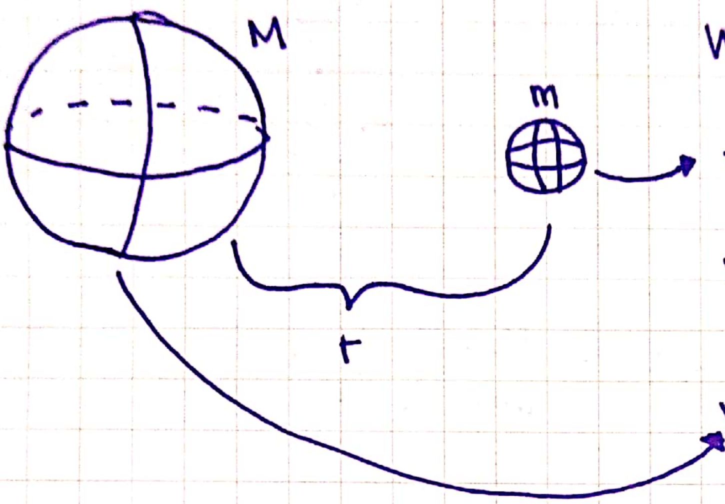
01 - 04 - 24

"pontesial listrik"

electric potensial



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

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

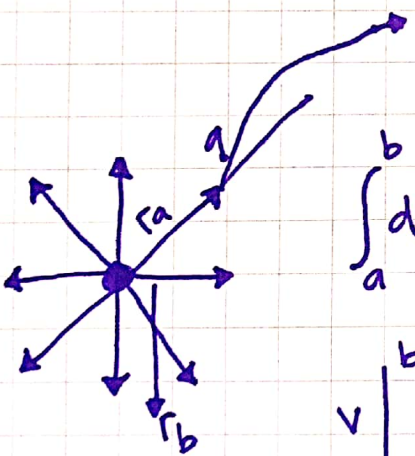
$$V = \frac{W}{M}$$

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

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

$$= \frac{\frac{kq.\cancel{Q}}{\cancel{r^2}}}{\cancel{Q}}$$

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



$\int \Delta V$

$$\int_a^b dV = -\int \vec{E}.dr$$

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

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

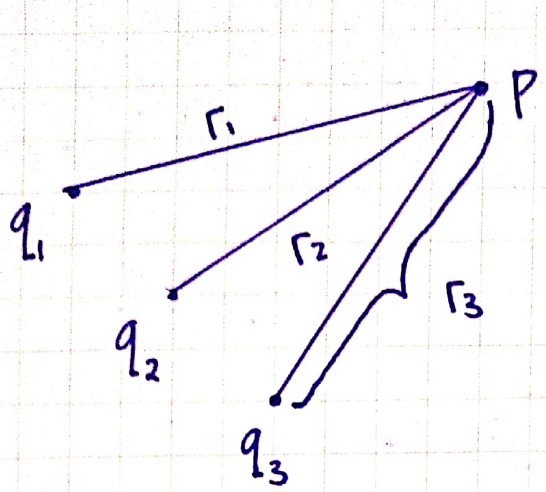
$$V_a - V_a = \frac{q}{4\pi\varepsilon_0}\left(\frac{1}{r_b} - \frac{1}{r_a}\right)$$

