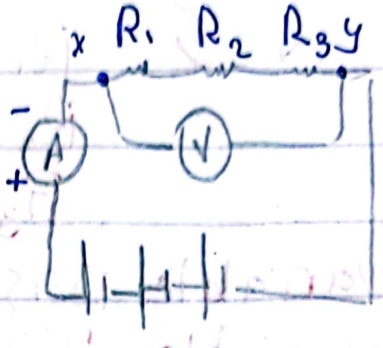
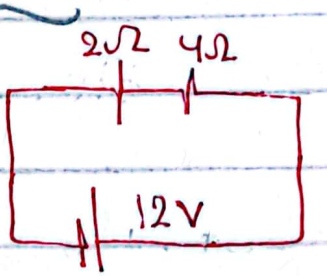
lec 3



end to end
connected in Series

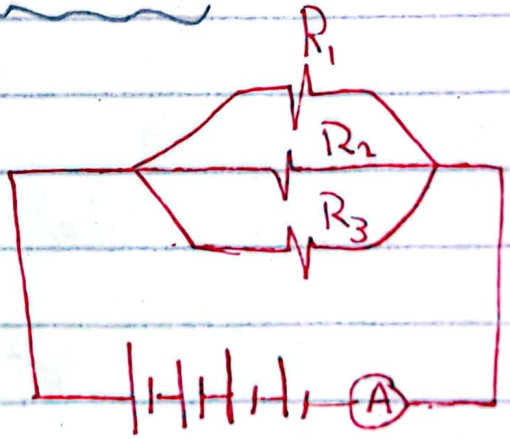
$$V = V_1 + V_2 + V_3$$
$$IR_t = IR_1 + IR_2 + IR_3$$
$$\# \quad R_t = R_s = R_1 + R_2 + R_3$$

Ex: $R_s = R_1 + R_2 = 6\Omega$



$$I_t = \frac{V}{R_t} = \frac{12}{6} = 2A$$

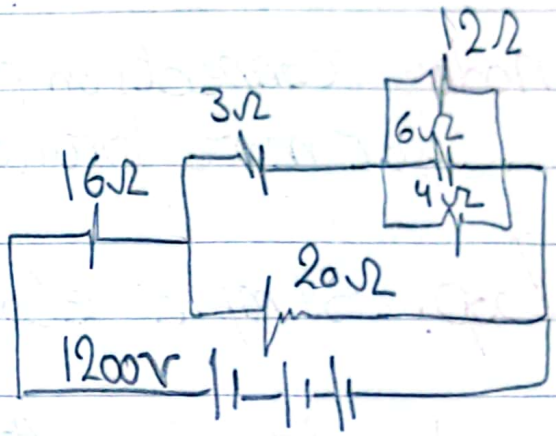
$$V_1 = IR_1 = 2*2 = 4V$$
$$V_2 = IR_2 = 2*4 = 8V$$



connected together
between x, y
"praller"

$$I = I_1 + I_2 + I_3$$
$$\frac{V}{R_p} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$$
$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

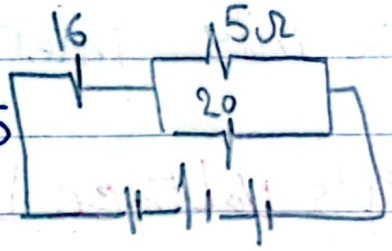
$$2R \rightarrow R_t = \frac{R_1 * R_2}{R_1 + R_2}$$



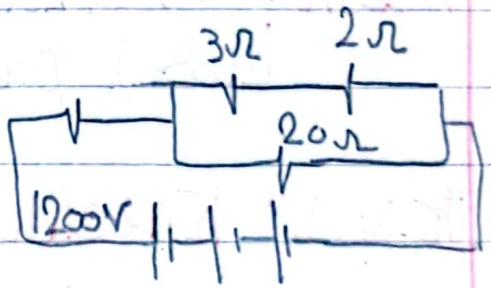
$$\frac{1}{R_{P_1}} = \frac{1}{12} + \frac{1}{6} + \frac{1}{4}$$

$$= 0.5$$

$$R_1 = 2$$

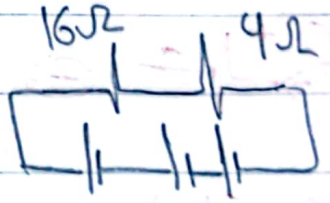


$R_{S1} = 3+2=5$



$$\frac{1}{R_{P_2}} = \frac{1}{5} + \frac{1}{20} = \frac{1}{4} \qquad R_2 = 4$$

$$R_t = 16+4 = 20\Omega$$



$$I = V/R = 60\,A$$

Branch:- is a group of components that carry the same current

node: connection point between two or more branches

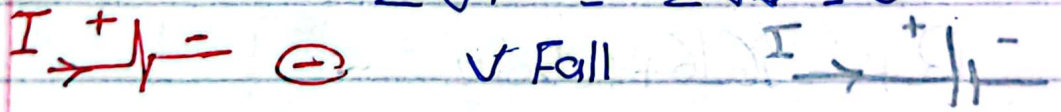
Loop: Simple closed path in circuit

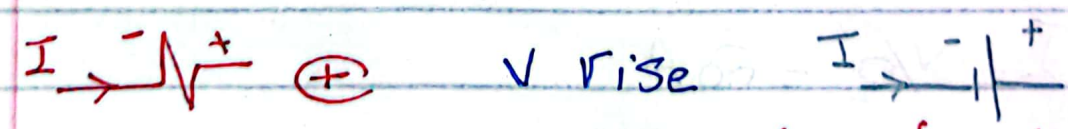
mesh: is a loop that dosen't have closed path inits interior

