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$$= \frac{q}{4\pi\epsilon_0}\int_{r_1}^{r_2} r^{-2}\,dr$$

$$= \square \int_{r_1}^{r_2} r^{-2}\,dr$$

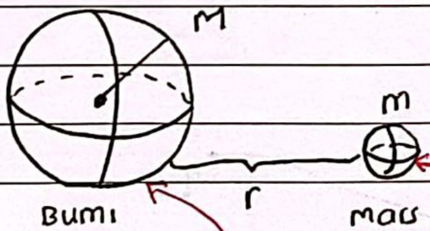
$$= \square \left(-\frac{1}{r}\Big|_{r_1}^{r_2} \right)$$

$$= \square \left(\frac{1}{r_2} - \frac{1}{r_1} \right)$$

$$V = \frac{1}{4\pi\epsilon_0}\,\frac{q}{r} = k\,\frac{q}{r}$$

1 April 2024

Potensial listrik (Elektrik potensial)



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

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

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

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

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

$$= \frac{k\,\frac{q_1 Q}{r^2} \cdot r}{Q}$$

$$V = k\,\frac{q_1}{r}$$

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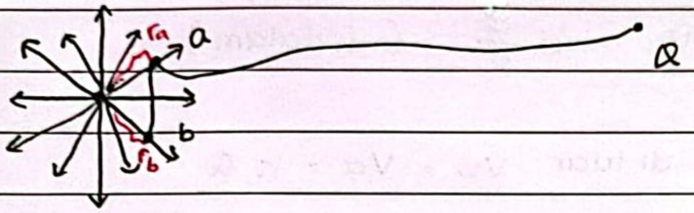


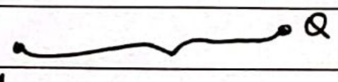
$$\int dV = -\int \vec{E} \cdot dr$$

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

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

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

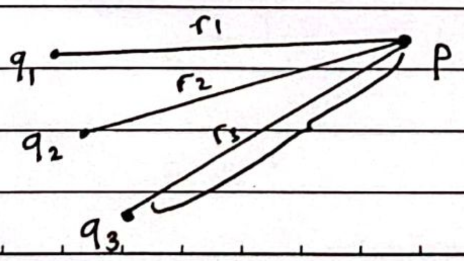
$$\boxed{= V_b - V_a = \frac{q}{4\pi\varepsilon_0} \left(\frac{1}{r_b} - \frac{1}{r_a} \right)}$$



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

$$V = \frac{W}{Q}, \quad W \rightarrow k \frac{qQ}{r}$$

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



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

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

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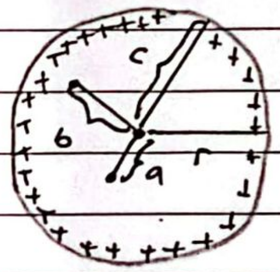
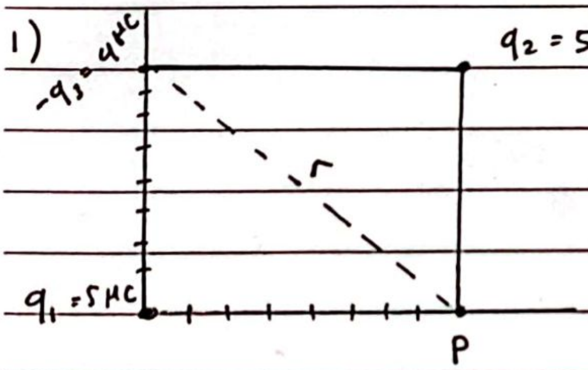


$$V_b - V_a = \frac{\overset{\neq 0}{q}}{4\pi\epsilon_0}\left(\frac{1}{r_b} - \frac{1}{r_a}\right)$$

$$V_b - V_a = k\frac{Q}{R} \quad \text{(didalam)}$$

kalau di luar $V_b = V_a = k\dfrac{Q}{r}$

1)



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

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

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

- Persamaan Poisson dan Perramaan lapalace

$$\left.\begin{aligned} \vec{E} &= -\nabla V \\ \nabla \cdot E &= -\nabla^2 V \\ \nabla \vec{E} &= \frac{\rho}{\epsilon_0} \\ \nabla^2 V &= -\frac{\rho}{\epsilon_0} \quad \text{poisson} \end{aligned}\right\} \text{poisson}$$

$$\nabla^2 V = 0 \quad \text{lapalace}$$

Gradien : perubahan suhu

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Date . .

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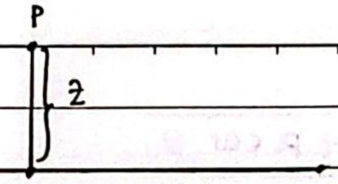


$$\vec{E} = \frac{\lambda}{2\pi \epsilon_0 r}$$

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

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

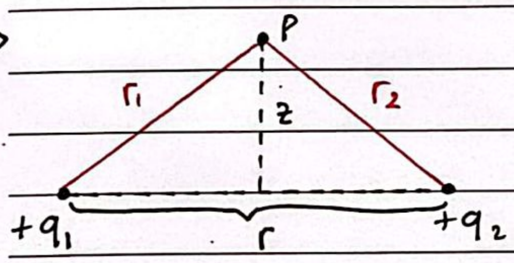
$$= -\frac{\lambda}{2\pi\epsilon_0} \int \frac{1}{r} \, dr$$

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

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

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

»



V_P .... ?

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

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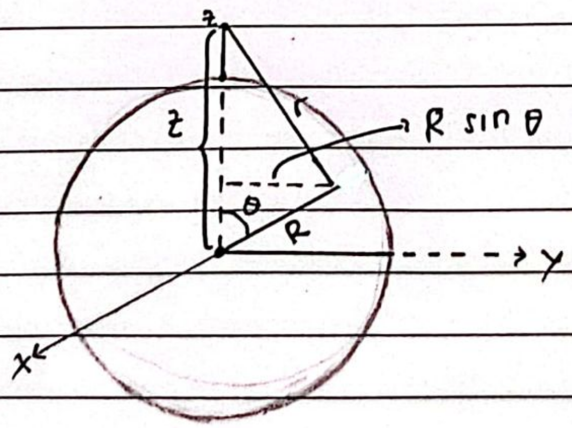

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$$r = \sqrt{(R\sin\theta)^2 + (z - R\cos\theta)^2}$$

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

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

$=1$

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

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

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

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

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

r disini adalah R besar digambar

R disini adalah r kecil pd gambar

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

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

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

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