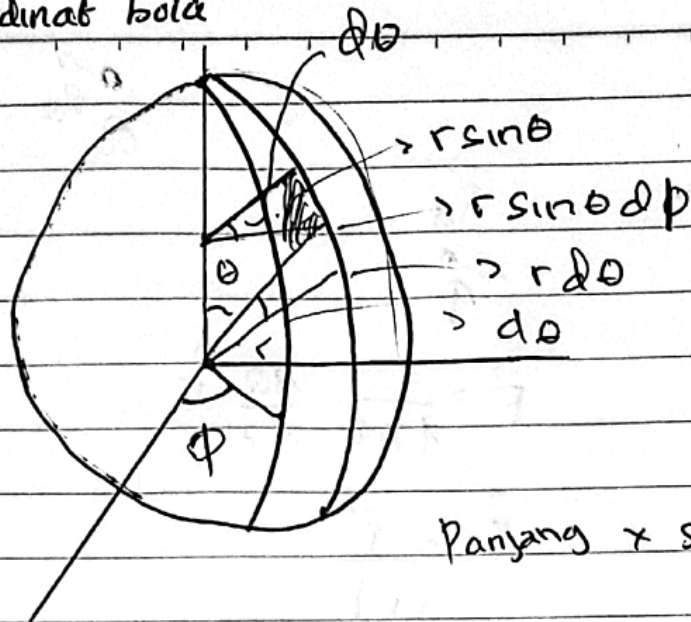


Sistem koordinat bola



Panjang x sudutnya.

$$da = d\phi \times d\theta$$

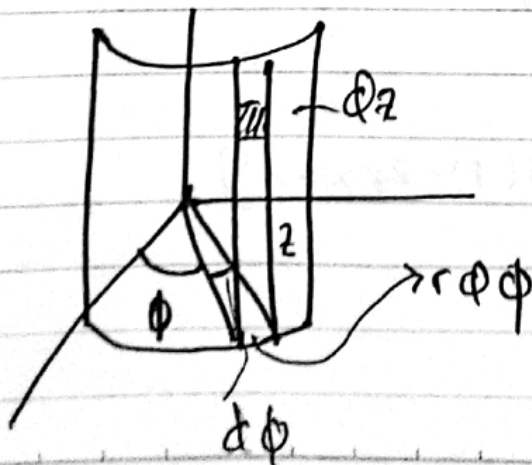
$$= r d\theta \cdot r \sin \theta d\phi$$

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

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

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

V:



$$A = r d\phi dz$$

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

"Medan Listrik"

