

**2.1** Determine the current and power dissipated in the resistor in Fig. P2.1.



**Figure P2.1**

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**SOLUTION:**

$$I = \frac{9}{12} = \frac{3}{4} \text{ A}$$

$$P_{12\Omega} = I^2 R = \left(\frac{3}{4}\right)^2 (12)$$

$$P_{12\Omega} = 6.75 \text{ W}$$

**2.10** Find  $I_1$  in the network in Fig. P2.10.

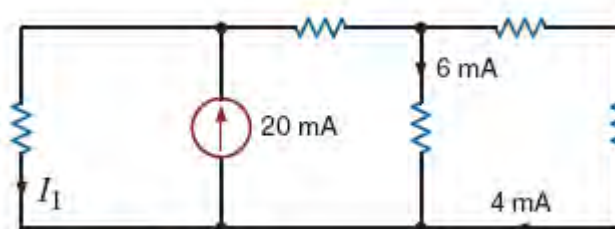
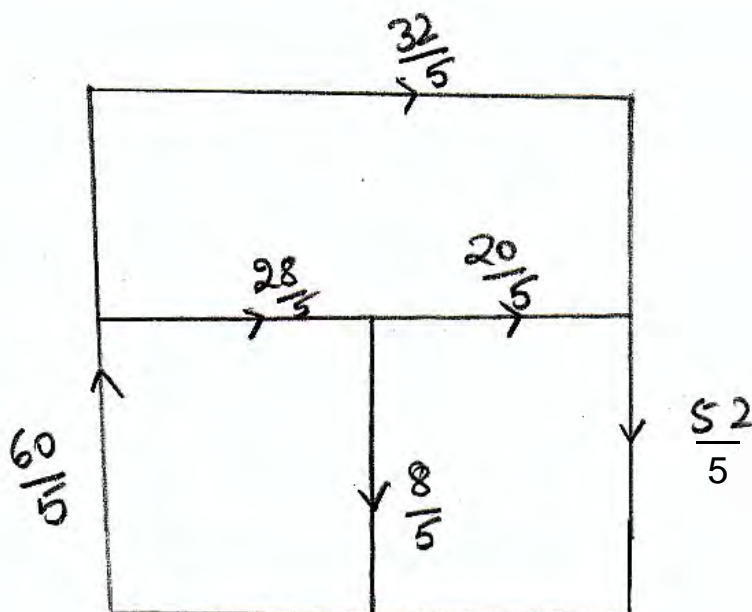


Figure P2.10

**SOLUTION:**

$$\begin{aligned}\text{KCL at node B: } I_2 &= 6\text{ m} + 4\text{ m} \\ I_2 &= 10\text{ m A}\end{aligned}$$

$$\begin{aligned}\text{KCL at node A: } I_1 + I_2 &= 20\text{ m} \\ I_1 &= 20\text{ m} - 10\text{ m} \\ I_1 &= 10\text{ m A}\end{aligned}$$



**2.44** Find the power absorbed by the dependent source in the circuit in Fig. P2.44.

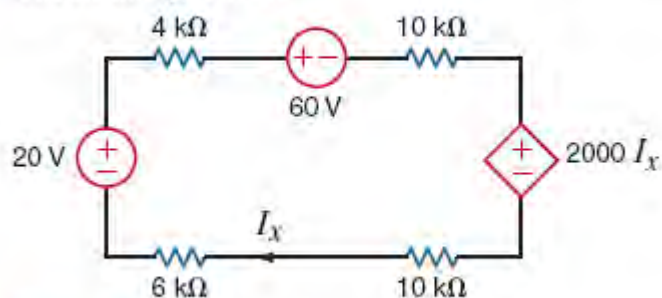


Figure P2.44

**SOLUTION:**

KVL:

$$20 = 6\text{ k}\Omega I_x + 4\text{ k}\Omega I_x + 60 + 10\text{ k}\Omega I_x + 2\text{ k}\Omega I_x + 10\text{ k}\Omega I_x$$

