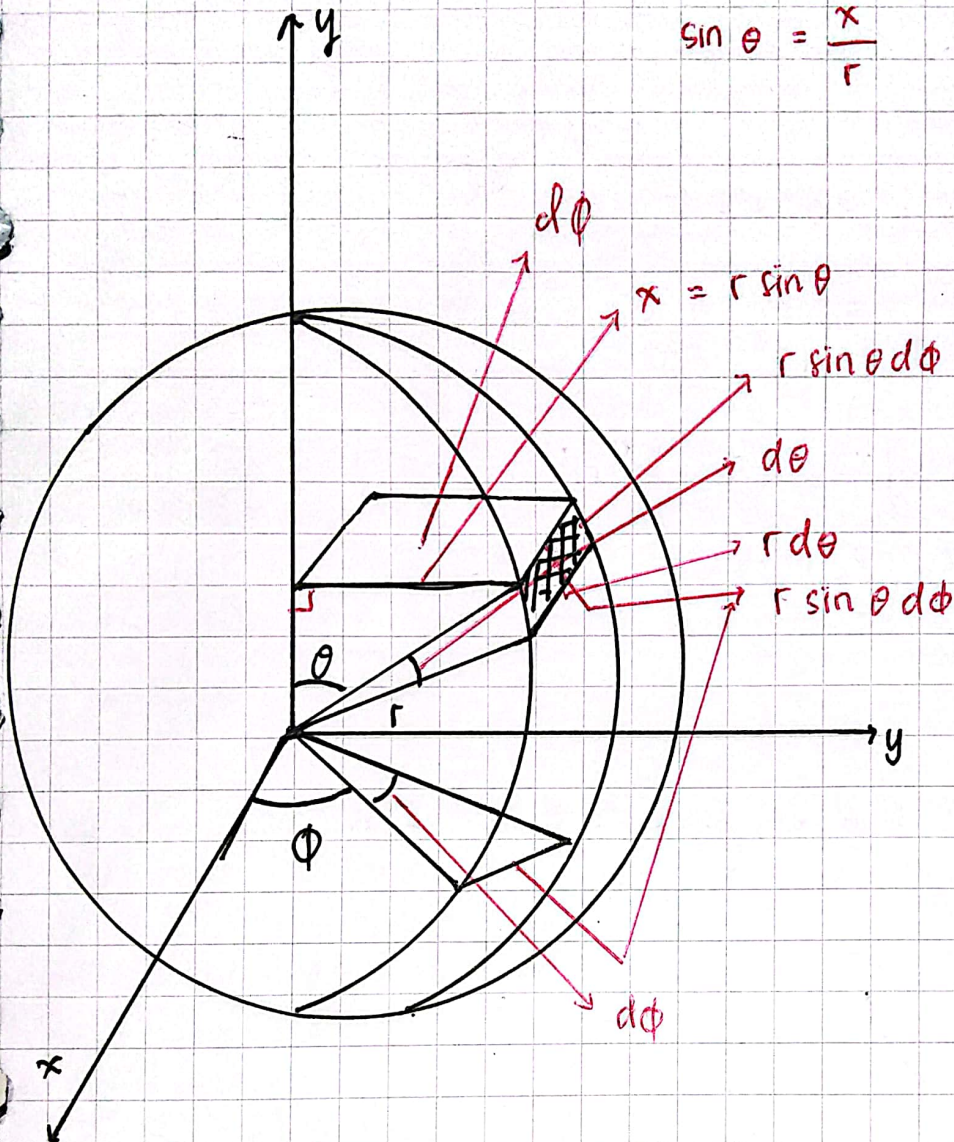


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SISTEM KOORDINAT

1. KOORDINAT BOLA



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

$$\begin{aligned} dT_{\text{bol}} &= dp \cdot dl \cdot d\phi \\ &= r^2 \sin \theta d\theta d\phi dp \end{aligned}$$

