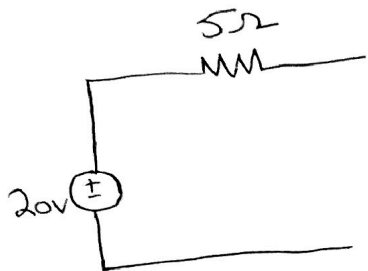


Source Transformation:-

Numerical 1:-

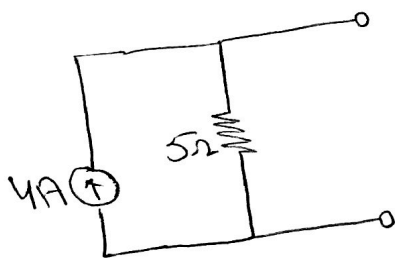
Transform a voltage source of 20V with an internal resistance of 5Ω to a current source. Refer to the fig below:-

Sol:-



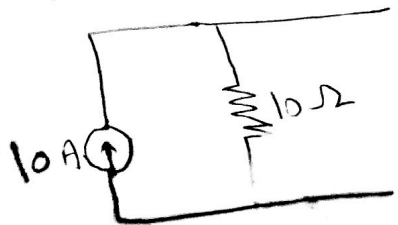
$$I = \frac{V}{R_{se}} = \frac{20}{5} = 4A \text{ (with internal resistance)}$$

Same as R_{se})

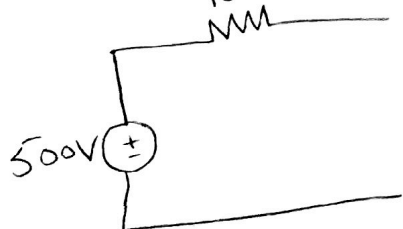


Numerical 2:-
convert the given current source of 10Ω to the equivalent voltage source of 50V with internal resistance.

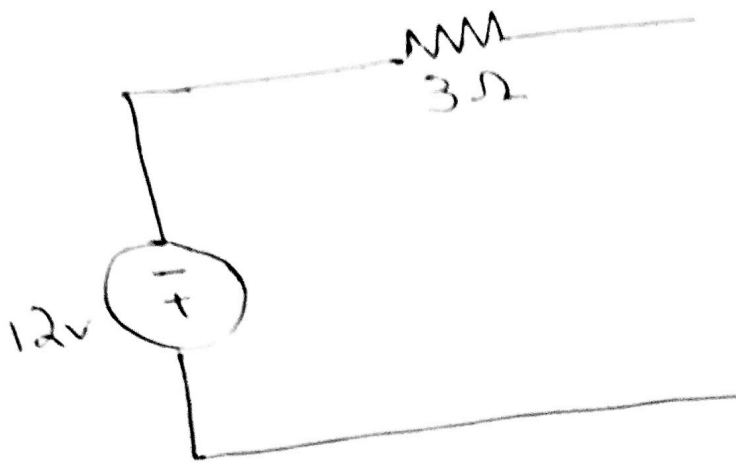
Sol:-



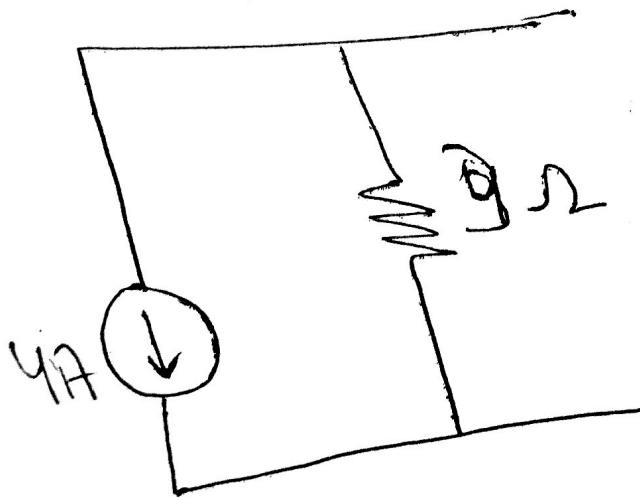
$$V = I \times R_{sh} = 50 \times 10 = 500V$$



