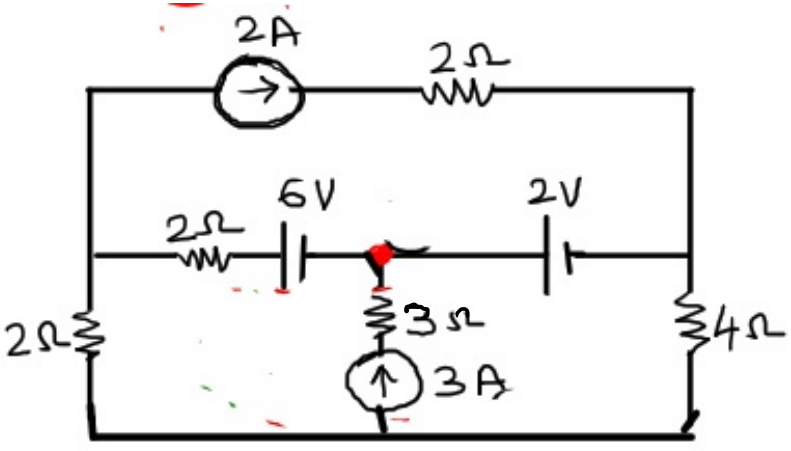
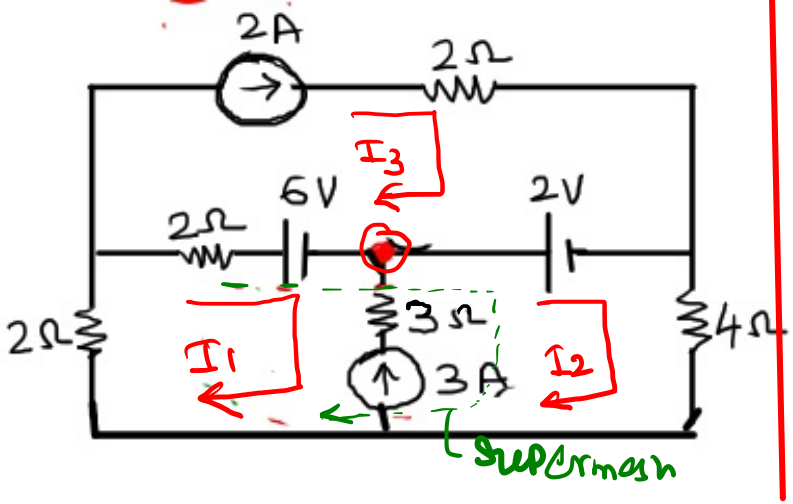
1. Find Current Flowing in 4 Ohm Resistor using Mesh/Nodal/ Thevenin's/ Norton's /Superposition Method/ Source transformation.

1A



⇒ Using mesh Analysis



⇒ 2A current source on uncommon branch of mesh-3.

$\therefore I_3 = 2A$

⇒ 3A Current source on Common branch of mesh ① & ② So its Supermesh.

