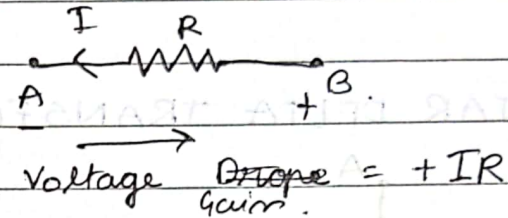
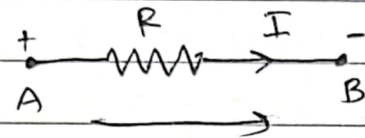
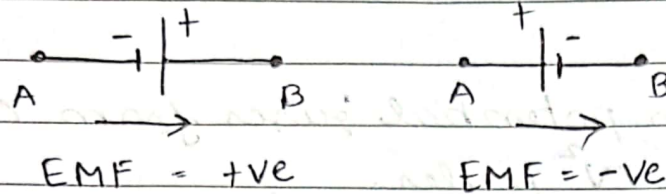


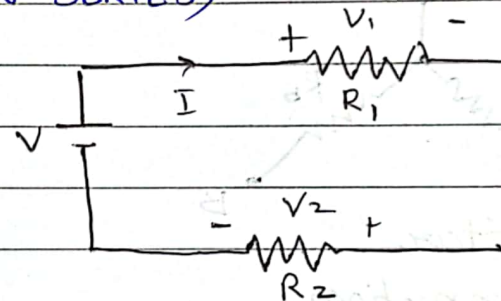
30/10. SIGN CONVENTION OF KIRCHHOFF'S VOLTAGE LAW



VOLTAGE DIVISION (IN SERIES)

$$V = V_1 + V_2$$

$$V = V_1 + V_1 \frac{R_2}{R_1}$$



$V_1 = V \frac{R_1}{R_1 + R_2}$	$V_2 = V \frac{R_2}{R_1 + R_2}$
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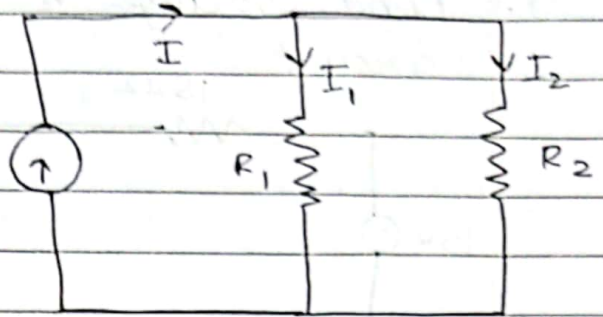
CURRENT DIVISION (IN PARALLEL)

$$I = I_1 + I_2$$

$$R_T = \frac{R_1 R_2}{R_1 + R_2}$$

$$I = \frac{V}{R_1} + \frac{V}{R_2}$$

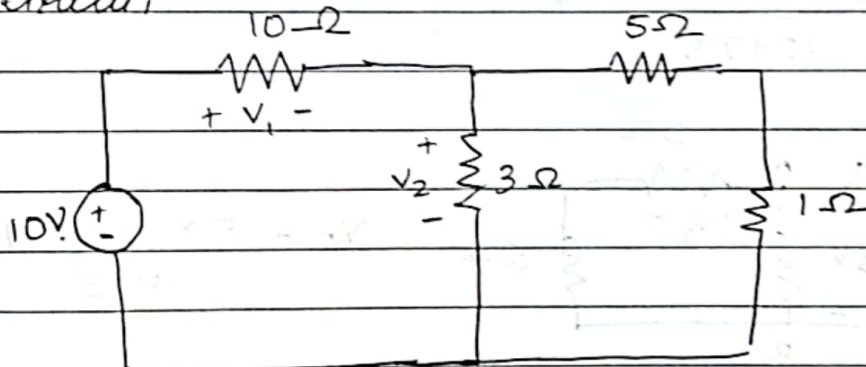
$$I_1 = \frac{V}{R_1} \quad I_2 = \frac{V}{R_2}$$