Numerical 3 :-



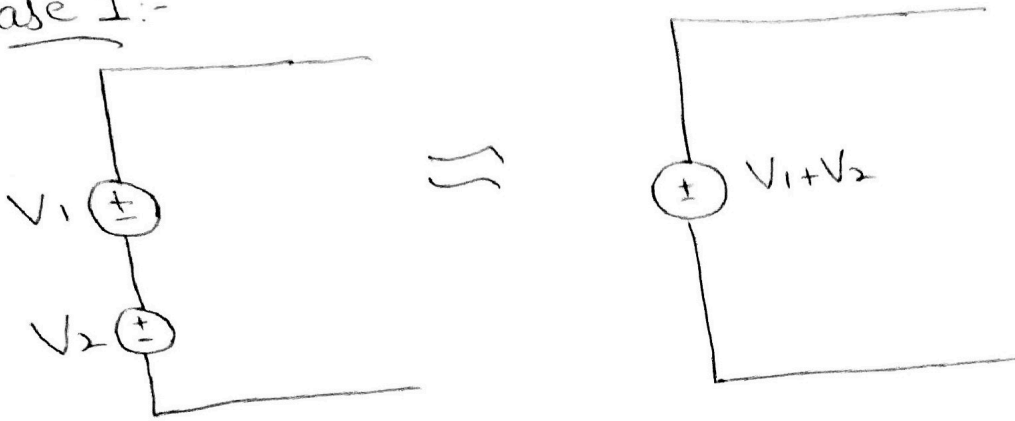
Solⁿ:-
$$I = \frac{V}{R} = \frac{12}{3} = 4A$$



