



UNIVERSIDAD DE SAN CARLOS DE GUATEMALA
FACULTAD DE INGENIERÍA
ESCUELA DE CIENCIAS
DEPARTAMENTO DE FÍSICA

Curso: F2 R	Nota:
2S2022	
AUX. CÉSAR FERNÁNDEZ	

TAREA
HOJA DE TRABAJO
EXAMEN CORTO



No.
1

CARNÉ:	201709088	FECHA:	08/08/2022
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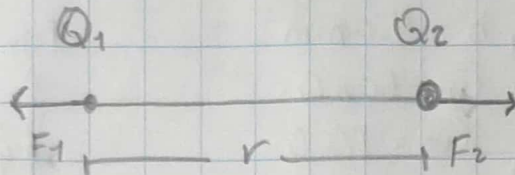
Corto 1

1/1

$$Q_1 =$$

$$Q_2 = 5Q_1$$

r



$$F_1 = F_{21}$$

$$F_2 = F_{12}$$

$$\frac{-K Q_2 Q_1}{r^2} = \frac{K Q_1 Q_2}{r^2}$$

$$\frac{-K (5Q_1)(Q_1)}{r^2} = \frac{K Q_1 (5Q_1)}{r^2}$$

$$-F_1 = F_2$$

$$F_2 = -F_1$$

2/2



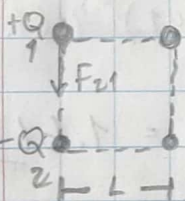
A y B → Carga Opuesta

B y C → Misma Carga

→ A y C → Carga Opuesta

Cargas Opuestas se atraen

3/3



$$Q = 20 \mu C$$

$$L = 60 \text{ cm} \rightarrow 0.6 \text{ m}$$

$$|F_{21}| = \frac{K (Q_1)(Q_2)}{L^2}$$

$$|F_{21}| = \frac{K (20 \mu)(20 \mu)}{(0.6)^2} = 10 \text{ N}$$

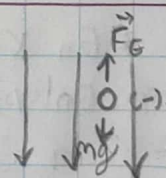
$$F_{21} = 10 \text{ N}$$

$$m = 1.45 \text{ g}$$

$$\vec{E} = 650 \text{ N/C } (-\hat{j})$$

$$E = \frac{F}{q} = \frac{m g}{q}$$

4/4



Carga (-)

\vec{F}_g y \vec{E}

son opuestas

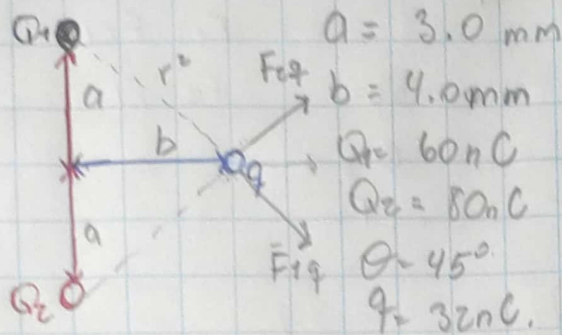
Partícula reposa $\Rightarrow F_n = 0$

$$|q| = \frac{m g}{E} = \frac{(1.45 \times 10^{-3})(9.8)}{650} = 2.19 \times 10^{-5}$$

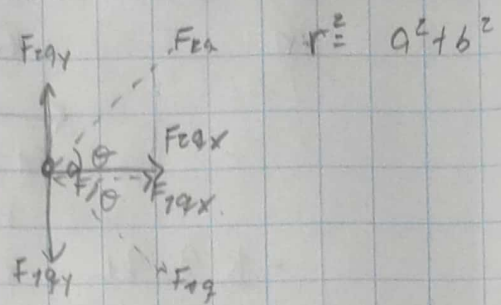
$$|q| = 2.19 \times 10^{-5} \text{ C}$$

$$q = (-)$$

5/15



$Q = 32 \text{ nC}$



$$F_{23x} = \frac{k(Q_2)(Q_3)}{(a^2 + b^2)} \cos 45^\circ = \frac{9 \times 10^9 (80 \text{ nC})(32 \text{ nC}) \cos 45^\circ}{(3 \times 10^{-3})^2 + (4 \times 10^{-3})^2} = 0.652 \text{ N}$$

$$F_{23y} = \frac{k(80 \text{ nC})(32 \text{ nC})}{(3 \times 10^{-3})^2 + (4 \times 10^{-3})^2} \sin 45^\circ = 0.6516 \text{ N}$$