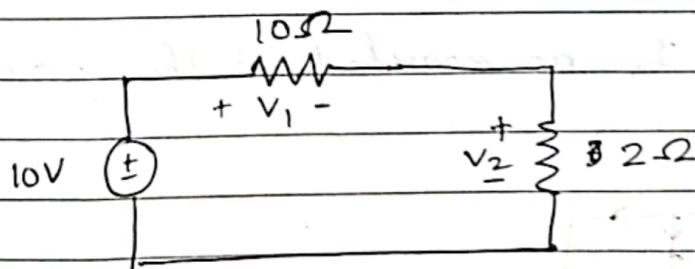
Do $\frac{I_1}{I}$ and $\frac{I_2}{I} \Rightarrow$

$$I_1 = I \left(\frac{R_2}{R_1 + R_2} \right) \quad I_2 = I \left(\frac{R_1}{R_1 + R_2} \right)$$

Q. Find voltage V_1 and V_2 as marked in the given circuit



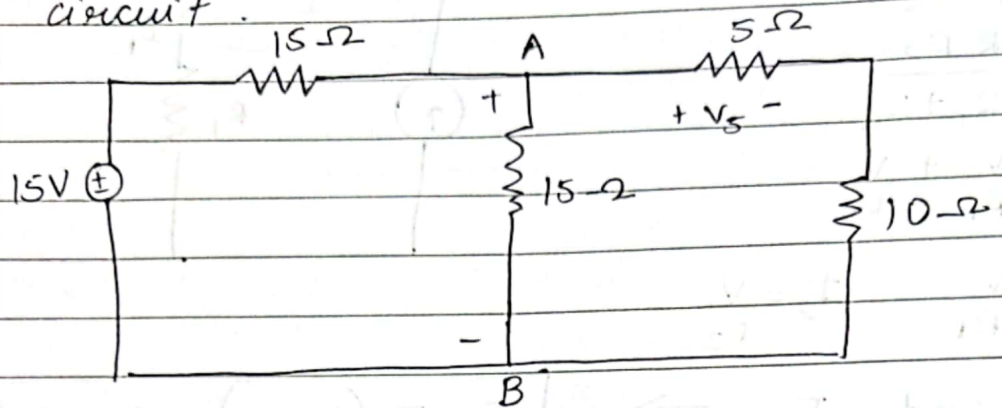
Ans.



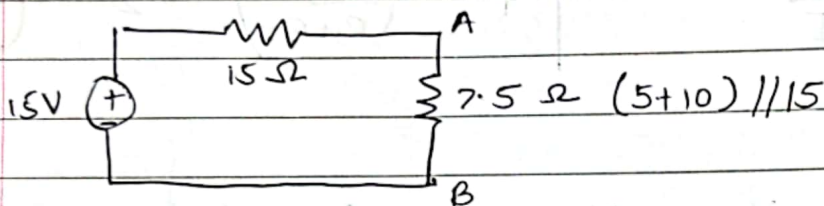
$$V_1 = \frac{V R_1}{R_1 + R_2} = \frac{10 \times 10}{10 + 2} = 8.33 \text{ V}$$

$$V_2 = \frac{V R_2}{R_1 + R_2} = \frac{10 \times 2}{10 + 2} = 1.667 \text{ V}$$

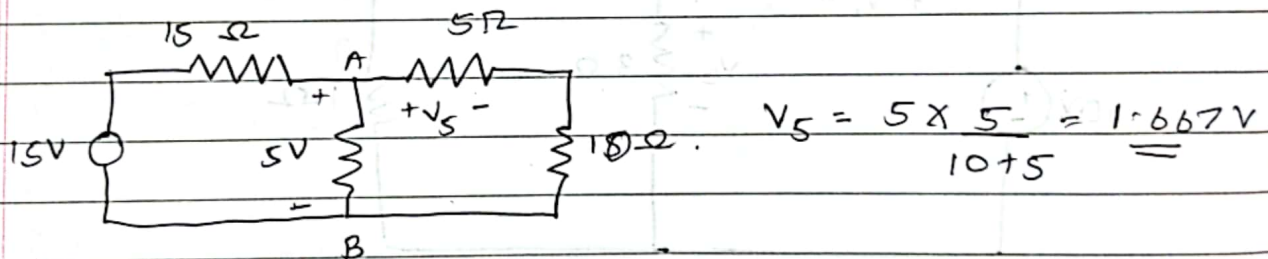
Q. Find voltage V_s as marked in the given circuit.



