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Prodi: Pendidikan Fisika B

Pemecahan Kasus

• Kasus muatan listrik

$$1) H = \frac{(5 - 0,8) \cdot (6,02 \times 10^{23})}{107,9} + 0,8 \frac{(6,02 \times 10^{23})}{197}$$

$$= 2,34 \times 10^{22} + 2,44 \times 10^{21}$$

$$= 2,58 \times 10^{22}$$

Karena atom yg mempunyai 47 elektron dan Au mempunyai 79 elektron maka jumlah kedua atom adalah 126 elektron

Jumlah medan total Q adalah:

$$Q = (2,58 \times 10^{22} \text{ atom}) (126 \text{ elektron}) (1,6 \times 10^{-19} \text{ C / elektron})$$

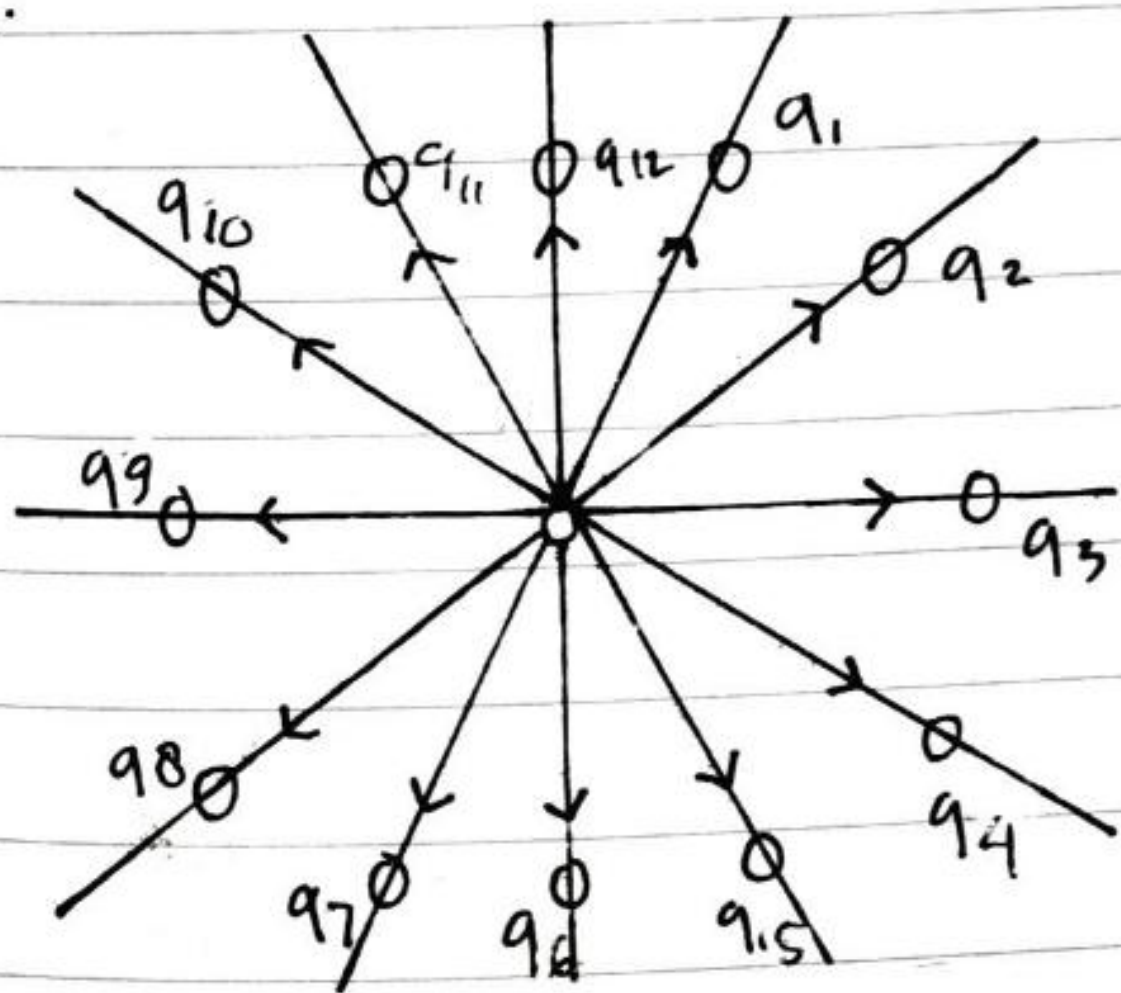
$$= 5,2 \times 10^5 \text{ C}$$

Jadi pada cincin Sgr terdapat muatan $5,2 \times 10^5 \text{ C}$, dimana pada cincin

