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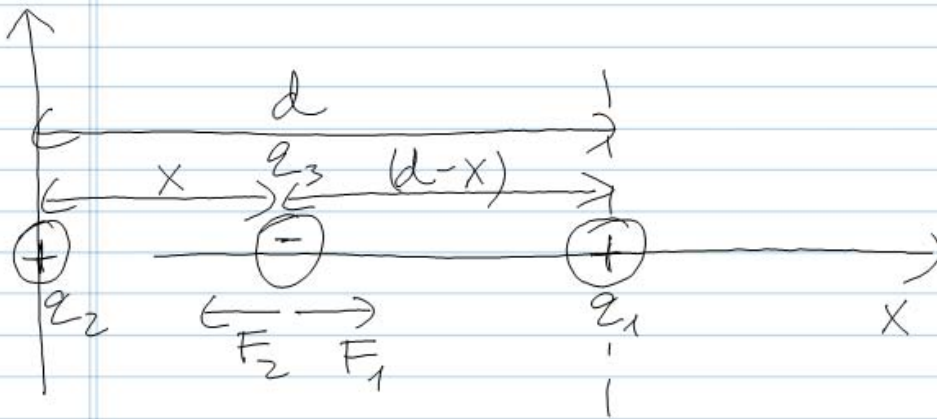
ВЕЛЕШКЕ - ЕЛЕКТРИЦИТЕТ (1)

СЛАЗД (18) - ЗАДАТАК ЕЛЕКТРИЧНА СИЛА

$$F_e = k_e \frac{q^2}{r^2} = \left(8.99 \cdot 10^9 \frac{\text{N} \cdot \text{m}^2}{\text{C}^2} \right) \cdot \frac{(1.6 \cdot 10^{-19} \text{C})^2}{(5.3 \cdot 10^{-11} \text{m})^2}$$

$$F_e = 8.2 \cdot 10^{-8} \text{N}$$

СЛАЗД (24) - ЗАДАТАК ЕЛЕКТРИЧНО ПОЉЕ



$$\sum F_x = 0 \Rightarrow F_1 - F_2 = 0 \Rightarrow F_1 = F_2$$

$$k_e \frac{q_1 \cdot q_3}{(d-x)^2} = k_e \frac{q_2 \cdot q_3}{x^2}$$

$$q_1 x^2 = q_2 (d-x)^2$$

$$e_1 x^2 = e_2 (d^2 - 2dx + x^2)$$

$$e_1 x^2 = e_2 d^2 - 2de_2 x + e_2 x^2$$

$$\underbrace{(e_1 - e_2)}_a x^2 + \underbrace{2de_2}_b x - \underbrace{e_2 d^2}_c = 0$$

$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x_{1,2} = \frac{-2de_2 \pm \sqrt{(2de_2)^2 + 4(e_1 - e_2)e_2 d^2}}{2(e_1 - e_2)}$$

ПОЩТО "X" МОРА БИТИ ПОЗИТИВНО, УЗИМАМО

"+" ЗНАК У ПОРЪЕМ ИЗРАЗУ

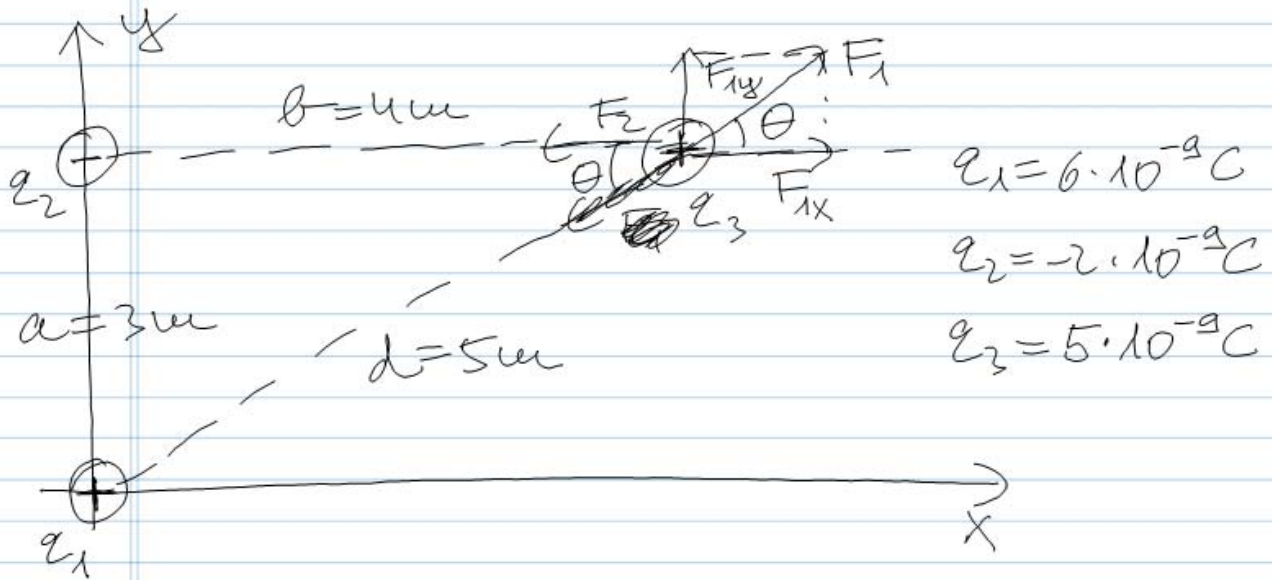
$$x = \frac{\sqrt{(2de_2)^2 + 4(e_1 - e_2)e_2 d^2} - 2de_2}{2(e_1 - e_2)}$$

