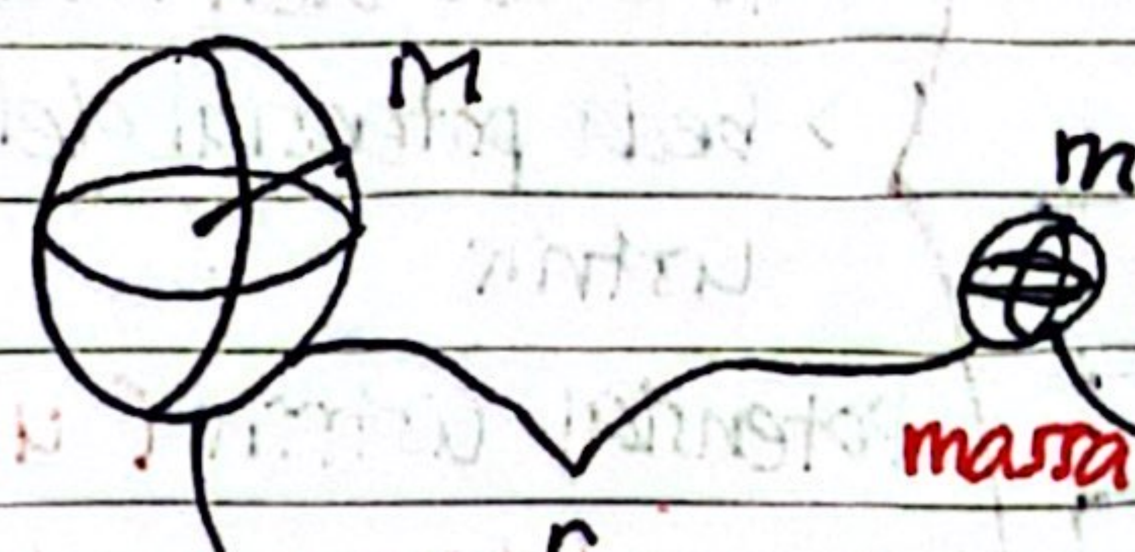
Kalisma

No. p. 7

Date 1 . 4 . 2024

POTENSIAL LISTRIK / electric potential



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

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

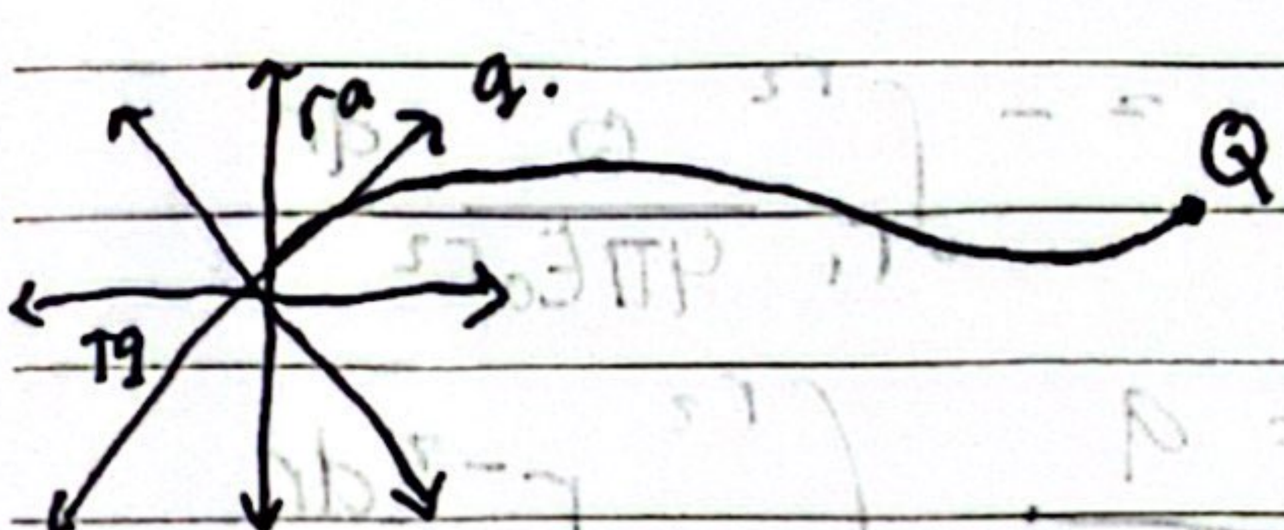
$$V = \frac{W}{m}$$

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

$$V = \frac{W}{q} = \frac{F.r}{q} = \frac{k\,\frac{q_1 Q_2}{r^2}\,r}{Q}$$

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

