

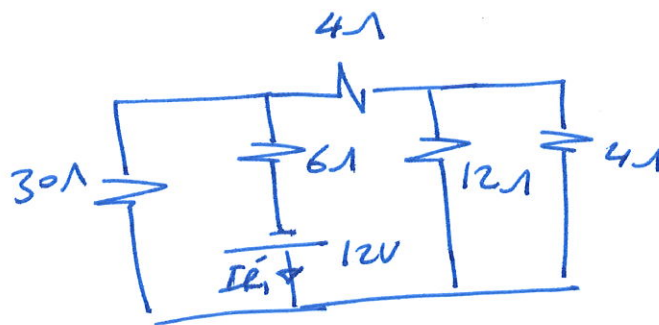
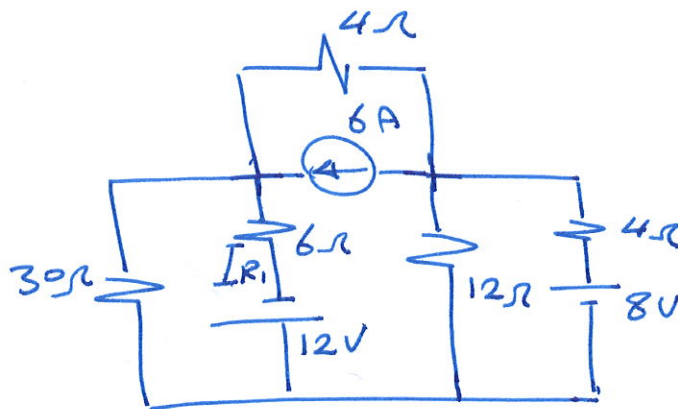
Q2
SOL

- effect of 12V

$$R_{T1} = [(4 \parallel 12) + 4] \parallel 30 + 6$$

$$R_{T1} = 11.675 \Omega$$

$$I_{R1}' = \underline{\underline{1.0277A \downarrow}}$$



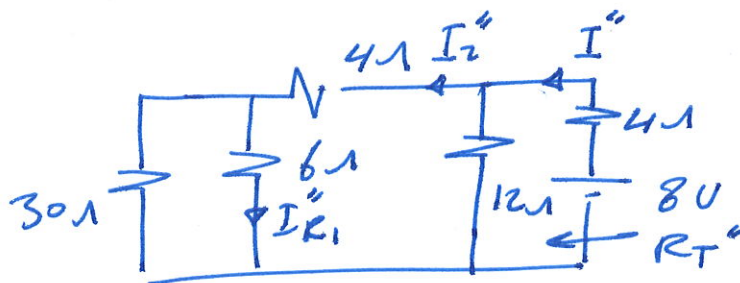
- effect of 8V

$$R_{T''} = 9.142 \Omega$$

$$I'' = 0.875A$$

$$I_2'' = I'' \times \frac{12}{12+9} = 0.5A$$

$$I_{R1}'' = 0.5 \times \frac{30}{30+6} = \underline{\underline{0.4166A \downarrow}}$$



- effect of 6A.

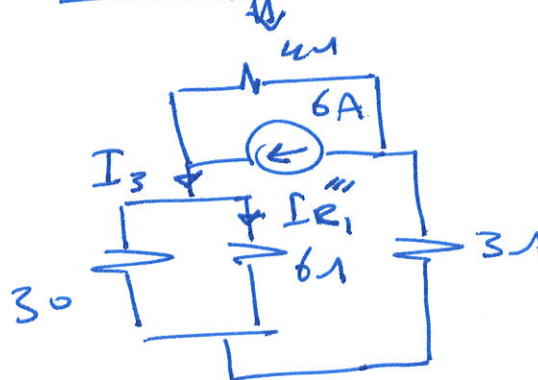
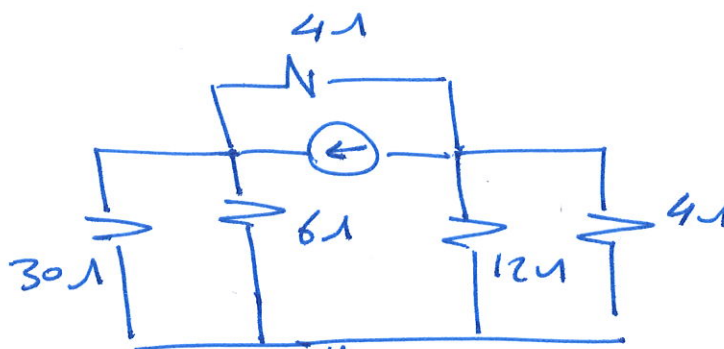
$$I_3 = 6 \times \frac{4}{4+8} = 2A$$