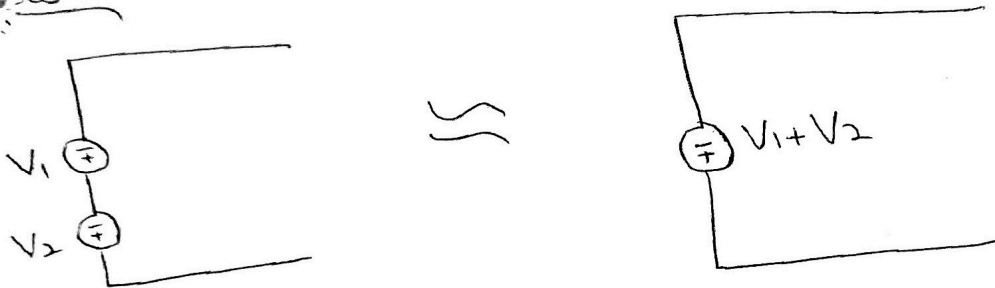
Combination of Sources:-

①:- voltage sources in series:-

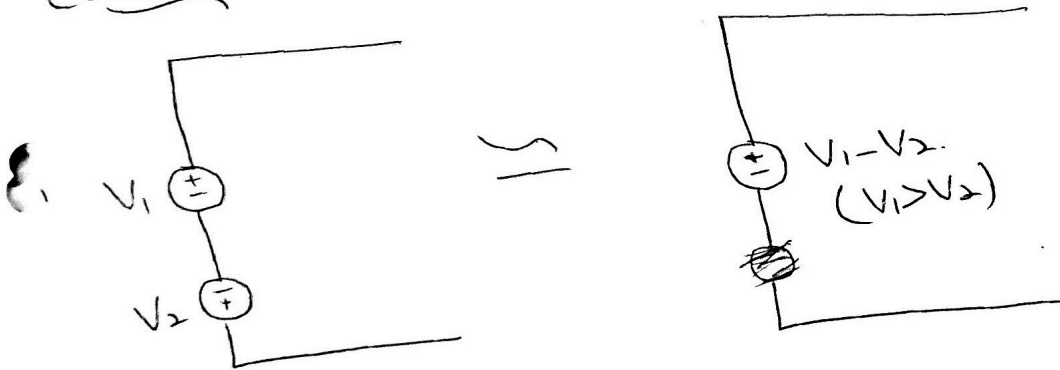
case 1:-



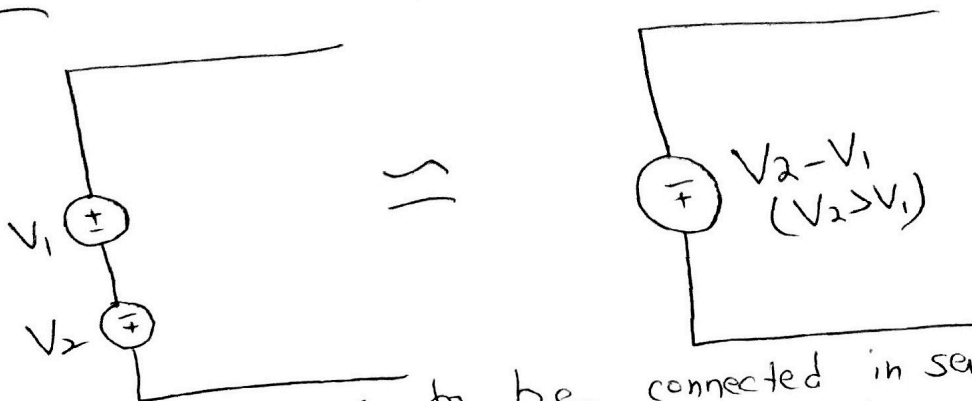
case 2:-



case 3:-



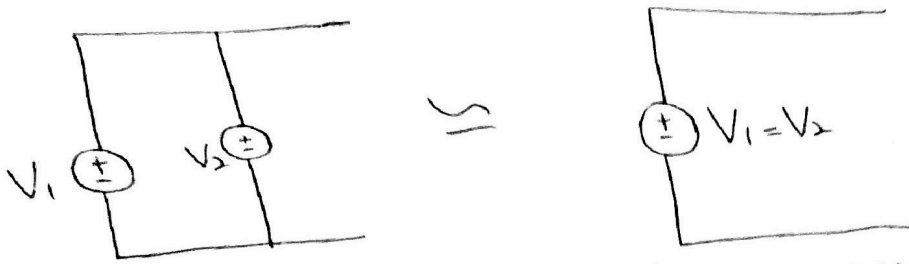
case 4:-



The voltage sources to be connected in series must have same current ratings though their voltage ratings may be same or different.

2):- voltage sources in parallel:-

case 1:-



Hence the voltage sources to be connected in parallel must have same polarity and voltage ratings though their current ratings may be same or different.

3):- current sources in series:-



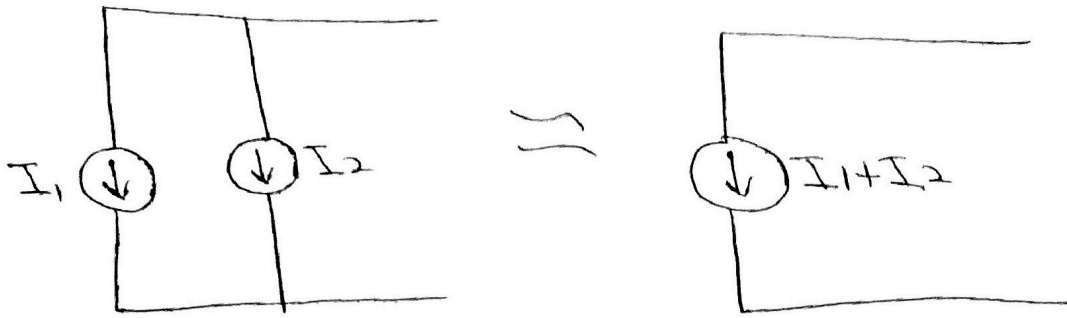
Hence the current through series ckt is always same hence it must be noted that the current sources to be connected in series must have same current ratings though their voltage ratings may be same or different.

