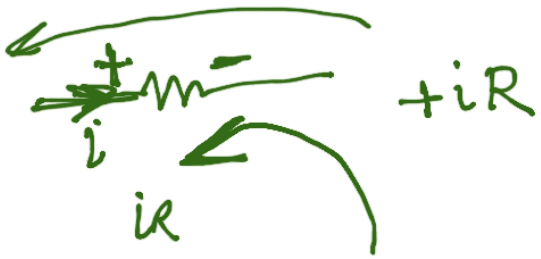
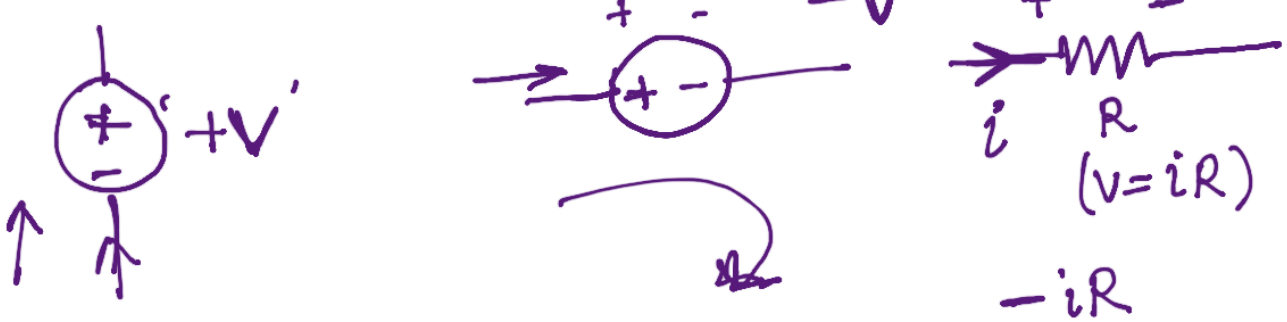
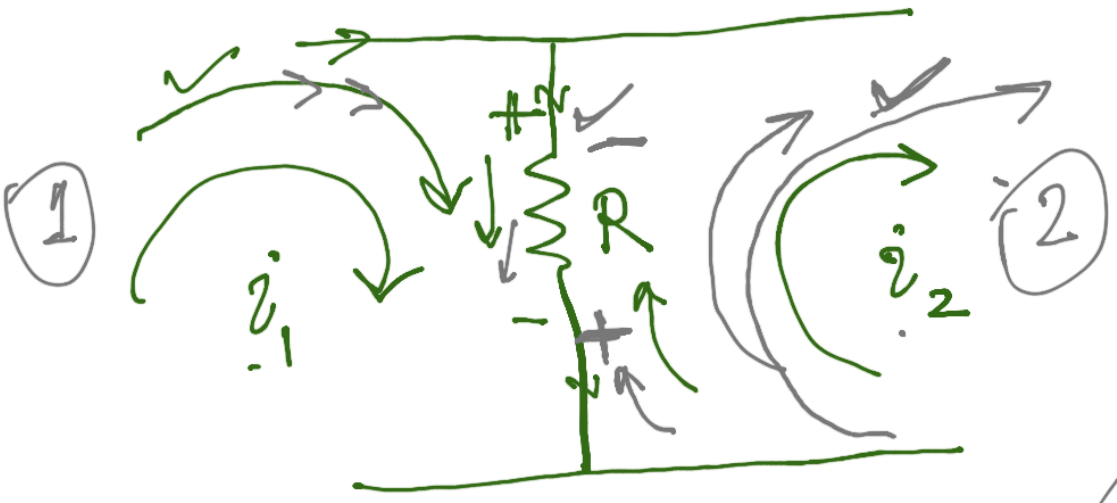
KVL

1. Decide/select a loop.
2. Determine current direction.
3. Traverse loop & add (sub) voltages in the closed loop & equate it to zero.



