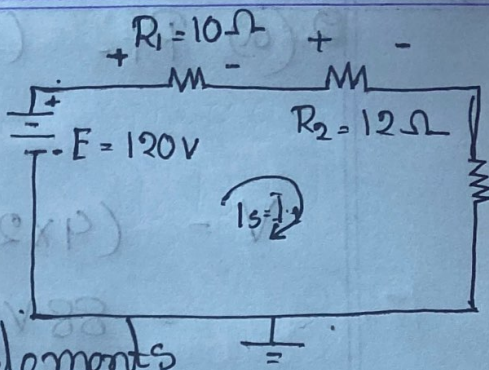
ID: 1922180042 Sec: 08 Faculty: SSH1

Course Code: EEE141

5'3

7. For the series configuration, find



(a) Total resistance

(b) Total current

(c) Voltage accross each resistive elements

(a) Here, Total resistance, $R_T = (10+2+18)\Omega = 40\Omega$

(b) As per Ohm's Law, Current, $I_s = \frac{E}{R_T} = \frac{120}{40}$ A

$= 3A$

(c) Applying ohm's law in each resistive elements we can obtain voltage accross each of them.

So, $V_{R_1} = I_1 R_1 = [(3A)(10\Omega)]V = 30V.$

$V_{R_2} = I_1 R_2 = [3A * 12\Omega]V = 36V$

$V_{R_3} = I_1 R_3 = [18\Omega \times 3A] = 54V$

9 (a) $R_T = (12 + 4 + 6)\,k\Omega$

$= 22\,k\Omega$

$V = (4 \times 22)\,V$

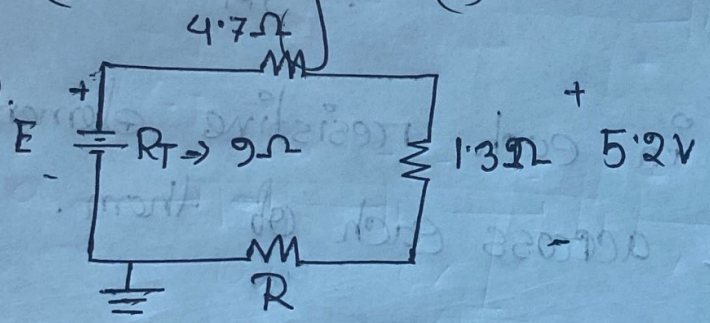
$= 88\,V$

(b) $R_T = (18 + 14 + 8 + 40)\,\Omega = 80\,\Omega$

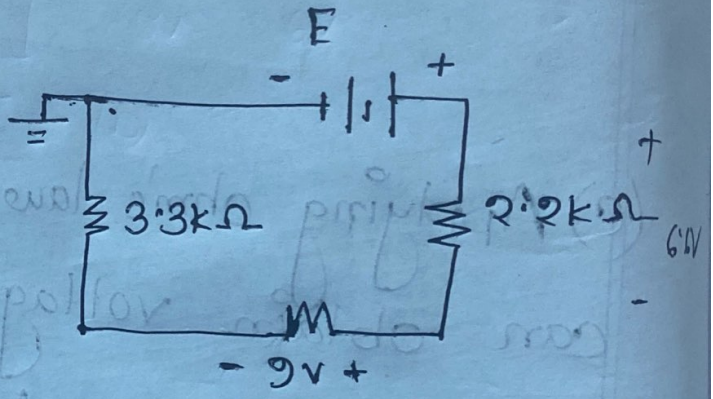
$V = \left(\frac{250}{1000} \times 80\right) = 20\,V$

~~10. (a) For figure (a)~~

10.

