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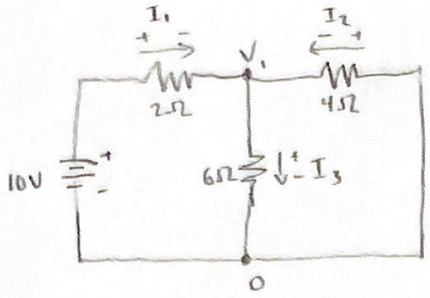
Lab1B



a) Use KCL at node V_1 to find Voltage

$$-I_1 + I_3 - I_2 = 0$$

$$-\left(\frac{10V - V_1}{2}\right) + \left(\frac{V_1 - 0}{6}\right) - \left(\frac{0 - V_1}{4}\right) = 0$$

↓ assume $10 > V_1$ as current flows towards V_1

↓ assume $V_1 > 0$ as current flows to 0

↓ assume $0 > V_1$ as current flows to V_1

$$-\left(\frac{10 - V_1}{2}\right) + \left(\frac{V_1}{6}\right) - \left(\frac{-V_1}{4}\right) = 0$$

$$V_1 = \frac{60}{11} V \qquad \boxed{V_1 = 5.45\ V}$$

b) $I_1 = \frac{10 - V_1}{2} \rightarrow I_1 = \frac{10 - 5.45}{2} = 2.27\ A$

$I_3 = \frac{V_1}{6} \rightarrow I_3 = \frac{5.45}{6} = 0.91\ A$

$I_2 = \frac{-V_1}{4} \rightarrow I_2 = \frac{-5.45}{4} = -1.36\ A$

$I_1 \rightarrow P_{2\Omega} = (5.15)(2.00) = -10.30\ W$

$I_3 \rightarrow P_{6\Omega} = (0.91)(5.45) = -4.96\ W$

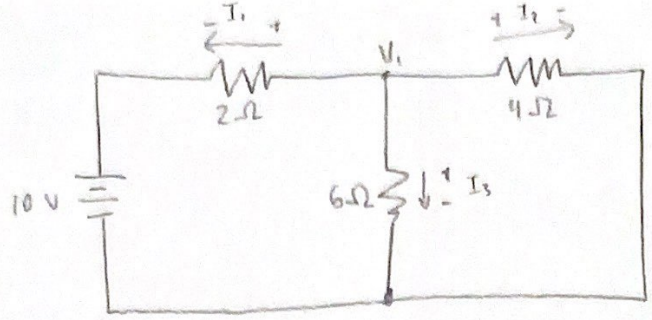
$I_2 \rightarrow P_{4\Omega} = (-1.36)(5.45) = -7.412\ W$

$P_{10V} = (10)(2.27) = 22.7$

$P_{10V} + P_{2\Omega} + P_{6\Omega} + P_{4\Omega} = 0$

$22.7 + (-10.3) + (-4.96) + [-7.412) = 0\ W$ ✓

c)



USE KCL at V_1 to find Voltage

I_1 I_3 I_2

$$\left(\frac{V_1 - 10}{2}\right) + \left(\frac{V_1}{6}\right) + \left(\frac{V_1}{4}\right) = 0$$

$$V_1 = \frac{60}{11} = 5.45 \qquad \boxed{V_1 = 5.45\ V}$$

$$I_1 = \frac{V_1 - 10}{2} \rightarrow \frac{5.45 - 10}{2} = -2.27\ A$$

$$I_3 = \frac{V_1}{6} \rightarrow \frac{5.45}{6} = 0.91 A$$

$$I_2 = \frac{V_1}{4} \rightarrow \frac{5.45}{4} = 1.36 A$$

$I_1 \rightarrow P_{2\Omega} = (5.15)(2.00) = 10.30\ W$

$I_3 \rightarrow P_{6\Omega} = (0.91)(5.45) = 4.96\ W$

$I_2 \rightarrow P_{4\Omega} = (1.36)(5.45) = 7.412\ W$

$P_{10V} = (10)(-2.27) = -22.7 W$

$$P_{10V} + I_1 + I_3 + I_2 = 0$$

$$-22.7 + 10.30 + 4.96 + 7.412 = 0 \checkmark$$