

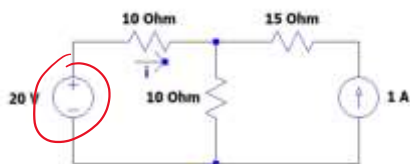
I, II \swarrow Dasar teori
 \searrow komponen

III \rightarrow analisis node \rightarrow Hk. Kirchhoff I $\rightarrow \sum i = 0$

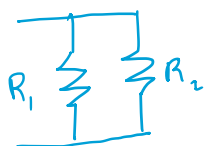
IV \rightarrow analisis mesh \rightarrow Hk. Kirchhoff II $\rightarrow \sum v = 0$

V. Teorema Thevenin

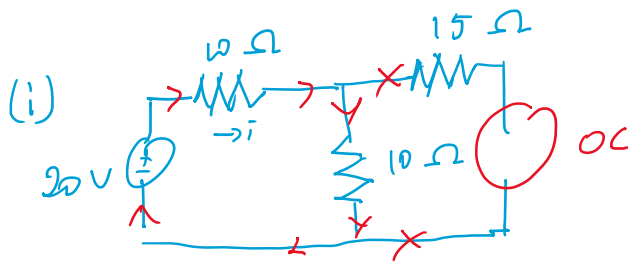
Teorema Superposisi (5)



$$i = \dots ?$$



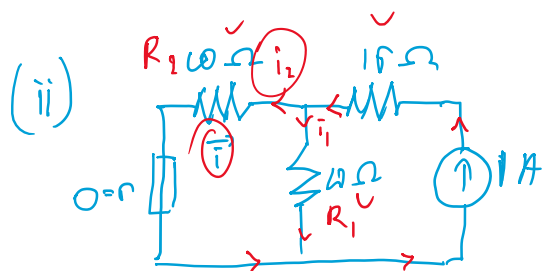
$$R_p = \frac{R_1 \times R_2}{R_1 + R_2}$$



$$V = 20 \text{ V}$$

$$R_T = 10 + 10 = 20 \Omega$$

$$i_1 = \frac{V}{R_T} = \frac{20}{20} = 1 \text{ A} \quad \dots (i)$$



$$I_T = 1 \text{ A}$$

$$R_p = \frac{10 \times 10}{10 + 10} = \frac{100}{20} = 5 \Omega$$

$$R_p \begin{cases} V_1 = V_2 = V_3 = \dots \\ I_1 + I_2 + I_3 = \dots = I_T \end{cases}$$

$$V_1 = V_2$$

$$I_1 \cdot R_1 = I_2 \cdot R_2$$

$$i_1 \cdot 10 = i_2 \cdot 15$$

$$i_1 = i_2$$

$$i_1 + i_2 = i_T$$

$$2i_2 = 1$$

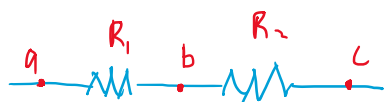
$$i_2 = 0,5 \text{ A}$$

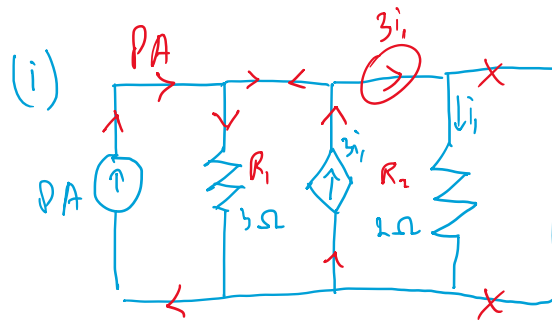
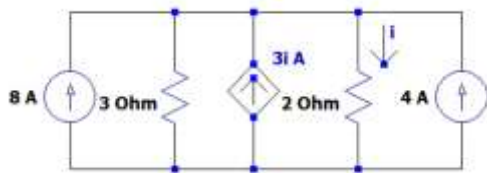
$$i = -i_2 = -0,5 \text{ A} \quad \dots (ii)$$