$$F_{13x} = \frac{k(Q_1)(Q_3) \cos 45^\circ}{(a^2 + b^2)} = \frac{k(60 \text{ nC})(32 \text{ nC})}{(3 \times 10^{-3})^2 + (4 \times 10^{-3})^2} = 0.489 \text{ N}$$

$$F_{13y} = \frac{k(60 \text{ nC})(32 \text{ nC})}{(3 \times 10^{-3})^2 + (4 \times 10^{-3})^2} \sin 45^\circ = 0.489 \text{ N}$$

$$\vec{F}_R = (0.652 + 0.489) \hat{x} + (0.6516 + 0.489) \hat{y} = \sqrt{(1.141)^2 + (1.141)^2}$$

$|\vec{F}_R| = 1.61 \text{ N}$

$|\vec{F}_R| = 1.61 \text{ N}$

$q = 4.0 \text{ mC}$

$v_0 = 25 \text{ m/s}$

6/16

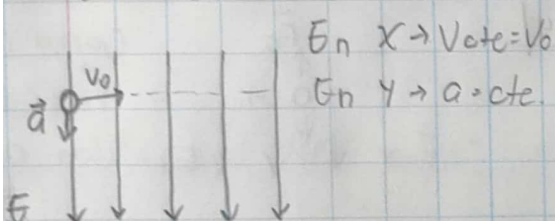
$v_f = v_0 + at$

a) $m = 50 \text{ g}$
 $t = 5.0 \text{ s}$

$\vec{E} = 60 \text{ N/C}$

b) $a = \frac{q\vec{E}}{m} = \frac{(4 \times 10^{-3})(60)}{(50 \times 10^{-3})}$

$a = 4.8 \text{ m/s}^2$



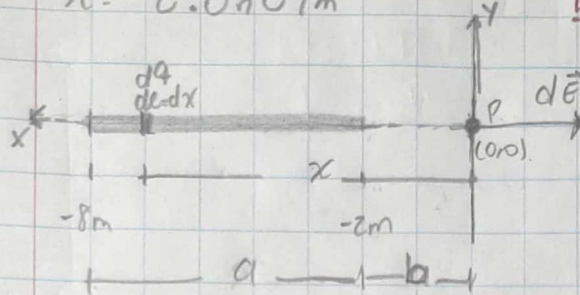
$v_f = (25) + (4.8)(5) = 49 \text{ m/s}$

$v_f = 49 \text{ m/s}$

$a = 4.8 \text{ m/s}^2$

$$\lambda = 2.0 \text{ nC/m}$$

7 / #7



$$dE = \frac{k dq}{r^2}$$

$$dq = \lambda dx$$

$$dE = \frac{k \lambda dx}{x^2}$$

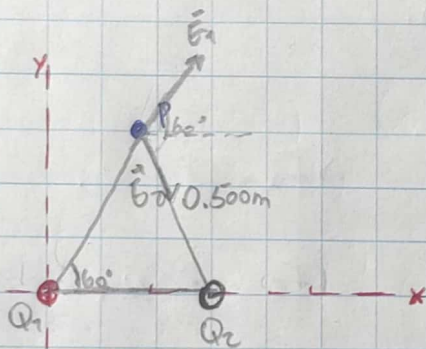
$$r = x \rightarrow E = k \lambda \int_{-8}^{2} \frac{dx}{x^2} = k \lambda \left(-\frac{1}{x} \right) \Big|_{-8}^{2}$$

$$E = k \lambda \left[\frac{-1}{-2} - \left(\frac{-1}{-8} \right) \right] = k \lambda \left(\frac{1}{2} - \frac{1}{8} \right) = k \lambda \left(\frac{3}{8} \right)$$

$$E = k (2 \times 10^{-9}) \left(\frac{3}{8} \right) = 6.75 \text{ N/C}$$

$$E = 6.75 \text{ N/C}$$

8 / #8

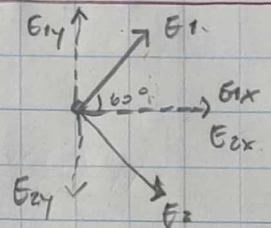


$$Q_1 = 2.00 \text{ nC}$$

$$Q_2 = -4.00 \text{ nC}$$

$$r = 0.500 \text{ m}$$

$$|E| = \frac{k q}{r^2}$$



a)

