

KALISMA

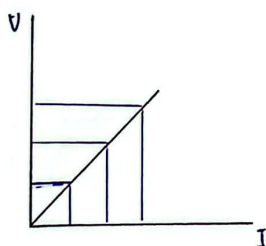
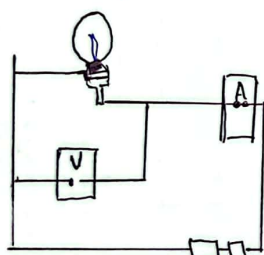
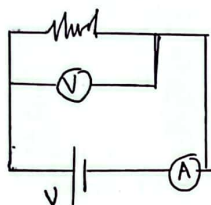
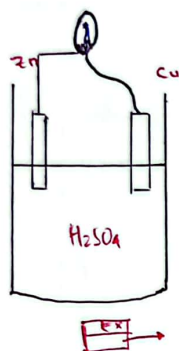
Elektrodinamika

1. Hukum ohm
2. Rangkaian Listrik

Pembahasan :

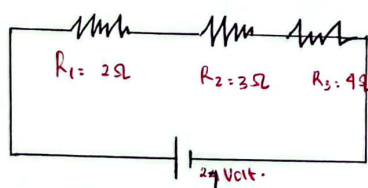
$$J = \sigma E \rightarrow DC$$

$$V = IR \rightarrow AC$$



$$V = IR$$

ex. Seri



$$R_{total} = 9\Omega$$

$$I = \frac{V}{R} = \frac{24}{9} = 3A$$

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Hambatan :

$$R_1 = 3$$

$$R_2 = 3$$

$$R_3 = 3$$

Tegangan :

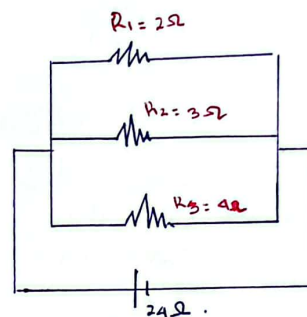
$$R_1 = 6$$

$$R_2 = 9$$

$$R_3 = 12$$

Tegangan total = 27.

ex. paralel.



Tegangan $V = IR$.

$$R_1 = 24$$

$$R_2 = 24$$

$$R_3 = 24$$

$$\text{Arus: } I = \frac{V}{R}$$

$$R_1 : 12$$

$$R_2 : 8$$

$$R_3 : 6$$

$$1. \frac{24}{2} = 12$$

$$3. \frac{24}{4} = 6$$

$$2. \frac{24}{3} = 8$$

Arus total = 26.

$$R_{total} = \frac{1}{2} + \frac{1}{3} + \frac{1}{4}$$

$$\frac{1}{R_t} = \frac{6 + 4 + 3}{12}$$

$$\frac{1}{R_t} = \frac{13}{12}$$

$$R_t = 0.9$$

$$I = \frac{V}{R_t}$$

$$= \frac{24}{0.9} = 26.6 A.$$

Daya :

$$P = 24 \times I$$

$$V \times I$$

$$= 24 \times$$

$$P_1 = 288 \text{ W}$$

$$P_2 = V \times I$$

$$= 24 \times 8$$

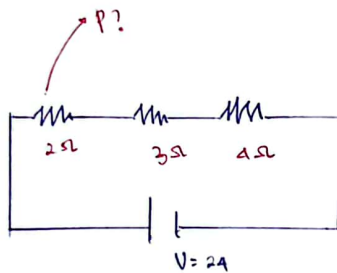
$$= 192 \text{ W}$$

$$P_3 = V \times I$$

$$= 24 \times 6$$

$$= 144 \text{ W}$$

ex :



$$I_{Rt} = \frac{V}{R_t}$$

$$= \frac{24}{9} = 2.67 \text{ A}$$

$$V_{Rt} = I \times R$$

$$= 2.67 \times 9$$

$$= 24 \text{ V}$$

$$P_1 = V \times I$$

$$= 24 \times 2.67$$

$$= 64.08 \text{ W}$$

$$V_{R_2} = I \times R$$

$$= 2.67 \times 3$$

$$= 8.01 \text{ V}$$

$$P_2 = V \times I$$

$$= 8.01 \times 2.67$$

$$= 21.38 \text{ W}$$

$$I \times R$$

$$V_{R_2} = 2.67 \times 3$$

$$= 8.01$$

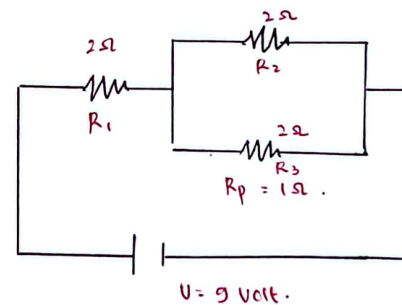
$$P_{R_2} = V \times I$$

$$= 8.01 \times 2.67$$

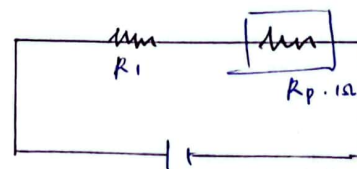
$$= 21.38 \text{ W}$$

Jadi, perbandingan lampu secara paralel dan seri adalah seri lebih kecil dan pada paralel dan bisa membuat listrik hemat dan redup, sedangkan paralel lebih besar dari seri artinya lampu lebih terang dan boros listrik.