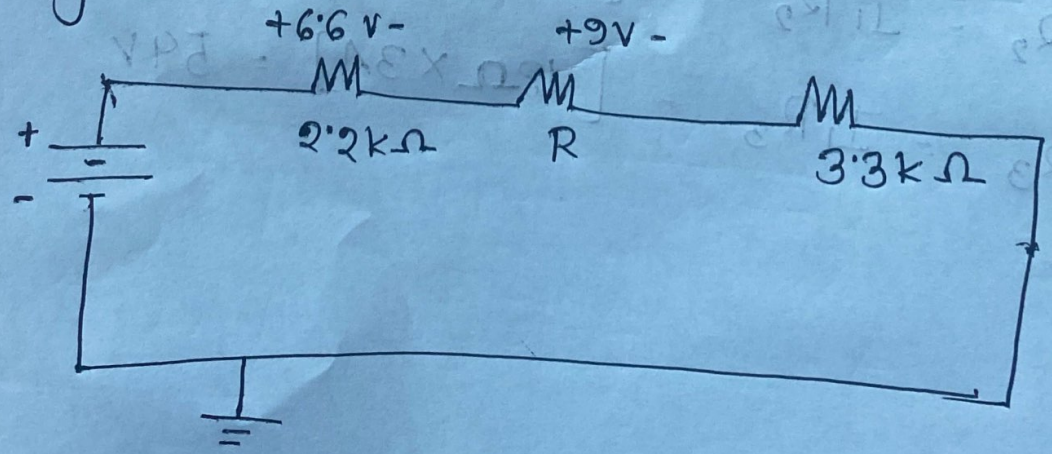


(a)



(b)

Here figure (b) can be drawn as



(a) For figure (a) Current $I = \frac{VR}{R} = \frac{5.2V}{13\Omega} = 4A$

& For " (b) Current $I = \frac{VR}{R} = \frac{6.6\,V}{2.2k\Omega}$

$= \frac{6.6\,V}{2.2\times10^{3}\Omega}$

(b) For 1st figure $IR_T = (4\times9)V = 36\,V$

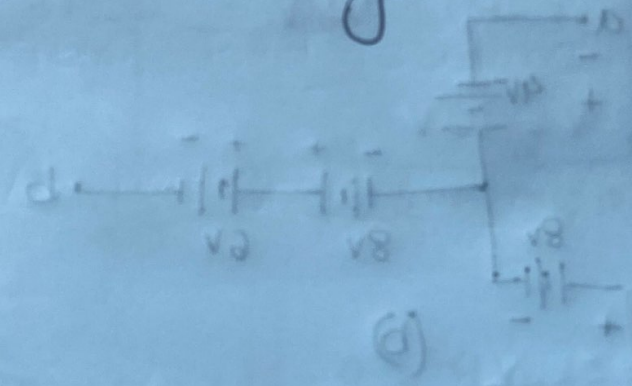
For 2nd figure, unknown Resistance, $R = \frac{V_{unk}}{I}$