$$32\text{ k}\Omega I_x = -40$$

$$I_x = -1.25\text{ mA}$$

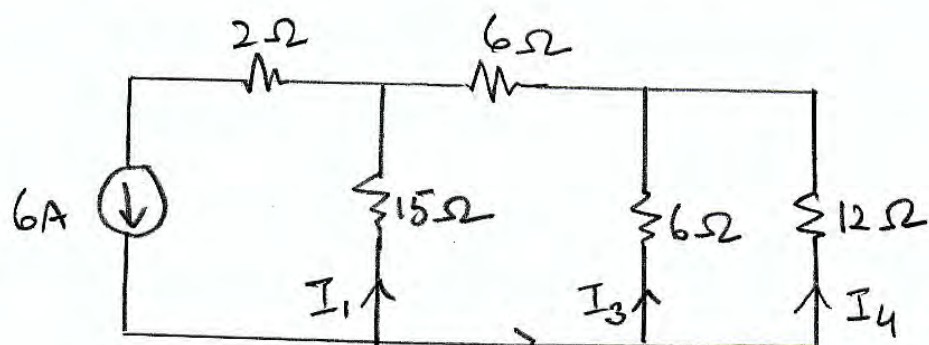
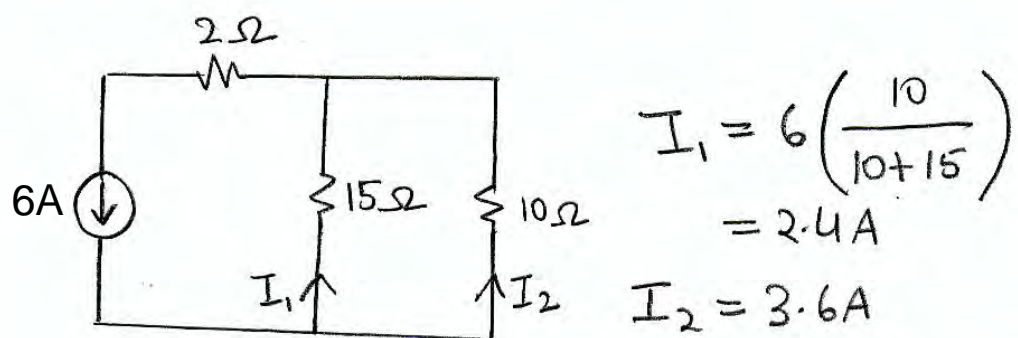
$$P = (2000 I_x)(I_x)$$

$$P = \{2000(-1.25\text{ m})\}(-1.25\text{ m})$$

$$P = 3.125\text{ mW}$$

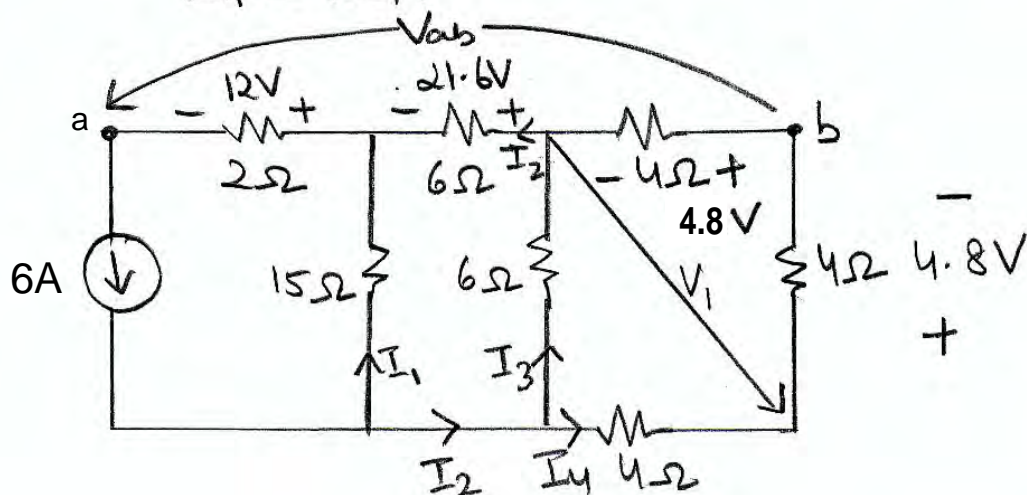
$$R_{ab} = R_{10} + R_{11} + R_z = 4 + 8 + 5.45$$

