Huda Abu Zayed

في قناة على اليوتيوب اسمها "Circuit_99"

بتشرح السيرت بطريقة رائعة احمزلي منها

وح تستفيدوا كتير

ch 1) $\Sigma P_{power\ supply} = \Sigma P_{power\ absorbed} + \Sigma P_{power\ dissipated}$ (المولدات تساوي)

$V = \frac{dw}{dq}$

$i = \frac{dq}{dt}$

$V = RI$

$P = \frac{dw}{dt} = \left(\frac{dw}{dq}\right) \cdot \left(\frac{dq}{dt}\right) = Vi$

Active : Sources "delivering"
Passive : R, C, L "recieving"

$V = Ri$

$i = \frac{1}{R} V$

$= G \cdot V(t)$
Siemens (ʊ)

$p(t) = Vi$
$V = Ri$
$P = \frac{V^2}{R}$
$P = Ri^2$

C ⇒ Farad
L : inductor henry (H) (الحث)

$p(t) = +V i$ absorbing "consume"
$p(t) = -V(t)\, i$ Supplying "deliver"

VIR $V = RI$

VIC $i = C\frac{dV}{dt}$

VIL $V = L\frac{di}{dt}$

$R_1 // R_2 \Rightarrow Req = \frac{R_1 R_2}{R_1 + R_2}$

VDR $V_1 = V_x \frac{R_1}{R_1 + R_2}$

$V_2 = V_x \frac{R_2}{R_1 + R_2}$

CDR $I_2 = I_x \cdot \frac{R_2}{R_1 + R_2}$

$I_2 = I_x \cdot \frac{R_1}{R_1 + R_2}$

DC Ammeter $R_{sh} I_{sh} = R_m I_m$

$R_{sh} = \frac{R_m I_m}{I_{sh}} = \frac{R_m I_m}{I - I_m}$

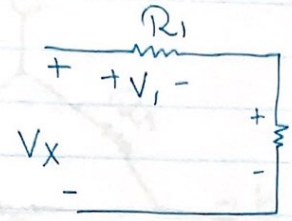
DC Volt $V = R_S I_m + R_m I_m$

$R_S = \frac{V - R_m I_m}{I_m}$

wheatstone $R_x = \frac{R_2 R_3}{R_1}$

$\frac{R_1}{R_3} = \frac{R_2}{R_x}$

VDR: V_2, V_1 متغير لعندي R_2, R_1, V_x يكون عندي

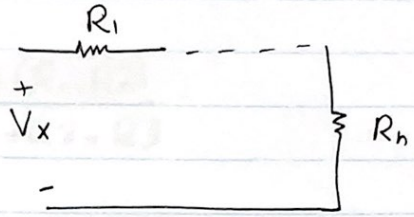


$$V_1 = \frac{R}{R_1+R_2} V_x$$

$$V_2 = \frac{R_2}{R_1+R_2} V_x$$

لحابي أعوض واوجد I على الـ Series لازم اعمل Req

if you Know
Vx & R_1 -- R_n

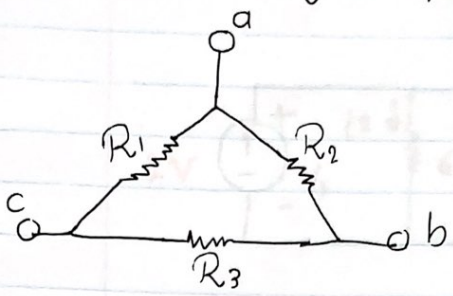


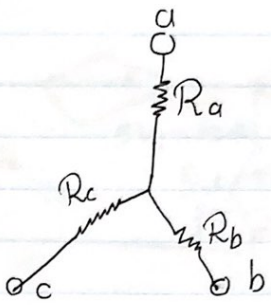
بستخدم

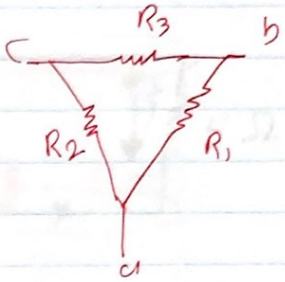
$$V_1 = Vx \frac{R_1}{\varepsilon R}$$

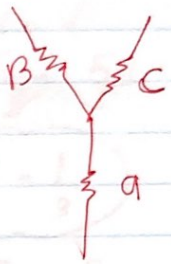
$18 // 9 = 6\Omega$
$6 // 3 = 2\Omega$
$12 // 6 = 4\Omega$
$12 // 4 = 3\Omega$

