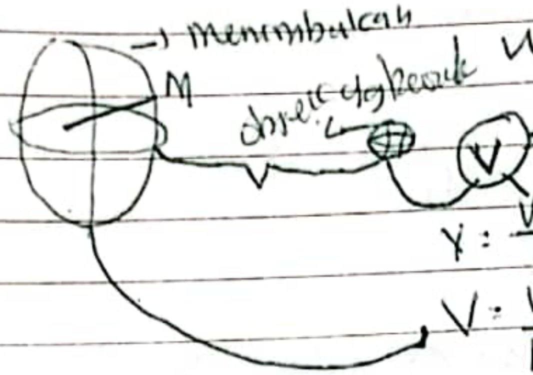
1 - April - 2024

"Kalisma"

Potensial listrik (Electrik Potensial)

Usaha per satuan muatan



$$W = G\frac{Mm}{r}$$

$$\frac{Gm}{r}$$

$$V = \frac{W}{m}$$

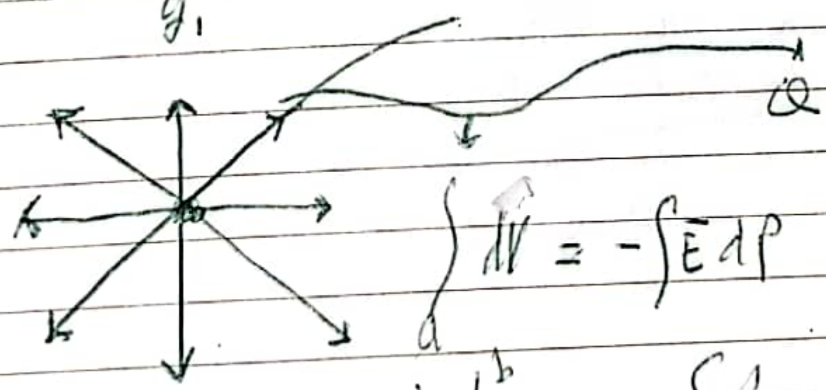
$$V = \frac{W}{m} = \frac{Gm}{r}$$

⇒ Benda terbesar di sebuah energi = kostanta.

$$V = \frac{W}{q} = \frac{F \cdot r}{q} = \frac{K\frac{q_1 Q}{r^2}r}{Q}$$

$$\boxed{V = K\frac{q}{r}}$$

$$V = \frac{W}{q_1}$$



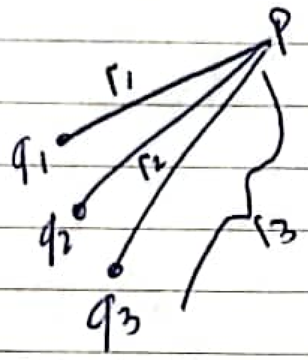
$$\int_a^b dV = -\int E\,dr$$

$$V\Big|_a^b = -\int \frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}\,dr$$

$$= -\frac{q_1}{4\pi\varepsilon_0}\int_{r_a}^{r_b} \frac{1}{r^2}\, dr = \frac{-q_1}{4\pi\varepsilon_0}$$

$$= \left(-\frac{1}{r}\Big|_{r_a}^{r_b}\right)$$

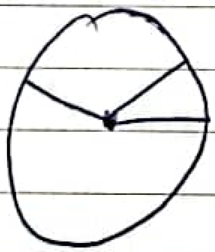
$$\therefore V_b - V_a = \frac{q_1}{4\pi\varepsilon_0}\left(\frac{1}{r_b} - \frac{1}{r_a}\right)$$



$$V_p = k\left[\frac{q_1}{r_1} + \frac{q_2}{r_2} + \frac{q_3}{r_3}\right]$$

$$= k\sum_{i=1}^{n} \frac{q_i}{r_i}$$

$$V = \frac{W}{q} = \frac{\vec{F}\cdot\vec{s}}{q} = \boxed{k\frac{q}{r}}$$



$$V_b - V_a = \frac{q \,=\, 0}{4\pi\varepsilon_0}\left(\frac{1}{r_b} - \frac{1}{r_a}\right)$$

$$\boxed{V_b - V_a = k\frac{Q}{R}}$$

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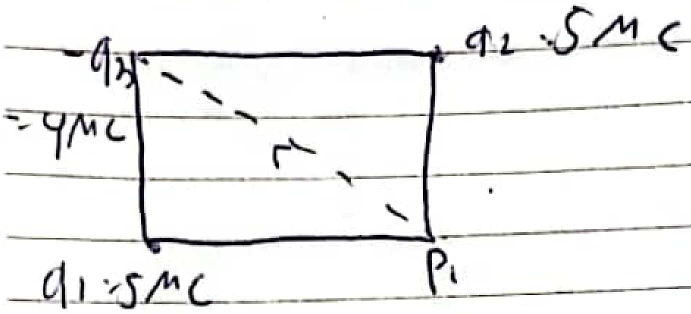
Soal 1