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



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

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

$$= -\frac{q}{4\pi\epsilon_0}\int_a^b \frac{1}{r^2}\,dr$$

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

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

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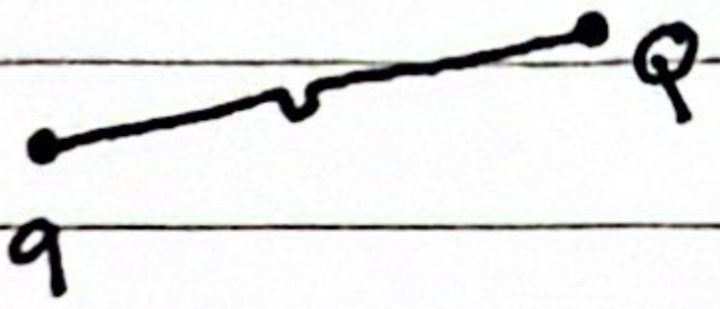
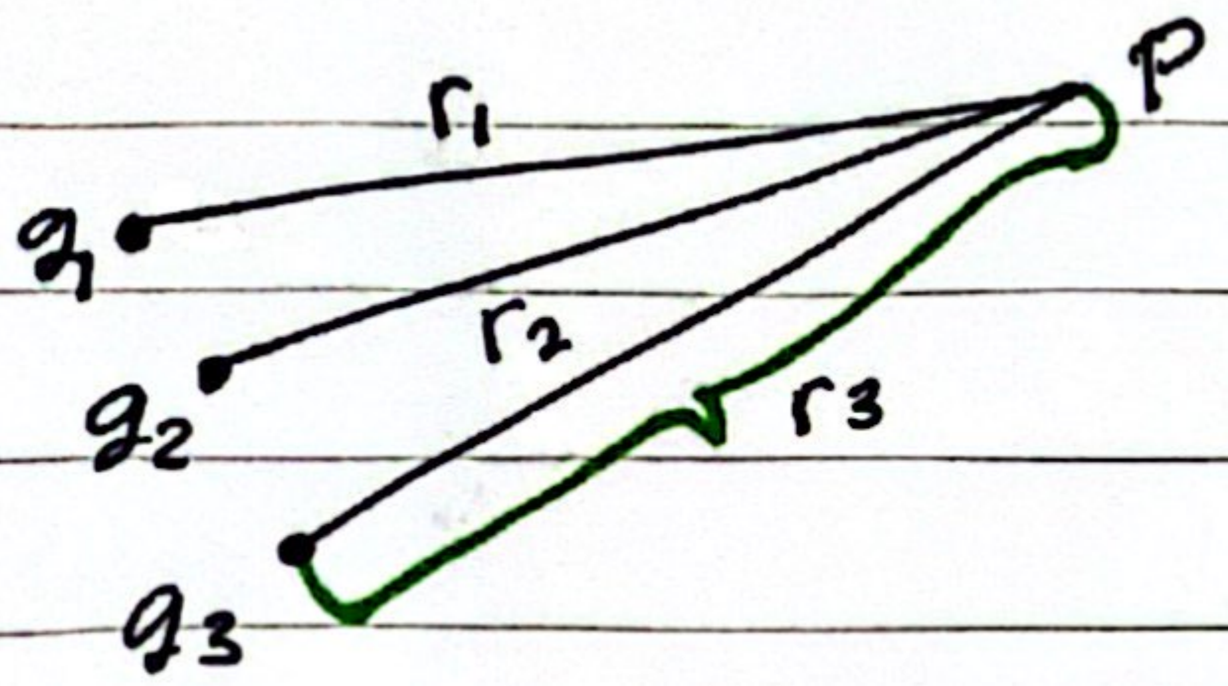
$$V = k \frac{q}{r}$$