Delta to wye & Y to Δ









$$R_{ab} = R_a + R_b = \frac{R_2(R_1+R_3)}{R_1+R_2+R_3}$$

$$R_{bc} = R_b + R_c = \frac{R_3(R_1+R_2)}{R_1+R_2+R_3}$$

$$R_{ca} = R_c + R_a = \frac{R_1(R_2+R_3)}{R_1+R_2+R_3}$$

Y → Δ

$$R_1 = \frac{R_aR_b + R_bR_c + R_cR_a}{R_b}$$

$$R_2 = \frac{R_aR_b + R_bR_c + R_cR_a}{R_c}$$

$$R_3 = \frac{R_aR_b + R_bR_c + R_cR_a}{R_a}$$

Δ → Y

$$R_a = \frac{R_1R_2}{R_1+R_2+R_3}$$

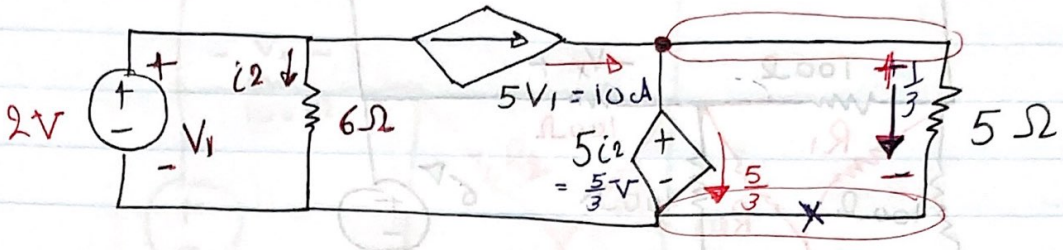
$$R_b = \frac{R_2R_3}{R_1+R_2+R_3}$$

$$R_c = \frac{R_3R_1}{R_1+R_2+R_3}$$

$$R_\Delta = 3R_Y$$

$$R_Y = \frac{1}{3}R_\Delta$$

The power associated with th 5Ω resistor equals to



$V = V$

$2 = 6i_2$ $\left(i_2 = \frac{1}{3}\right)$

$\frac{5}{3}\frac{i}{5} = \frac{5i}{5}$ $\left(i = \frac{1}{3}\right)$

$P = i^2 R$

$5\Omega = \left(\frac{1}{3}\right)^2 * 5 = 0.55$ watt

$P_{Voltage} = Vi$

Parallel $V = V$

$\frac{5}{3}\frac{i}{5} = \frac{5i}{5}$

$i = \frac{1}{3}$

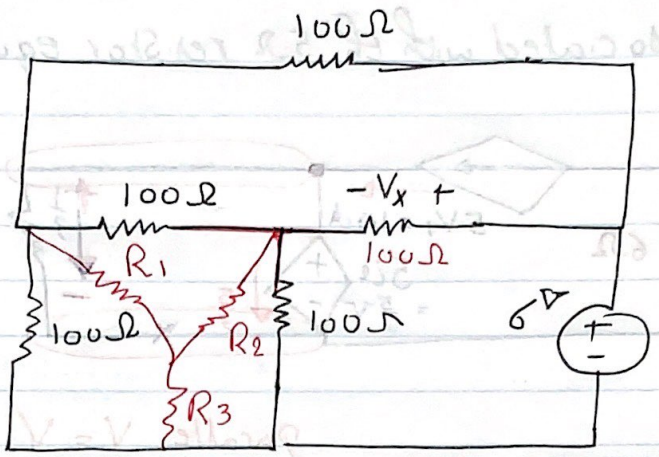
$-\frac{5}{3} + 5$

Apply KCL

$10 = \frac{1}{3} + I_3$

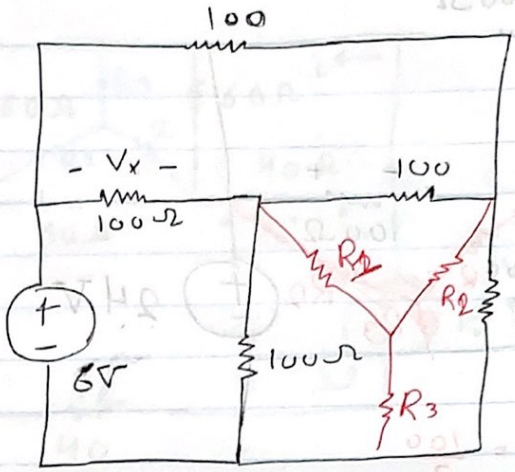
$9.66 = I_3$

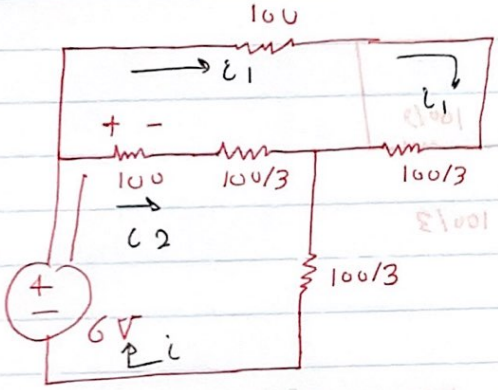
$P = V I_3 = \frac{5}{3} \times 9.66 \doteq 16.11$ watt