$$x = \frac{\sqrt{4q_1q_2d^2 - 2dq_2}}{2(q_1 - q_2)}$$

$$x = d \frac{\sqrt{q_1q_2} - q_2}{(q_1 - q_2)} = 2\text{m} \frac{\sqrt{15.6 \mu\text{C}} - 6 \mu\text{C}}{9 \mu\text{C}}$$

~~XXXXXXXXXX~~ $x = 0.77\text{m}$

СЛАБД, 25 - ЗАДАТАК ТРОУГЛАО



$$d = \sqrt{a^2 + b^2} = \sqrt{(3\text{m})^2 + (4\text{m})^2} = 5\text{m}$$

$$a) F_{2x} = -F_2 = -k_e \frac{q_2 q_3}{b^2}$$

$$F_{2x} = - \left(8.99 \cdot 10^9 \frac{\text{N} \cdot \text{m}^2}{\text{C}^2} \right) \cdot \frac{(2 \cdot 10^{-9} \text{C}) \cdot (5 \cdot 10^{-9} \text{C})}{(4 \text{m})^2}$$

$$F_{2x} = -5.62 \cdot 10^{-9} \text{N}$$

$$F_{2y} = 0 \text{N}$$

$$b) F_{1x} = F_1 \cdot \cos \theta = k_e \frac{q_1 q_3}{d^2} \cdot \frac{b}{d}$$

$$F_{1x} = \left(8.99 \cdot 10^9 \frac{\text{N} \cdot \text{m}^2}{\text{C}^2} \right) \cdot \frac{(6 \cdot 10^{-9} \text{C}) \cdot (5 \cdot 10^{-9} \text{C})}{(5 \text{m})^3} \cdot (4 \text{m})$$

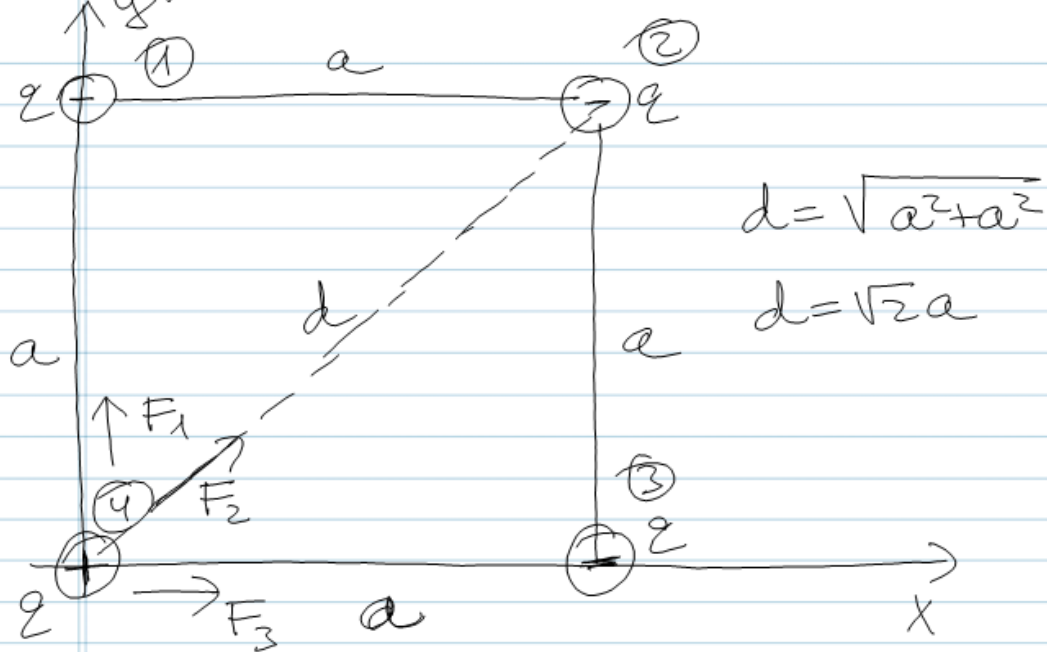
$$F_{1x} = 8.63 \cdot 10^{-9} \text{N}$$

