

# "Tugas Lisma"

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→ Pemecahan kasus muatan listrik.

1) Seorang remaja putri menggunakan cincin yang terbuat dari Perak ( $^{107.9}_{47} \text{Ag}$ ) dan dilapisi emas ( $^{197}_{79} \text{Au}$ ) 0,8 gram. Massa cincin tersebut 5 gram. Berapa jumlah elektron dalam cincin remaja putri tersebut?

Penyelesaian:

$$\begin{aligned} \rightarrow N &= \langle 5 - 0,8 \rangle \cdot \frac{6,02 \times 10^{23}}{107,9} + 0,8 \cdot \frac{6,02 \times 10^{23}}{197} \\ &= 4,2 \cdot \frac{6,02 \times 10^{23}}{107,9} + 0,8 \cdot \frac{6,02 \times 10^{23}}{197} \\ &= 2,39 \times 10^{22} + 2,44 \times 10^{21} \\ &= 2,58 \times 10^{22} \end{aligned}$$

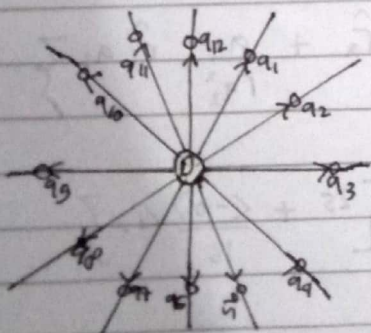
⇒ Atom Ag mempunyai 47 elektron atom Au mempunyai 79 elektron maka jumlah kedua atom tersebut adalah  $47 + 79 = 126$  elektron. Jadi jumlah medan total 0 yaitu:

$$\begin{aligned} Q &= \langle 2,58 \times 10^{22} \text{ atom} \rangle \langle 126 \text{ elektron/atom} \rangle \langle 1,6 \times 10^{-19} \text{ C/electron} \rangle \\ &= 5,2 \times 10^5 \text{ C} \end{aligned}$$

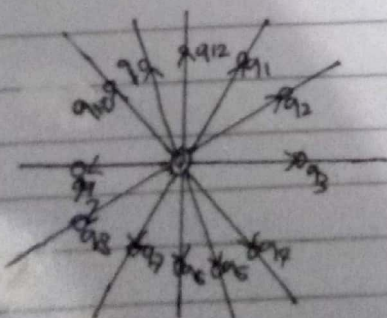
Jadi untuk massa cincin 5 gr mempunyai muatan  $5,2 \times 10^5 \text{ C}$  hal ini berarti dalam massa cincin 5 gr terdapat  $\frac{5,2 \times 10^5}{1,6 \times 10^{-19}} = 3,25 \times 10^{24}$  elektron.

→ Kasus gaya listrik.

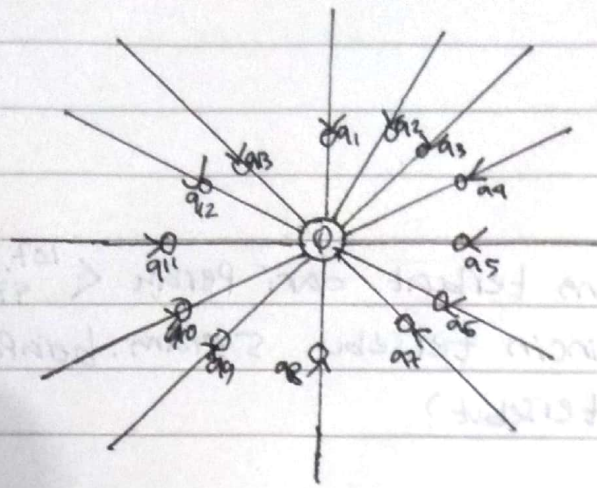
a)



