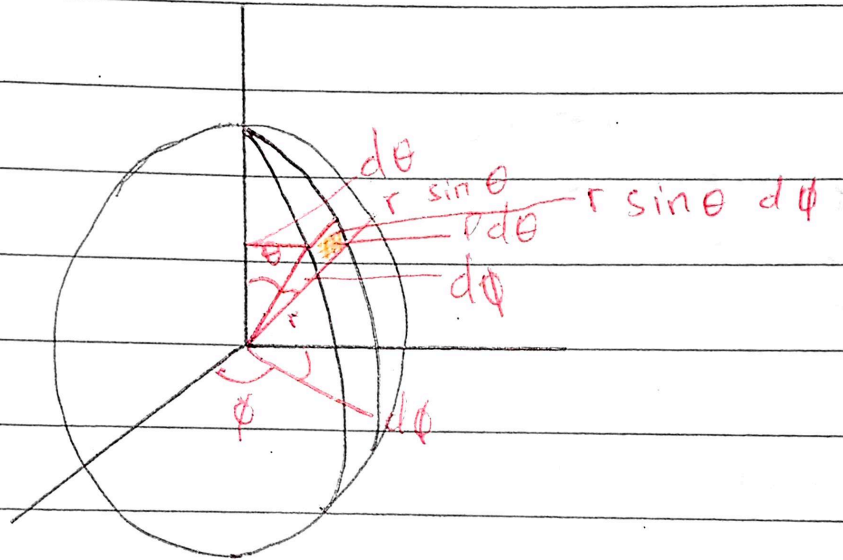


Senin, 4-03-2024

Kelistrikan dan Kemagnetan

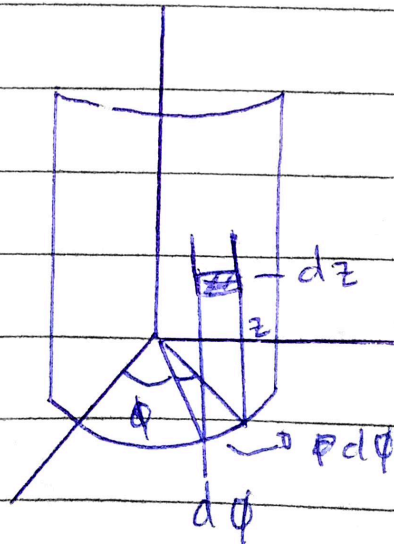


$$da = d\ell \times d\ell$$

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

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

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

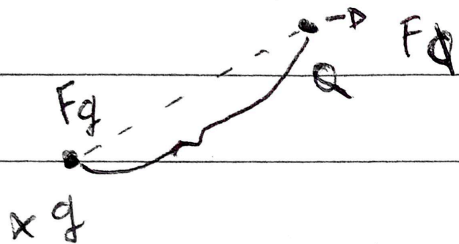


$$A = r d\phi dz$$

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

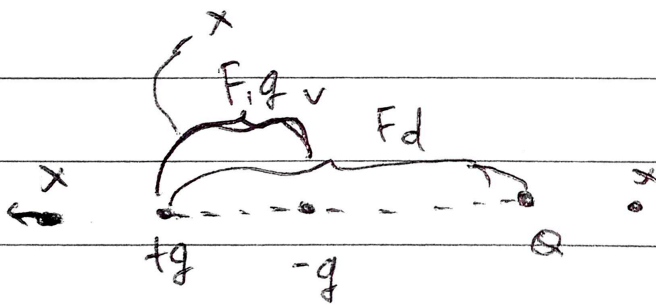
Muatan Listrik

$$q = \pm Ne$$



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

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

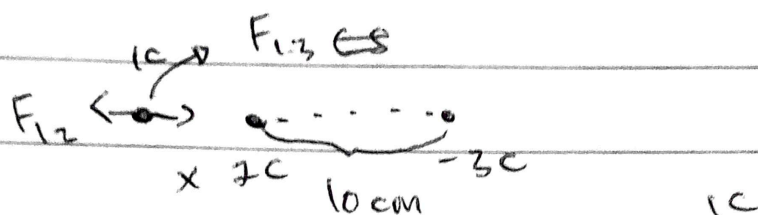


$$Q > q$$

$$-q \quad F_q \quad F_{1q} = F_{2q}$$

$$k \frac{q_1 Q}{(r-x)^2} = k \frac{q_1 q}{(x^2)}$$

$$\frac{Q}{(r^2 - 2rx + x^2)} \quad x^2 Q x^2 = 2(r^2 + rx + x^2)$$



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

$$F_i = F_g$$

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

$$k \frac{9 \cdot 0}{(r+x)^2} = k \frac{9 \cdot 9}{(x^2)}$$

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

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

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

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

$$(x-20)(x-60)$$

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

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