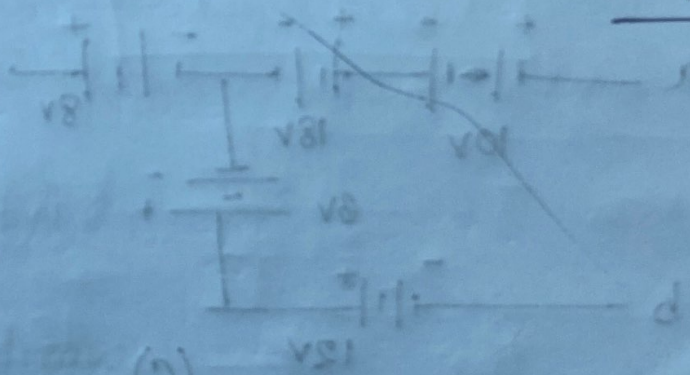
$= \frac{9}{3\times10^{-3}}$

$= 3000\Omega$

$= 3\,k\Omega$

Ans

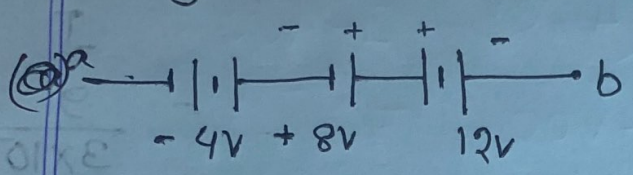




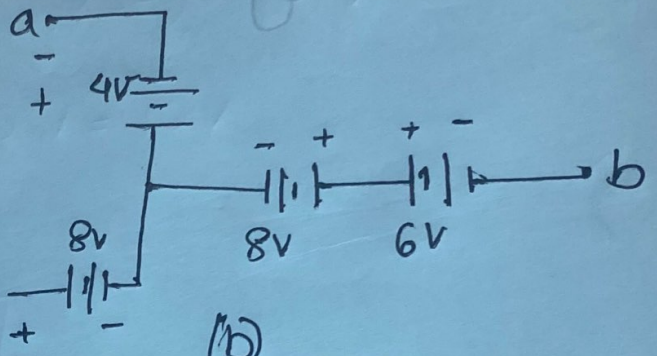
6 (i) $I = \frac{6.6}{2.2} = 3$

5.5

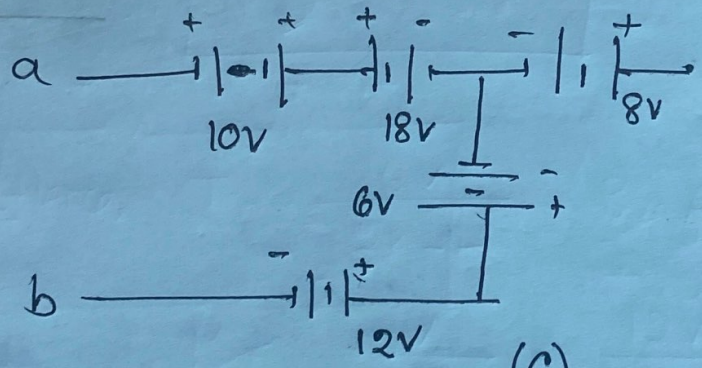
17. Combine the series voltage source into a single voltage source between points a & b



(a)



(b)



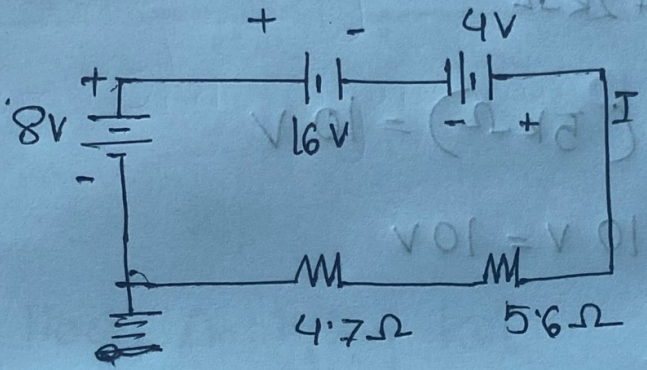
(c)

For figure (a) $V_{ab} = -4V - 8V + 12V = 0$

For figure (b) $V_{ab} = -4V - 8V + 6V = -6V$

For figure (c) $V_{ab} = -10V + 18V - 6V + 12V = 14V$

18.

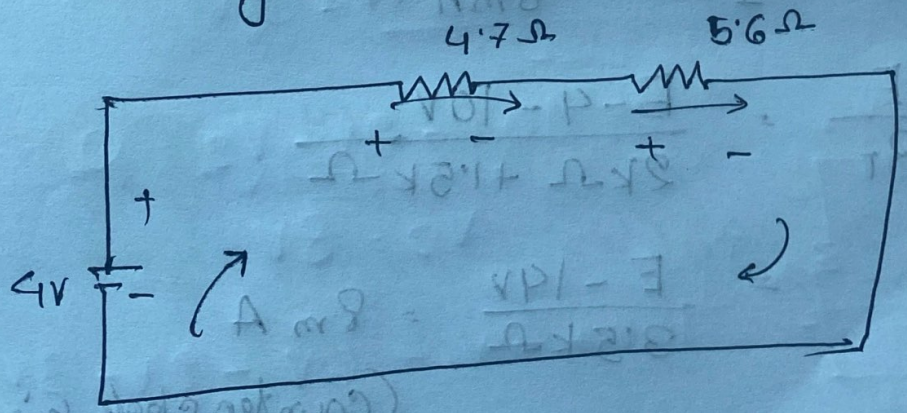


$V_S = -8 + 16 - 4 = 4V$

$R_T = 4.7 + 5.6 = 10.2\Omega$

$I = \frac{4}{10.2} = 0.392\,A$

Single voltage redraw



Unknown Register

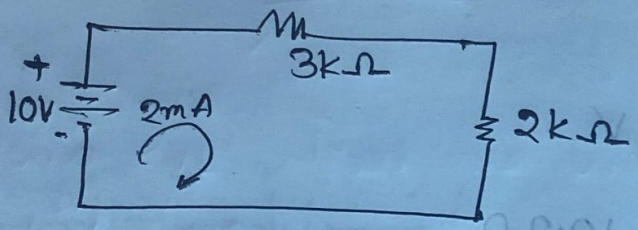
19. (a) $P = i^2R$

$$R = \frac{8mW}{I^2} = \frac{8mW}{(2mA)^2} = 2k\Omega$$

$$I = \frac{\Sigma E}{R_T} = \frac{20V - E}{3k\Omega + 2k\Omega} = 2mA \text{ (clockwise)}$$