4):- current sources in parallel:-

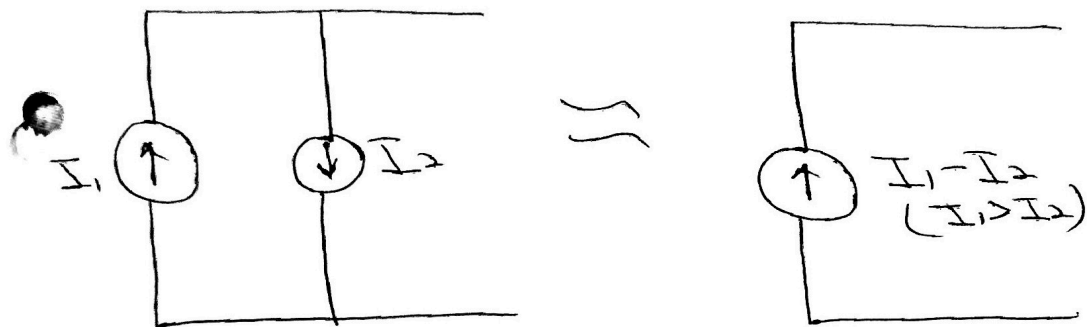
case 1:-



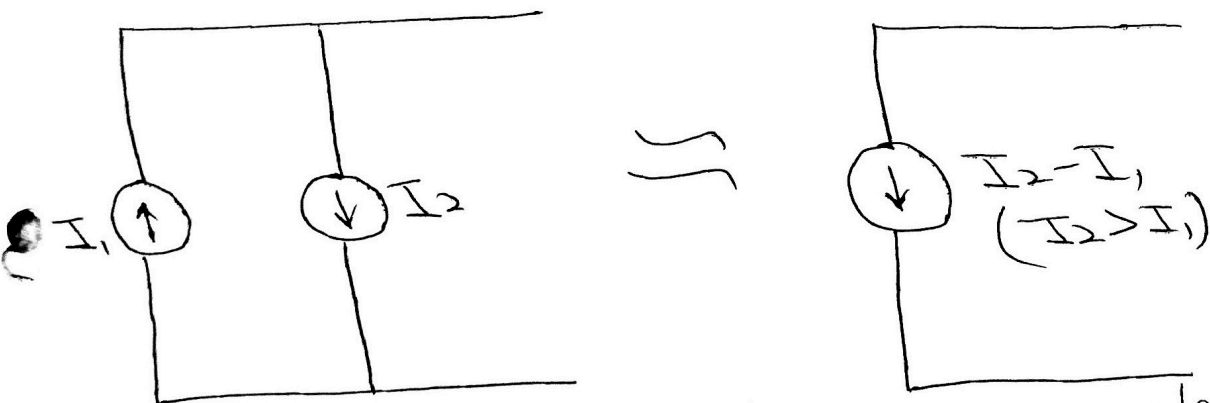
Case 2 :-



Case 3 :-



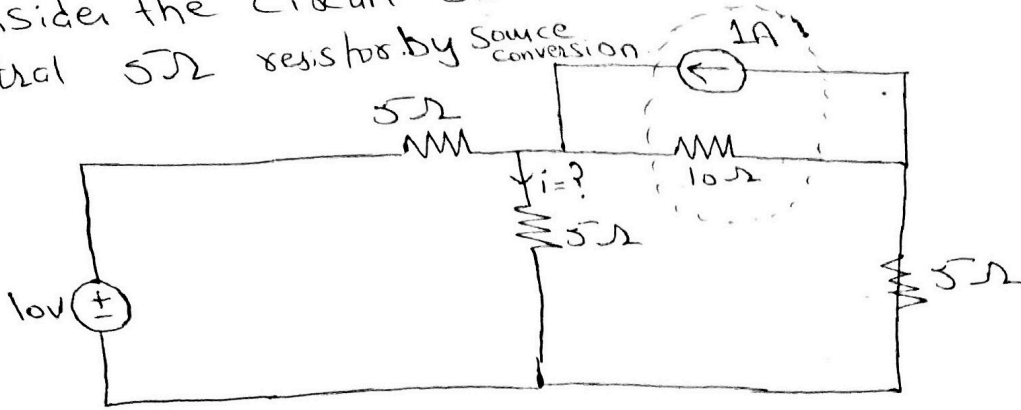
Case 4 :-



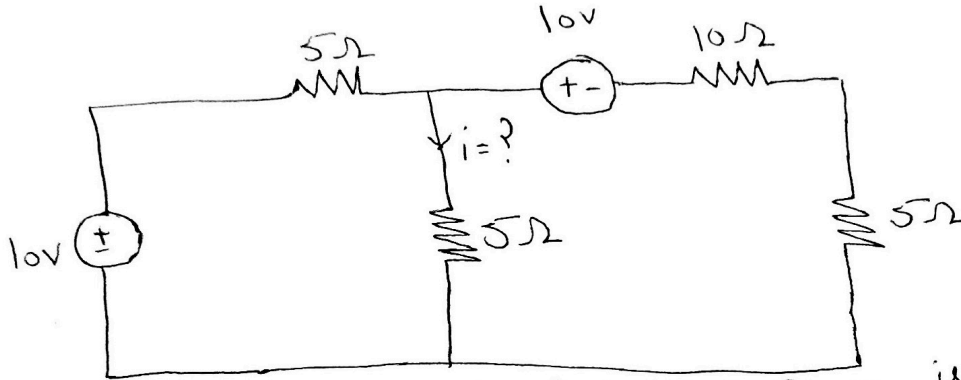
The current sources must have same voltage but current ratings may be different. They