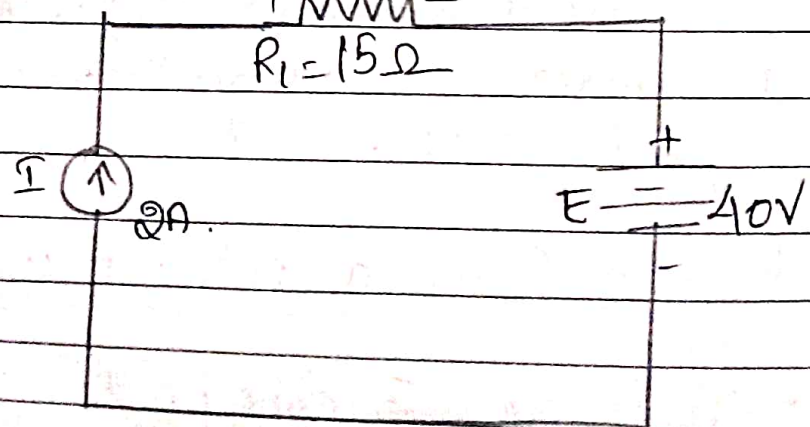


Steps to solve a network

- (i) When a voltage or current source is acting, the other sources are set to be zero and replaced by their internal resistances.
- (ii) An ideal voltage source must be replaced by a short circuit and an ideal current source must be replaced by an open circuit.
- (iii) current through or voltage across an element due to one source alone is found out.
- (iv) The above steps are repeated for each source separately.
- (v) The total current through or voltage across the given element is equal to the algebraic sum of the currents or voltages produced independently by each source.

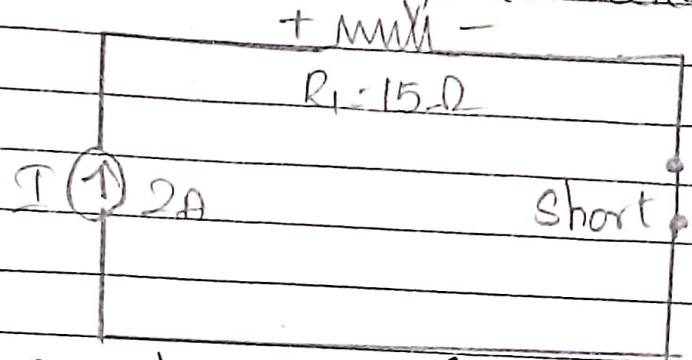
Problems :-

1. Determine V_1 for network using superposition



Solution :-

Step 1 :- Set the source voltage to be zero
Thus $E=0$, which must be replaced by
short circuit in the network

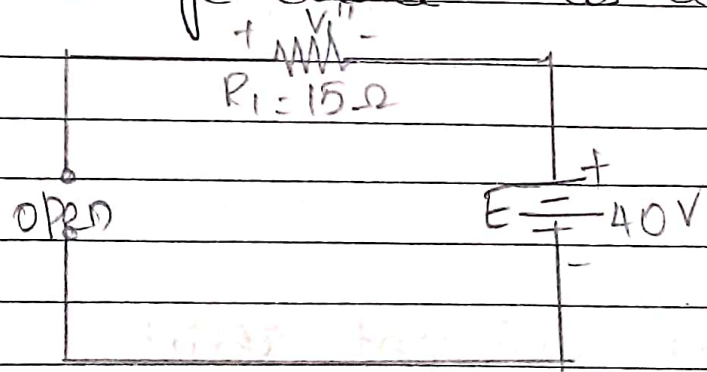


By applying ohm's law in the circuit, can find voltage (V_1') across the circuit.

$$V_1' = I_1' R_1 = (2)(15) = 30V$$

Thus, for only current source, the voltage across the network is 30V for ($I=2A; R=15\Omega$).

Step 2 :- Set $I=0$ (open circuit) and keep the voltage source 'E' as active.



By applying ohm's law, can calculate voltage (V_1'') for 'E' and 'R1'.

$$V_1'' = I_1'' R_1 = (0)(15) = 0 \quad \left(\begin{array}{l} \because \text{for open} \\ \text{circuit } I=0 \end{array} \right)$$

Step 3 :- Calculate V_1 .

$$V_1 = V_1' + V_1'' = 30V + 0V = 30V$$

Thus ' V_1 ' for the network is 30V by superposition theorem.