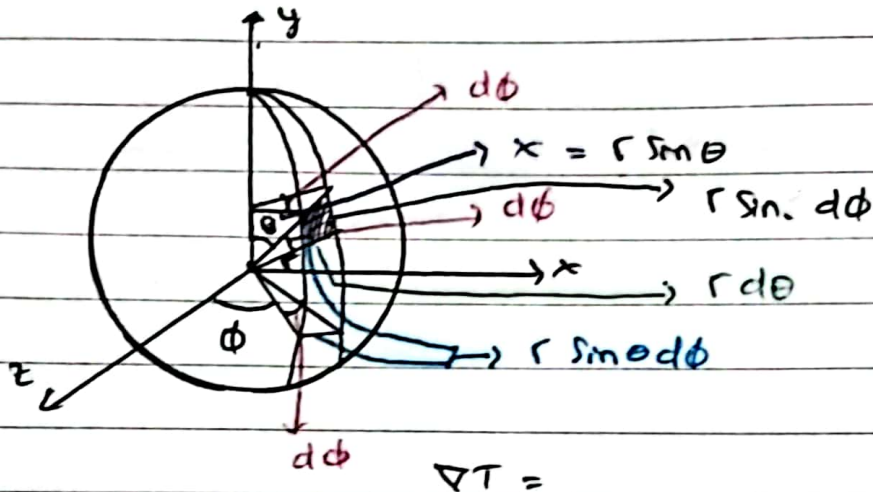


KALISMA

⇒ Sistem koordinat bola



$$\begin{aligned} da &= dp \times dl \\ &= r d\theta \cdot r \sin \theta d\phi \\ &= r^2 \sin \theta d\theta d\phi \end{aligned}$$

P = Panjang
L = lebar
t = tebal

$$\begin{aligned} dG &= dp \cdot dl \cdot dt \\ &= r^2 \sin \theta d\theta d\phi dr \end{aligned}$$

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

$$\nabla T = \frac{\partial T}{\partial r} \hat{r}_0 + \frac{1}{r} \frac{\partial T}{\partial \theta} \hat{\theta}_0 + \frac{1}{r \sin \theta} \frac{\partial T}{\partial \phi} \hat{\phi}_0$$

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

$$\nabla \times T = \dots$$

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

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

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

$$= 0 \left[-\cos \theta \right]_0^\pi = 4\pi r^2$$

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

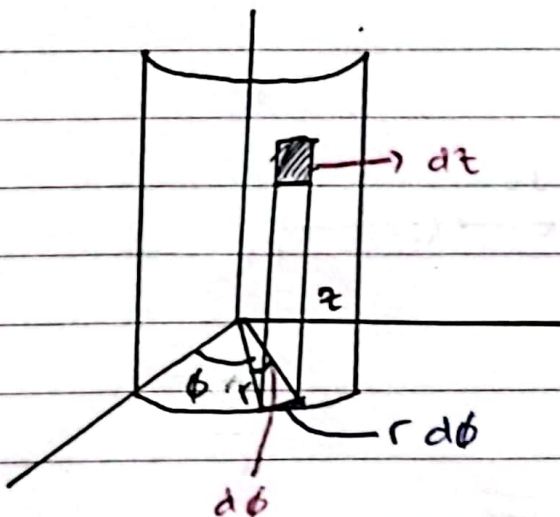
$$= \int_0^\pi \sin \theta d\theta \int_0^{2\pi} d\phi \int_0^r r^2 dr$$