$R_\Delta = 3R_Y$

$= 3 \times 100 = 300$





$$Req = \left(100 + \frac{100}{3}\right) // \left(66 + 100/3\right)$$

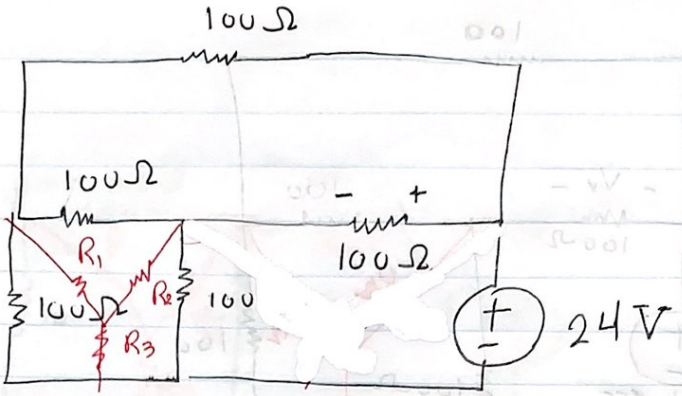
$$Req = 100\Omega$$

$$i = \frac{6}{66.66} = 0.06$$

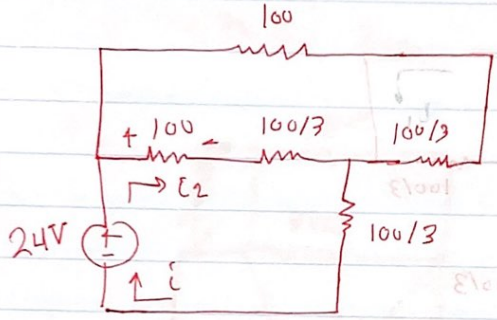
Current division Law

$$i_2 = \frac{\left(100 + \frac{100}{3}\right)}{2\left(100 + \frac{100}{3}\right)} * 0.06 = 0.03$$

$$V = Ri = 0.03 * 100 = 3V$$



$R_1 = R_2, \; R_3 = \frac{100}{3}$



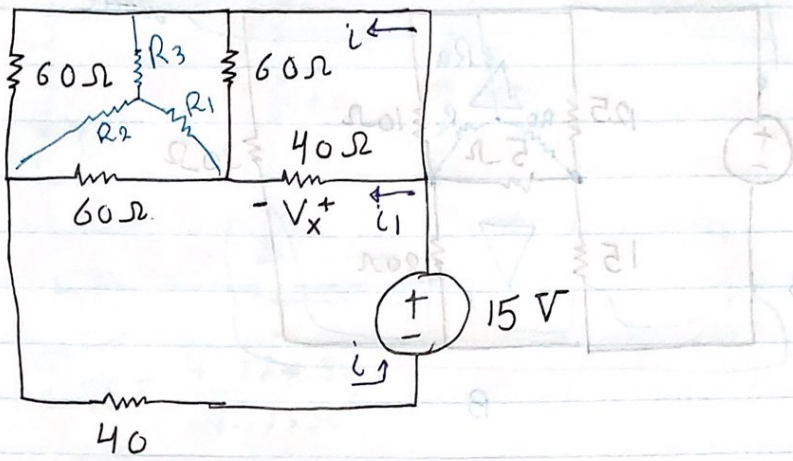
$$R_{eq} = \frac{100 + 100/3}{2} + \frac{100}{3} = 100$$

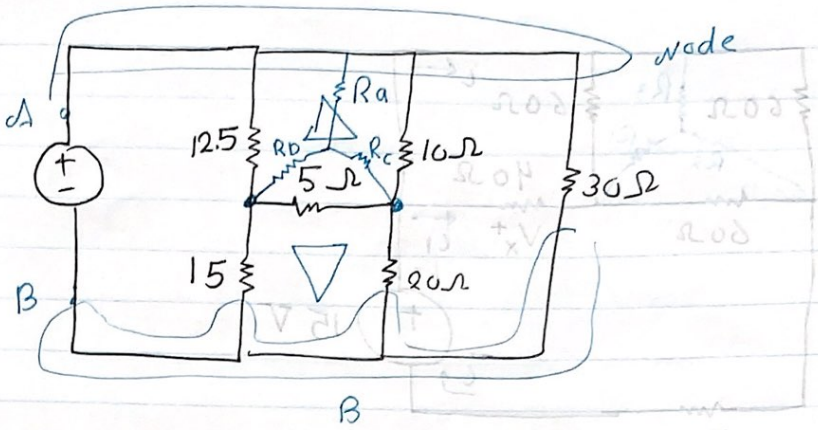
$$i = \frac{V}{R} = \frac{24}{100} = 0.24$$

