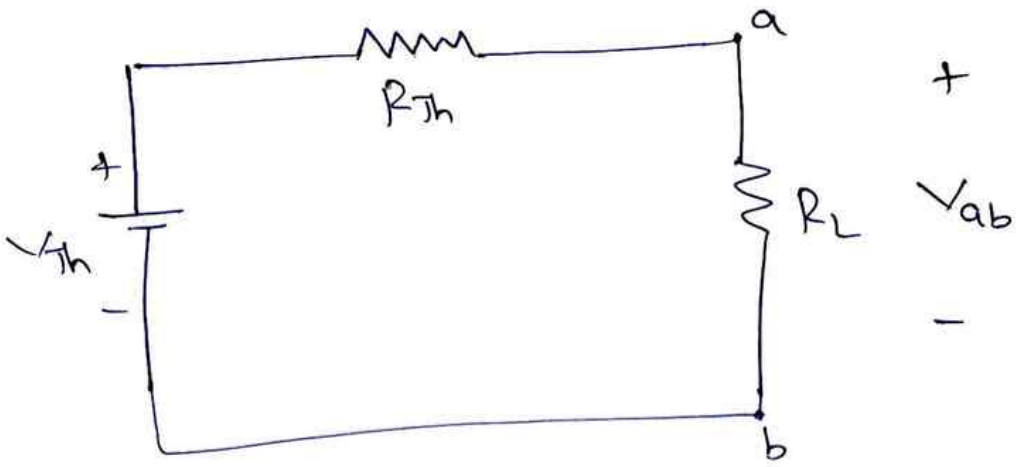
Answer

(a)



$$V_{ab} = V_{Th}\left(\frac{R_L}{R_L + R_{Th}}\right)$$

For $R_L = 10k\Omega$, $V_{ab} = 6V$

$$6 = V_{Th}\left(\frac{10000}{10000 + R_{Th}}\right)$$

$$V_{Th} = \frac{6}{\left(\frac{10000}{10000 + R_{Th}}\right)} \longrightarrow (1)$$

For $R_L = 30k\Omega$, $V_{ab} = 12V$

$$12 = V_{Th}\left(\frac{30000}{30000 + R_{Th}}\right)$$

$$V_{Th} = \frac{12}{\quad} \longrightarrow (2)$$

$$I_R = \frac{\qquad\qquad\qquad\qquad}{\left(\frac{30000}{30000 + R_{Th}}\right)} \quad \rightarrow (2)$$

Equating (1) and (2) we get

$$\frac{6}{\left(\frac{10000}{10000 + R_{Th}}\right)} = \frac{12}{\left(\frac{30000}{30000 + R_{Th}}\right)}$$

$$\frac{180000}{30000 + R_{Th}} = \frac{120000}{10000 + R_{Th}}$$

$$180000\,(10000 + R_{Th}) = 120000\,(30000 + R_{Th})$$

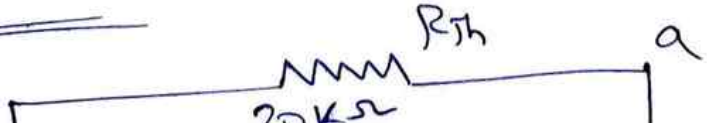
$$60000\,R_{Th} = 18 \times 10^{8}$$

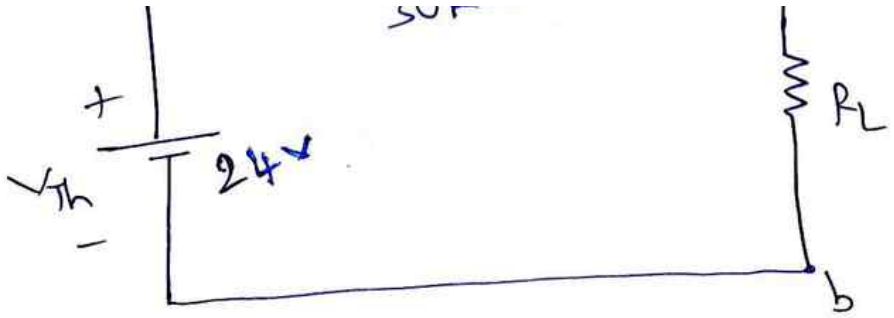
$$\boxed{R_{Th} = 30\ k\Omega}$$

From equation (1)

$$V_{Th} = \frac{6}{\left(\frac{10000}{10000 + 30000}\right)} \Rightarrow \boxed{V_{Th} = 24\ V}$$

Thevenin's equivant Circuit :





(b) $R_L = 20\,k\Omega$

$$V_{ab} = V_{Th}\left(\frac{R_L}{R_{Th}+R_L}\right)$$

$$V_{ab} = 24\left(\frac{20}{30+20}\right) V$$

$$\boxed{V_{ab} = 9.6\,V}$$

Likes: 1 **Dislikes: 0**