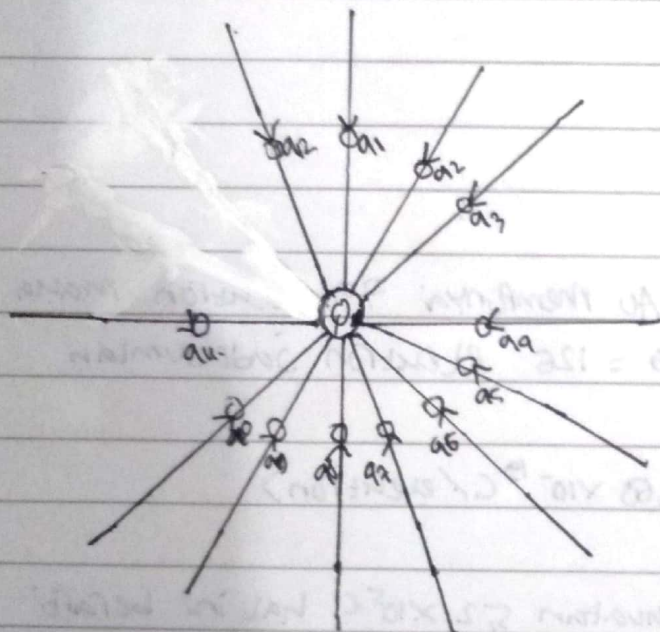
b)



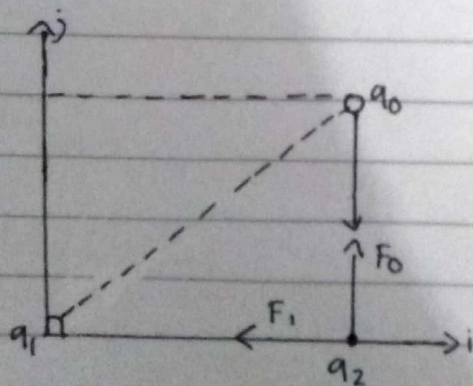
(c)



(d)



- (e)  $q_1 = 25 \text{ Hc} \rightarrow \langle 0, 0 \rangle \text{ m}$   
 $q_2 = -10 \text{ Hc} \rightarrow \langle 4, 0 \rangle \text{ m}$   
 $q_0 = 10 \text{ Hc} \rightarrow \langle 4, 3 \rangle \text{ m}$



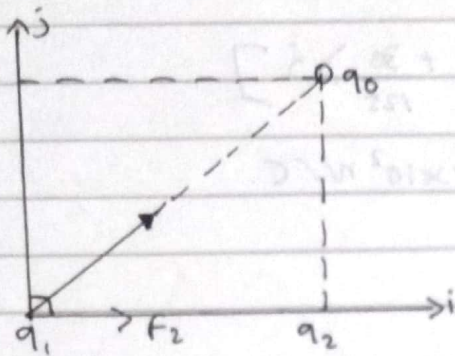
$$\vec{F} = q_0 k \left\{ \frac{q_1}{r_{q_1}^2} \hat{r}_1 + \frac{q_2}{r_{q_2}^2} \hat{r}_2 \right\}$$

$$= 10.9 \times 10^9 \left\{ 25 + \frac{\langle -10 \rangle}{16} \langle 4 \rangle \right\}$$

⑦  $q_1 = 25 \text{ Hc} \rightarrow \langle 0,0 \rangle$

$q_2 = -15 \text{ Hc} \rightarrow \langle 9,0 \rangle$

$q_0 = 20 \text{ Hc} \rightarrow \langle 9,3 \rangle$

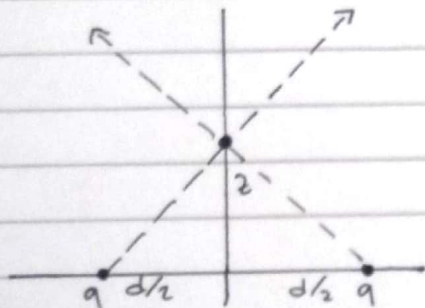


$$\vec{F} = q_0 k \left\{ \frac{q_1}{r_{q_1}^2} \hat{r}_{q_1} + \frac{q_2}{r_{q_2}^2} \hat{r}_{q_2} \right\}$$

$$= 20 \cdot 9 \times 10^9 \left\{ \frac{25}{16} + \frac{\langle -15 \rangle}{16} \langle i \rangle \right\}$$

→ kuat medan listrik.

