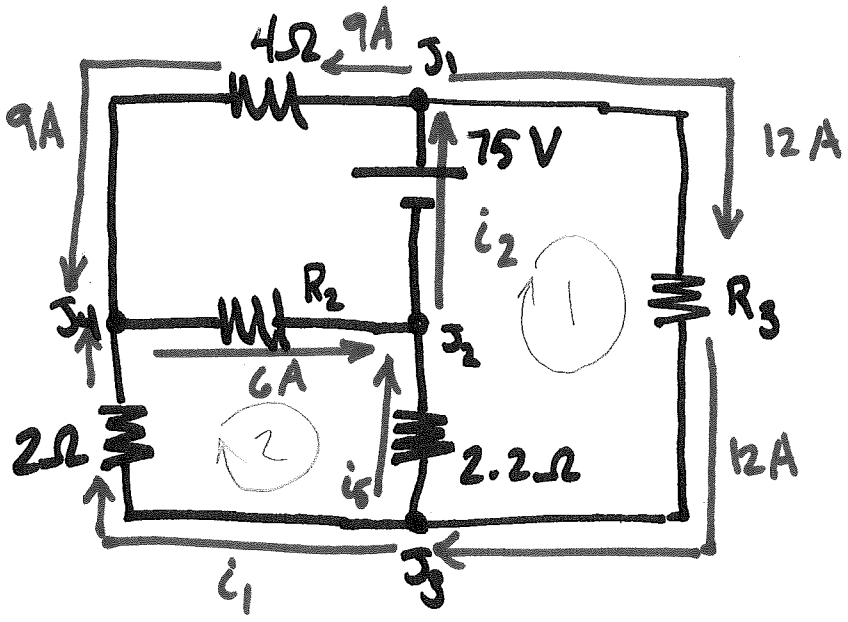
$P_6 = (\frac{1}{3}A)(2V) = \boxed{\frac{2}{3}W}$

$P_5 = (2A)(10V) = \boxed{20W}$

$P_{10} = (0.4A)(4V) = \boxed{1.6W}$

$P_{20} = (0.4A)(8V) = \boxed{3.2W}$

$P_T = \sum P_i = \boxed{28.8W}$



JRI 1: $i_2 = 9A + 12A = \boxed{21\,A}$

2: $6A + i_5 = i_2 = 21A$

$\boxed{i_5 = 15A}$

3: $12A = i_1 + i_5 = i_1 + 15A$

$\boxed{i_1 = -3A}$

4: Repeat $9 - 3 = 6$ ✓

LR1

1: $-12R_3 - (1.5A)(2.2\Omega) + 7.5 = 0$

$-12R_3 = -4.2$

$\boxed{R_3 = 3.5\,\Omega}$

2: $-6R_2 + (1.5A)(2.2\Omega) - i_1(2\Omega) = 0$

$-6R_2 + 3.3 + 6 = 0$

$-6R_2 = -3.9$

$\boxed{R_2 = 6.5\,\Omega}$