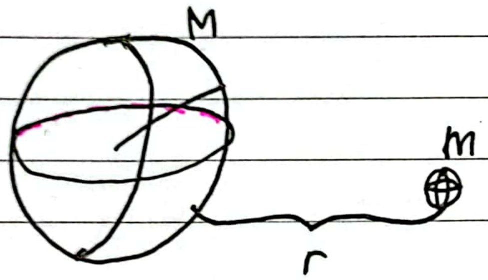
No Senin,
Date 1 - 04 - 2024

KALISMA

Potensial Listrik

- Usaha per satuan → muatan
- Perubahan energi potensial persatuan masa.

diskrit 1
continous 1 } UTS 30 menit di vc



$W = G \frac{M \cdot m}{r}$

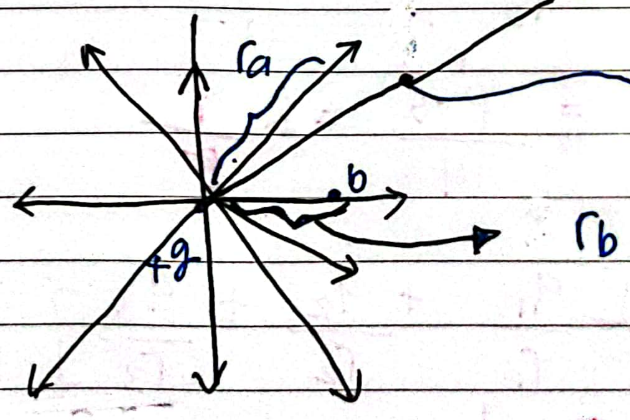
$V = G \frac{M}{r}$ → di mars

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

$V = \frac{W}{M} = G \frac{M}{r}$ → di bumi

$V = \frac{M}{q} = \frac{F \cdot r}{q} = \frac{k \frac{q Q r}{r^2}}{Q}$

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



$\int_a^b dv = -\int \vec{E}\, dr$

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

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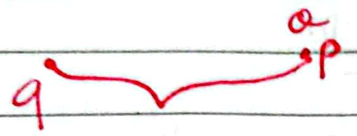
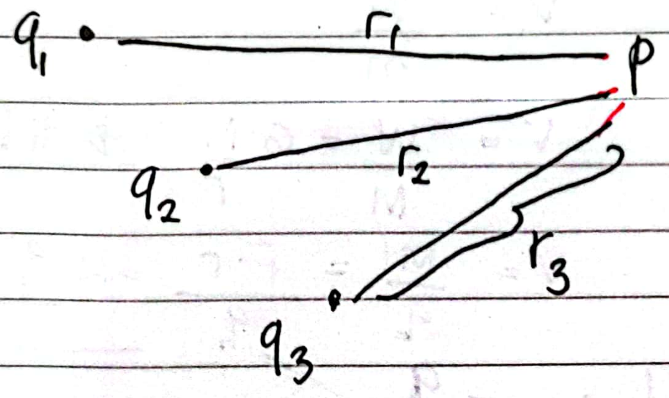
$$V\Big|_a^b 1 = -\int \frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}\,dr = -\frac{q}{4\pi\varepsilon_0}\left(-\frac{1}{r}\Big|_{a}^{b}\right)$$

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

$$\boxed{V = k\frac{q}{r}} \qquad V = \frac{W}{Q} \qquad \rightarrow k = \frac{qQ}{r}$$

