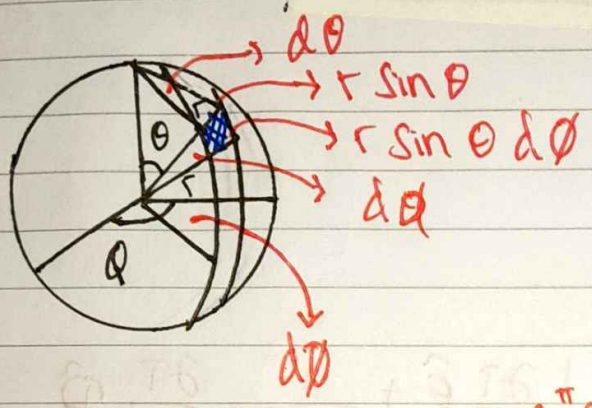
No. Senin

Date 04. 03. 2024

Kelistrikan dan Kemagnetan.



$dq = d\rho \times dl$

$= \rho d\theta \cdot r \sin\theta \, d\phi$

$= r^2 \sin\theta \, d\theta \, d\phi$

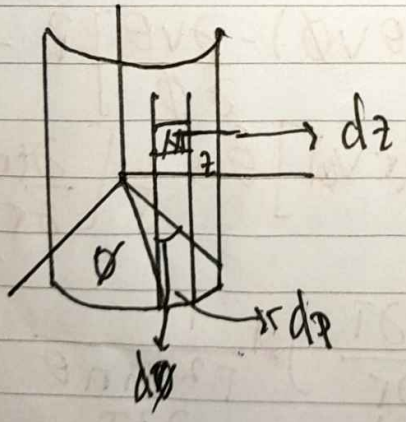
$dr = r^2 \sin\theta \, d\theta \, d\phi \, d\rho$

$\sin\theta = \frac{x}{r}$

$x = r \sin\theta$

$A = \int_0^{\pi} \int_0^{2\pi} = \pi^2 \sin\theta \, d\theta \, dr.$

$V = \int r^2 \sin\theta \, d\theta \, d\phi \, dr.$



$A = r \, d\rho \, dz$

$V = r \theta \rho \, dz \, d\rho$

Gaya Listrik.

→ Muatan Listrik → bisa dianggap dari kelebihan kekurangan proton/elektron.

$q = \pm Ne$

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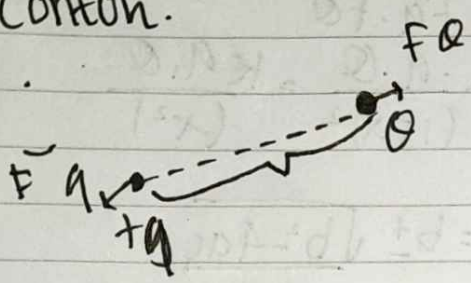
Contoh.

1.

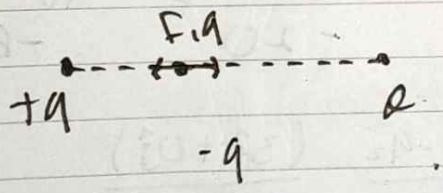


Gaya yang dikeluarkan sama.

$$\vec{F}_q = \vec{F}_Q = \vec{F} = \frac{1}{4\pi\omega}\frac{qQ}{r^2}\hat{r}$$

$$\hat{r}_0 = \frac{\vec{r}}{|\vec{r}|}$$

2.



$$\vec{F}_{1q} = F_{1Q}$$

$Q > q$

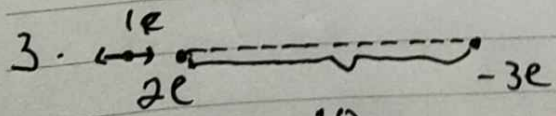
$-q, +q$

$$\frac{Kq_1Q}{(r-x)^2} = K\frac{q_1q}{(x^2)}$$

$$\frac{Q}{r^2-2rx+x^2} = \frac{q}{x^2}$$

$$Qx^2 = q(r^2-2rx+x^2)$$

3.



