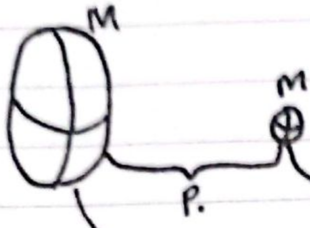
No.

Date

Potensial Listrik
(Elekeric Potensial)



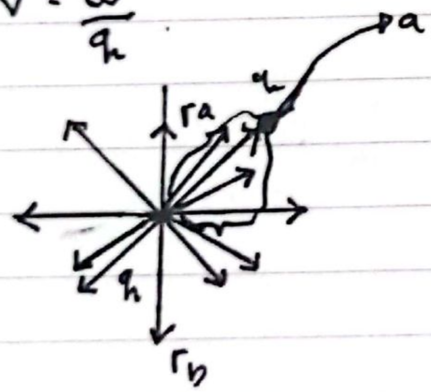
$$W = G\,\frac{Mm}{r}$$

$$V = G\,\frac{M}{P}$$

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

$$V = \frac{W}{M} = G\,\frac{m}{P}$$

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



$$\int_a^b dV = -\int \vec{E}\,dp$$

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

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

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

lanjutan

$$V = \frac{W}{q} = \frac{F_1 \, P}{\partial}$$

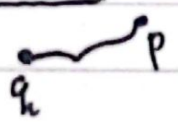
$$= K \frac{q_1 \, Q}{r^2} . P$$

$$= \frac{r^2}{Q}$$

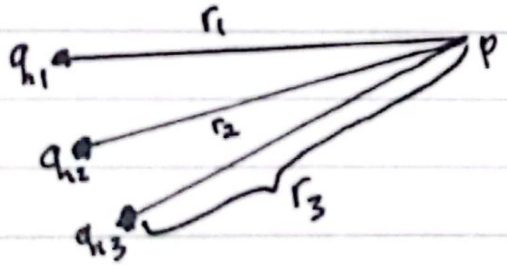
$$\boxed{= V = K \frac{q}{p}}$$

$\int \Delta V$

$$\boxed{V = K \frac{q}{r}} \qquad V = \frac{\overset{Kq}{W}}{q}$$



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

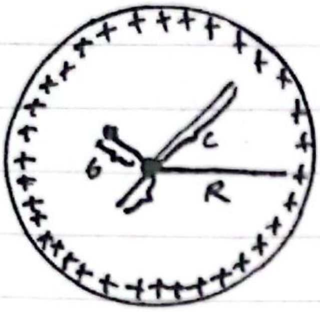


$$V_p = K \left[\frac{q_1}{r_1} + \frac{q_2}{r_2} + \frac{q_3}{r_3} \right]$$

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

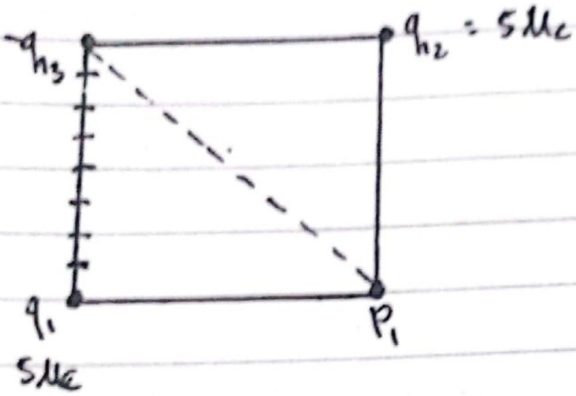
$$V = \frac{W}{q} = \frac{P . S}{q} = \boxed{K \frac{q}{r}}$$

Date



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

1.) Gambarkan



Jawab : $V = \frac{Kq_1}{r_1} + \frac{Kq_2}{r_2} + \frac{K(-q_3)}{r_3}$

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

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

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Persamaan Poisson

$$E = -\nabla V$$

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

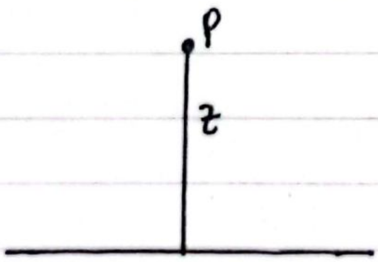
$$\nabla \vec{E} = \frac{\rho}{\varepsilon_0}$$

$$\nabla^2 V = -\frac{\rho}{\varepsilon_0} \quad \text{Poisson}$$

Yang berarti ada sumber medan listrik. Dalam banyak kasus, kita harus memecahkan persamaan ini di wilayah yang tidak mencakup distribusi muatan, yaitu untuk daerah bebas muatan $\rho = 0$

$$\nabla^2 V = 0 \rightarrow \text{persamaan Laplace}$$

Potensial muatan terdistribusi



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

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

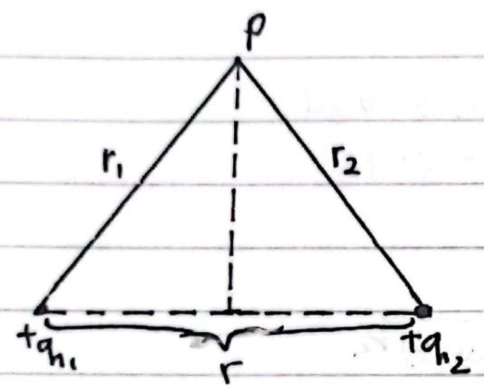
$$\vec{E}\,(2\pi r \ell) = \frac{\lambda \ell}{\varepsilon_0}$$

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

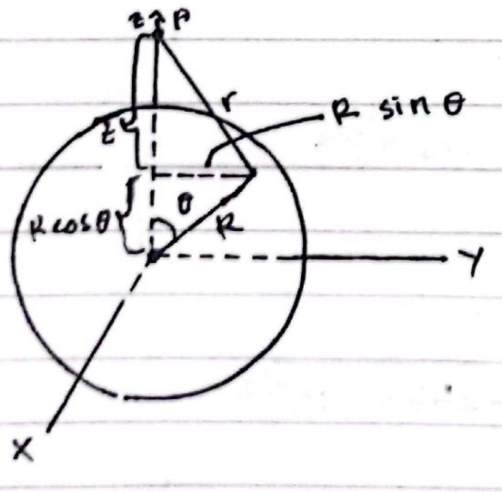
$$V = -\int \vec{E}\, dr$$

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

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



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



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

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

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

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

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

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

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

$dq = \sigma\, da$

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

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

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

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

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

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

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