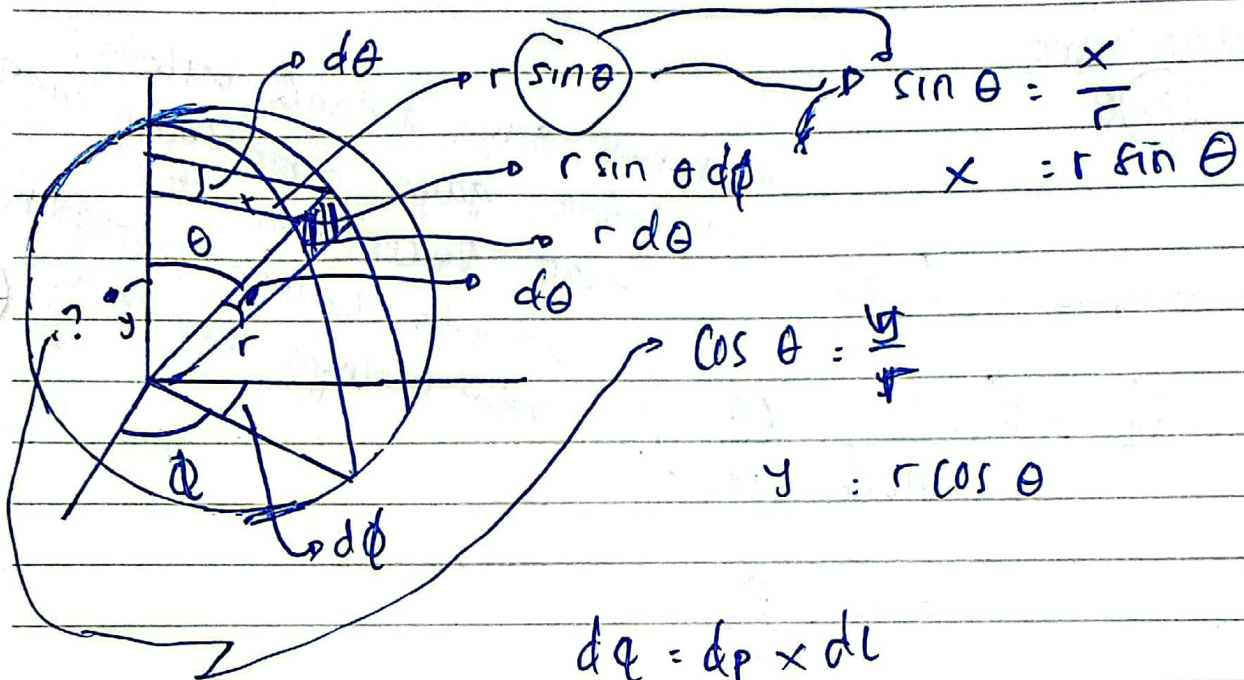




$$\sin \theta = \frac{x}{r}$$

$$x = r \sin \theta$$

$$\cos \theta = \frac{y}{r}$$

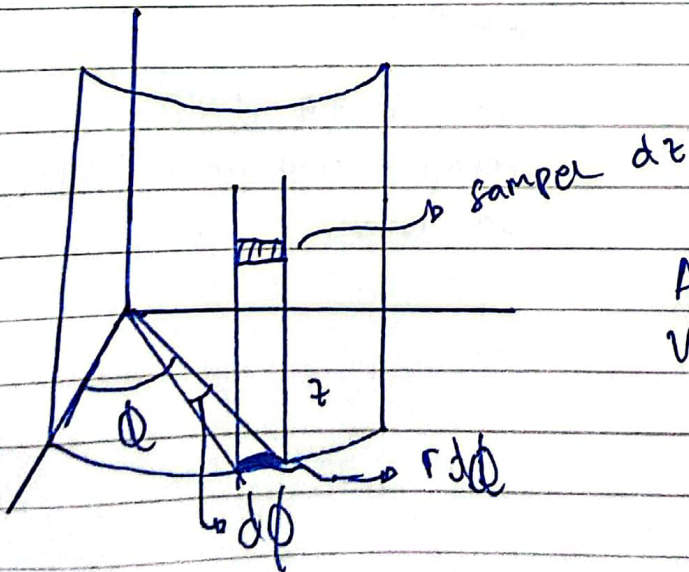
$$y = r \cos \theta$$

$$dV = dV \times dV$$

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

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

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



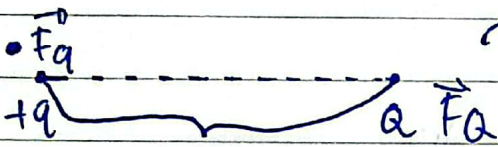
$$A(\text{luas}) : r d\phi dz$$

$$V(\text{volume}) : r d\phi dz dr$$

## Gaya Listrik

↳ muatan listrik

$$q = \pm (N)e$$

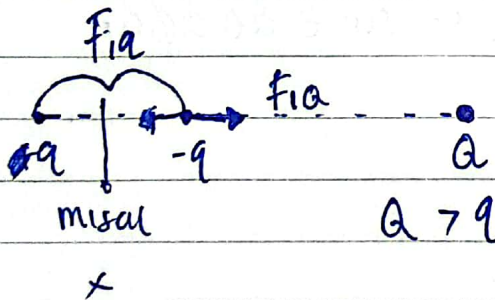


$$\vec{F}_q - \vec{F}_Q = \vec{F} = \frac{1}{4\pi\epsilon_0} \frac{qQ}{r^2} \hat{r}_0$$

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

↳ apakah gaya q dan Q berbeda?  
 ↳ tidak, gaya akan tetap sama  
 tetapi percepatan akan  
 berbeda karena dipengaruhi  
 besar besarnya muatan.

cth.