$$i_1 + i_2 = 1 + (-0,5) = 0,5 \text{ A}$$

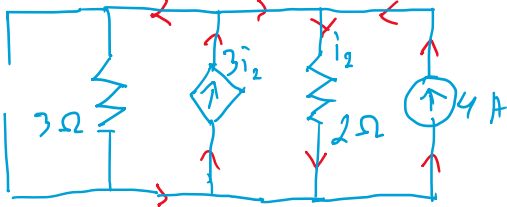
$$R_p \begin{cases} V_1 = V_2 = \dots = V_T \\ I_1 + I_2 + \dots = I_T \end{cases}$$

$$R_s \begin{cases} I_1 = I_2 = I_3 = I_T \\ V_1 + V_2 + V_3 = V_T \end{cases}$$





(ii)



$$i_T = 3i_2 + 4$$

$$R_T = \frac{3 \times 2}{3+2} = \frac{6}{5} \Omega$$

$$V = V_T$$

$$i_2 \cdot 2 = (3i_2 + 4) \cdot \frac{6}{5}$$

$$5 \times (i_2) = \left(\frac{9}{5} i_2 + \frac{12}{5} \right) \times 5$$

$$5i_2 = 9i_2 + 12$$

$$-4i_2 = 12$$

$$i_2 = -3 \text{ A} \quad (ii)$$

$$i = i_1 + i_2 = 6 + (-3) = 3 \text{ A}$$

$$i_T = 3i_1 - PA$$

$$R_T = \frac{3 \times 2}{3+2} = \frac{6}{5} \Omega$$

$$V_2 = V_T$$

$$i_1 \cdot R_2 = i_T \cdot R_T$$

$$i_1 \cdot 2 = (3i_1 - PA) \cdot \frac{6}{5}$$

$$i_1 = (3i_1 - PA) \cdot \frac{3}{5}$$

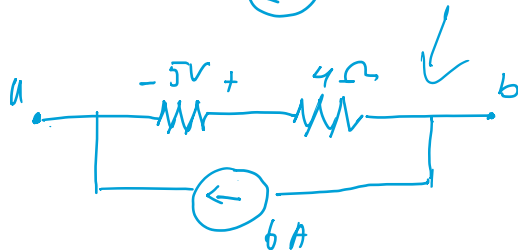
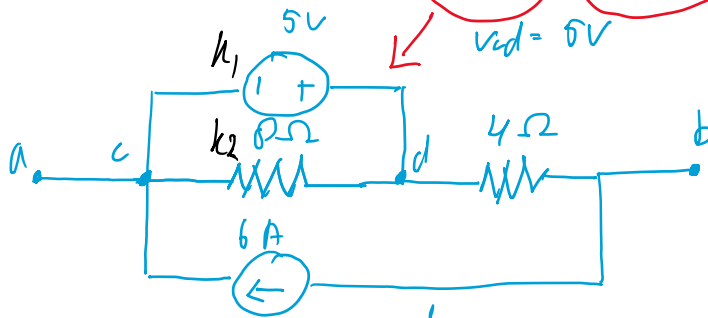
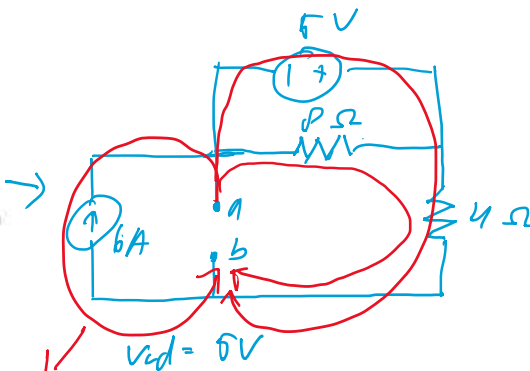
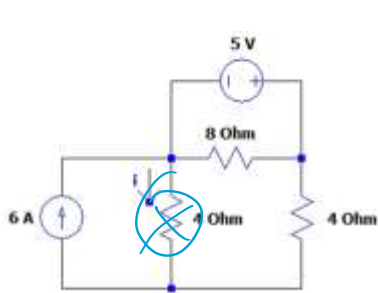
$$5 \times (i_1) = \left(\frac{9}{5} i_1 - \frac{24}{5} \right) \times 5$$

