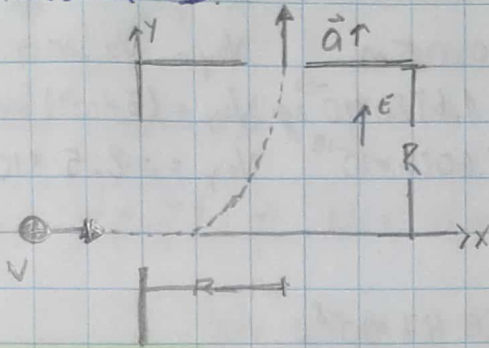
	UNIVERSIDAD DE SAN CARLOS DE GUATEMALA	FÍSICA 2 C	NOTA:
	FACULTAD DE INGENIERÍA		
	ESCUELA DE CIENCIAS	1S2023	
	DEPARTAMENTO DE FÍSICA		
	INGA. CLAUDIA CECILIA CONTRERAS FOLGAR DE ALFARO	AUX. ANGEL QUIM	

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HT 2

HTZ

Problema 1.



$$q = 1.6 \times 10^{-19} \text{ C}$$

$$m = 1.67 \times 10^{-27} \text{ kg}$$

$$E = 6.96 \text{ N/C}$$

$$v = 10 \times 10^3 \text{ m/s}$$

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

$$F_y = ma \Rightarrow F = Eq$$

$$a = \frac{(6.96)(1.6 \times 10^{-19})}{1.67 \times 10^{-27}} = 6.96 \times 10^8$$

$$v_i = v_x = 10 \times 10^3 \text{ m/s}$$

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

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

$$y_f = y_0 + v_{y0}t + \frac{1}{2} a t^2$$

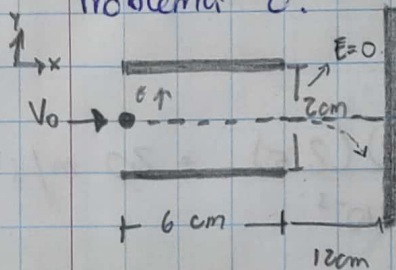
$$y_f = \frac{1}{2} a \left(\frac{R}{v_x} \right)^2 = \frac{1}{2} a \frac{R^2}{v^2}$$

$$\frac{R}{R^2} = \frac{a}{2v^2} \Rightarrow \frac{2v^2}{a} = R$$

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

$$R = \frac{2(10 \times 10^3)^2}{(6.96 \times 10^8)} = 0.287 \text{ m}$$

Problema 2.



$$v_0 = 6.50 \times 10^6 \text{ m/s}$$

$$m_e = 9.1094 \times 10^{-31} \text{ kg}$$

$$E = 1.1 \times 10^5 \text{ N/C}$$

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

$$a_y = \frac{-eE}{m_e} = \frac{-(1.6022 \times 10^{-19})(1.1 \times 10^5)}{9.1094 \times 10^{-31}}$$

$$a_y = -1.934 \times 10^{14} \text{ m/s}^2$$

$$x = v_0 t \Rightarrow t = \frac{0.06}{6.5 \times 10^6} = 9.23 \times 10^{-9} \text{ s}$$

$$v_0$$

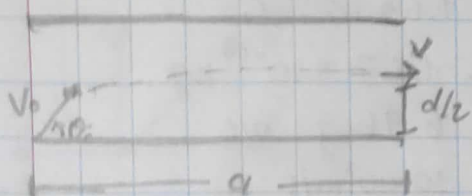
$$\Delta y = -8.238 \times 10^{-3} \text{ m}$$

$$y_f - y_0 = v_{y0}t + \frac{1}{2} a t^2$$

$$\Delta y = 8.24 \times 10^{-3} \text{ m}$$

$$\Delta y = \frac{1}{2} (-1.934 \times 10^{14}) (9.23 \times 10^{-9})^2$$

Problema 3:



$$V_0 = 5 \times 10^6 \text{ m/s}$$

$$\theta_0 = 30^\circ$$

$$q = 0.05 \text{ m}$$

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

$$p = 1.6022 \times 10^{-19}$$

$$V_{0x} = V_0 \cos 30^\circ$$

$$V_{0x} = (5 \times 10^6) \cos 30^\circ = 4.3 \times 10^6$$

$$V_{0y} = V_0 \sin \theta$$

$$V_{0y} = (5 \times 10^6) \sin 30^\circ$$

$$V_{0y} = 2.5 \times 10^6 \text{ m/s}$$

a)

$$x = V_{0x} t$$

$$t = \frac{x}{V_{0x}} = \frac{0.05}{4.33 \times 10^6} = 1.1547 \times 10^{-8} \text{ s}$$

$$t = 11.55 \times 10^{-9} \text{ s}$$

b)