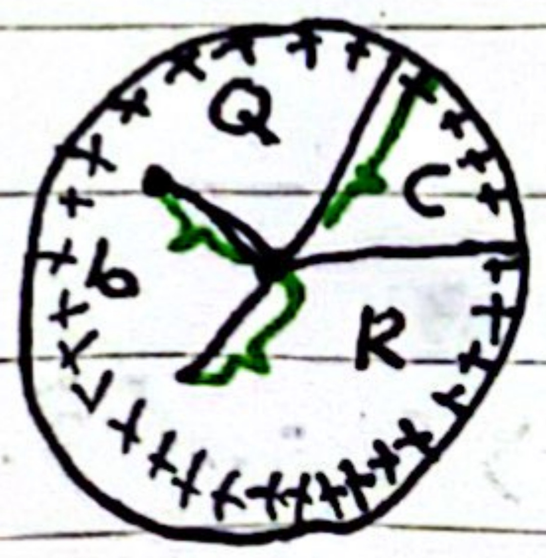


$$V = \frac{W}{Q} \rightarrow V = k \frac{q}{r}$$



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

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

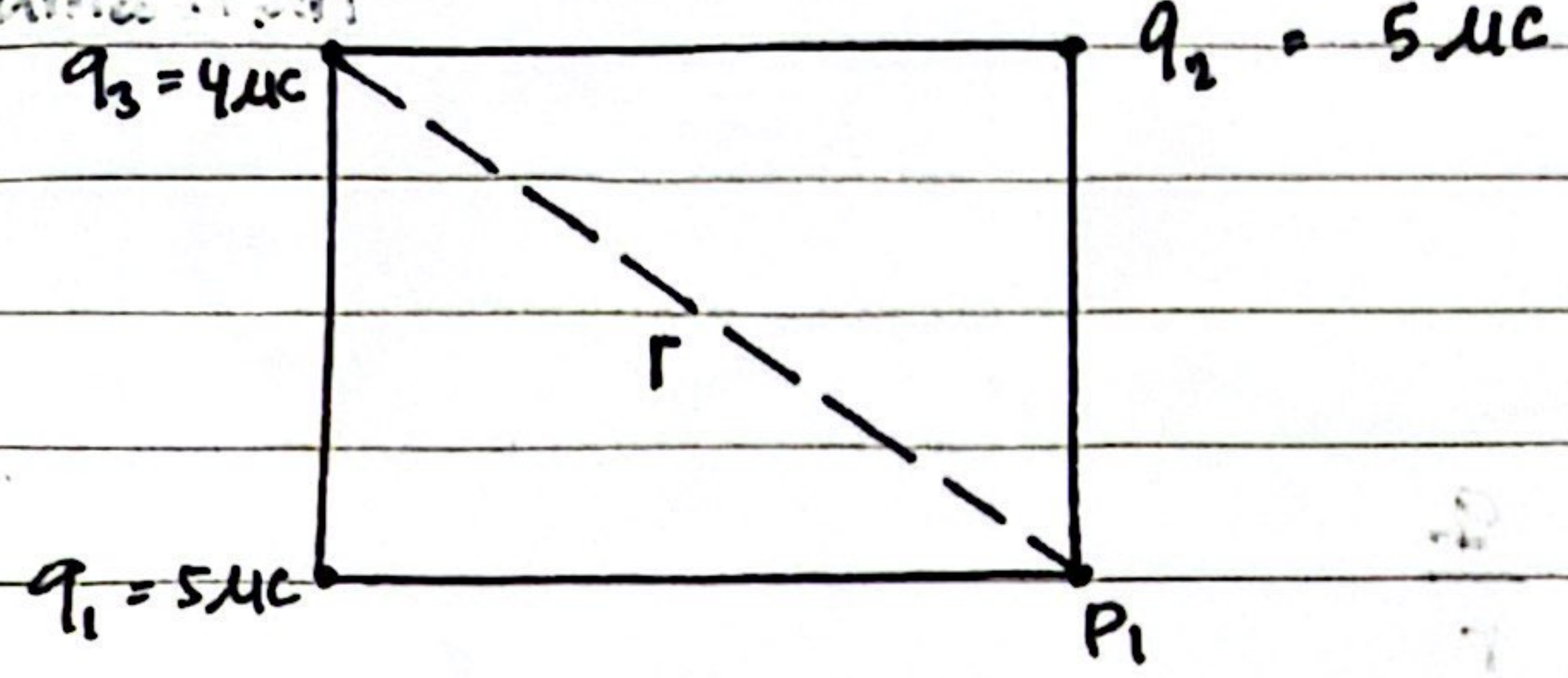


$$V_b - V_a = \frac{q}{4\pi\epsilon_0} \left(\frac{1}{r_b} - \frac{1}{r_a} \right)$$