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

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

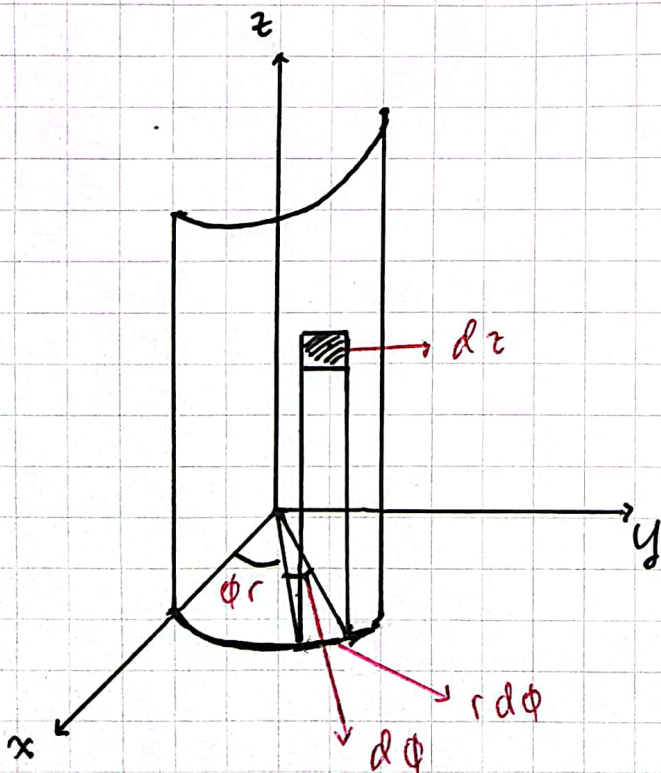
$$\nabla \cdot T = \dots$$

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

$$\begin{aligned}
 A &= \int_0^{2\pi} \int_0^\pi r^2 \sin \theta \, d\theta \, d\phi \\
 &= r^2 \int_0^{2\pi} d\phi \int_0^\pi \sin \theta \, d\theta \\
 &= 2\pi r^2 \int_0^\pi \sin \theta \, d\theta \\
 &= 2\pi r^2 \left[-\cos \theta \right]_0^\pi \\
 &= 4\pi r^2
 \end{aligned}$$

$$\begin{aligned}
 V &= \int_0^\pi \int_0^{2\pi} \int_0^r r^2 \sin \theta \, d\theta \, d\phi \, dr \\
 &= \int_0^\pi \sin \theta \, d\theta \int_0^{2\pi} d\phi \int_0^r r^2 \, dr \\
 &= \left[-\cos \theta \right]_0^\pi (2\pi) \int_0^r r^2 \, dr \\
 &= 2(2\pi) \left(\frac{1}{3} r^3 \right) \\
 &= \frac{4}{3} \pi r^3
 \end{aligned}$$