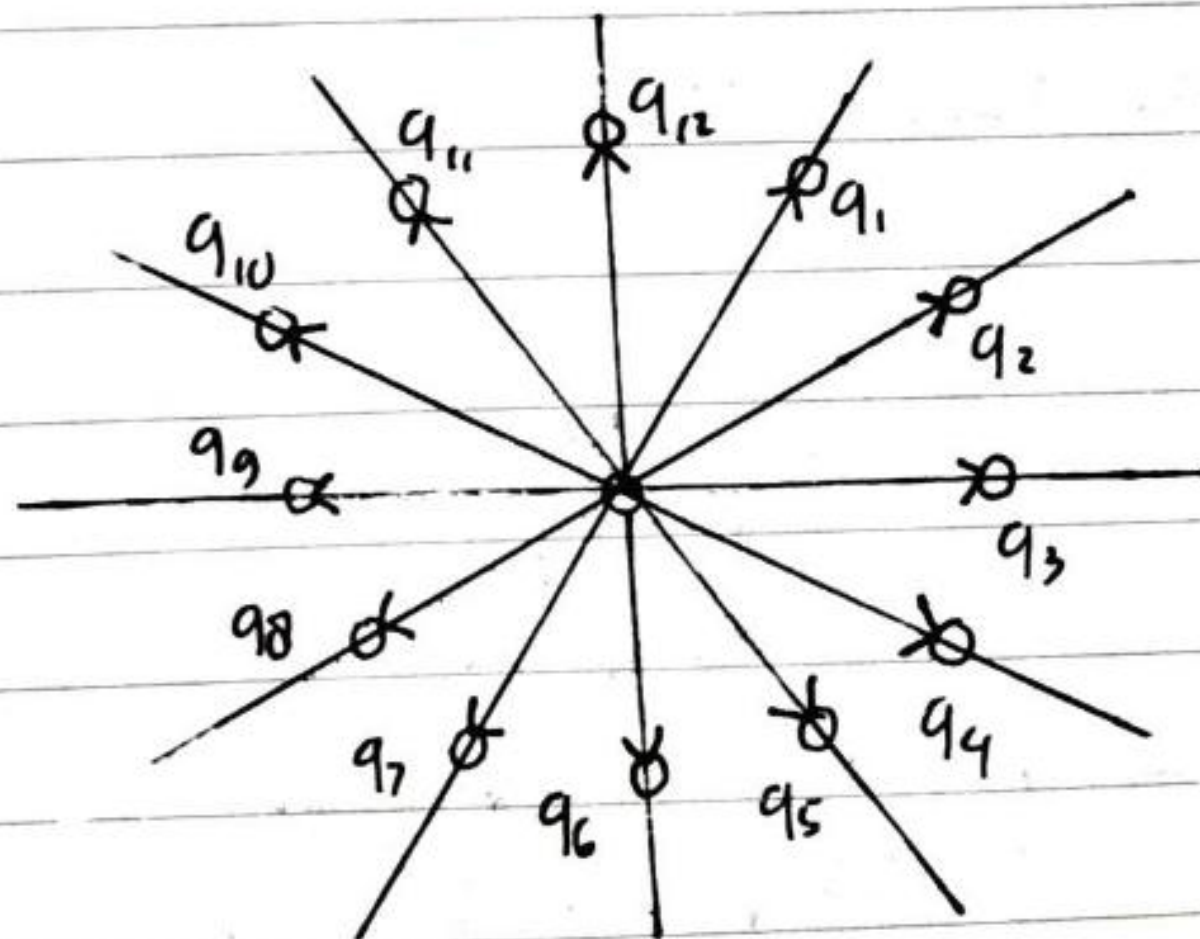
$$\text{Sgr terdapat } \frac{5,2 \times 10^5 \text{ C}}{1,6 \times 10^{-19}} = 3,25 \times 10^{24} \text{ elektron}$$

• Kasus gaya listrik

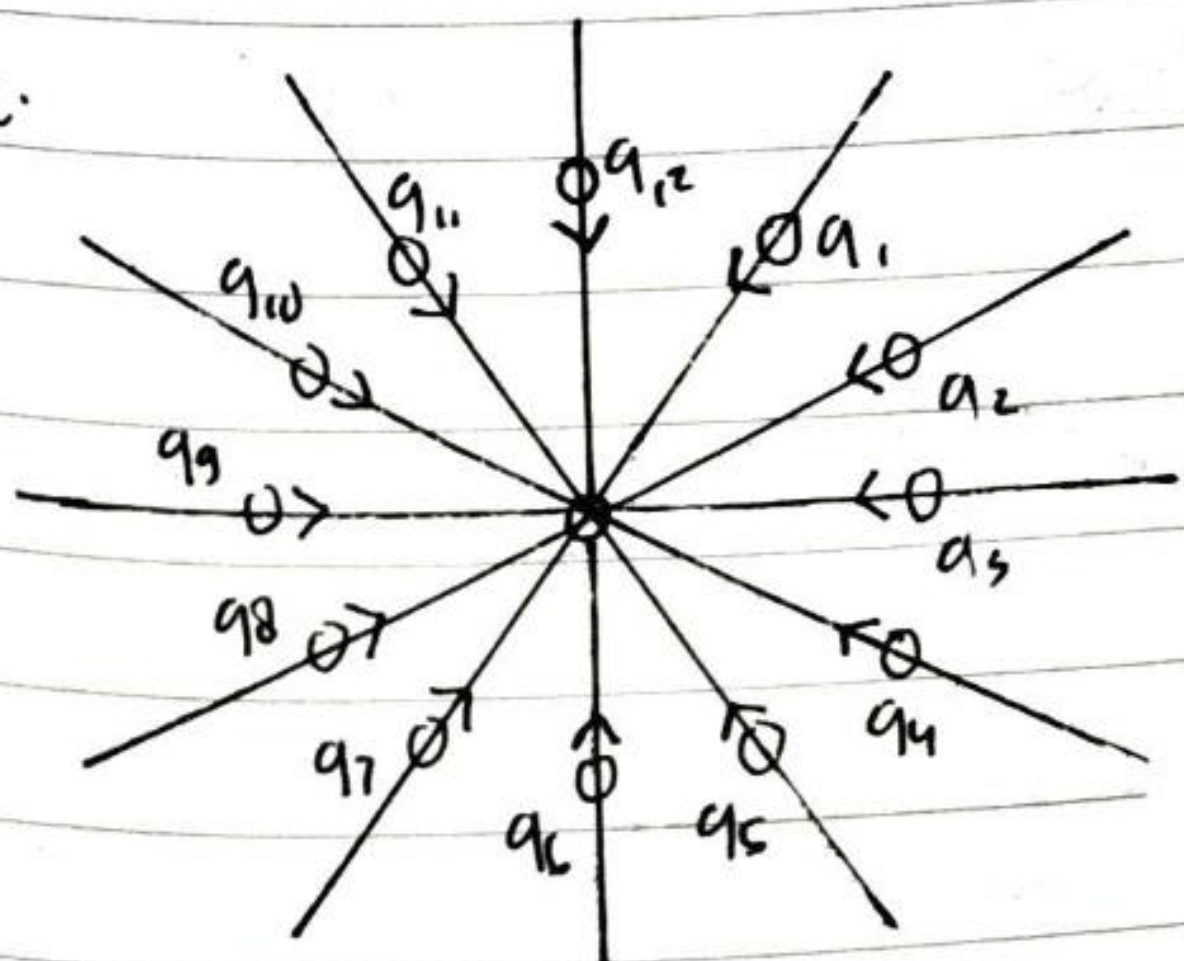
a.