$$\Rightarrow 20V - E = (2mA)(5k\Omega) = 10V$$

$$\therefore E = 20V - 10V = 10V$$



(b) Here, $I = \frac{16V}{2k\Omega} = 8mA$

$$R = \frac{V}{I} = \frac{12V}{8mA} = 1.5k\Omega$$

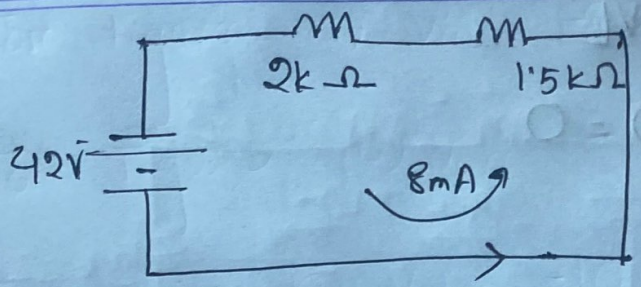
$$I_S = \frac{E}{R_T} = \frac{E - 4 - 10V}{2k\Omega + 1.5k\Omega}$$

$$= \frac{E - 14V}{3.5k\Omega} = 8mA$$

(counter clock wise)

$$\therefore E - 14 = (8mA)(3.5k\Omega)$$

$$\therefore E = 42V$$



5.6

20. (a) ~~KVL~~

Here, Applying KVL

$+10V - 4V - 3V - V = 0$

$\therefore V = 14V - 3V = 11V$

(b) Applying KVL,

$+30V + 20V - 8V - V = 0$

$\therefore V = 50V - 8V = 42V$

(c) Applying KVL

$+16V - 10V - 4V - V + 60V = 0$

$\therefore -V = 62V$

21. (a) Here Applying KVL

$60 - 12 - V - 20 = 0$

$\therefore V = 28V$

(b) Here, Applying KVL

$V + 18 - 14 - 6 - 2 = 0$

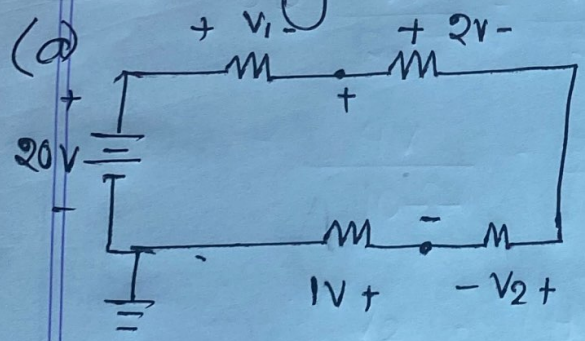
$\therefore V - 4 = 0$

$\therefore V = 4$

Ans

23 Using KVL, find the unknown voltage

(a)



Applying KVL

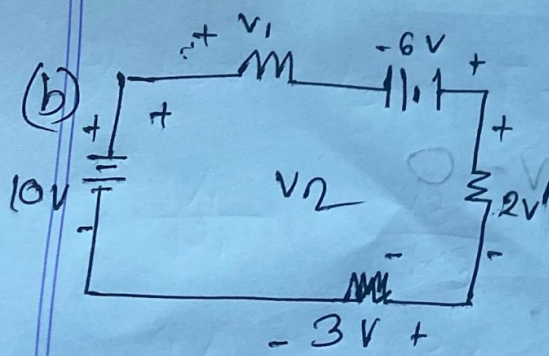
$+20V - V_1 - 10V - 8V = 0$

$\therefore V_1 = 9V$

and, $10V - 2V - V_2 = 0$

$\therefore V_2 = 8V$

(b)



