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No.

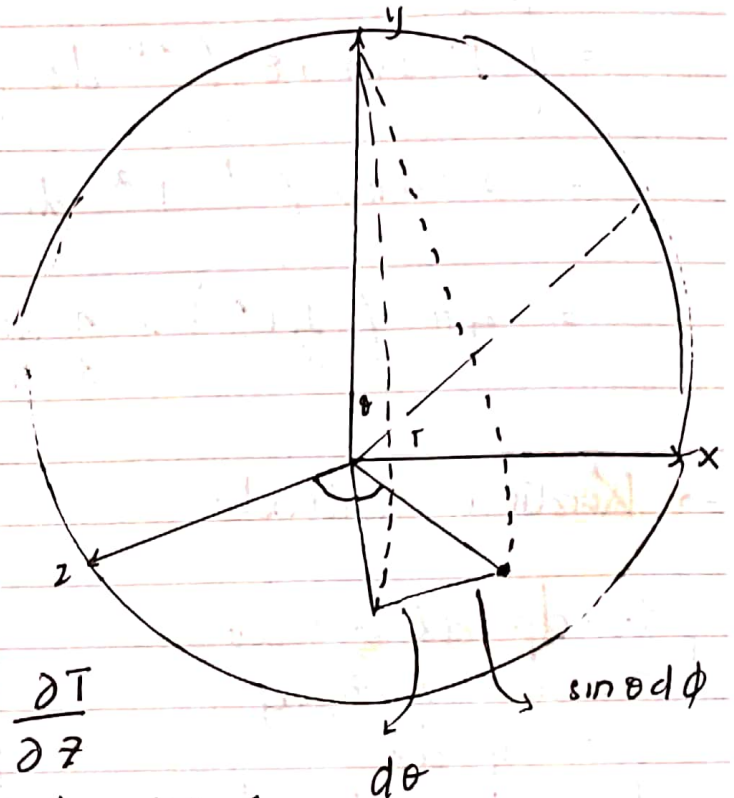
Date

# Kelistrikan dan Kemagnetan

## SISTEM KOORDINAT ( )

→ Koordinat Bola.

gambar:



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

$$x = r \sin \theta$$

panjang · lebar

$$da = dp \times dl$$

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

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

$$dV = dV \cdot d\theta \cdot d\phi$$

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

$$\nabla T = \hat{i} \frac{\partial T}{\partial x} + \hat{j} \frac{\partial T}{\partial y} + \hat{k} \frac{\partial T}{\partial z}$$

$$\nabla T = \frac{\partial}{\partial r} \hat{r} + \frac{1}{r} \frac{\partial}{\partial \theta} \theta + \frac{1}{\sin \theta} \frac{\partial}{\partial \phi} \phi$$

$$\nabla T = \dots$$

$$\nabla \cdot T = \dots$$

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

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

$$= 2\pi r^2 \int_0^\pi \sin \theta d\theta$$

$$= \square \int \cos \theta \Big|_0^\pi = 4\pi r^2$$

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

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

$$= 2(2\pi) \int_0^r r^2 \, dr$$

$$= 4\pi \left( \frac{1}{3} r^3 \right) = \frac{4}{3} \pi r^3$$

→ Koordinat Silinder

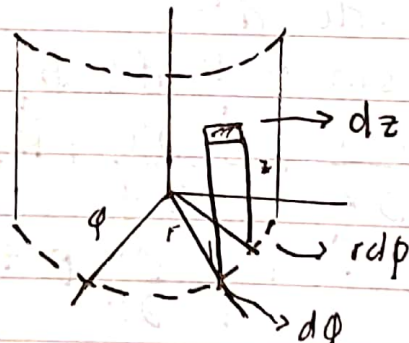
gambar:

$dh = dp \cdot dl \rightarrow$  lebar

↳ elemen  $\rightarrow$  panjang

$$= r dp \cdot dz$$

$$dV = r dp \cdot dz \cdot dr$$



Listrik Statis  $\rightarrow$  gasa (fotocopy, dll)

