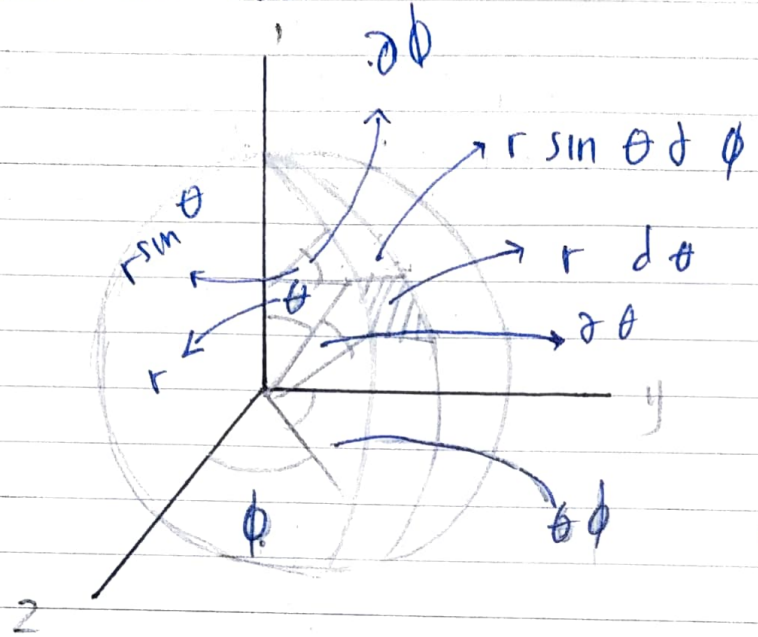
Indah Purnama
2213022063

Kelistrikan & kemagnetan.

No 4/03/2024
Date

Bapak Wayan Ditrik / pertemuan ke-4

Koordinat bola



$$\partial a = \partial\phi \times \partial\rho$$
$$= r\partial\theta \; r \sin\theta \partial\phi$$
$$= r^2 \sin\theta . \partial\theta \partial\phi$$
$$\partial\rho = r^2 \sin\theta . \partial\theta \partial\phi \partial$$

$$A = P \times \ell$$
$$= r\,d\theta . r \sin\theta\, d\phi$$
$$= r^2 \sin\theta \, d\theta \, d\phi$$
$$V = r^2 \sin\theta \, d\theta \, d\phi \, dr$$
$$A = \int_0^{2\pi} \int_0^{\pi} r^2 \sin\theta \, d\theta \, d\phi = 4\pi r$$

$$A = r^2 \int_0^{2\pi} d\phi \int_0^{\pi} \sin\theta \, d\theta$$

$$= 4\pi r^2$$

$$V = \int_0^{\rho} \int_0^{\pi} \int_0^{\pi} r^2 \sin\theta \, d\theta \, dr$$

$$= \frac{4}{3} \pi r$$

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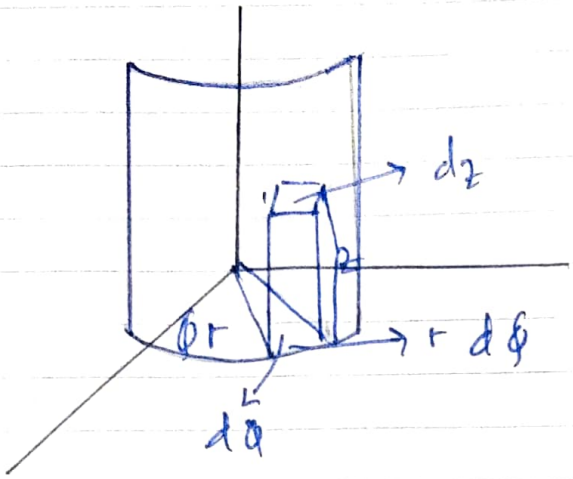
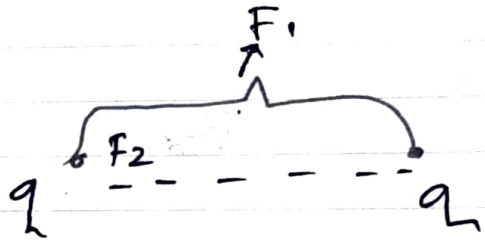


$$A = r\,\phi\,\phi\,dz$$
$$V = r\,d\phi\,dz\,dr$$

Listrik Statis

$$\vec{F} = \frac{1}{q\pi} \quad \frac{qQ}{r^2} \quad \hat{r}_0$$



$$Q > q$$

$$\vec{F}_1 = F_2$$

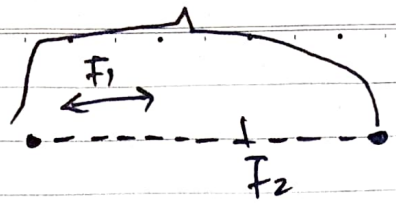
Listrik statis merupakan listrik dengan muatan dalam keadaan diam atau statis, berbeda dengan listrik dinamis yang muatan listriknya senantiasa bergerak. Secara makna, listrik jenis statis merupakan ketidak seimbangan muatan listrik dalam atau dipermukaan benda.

$$k\,\frac{9.Q}{(r-x)^2} = k\,\frac{9.Q}{x^2}$$

Kalisma.