$$i_2 = \frac{\left(100 + \frac{100}{3}\right) * 0.25}{2\left(100 + \frac{100}{3}\right)} = 0.12$$

$$V = Ri$$

$$= 0.12 * 100 = 12\,V$$

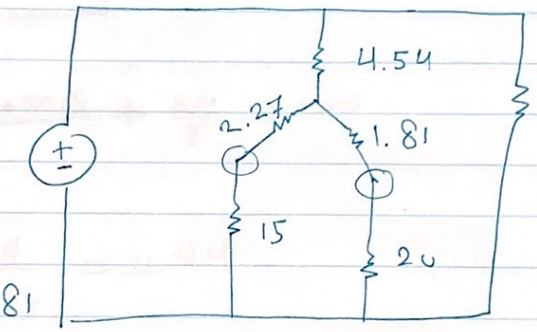




$$R_a = \frac{12.5 \times 10}{12.5+10+5} = 4.54$$

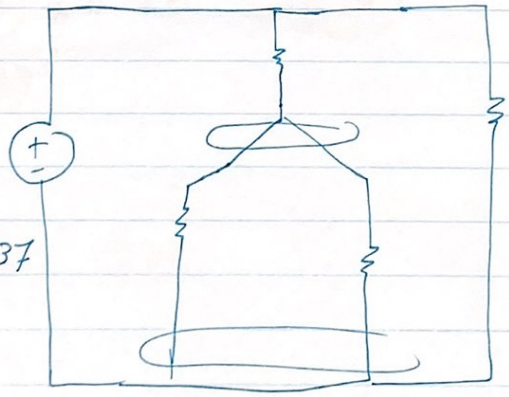
$$R_b = \frac{(12.5)(5)}{12.5+10+5} = 2.27$$

$$R_c = 1.81$$

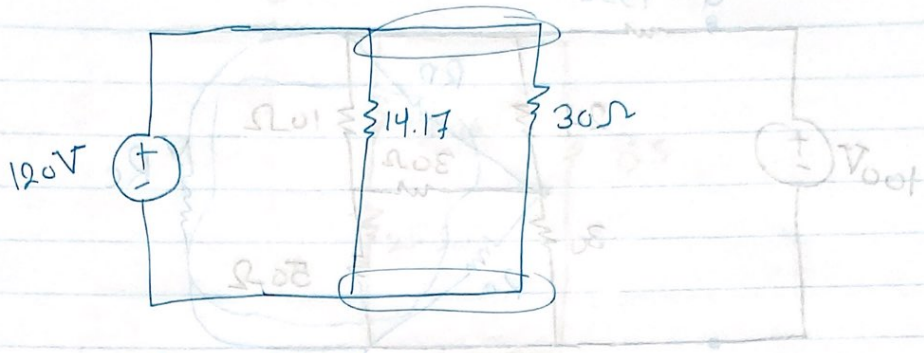


$$R_{eq} = 15 + 2.27 = 17.27$$

$$R_{eq} = 1.8 + 20 = 21.81$$

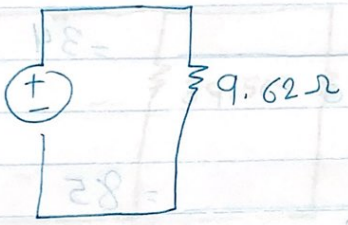


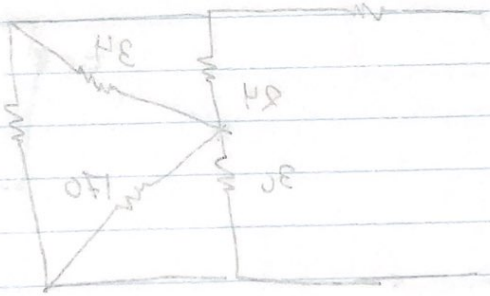
$$\frac{17.27 \times 21.87}{17.27+21.81} = \frac{376.65}{39.08} = 9.637$$