$$= k\frac{q}{r}$$

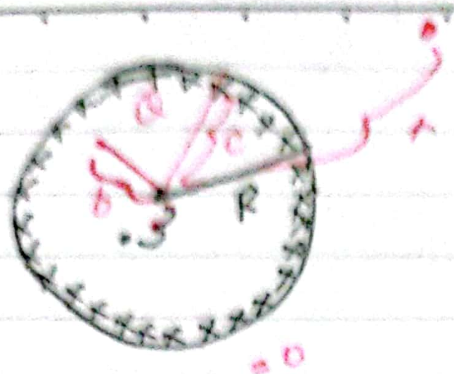




$$V = \frac{W}{q} = \frac{\vec{P}\cdot\vec{S}}{q} = k\frac{q}{r}$$

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

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



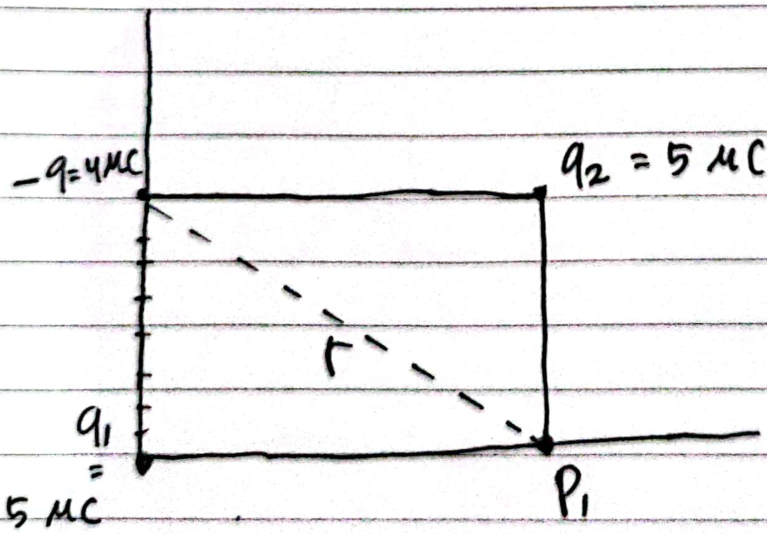
$$V_b - V_a = \frac{q}{4\pi\varepsilon_0}\left(\frac{1}{r_b} - \frac{1}{r_a}\right)$$

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

$$V = k\frac{Q}{r}, \quad r > R$$

Soal

1. Gambarkan Step up. kasusnya



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

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

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

$$\vec{E} = -\nabla V$$

$$\nabla \cdot \vec{E} = -\nabla^2 V$$

$$\nabla \cdot \vec{E} = \frac{\rho}{\varepsilon_0}$$ → pers Gauss dlm diferensial

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

$$\nabla^2 V = 0$$ Laplace

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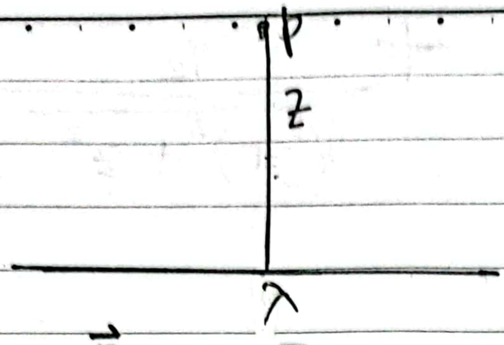


$$\vec{E} = \frac{\lambda}{2\pi \varepsilon_0 r}$$

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

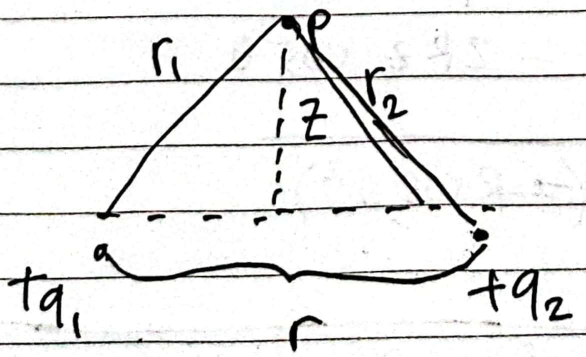
$$\vec{E} = (2\pi r \cancel{l}) = \frac{\lambda \cancel{l}}{\varepsilon_0}$$

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

$$V = -\int \vec{E}\, dr$$

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

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



$V_p = \ldots ?$

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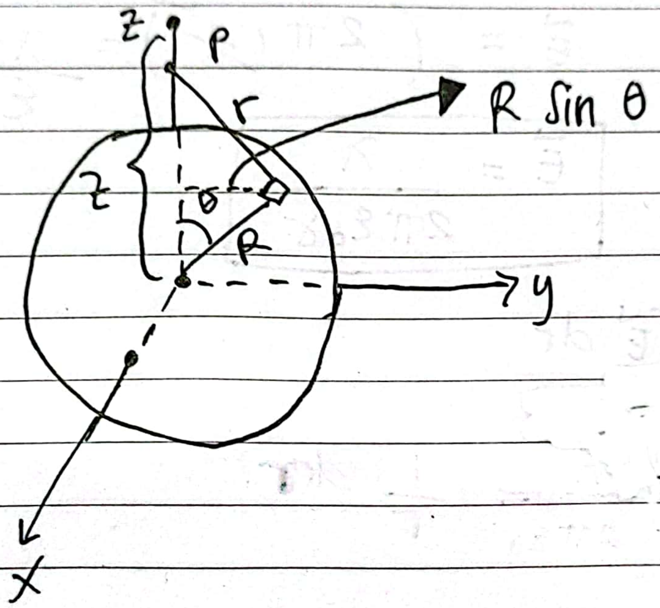
$$V_p = K\left[\frac{q_1}{\sqrt{(\frac{1}{2}r)^2 + z^2}} + \frac{q_2}{\sqrt{(\frac{1}{2}r)^2 + z^2}}\right]$$



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

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

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

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

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

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

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

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

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

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

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

$$= \square 2 \left(R^2 + z^2 - 2Rz\cos\theta\right)^{1/2} \Big|_0^{\pi}$$