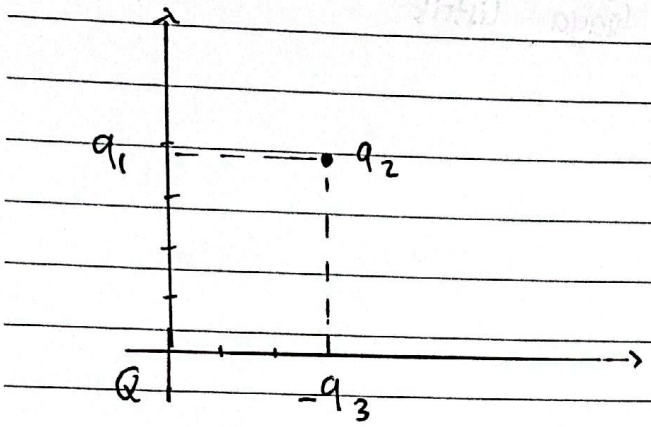
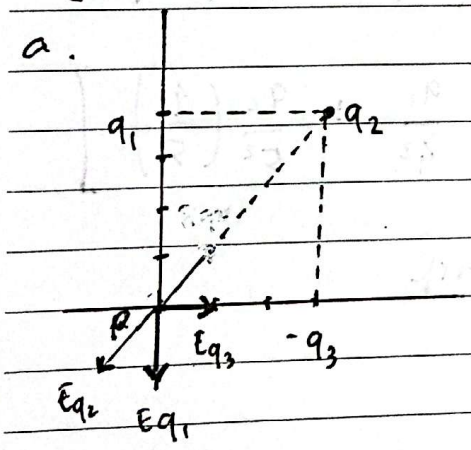
No
Date



a. Hitung medan listrik pada titik (0,0)
b. Hitung gaya listrik
c. Hitung potensial listrik
d. Hitung usaha untuk memindahkan ke-4 muatan tersebut

Jawaban :

a. Medan listrik

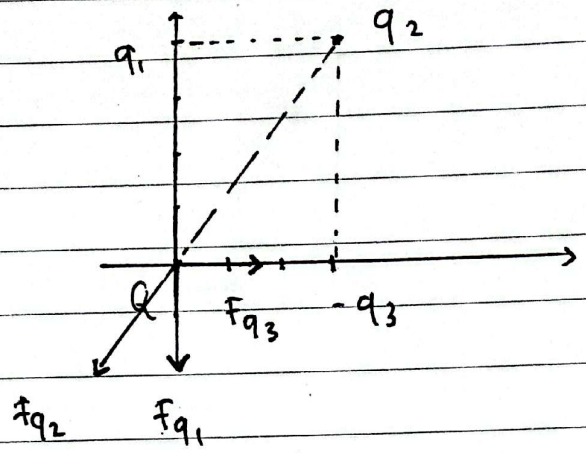


$$E_p = K\left[\frac{q_1}{4^2}(-\hat{j}) + \frac{q_2}{5^2}\left(\frac{-3\hat{i}-4\hat{j}}{5}\right) + \frac{q_3}{3^2}(\hat{i})\right]$$

$$E_p = K\left[(-\hat{j})\left(\frac{q_1}{4^2} + \frac{q_2}{5^2}\left(\frac{4}{5}\right)\right) + i\left(\frac{q_2}{5^2}\left(\frac{-3}{5}\right) + \frac{q_3}{3^2}\right)\right]$$

Date

b. Gaya listrik

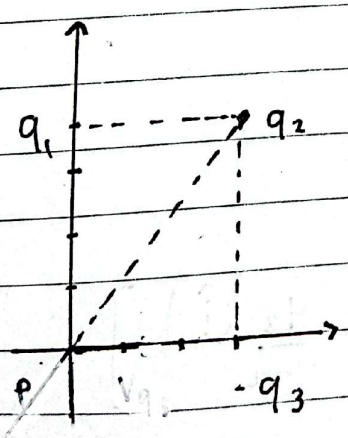


$$F_Q = kQ\left[\frac{q_1}{4^2}(-\hat{j}) + \frac{q_2}{5^2}\left(\frac{-3\hat{i}-4\hat{j}}{5}\right) + \frac{q_3}{3^2}(\hat{i})\right]$$

$$= kQ\left[\hat{i}\left(\frac{q_2}{5^2}\left(\frac{-3}{5}\right) + \frac{q_3}{3^2}\right) + \hat{j}\left(-\frac{q_1}{4^2} + \frac{q_2}{5^2}\left(\frac{-4}{5}\right)\right)\right.$$

$$= kQ\left[\hat{i}\left(\frac{q_2}{5^2}\left(\frac{-3}{5}\right) + \frac{q_3}{3^2}\right) - \hat{j}\left(\frac{q_1}{4^2} + \frac{q_2}{5^2}\left(\frac{4}{5}\right)\right)\right]$$

c. Potensial listrik



$$V_P = k\left[\frac{q_1}{4} + \frac{q_2}{5} - \frac{q_3}{3}\right]$$

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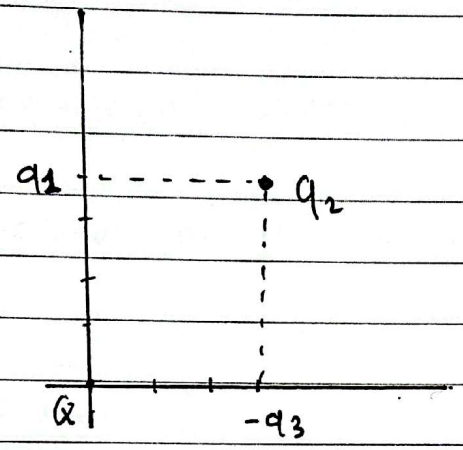
d. Usaha untuk memindahkan ke-4 muatan tersebut



$W_1 = 0$

$W_2 = V_1 q_2 = k \frac{q_1}{4} \cdot q_2$

$W_3 = V_1 q_3 + V_2 q_3$

$= k \frac{q_1 q_3}{5} + k \frac{q_2}{4} q_3$

$W_4 = V_1 q_4 + V_2 q_4 + V_3 q_4$

$= k \frac{q_1}{4} q_4 + k \frac{q_2}{4} q_4 + k \frac{q_3}{3} q_4$

$W_{total} = 0 + \left(k \frac{q_1}{4} q_2 \right) + \left(k \frac{q_1}{5} q_3 + k \frac{q_2}{4} q_3 \right) +$

$\left(k \frac{q_1 q_4}{4} + k \frac{q_2 q_4}{4} + k \frac{q_3 q_4}{3} \right)$