

3-12) tehty

3-14) $q_1 = +1,5 \text{ nC}$ pisteessä $(7,0 \text{ cm}; 0,0 \text{ cm})$
 $q_2 = -6,5 \text{ nC}$ pisteessä $(0,0 \text{ cm}; 15 \text{ cm})$

$$E_1 = k \frac{q_1}{r_1^2}$$

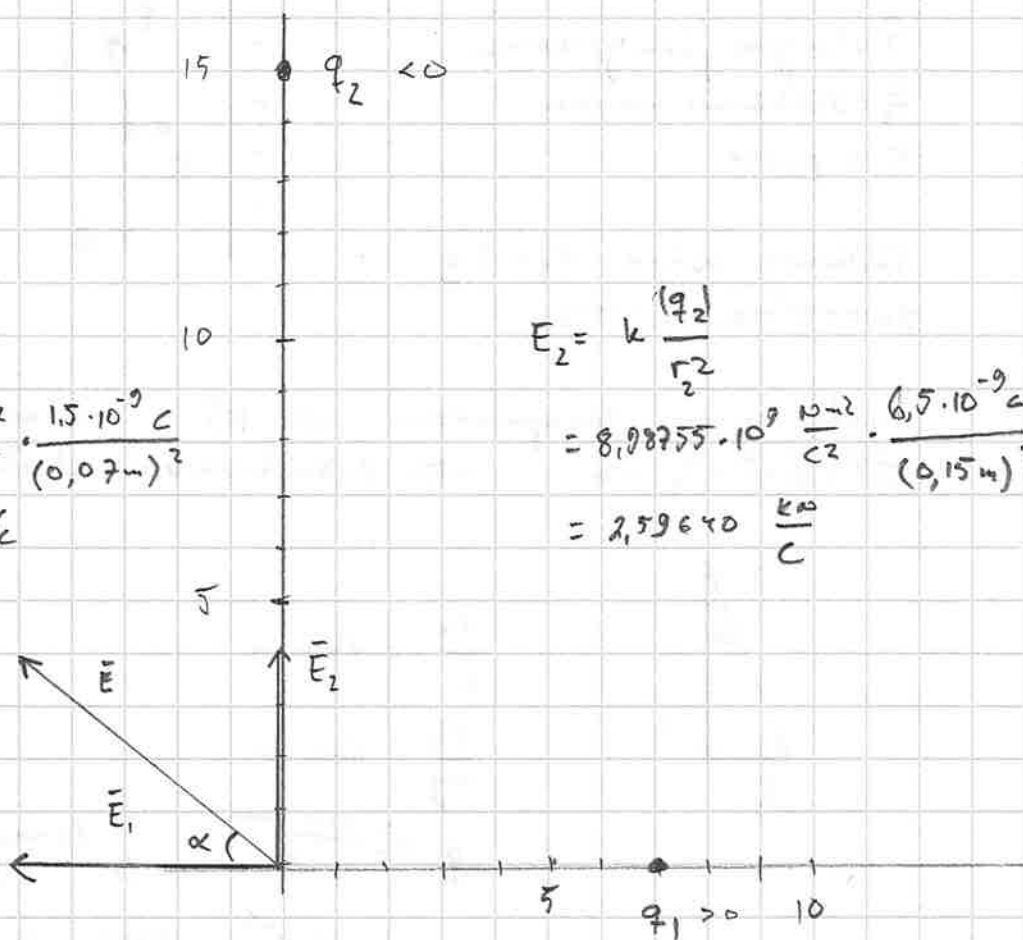
$$= 8,98755 \cdot 10^9 \frac{\text{Nm}^2}{\text{C}^2} \cdot \frac{1,5 \cdot 10^{-9} \text{ C}}{(0,07 \text{ m})^2}$$

$$= 2,75129 \dots \frac{\text{KN}}{\text{C}}$$

$$E_2 = k \frac{|q_2|}{r_2^2}$$

$$= 8,98755 \cdot 10^9 \frac{\text{Nm}^2}{\text{C}^2} \cdot \frac{6,5 \cdot 10^{-9} \text{ C}}{(0,15 \text{ m})^2}$$

$$= 2,59640 \frac{\text{KN}}{\text{C}}$$



$$E = \sqrt{E_1^2 + E_2^2}$$

$$= \sqrt{(2,75129 \frac{\text{KN}}{\text{C}})^2 + (2,59640 \frac{\text{KN}}{\text{C}})^2} \approx 3,8 \frac{\text{KN}}{\text{C}}$$

suuntakulma α

$$\tan \alpha = \frac{E_2}{E_1} = \frac{2,59640 \frac{\text{KN}}{\text{C}}}{2,75129 \frac{\text{KN}}{\text{C}}} \quad || \tan^{-1}$$

$$\alpha \approx \underline{\underline{43^\circ}}$$

3-16)

$$\text{massa } m = 13 \text{ mg}$$

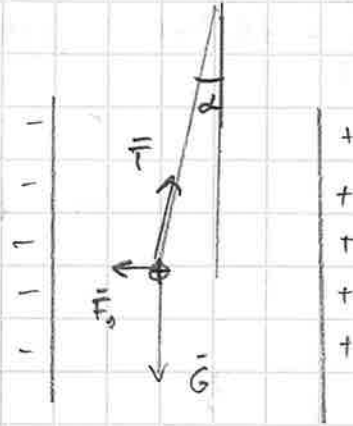
$$E = 4,0 \text{ kV/cm}$$

$$\alpha = 2,5^\circ$$

$\vec{T}$ = langan jännitysvoima

$\vec{F}_s$ = sähköinen voima

$\vec{G}$ = paino

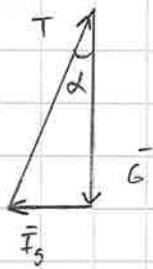


Sähköinen voima $F_s = Eq$

painovoima $G = mg$

Systemi on tasapainossa $\rightarrow$ NII:n mukaan

$$\Sigma \vec{F} = \vec{G} + \vec{T} + \vec{F}_s = 0 \quad \rightarrow \text{sulkeutuva voimakahtio}$$



$$\frac{F_s}{G} = \tan \alpha$$

$$\frac{Eq}{mg} = \tan \alpha$$

$$q = \pm \frac{mg \tan \alpha}{E}$$

(sanallinen
ratkaisu eteen.)

$$q = \pm \frac{13 \cdot 10^{-6} \text{ kg} \cdot 9,81 \text{ m/s}^2 \cdot \tan 2,5^\circ}{4,0 \cdot 10^5 \text{ V/m}}$$

$$= \pm 1,39 \dots \cdot 10^{-11} \text{ C} \quad \approx \pm 14 \text{ pC}$$