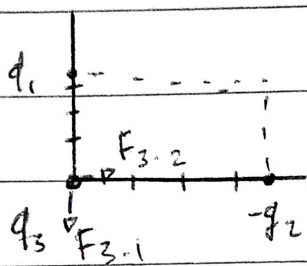
$$= \frac{-40 \pm \sqrt{1600 + 800}}{2}$$

$$= -40 \pm \sqrt{2400}$$

$$= -40 + 20 = -40 - 20$$

$$= -20$$

$$= -60$$



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

$$F_{32} = k \frac{q_3 \cdot q_2}{a^2}$$

$$\frac{(3\hat{i} + 0\hat{j})}{\sqrt{3^2 + 0^2}}$$

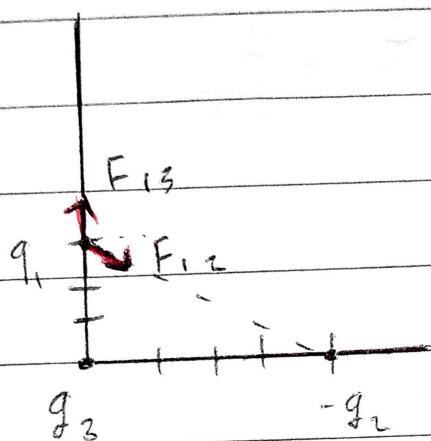
$$= k \frac{q_3 \cdot q_2}{l_0} \hat{i}$$

$$F_{31} = k \frac{q_3 \cdot q_1}{a^2} - \hat{j}$$

$$= k \frac{q_3 \cdot q_1}{a} \hat{j}$$

$$\vec{F} = k q_3 \left[\frac{q_2}{l_0} \hat{i} - \frac{q_1}{a} \hat{j} \right]$$

$$|\vec{F}| = k q_3 \sqrt{\left(\frac{q_2}{l_0}\right)^2 + \left(\frac{q_1}{a}\right)^2}$$

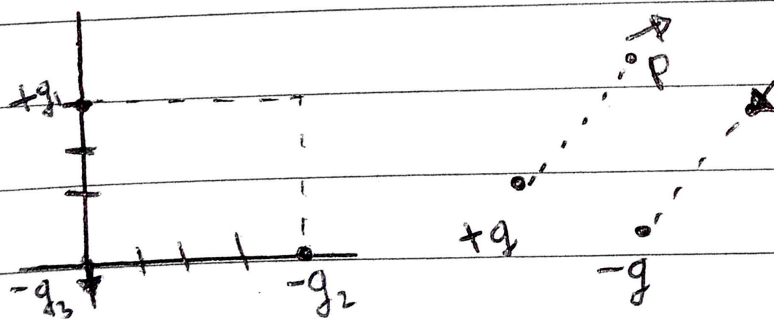


$$\vec{F}_{13} = k \frac{q_1 q_3}{3^2} \hat{j}$$

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

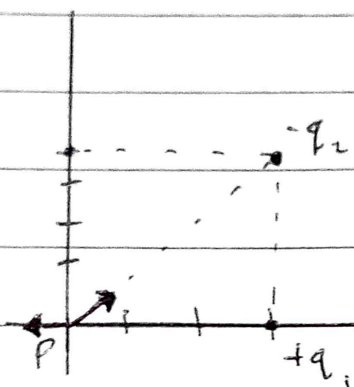
$$= 4k \frac{q_1 q_2}{125} \hat{i} - 3k \frac{q_1 q_2}{125} \hat{j}$$

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



$$\vec{F}_{g_3} = \vec{E}_{g_3} = \frac{\vec{F}_{3,2}}{q_3} = k \frac{q_3 q_2 / r^2}{q_3}$$

$$F = k \frac{q}{r^2} P_0$$



$$\vec{E}_1 = k \frac{q_1}{5^2} (-\hat{i})$$

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

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

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

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