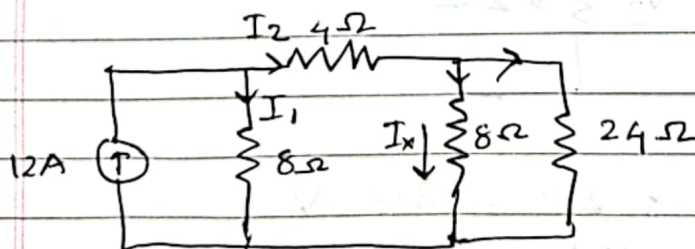
Ans:

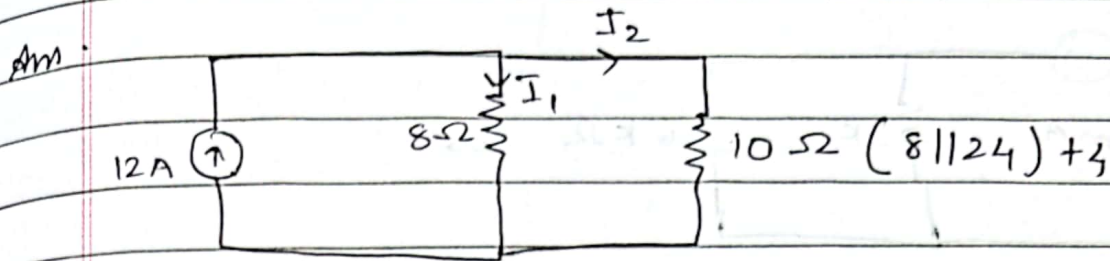


$$V_{AB} = \frac{15 \times 7.5}{15 + 7.5} = 5V$$

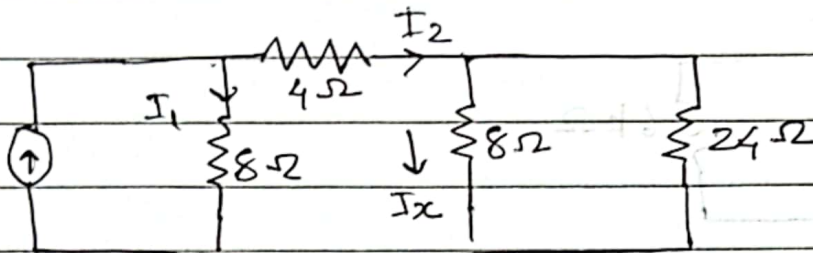


Q. Find current I_x as marked in the given circuit





$$I_2 = 12 \times \frac{8}{8+10} = 5.333 \text{ A}$$

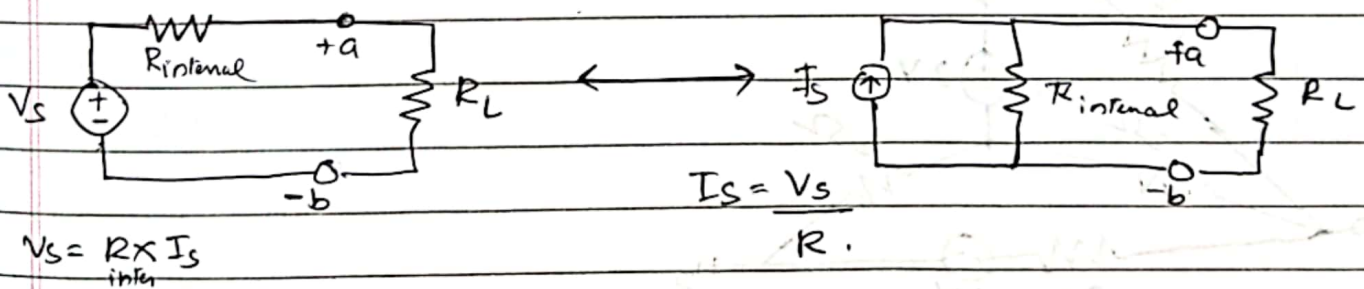


$$I_{2L} = 5.333 \times \frac{24}{(24+8)} = 4 \text{ A}$$

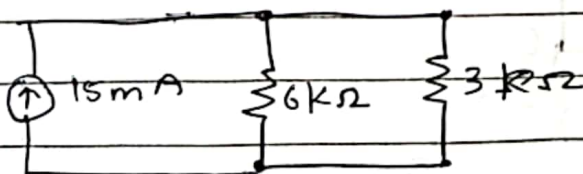
