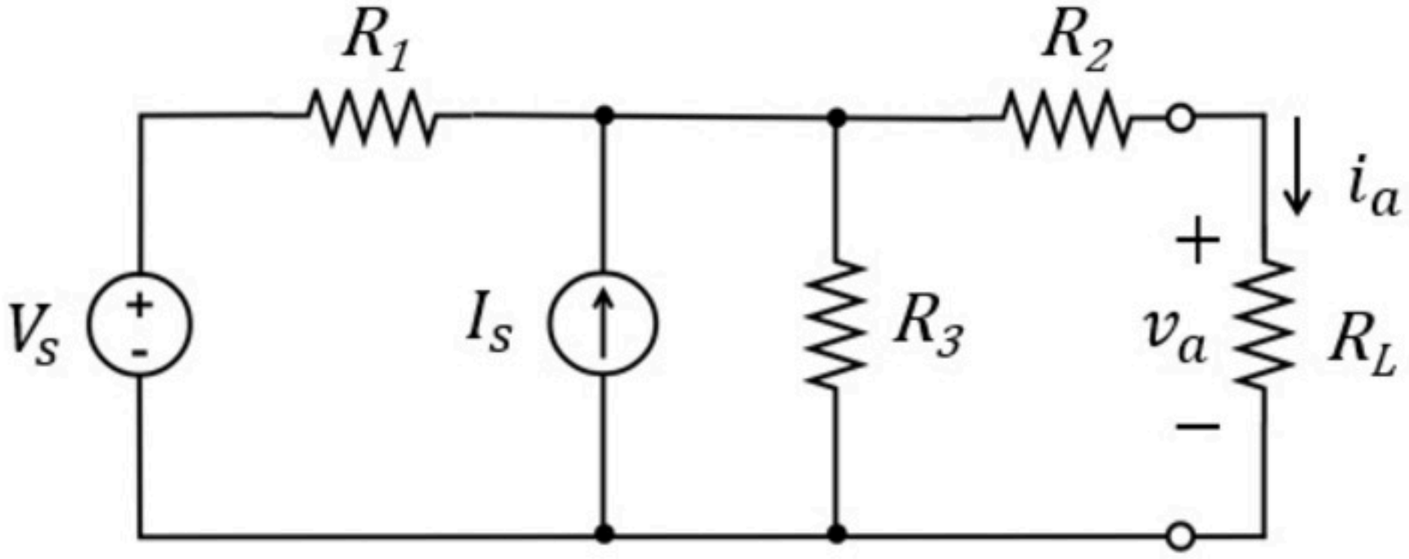
Circuit theorems 010

Unlimited Attempts.

Find (and think about how to minimize your calculations)

1. The value of $v_a = v_{a1}$ when R_L= 12 Ω
2. The value of $R_L = R_{L2}$ that results in v_a = 4 V
3. The value of $R_L = R_{L3}$ that results in i_a = 1 A



Given Variables:

Vs : 12 V

Is : 1 A

R1 : 6 ohm

R2 : 8 ohm

R3 : 12 ohm

Calculate the following:

va1 (V) :

RL2 (ohm) :

RL3 (ohm) :

> Hint: Find the Thevenin model of the circuit (without RL) first

Find (and think about how to minimize your calculations)

1. The value of $v_a = v_{a1}$ when R_L = 12 Ω
2. The value of $R_L = R_{L2}$ that results in v_a = 4 V
3. The value of $R_L = R_{L3}$ that results in i_a = 1 A