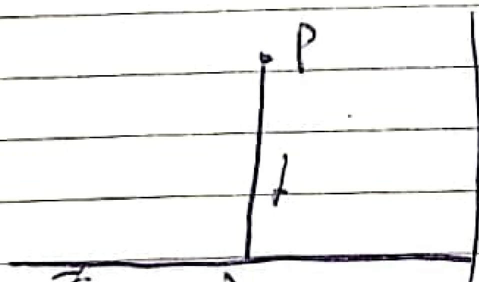
Gambarkan kasusnya



$$V = \frac{kq_1}{r_1} + \frac{kq_2}{r_2} + \frac{k(-q_3)}{r_3}$$

$$= k\left(\frac{5}{8} + \frac{5}{8} + \frac{(-4)}{\sqrt{8^2+8^2}}\right)$$

$$= k\left(\frac{5}{8} + \frac{5}{8} + \frac{(-4)}{\sqrt{128}}\right)$$



$$E = \frac{\lambda}{2\pi\varepsilon_0 r}$$

$$\oint E\,da = \frac{\lambda \cdot l}{\varepsilon_0}$$

$$\vec{E} \cdot (2\pi r l) = \frac{\lambda \cdot l}{\varepsilon_0}$$

$\cancel{\vec{E}\ (2\pi r}$

$$\vec{E} = \frac{\lambda}{2\pi\varepsilon_0 r}$$

$$E = -\nabla V$$

$$\nabla \cdot E = -\nabla^2 V$$

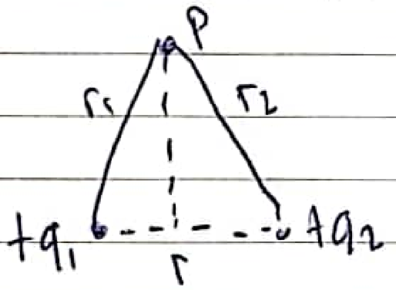
$$\nabla \cdot E = \frac{\rho}{\varepsilon_0}$$

$$\nabla^2 V = \frac{-\rho}{\varepsilon_0}$$ Poisson.

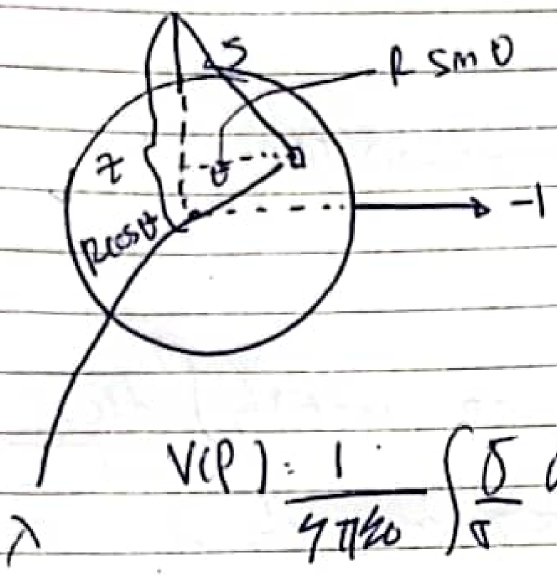
$$V = \int E \, dr$$

$$= -\int \frac{\lambda}{2\pi\varepsilon_0} \frac{1}{r} \, dr$$

$$= -\frac{\lambda}{2\pi\varepsilon_0} \int \frac{1}{r} \, dr$$



$$V_P = k\left[\frac{q_1}{(l+r)^2+z^2} + \frac{q^2}{\sqrt{(l+p^2)}+z^2}\right]$$



$$V(P) = \frac{1}{4\pi\varepsilon_0} \int \frac{\sigma}{r} da$$

$$r^2 = R^2 + z^2 - 2Rz\cos\theta$$

$$r = \sqrt{(R\sin\theta)^2 + (z - R\cos\theta)^2}$$

$$= \sqrt{R^2\sin^2 + z^2 + R^2\cos\theta - 2zR\cos\theta}$$

$$= \sqrt{R^2(\sin^2\theta + \cos\theta^2) + z^2 - 2zR\cos\theta}$$

$$= \sqrt{R^2 + z^2 - 2zR\cos\theta}$$

$$V = \frac{1}{4\pi\varepsilon_0} \int \frac{\sigma d}{r}$$

$$= \frac{1}{4\pi\varepsilon_0} \iint \frac{\sigma\, da}{(R^2 + z^2 - 2Rz\cos\theta)^{\frac{1}{2}}}$$

$$= \frac{\sigma}{4\pi\varepsilon_0} \int_0^{\pi}\int_0^{\pi} \frac{R\sin\theta\, d\theta\, d\phi}{(R^2 + z^2 - 2Rz\cos\theta)^{\frac{1}{2}}}$$

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$$= \frac{\sigma R 2\pi}{4\pi\epsilon_0} \int_0^{\pi} \frac{\sin\theta \, d\theta}{(R^2 + z^2 - 2Rz\cos\theta)^{1/2}}$$

$$V_P = \frac{\sigma R 2\pi}{4\pi\epsilon_0} \int_0^{\pi} \frac{\sin\theta \, d\theta}{(R^2 + z^2 - 2Rz\cos\theta)^{\frac{1}{2}}} \int_0^{\pi} \frac{d\cos\theta}{(R^2 + z^2 - 2Rz\cos\theta)^{\frac{1}{2}}}$$

$$= \square \int_0^{\pi} (R^2 + z^2 - 2Rz\cos\theta)^{-\frac{1}{2}} \, d(\cos\theta)$$

$$= \square_2 (R^2 + z^2 - 2Rz\cos\theta)^{\frac{1}{2}} \Big|_0^{\pi}$$