should be connected in parallel though their ratings may be some or different.

Numerical:-

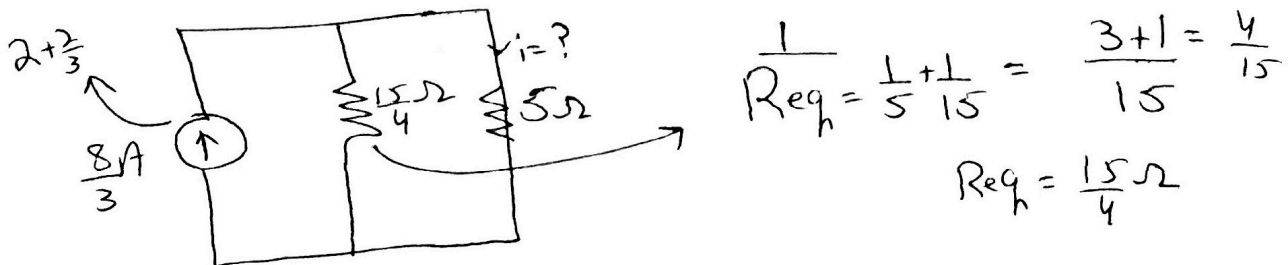
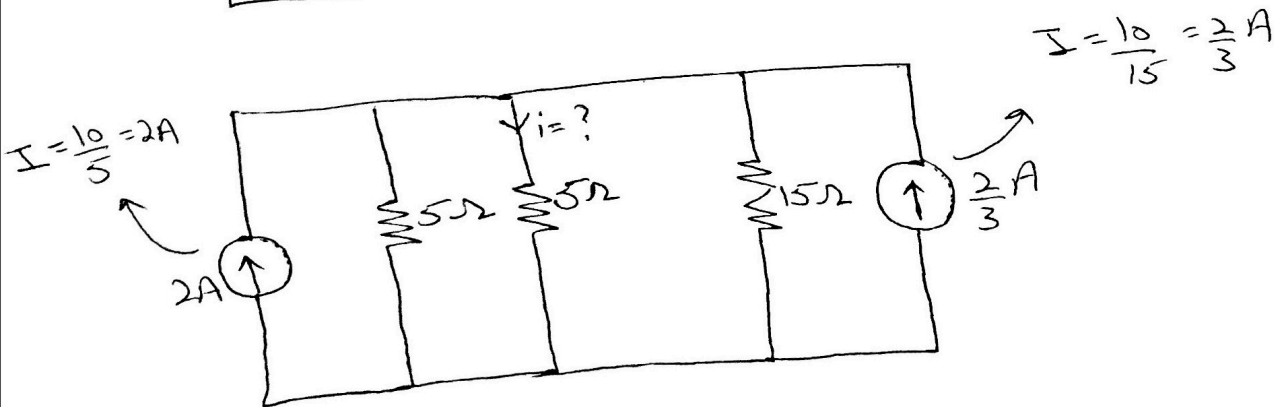
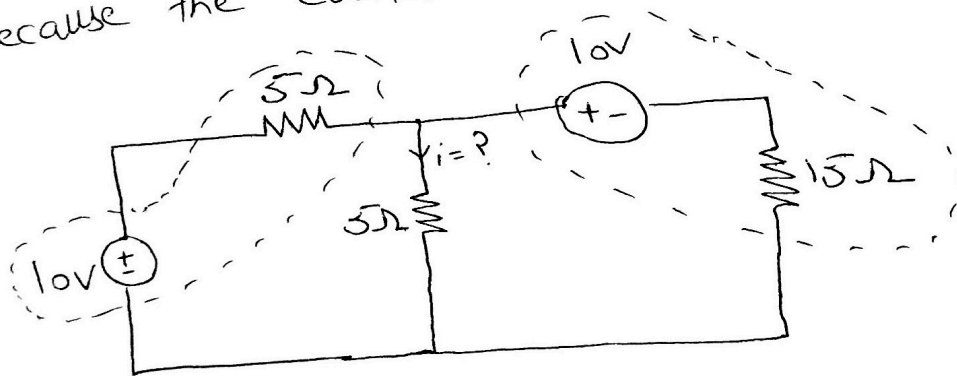
Consider the circuit shown below. Find the current through the central 5Ω resistor by source conversion.