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

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

soal 1



$$V = \frac{kq_1}{r_1} + \frac{kq_2}{r_2} + \frac{kq_3}{r_3}$$

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

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

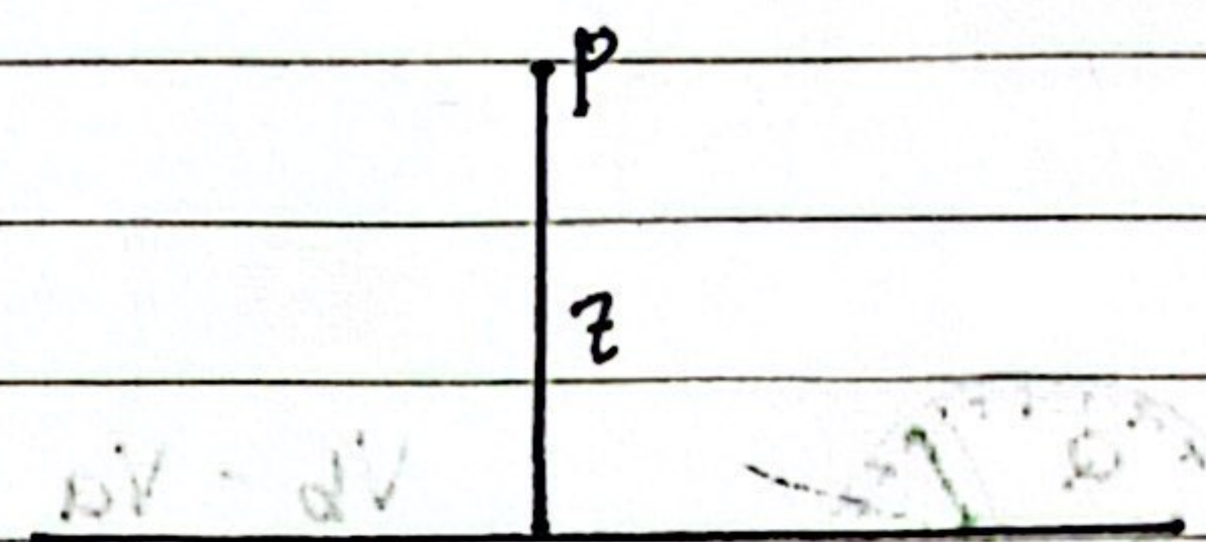
$$E = -\nabla V$$

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

