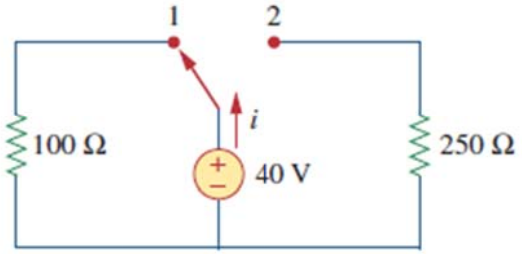
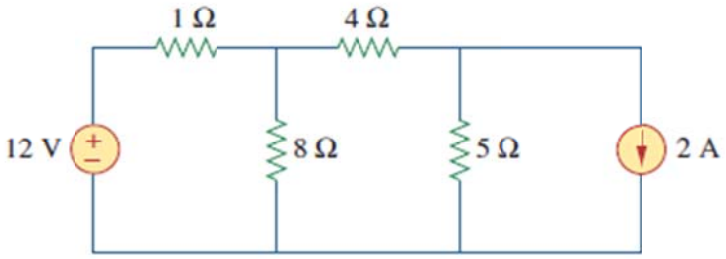
Circuits I – Tutorial 02

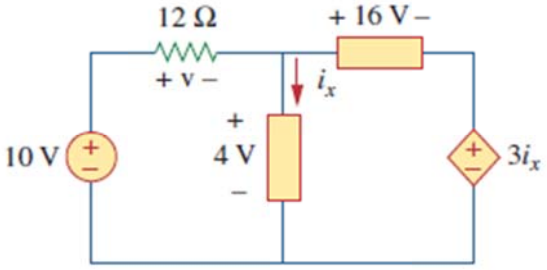
Basic laws I

Q1	**2.4** (a) Calculate current i in Fig. 2.68 when the switch is in position 1. (b) Find the current when the switch is in position 2. 
Sol 1	(a) $\mathbf{i = 40/100 = 400\ mA}$ (b) $\mathbf{i = 40/250 = 160\ mA}$

Q2	**2.7** Determine the number of branches and nodes in the circuit of Fig. 2.71. 
Sol 2	6 branches and 4 nodes

Q3

2.15 Calculate v and i_x in the circuit of Fig. 2.79.



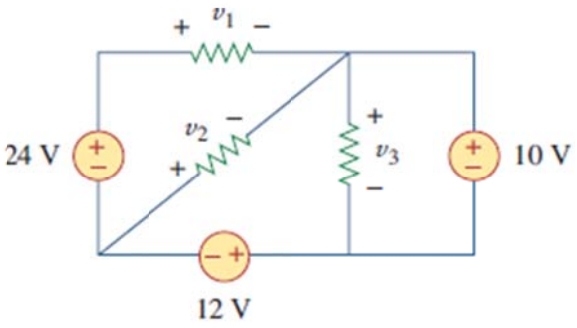
Sol 3

For loop 1, $-10 + v + 4 = 0$, $v = \mathbf{6\ V}$

For loop 2, $-4 + 16 + 3i_x = 0$, $i_x = \mathbf{-4\ A}$

Q4

2.17 Obtain v_1 through v_3 in the circuit of Fig. 2.81.



Sol 4

Applying KVL around the entire outside loop we get,

$$-24 + v_1 + 10 + 12 = 0 \text{ or } v_1 = \mathbf{2V}$$

Applying KVL around the loop containing v_2, the 10-volt source, and the 12-volt source we get,

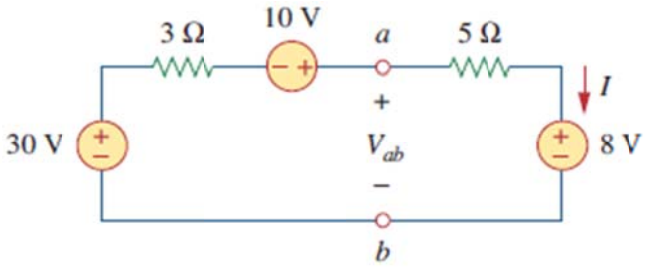
$$v_2 + 10 + 12 = 0 \text{ or } v_2 = \mathbf{-22V}$$

Applying KVL around the loop containing v_3 and the 10-volt source we get,

$$-v_3 + 10 = 0 \text{ or } v_3 = \mathbf{10V}$$

Q5

2.18 Find I and V_{ab} in the circuit of Fig. 2.82.



Sol 5

Applying KVL,

$$-30 - 10 + 8 + I(3+5) = 0$$

$$8I = 32 \longrightarrow I = \underline{\mathbf{4A}}$$

$$-V_{ab} + 5I + 8 = 0 \longrightarrow V_{ab} = \underline{\mathbf{28V}}$$