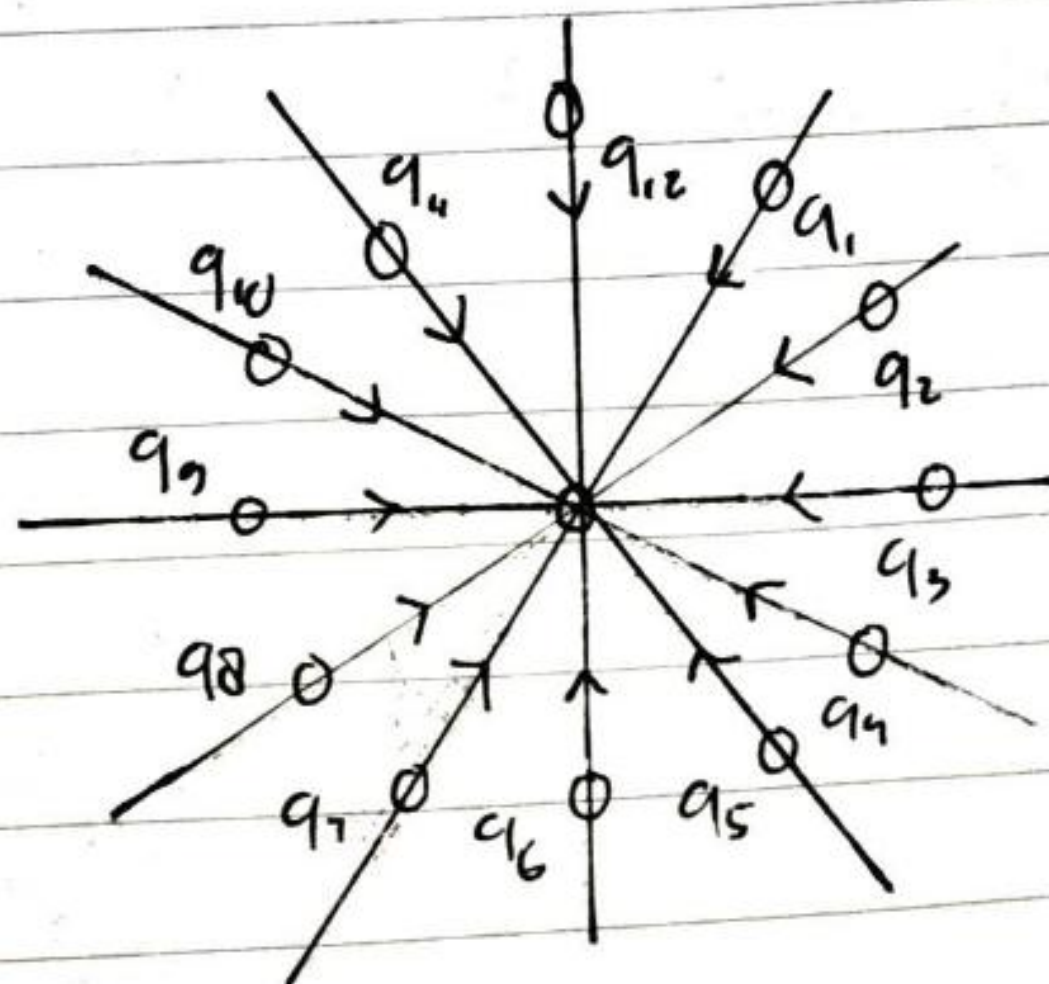
b.



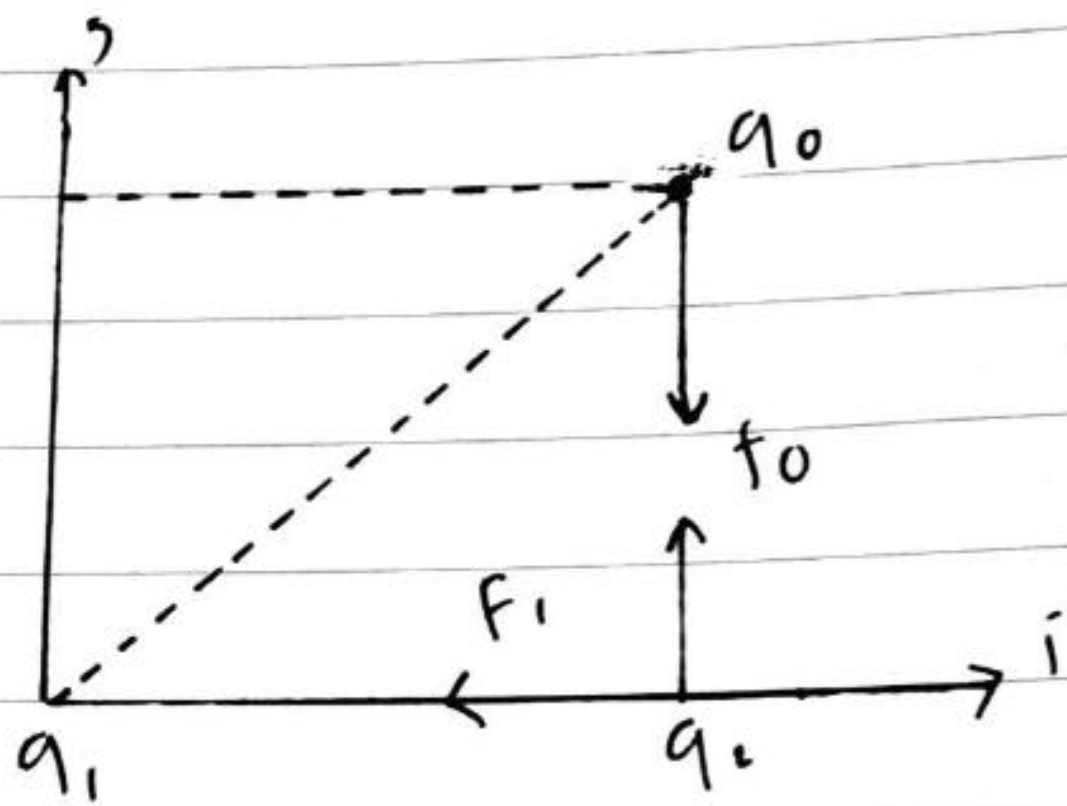
c.



d.



