UNIVERSIDAD DE SAN CARLOS DE GUATEMALA
FACULTAD DE INGENIERIA
ESCUELA DE CIENCIAS
DEPARTAMENTO DE FISICA

TAREA No. 1

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Carné: 201709088	CAPÍTULO No.: **21**
Sección: P	NOMBRE DEL CAPITULO: **Carga eléctrica y campo eléctrico**
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21.4, 21.11, 21.17, 21.19, 21.23, 21.25, 21.27, 21.32, 21.35, 21.39, 21.41, 21.43, 21.47, 21.50, 21.51, 21.57, 21.65, 21.86, 21.88

-----------------Puede iniciar su tarea a partir de aquí (Mínimo 10 problemas) ------------

m = 10.8 g
mat = 197 g/mol   a) # Protones
nat = 79

$$10.8\,g \times \frac{1\,mol}{197\,g} \times 6.022 \times 10^{23}\,at \times \frac{79\,Prot}{1\,at} = 2.61 \times 10^{24}\,p$$

Carga Positiva = $(2.61 \times 10^{24}\,p)(1.6022 \times 10^{-19}\,c/p) = 4.18 \times 10^{5}\,c$

<mark># Protones: 2.61 \times 10^{24} p</mark>
<mark>Q+ = 4.18 \times 10^{5} c</mark>

b) # electrones = # Protones

<mark># electrones: 2.61 \times 10^{24} e^{-}</mark>

_____ P. 21.11 _____

a)   ¹⊕ _____ ⊕² $F = m\hat{a}$
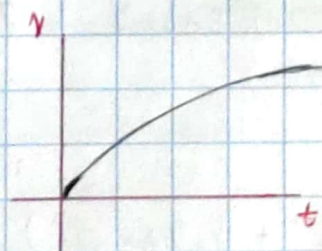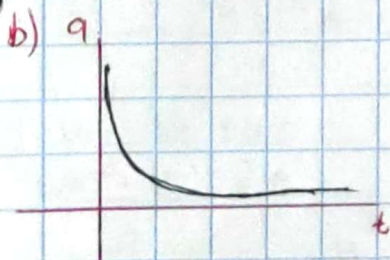
            2.50 mm $a = \dfrac{F}{m}$

$$F_e = \frac{K\,q_p^2}{r_{E1}} = \frac{9 \times 10^9 (1.6 \times 10^{-19})^2}{(0.00250)^2} = 3.69 \times 10^{-23}\,N$$

$$a = \frac{3.69 \times 10^{-23}}{1.67 \times 10^{-27}} = 22074.2\ m/s^2$$

<mark>$a = 2.21 \times 10^4\ m/s^2$</mark>

b)

$q_1 = +3.00 \mu C$ $x = 0$ $F_1 = 7.00 N, -\hat{o}$

$q_2 = -5.00 \mu C$ $x = 0.200 m$

$q_3 = -2.00 \mu C$

$$\vec{F_1} = \vec{F_{12}} + \vec{F_{13}}$$

$$-7 = \frac{k \, |q_1||q_2|}{0.2^2} + \vec{F_{13}}$$

$$\vec{F_{13}} = -7 - \frac{9 \times 10^9 \, (3 \times 10^{-6})(5 \times 10^{-6})}{0.2^2}$$

$$\vec{F_{13}} = -10.375 N$$

$$|F_{13}| = \frac{k \, |q_1||q_3|}{r_{13}^2} =$$

$$r_{13} = \sqrt{\frac{9 \times 10^9 \, (2 \times 10^{-7})(3 \times 10^{-6})}{10.375}} = 0.144 m$$

$$X = -0.144 m$$

$q_1 = -1.50 \, nC$ $Y = -0.600 m$

$q_2 = +3.20 \, nC$ $Y = 0$

$q_3 = +5.00 \, nC$ $Y = -0.400 m$

$$\vec{F_e} = \vec{F_{13}} + \vec{F_{23}}$$

$$F_{13} = \frac{k \, |q_1||q_3|}{r_{13}^2} = \frac{9 \times 10^9 (1.50 n)(5.00 n)}{(0.200)^2}$$

$$F_{13} = 1.69 \times 10^{-6} N$$

$$F_{23} = \frac{9 \times 10^9 \, (3.20 n)(5.00 n)}{(0.400)^2} = 8.97 \times 10^{-7} N$$

$$F_{2x} = 0$$

$$F_{2y} = -(1.69 \times 10^{-6} + 8.97 \times 10^{-7}) = -2.59 \times 10^{-6} N$$

