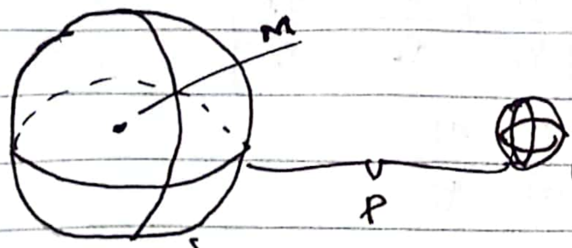
~ KALISMA ~ 01 APRIL 2024

Potensial Listrik



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

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

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

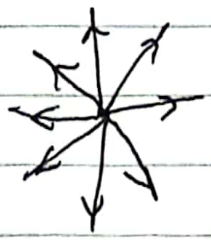
$$V = \frac{W}{M} = G\frac{m}{r}$$

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

$$V = \frac{W}{q} = \frac{F \cdot r}{q}$$

$$\frac{k\frac{qQr}{r}}{Q}$$

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



$$\int_a dV = -\int \vec{E} \cdot dr$$

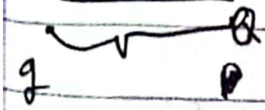
$$V\Big|_a^b = -\int \frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}\,dr$$

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

$$= \frac{q}{4\pi\varepsilon_0}\left(\frac{1}{r}\right)\Big|_{r_a}^{r_b}$$

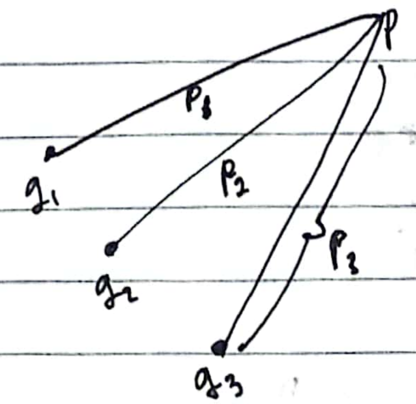
$$\boxed{V_b - V_a = \frac{q}{4\pi\varepsilon_0}\left(\frac{1}{r_b} - \frac{1}{r_a}\right)}$$

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



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

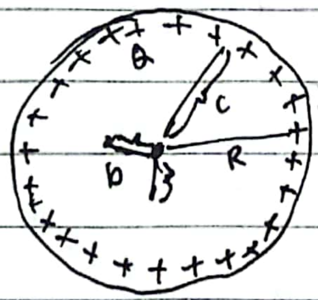
$$P = k\frac{q}{r}$$



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

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

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



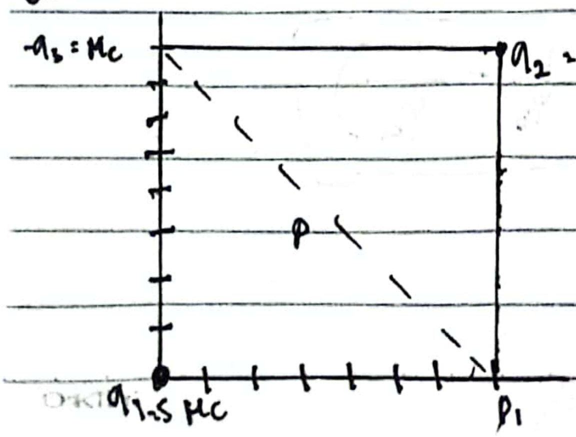
$$V_b - V_a = \frac{q}{4\pi\epsilon_0}\left(\frac{1}{r_b}-\frac{1}{r_a}\right)$$

$$V_b - V_a = K\frac{Q}{R}$$

Soal 1

Dua buah muatan titik positif sama besarnya +5 μC pada sumbu x. Satu dipusat (0,0) dan yg lain pada (8,0) cm. Tentukan potensial di (a) titik P_1 pada posisi (8,6) cm.

Jawab



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

$$= k\left(\frac{5}{9} + \frac{5}{8} + \frac{(-4)}{\sqrt{8^2+8^2}}\right)$$

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

- Persamaan poissan & lapalace

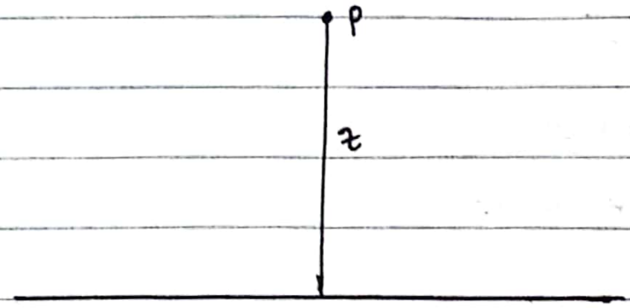
$E = -\nabla V$

$\nabla . E = -\nabla^2 V$ — Persamaan Gaus $\oint \vec{E} . d\vec{a} = \int_V (\nabla . \vec{E}) \, d\tau$

$\nabla . \vec{E} = \frac{\rho}{\epsilon_0}$

$\nabla^2 V = \frac{\rho}{\epsilon_0}$ Persen

$\nabla^2 V = 0$ Laplace



$E = \frac{\lambda}{2\pi\epsilon_0 r}$

$\oint \vec{E} . da = \frac{\lambda . \ell}{\epsilon_0}$

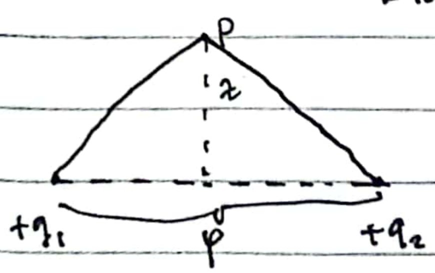
$\vec{E}(2\pi\rho\cancel{\ell}) = \frac{\lambda\cancel{\ell}}{\epsilon_0}$

$\vec{E} = \frac{\lambda}{2\pi\epsilon_0 r}$

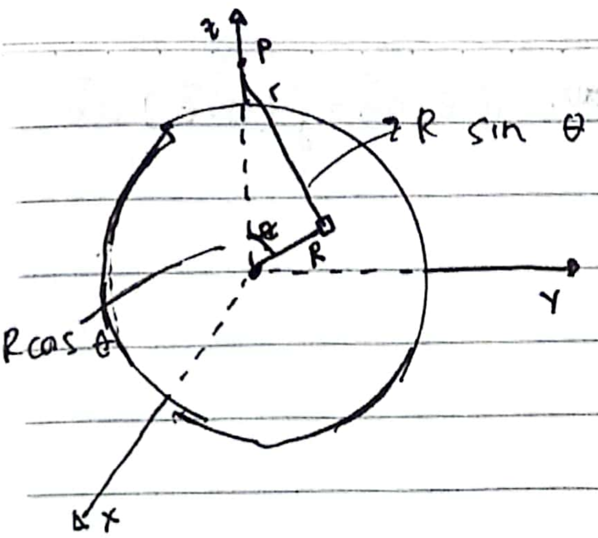
$V = \int \vec{E} \, d\rho$

$= -\int \frac{\lambda}{2\pi\epsilon_0} \frac{1}{\rho}$

$= -\frac{\lambda}{2\pi\epsilon_0} \int \frac{1}{\rho} d\rho$



$V_p = k \frac{q_1}{\sqrt{(\frac{1}{2}\rho)^2 + z^2}} + \frac{q_2}{\sqrt{(\frac{1}{2}\rho)^2 + z^2}}$



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

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

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