$$I_{R1}''' = 2 \times \frac{30}{30+6} = \underline{\underline{1.666A}}$$

$$\therefore I_{R1} = I_{R1}' + I_{R1}'' + I_{R1}'''$$

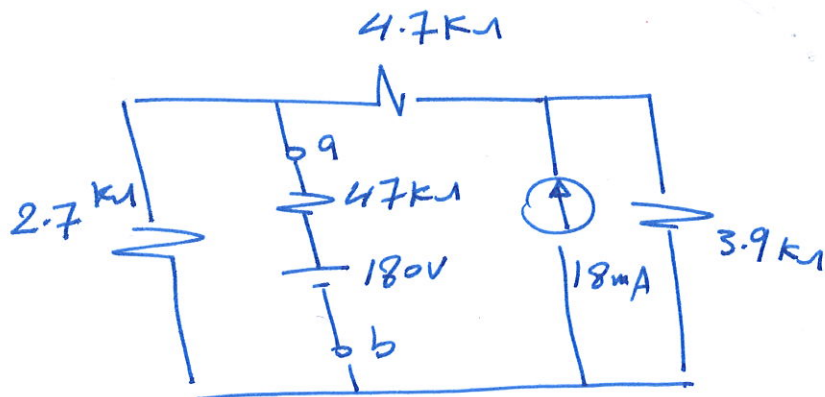
$$= 1.0277 + 0.4166 + 1.666$$

$$I_{R1} = \underline{\underline{3.1103A \downarrow}}$$



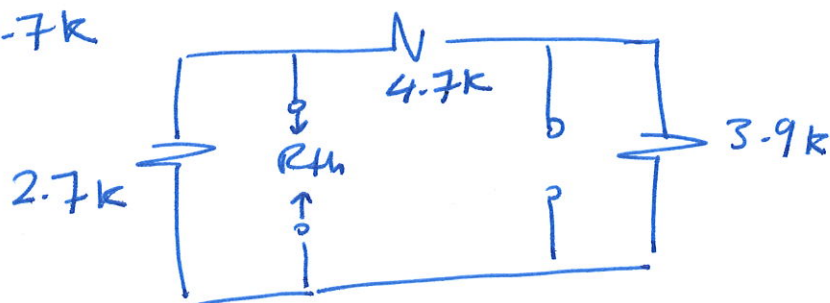
SOL - A -

$$R_{th} = ?$$



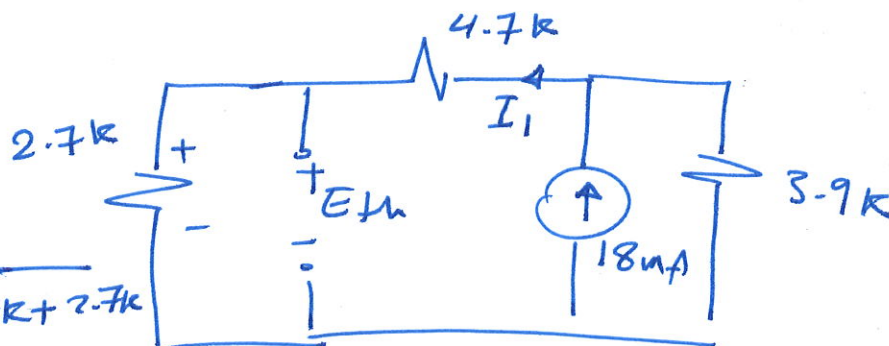
$$R_{th} = (3.9k + 4.7k) \parallel 2.7k$$