Campuran.



$$R_p = \frac{2 \times 2}{2+2} = 1$$



$$R_{total} = 3\Omega$$

$$I = 3 \text{ A}$$

$$V_{R_1} = I \times R_p$$

$$= 3 \times 1$$

$$= 3 \text{ Volt}$$

$$V_{R_2} = I \times R_p$$

$$V_{R_2} = 3 \text{ Volt}$$

$$V_{R_3} = 3 \text{ Volt}$$

$$I = \frac{V}{R}$$

$$IR_2 = 1.5$$

$$IR_3 = 1.5$$

$$IR_p = 3A$$

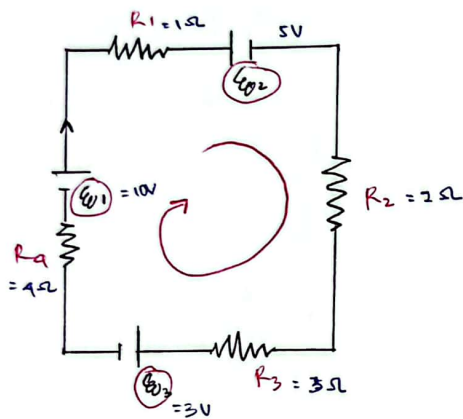
$$IR_1 = \frac{V}{R}$$

$$= \frac{9}{2} = 4.5$$

$$IR_2 = \frac{V}{R}$$

$$= \frac{3}{2} = 1.5$$

Hukum Kirchhoff



$$E_1 > E_2 > E_3$$

1. Gambar arah arus sesuai dengan besarnya E
2. Gambar loop sesuai hati
3. jika arah arus searah dengan arah loop maka positif (+)

$$\sum E + \sum IR = 0$$

$$-E_1 + E_2 + E_3 + I(R_1 + R_2 + R_3) = 0$$

$$-E_1 + E_2 + E_3 + I(R_1 + R_2 + R_3 + R_4) = 0$$

$$-10V + 5V + 3V + I(1 + 2 + 3 + 4) = 0$$

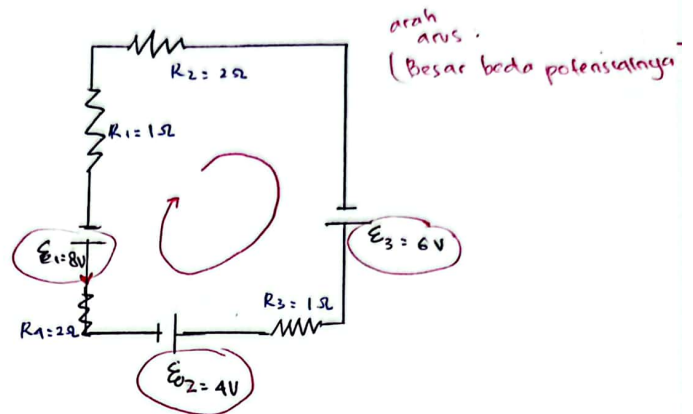
$$I = -2V \times I(10) = 0$$

$$I = \frac{10V/10}{10} = \frac{1}{10}$$

$$I = \frac{1}{5}$$

$$I = 0.12 \cdot A \text{ jadi, arus yang mengalir } 0.12 \cdot A$$

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$$\sum E + \sum IR = 0$$

$$E_1 + E_2 - E_3 - I(R_1 + R_2 + R_3 + R_4) = 0$$

$$8V + 4V - 6V - I(1 + 2 + 1 + 2) = 0$$

$$6 - I(6) = 0$$

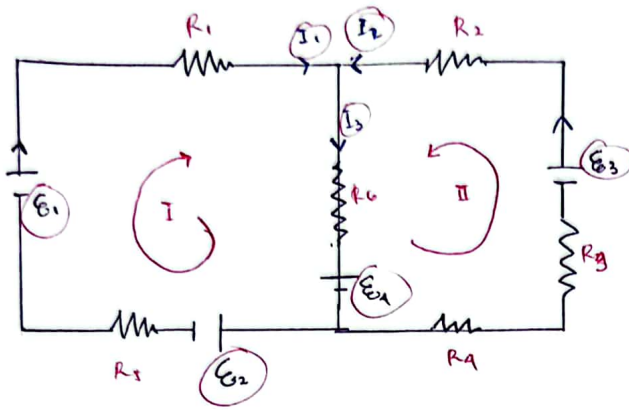
$$I = \frac{6}{6}$$

$$I = 1A$$

Jadi, arus yang mengalir adalah 1A.

Contoh Soal!

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Loop I

$$\sum E + \sum IR = 0$$

$$-E_1 + E_4 + E_2 + I_1(R_1 + R_5) + I_3 R_6 = 0$$

Loop II

$$\sum E + \sum IR = 0$$

$$-E_3 + E_4 + I_2(R_2 + R_3 + R_4) + I_3 R_6 = 0$$