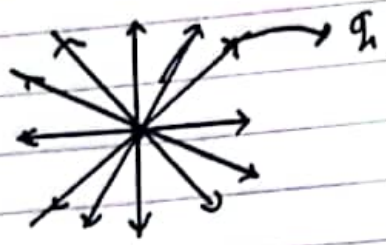
Usaha dan Energi

$W = \int F \, dP \rightarrow \vec{dP}$



$W = \int F \, dP$

$= -q_1 \int E \, dP$

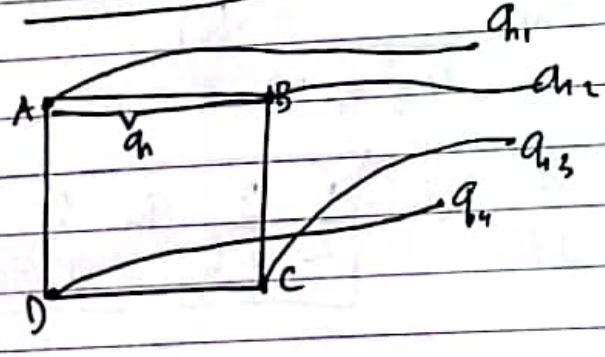
$\therefore -q_1 \left[-k \frac{Q}{P} \right] - q_1 V$

$\boxed{W = q \cdot V}$

$q^2 = \sqrt{a^2 + a^2}$

$q = a\sqrt{2}$

For Example



$W_1 = q_1 V_1 = 0$

$= 0$

$W_2 = q_2 V_2$

$V_2 = k \frac{q_1}{a}$

$W_2 = k q_2 \frac{q_1}{a} = k \frac{a a_2}{a}$

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$W_3 = q_3 V_3$

$V_3 = K \frac{q_1}{\sqrt{2}a} + K \frac{q_2}{a}$

$W_3 = K \left[\frac{q_1 q_3}{\sqrt{2}a} + \frac{q_2 q_3}{a} \right]$

$W_4 = q_4 V_4$

$V_4 = K \left[\frac{q_1}{a} + \frac{q_2}{\sqrt{2}a} + \frac{q_3}{a} \right]$

$W_{tot} = W_1 + W_2 + W_3 + W_4$

$= \sum_{i=1}^{\hat{}} \sum_{j \neq i}^{n} q_i \frac{q_j}{4\pi\varepsilon_0 r_{ij}}$

$= \frac{1}{8\pi\varepsilon_0} \sum_{i=1} q_i \sum_{j \neq i} \frac{q_j}{r_{ij}}$

$= \frac{1}{2} \sum_{i=1}^{n} q_i \cdot \frac{1}{4\pi\varepsilon_0 r_{ij}} q_j$

$W = \frac{1}{2} \sum_{i=1}^{n} q_i \sum_{j \neq i}^{n} V_j$: $\boxed{\frac{1}{2} \sum_{i=1}^{n} q_i \sum_{j \neq i} V_j}$

$$W = \frac{1}{2} \sum_{i=1}^{n} q_i \sum_{j \neq i} V_j$$

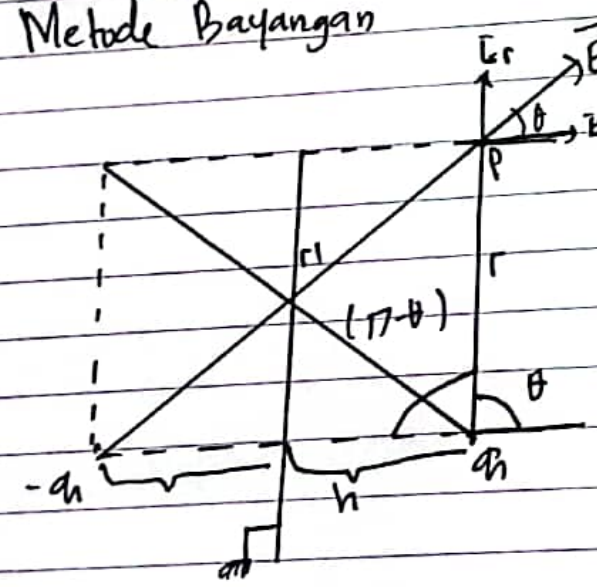
$W = \frac{1}{2} \int \sigma V \, d\vec{r}$ → Potensial oleh muatan Pada garis

$W = \frac{1}{2} \int \sigma V \, d\vec{S}$ → Potensial oleh muatan Pada Permukaan

$W = \frac{1}{2} \int \rho V \, dV$ → Volume

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

Metode Bayangan



$$V_p = k\left[\frac{q}{r} + \frac{-q}{r_0}\right]$$

$$= kq \frac{1}{r} = \frac{1}{(r^2+h^2)^2 + 2hr\cos(\pi-\theta)^2}$$

$$V_p = kq\left[\frac{1}{r} = \frac{1}{(r^2+2h^2+2hr\cos\theta)^{\frac{1}{2}}}\right]$$

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$$= kq\left[-\frac{1}{r^2} - \frac{1}{2}(\cdots)^{-\frac{1}{2}} \frac{(2r + 4h\cos\theta)}{(r^2 + 4h^2 + 4hr\cos\theta)}\right]$$

$$= kq\ \frac{1}{r^2} - \frac{(r + 2h\cos\theta)}{(r^2 + 4h^2 + 4hr\cos\theta)^{3/2}}$$