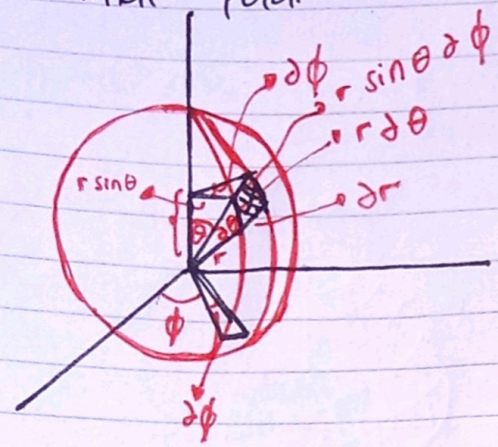
No. 4/2024

Date 3

Senin

Kelistrikan dan kemagnetan

→ Koordinat Polar



$A = P \times l$

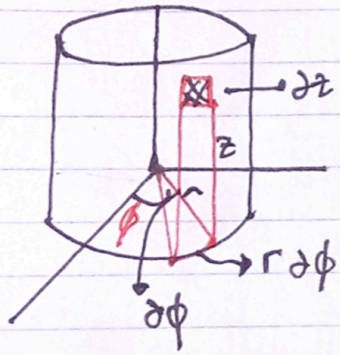
$= r\,\partial\theta \cdot r\sin\theta \cdot \partial\phi$

$= r^2 \sin\theta\, \partial\theta\, \partial\phi$

$A = 4\pi r^2$

$V = \frac{4}{3}\pi r^3$

→ Koordinat silinder



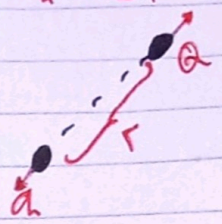
$A = r\,\partial\phi\,\partial z$

$V = r\,\partial\phi\,\partial z\,\partial r$

→ Listrik Statis

Contoh listrik statis yaitu petir.

$q = \pm Ne$

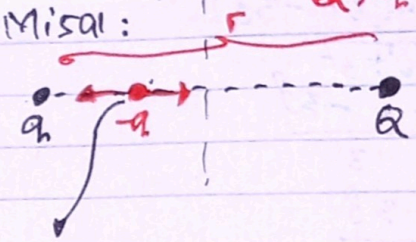


$F = \frac{1}{4\pi\varepsilon_0}$

ε_0 = Permitivitas listrik

$\varepsilon_0 = \frac{q \cdot Q}{r^2}\hat{r}$

Misal: $Q > q$



} Dimana letak $-q$ supaya seimbang

ditengah-tengah disebelah kiri supaya Q menarik $-q$ sama besar dengan q menarik $-q$.

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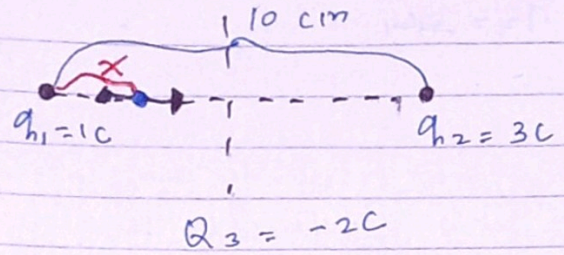
Latihan !

1)



$$\vec{F_1} = \vec{F_2}$$

$$k\frac{1.2}{x^2} = k\frac{2.3}{(10-x)^2}$$

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

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

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

$$100 - 10x - 10x + x^2 = 3x^2$$

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

$$100 - 20x + x^2 - 3x^2 = 0$$

$$-2x^2 - 10x^2 + 100 = 0 \quad | \times 1/2$$

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

$$x_{12} = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

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

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

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

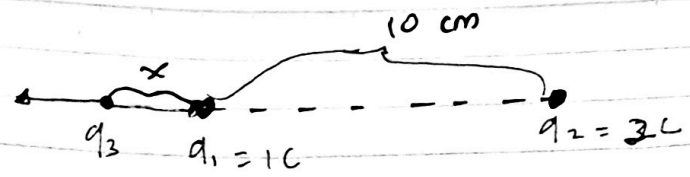
$$x_{12} = \frac{10 \pm 10\sqrt{3}}{-2}$$

$$x_{12} = \frac{10 \pm 10.1{,}7}{-2}$$

$$x_1 = \frac{10+17}{-2} = \frac{27}{-2} = -13{,}5$$

$$x_2 = \frac{10-17}{-2} = \frac{-7}{-2} = 3{,}5$$

2)



$$\vec{F_1} = F_2$$

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

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

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

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

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

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

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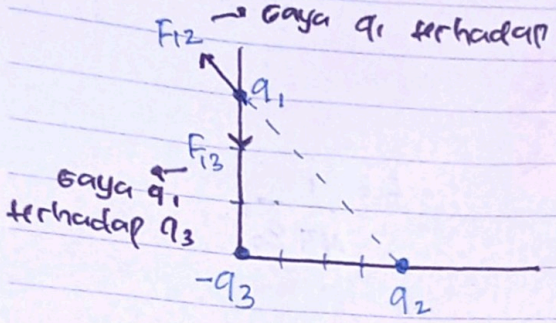
Contoh :



$$F_{13} = k\frac{q_1 \cdot q_3}{r^2}$$

$$= k\frac{q_1 \cdot q_3}{r^2}(-\hat{j})$$ → $\hat{j}$ untuk sumbu y. (-) karena ke bawah

$$F_{13} = \frac{k \cdot (0\hat{i} - 3\hat{j})}{\sqrt{0+3^2}}$$

$$F_{13} = \frac{k \cdot -3\hat{j}}{3}$$

$$F_{13} = \frac{-3\hat{j}}{3}$$

$$F_{13} = -\hat{j}$$

$$F_{12} = \frac{k \cdot q_1 \cdot q_2}{r^2}$$

$$= k \cdot \frac{q_1 \cdot q_2}{5^2}(-4\hat{i} + 3\hat{j})$$ (sumbu x, sumbu y)

$$=$$