$$V_{0y} = V_0 \sin \theta$$

$$V_{0y} = 0$$

$$V_{fy} = V_{0y} + at$$

$$\frac{-V_{0y}}{t} = a$$

$$a = \frac{-2.5 \times 10^6}{1.1547 \times 10^{-8}}$$

$$a = -2.165 \times 10^{14} \text{ m/s}^2$$

c)

$$q_y = \frac{E q}{m} \Rightarrow E = \frac{q_y m}{q}$$

$$a = 2.16 \times 10^{14} \text{ m/s}^2 (-\hat{j})$$

$$E = \frac{(2.16 \times 10^{14})(1.6726 \times 10^{-27})}{1.6022 \times 10^{-19}} = 2.26 \times 10^6 \text{ N/C}$$

$$E = 2.26 \times 10^6 \text{ N/C}$$

Problema 4:

$$t = 0 \rightarrow V_y = 50 \text{ m/s}$$

$$m = 5.0 \text{ g}$$

$$V_x = V_z = 0$$

$$q = 40 \text{ mC}$$

$$t = 2 \text{ s} \rightarrow V = ?$$

$$E_x = 2.5 \text{ N/C}$$

$$E_y = E_z = 0$$

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

$$V_{0x} = 0$$

$$V_{fx} = V_{0x} + a_x t$$

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

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

$$V_{fx} = V_x$$

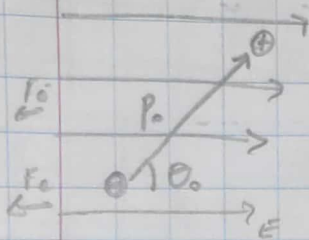
$$V_{fy} = V_y$$

$$V = 64 \text{ m/s}$$

Problema 5:

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

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



a) $\theta_0 = 30^\circ$

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

$$\tau = 0.1 \text{ Nm}$$

$$\tau = 0.1 \text{ Nm}$$

b) $F_e = 0 \text{ N}$. Es cero debido a que la magnitud es igual pero en dirección opuesta.

c) $U = -pE \cos\theta =$
 $U = -(100 \times 10^{-6})(2000) \cos 60^\circ = -0.2 \text{ J}$

$$U = -0.2 \text{ J}$$

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

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

$$U_f = -(100 \times 10^{-6})(2000) \cos 90 = 0.2 \text{ J}$$

$$W = 0.373 \text{ J}$$

$$W = 0.2 - (-0.173) = 0.373 \text{ J}$$

Problema 6:

$$W_e = U_0 - U_f$$

a) $P = 6 \mu\text{Cm}$

$$\theta_0 = \pi/3$$

$$E = 1 \times 10^3 \text{ N/C}$$

$$U_0 = -(6 \times 10^{-6})(1 \times 10^3) \cos \pi/3 = -3 \times 10^{-3} \text{ J}$$

$$U_f = -(6 \times 10^{-6})(1 \times 10^3) \cos 0^\circ = -6 \times 10^{-3} \text{ J}$$

$$W_e = -3 \times 10^{-3} - (-6 \times 10^{-3}) = 3 \times 10^{-3} \text{ J}$$

$$W_e = 3 \times 10^{-3} \text{ J}$$

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

$$U_0 + K_0 = U_f + K_f$$

$$U_0 - U_f = K_f$$

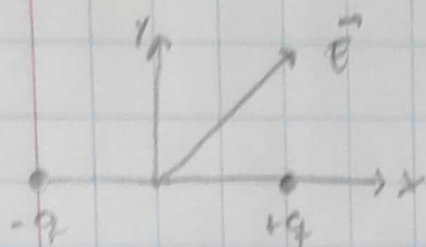
$$U_0 - U_f = \frac{1}{2} I \omega^2$$

$$\omega = \sqrt{\frac{2(-3 \times 10^{-3} + 6 \times 10^{-3})}{1.1 \times 10^{-11}}} = 23,554.9 \text{ rad/s}$$

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

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

Problema 7:



$$+q = +3 \mu\text{C}$$

$$-q = -3 \mu\text{C}$$

$$x = 0.75 \text{ m}$$

$$-x = -0.75 \text{ m}$$

$$\vec{E} = (4\hat{x} + 3\hat{y}) \times 10^6 \text{ N/C}$$

$$a) U = -(\vec{p} \cdot \vec{E}) \Rightarrow U = -(p_x E_x + p_y E_y)$$

$$U = -(4.5 \times 10^{-6})(4 \times 10^6) = -18 \text{ J}$$

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

$$b) W = \Delta U = U_f - U_o \rightarrow U_o = -18 \text{ J}$$

$$\theta = 0$$

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

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

$$U_f = -(4.5 \times 10^{-6})(5 \times 10^6) \cos 0 = -22.5 \text{ J}$$

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

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