$I_1 + 3 = I_2$

$I_1 - I_2 = -3$ ---- ①

⇒ KVL to Supermesh

$-2I_1 - 2(I_1 - I_3) - 6 - 2 - 4I_2 = 0$

$-2I_1 - 2I_1 + 2\times 2 - 8 - 4I_2 = 0$

$-4I_1 - 4I_2 = 4$

$I_1 + I_2 = -1$ ---- ②

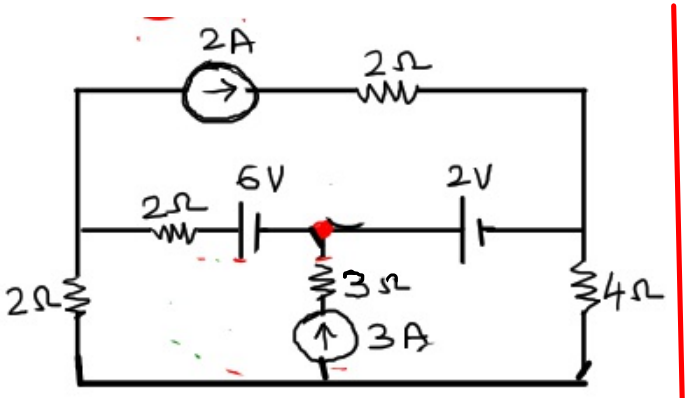
Solving ① & ②

$I_1 = -2A$, $I_2 = 1A$

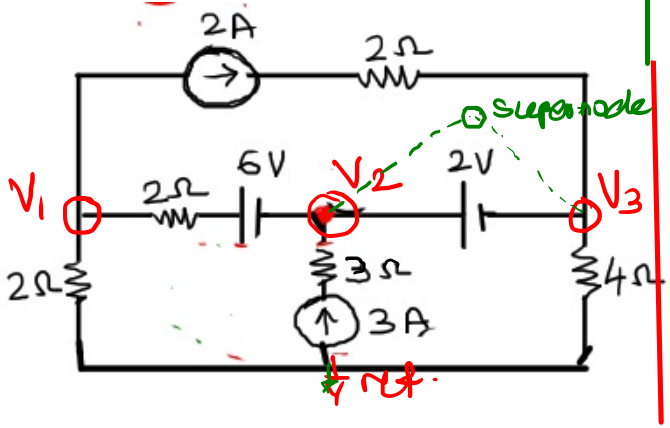
$\boxed{I_{4\Omega} = I_2 = 1A}$

1. Find Current Flowing in 4 Ohm Resistor using Mesh/Nodal/ Thevenin's/ Norton's /Superposition Method/ source transformation.

1A



⇒ Using Nodal Analysis



⇒ KCL at node-1.

$$\frac{V_1}{2} + \frac{V_1 - 6 - V_2}{2} + 2 = 0$$

$$V_1 + V_1 - 6 - V_2 + 4 = 0$$

$$2V_1 - V_2 = 2 \quad \text{----- (1)}$$

⇒ 2V source without series resistance both two non-ref nodes ② & ③ so supernode case.

$$V_2 - 2 - V_3 = 0$$

$$V_2 - V_3 = 2 \quad \text{---- (2)}$$

⇒ KCL at supernode.

$$-3 + \frac{V_2 + 6 - V_1}{2} + \frac{V_3}{4} - 2 = 0$$

$$\frac{2V_2 + 12 - 2V_1 + V_3}{4} = 5$$

$$-2V_1 + 2V_2 + V_3 = 8 \quad \text{---- (3)}$$

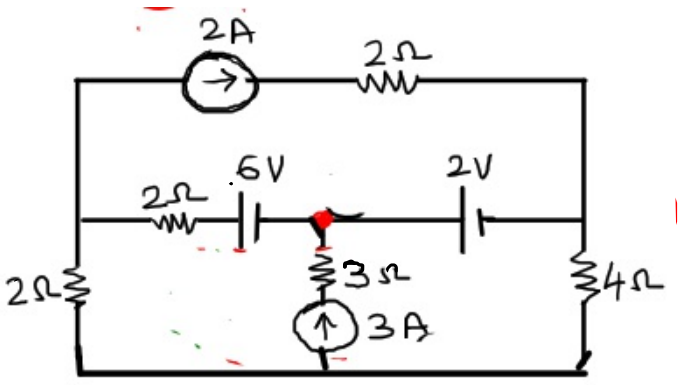
Solving (1), (2) & (3)

$V_1 = 4V$, $V_2 = 6$, $V_3 = 4$

$$I_{4\Omega} = \frac{V_3}{4} = \frac{4}{4} = 1A$$

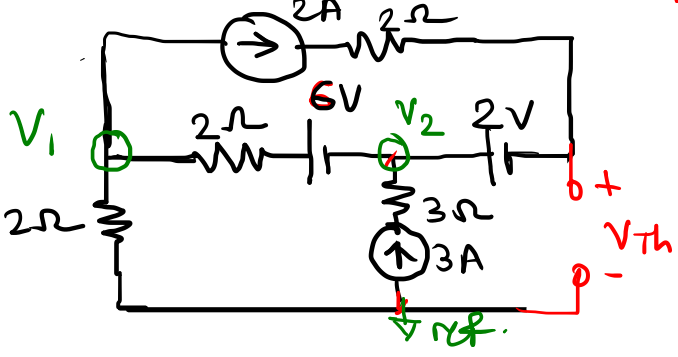
1. Find Current Flowing in 4 Ohm Resistor using Mesh/Nodal/ Thevenin's/ Norton's /Superposition Method/ source transformation.

1A



⇒ Using Thevenin's Theorem.

