

Nama : Tri Lestari

Npm : 2013022058

Kelas : B

Pemecan 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. masa cincin tersebut 5 gram, berapa jumlah elektron dalam cincin remaja putri tersebut

⇒ penyelesaian :

$$n \cdot 4.2 \text{ g} \cdot \frac{6.02 \cdot 10^{23} \text{ atom/mol}}{107.9 \text{ g/mol}} + 0.8 \text{ g} \cdot \frac{6.02 \cdot 10^{23} \text{ atom/mol}}{197 \text{ g/mol}}$$

$$= 2.34 \cdot 10^{22} \text{ atom} + 0.24 \cdot 10^{22} \text{ atom}$$

$$= 2.58 \cdot 10^{22} \text{ atom}$$

atom Ag mempunyai 47 elektron atom Au mempunyai 79

Elektron maka jumlah kedua atom tersebut adalah

$47 + 79 = 126$ elektron, jumlah tersebut total @ yaitu :

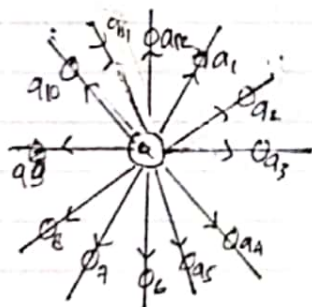
$$Q = (2.58 \times 10^{22} \text{ atom}) (126 \text{ elektron/atom}) (1.60 \times 10^{-19} \text{ C/elektron})$$
$$= 5.2 \times 10^5 \text{ C}$$

Jadi, Untuk masa cincin sgr mempunyai muatan $5.2 \times 10^5 \text{ C}$
hal ini berarti dalam massa cincin sgr terdapat

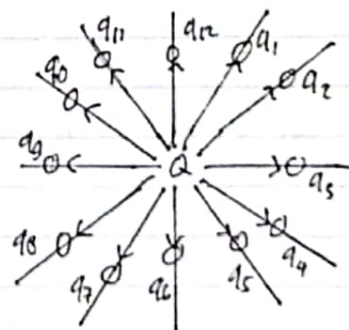
$$\frac{5.2 \times 10^5}{1.6 \times 10^{-19}} = 3.25 \times 10^{34} \text{ elektron}$$

* Kasus gaya Listrik

a).



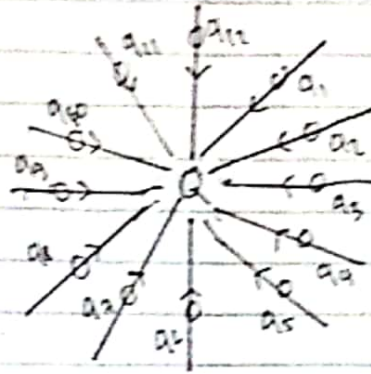
b).



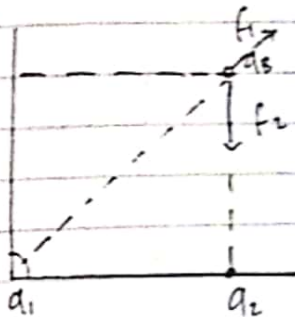
c).



d).



e). $q_1 = 25 \mu C \rightarrow (0,0) m$
 $q_2 = -10 \mu C \rightarrow (4,0) m$
 $q_3 = 10 \mu C \rightarrow (4,3) m$



$$\Rightarrow \vec{F} = q_0 k \left[\frac{q_1}{r_1^2} \vec{r}_1 + \frac{q_2}{r_2^2} \vec{r}_2 \right]$$

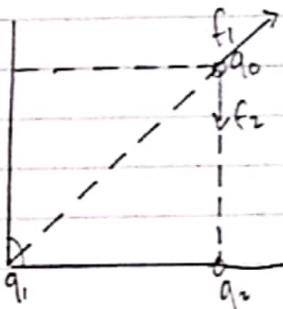
$$= 10 \cdot 9 \times 10^{10} \left(\frac{25}{25} \left(\frac{4}{5} \vec{i} + \frac{3}{5} \vec{j} \right) + \frac{10}{16} (\vec{i}) \right)$$

$$= 10 \cdot 9 \times 10^{10} \left(\frac{100}{125} + \frac{10}{16} \vec{i} + \frac{75}{125} \vec{j} \right)$$

$$= 9 \times 10^{11} (1.42 \vec{i} + 0.6 \vec{j})$$

$$F = 9 \times 10^{11} \sqrt{(1.42)^2 + (0.6)^2}$$

f). $q_1 = 25 \mu C \rightarrow (0,0)$
 $q_2 = -15 \mu C \rightarrow (4,0)$
 $q_3 = 20 \mu C \rightarrow (4,3)$



$$\vec{F} \cdot q_0 k = \left(\frac{q_1}{r_1^2} \vec{r}_1 + \frac{q_2}{r_2^2} \vec{r}_2 \right)$$