$$5i_1 = 9i_1 - 24$$

$$4i_1 = 24$$

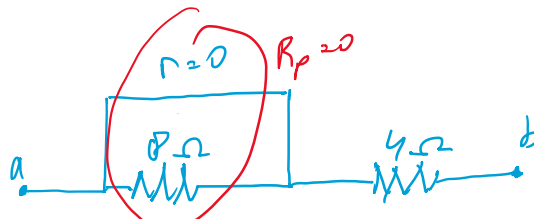
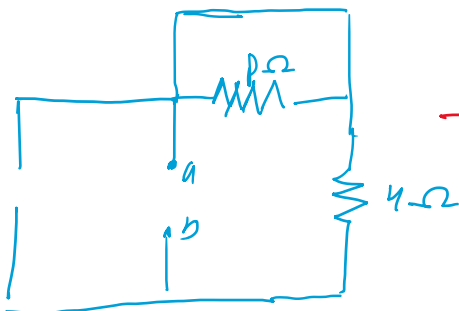
$$i_1 = 6 \text{ A} \quad (i)$$

Teorema Thevenin



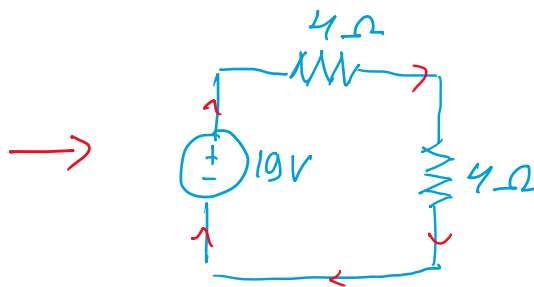
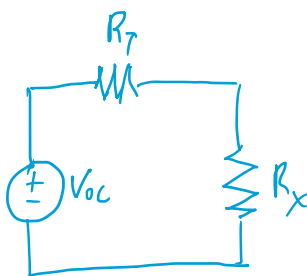
$$V_{ab} = V_{oc} = -5 + 6 \cdot 4 = -5 + 24$$

$$V_{oc} = 19V$$



$$R_p = \frac{0 \times 0}{0 + 0} = 0$$

$$R_t = 0 + 4 = 4 \Omega$$



$$i = \frac{V}{R_t} = \frac{19}{4+4}$$

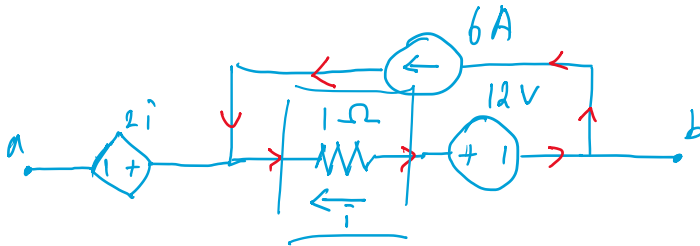
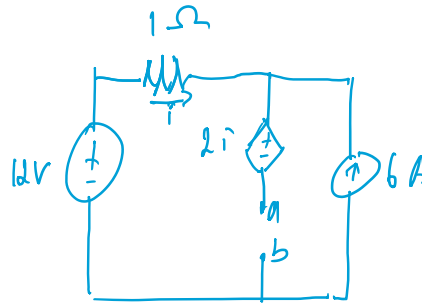
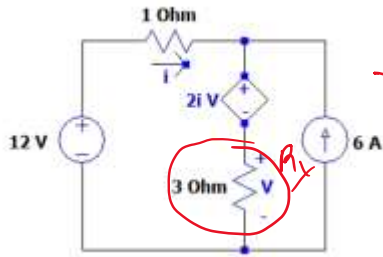
$$= \frac{19}{8} = 2,375 A$$

1. Tentukan komponen yg mau dicari nilainya (i, V)
2. Cabut komponen tsb
3. Cari $V_{ab} = V_{oc}$
4. Cari R_t saat semua sumber dimatikan

$$R_p \rightarrow V_1 = V_2 = V_t$$

Sumber tak bebas :