$$E_{1y} = \frac{k Q_1}{r^2} \sin 60^\circ = \frac{k (2 \text{ nC}) \sin 60^\circ}{(0.5)^2} = 62.3 \times 10^3 \text{ N/C}$$

$$E_{1x} = \frac{k (Q_1)}{r^2} \cos 60^\circ = \frac{k (2 \text{ nC}) \cos 60^\circ}{(0.5)^2} = 36 \times 10^3 \text{ N/C}$$

$$E_{2y} = \frac{k (Q_2)}{r^2} \sin 60^\circ = \frac{k (4 \text{ nC}) \sin 60^\circ}{(0.5)^2} = 124.7 \times 10^3 \text{ N/C}$$

$$E_{2x} = \frac{k (Q_2)}{r^2} \cos 60^\circ = \frac{k (4 \text{ nC}) \cos 60^\circ}{(0.5)^2} = 72 \times 10^3 \text{ N/C}$$

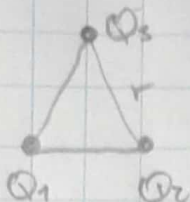
$$|E_R| = \sqrt{(108 \times 10^3)^2 + (187 \times 10^3)^2} = 215.9 \times 10^3 \text{ N/C}$$

$$\alpha = \tan^{-1} \left(\frac{187 \times 10^3}{108 \times 10^3} \right) = 60^\circ$$

$$|E| = 215.9 \times 10^3 \text{ N/C}$$

$$\alpha = 60^\circ$$

b)



$$Q_1 = 2 \mu\text{C}$$

$$Q_2 = -4 \mu\text{C}$$

$$Q_3 = 7 \mu\text{C}$$

$$r = 0.5 \text{ m}$$

$$|E| = |F|$$

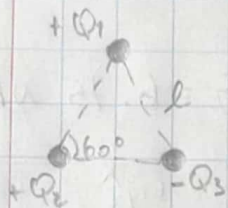
$$q$$

$$F_R = E_R Q_3$$

$$F_R = (216 \times 10^3)(7 \times 10^{-6}) = 1.512 \text{ N}$$

$$F = (+E)(+Q_3) = (+) = (+)$$

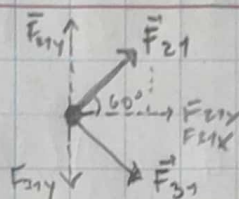
$$F = 1.512 \text{ N} \quad \underline{\underline{0.011}}$$



$$Q = 20 \mu\text{C}$$

$$l = 0.3 \text{ m}$$

$F_y \rightarrow$ se cancelan.



$$F_{21x} = \frac{k(20 \mu\text{C})(20 \mu\text{C})}{(0.3)^2} = 40 \text{ N}$$

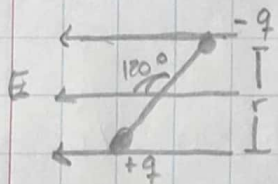
$$\Rightarrow F_x = 80 \text{ N}$$

$$F_{31x} = \frac{k(20 \mu\text{C})(20 \mu\text{C})}{(0.3)^2} = 40 \text{ N}$$

$$F_R = 80 \text{ N}$$

$$F_R = 80 \text{ N} \quad \underline{\underline{0.011}}$$

a)



$$q = 1.5 \times 10^{-5} \text{ C} \quad \underline{\underline{10 / 10.1}}$$

$$r = 0.06 \text{ m}$$

$$|E| = 4 \times 10^5 \text{ N/C}$$

$$P = (1.5 \times 10^{-5})(0.06 \text{ m})$$

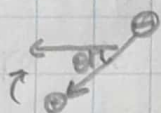
$$P = 9 \times 10^{-5}$$

$$|\tau| = (9 \times 10^{-5})(4 \times 10^5) \sin 120^\circ = 31.18 \text{ N/m}$$

$$\tau = 31.18 \text{ N/m}$$

$$\text{Direction} = -\hat{k}$$

b)



$$\theta = 60^\circ \quad -(\hat{k})$$

c)

$$W = -U_f - U_o$$

$$U_o = -PE \cos 60$$

$$U_o = -(9 \times 10^{-5})(4 \times 10^5) \cos 60 = -18 \text{ J}$$

$$U_f = -(9 \times 10^{-5})(4 \times 10^5) \cos 120 = -36 \text{ J}$$

$$W = -18 \text{ J} \quad \underline{\underline{0.011}}$$

$$W = -36 - (-18) = -18 \text{ J}$$