→ Remove load $R_L = 4\Omega$ & find V_{Th}

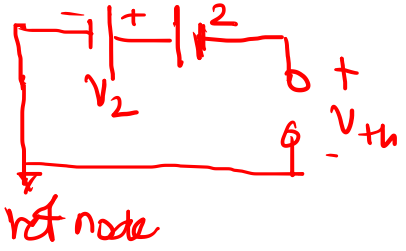


⇒ Find V_{Th}

$V_{th} + 2 + 6 + V_{2\Omega} + V_{2\Omega} = 0$ ✓

$V_{Th} + 2 - V_2 = 0 \rightarrow$

$V_{th} = V_2 - 2 \Longrightarrow$



Using Nodal KCL to node ①

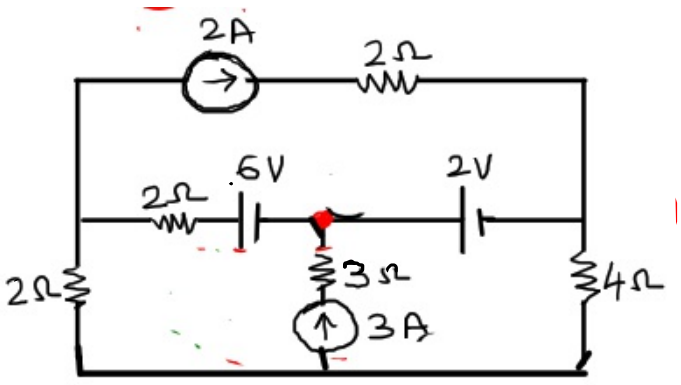
$$\frac{V_1}{2} + \frac{V_1 - 6 - V_2}{2} + 2 = 0$$

$$V_1 + V_1 - 6 - V_2 = -4$$

$$2V_1 - V_2 = 2 \quad \cdots \quad ①$$

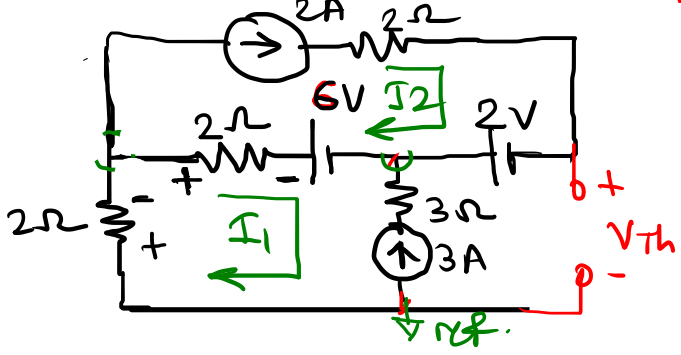
1. Find Current Flowing in 4 Ohm Resistor using Mesh/Nodal/ Thevenin's/ Norton's /Superposition Method/ source transformation.

1A



⇒ Using Thevenin's Theorem.

→ Remove load $R_L = 4\Omega$ & find V_{th}



⇒ Find V_{Th}

$V_{th} + 2 + 6 + V_{2\Omega} + V_{2\Omega} = 0$ — (1)

Using mesh Analysis

KVL to mesh (I)

$I_1 = -3A$

$I_2 = 2A$

Using eqn (1)

$V_{th} + 2 + 6 + 2(I_1 - I_2) + 2I_1 = 0$

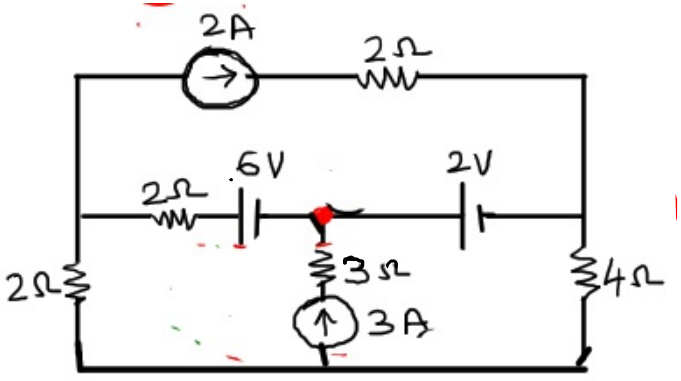
$V_{th} + 2 + 6 + 2(-3-2) + 2 \times -3 = 0$

$V_{th} + 8 - 10 - 6 = 0$

$\boxed{V_{th} = 8V}$

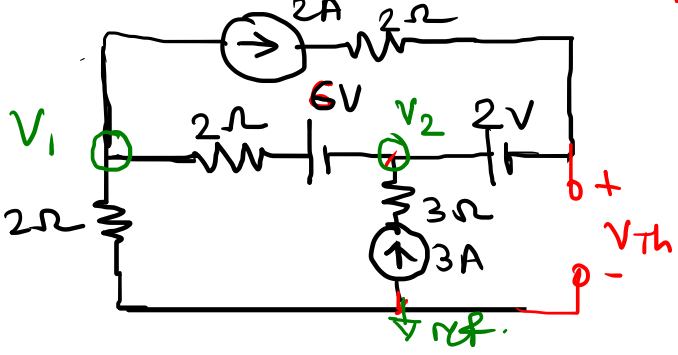
1. Find Current Flowing in 4 Ohm Resistor using Mesh/Nodal/ Thevenin's/ Norton's /Superposition Method/ source transformation.

