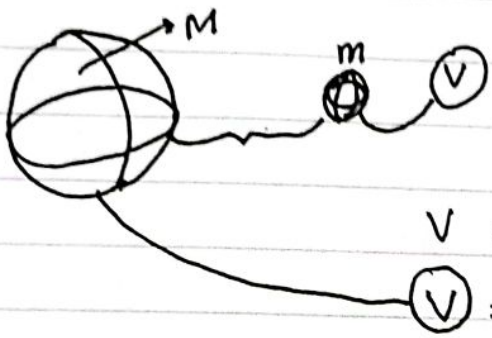
No Senin
Date 1 April 2024

Potensial Listrik
(electric potensial)

$$W = 6\frac{Mm}{r}$$



$$V = 6\frac{M}{r}$$

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

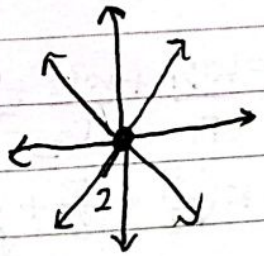
$$V = \frac{W}{m} = 6\frac{M}{r}$$

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

$$= \frac{\frac{kq_1 \cdot q_2}{r^2} r}{q}$$

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

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



$$V\Big|_a^b = -\int \frac{1}{4\pi\epsilon_0}\frac{q}{r^2}\,dr$$

$$= -\frac{q}{4\pi\epsilon_0}\int_{ra}^{rb}\frac{1}{r^2}\,dr$$

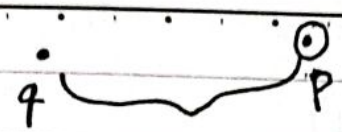
$$= -\frac{q}{4\pi\epsilon_0}\left(-\frac{1}{r}\Big|_{ra}^{rb}\right)$$

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

No
Date

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

Kasus

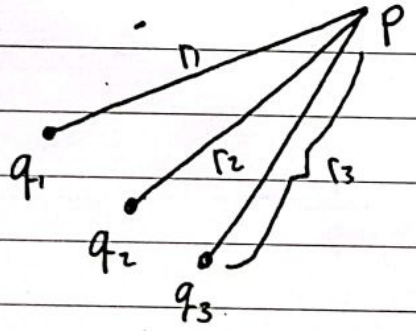


$k \frac{q \cdot d}{r}$

↓

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

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



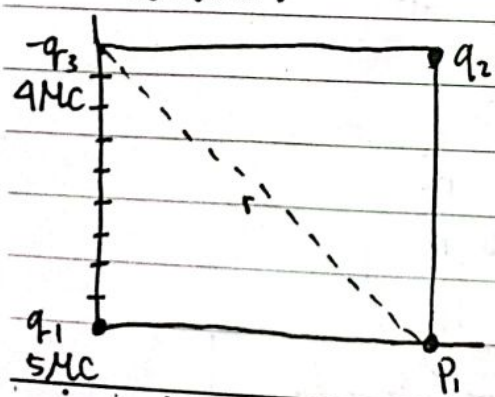
$V_p = k \left[\frac{q_1}{r_1} + \frac{q_2}{r_2} + \frac{q_3}{r_3} \right]$

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

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

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

Contoh :



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

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

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

No Senin
Date 1 April 2024

Persamaan poisson dan persamaan Lapalace

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

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

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

$\nabla^2 V = -\frac{\rho}{\epsilon_0}$ → poisson

$\nabla^2 V = 0$ → Laplace

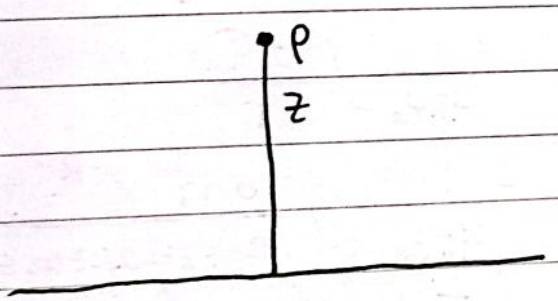
(Potensial)

Note :

(Gaus)

$\oint_s \vec{E}\, da = \oint_v (\nabla \cdot \vec{E})\, dv$

Gradien = perubahan (dlm fisika)



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

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

$\vec{E}(2\pi r \ell) = \frac{\lambda \cdot \ell}{\epsilon_0}$

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

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

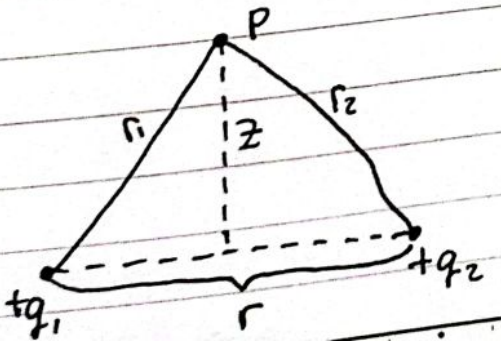
$= -\int \frac{\lambda}{2\pi\epsilon_0} \frac{1}{r} dr$

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

Contoh :

$V_p = ?$

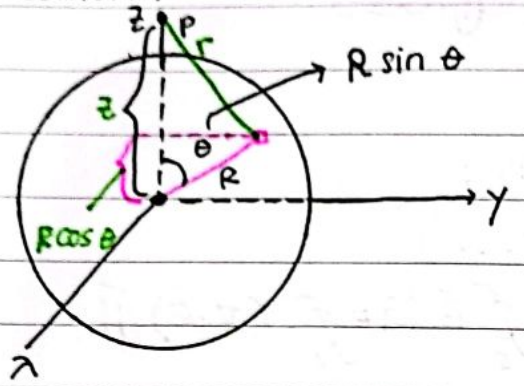
$V_p = K \left[\frac{q_1}{\sqrt{(\frac{1}{2}r)^2 + z^2}} + \frac{q_2}{\sqrt{(\frac{1}{2}r)^2 + z^2}} \right]$



No

Date

contoh :



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

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

contoh :

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

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

$$(\cos\theta)$$

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

$2 : \frac{1}{2}$

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

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

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

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

$$dq = \sigma\,da$$

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

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

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

r^2

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

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