$$|F_e| = 2.59 \times 10^{-6} N \, (-\hat{j})$$

$\vec{E} = 2.75 * 10^3$ N/C $q_{proton} = 1.60 \times 10^{-19}$ c

a) $\vec{E} = \dfrac{F}{q}$ → $F = Eq$

$F = (2.75 * 10^3)(1.60 * 10^{-19})$

$F = 4.4 * 10^{-16}$ N

$\boxed{F = 4.4 * 10^{-16} N}$

b) $F = ma$ → $a = \dfrac{F}{m} = \dfrac{4.4 * 10^{-16}}{1.67 * 10^{-27}}$

$a = 2.63 * 10^{11}$ m/s²

$\boxed{a = 2.63 * 10^{11} m/s^2}$

c) $V_f = \cancel{V_0}^{\,0} + at$

$t = 1\mu s$

$U = (2.63 * 10^{11})(1 * 10^{-6}) = 263473.05$ m/s

$\boxed{U = 2.63 * 10^5 m/s}$

$V = 4.50 * 10^6$ m/s.

$q_{proton} = 1.60 * 10^{-19}$ c.

$X = 3.20$ cm

a) $V_f^2 = \cancel{V_0}^{\,2>0} + 2a \Delta x.$

$\dfrac{-V_0^2}{2\Delta x} = a.$ → $a = \dfrac{-(4.50 * 10^6)^2}{2(0.0320)}$

$a = -3.16 * 10^{14}$ m/s²

$E = \dfrac{F}{q} = \dfrac{ma}{q} = \dfrac{(1.67 * 10^{-27})(3.16 * 10^{14})}{1.60 * 10^{-19}}$

$E = 3.3 * 10^6$ N/c +x

$\boxed{E = 3.3 * 10^6 (-x) N/c}$

b) $V_f = V_0 + at$ $t = \dfrac{-V_0}{a} = \dfrac{4.50 * 10^6}{3.16 * 10^{14}} = 1.42 * 10^{-8}$

$\dfrac{V_f^{\,0} - V_0}{a} = t.$

$\boxed{t = 1.42 * 10^{-8} s}$

c) $E_e = \dfrac{m_e}{m_p} E_p = \dfrac{9.10 * 10^{-31}}{1.67 * 10^{-27}}(3.3 * 10^6) = 1798.2$ N/c

$\boxed{E_e = 1.80 * 10^3 N/c}$

P. 21.27

$m = 1.45 g$

$E = 650 \, N/C$

a)

$F = E q_0$

$mg = E q_0$

$\dfrac{mg}{E} = q_0$

$F = mg$
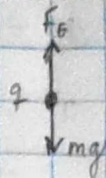
$$q_0 = \dfrac{(1.45 \times 10^{-3})(9.80)}{650} = 2.19 \times 10^{-5} \, C$$

$q = -21.9 \, \mu C$

b) $F_E = |q| E = eE$

$$E = \dfrac{mg}{e^-} = \dfrac{(1.67 \times 10^{-27})(9.80)}{1.602 \times 10^{-19}} = 1.02 \times 10^{-7} \, N/C$$

$E = 1.02 \times 10^{-7} \, N/C$

P. 21.32

$X = 1.60 \, cm$

$t = 3.20 \times 10^{-6} \, s$

$m_p = 1.67 \times 10^{-27}$

$E = \dfrac{F}{|q|} \rightarrow a = \dfrac{E q e^-}{m_p}$

a) $X - X_0 = \overset{0}{\cancel{v_{0x}}} t + \dfrac{1}{2} a t^2$

$\dfrac{2(X - X_0)}{t^2} = a$

$\dfrac{2(X - X_0)}{t^2} = \dfrac{E q e^-}{m_p}$

$$E = \dfrac{2(X - X_0) m_p}{q e^+ t^2} = \dfrac{2(0.0160)(1.67 \times 10^{-27})}{(1.60 \times 10^{-19})(3.20 \times 10^{-6})^2} = 32.6 \, N/C$$

$E = 32.6 \, N/C$

b) $V_F = \overset{0}{\cancel{v_0}} + at$

$$V_F = \dfrac{E q e^-}{m_p} t = \dfrac{(32.6)(1.60 \times 10^{-19})}{(1.67 \times 10^{-17})} (3.20 \times 10^{-6}) = 1.00 \times 10^4 \, m/s$$

$V = 1.00 \times 10^4 \, m/s$