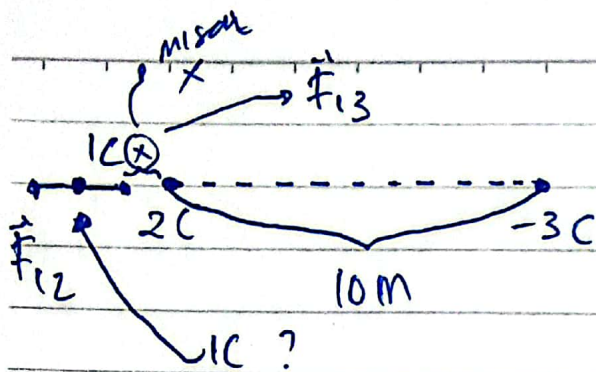


↳ jika ada -q maka  
 akan diletakkan disebelah  
 mana?

jika ada +q ?

- tetap diletakkan di posisi  
 -q juga

$$\text{maka } \vec{F}_{iq} = \vec{F}_{iQ}$$



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

~~$$\frac{1 \cdot 2}{x^2} = \frac{1 \cdot 3}{(10+x)^2}$$~~

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

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

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

$$x^2 + 40x + 200 = 0$$

$$(x-20)(x-60) = 0$$

→ gunakan rumus ABC

Rumus ABC

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

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

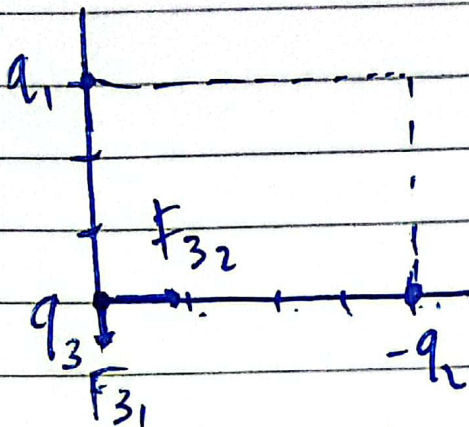
$$= \frac{-40 \pm \sqrt{1600 - 800}}{2}$$

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

$$= -20$$

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

$$= -60$$



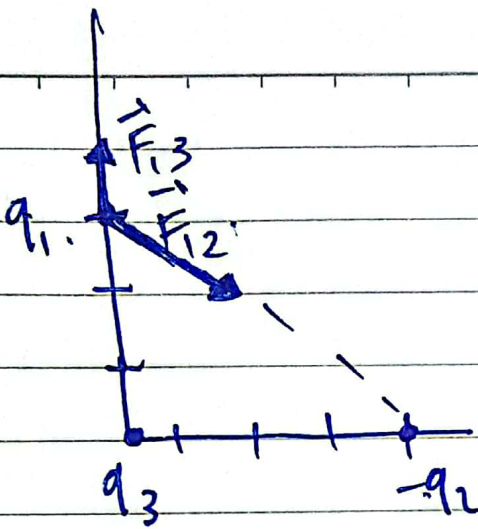
$$\vec{F}_{32} = k \frac{q_3 q_2}{r^2} \left( \frac{3\hat{i} + 0\hat{j}}{\sqrt{3^2 + 0^2}} \right)$$

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

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

$$\vec{F} = k q_3 \left[ \frac{q_2}{16} \hat{i} - \frac{q_1}{9} \hat{j} \right]$$

$$|\vec{F}| = k q_3 \sqrt{\left(\frac{q_2}{16}\right)^2 + \left(\frac{q_1}{9}\right)^2}$$



$$\vec{F}_{13} = k \frac{q_1 q_3}{3^2} \hat{j}$$

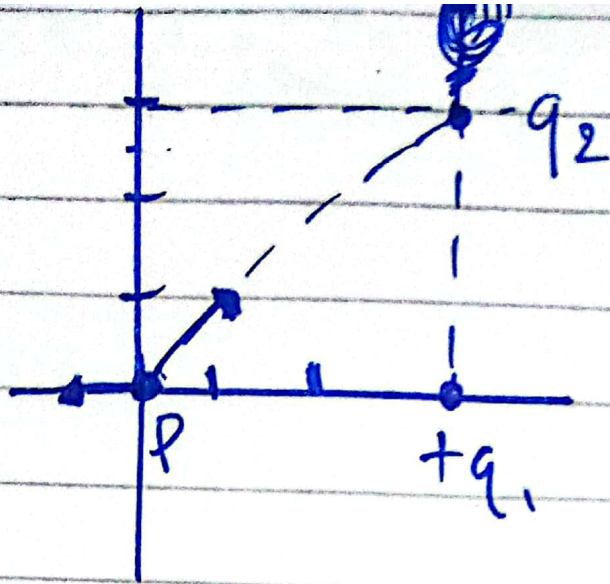
$$= k \frac{q_1 q_3}{9} \hat{j}$$

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

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

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

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



$$\vec{E}_1 = k \frac{q_1}{3^2} (-\hat{i})$$

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

$$\begin{aligned} \vec{E}_2 &= k \frac{q_2}{5^2} \left( \frac{3\hat{i} + 4\hat{j}}{5} \right) \\ &= 3k \frac{q_2}{125} \hat{i} + 4k \frac{q_2}{125} \hat{j} \end{aligned}$$

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