SOURCE TRANSFORMATION


Practical Voltage Source

Practical current source



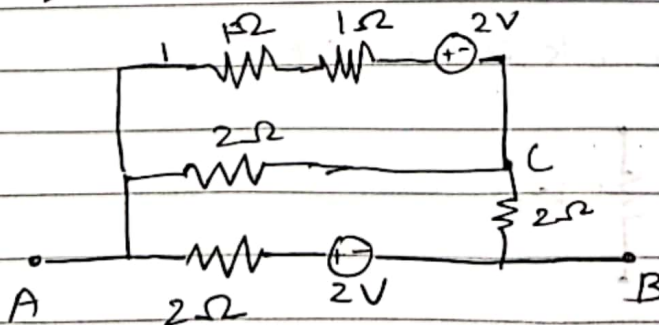
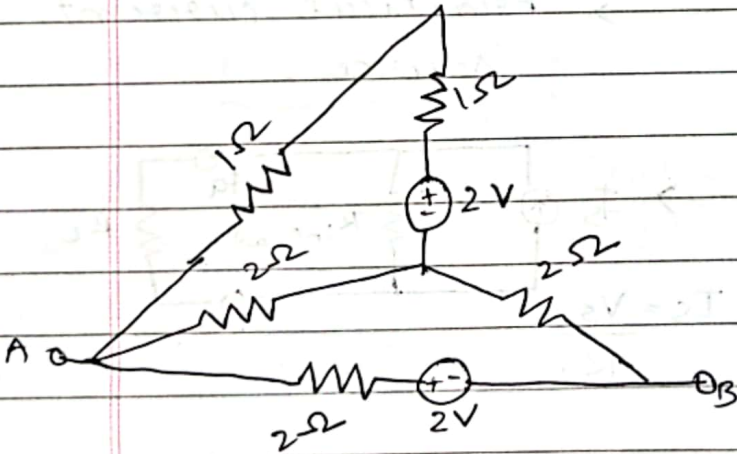
Q. Find current in $6 \text{ k}\Omega$ resistor.



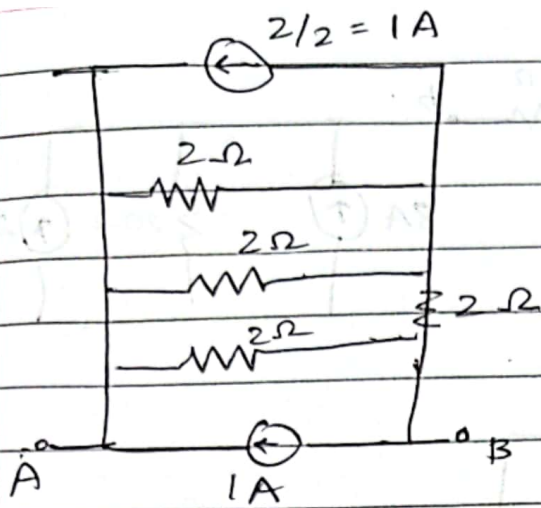


A series circuit diagram consisting of a DC voltage source $V_s = 15\text{V}$ connected in series with a $3\text{ k}\Omega$ resistor and a $6\text{ k}\Omega$ resistor.