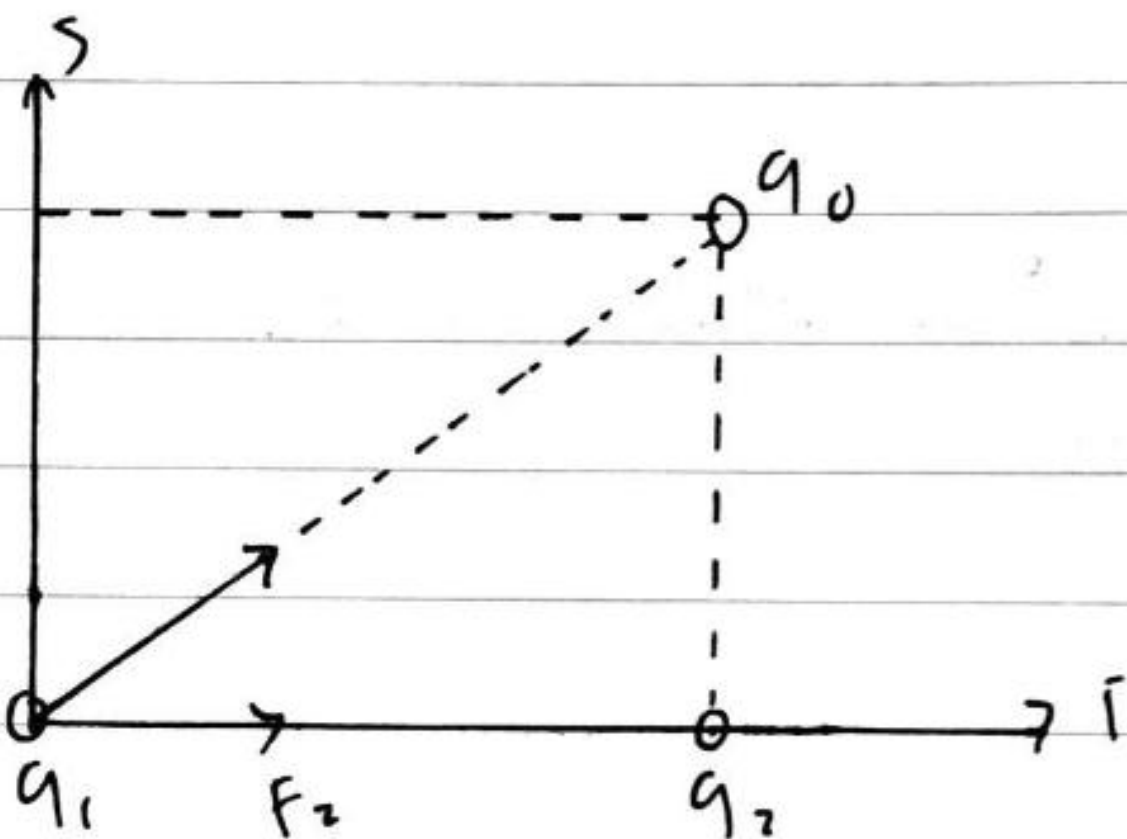
- e. $q_1 : 25 \mu C \rightarrow (0,0) m$
 $q_2 : -10 \mu C \rightarrow (4,0) m$
 $q_0 : 10 \mu C \rightarrow (4,3) m$



$$\vec{F} = q_0 k \left\{ \frac{q_1}{r_{q_1}^2} \hat{r}_{q_1} + \frac{q_2}{r_{q_2}^2} \hat{r}_{q_2} \right\}$$

$$= 10 \cdot 9 \times 10^9 \left\{ \frac{25}{16} + \frac{(-10)}{16} (i) \right\}$$

- f. $q_1 : 25 \mu C \rightarrow (0,0)$
 $q_2 : -15 \mu C \rightarrow (4,0)$
 $q_0 : 20 \mu C \rightarrow (4,3)$

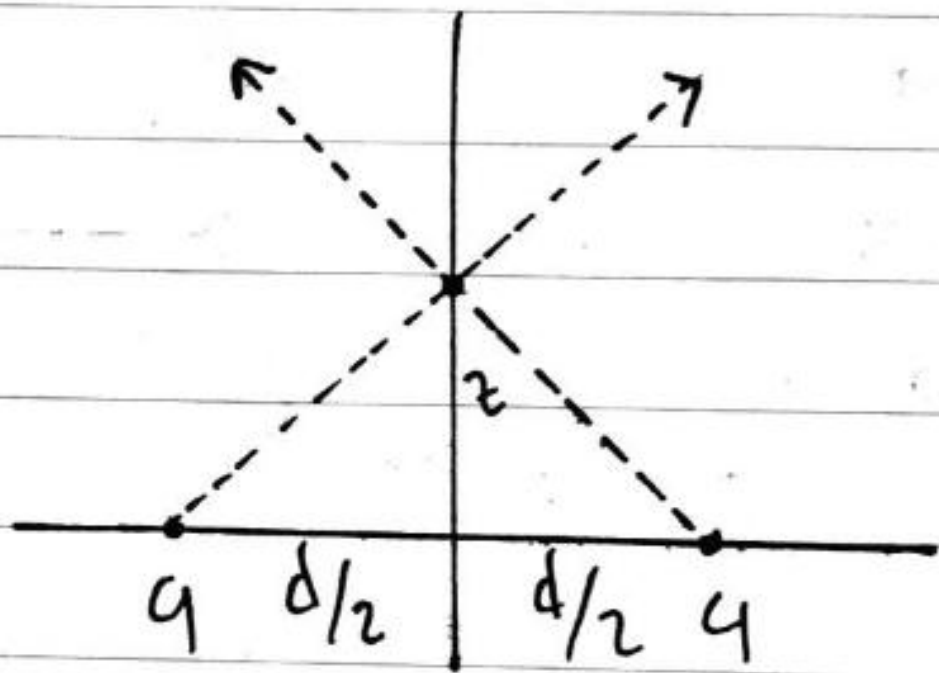


$$\vec{F} = q_0 k \left\{ \frac{q_1}{r_{q_1}^2} \hat{r}_{q_1} + \frac{q_2}{r_{q_2}^2} \hat{r}_{q_2} \right\}$$

$$= 20 \cdot 9 \times 10^9 \left\{ \frac{25}{16} + \frac{(-15)}{16} (i) \right\}$$