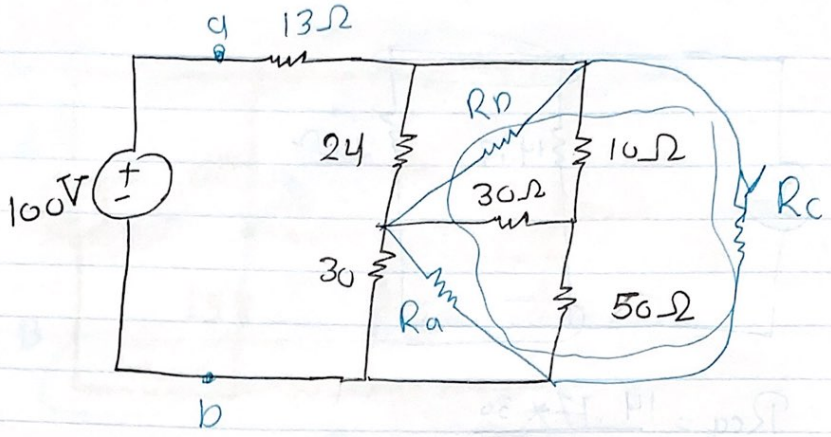


$$R_{eq} = \frac{14.17 * 30}{14.17 + 30}$$

$$= 9.62\,\Omega$$



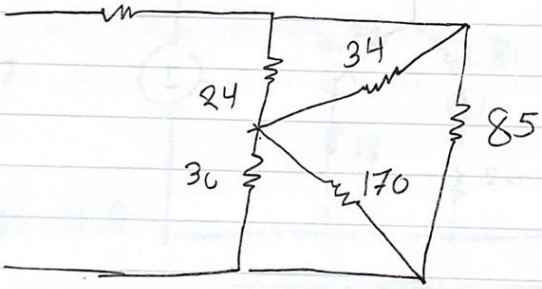




$$R_a = \frac{(10*50) + (50\times20) + (10\times20)}{10} = 170\,\Omega$$

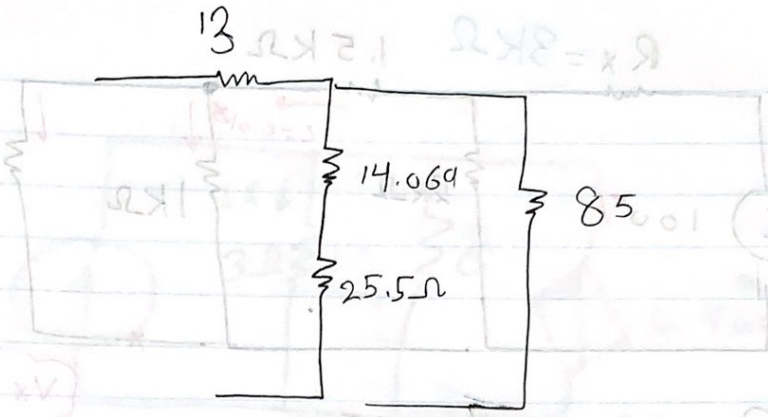
$$R_b = \frac{}{50} = 34$$

$$R_c = \frac{}{20} = 85$$

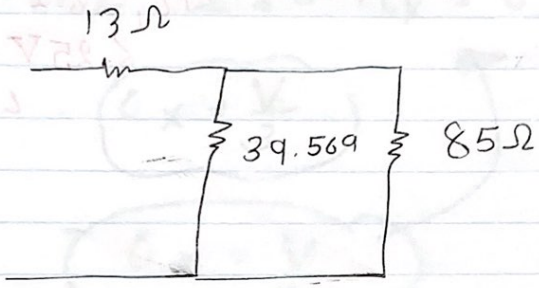


$24 \parallel 34 = 14.069\,\Omega$

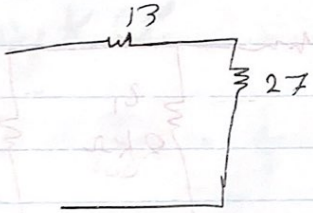
$30 \parallel 170 = 25.50$



$14.069 + 25.5 = 39.569$

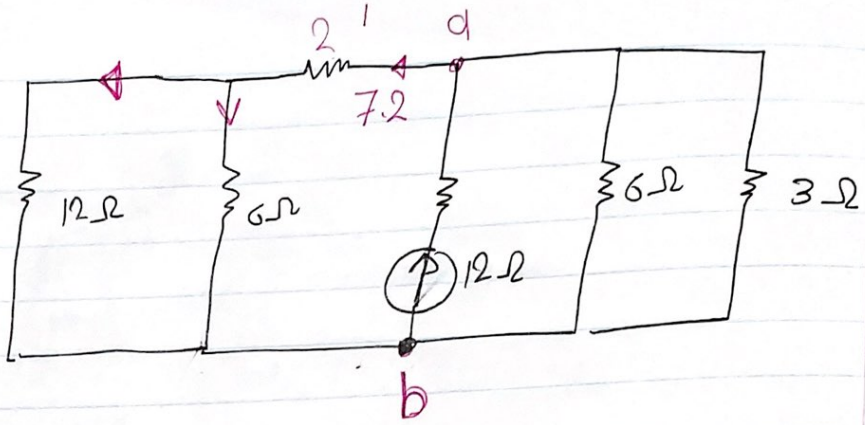


$39.569\Omega \,//\, 85 = 27$



$13 + 27 = 40$

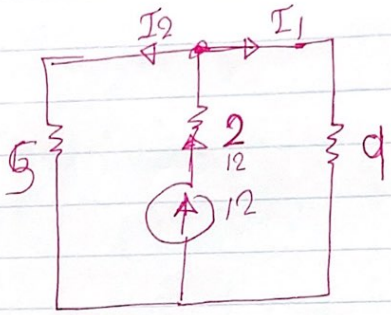
$$C = \frac{V}{40} = \frac{100}{40} = 2.5$$