$$R_{ab} = 17.45 \, \Omega$$



$$I_3 = 3.6 \left( \frac{12}{12+6} \right) = 2.4 \text{ A}$$

$$I_4 = 1.2 \text{ A}$$



**2.87** If  $V_1 = 5\text{ V}$  in the circuit in Fig. P2.87, find  $I_S$ .

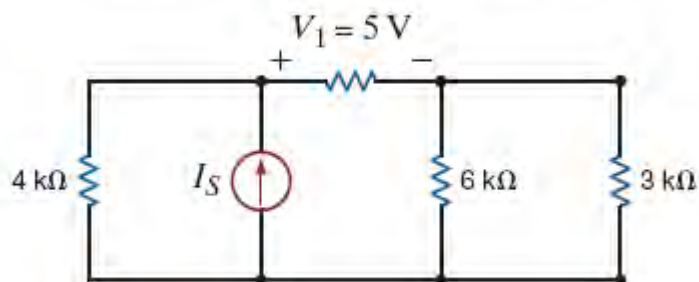
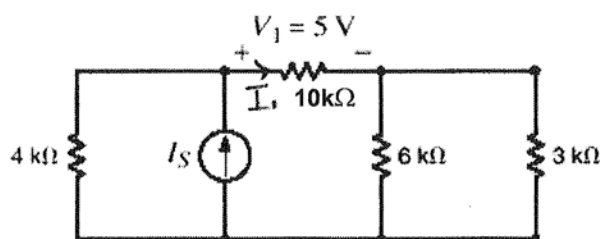
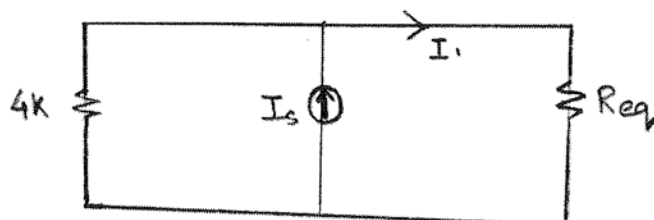


Figure P2.87

**SOLUTION:**



$$I_1 = \frac{V_1}{10\text{ k}\Omega} = \frac{5}{10\text{ k}} = \frac{1}{2} \text{ mA}$$



$$R_{eq} = (6\text{ k}\Omega \parallel 3\text{ k}\Omega) + 10\text{ k}\Omega$$

$$R_{eq} = 12\text{ k}\Omega$$

$$I_1 = \left( \frac{4\text{ k}}{4\text{ k} + 12\text{ k}} \right) I_S$$

$$I_S = \frac{I_1}{\left( \frac{4\text{ k}}{4\text{ k} + 12\text{ k}} \right)} = \frac{\frac{1}{2} \text{ mA}}{\left( \frac{4\text{ k}}{4\text{ k} + 12\text{ k}} \right)}$$

$$I_S = 2\text{ mA}$$

KCL:

$$I_1 + I_3 = I_2$$

$$I_3 = 4\text{mA} - 2\text{mA}$$

$$I_3 = 2\text{mA}$$

KCL:

$$I_3 + I_4 = 5\text{mA}$$

$$I_4 = 3\text{mA}$$

KCL:

$$I_4 = I_0 + 4\text{mA}$$

$$I_0 = -1\text{mA}$$

KVL:

$$2\text{K}I_3 + 16 = 6\text{K}I_4 + V_0 + V_1$$

$$V_0 = 2\text{K}(2\text{mA}) + 16 - 6\text{K}(3\text{mA}) - 4$$

$$V_0 = -2\text{V}$$

$$V_0 = I_0 R_0$$

$$R_0 = \frac{-2}{-1\text{mA}} = 2\text{K}\Omega$$



$$\overline{I}_3 = 6 - 3$$

$$I_3 = 3\text{ A}$$