Voltage: Add, subtract.
(KVL)

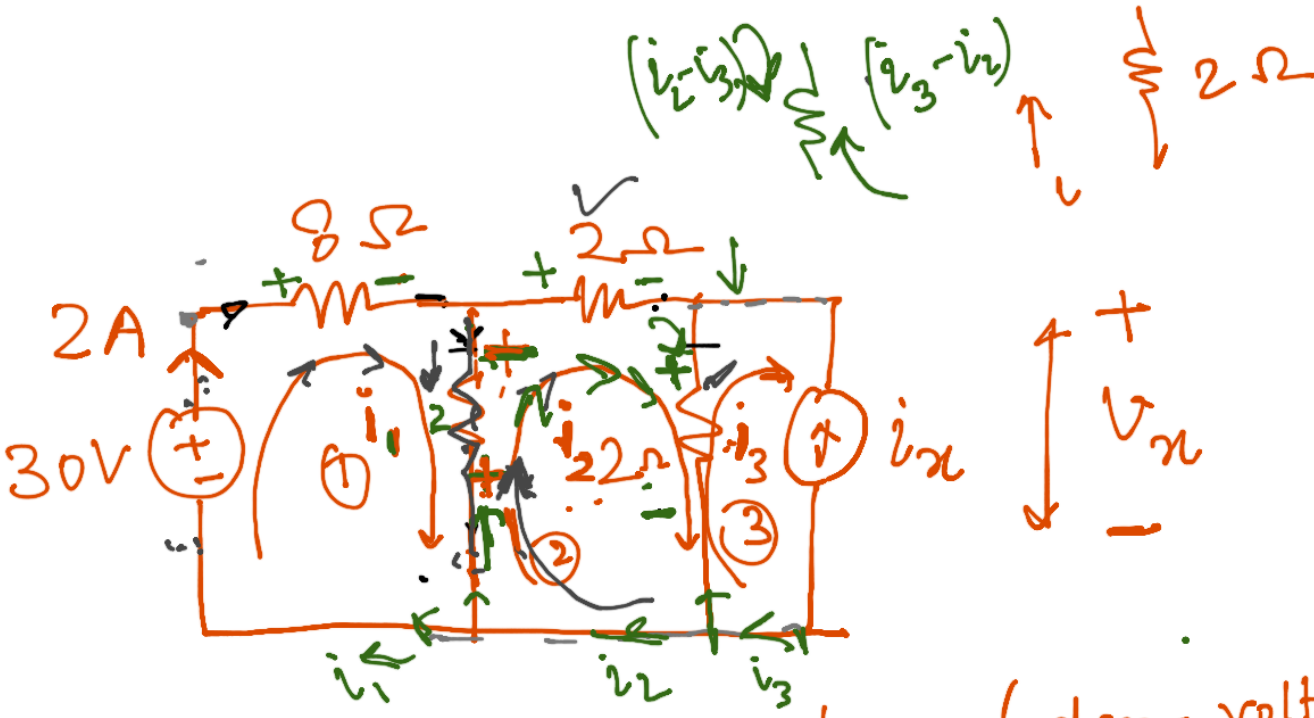




Drop : $-(i_1 - i_2)R$ ① (Clockwise) ✓

✓ $(i_2 - i_1)R$ $(i_1 - i_2)R$

$(i_2 - i_1)R$



Step 1 Assume currents (drop-voltge).

3 loop currents. Direction of current flow : clockwise. i_1, i_2, i_3

Determine voltage drop across 'R'.

Step 2 Traverse closed loop.

− + → Rise '+'

+ − → Drop '−'