1. --
2. --
3. --
4. i_{sc}
5. R_T

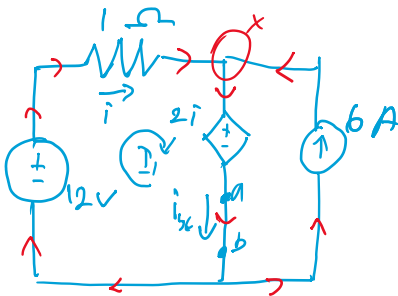


$$V_{ab} = V_{oc} = -2i - i + 12$$

$$= -3i + 12$$

$$i = -6$$

$$V_{oc} = -3(-6) + 12 = 30 \text{ V}$$



$$\sum v = 0$$

$$-12 + i + 2i = 0$$

$$-12 + 3i = 0$$

$$3i = 12$$

$$i = 4$$

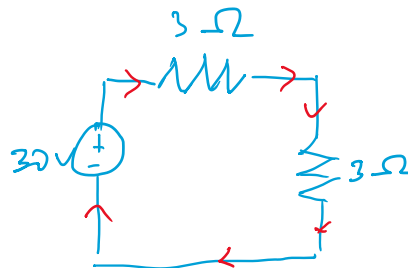
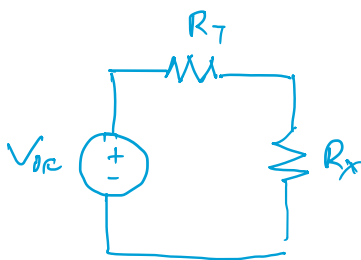
$$\sum i_x = 0$$

$$i + 6 = i_{sc}$$

$$4 + 6 = i_{sc}$$

$$i_{sc} = 10 \text{ A}$$

$$R_T = \frac{V_{oc}}{i_{sc}} = \frac{30}{10} = 3 \Omega$$

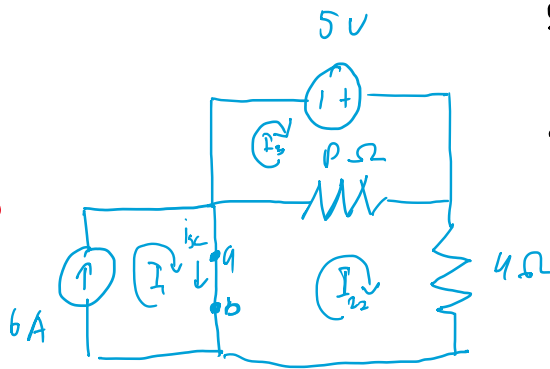
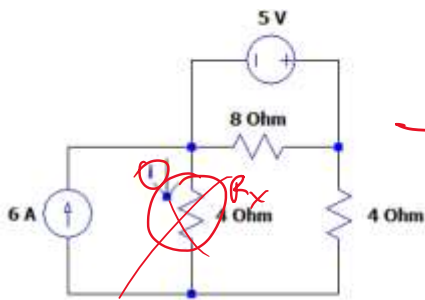


$$i = \frac{V}{R_T} = \frac{30}{3+3} = \frac{30}{6} = 5 \text{ A}$$

$$V_x = R_x \cdot i$$

$$= 3 \cdot 5 = 15 \text{ V}$$

Teorema Norton (Sumber bebas)