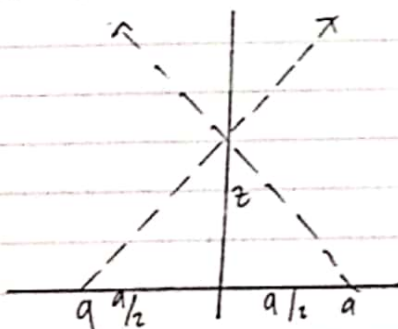
$$= 20 \cdot 9 \times 10^9 \left(\frac{25}{25} \left(\frac{4}{5} \vec{i} + \frac{3}{5} \vec{j} \right) + \frac{10}{16} (\vec{i}) \right)$$

$$= 20 \cdot 9 \times 10^9 \left(\frac{100}{125} + \frac{10}{16} \vec{i} + \frac{75}{125} \vec{j} \right)$$

$$= (-18 \times 10^{10}) (1.42 \vec{i} + 0.6 \vec{j})$$

$$F = 18 \times 10^{10} \sqrt{(1.42)^2 + (0.6)^2} \vec{r}_2^{1/2}$$

* kasus Medan Listrik

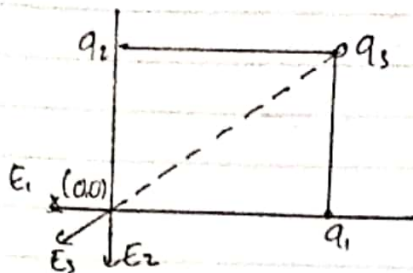


b) $q_1 (4,0) = 20$

$q_2 (0,3) = 50$

$q_3 (4,3) = 100$

Medan Listrik pada posisi $(0,0)$



$$\Rightarrow \text{Medan oleh } q_1, \vec{E}_1 = \frac{1}{4\pi\epsilon_0} \frac{20}{16} (\hat{j})$$

$$\text{Medan oleh } q_2, \vec{E}_2 = \frac{1}{4\pi\epsilon_0} \frac{50}{9} (\hat{i})$$

$$q_3, \vec{E}_3 = \frac{1}{4\pi\epsilon_0} \frac{100}{25} \left(\frac{4\hat{i} + 3\hat{j}}{5} \right)$$

$$= \frac{1}{4\pi\epsilon_0} \left(\frac{40}{125} \hat{i} + \frac{30}{125} \hat{j} \right)$$

$$\text{Medan total } \vec{E} = \frac{1}{4\pi\epsilon_0} \left[\left(\frac{5}{9} + \frac{40}{125} \right) (\hat{i}) + \left(\frac{2}{16} + \frac{30}{125} \right) (\hat{j}) \right]$$

$$= \frac{1}{4\pi\epsilon_0} \sqrt{(0.44)^2 + (0.0)^2}$$

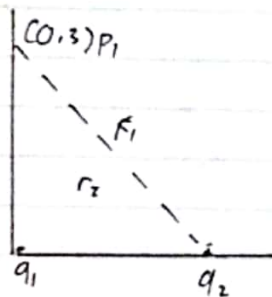
$$= 8.35 \times 10^2 \text{ N/C}$$

* Potensial Listrik

2) $q_1 (0,0) = -5 \mu\text{C}$

$q_2 (4,0) = 10 \mu\text{C}$

Hitung Medan Listrik titik $(0,3)$



$$\rightarrow V = kq_1 \frac{1}{r_1} + kq_2 \frac{1}{r_2}$$

$$= 9 \cdot 10^6 \left(\frac{5}{3} + \frac{10}{4} \right)$$

$$= 3.75 \times 10^7 \frac{\text{dyne cm}}{\mu\text{C}}$$

3) $q_1 (0,0) = 25 \mu\text{C}$

$q_2 (4,0) = -15 \mu\text{C}$

$q_3 (4,3) = 20 \mu\text{C}$

carilah pada titik $(0,3)$