⑧

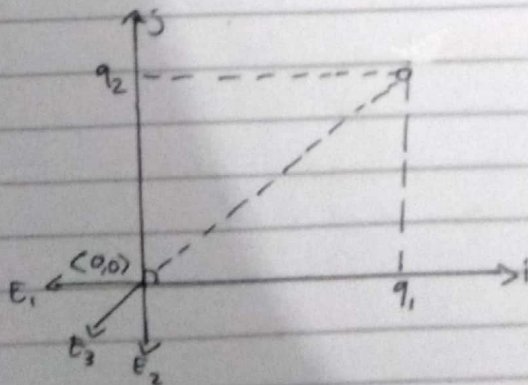


⑨  $q_1 \langle 9,0 \rangle = 2 \text{ C}$

$q_2 \langle 0,3 \rangle = 5 \text{ C}$

$q_3 \langle 9,3 \rangle = 10 \text{ C}$

medan listrik Posisi  $\langle 0,0 \rangle$ .



$$\vec{E}_1 = \frac{1}{4\pi\epsilon_0} \frac{q}{16} \hat{j}$$

medan oleh  $q_2 \vec{E}_2 = \frac{1}{4\pi\epsilon_0} \frac{5}{9} \langle i \rangle$

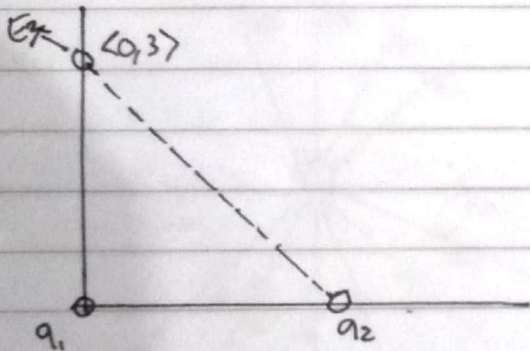
$$\text{Medan oleh } q_3 \quad \vec{E}_3 = \frac{1}{4\pi\epsilon_0} \frac{10}{25} \left\langle \frac{4i}{5} + \frac{3j}{5} \right\rangle$$

$$= \frac{1}{4\pi\epsilon_0} \left\langle \frac{40i}{125} + \frac{30j}{125} \right\rangle$$

$$\text{Medan total } \vec{E} = \frac{1}{4\pi\epsilon_0} \left[ \left\langle \frac{5}{5} + \frac{40}{125} \right\rangle i + \left\langle \frac{2}{15} + \frac{30}{125} \right\rangle j \right]$$

$$\vec{E} = \frac{1}{4\pi\epsilon_0} \sqrt{\langle 0,97 \rangle^2 + \langle 0,8 \rangle^2} = 8,35 \times 10^2 \text{ N/C.}$$

©  $q_1 = -5 \text{ Hc} \rightarrow \langle 0,0 \rangle$   
 $q_2 = 10 \text{ Hc} \rightarrow \langle 4,0 \rangle$



$$\text{Medan oleh } q_1 \quad \vec{E}_1 = \frac{1}{4\pi\epsilon_0} \frac{5}{25} \left\langle \frac{4i}{5} + \frac{3j}{5} \right\rangle$$

$$= \frac{1}{4\pi\epsilon_0} \left\langle \frac{20}{125} \langle i \rangle + \frac{15}{125} \langle j \rangle \right\rangle$$