1A



⇒Using Thevenin's Theorem.

→ Remove load $R_L = 4\Omega$. & find V_{th}



KCL to node ②

$$\frac{V_2+6-V_1}{2} - 3 - 2 = 0$$

$$\frac{V_2+6-V_1}{2} = 5$$

$$-V_1 + V_2 = 4 \quad \cdots ②$$

Solving ① & ②

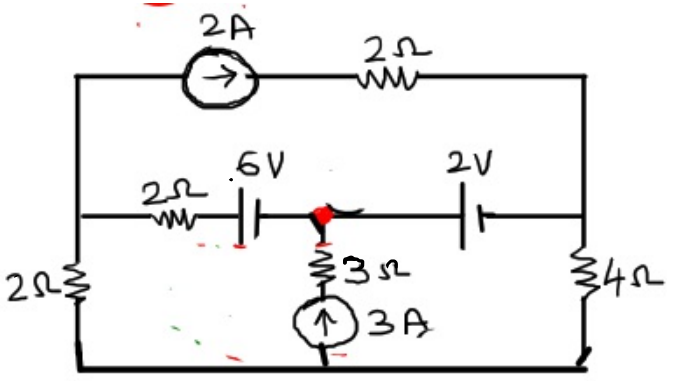
$$2V_1 - V_2 = 2 \quad \cdots ①$$

$V_1 = 6V \qquad V_2 = 10V$

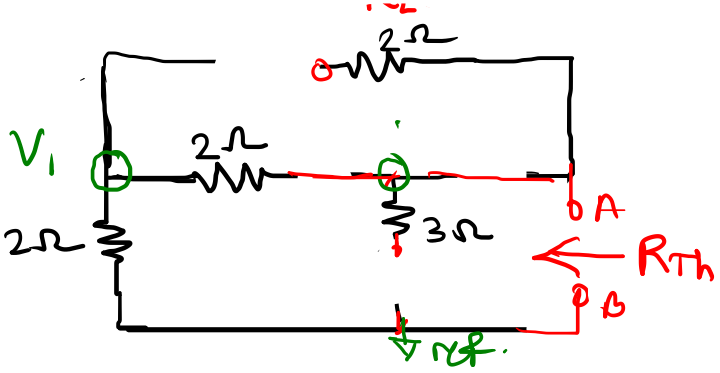
$V_{th} = V_2 - 2 = 10 - 2 = 8V.$

1. Find Current Flowing in 4 Ohm Resistor using Mesh/Nodal/ Thevenin's/ Norton's /Superposition Method/ source transformation.