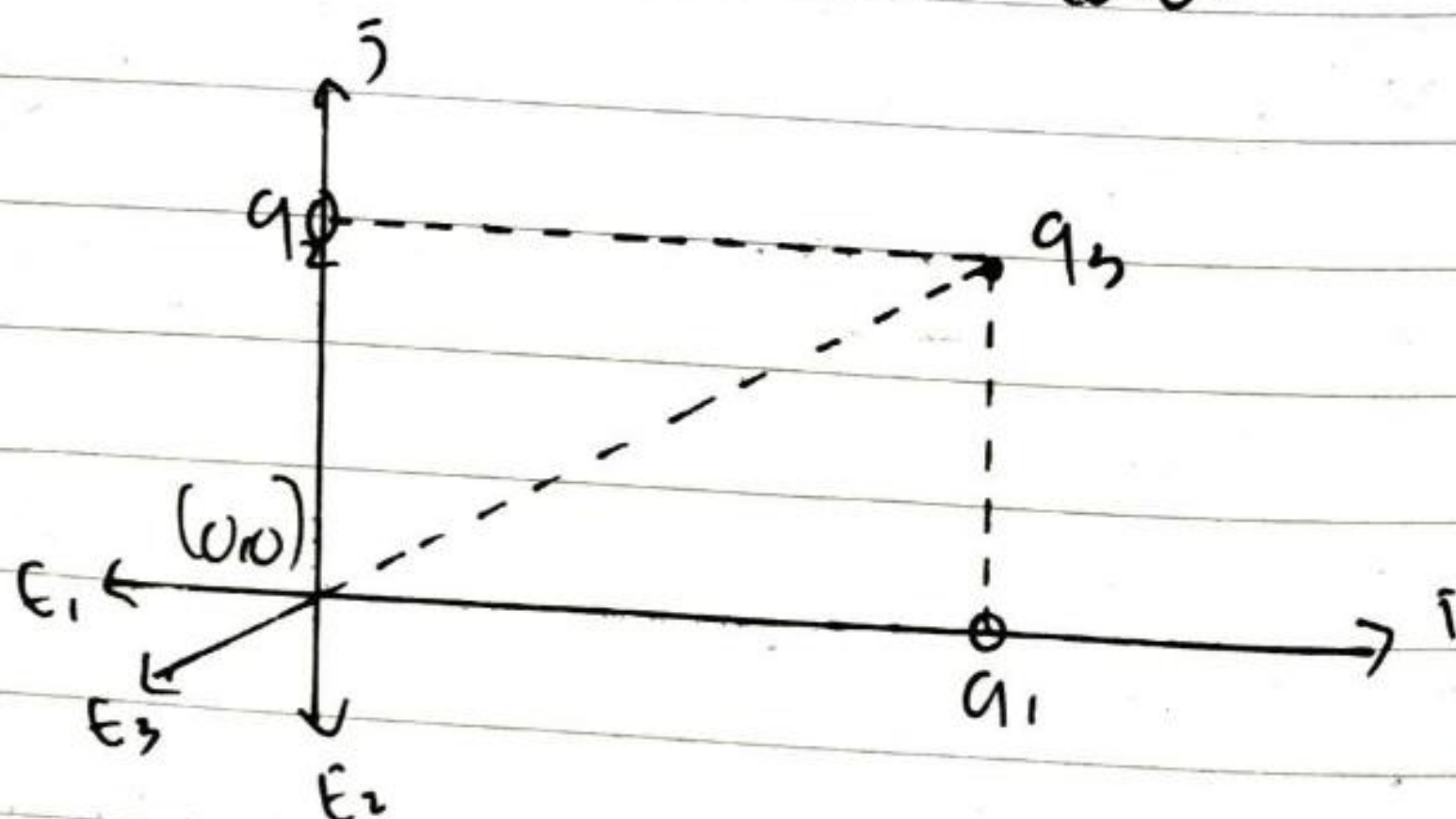
• Kuat medan listrik

a.



- b. $q_1 (4,0) : 2C$
 $q_2 (0,3) : 5C$
 $q_3 (4,3) : 10C$

medan listrik posisi (0,0)