$6 \parallel 3 = 2$

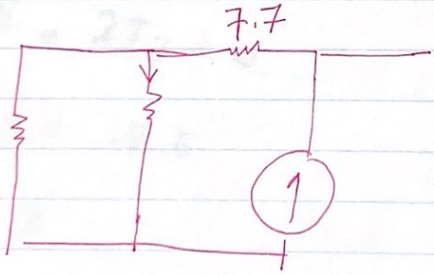
$12 \parallel 6 = 4$

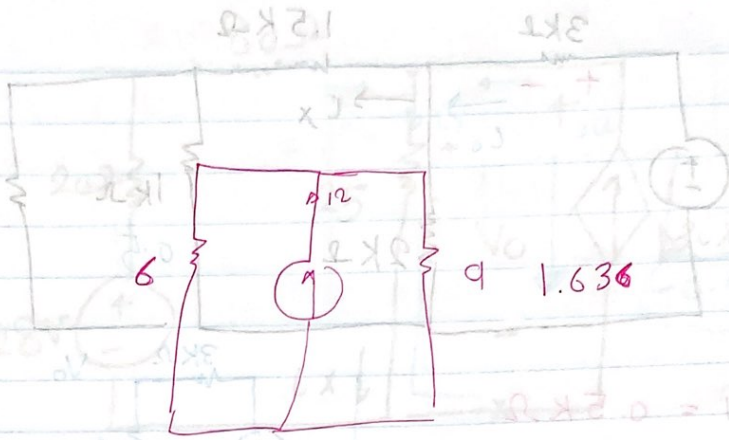
$4 + 2 = 5$



$i_2 = -12 \frac{9}{157} =$ ~~7.7~~ 6.35

$i_6 = 7.2 * \frac{12}{18} = 4A$





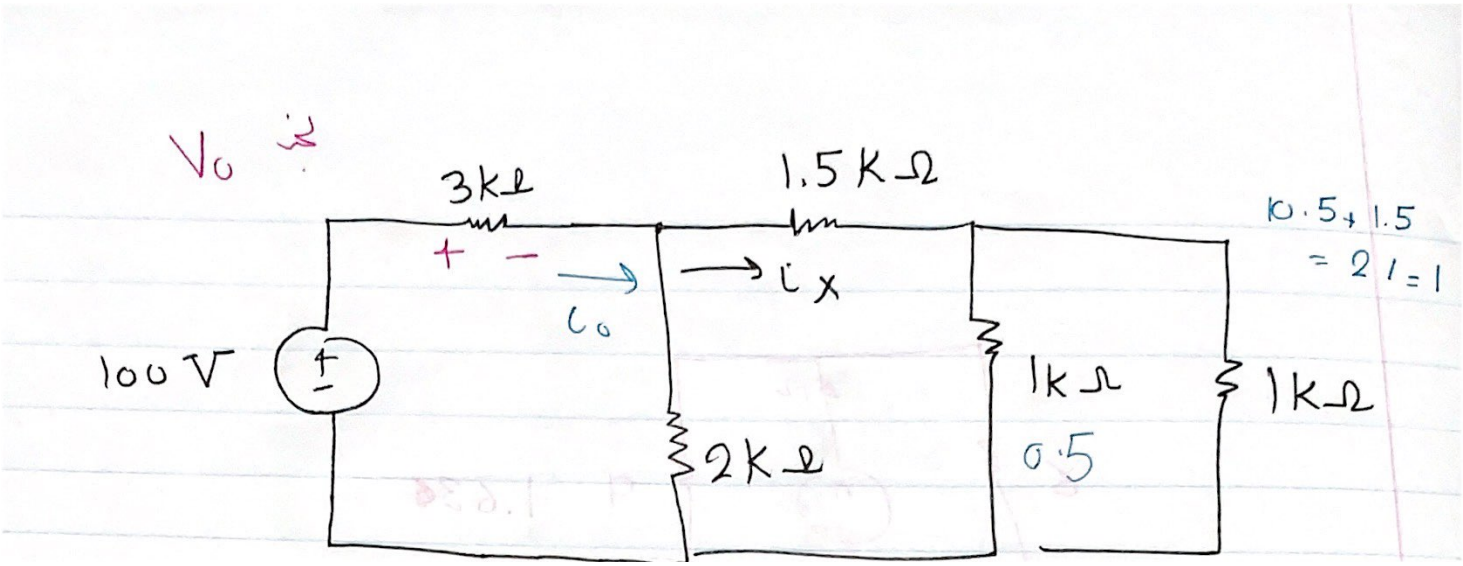
$$i_6 = \frac{12 * 9}{15} = 7.2$$

$\leftarrow 7.2$

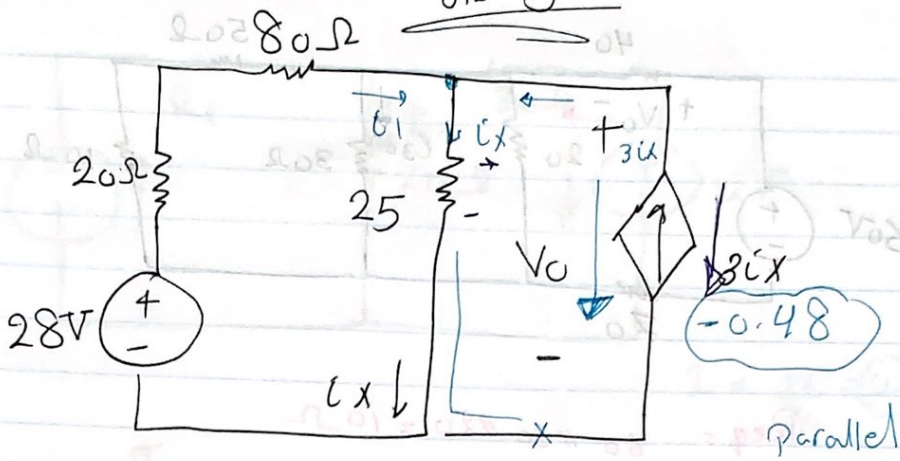
$$i_6 = \frac{12 * 7.2}{18}$$

2,57

$$2.57 * \frac{12}{18}$$