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

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

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

o>> Sistem koordinat Silinder



$$dA = dr \times dl$$

$$= r d\phi \cdot dz$$

$$dV = dA \times dz$$

$$= r d\phi \cdot dz \cdot dr$$

⇒ listrik statis

- Gaya Coulomb

- Medan listrik

- diskrit

- non diskrit

Coulomb

Gauss

Statis

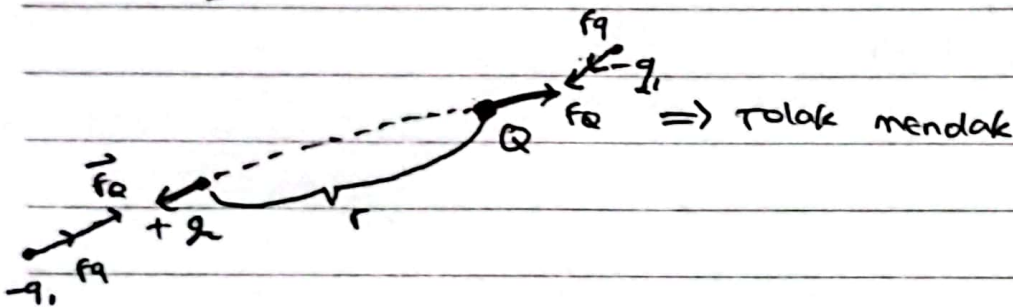
- Potensial

- Diskrit

- non Diskrit

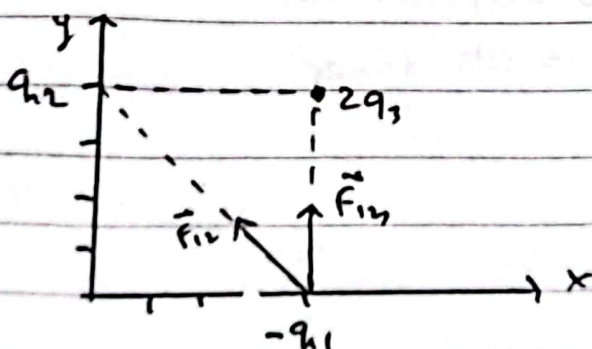
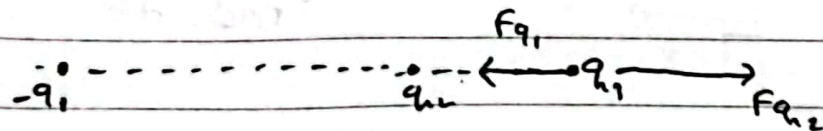
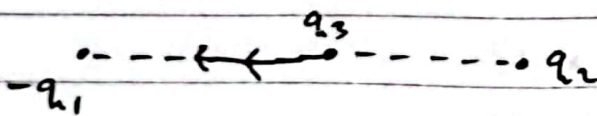
- Usaha dan Energi

$$Q = \pm n e$$



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

$$\vec{F} = \frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{r^2} \hat{r}_0$$



$$\vec{F}_{q_1} =$$

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

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

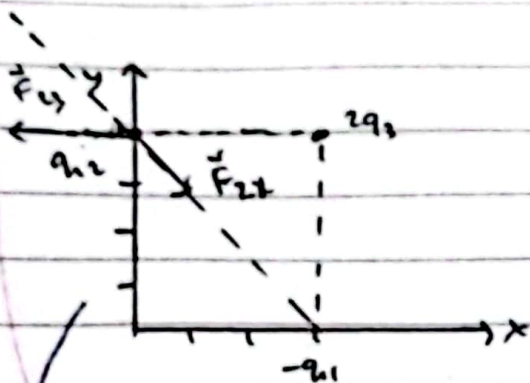
$$\vec{F}_{12} = k \frac{q_1 (2q_3)}{r^2} \hat{j}$$

$$\sqrt{4^2 + 3^2} = 5$$

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

$$\vec{F} = kq_1 \left[-\frac{3q_2}{125} \hat{i} + \left(\frac{2q_3}{16} + \frac{4q_2}{125} \right) \hat{j} \right]$$

$$|\vec{F}| = kq_1 \sqrt{\left(-\frac{3q_2}{125} \right)^2 + \left(\frac{2q_3}{16} + \frac{4q_2}{125} \right)^2}$$



→ cara panjang

$$\vec{F}_{12} = \frac{-3kq_1q_2}{125} \hat{i} + \frac{4kq_1q_2}{125} \hat{j}$$

$$\vec{F}_{\text{total}} = \frac{-3kq_1q_2}{125} \hat{i} + \left(\frac{2kq_1q_3}{16} + \frac{4kq_1q_2}{125} \right) \hat{j}$$

$$\vec{F}_{23} = k \frac{q_2 q_3}{r^2} \frac{(-3\hat{i} - 4\hat{j})}{5}$$

$$\vec{F}_{23} = -k \frac{q_2 \cdot 2q_3}{3^2} \hat{i}$$

$$= -2k \frac{q_2 q_3}{9} \hat{i}$$

$$\vec{F}_{\text{total}} = \left(\frac{3kq_1q_2}{125} - \frac{2kq_2q_3}{9} \right) \hat{i} + \frac{4kq_1q_2}{125} \hat{j}$$