$$E_1 = \frac{1}{4\pi\epsilon_0} \frac{2}{16}$$

$$\text{medan oleh } q_2 \bar{E}_2 = \frac{1}{4\pi\epsilon_0} \frac{5}{9} (i)$$

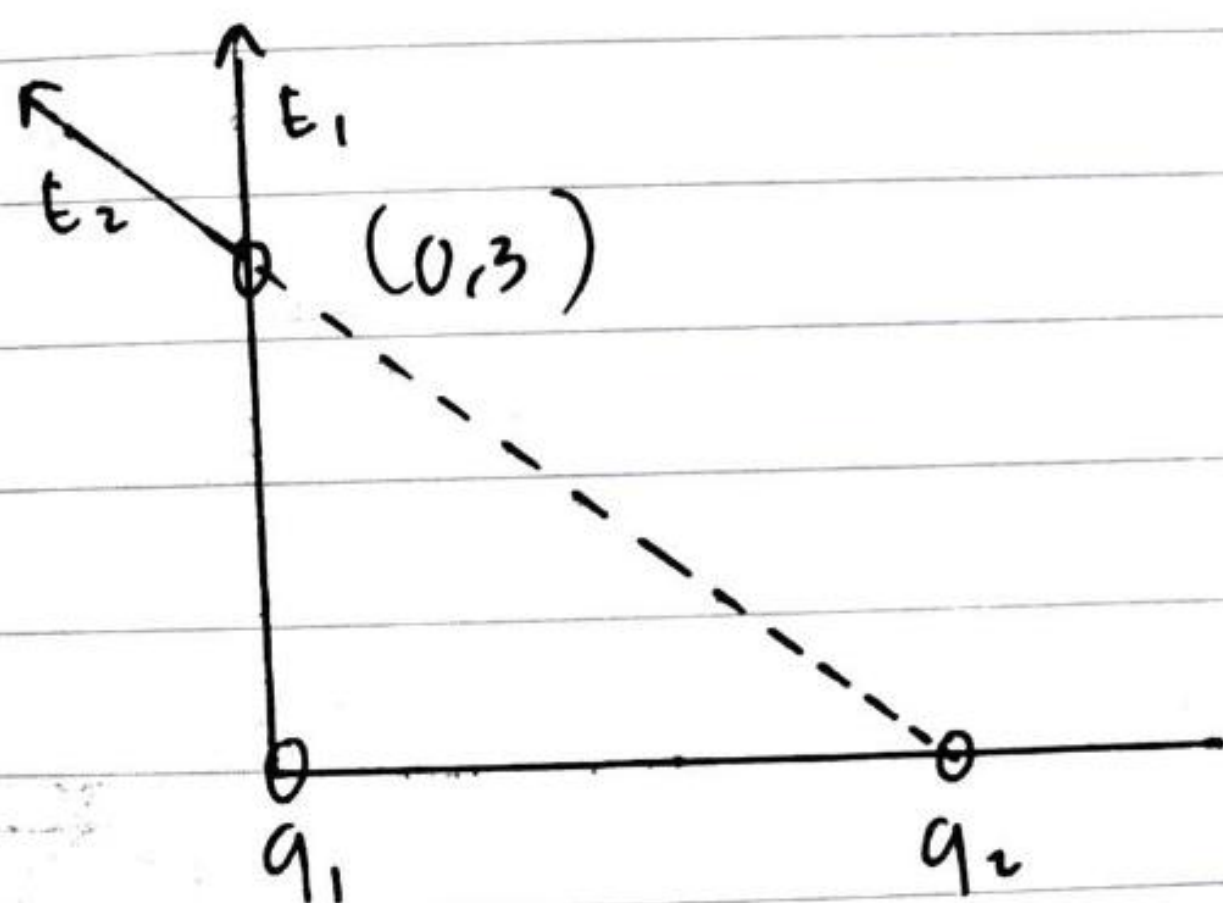
$$\text{medan oleh } q_3 \bar{E}_3 = \frac{1}{4\pi\epsilon_0} \left(\frac{40}{125} i + \frac{30}{125} j \right)$$

$$\text{medan total: } \bar{E} = \frac{1}{4\pi\epsilon_0} \left[\left(\frac{5}{9} + \frac{40}{125} \right) i + \left(\frac{2}{16} + \frac{30}{125} \right) j \right]$$

$$\bar{E} = \frac{1}{4\pi\epsilon_0} \sqrt{(0,47)^2 + (0,8)^2} = 8,35 \times 10^3 \text{ N/C}$$

$$c. q_1 = -5 \mu\text{C} \rightarrow (0,0)$$

$$q_2 = 10 \mu\text{C} \rightarrow (4,0)$$



$$\text{medan oleh } q_1 \bar{E}_1 = \frac{1}{4\pi\epsilon_0} \frac{5}{25} \left(\frac{4i}{5} + \frac{3j}{5} \right)$$

$$= \frac{1}{4\pi\epsilon_0} \left(\frac{20}{125} i + \frac{15}{125} j \right)$$

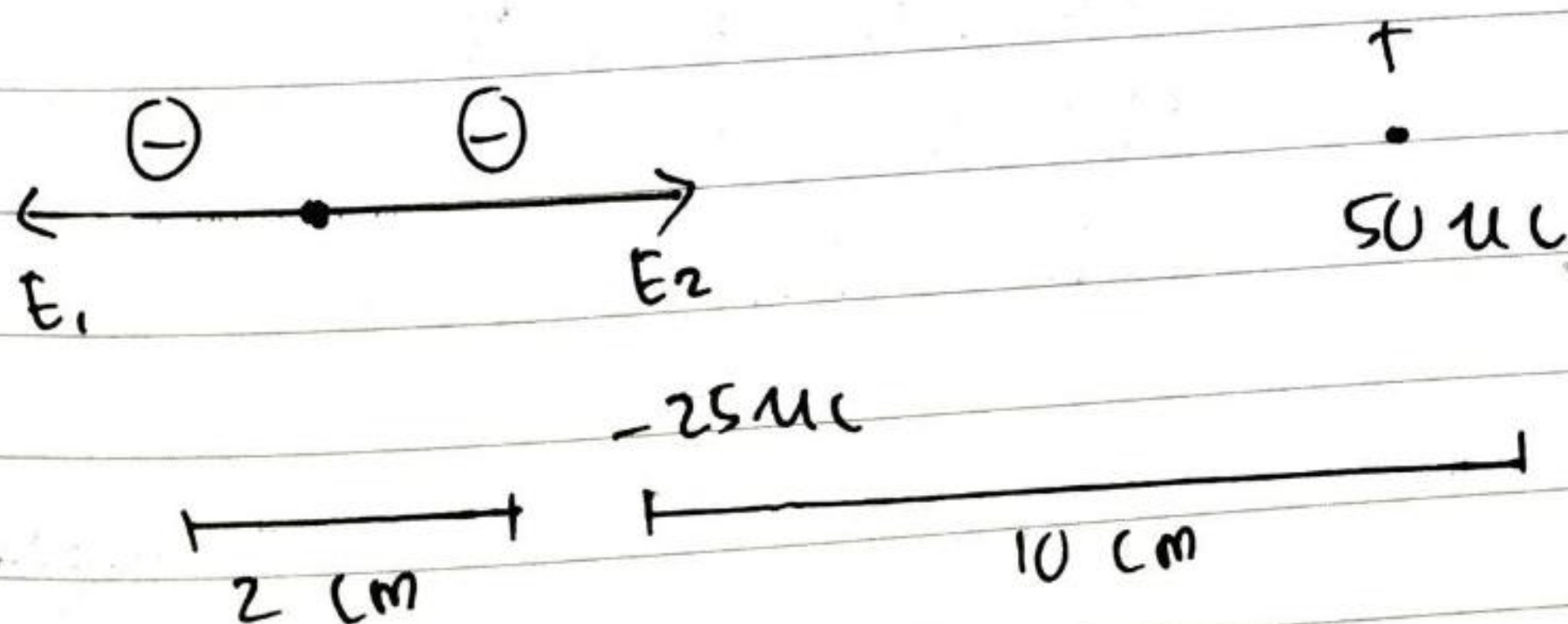
$$\text{oleh } q_2 \bar{E}_2 = \frac{1}{4\pi\epsilon_0} \frac{10}{16} (j)$$

$$\text{Total } \bar{E} = \frac{1}{4\pi\epsilon_0} \left[\left(\frac{20}{125} i \right) + \left(\frac{10}{16} + \frac{15}{125} \right) j \right]$$

