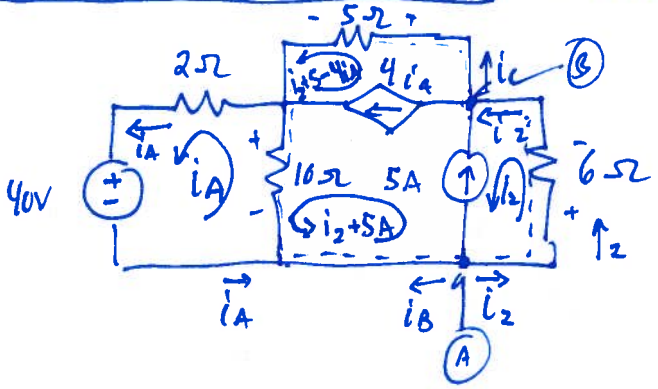
Review of Mesh W2017 Module 3



what is i_A and i_2?

KCL @ (A)

$i_B + i_2 + 5A = 0$

$i_B = -i_2 - 5$

KCL @ B

$-i_2 - 5 + i_C + 4i_A = 0 \qquad i_C = -4i_A + 5 + i_2$

KVL on super-mesh:

$$6\Omega \cdot i_2 + 5\Omega[i_2 + 5A - 4i_A] + 10\Omega[i_2 + 5A - i_A] = 0$$

$$6i_2 + 5i_2 + 25 - 20i_A + 10i_2 + 50 - 10i_A = 0$$

$$21i_2 - 30i_A + 75 = 0 \qquad \text{—(1)}$$

KVL on other mesh: $40V + 10(i_A - i_2 - 5) + 2i_A = 0$

$$40 + 10i_A - 10i_2 - 50 + 2i_A = 0$$

$$-10i_2 + 12i_A - 10 = 0$$

$$i_A = \frac{1}{12}(10i_2 + 10) = \frac{1}{6}(5i_2 + 5)$$

(2) — $i_A = \frac{5}{6}(i_2 + 1)$

(2) in (1)

$$21i_2 - 30 \cdot \frac{5}{6}(i_2 + 1) + 75 = 0$$

$$21i_2 - 25i_2 - 25 + 75 = 0$$

$$-4i_2 + 50 = 0$$

$$i_2 = \frac{50}{4} = \frac{25}{2} \rightarrow \boxed{i_2 = 12.5A}$$

$$i_A = \frac{5}{6}\left(\frac{25}{2} + 1\right) = \frac{5}{6} \cdot \frac{27}{2} = \frac{135}{12} = 11.25A$$

$i_A = 11.25A$