$\vec{F}_{12} = F_{13}$

$\frac{K_{1\cdot 2}}{x^2} = \frac{K_{13}}{(10+x)^2}$

$\frac{2}{x^2} = \frac{3}{x^2+20x+100}$

$3x^2 = 2x^2 + 40x + 200$

$3x^2 - 2x^2 - 40x - 200 = 0$

$x^2 - 40x - 200 = 0$

$(x-20)\quad (x-60)$

$F_{a} \cdot F_{Q}$

$K \cdot \frac{q \cdot Q}{(1-x)^2} = \frac{K q_1 Q}{(x^2)}$

$x = \frac{b \pm \sqrt{b^2-4ac}}{2a}$

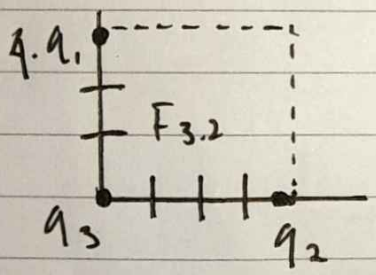
$= \frac{(-40) \pm \sqrt{(-40)-4\ 1-200}}{}$

$= -40 + \sqrt{\frac{1000+200}{2}}$

$= -40 + \sqrt{400}$

$= -40 + 20 = 40 - 20$

$-20 \qquad -60$



$\vec{F}_{3.2} = K \frac{q_3 - q_2}{4^2} \frac{(3\hat{i} + 0\hat{j})}{\sqrt{3^2+0^2}}$

$= K \frac{q_3 q_2}{16} \hat{i}$

$\vec{F}_{3.1} = K \frac{q_3 q_1}{3^2} - (-\hat{j})$

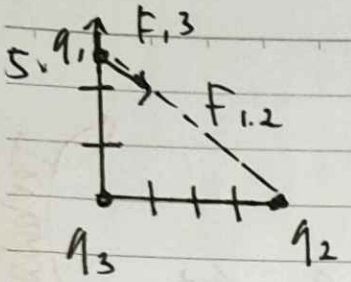
$= K \frac{q^{3\ 2}}{9} \hat{j}$

$|\vec{F}| = \sqrt{\square^2 + 0^2}$

$= K\sqrt{\square^2 0^2}$

$\vec{F} = K q_3 \left[\frac{q_2}{16}\hat{i} - \frac{q_1}{9}\hat{j}\right]$

$|F| = |K q_3 \sqrt{\left(\frac{q^2}{16}\right)^2 + \left(\frac{q_1}{9}\right)^2}$



Gaya yang dialami q_1 ?

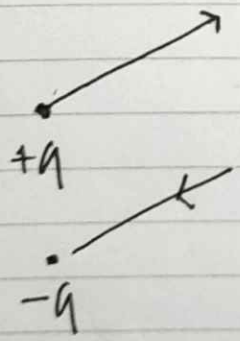
$$F_{13} = K \frac{q_1 q_3}{3^2} \hat{j}$$

$$F_{12} = K \frac{q_1 q_2}{5^2} (4\hat{i} - 3\hat{j})$$

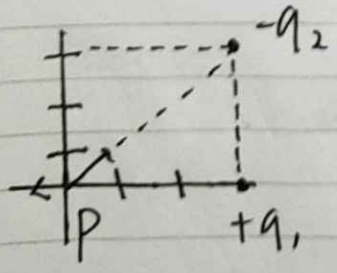
$$= 4K \frac{q_1 q_2}{125} \hat{i} - 3K \frac{q_1 q_2}{125} \hat{j}$$

$$\vec{F} = Kq_1 \left[\left(\frac{4q_2}{125} \right) \hat{i} + \left(\frac{q_3}{9} - \frac{3q_2}{125} \right) \hat{j} \right]$$

Medan Magnet.



Medan hanya satu muatan.



$$\vec{E}_1 = K \frac{q_1}{3^2} (-\hat{i})$$

$$= K \frac{q_1}{9} - \hat{i}$$

$$\vec{E}_2 = K \frac{q_2}{5^2} \left(\frac{3\hat{i} + 4\hat{j}}{5} \right)$$

$$= 3K \frac{q_2}{125} \hat{i} + 4K \frac{q_2}{125} \hat{j}$$

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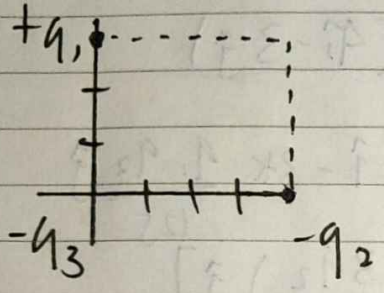
$$\vec{E} = k\left[\left(\frac{3q_2}{125} - \frac{q_1}{9}\right)\hat{i} + \frac{4q_2}{125}\hat{j}\right]$$



$$\vec{E}_{q_3} = \frac{F_{3:2}}{-q_3} = \frac{k q_3 q_2 / r^2}{q_2}$$

$$F = k\frac{q}{r^2}\hat{r}_x$$

Terbalik seharusnya yang ini di atas.