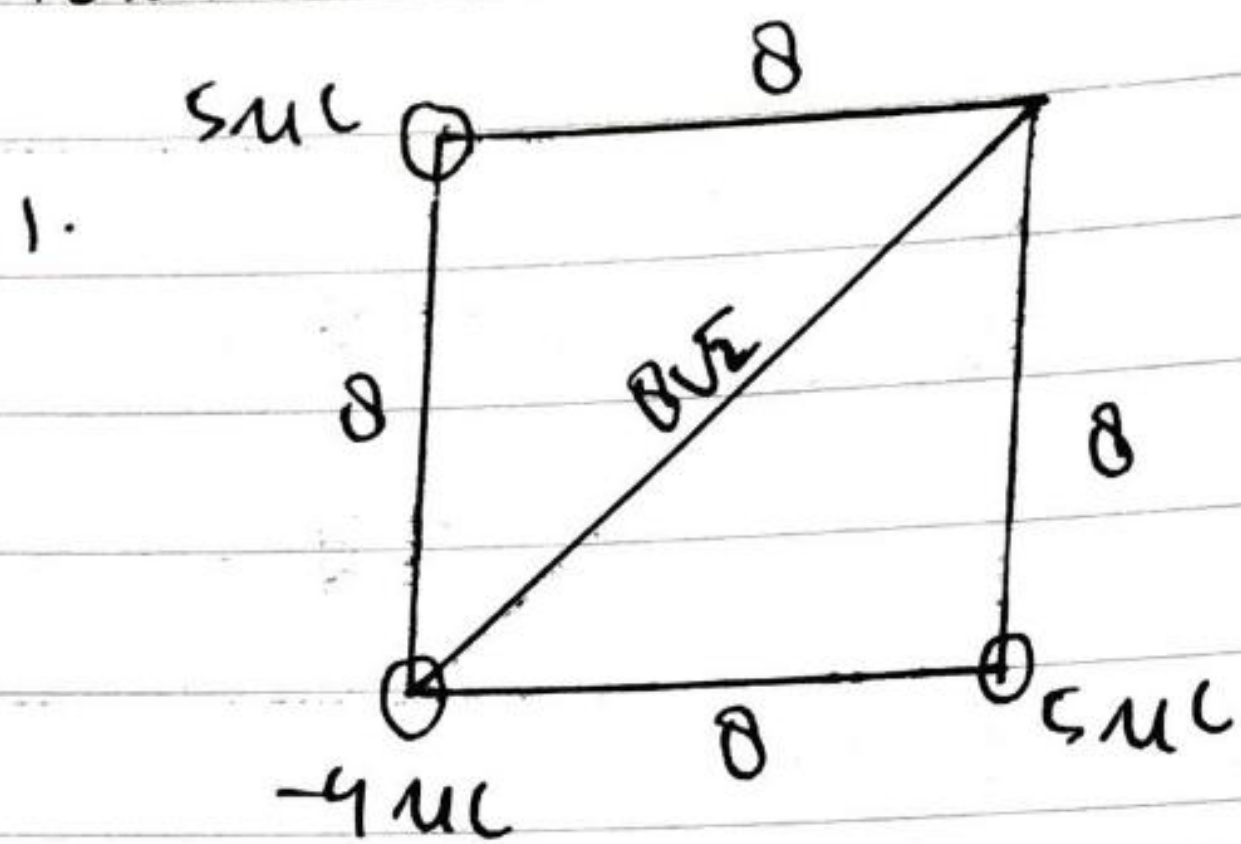
$$= \frac{1}{4\pi\epsilon_0} \sqrt{(0,16)^2 + (0,74)^2}$$

$$= \frac{1}{4\pi\epsilon_0} \sqrt{0,5732}$$

d. a)



• Potensial listrik



$$V_{\text{total}} = \sum k \frac{q}{r}$$

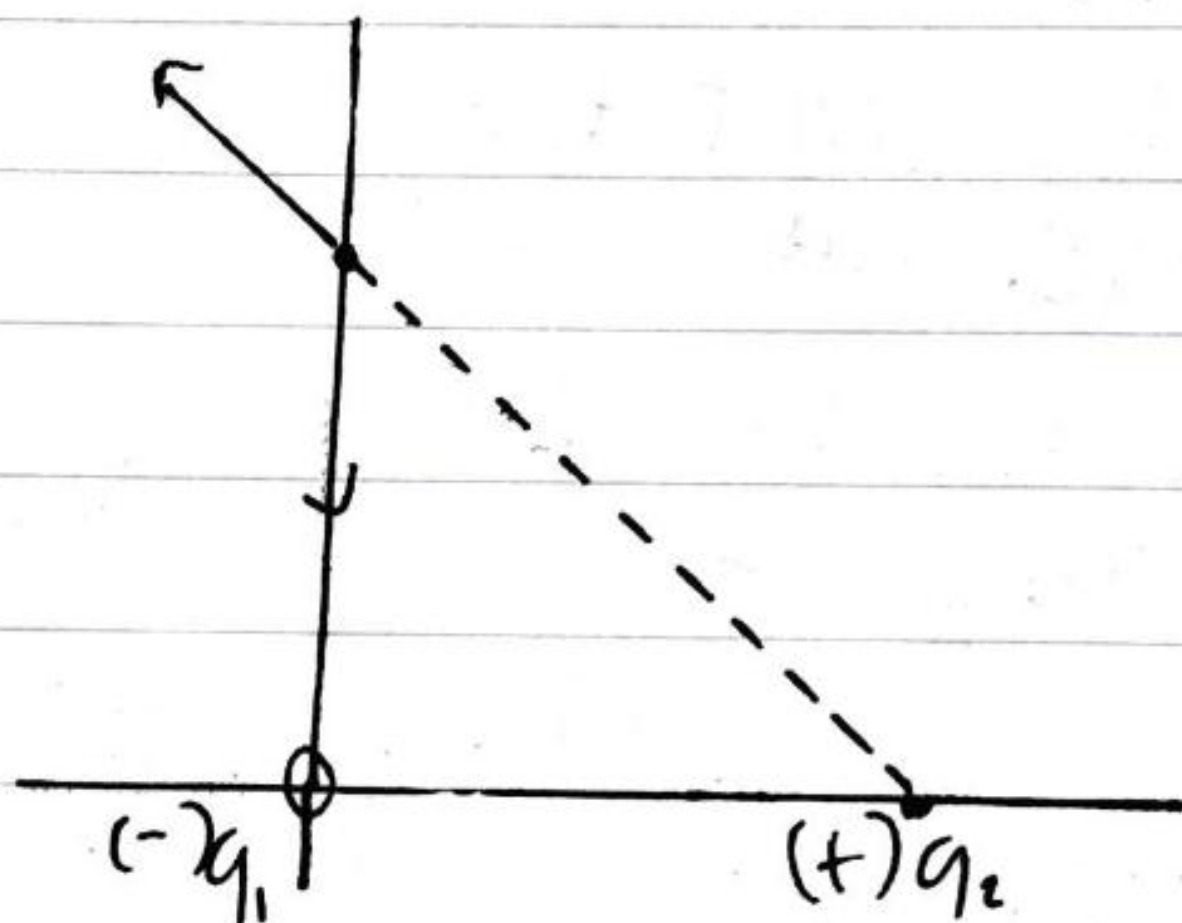
$$= 9 \cdot 10^9 \cdot \frac{5 \cdot 10^{-6}}{8} + \frac{5 \cdot 10^{-6}}{8} \cdot 9 \cdot 10^9 - \frac{4 \cdot 10^{-6} \cdot 9 \cdot 10^9}{8\sqrt{2}}$$