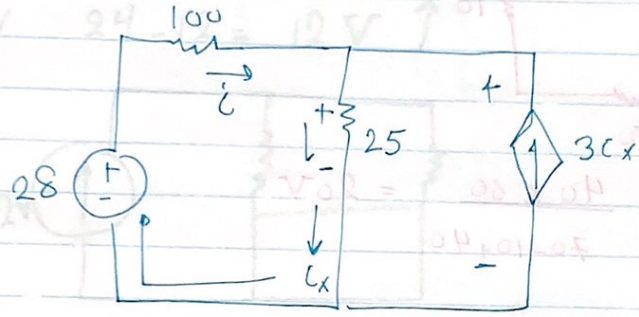


Huda AbuZayed



Parallel

Find p $3i_x$



$V_o = 25 i_x$
$= 25 \times -0.16$
$= -4$

$P = -4 * -0.48$
$= -(1.92)$

delivering

Applying KVL $-28 - 100\,i + 25 i_x = 0$

Applying KCL

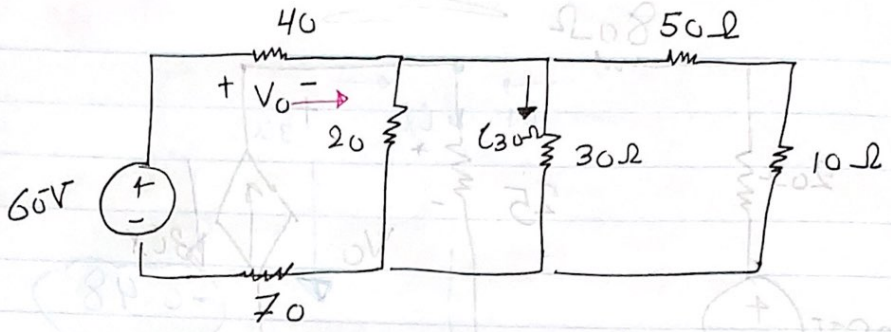
$3i_x = i_1 + i_x$
$-i_x \quad -i_x$

$2 i_x = i_1$

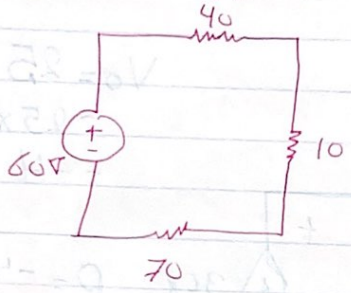
$-28 - 200 i_x + 25 i_x = 0$
$28 = \frac{-175}{-175} i_x$