2. KOORDINAT SILINDER



$$\begin{aligned}
 dA &= dp \times dl \\
 &= r \, d\phi \, dz
 \end{aligned}$$

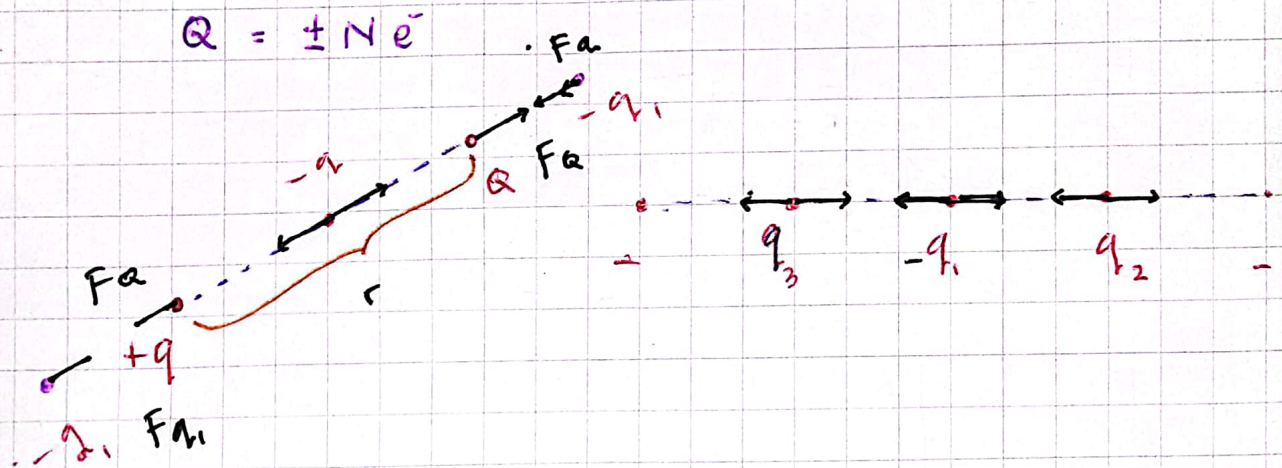
$$dV = r \, d\phi \, dz \, dr$$

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LISTRIK STATIS

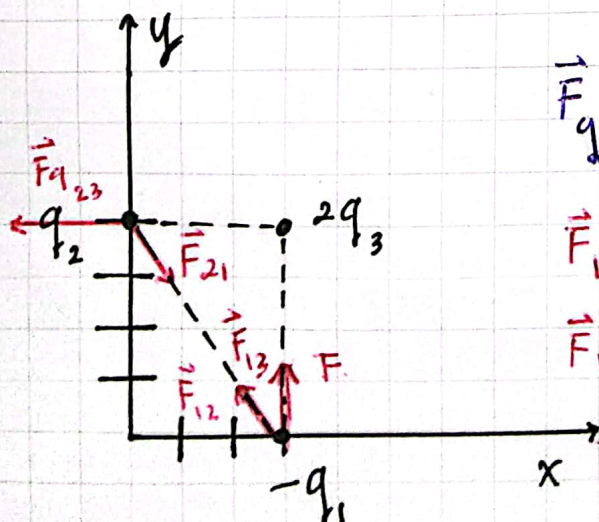
- ↳ Gaya Coulomb
 - Medan Listrik
 - diskrit
 - non diskrit
 - Potensial
 - diskrit
 - non diskrit
 - Usaha dan Energi
- Coulomb
 Gauss
 Statis



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

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

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



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

$$\vec{F}_{13} = \frac{k q_1 (2q_3)}{4^2} \hat{j} = \frac{2k q_1 q_3}{16}$$

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

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

$$|\vec{F}| = kq_1 \sqrt{0^2 + \square^2}$$

$$\begin{aligned} \vec{F}_{12} &= K \frac{q_1 q_2}{5^2} \left(\frac{-3\hat{i} + 4\hat{j}}{5} \right) \\ &= \frac{-3kq_1 q_2}{125} \hat{i} + \frac{4kq_1 q_2}{125} \hat{j} \end{aligned}$$

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

$$\begin{aligned} \vec{F}_{21} &= K \frac{q_2 q_1}{5^2} \left(\frac{-4\hat{j} + 3\hat{i}}{5} \right) \\ &= \frac{-4kq_2 q_1}{125} \hat{j} + \frac{3kq_2 q_1}{125} \hat{i} \end{aligned}$$

$$\vec{F}_{23} = \frac{-kq_2 q_3}{2^2} \hat{i} = \frac{-2kq_2 q_3}{2^2} \hat{i}$$

$$\begin{aligned} \vec{F} &= \left[\left(\frac{3kq_2 q_1}{125} + \frac{2kq_2 q_3}{4} \right) \hat{i} - \frac{4kq_2 q_1}{125} \hat{j} \right] \\ &= kq_2 \left[\left(\frac{3q_1}{125} + 2q_3 \right) \hat{i} - \frac{4q_1}{125} \hat{j} \right] \end{aligned}$$