1A

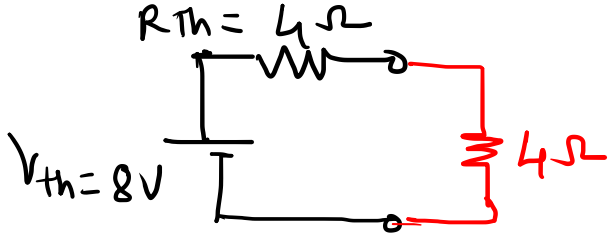


⇒ Find R_{Th}



$R_{Th} = 2+2 = 4\ \Omega$

⇒ Draw Thevenin's Equivalent circuit & Connect load

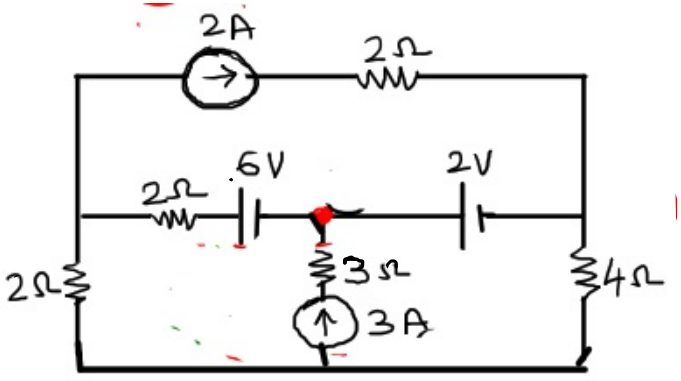


$$I_{4\Omega} = \frac{8}{4+4}$$

$$I_{4\Omega} = 1A$$

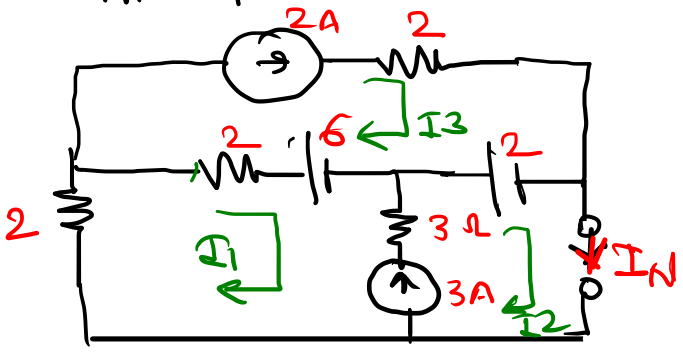
1. Find Current Flowing in 4 Ohm Resistor using Mesh/Nodal/ Thevenin's/ Norton's /Superposition Method/ source transformation.

1A



Using Norton's Theorem.

$\Rightarrow R_{th} = 4\Omega$



$\Rightarrow I_3 = 2A$

$\Rightarrow$ Supermesh because of 3A

$I_1 - I_2 = -3$ ---(1)

$\Rightarrow$ KVL to supermesh.

$-2I_1 - 2(I_1 - I_3) - 6 - 2 = 0$

$-2I_1 - 2I_1 + 2I_3 - 8 = 0$

$-4I_1 + 2 \times 2 - 8 = 0$

$-4I_1 + 4 - 8 = 0$

$-4I_1 = 4$ $\quad \boxed{I_1 = -1A}$

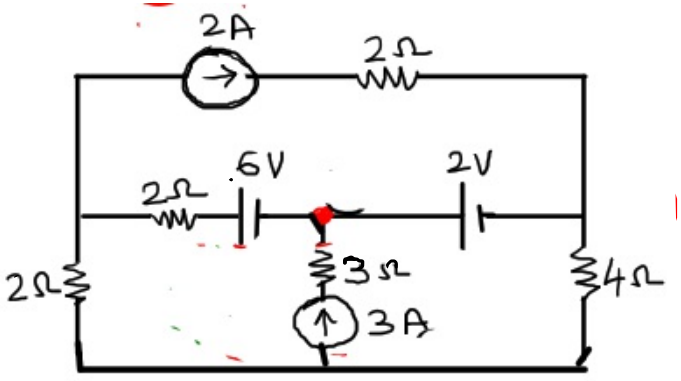
using eqn (1)

$I_1 - I_2 = -3$ $\quad \boxed{I_2 = 2A}$

$-1 - I_2 = -3$

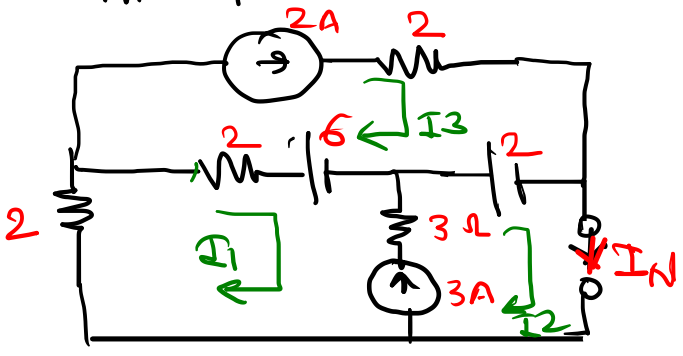
1. Find Current Flowing in 4 Ohm Resistor using Mesh/Nodal/ Thevenin's/ Norton's /Superposition Method/ Source transformation.

1A

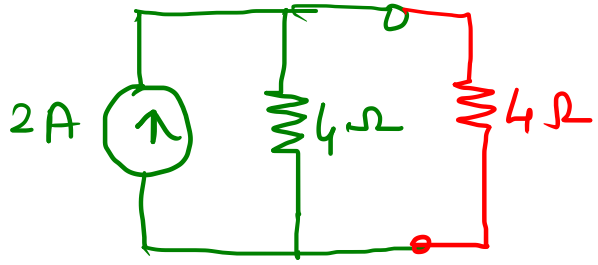


Using Norton's Theorem.