No
Date

1.)



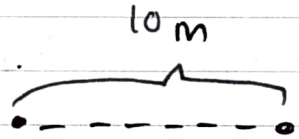
$q_1 = 1C$ $\quad q_2 = 3C$

$q_3 = -2C$ $\quad \overrightarrow{F_1} = \overrightarrow{F_2}$

$$k\frac{1.2}{1^2} = k\frac{2.3}{(10-x)^2}$$

$$\frac{1}{x^2} = \frac{3}{(10-x)^2}$$

2)



$-q_1 = 1C$ $\quad q_2 = 2C$

$q_3 = 1C$

$\vec{F}_1 = \overrightarrow{F_2}$ $\quad k = \frac{1.2}{x^2} = k\frac{2.3}{(10-x)^2}$

$$= \frac{1}{x^2} = \frac{3}{(10-x)^2}$$

$$100 - 20x + x^2 = 3x^2$$

$$2x^2 + 20x - 100 = 0$$

$$x^2 + 100x - 50 = 0$$

$$(x+15)(x-5) = 0$$

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

Lanjutan no.2

$$= \frac{-10 \pm \sqrt{(10)^2 - 4.1(-50)}}{2.1}$$

$$= \frac{-10 \pm \sqrt{100 + 200}}{2}$$

$$= \frac{-10 + \sqrt{300}}{2}$$

$$= \frac{10\sqrt{3} - 10}{-5\ 1,7 - 5}$$

$$\frac{-10 \pm \sqrt{300}\ 3.60}{2}$$

$$\frac{-10 + 10\sqrt{3}}{2}$$

$$\frac{-10 - 10\sqrt{3}}{2}$$

$$-5 - 5 \times 1,7$$

$$= 13.5$$

Kalisma

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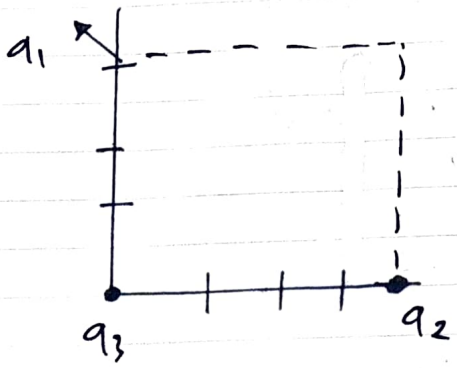
contoh :



$$F_{13} = k \frac{q_1 q_3}{3^2} (-\hat{j})$$

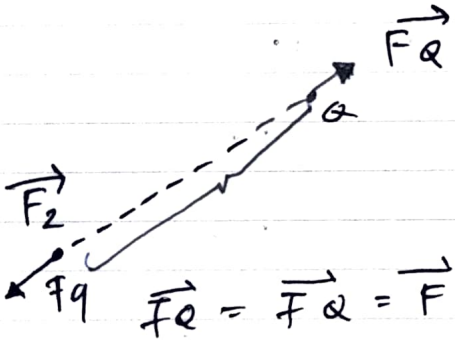
$$\vec{F}_{12} = k \frac{q_1 q_2}{5^2} \frac{(4\hat{i} + 3\hat{j})}{5}$$

$$= \frac{(0\hat{i} - 3\hat{j})}{\sqrt{4^2 + 2^2}}$$

Gaya listrik

⇒ Muatan listrik
Muatan positif (panas)

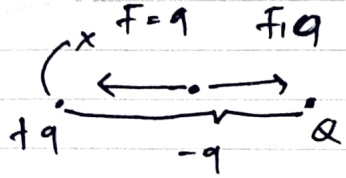
$q = \pm (N) e$ akan melepas elektron / yang kekurangan elektron



$$\vec{F}_Q = \vec{F}_Q = \vec{F} = \frac{1}{4\pi\varepsilon_0} \frac{qQ}{r^2} \vec{r}$$

Gaya yang dikeluarkan sama, besarnya yang berbeda.

contoh :



$Q > q$

$$\vec{F}_q = F_1 Q$$

$$k \frac{q_1 Q}{(r-x)^2} = k \frac{q_1 q}{(x^2)} \quad x?$$

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

$$= Qx^2 = 2(\hat{i}^2 - \hat{i}x + x^2)$$

Kalisma

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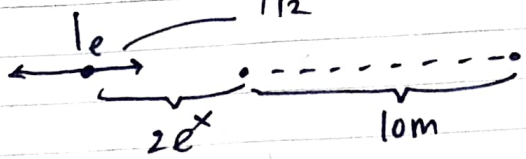
1.) F_{12} F_{12}