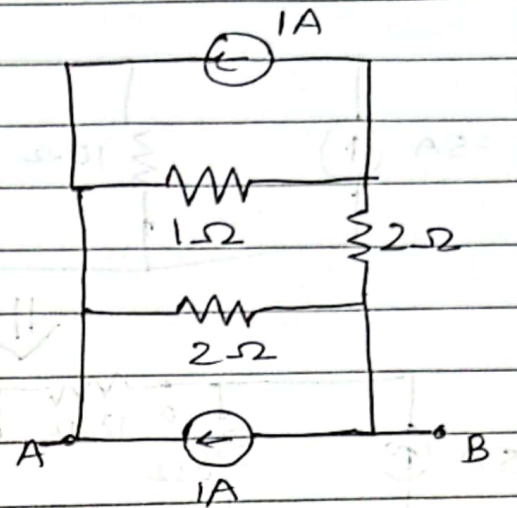
Q. Reduce the following circuit to current source in parallel with a resistance



Scanned with CamScanner

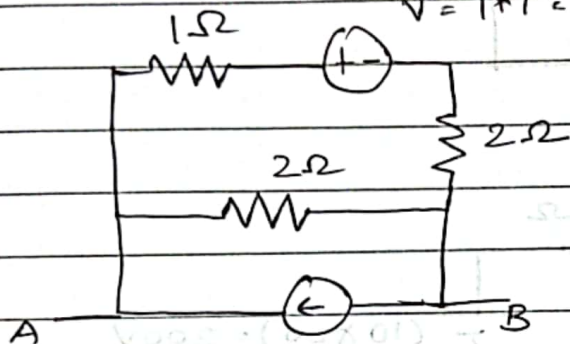


\Rightarrow

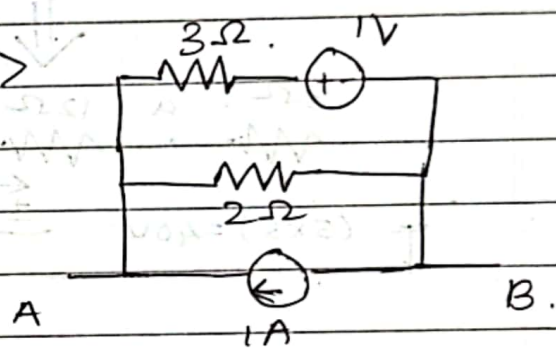


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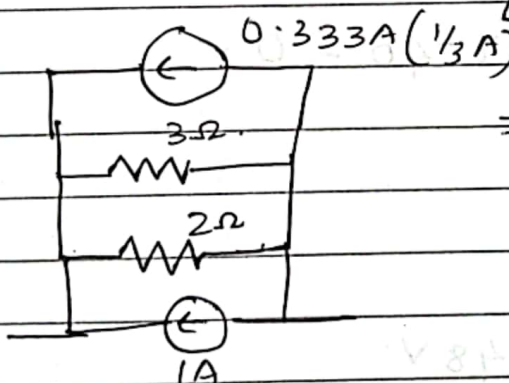
$V = 1 \times 1 = 1V$



