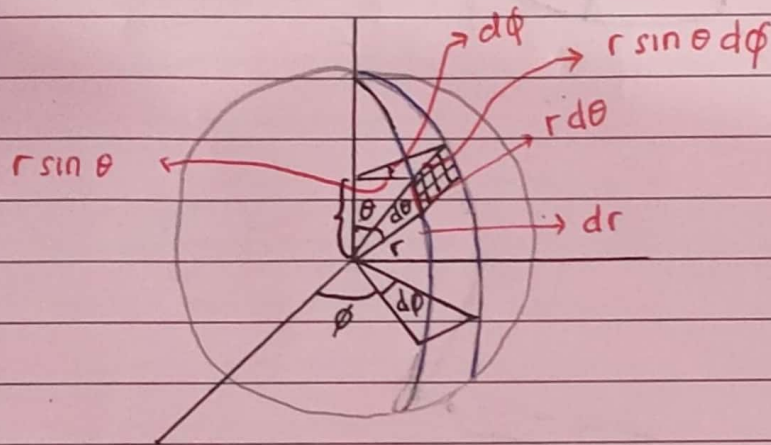


$$\nabla = \frac{\partial}{\partial r} \hat{r} + \frac{1}{r} \frac{\partial}{\partial \theta} \hat{\theta} + \frac{\partial}{\partial z} \hat{z}$$

$$\nabla \tau = \frac{\partial(\tau)}{\partial r} \hat{r} + \frac{1}{r} \frac{\partial(\tau)}{\partial \theta} \hat{\theta} + \frac{\partial(\tau)}{\partial z} \hat{z}$$

04 Maret 2023



$$A = P \times l$$

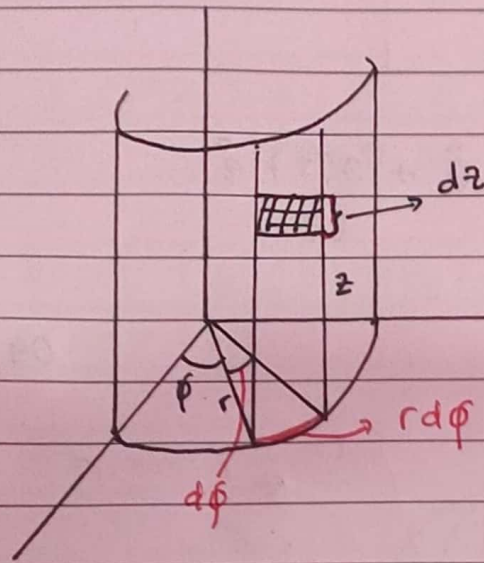
$$= r d\theta \cdot r \sin \theta d\phi$$

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

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

$$A = \int_0^{2\pi} \int_0^{\pi} r^2 \sin \theta d\theta d\phi = 4\pi r^2$$

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

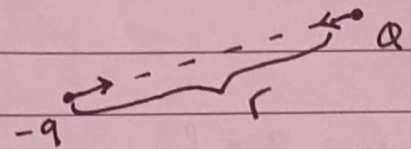
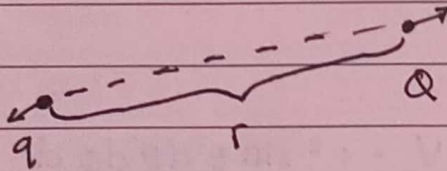


$$A = r d\phi dz$$

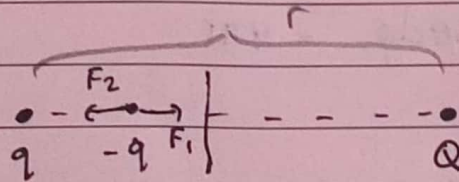
$$V = r d\phi dz dr$$

> Kelistrikan

» Listrik statis



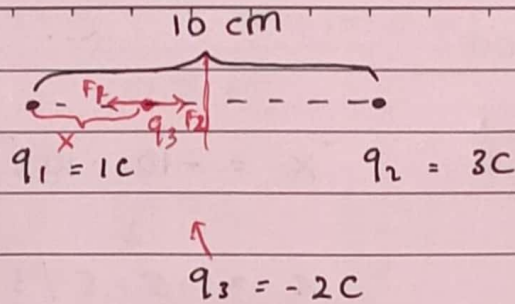
$$\vec{F} = \frac{1}{4\pi\epsilon_0} \frac{qQ}{r^2} \hat{r}_0$$



$$\vec{F}_1 = \vec{F}_2$$

$$k \frac{qQ}{(r-x)^2} = k \frac{qq}{x^2}$$

contoh :



$$\vec{F}_1 = \vec{F}_2$$

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

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

$$(10-x)^2 = 3x^2$$

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

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

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

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

$$0 = x^2 + 10x - 50$$

$$a = 1 \quad b = 10 \quad c = -50$$

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

$$= \frac{-10 \pm \sqrt{10^2 - 4(1)(-50)}}{2(1)}$$

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

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

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

$$x = -5 + 5\sqrt{3}$$

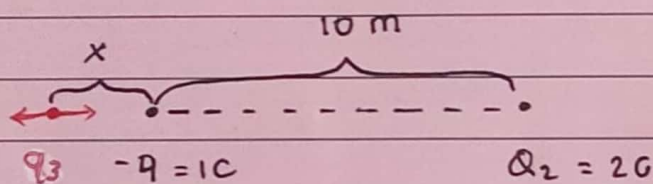
$$= -13,66$$

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

$$x = -5 - 5\sqrt{3}$$

$$= 3,66$$

contoh :



$$q_3 = 1C$$

$$\vec{F}_1 = \vec{F}_2$$

$$k \frac{q_1 q_3}{x^2} = k \frac{q_3 q_2}{(10+x)^2}$$

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

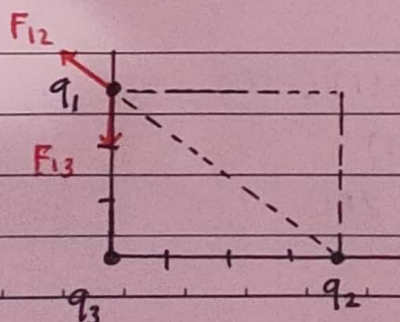
$$2x^2 = (10+x)^2$$

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

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

$$x^2 - 20x - 100 = 0 \rightarrow \text{lanjut pake rumus abc}$$

contoh :



$$F_{13} = k \frac{q_1 q_3}{3^2} (-\hat{j}) \rightarrow \text{asalnya dr } \frac{(0\hat{i} - 3\hat{j})}{\sqrt{0^2 + 3^2}}$$

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