o Gaya Coulomb

o Medan Listrik

\* Diskrit

\* Non Diskrit

o Potential

- Diskrit - Non Diskrit

o Usaha dan Energi

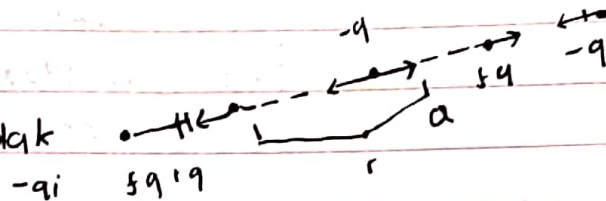
{ Coulomb  
gaussian  
statis

atom +  $g^0$  : kekurangan elektron

$Q_1 \pm Me$

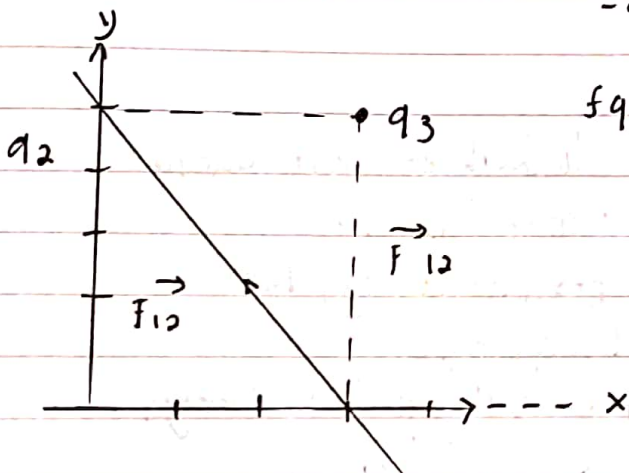
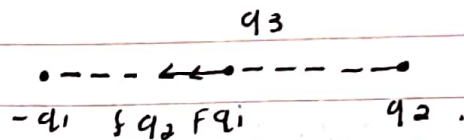
+ (-) = tarik

+ + : tidak mendak



$$q = \frac{F}{m}$$

$$k = \frac{1}{4\pi\epsilon_0}$$



$$F_{q1} = F_{12} = k \frac{q_1 (2q_3)}{q_2} \hat{j}$$

$$r_0 = \frac{\vec{r}}{|\vec{r}|}$$

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

$$\vec{F}_{12} = -\frac{3k q_1 q_2}{125} \hat{i} + \frac{4k q_1 q_2}{125} \hat{j}$$

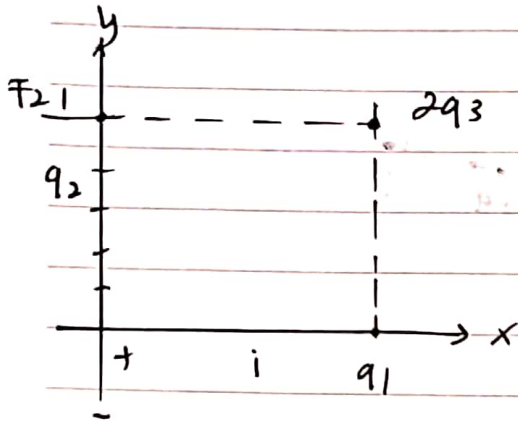
$$\vec{F}_{total} = -\frac{3 q_1 q_2}{125} \hat{i} + \left( \frac{2k q_1 q_3}{16} + \frac{4k q_1 q_2}{125} \right) \hat{j}$$

$$\vec{F}_{total} = k a i \left[ \frac{2q_2}{125} \hat{i} + \left( \frac{2q_3}{16} + \frac{4q_2}{125} \right) \hat{j} \right]$$

$$|\vec{F}| = k q_1 \sqrt{0^2 + 0^2} \quad F_{21} = k \frac{q_1 q_2}{5^2} \left( \frac{3\vec{i} - 4\vec{j}}{5} \right)$$

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

$$F_{23} = \frac{-k q_1 q_2}{3^2} = \frac{-2k q_2 q_3}{9}$$



## Gaya Listrik

(Hukum Coulomb) Gaya yang dilakukan oleh suatu muatan listrik pada muatan yang lainnya bekerja sepanjang garis yang menghubungkan kedua muatan tersebut. Besarnya gaya berbanding terbalik kuadrat jarak keduanya berbanding lurus dengan perkalian kedua muatan.

- Gaya tolak menolak  $\rightarrow$  muatan sama
- Gaya tarik menarik  $\rightarrow$  muatan beda.

$$F_{12} = \frac{k q_1 q_2}{r_{12}^2} \cdot \hat{r}_{12}$$

$$\hat{r} =$$

$$r =$$

$$k = 8,99 \cdot 10^9 \text{ Nm}^2 / \text{C}^2$$