→ 2Ω resistor: $(i_1 - i_2)R$

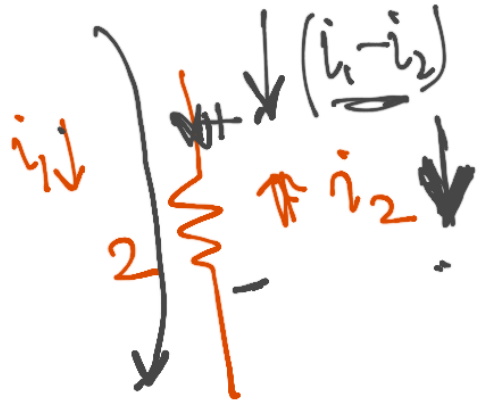
2Ω " 2 : $(i_2 - i_3)R$

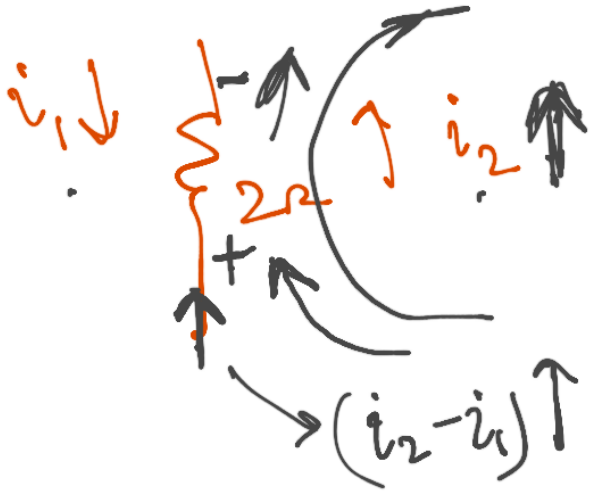
L2 $+30 - 8i_1 - 2(i_1 - i_2) = 0$

L2 $+2(i_1 - i_2) - 2i_2 - 2(i_2 - i_3) = 0$

L2 $-2(i_2 - i_1) - 2i_2 - 2(i_2 - i_3) = 0$

L3. $-2(i_3 - i_2) - V_x = 0 \Rightarrow +2(i_2 - i_3) - V_x = 0$





$V_R = 2(i_1 - i_2)$

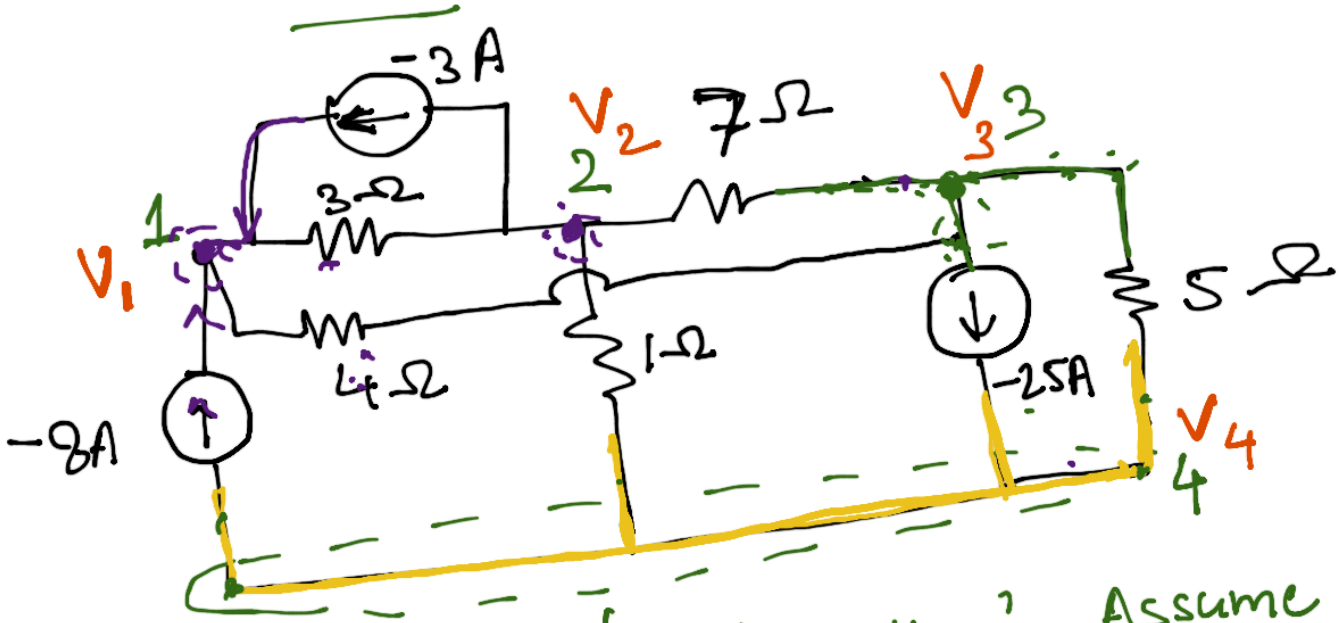
Net current

$V_R = 2(i_2 - i_1)$

What is the direction of the net current in the component during the loop traversal.

KCL

Steps: KCL



1. Identify Nodes. 'Node voltge'. Assume Node volte.
2. Determine current flow
3. Write equation at node $\sum i = 0$

(N1) KCL $\quad -8A - 3A + \frac{V_2 - V_1}{3} + \frac{V_3 - V_1}{4} = 0 \quad \cdots (1)$

$$-8A - 3 - \frac{V_1 - V_2}{3} - \frac{V_1 - V_3}{4} = 0$$

N2, N3, N4

V_1 V_2 V_3 V_4