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

$$\nabla^2 V = \frac{\rho}{\epsilon_0} \quad \text{Paisson}$$

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



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

$$\oint \bar{E} . da = \frac{\lambda . L}{\epsilon_0}$$

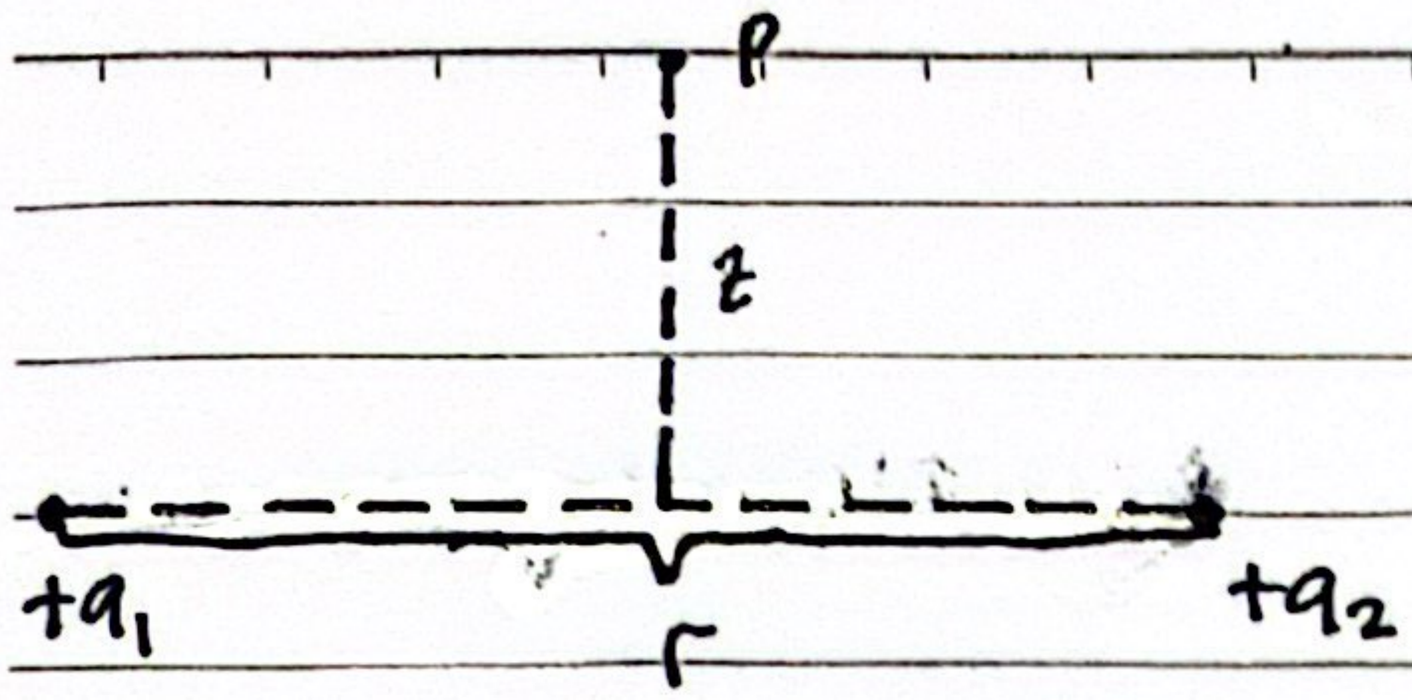
$$\bar{E}(2\pi r l) = \frac{\lambda . L}{\epsilon_0}$$