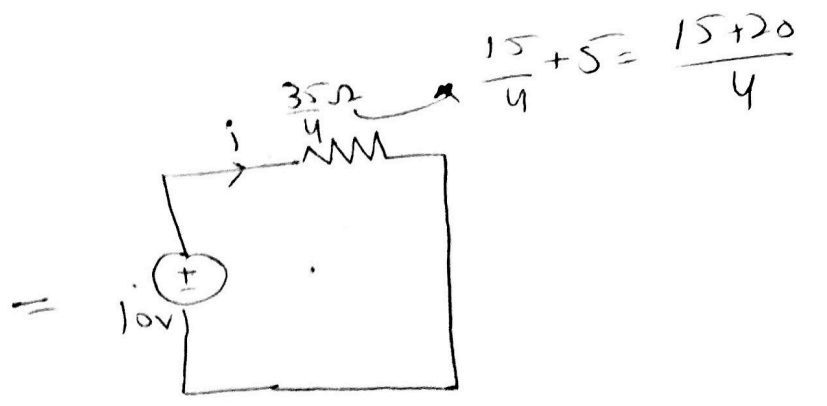
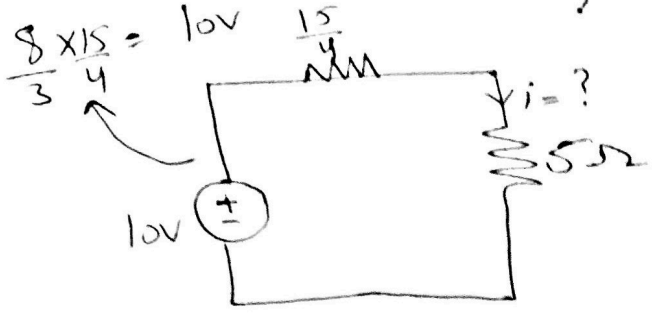


Sol:-



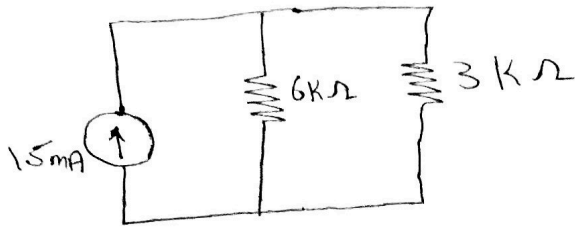
Note that the +ve terminal of the $10V$ source is placed to the left because the current source arrow was pointing to the left.