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

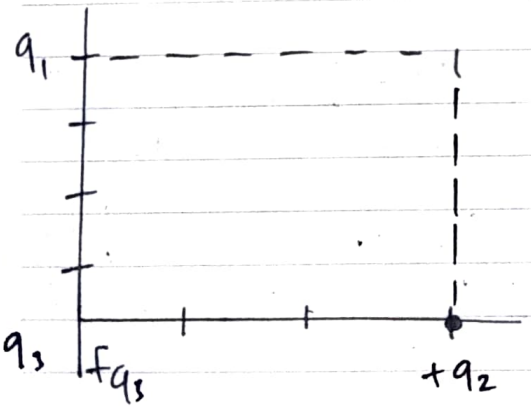
$K \frac{1,2}{x^2} = K \frac{1,3}{(10+x)^2}$

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

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

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

$(x-20)(x-60)$



$\vec{F}_{q3} =$

$\vec{F} = Kq_3\left[\frac{q_2}{16}\hat{i} - \frac{q_1}{9}\hat{j}\right]$

$|F| = Kq_3\sqrt{\left(\frac{q_3}{10}\right)^2 + \left(\frac{q_1}{9}\right)^2}$

$F_{q} - F_{Q}$

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

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

$= \frac{-40 \pm \sqrt{(-40)^2 - 4.1 \cdot -200}}{2.1}$

$= \frac{-40 + \sqrt{1600 + 800}}{2}$

$= -40 + \sqrt{400}$

$= -40 + 20 \quad = -40 - 20$

$= -20 \quad = -60$

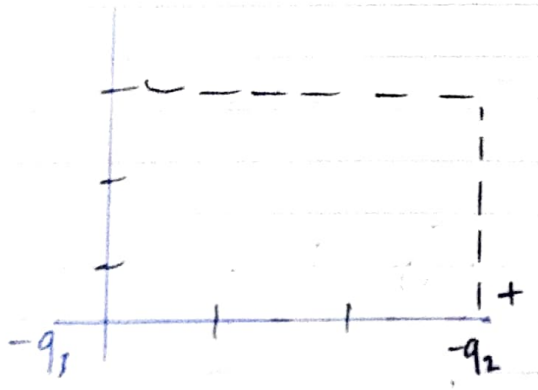
$F_{32} = K \frac{q_3 q_2}{q^2} \frac{(3\hat{i} + 0\hat{j})}{\sqrt{3^2+0^2}}$

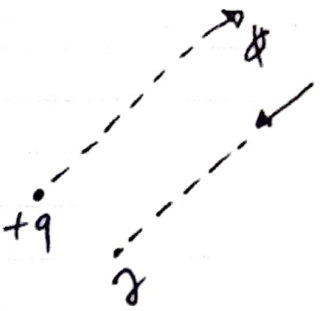
$= K \frac{q_3 q_3}{16} \hat{i}$

$\vec{F}_{31} = K \frac{q_3 q_1}{3^2}(-\hat{j})$

$= -K \frac{Q_3 q_1}{9} \hat{j}$

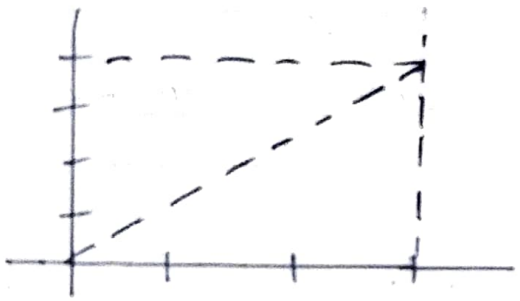
Kalisma.





$$q_3 = \vec{E}_{q_3} = \frac{F_{12}}{q_3} = k\,\frac{q_3 q_2}{q_3}\,/\hat{r}$$

$$F = k\left(\frac{q}{q_2}\hat{r}\right)$$



$$\vec{F} = k\,\frac{q_1 q_3}{3^2}\,\hat{j}$$

$$\vec{F}_{12} = k\,\frac{q_1 q_2}{5^2}\left(\frac{4\hat{i} - 3\hat{j}}{5}\right)$$

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

$$\vec{E_1} = k\,\frac{q_1}{3^2}(-\hat{i})$$

$$= k\,\frac{q_1}{9}\,\hat{i}$$

$$\vec{F} = k q_1\left[\left(\frac{4 q_2}{125}\right)\hat{i} + \left(\frac{q_3}{9} - \frac{3 q_2}{125}\right)\hat{j}\right]$$

$$\vec{E_2} = k\,\frac{q_2}{5^2}\left(\frac{3\hat{i} + \hat{j}}{5}\right)$$

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

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