Gaya listrik

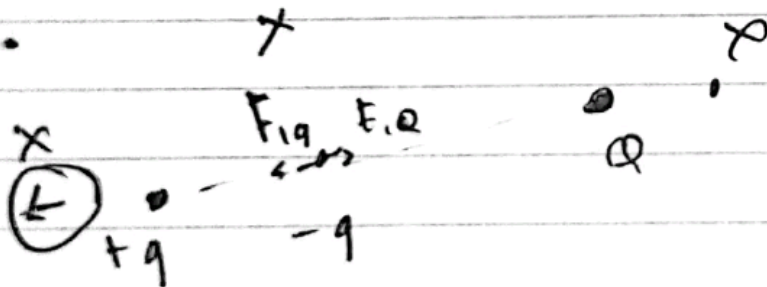
→ muatan listrik

$$q = \pm Ne$$

$$\vec{F}_q = \vec{F}_Q$$

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

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



$$Q > q$$

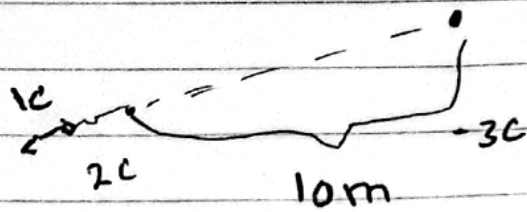
$$-q, F_q$$

$$\vec{F}_{1q} = F_{1Q}$$

$$K \frac{q \cdot Q}{(r-x)^2} = K \frac{q \cdot q}{(x^2)}$$

$$\frac{Q}{(r-x)^2} = \frac{q}{x^2}$$

$$Qx^2 = q(r^2 - 2rx + x^2)$$



2C

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

$$k \frac{1 \cdot 2}{x^2} = k \frac{1 \cdot 3}{(1+x)^2}$$

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

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

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

$$(x \dots) (x \dots)$$

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

$$= \frac{-(-40) \pm \sqrt{(-40)^2 - 4 \cdot 1 \cdot 200}}{2 \cdot 1}$$

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

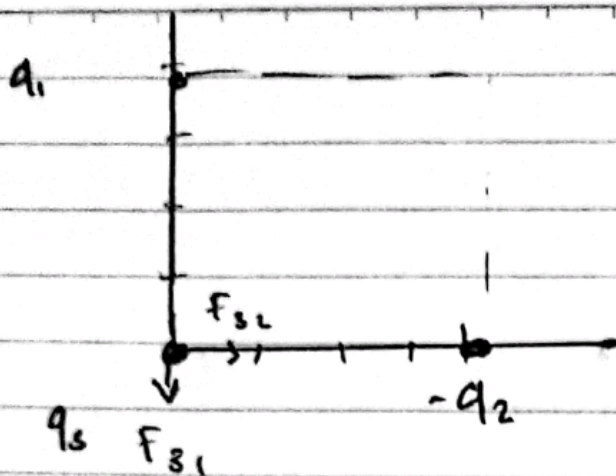
$$= \frac{-40 \pm \sqrt{800}}{2}$$

$$= \frac{-40 + 20}{2}$$

$$= -20$$

$$= \frac{-40 - 20}{2}$$

$$= -60$$



$$\vec{F}_{32} = k \frac{q_3 q_2}{4^2} \frac{(3\hat{i} + 0\hat{j})}{\sqrt{3^2 + 0^2}}$$

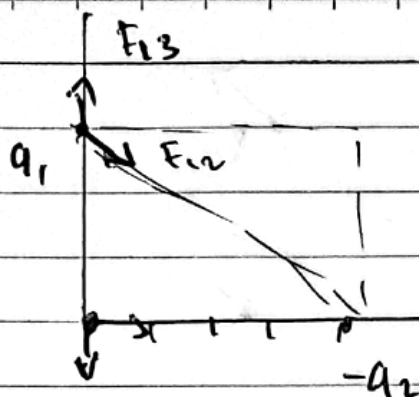
$$= k \frac{q_3 q_2}{16} \hat{i}$$

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

$$\vec{F}_{31} = k \frac{q_3 q_1}{3^2} (-\hat{j}) = -k \frac{q_3 q_1}{9} \hat{j}$$

$$\vec{F} = kq_3 \left[\frac{q_2}{16} \hat{i} - \frac{q_1}{9} \hat{j} \right]$$

$$|\vec{F}| = kq_3 \sqrt{\left(\frac{q_2}{16}\right)^2 + \left(\frac{q_1}{9}\right)^2}$$

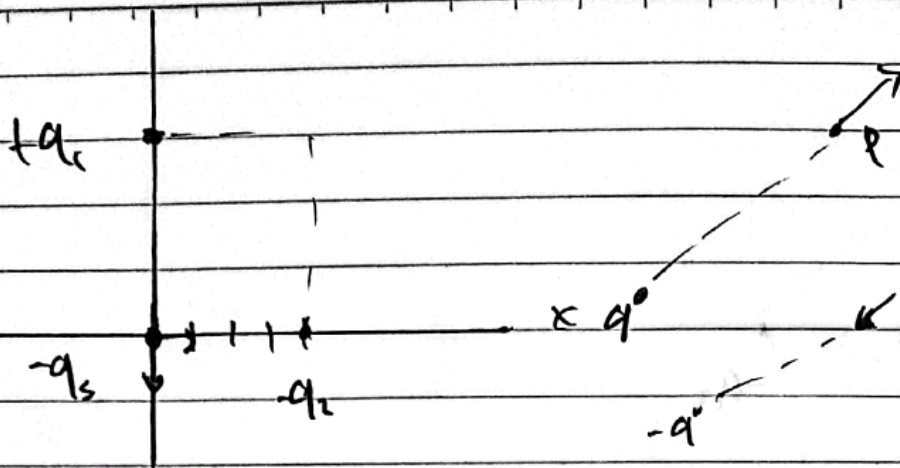


$$F_{13} = k \frac{q_1 q_3}{3^2} \hat{j}$$

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

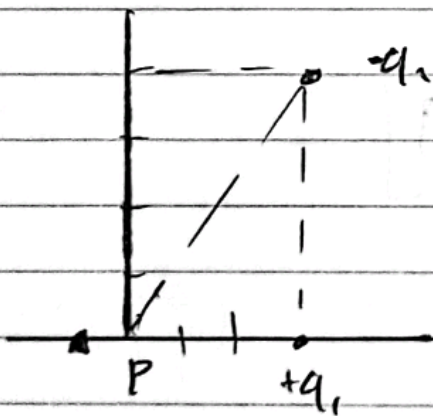
$$= 4k \frac{q_1 q_2}{125} \hat{i} - 3k \frac{q_1 q_2}{125} \hat{j}$$

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



$$\vec{E}_{q3} = \frac{\vec{F}_{32}}{q_3} = \frac{k q_3 q_2 / r^2}{q_3}$$

$$\vec{F} = k \frac{q}{r^2} \vec{r}$$



$$\vec{E} = k \frac{q_1}{3^2} (-\hat{j})$$

$$= k \frac{q_1}{9} -\hat{j}$$

$$\vec{E}_1 = k \frac{q_1}{5^2} \left(\frac{3\hat{i} + 4\hat{j}}{5} \right)$$

$$= 3k \frac{q_1}{125} \hat{i} + 4k \frac{q_1}{125} \hat{j}$$

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