$$= 5,62 \cdot 10^3 + 5,62 \cdot 10^3 - 6,36 \cdot 10^3$$

$$= 17,6 \cdot 10^3$$

$$= 1,76 \cdot 10^4 \text{ Volt}$$

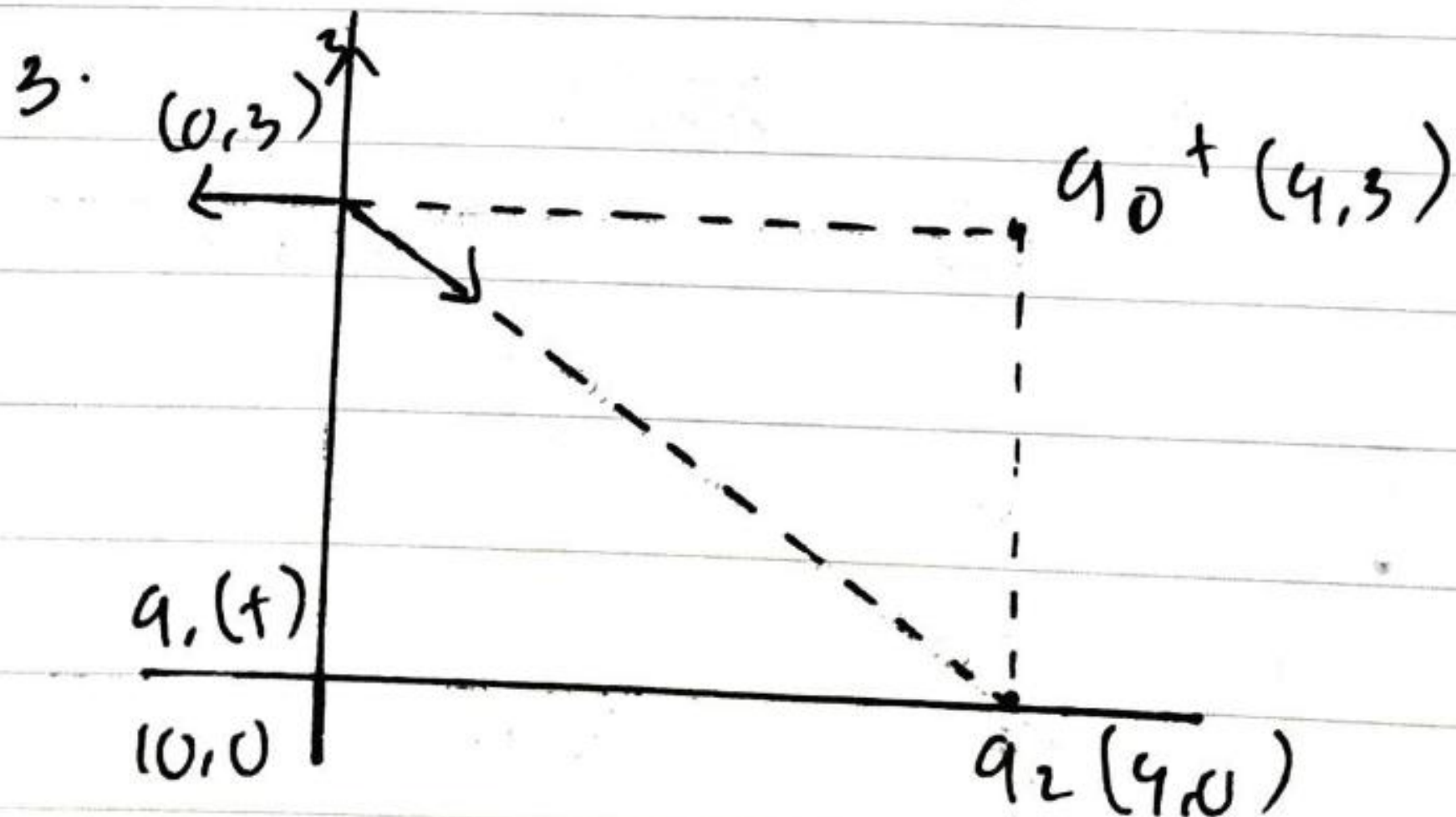
2.



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

$$= 9 \cdot 10^6 \left(\frac{5}{3} + \frac{10}{4} \right)$$

$$= 3,75 \times 10^4 \frac{\text{dyne cm}}{\mu\text{C}}$$



$$q_1 (0,0) = 25 \mu\text{C}$$

$$q_2 (4,0) = -15 \mu\text{C}$$

$$q_0 (4,3) = 20 \mu\text{C}$$

Carilah titik (0,3)