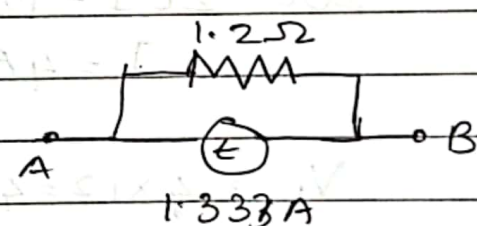
\Rightarrow



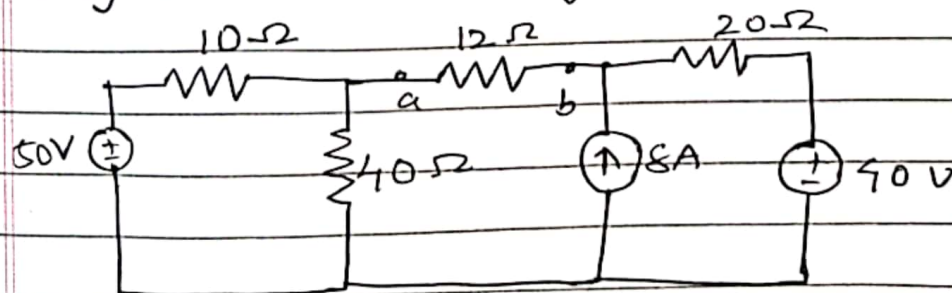
\swarrow

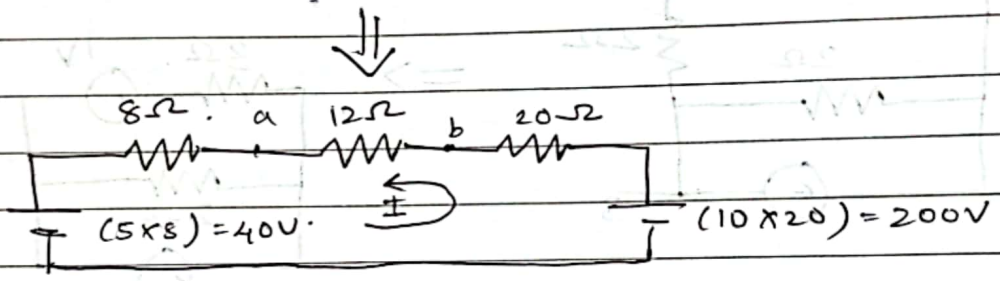
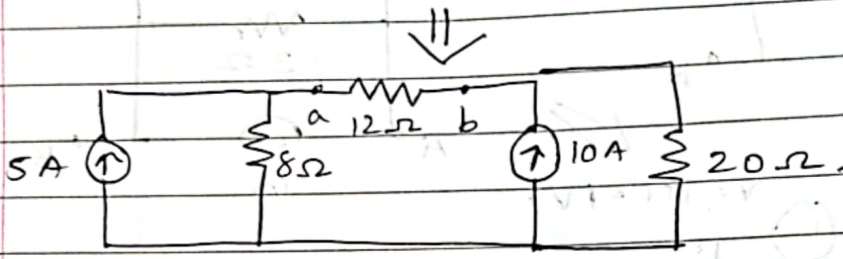
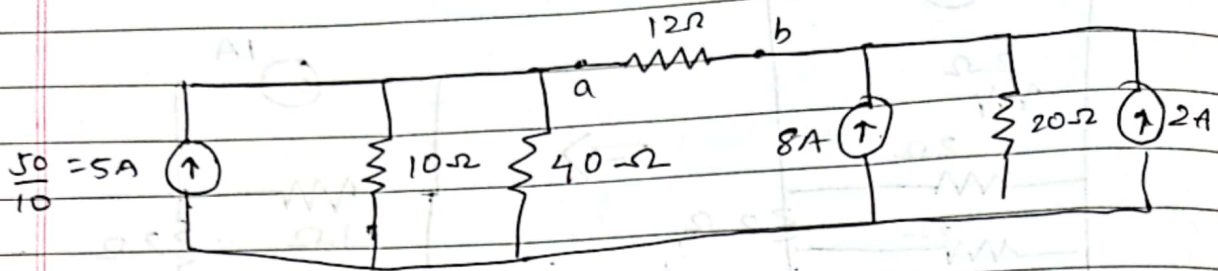


\Rightarrow



Q. Find the voltage across 12Ω resistor (i.e. V_x) by source transformation.





$$200 - 20I - 12I - 8I - 40 = 0$$

$$I = 4A$$

$$V_{ba} = 4 \times 12 = 48V$$

$$V_x = V_{ab} = -V_{ba} = -48V$$