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

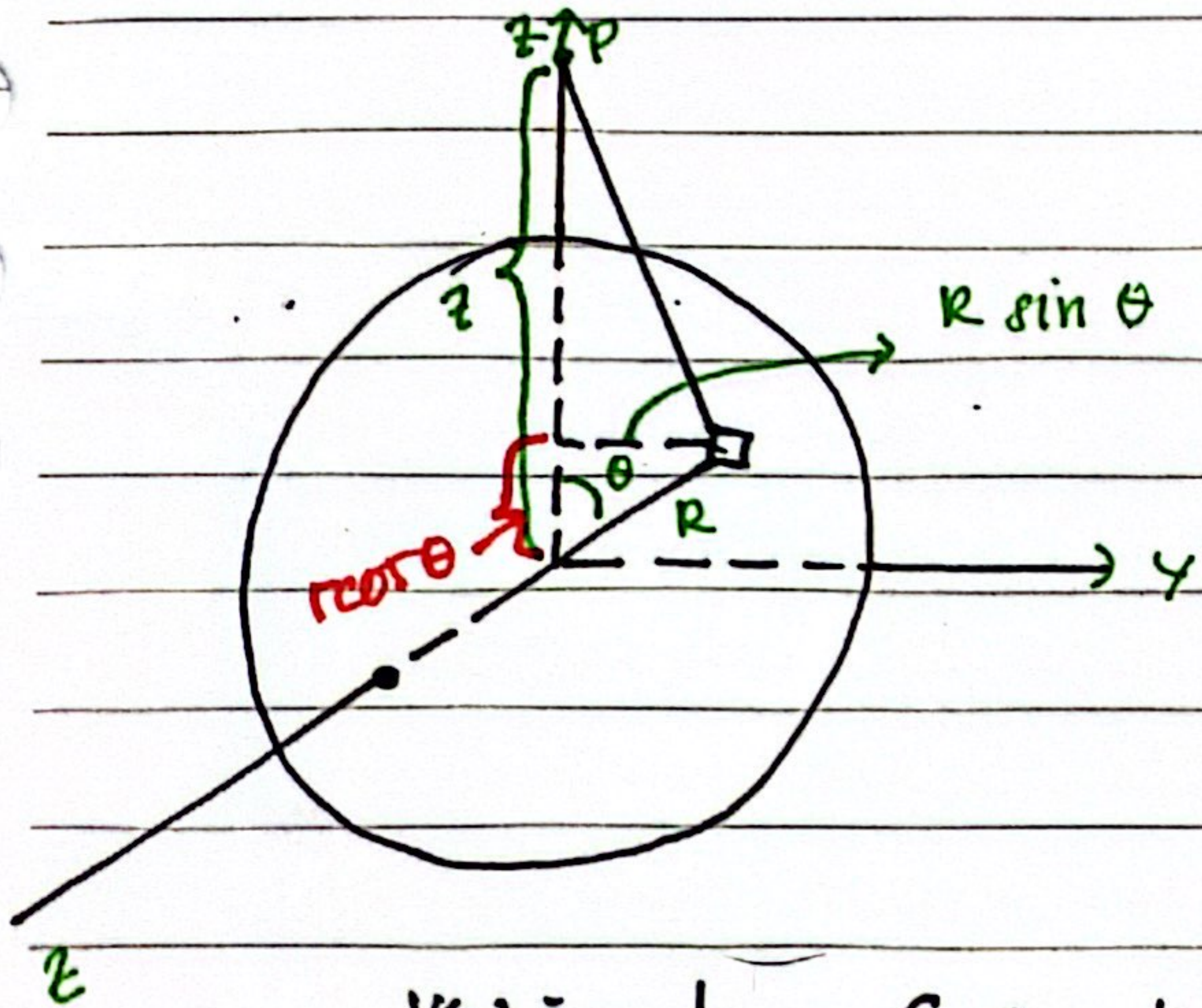
$$V = -\int \bar{E} . dr$$

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

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



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



$$V(p) = \frac{1}{4\pi\epsilon_0}\int \frac{\sigma}{r}\,da$$

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

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

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

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

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

$$V = \frac{1}{4\pi\epsilon_0} \int \frac{\sigma \, da}{r}$$

$$= \frac{1}{4\pi\epsilon_0} \iint \frac{\sigma \, da}{(R^2 + z^2 - 2Rz\cos\theta)^{1/2}}$$

$$= \frac{\sigma}{4\pi\epsilon_0} \int_0^{\pi} \int_0^{2\pi} \frac{r^2 \sin\theta \, d\theta \, d\phi}{(R^2 + z^2 - 2Rz\cos\theta)^{1/2}}$$

$$= \frac{\sigma R 2\pi}{4\pi\epsilon_0} \int_0^{\pi} \frac{\sin\theta \, d\theta}{[R^2 + z^2 - 2Rz\cos\theta]^{1/2}}$$

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

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

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