$i_x = 0.16$

Applying KVL



Req = $60 // 30 // 20 = 10\Omega$



$$V_o = \frac{40 * 60}{70+10+40} = 20V$$

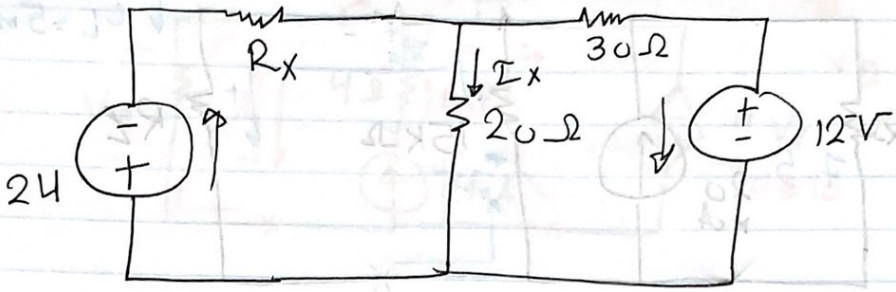
The current through 40

$$i = \frac{V_o}{40} = \frac{20}{40} = 0.5A$$

to use Current division Rule we find the equ resistent parallel to 2 contain 20

$$60 // 20 = \frac{20 \times 60}{20+60} = 15$$

$$i_{30} = 0.5 * \frac{15}{45} = 0.1667$$



$I = \frac{12}{30} = 0.4$

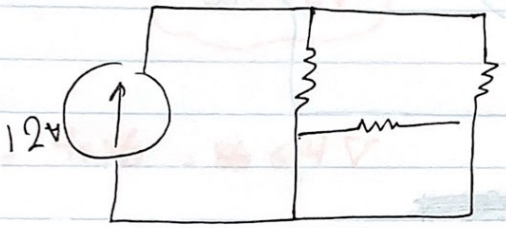
I_x = zero

$V = RI$

12 => 30
24 => 60

60Ω

ΔV 24 - 12 = 12 V ↑

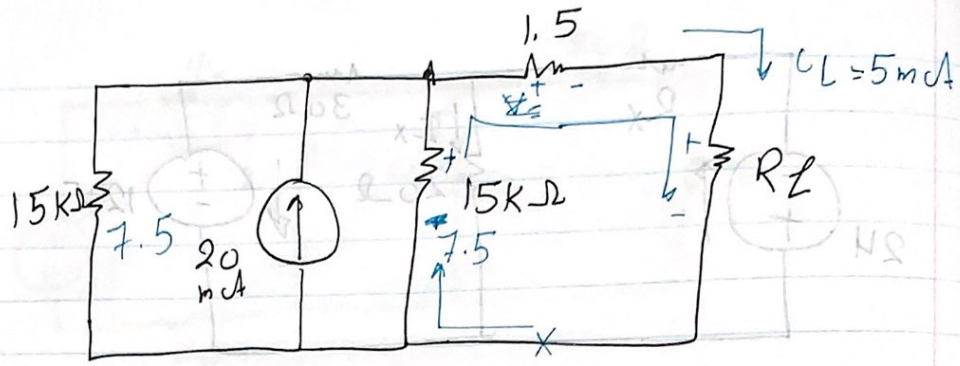


the same potential

$I = I$ $\quad V = V$

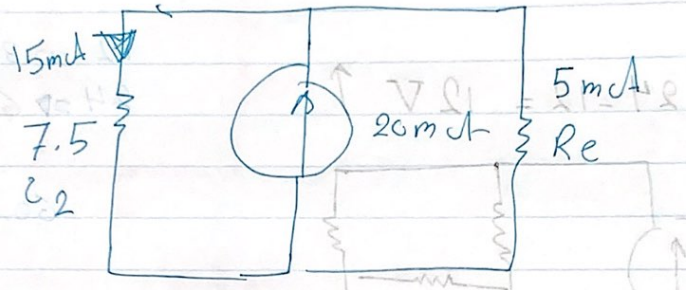
$\frac{24}{R_x} = \frac{30}{12}$ $\quad I$

$2.5R_x = 24$



$R_L = ?!$ if $i_L = 5mA$

$R_e = 1.5 + R_L$



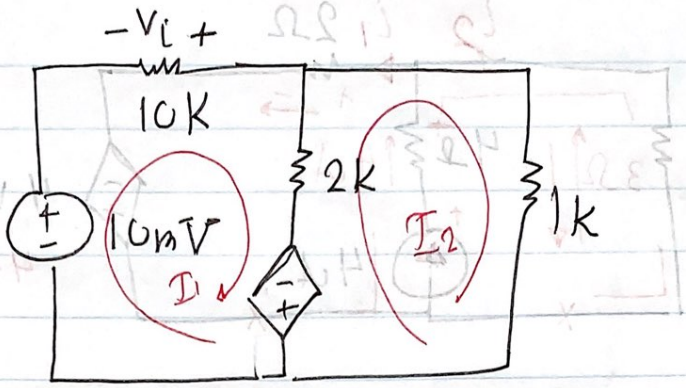
KVL

$$-7.5 * 15 + 1.5 * 5mA + 5R_L = 0$$

$$120 = 5R_L$$

$$-105 = 5R_L$$

$$R_L = 21$$



$$10mV - I_1 10K - (I_1 - I_2) 2K + 10Vi = 0$$

$$Vi = -I_1 10K$$