



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

ING. OSCAR TECUN

Física 2 P	Nota:
Junio 2022	
AUX. ANDREA GARCIA	

TAREA

HOJA DE TRABAJO

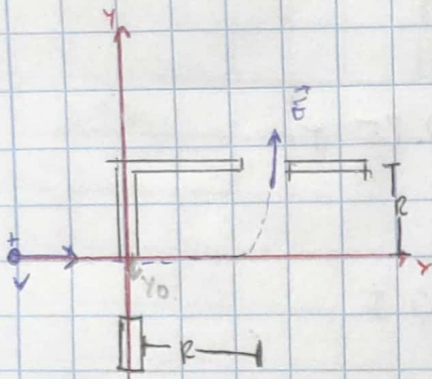
EXAMEN CORTO

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No.
3

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Problema 1:



$$y_0 = 0 \quad v_{y0} = 0$$

$$y_c = R \quad v_{y0} = 0$$

$$a = \frac{qE}{m}$$

$$t = \frac{R}{v_x}$$

$$y_c = y_0 + v_{y0}t + \frac{1}{2}at^2$$

$$y_c = \frac{1}{2} \left(\frac{qE}{m} \right) \left(\frac{R}{v_x} \right)^2$$

$$\sum \vec{F}_y = m\vec{a}$$

$$qE = m\vec{a}$$

$$a_y = \frac{qE}{m} \quad (g)$$

$$v_x = \frac{\Delta x}{t}$$

$$t = \frac{\Delta x}{v_x} = \frac{R}{v_x}$$

$$R = 0.3 \text{ m.}$$

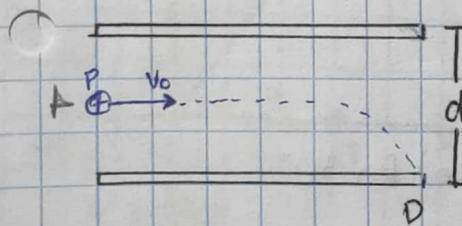
$$R = \frac{1}{2} \left(\frac{qE}{m} \right) \frac{R^2}{v_x^2}$$

$$R = \frac{2(1.67 \times 10^{-27})(10 \times 10^3)^2}{(1.6 \times 10^{-19})(6.96)} =$$

$$R = \frac{2mV^2}{qE}$$

$$R = 0.2999 \text{ m.}$$

Problema 2:



$$A = 25 \text{ cm}^2$$

$$\sigma = 8.85 \times 10^{-8} \text{ C/m}^2$$

$$d = 1 \times 10^{-3}$$

$$\epsilon_0 = 8.8542 \times 10^{-12} \text{ C}^2/\text{Nm}^2$$

$$q = 1.6022 \times 10^{-19} \text{ C}$$

$$m_p = 1.6726 \times 10^{-27} \text{ kg}$$

$$a) E = \frac{\sigma}{\epsilon_0} = \frac{8.85 \times 10^{-8}}{8.85 \times 10^{-12}} = 10,000 \text{ N/C}$$

$$\vec{E} = 10 \text{ kN/C}$$

$$b) a_y = \frac{qE}{m_p} \Rightarrow y_f = y_0 + v_{y0}t + \frac{1}{2}at^2$$

$$y_f = \frac{1}{2}at^2$$

$$y_f = d/2$$

$$t = \sqrt{\frac{2y_f}{a}} = \sqrt{\frac{2(-1 \times 10^{-3}/2)}{\left(\frac{(1.6022 \times 10^{-19})(10 \times 10^3)}{1.6726 \times 10^{-27}} \right)}} = 3.2310 \times 10^{-8} \text{ s}$$

$$t = 32.31 \times 10^{-9} \text{ s.}$$

d) $P = 50 \mu\text{Cm}$

$\theta_0 = 2\pi/3$

$W = -\Delta U = U_0 - U_f$

$U_0 = -PE \cos \theta_{0 \rightarrow \theta_0}$

$U_0 = -(50 \times 10^{-6})(10 \times 10^3) \cos(2\pi/3) = 0.25 \text{ J}$

$U_f = -PE \cos \theta_{f \rightarrow \theta_0} =$

$U_f = -(50 \times 10^{-6})(10 \times 10^3) \cos(0) = -0.50 \text{ J}$

$W = 0.25 - (-0.50) = 0.75 \text{ J}$

$W = 0.75 \text{ J}$

Problema 3:

$m = 5.0 \text{ g}$

$V_{0y} = 50 \text{ m/s}$

$\sum F_x = ma$

$q = 40 \text{ mC}$

$V_x = V_z = 0$

$qE = ma$

$\vec{E}_x = 2.5 \text{ N/C}$

$V_f \rightarrow t = 2 \text{ s}$

$a = \frac{qE}{m}$

$E_y = E_z = 0$

$a_x = \frac{(40 \times 10^{-3})(2.5)}{5 \times 10^{-3}} = 20 \text{ m/s}^2$

$V_{fx} = V_{ix} + at$

$V_{0x} = V_x = V_x$

$V_{fx} = (20)(2) = 40 \text{ m/s}$

$V = \sqrt{40^2 + 50^2} = 64.03 \text{ m/s}$

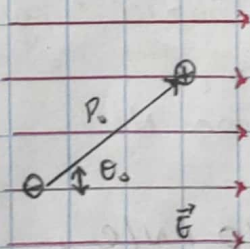
$V = 64.03 \text{ m/s}$

Problema 4:

$P = 100 \mu\text{Cm}$

$\theta_0 = 30^\circ$

$\vec{E} = 2000 \text{ N/C}$



$\tau = P E \sin \theta = (100 \times 10^{-6})(2000) \sin 30^\circ$

$\tau = 0.1 \text{ Nm}$

$\tau = 0.1 \text{ Nm}$

b) $F_e = 0$ debido a la fuerza de cada partícula en dirección contraria a esta.

c) $U = -PE \cos \theta$

$U = -0.2 \text{ J}$

$U = -(100 \times 10^{-6})(2000) = -0.2 \text{ J}$

$W = 0.2 - (-0.173)$

$W = 0.373 \text{ J}$

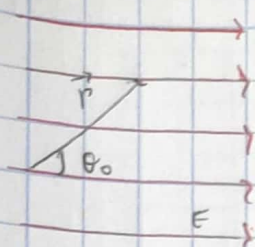
d) $W = \Delta U = U_f - U_0$

$U_0 = -(100 \times 10^{-6})(2000) \cos 30^\circ = -0.173 \text{ J}$

$U_f = -(100 \times 10^{-6})(2000) \cos 180^\circ = 0.2 \text{ J}$

$W = 0.373 \text{ J}$

Problema 5:



$$P = 6 \mu\text{C}\cdot\text{m}$$

$$\theta = \pi/3$$

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

$$W = -\Delta U$$

$$U_0 = -(6 \mu)(10^3) \cos(\pi/3)$$

$$U_0 = -3 \times 10^{-3}$$

$$U_f = -(6 \mu)(10^3) \cos(2\pi)$$

$$U_f = -6 \times 10^{-3}$$

$$W = -3 \times 10^{-3} + 6 \times 10^{-3}$$

$$W = 3 \times 10^{-3}$$

$$W = 3 \times 10^{-3} \text{ Nm}$$

b) $I_{\text{cm}} = 1.1 \times 10^{-11} \text{ kg}\cdot\text{m}^2$

$$E_0 = EA$$

$$U_0 + K_0 = U_f + K_f$$

$$U_0 - U_f = K_f$$

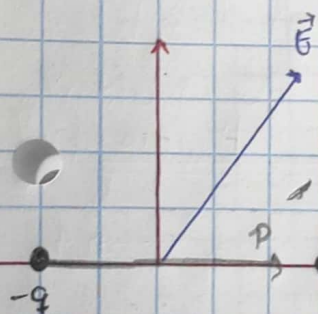
$$U_0 - U_f = \frac{1}{2} I \omega^2$$

$$\omega = \sqrt{\frac{2(U_0 - U_f)}{I}}$$

$$\omega = \sqrt{\frac{2(3 \times 10^{-3})}{1.1 \times 10^{-11}}} = 23.35 \times 10^3 \text{ rad}$$

$$\omega = 23.35 \times 10^3 \text{ rad/s}$$

Problema 6:



$$q_1 = +3 \mu\text{C} \quad x = 0.75 \text{ m}$$

$$q_2 = -3 \mu\text{C} \quad x = 0.75 \text{ m}$$

$$\vec{E} = (4.0 + 3.0) \times 10^6$$

a) $U = -(\vec{P} \cdot \vec{E})$

$$P = qd$$

$$P = (3 \times 10^{-6})(1.5) =$$

$$P = 4.5 \times 10^{-6}$$

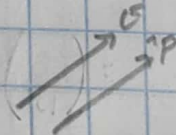
$$U = -(4.5 \times 10^{-6} \times 4 \times 10^6)$$

$$U = -18 \text{ J}$$

$$U = -18 \text{ J}$$

b) $|\vec{E}| = \sqrt{4^2 + 3^2} = 5 \times 10^6 \text{ N/C}$

$$\theta = 0$$



$$U_f = -P E \cos \theta$$

$$U_f = -(4.5 \times 10^{-6})(5 \times 10^6) = -22.5 \text{ J}$$

$$U_0 = -18 \text{ J}$$

$$W = \Delta U = U_f - U_0$$

$$W = -22.5 + 18 = -4.5 \text{ J}$$

$$W = -4.5 \text{ J}$$