$$R_{th} = 2.054k\Omega$$



$$E_{th} = ?$$

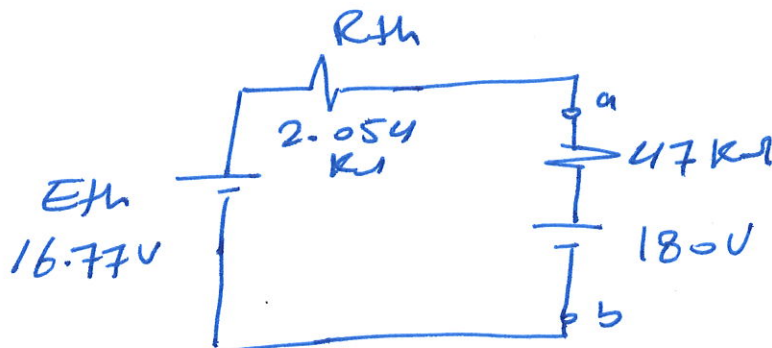
$$I_1 = 18mA \times \frac{3.9k}{3.9k + 4.7k + 2.7k}$$



$$I_1 = 6.21mA$$

$$E_{th} = I_1 \times 2.7k = 6.21mA \times 2.7k\Omega = 16.77V$$

$$\therefore E_{th} = 16.77V, R_{th} = 2.054k\Omega$$



Sol

① خول، باطنی، و د

R_T →

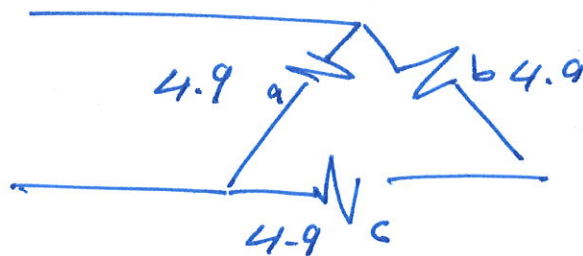
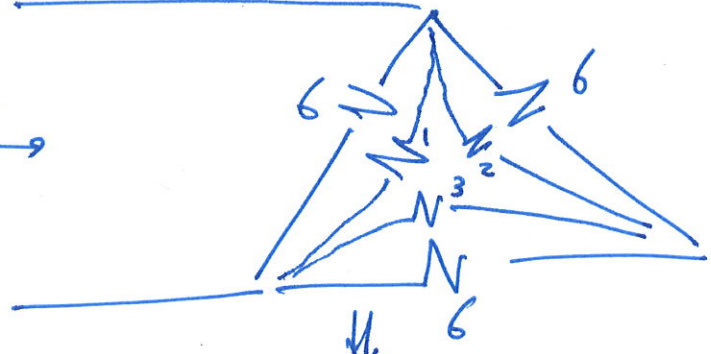
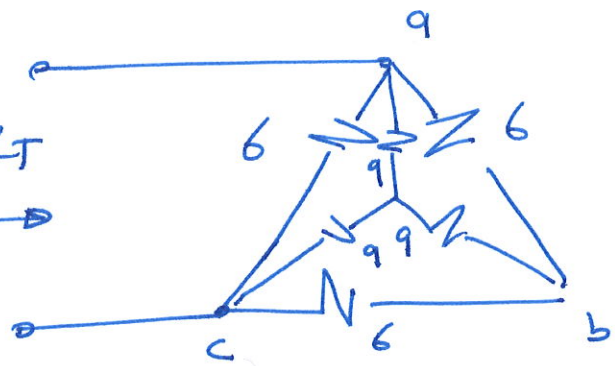
$$R_1 = \frac{9 \times 9 + 9 \times 9 + 9 \times 9}{9} = 27 = R_2 = R_3$$