$$F_{1y} = F_1 \cdot \sin \theta = k_e \frac{q_1 q_3}{d^2} \cdot \frac{d}{d}$$

$$F_{1y} = \left(8.99 \cdot 10^9 \frac{\text{N} \cdot \text{m}^2}{\text{C}^2} \right) \cdot \frac{(6 \cdot 10^{-9} \text{C}) \cdot (5 \cdot 10^{-9} \text{C})}{(5 \text{m})^3} \cdot 3 \text{m}$$

$$F_{1y} = 6.50 \cdot 10^{-9} \text{N}$$

ВІАЗДІ, 26 - ЗАДАЧА КВАДРАТ

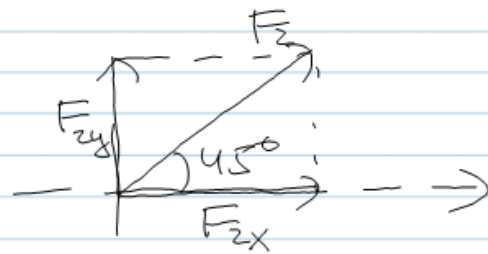


$$F_{1x} = 0$$

↑

$$F_{1y} = k_e \frac{q^2}{a^2}$$

$$F_{3y} = 0$$



$$F_{3x} = k_e \frac{q^2}{a^2}$$

$$F_{2x} = F_2 \cos \theta = k_e \frac{q^2}{d^2} \cdot \cos(45^\circ) = k_e \frac{q^2}{d^2} \cdot \frac{\sqrt{2}}{2}$$

$$F_{2y} = F_2 \sin \theta = k_e \frac{q^2}{d^2} \sin(45^\circ) = k_e \frac{q^2}{d^2} \frac{\sqrt{2}}{2}$$

$$F_x = F_{1x} + F_{2x} + F_{3x} = \frac{k_e q^2 \sqrt{2}}{2(\sqrt{2}a)^2} + \frac{k_e q^2}{a^2}$$

$$F_x = \frac{k_e q^2 \sqrt{2}}{a^2 4} + \frac{k_e q^2}{a^2} = \frac{k_e q^2}{a^2} \left(1 + \frac{\sqrt{2}}{4}\right)$$

$$F_y = F_{1y} + F_{2y} + F_{3y} = \frac{k_e q^2}{a^2} \left(1 + \frac{\sqrt{2}}{4}\right)$$

$$F = \sqrt{F_x^2 + F_y^2} = \sqrt{2} F_x = \frac{k_e q^2}{a^2} \left(\sqrt{2} + \frac{1}{2}\right)$$

$$\theta = \arctan\left(\frac{F_x}{F_y}\right) = \arctan(1) = 45^\circ$$

БЕЛЛЕШКЕ - ЕЛЕКТРИЦИТЕТ 2



СЛАЗА (1) - ЗАДАТАК КАПЛЪЦЕ

$$E = 5.92 \cdot 10^4 \frac{\text{N}}{\text{C}}$$

$$m = 2.93 \cdot 10^{-15} \text{ kg}$$

$$\Delta y = 10.3 \text{ cm}$$

$$\Delta t = 0.25 \text{ s}$$

$$g = 9.8 \text{ m/s}^2$$

$$a) \quad \sum F_y = 0 \Rightarrow mg - F_e = 0$$

$$mg = F_e$$

$$mg = qE$$

$$q = \frac{mg}{E}$$

$$q = \frac{2.93 \cdot 10^{-15} \text{ kg} \cdot 9.8 \frac{\text{m}}{\text{s}^2}}{5.92 \cdot 10^4 \text{ N/C}}$$