$\Rightarrow R_{th} = 4\Omega$



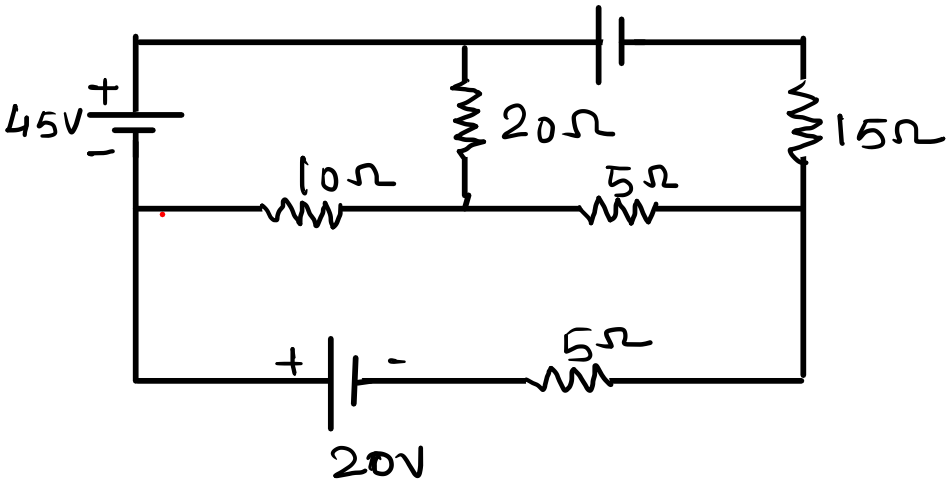
Norton's Equivalent & Connect load.



$$I_{4\Omega} = \frac{4 \times 2}{4+4}$$

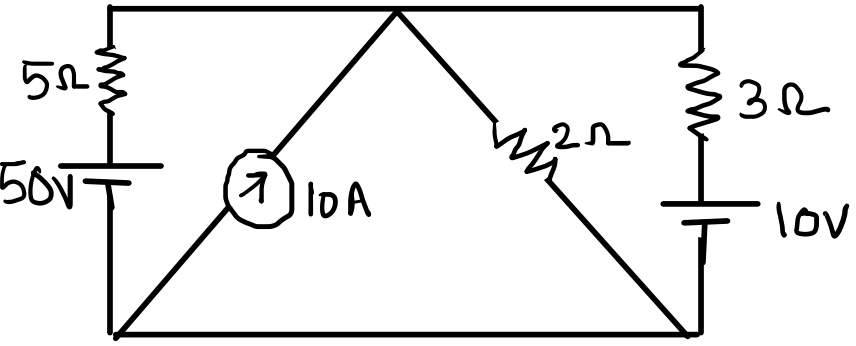
$$\boxed{I_{4\Omega} = 1\,A}$$

2. Find Current in 15 Ohm Resistor



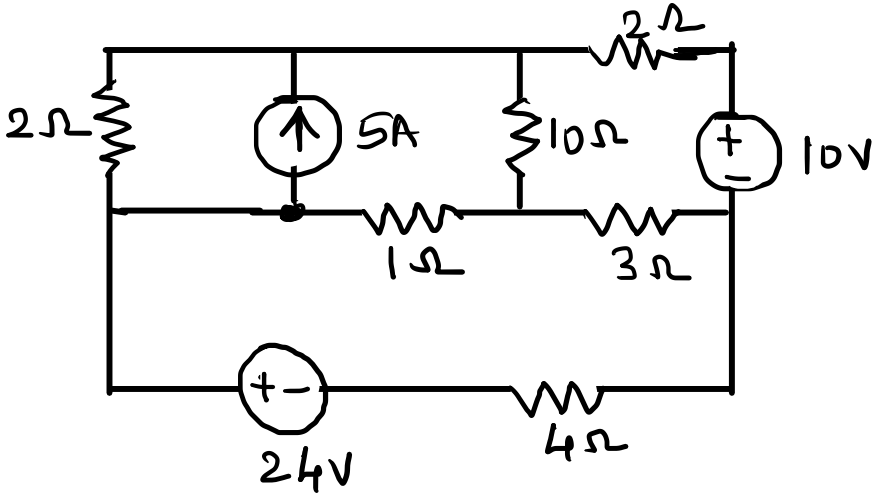
(3.54↑)

3. Find Current in 5 Ohm Resistor



5.485 ↑

4. Find Current in 4 Ohm Resistor



4.1 ←