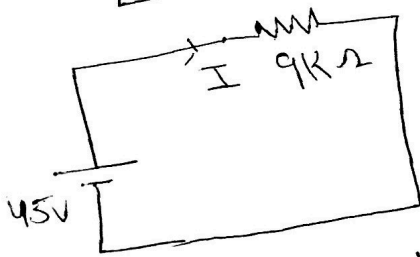
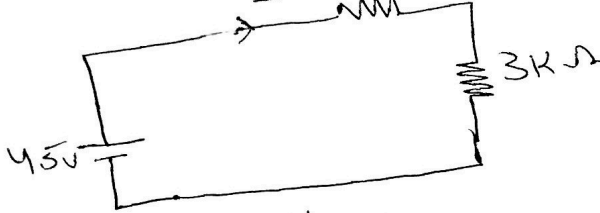
$$i = \frac{10}{\frac{35}{4}} = \frac{10 \times 4}{35} = \boxed{\frac{8\text{A}}{7}}$$

Q:- Find the current in $6k\Omega$ resistor in the below figure by converting the current source to a voltage source.



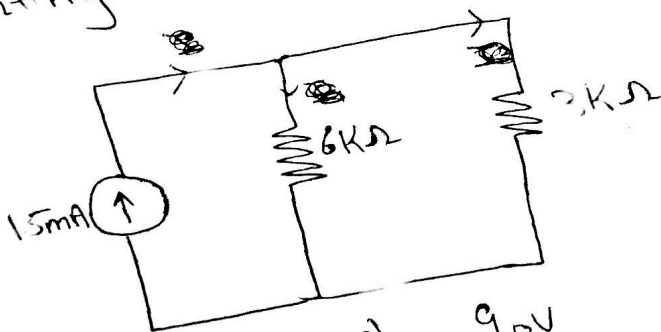
Sol:-

$$V = 15m \times 6K = 45V$$



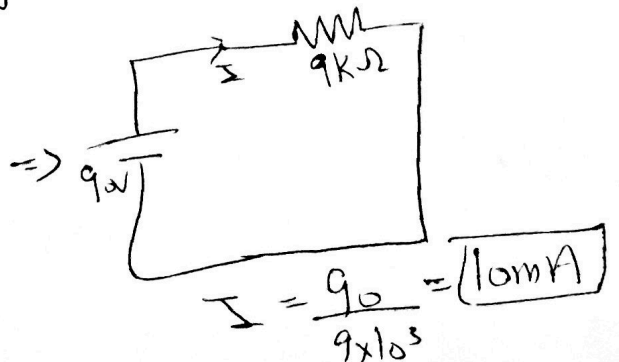
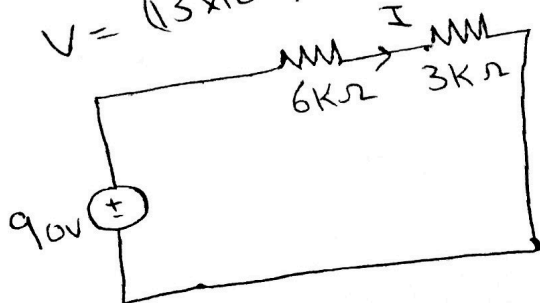
$$I = \frac{V}{R} = \frac{45}{9 \times 10^3} = \boxed{5mA}$$

Q2:- Find the current in the $3k\Omega$ resistor in below fig by converting the current source to voltage source.



$$V = (15 \times 10^{-3}) (6 \times 10^3) = 90V$$

Sol:-



$$I = \frac{90}{9 \times 10^3} = \boxed{10mA}$$