Again,

$10V + -V_1 + 6V - 2V - 3V = 0$

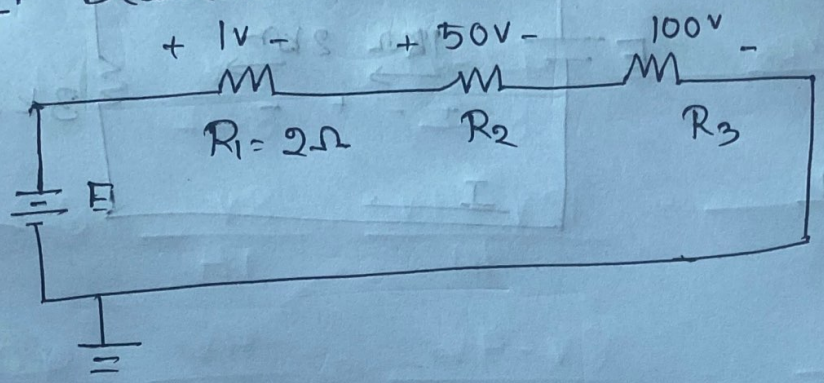
$\therefore V_1 = 11V$

Again,

$10V - V_2 - 3V = 0$

5.7

24. Determine the values of unknown resistores,



Here, $\frac{V_1}{R_1} = \frac{V_2}{R_2}$

$\Rightarrow \frac{1V}{2\Omega} = \frac{50V}{R_2}$

$\therefore R_2 = \frac{(50V)(2\Omega)}{1V} = 100\Omega$

Again, $\frac{V_1}{R_1} = \frac{V_3}{R_3}$

$\frac{1V}{2\Omega} = \frac{100V}{R_3}$

$\therefore R_3 = \frac{(100V)(2\Omega)}{1V} = 200\Omega$

28 Here,

$$\frac{2}{1} = \frac{V_2}{2}$$

$\Rightarrow V_2 = 4V$

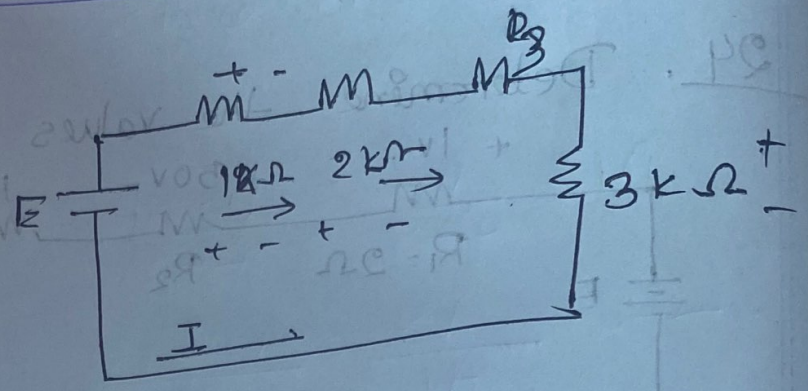
and $\frac{2}{1} = \frac{V_4}{3}$

$\Rightarrow V_4 = 6V$

$I = \frac{2}{1} = 2mA$

and $E = 2+4+12+6$

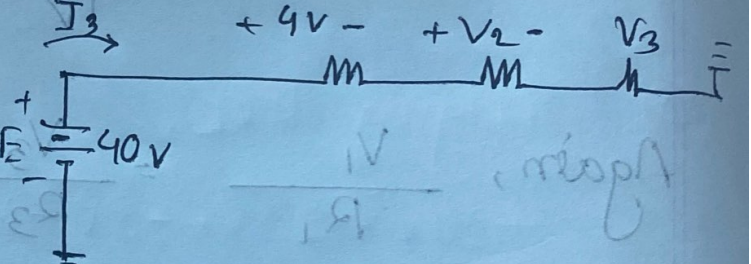
$= 24V$



30 Here $\frac{V_1}{R_1} = \frac{V_2}{R_2}$

$= \frac{4V}{10\Omega} = \frac{V_2}{20\Omega}$

$\therefore V_2 = \frac{(4V)(20\Omega)}{10\Omega} = 8V$



(b) Here, $V_3 = E - V_1 - V_2 = 40V - 4V - 8V = 28V$

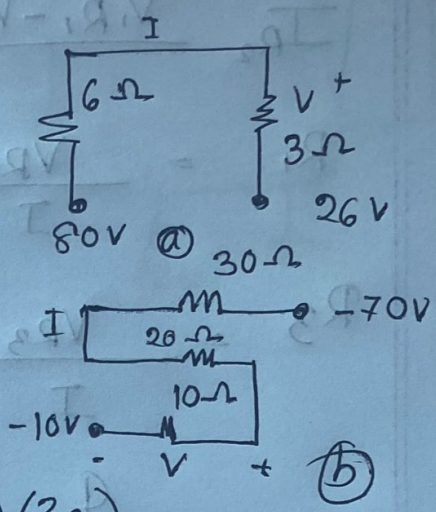
(c) $\frac{V_1}{R_1} = \frac{V_3}{R_3}$

$\Rightarrow \frac{4V}{10\Omega} = \frac{28V}{R_3}$

$\Rightarrow R_3 \frac{(28V)(10\Omega)}{4V} = 70\Omega$

5.9

36. Determine current I (with direction) & voltage V (with polarity) for the following figure



For figure (a)