$$q = -4.85 \cdot 10^{-19} \text{ C}$$

$$b) \sum F_y = m a_y$$

$$m g - q \cdot E = m a_y$$

$$q = \frac{m (g - a_y)}{E}$$

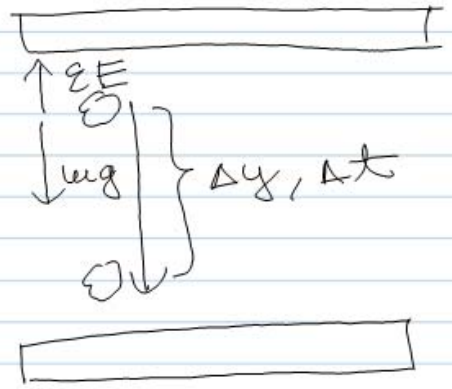
$$\Delta y = \cancel{v \Delta t} + \frac{a_y \Delta t^2}{2}$$

$$\Delta y = \frac{a_y \Delta t^2}{2} \Rightarrow a_y = \frac{2 \Delta y}{\Delta t^2}$$

$$a_y = \frac{2 \cdot 0.103 \text{ m}}{(0.25 \text{ s})^2} = 3.30 \frac{\text{m}}{\text{s}^2}$$

$$q = \frac{2.93 \cdot 10^{-15} \text{ kg} \left(9.8 \frac{\text{m}}{\text{s}^2} - 3.30 \frac{\text{m}}{\text{s}^2} \right)}{5.92 \cdot 10^4 \text{ N/C}}$$

$$q = 3.22 \cdot 10^{-19} \text{ C}$$



СЛАБД 13 - ЗАДАТАК СУПЕРПОЗИЦИЈА



$$q_1 = 7 \mu\text{C}$$

$$q_3 = 2 \cdot 10^{-8} \text{ C}$$

$$q_2 = 5 \mu\text{C}$$

$$k_e = 8.99 \cdot 10^9 \frac{\text{N} \cdot \text{m}^2}{\text{C}^2}$$

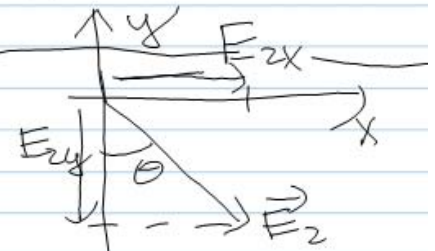
$$d = \sqrt{a^2 + b^2} = 0.5 \mu\text{m}$$

$$b = 0.4 \mu\text{m}$$



a)

$$E_{1x} = 0 \quad | \quad E_{1y} = E_1 = \frac{k_e q_1}{r^2}$$



$$E_{2x} = +E_2 \sin \theta \quad | \quad E_{2y} = -E_2 \cos \theta$$

$$\sin \theta = \frac{a}{d} \quad | \quad \cos \theta = \frac{b}{d} \quad | \quad E_2 = \frac{k_e q_2}{d^2}$$

$$E_{2x} = \frac{k_e q_2}{d^2} \sin \theta = \frac{k_e q_2 a}{d^3}$$

$$E_{2y} = - \frac{k_e q_2 b}{d^3}$$

$$E_x = E_{1x} + E_{2x} = \frac{k_e q_2 a}{d^3} = 1.08 \cdot 10^5 \frac{\text{N}}{\text{C}}$$

$$E_y = E_{1y} + E_{2y} = \frac{k_e q_1}{d^2} - \frac{k_e q_2 b}{d^3}$$

$$\cancel{E_y} E_y = 2.94 \cdot 10^5 \frac{\text{N}}{\text{C}}$$

$$E = \sqrt{E_x^2 + E_y^2} = 2.71 \cdot 10^5 \frac{\text{N}}{\text{C}}$$

$$\theta = \arctg\left(\frac{E_y}{E_x}\right) = 66.6^\circ$$

b)

$$F_{\bullet} = q_3 \cdot E = 2 \cdot 10^{-8} \text{ C} \cdot 2.71 \cdot 10^5 \frac{\text{N}}{\text{C}}$$

$$F = 5.42 \cdot 10^{-3} \text{ N}$$

травану силе \vec{F} је исти као и
• травану електричној тави \vec{E}