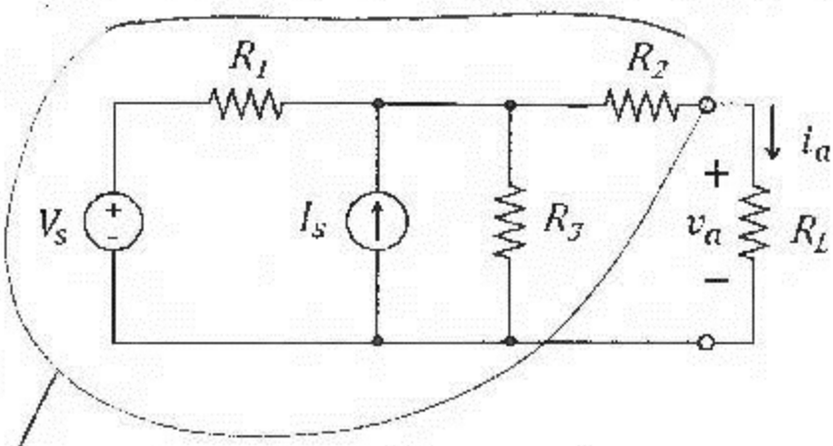
Vs = 12 V

Is = 2 A

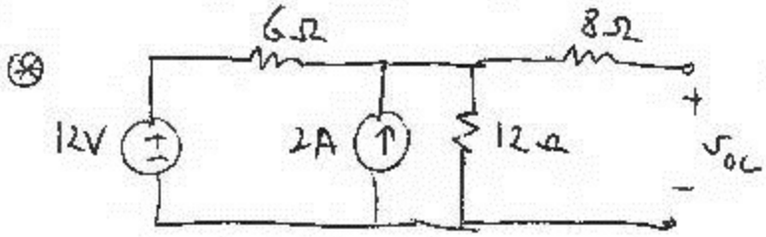
R1 = 6 ohm

R2 = 8 ohm

R3 = 12 ohm

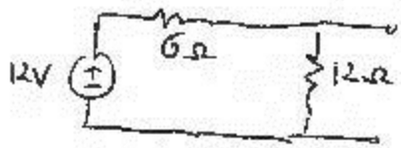


→ FIND THEVENIN MODEL

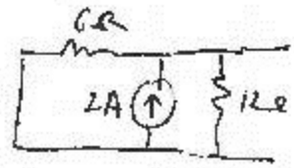


⇒ $v_{oc} = 16\ V$

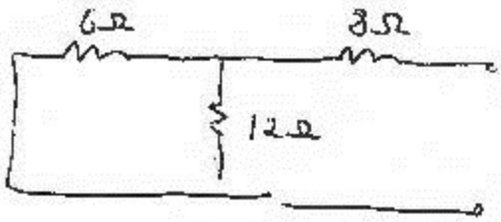
⇝ SUPERPOSITION



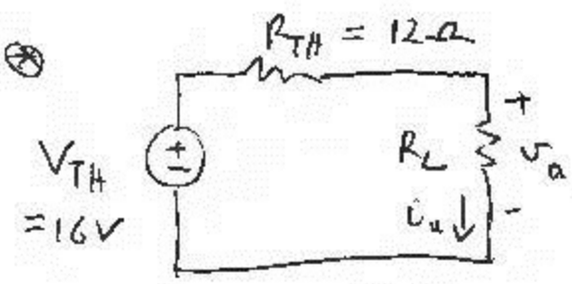
$v_{oc_1} = \frac{12}{4\beta_3} \cdot 4\beta_2 = 8\ V$



$v_{oc_2} = 2 \cdot (12 \| 6) = 2 \cdot 4 = 8\ V$



$R_{TH} = (6 \| 12) + 8 = 4 + 8 = 12\ \Omega$



① $v_a = \frac{16 \cdot 12}{12 + 12} = \frac{16 \cdot}{2} = 8$ → $v_a = 8V$

② $v_a = 16 \cdot \frac{R_L}{R_L + 12} = 4 \Rightarrow 12R_L = 4 \cdot 12$

$\Rightarrow$ $R_L = 4\Omega$

③ $i_a = \frac{16 \cdot}{R_L + 12} = 1 \Rightarrow$ $R_L = 4\Omega$