1. —
2. Cabut, ubah jadi SL
3. \hat{I}_{sc}
4. R_T

Loop I_1

$$I_1 = 6A \dots (1)$$

Loop I_2

$$\sum V = 0$$

$$8(I_2 - I_3) + 4I_2 = 0$$

$$8I_2 - 8I_3 + 4I_2 = 0$$

$$12I_2 = 8I_3$$

$$3I_2 = 2I_3 \dots (2)$$

$$I_3 = \frac{3}{2}I_2$$

$$I_3 = \frac{15}{8}A$$

Loop I_3

$$\sum V = 0$$

$$-5 + 8(I_3 - I_2) = 0$$

$$-5 + 8I_3 - 8I_2 = 0$$

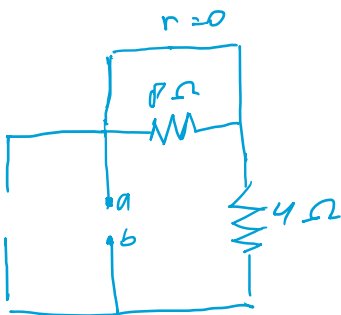
$$8I_3 - 8I_2 = 5 \dots (3)$$

$$4\left(\frac{3}{2}I_2\right) - 8I_2 = 5$$

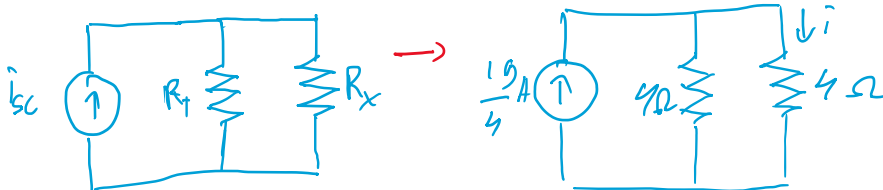
$$6I_2 = 5$$

$$I_2 = \frac{5}{6}A$$

$$I_{sc} = I_1 - I_2 = 6 - \frac{5}{6} = \frac{19}{6}A$$



$$R_T = 4\Omega$$



$$V = I \cdot R$$

$$V = \frac{19}{6} \cdot \frac{4 \times 4}{4 + 4}$$

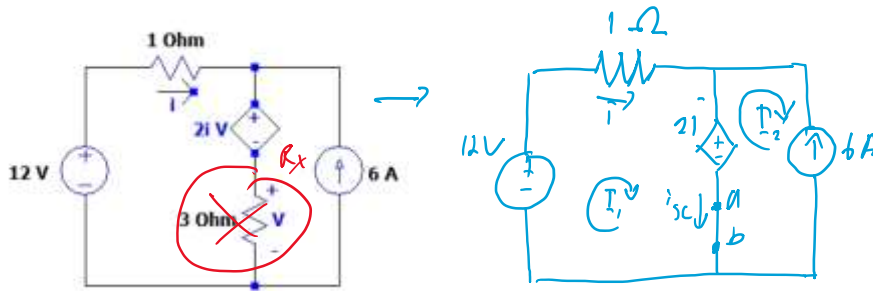
$$V = \frac{19}{2}V$$

$$V_T = V$$

$$I_T R_T = I_T \cdot R_T$$

$$I_T \cdot \frac{4}{4} = \frac{19}{6} \cdot \frac{4 \times 4}{4 + 4} \rightarrow \frac{19}{6}A$$

Sumber tak bebas
Morton



Loop I_2

$$\sum v = 0 \quad \times$$

$$-2i = 0 \quad \times$$

$$i = 0 \quad \times$$

$$I_2 = -6A$$

Loop I_1

$$-12 + i + 2i = 0$$

$$3i = 12$$

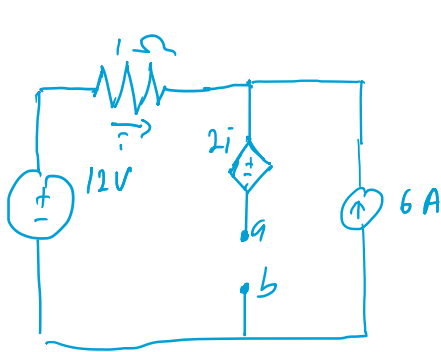
$$i = 4A$$

$$I_1 = 4A$$

$$i_{sc} = I_1 - I_2$$

$$i_{sc} = 4 - (-6)$$

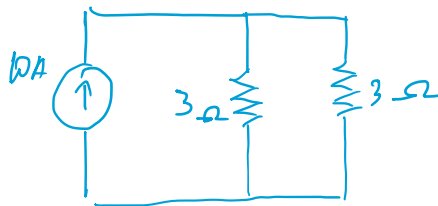
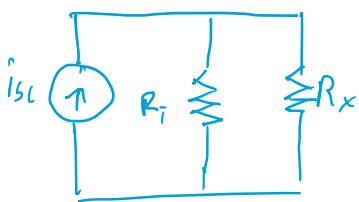
$$i_{sc} = 10A$$



$$V_{AB} = V_{oc} = -2i + 1 \cdot (-i) + 12$$

$$= -2(-6) - (-6) + 12 = 30$$

$$R_T = \frac{V_{oc}}{i_{sc}} = \frac{30}{10} = 3 \Omega$$



$$V_T = i_T \cdot R_T$$

$$V_T = 10 \cdot \frac{3 \times 3}{3 + 3}$$

$$V_T = 10 \cdot \frac{9}{6} = 15V$$

$$V_T = 15V$$