"K.V.L" KiRChhoff's VoLTAGE Low

$\Sigma V\uparrow = 0$ Rise $\quad \Sigma V\downarrow = 0$ Fall

$\Sigma V\uparrow = \Sigma V\downarrow = 0$





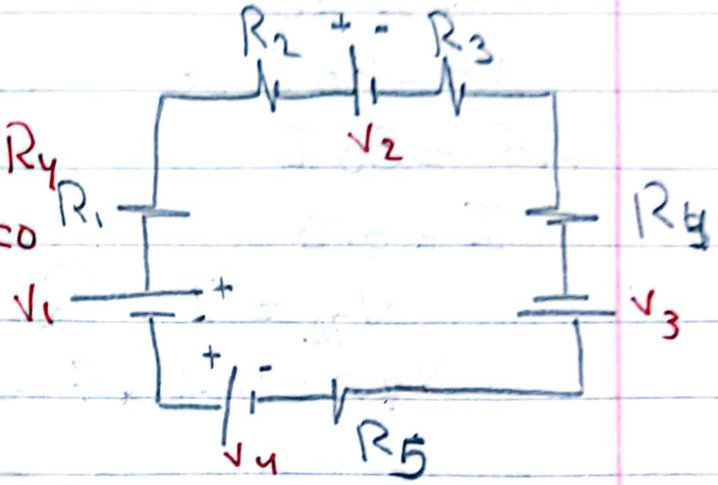
⊖ لو ماشي معاها

⊕ لو ماشي ضدها

ضد ↻ مع ↻

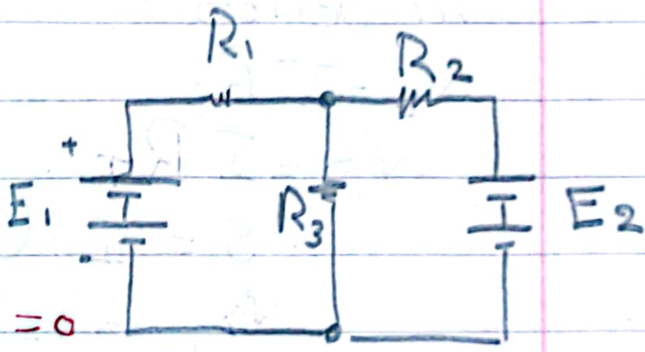
* لو مش مديني أفرض أشارات المقاومه بالسالب

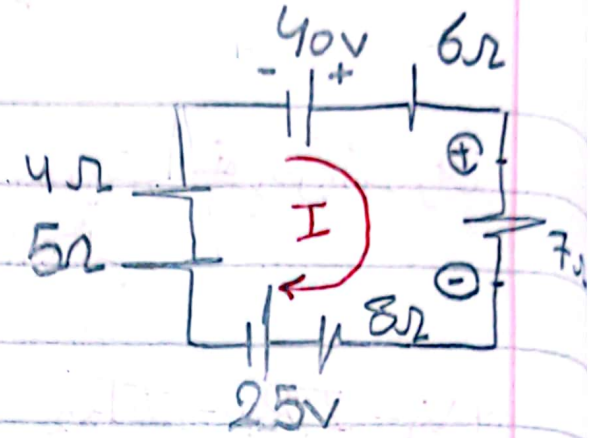
$$+V_1 - IR_1 - IR_2 - V_2 - IR_3 - IR_4 + V_3 + IR_5 + V_4 = 0$$



$$E_1 + I_1R_1 + I_1R_3 = 0$$

$$+ I_2R_2 - E_2 + I_2R_3 = 0$$





$+40 - 6I - 7I$

$-5I - 25 - 5I$

$-4I = 0$

$15 - 30I = 0$

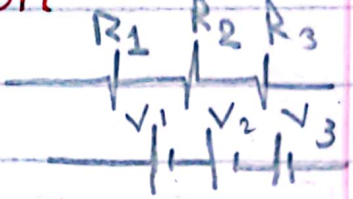
$+15 = 30I$

$I = 0.5$

$V_{7\Omega} = I * R$

$V_{7\Omega} = 0.5 * 7 = 3.5V$

Voltage Division



in series

$V_2 = I R_2$

$V_S = I R_T$

$V_S = I (R_1 + R_2 + R_3)$

$\frac{V_2}{V_S} = \frac{I R_2}{I (R_1 + R_2 + R_3)}$

$\Rightarrow V_2 = \frac{R}{R_1 + R_2 + R_3} * V_S$

$\Rightarrow V_x = \frac{R_x}{R_T} V_S$

EXAMPLES

How much current will flow through a 2-Ω resistor connected in series with a 4-Ω resistor, and the combination connected across a 12-V source? What is the voltage across each resistor?

$$V_1 = V\frac{R_1}{R_1 + R_2} = 12\frac{2}{2+4} = 4\,\text{V} \qquad V_2 = V\frac{R_2}{R_1 + R_2} = 12\frac{4}{2+4} = 8\,\text{V}$$

EXAMPLES

- **Find V3 and its polarity if the current I in the circuit of the Figure is 0.40 A.**

Assume that V_3 has the same polarity as V_1. Applying KVL and starting from the lower left corner.

$$V_1 - I(5.0) - V_2 - I(20.0) + V_3 = 0$$

$$50.0 - 2.0 - 10.0 - 8.0 + V_3 = 0$$

$$V_3 = -30.0\ \text{V}$$

Terminal b is positive with respect to terminal a.