Here $V = 80V - 26V = 54V$

& $R_T = 6\Omega + 3\Omega = 9\Omega$

$\therefore I = \frac{54V}{9\Omega}$ 6A & $V = IR = (6A)(3\Omega)$

$= 18V$

The direction would be clock wise as $80V > 26V$

For figure (b)

$E = 70V - 10V = 60V$

$R_T = 10\Omega + 20\Omega + 30\Omega = 60\Omega$

$\therefore I = \frac{E}{R_T} = \frac{60V}{60\Omega} = 1A$

Direction is clock wise

Again, $V = IR$ (1A) $(10\Omega) = 10V$

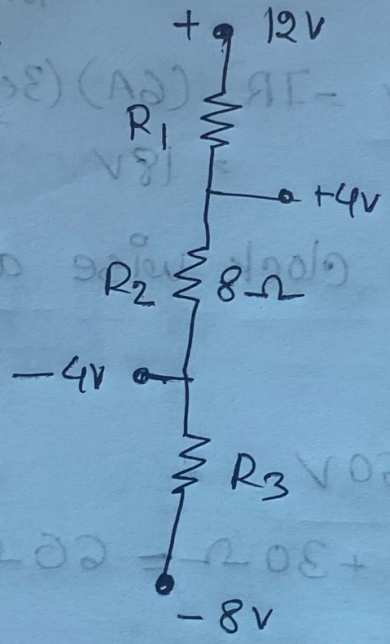
39. Find the level of Resistance R_1 & R_3

As per Law,

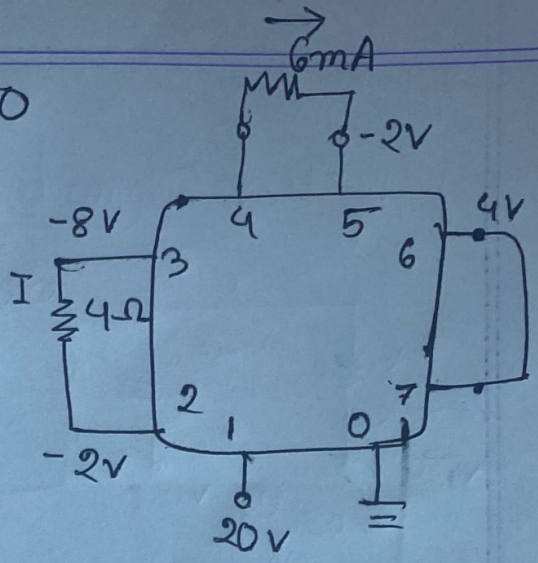
$$I_{R_2} \frac{V_1 R_1 - V_{R_2}}{} = \frac{4-(-4)}{8\Omega} = \frac{8V}{8\Omega} = 1A$$

$$R_1 = \frac{V_{R_1}}{I} = \frac{12V-4V}{1A} = \frac{8V}{1A} = 8\Omega$$

$$R_3 = \frac{V_{R_3}}{I} = \frac{8V-4V}{1A} = \frac{4V}{1A} = 4\Omega$$



42 Determine V_o, V_4, V_7, V_{10}, V_{23}, V_{30} V_{67}, V_{56} and I (magnitude & direction)



Here, V_o = 0V (ground)

$V_4 = -V_1 - 2V$

$= -(6mA \times 2k\Omega) - 2V$

$= 12V - 2$

$= 10V$

$V_7 = 4V$

$V_{10} = 20V - 0V = 20V$

$V_{23} = -2V + 8V = 6V$

$V_{30} = -8V - 0V = -8V$

$V_{67} = 4V - 0V = 4V$

$V_{56} = -2V - 4V = -6V$

Here, Current I $\frac{V_{23}}{4\Omega} = \frac{6V}{4\Omega} = 1.5A$ &

& the direction is clock-wise (↻)