$\underbrace{q \qquad p}$

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

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

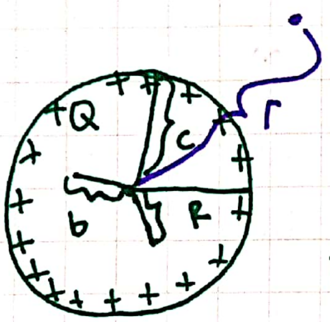
JOYKO



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

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

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



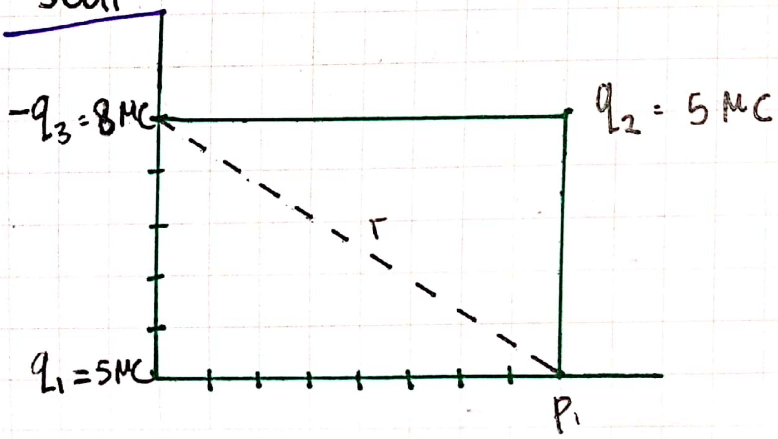
$$V_b - V_a = \frac{\overset{=0}{R}}{4\pi\epsilon_0}\left(\frac{1}{r_b} - \frac{1}{r_a}\right)$$

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

$$V = k\frac{Q}{r} \;;\; P > R$$

=dl

"Soal"



$$V = \frac{kq_1}{r_1} + \frac{kq_2}{r_2} + \frac{k(-q_3)}{5}$$

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

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

"Persamaan Paisson" dan Persamaan Lapalace"

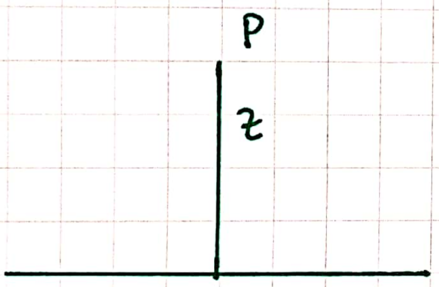
$$\vec{E} = -\nabla V$$

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

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

$$\boxed{\nabla^2 V = -\frac{\rho}{\varepsilon_0}} \longrightarrow \text{Paisson}$$

$$\boxed{\nabla^2 V = 0} \longrightarrow \text{Lapalace}$$



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

$$\oint \vec{E} \cdot da = \frac{a \cdot \ell}{\varepsilon_0}$$

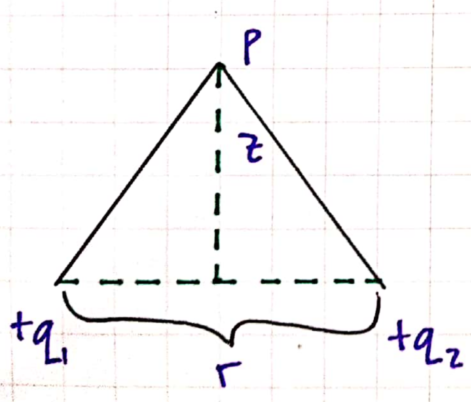
$$\vec{E}(2\pi r \cancel{\ell}) = \frac{a \cdot \cancel{\ell}}{\varepsilon_0}$$

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

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

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

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

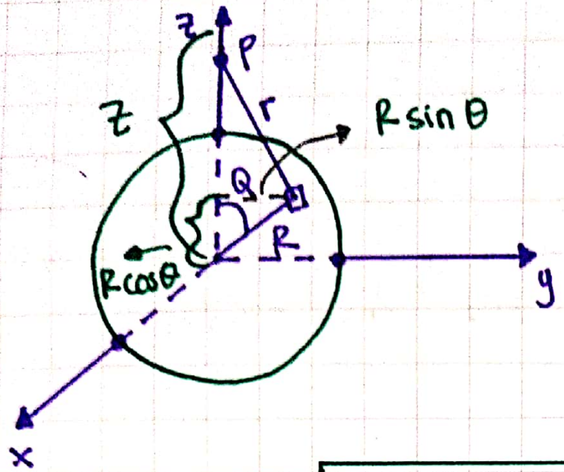


(skalar)

$$V_P = ?$$

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

"Contoh Soal"



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

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

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

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

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

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

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

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

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

R^2

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

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

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

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

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