$$R_a = 27 // 6 = 4.9 = R_b = R_c$$

$$\therefore R_T = (4.9 + 4.9) // 4.9$$

R_T →

$$R_T = \underline{\underline{3.27 \Omega}}$$



$$R_{T_2} = [(2+6) \parallel 8 \parallel 4] + 8$$

$$RT = \{[(4+6) \# 101] + 5\} \# 101$$

$$I = \frac{80}{5} = \underline{\underline{16}} \text{ A} \quad \text{---} \textcircled{*}$$

b- $I_1 = \frac{I}{2} = \frac{16}{2} = \underline{\underline{8A}}$ ~~not correct~~

$$I_3 = 4A, I_9 = 4A \text{ ————— } \textcircled{x}$$

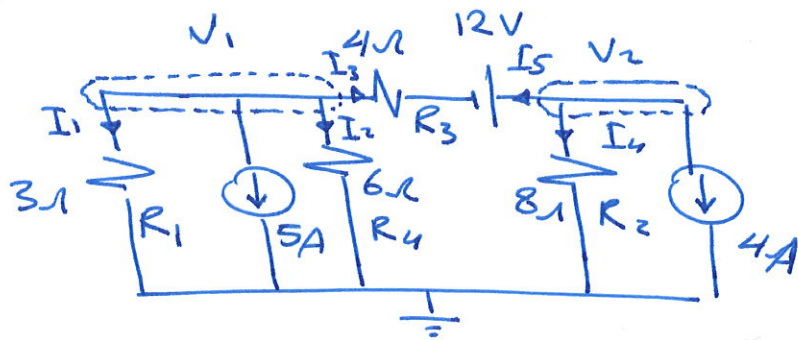
$$c - I_B = 4 \times \frac{2.667}{2.667 + 8} = 1A \quad \text{--- (✓)}$$

d- $V_{ab} = ?$, KVL

$$+ 2 \times 1 + \text{Valo} - 4 \times 4 = 0$$

$$2 + 4ab - 16 = 0$$

$V_{ab} = 14 \text{ V}$ ————— (*)



a) Nodal V_1 :

$$I_1 + 5 + I_2 + I_3 = 0$$

$$\frac{V_1}{R_1} + 5 + \frac{V_1}{R_4} + \frac{V_1 - (-12) - V_2}{R_3} = 0$$

$$\frac{1}{3}V_1 + 5 + \frac{1}{6}V_1 + \frac{V_1 + 12 - V_2}{4} = 0$$

$$0.75V_1 - 0.25V_2 = -8 \quad \text{--- (1)}$$

Nodal V_2 :

$$I_4 + I_5 + 4 = 0$$

$$\frac{V_2}{R_2} + \frac{V_2 - 12 - V_1}{R_3} + 4 = 0$$

$$\frac{V_2}{8} + \frac{V_2 - 12 - V_1}{4} + 4 = 0$$

$$0.375V_2 - 0.25V_1 + 1 = 0 \quad \text{--- (2)}$$

b) Solve:

من معادله ① نوبه V_1 ونقولها ③

$$V_1 = \frac{0.25V_2 - 8}{0.75} \quad \text{--- (3)}$$

$$\therefore 0.375V_2 - 0.25 \times \left(\frac{0.25V_2 - 8}{0.75} \right) + 1 = 0$$

$$V_2 = \underline{\underline{-12.5714V}}, \quad V_1 = \underline{\underline{-14.857V}}$$

c)

$$V_{R1} = V_{R4} = V_1 = -14.857V$$

$$V_{R2} = V_2 = -12.5714V$$

KVL to find V_{R3} :

$$+14.857 + V_{R3} - 12 - 12.57 = 0$$

$$\therefore V_{R3} = \underline{\underline{9.7144V (+)}} \quad \text{--- (4)}$$