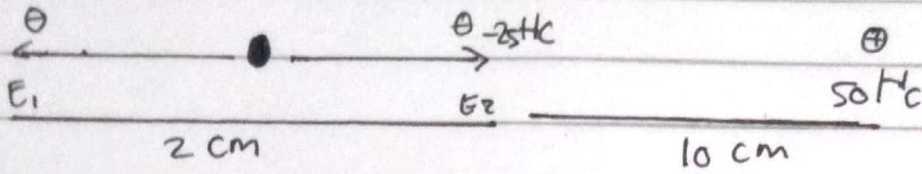
$$\text{Medan oleh } q_2 \quad \vec{E}_2 = \frac{1}{4\pi\epsilon_0} \frac{10}{10} \langle j \rangle$$

$$\text{total } \vec{E} = \frac{1}{4\pi\epsilon_0} \left[ \left\langle \frac{20}{125} \langle i \rangle + \frac{10}{15} + \frac{15}{125} \langle j \rangle \right\rangle \right]$$

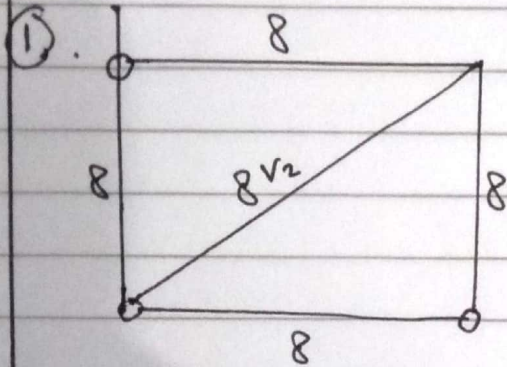
$$= \frac{1}{4\pi\epsilon_0} \sqrt{\langle 0,16 \rangle^2 + \langle 0,74 \rangle^2}$$

$$= \frac{1}{4\pi\epsilon_0} \sqrt{0,5732}$$

d.



Potensial Listrik.



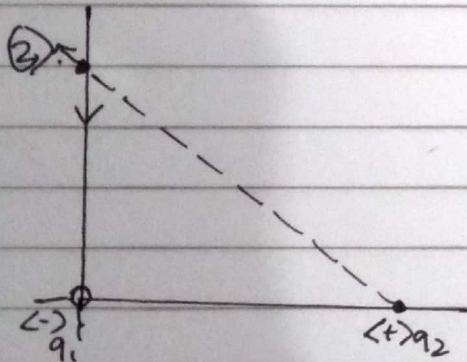
$$V_{\text{tot}} = \sum k \frac{q}{r}$$

$$= \frac{9 \cdot 10^9 \cdot 5 \cdot 10^{-6}}{8} + \frac{5 \cdot 10^{-6} \cdot 9 \cdot 10^9}{8} - \frac{4 \cdot 10^{-5} \cdot 9 \cdot 10^9}{8\sqrt{2}}$$

$$= 5,62 \cdot 10^3 + 5,62 \cdot 10^3 - 5,36 \cdot 10^3$$

$$= 17,5 \cdot 10^3$$

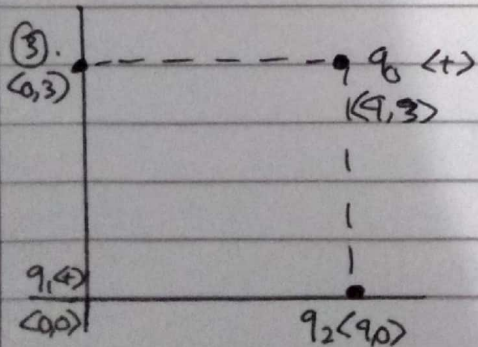
$$= 1,75 \cdot 10^4 \text{ Volt.}$$



$$V = \frac{kq_1}{r_1} + \frac{kq_2}{r_2}$$

$$= 9 \cdot 10^6 \left( \frac{5}{3} + \frac{10}{9} \right)$$

$$= 3,75 \times 10^7 \frac{\text{dyne cm}}{\text{Hc.}}$$



$$q_1 <0,0> = 25 \text{ Hc}$$

$$q_2 <9,0> = -15 \text{ Hc}$$

$$q_3 <9,3> = 20 \text{ Hc}$$

Carilah titik <0,3>