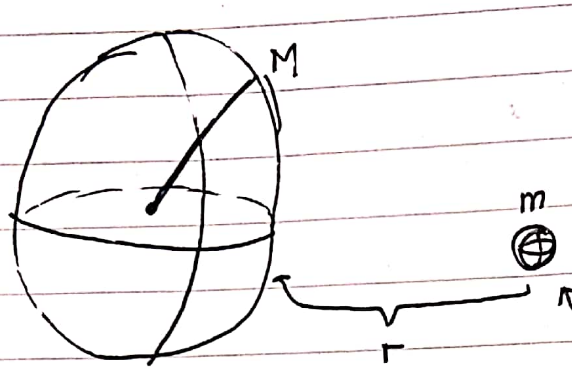
Date :

kallisma

▸ Potensial Listrik (electric potensial) → usaha/satuan muatan

①



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

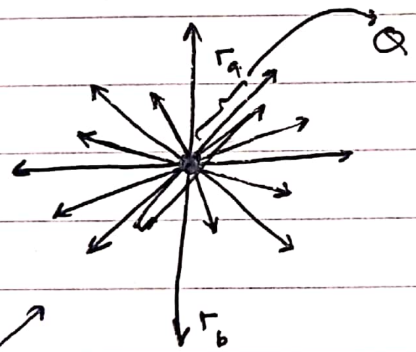
$$V = \frac{W}{m} = \frac{\frac{G \cdot M \cdot \cancel{m}}{r}}{\cancel{m}}$$

$$V = G \cdot \frac{M}{r}$$

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

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

②



$$V = \frac{W}{q} = \frac{F \cdot r}{q} = \frac{\frac{k\, q \cdot \cancel{Q} \cdot \cancel{r}}{\cancel{r^2}}}{\cancel{Q}}$$

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

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

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

$$\boxed{= -\frac{q}{4\pi\varepsilon_0}\int_{r_a}^{r_b}\frac{1}{r^2}\, dr} = -\frac{q}{4\pi\varepsilon_0}\left(-\frac{1}{r}\Big|_{r_a}^{r_b}\right)$$

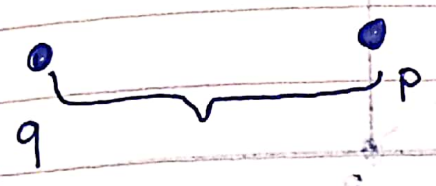
(2.23)

No.

Date :

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

3



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

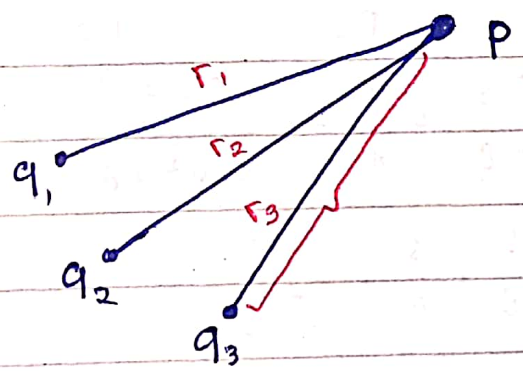
$$V = \frac{W}{Q}$$

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

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

4

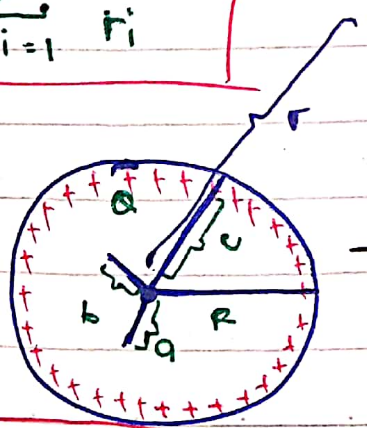
$$V_p = k\left[\frac{q_1}{r_1} + \frac{q_2}{r_2} + \frac{q_3}{r_3}\right]$$



