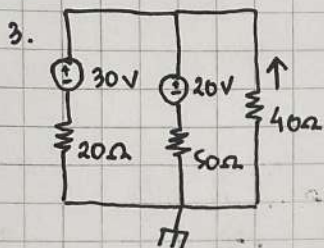


Nur Sabrina Hanifq. (224443088)

Persamaan node.



$$I_2 = I_1 + I_3$$

$$\frac{V_a - 20}{50} = \frac{V_a - 30}{20} + \frac{V_a}{40}$$

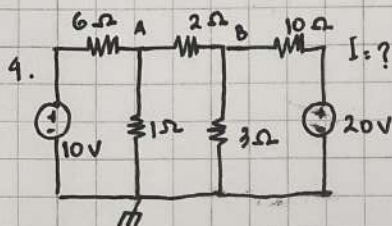
$$4V_a - 80 = 10V_a - 300 + 5V_a$$

$$4V_a + 80 = 15V_a - 300$$

$$4V_a - 15V_a = 80 - 300$$

$$-11V_a = -220$$

$$V_a = V_b = 20$$



$$\text{Node A} \Rightarrow I_1 = I_2 + I_3$$

$$\frac{V_a - 10}{6} = \frac{V_a}{1} + \frac{V_a - V_b}{2}$$

$$V_a - 10 = 6V_a + 3V_a - 3V_b$$

$$V_a - 9V_a + 3V_b = 10$$

$$-8V_a + 3V_b = 10 \quad (1)$$

$$\text{Node B} \Rightarrow I_3 = I_4 + I_5$$

$$\frac{V_a - V_b}{2} = \frac{V_b}{3} + \frac{V_b - 20}{10}$$

$$15V_a - 15V_b = 10V_b + 3V_b - 60$$

$$15V_a - 15V_b = 13V_b - 60$$

$$15V_a - 28V_b = -60 \quad (2)$$

$$8V_a - 3V_b = -10 \quad | \times 15$$

$$15V_a - 28V_b = -60 \quad | \times 8$$

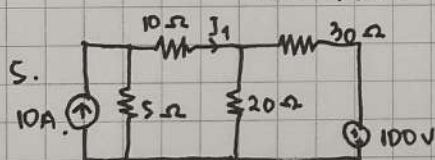
$$120V_a - 45V_b = -150$$

$$-120V_a - 224V_b = 480 \quad +$$

$$179V_b = 330$$

$$V_b = 1,8V$$

$$I = I_5 = \frac{V_b - 20}{10} \rightarrow \frac{1,8 - 20}{10} \rightarrow \frac{-18,2}{10} \rightarrow -1,82A //$$



$$\text{Node A: } I_1 = I_2 + I_3 \rightarrow 10 = \frac{V_a - V_b}{10} + \frac{V_a}{5} \rightarrow 100 = 2V_a + V_a - V_b$$

$$100 = 3V_a - V_b$$

$$3V_a + V_b = -100 \quad (1)$$

$$\text{Node B: } I_2 = I_3 + I_4 \rightarrow \frac{V_a - V_b}{10} = \frac{V_b - 100}{30} + \frac{V_b}{20} \rightarrow 6V_a - 6V_b = 2V_b + 3V_b - 200$$

$$6V_a - 6V_b - 5V_b = -200$$

$$6V_a - 11V_b = -200 \quad (2)$$

$$3V_a - V_b = 100 \quad | \times 2$$

$$6V_a - 11V_b = -200 \quad | \times -1$$

$$6V_a - 2V_b = 100$$

$$-6V_b - 11V_b = 200 \quad +$$

$$-17V_b = 200$$

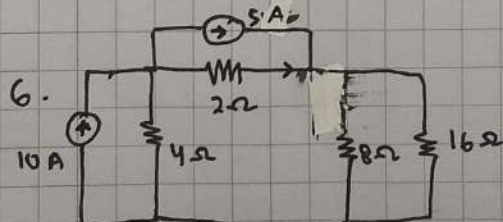
$$V_b = 44,44V$$

$$3V_a - 44,44 = 100$$

$$3V_a = 144,44$$

$$V_a = 48,15V$$

$$I = \frac{V_a - V_b}{10} \rightarrow \frac{48,15 - 44,44}{10} = \frac{3,71}{10} = 0,371A$$



$$\text{Node A: } I_1 = I_2 + I_3 + I_4 \rightarrow 5 = \frac{V_a}{4} + \frac{V_a - V_b}{2} \rightarrow 20 = 3V_a - 2V_b \quad (1)$$

$$10 = \frac{V_a}{4} + \frac{V_a - V_b}{2} + 5$$

$$\text{Node B: } I_3 + I_4 = I_5 + I_6$$

$$\frac{V_a - V_b}{2} + 5 = \frac{V_b}{8} + \frac{V_b}{16}$$

$$8V_a - 8V_b + 80 = 2V_b + V_b$$

$$8V_a - 8V_b + 80 = 3V_b$$

$$8V_a - 11V_b + 80 = 0$$

$$8V_a - 11V_b = -80 \quad (2)$$

$$3V_a - 2V_b = 20 \quad | \times 8$$

$$8V_a - 11V_b = -80 \quad | \times -3$$

$$24V_a - 16V_b = 160$$

$$-24V_a + 33V_b = 240 \quad +$$

$$17V_b = 400$$

$$V_b = 23,5$$

$$I = I_3 = \frac{V_a - V_b}{2}$$

$$= \frac{22,3 - 23,5}{2}$$

$$= -0,6A //$$

$$3V_a - 2(23,5) = 20$$

$$3V_a = 67 \rightarrow V_a = 22,3V$$