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

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

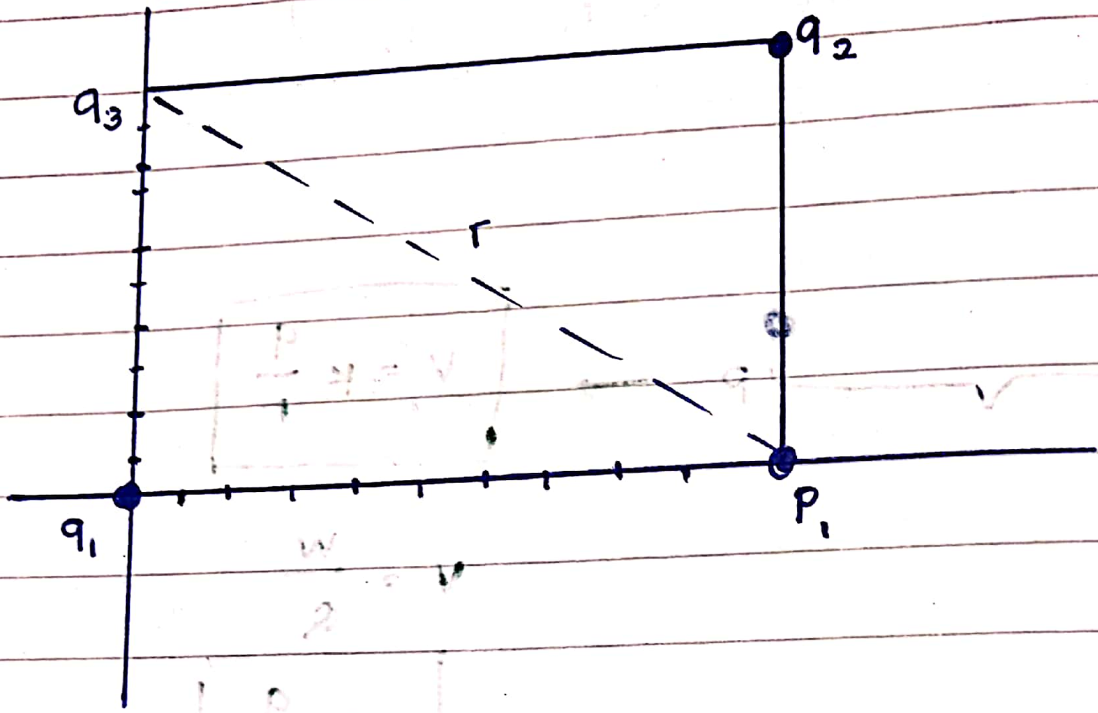
5



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

$$\boxed{V = k = \frac{Q}{r} = r > R}$$ persamaan diluar

b.



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

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

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

No.

Date :

- Persamaan poisson dan persamaan lapolace

$$E = -\nabla V$$

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

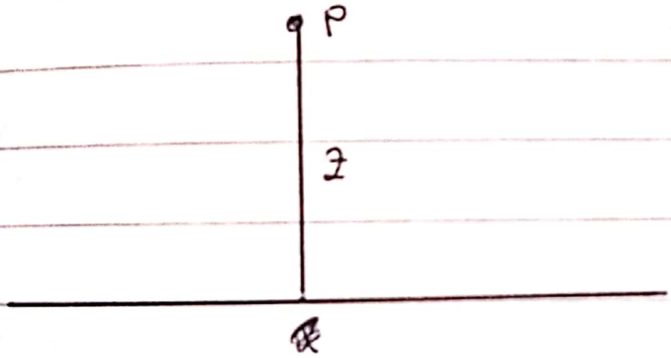
$$\nabla E = \rho / \varepsilon_0$$

$$\boxed{\nabla^2 E = -\rho / \varepsilon_0}$$ → poisson → potensial atau besaran yang berasal dari sumbernya

gradien → perubahan

$$\boxed{\nabla^2 V = 0}$$ → lapalace → potensial atau besaran yang tidak memiliki sumber (0)

- potensial muatan terdistribusi (distrit)



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

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

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

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

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

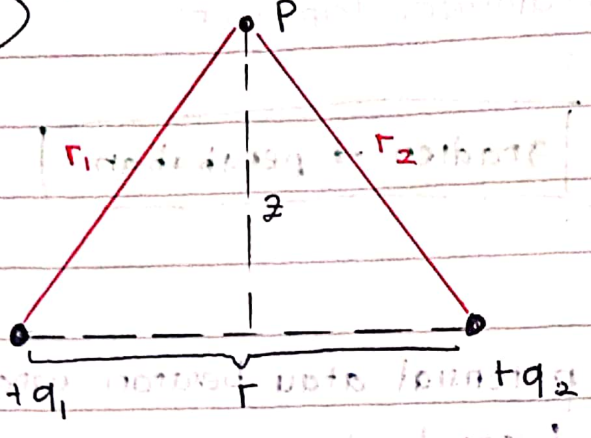
$$= -\int \frac{\lambda}{2\pi\varepsilon_0} \frac{1}{r} dr$$

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

No.

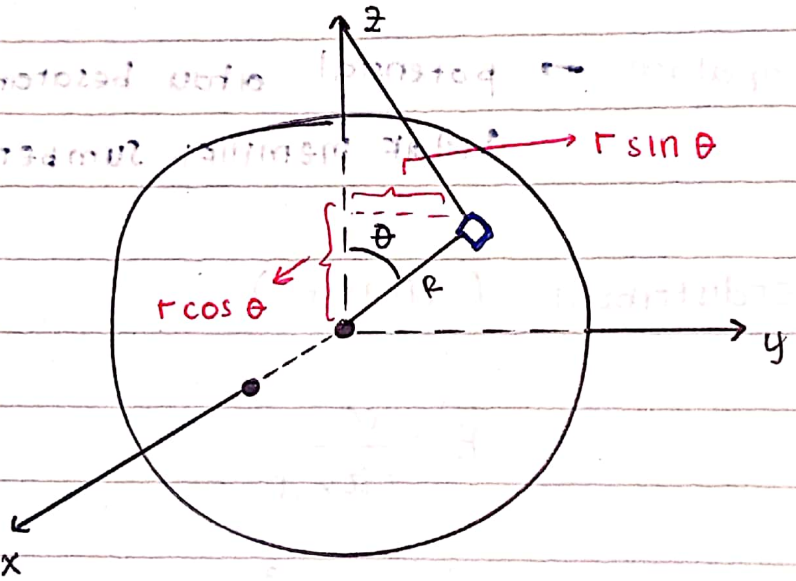
Date :

example 1 .



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

example 2



$$V_P = \frac{1}{4\pi\epsilon_0}\int \frac{\sigma}{r}\,da$$

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

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

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

No.

Date :

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

$R^2 \sin\theta \, d\theta \, d\phi$

$dq = \sigma \, da$

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

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

R^2

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

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

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

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

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

$$V_p = \frac{\sigma R 2\pi}{4\pi\varepsilon_0} \, 2(R^2 + z^2 - 2Rz\cos\theta)^{\frac{1}{2}} \Big|_0^{\pi}$$