



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.

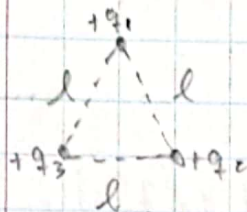
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3/23.1

#1



$$l = 2.00 \times 10^{-15} \text{ m.}$$

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

$$q_1 = q_2 = q_3 = q$$

$$W = U_{\text{elect.}}$$

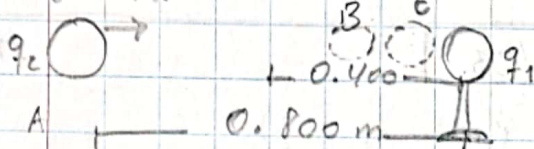
$$U_{\text{init}} = \sum U. \Rightarrow U = \frac{kq_1q_2}{l} + \frac{kq_1q_3}{l} + \frac{kq_2q_3}{l} =$$

$$U = \frac{k}{l} (q^2 + q^2 + q^2) = \frac{3kq^2}{l} = \frac{3(9 \times 10^9)(1.6022 \times 10^{-19})^2}{2 \times 10^{-15} \text{ m.}}$$

$$U = 2.16 \times 10^6 \text{ V.}$$

$$U_{\text{elect}} = 2.16 \times 10^6 \text{ V.}$$

$$v = 22 \text{ m/s}$$



5/23.1

#2

$$q_1 = -2.80 \text{ nC}$$

$$q_2 = -7.80 \text{ nC. } m = 1.50 \text{ g}$$

$$a) E_A = E_B$$

$$U_A + K_A = U_B + K_B$$

$$\frac{kq_1q_2}{r_A} + \frac{1}{2} m v_{iA}^2 = \frac{kq_1q_2}{r_B} + \frac{1}{2} m v_{fB}^2$$

$$\frac{2}{m} \left[ \frac{kq_1q_2}{r_A} \left( \frac{1}{r_A} - \frac{1}{r_B} \right) + \frac{1}{2} m v_{iA}^2 \right] = v_{fB}^2$$

$$v_{fB} = \sqrt{\frac{2}{1.5 \times 10^{-3}} \left[ (9 \times 10^9)(-2.8 \text{ nC})(-7.8 \text{ nC}) \left( \frac{1}{0.8} - \frac{1}{0.4} \right) + \frac{1}{2} (1.5 \times 10^{-3})(22)^2 \right]}$$

$$v_{fB} = 12.51 \text{ m/s}$$

$$r_{12C} = 0.323 \text{ m}$$

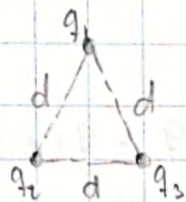
$$b) E_{\text{mech A}} = E_{\text{mech C}}$$

$$U_A + K_A = U_C + K_C$$

$$r_{12} = 0.323 \text{ m.}$$

$$\frac{kq_1q_2}{0.8} + \frac{1}{2} m v_{iA}^2 = \frac{kq_1q_2}{r_{12C}} + \frac{1}{2} m v_{fC}^2$$

$$\frac{(9 \times 10^9)(-7.8 \text{ nC})(-2.8 \text{ nC})}{0.8} + \frac{1}{2} (1.5 \times 10^{-3})(22)^2 = \frac{k(-7.8 \text{ nC})(-2.8 \text{ nC})}{r_{12C}} + \frac{1}{2} m v_{fC}^2$$



$$q_1 = q_2 = q_3$$

11/23.1

H3

$$W = -\Delta U = -(U_2 - U_1) \quad U_1 = 0$$

$$U_2 = U_{21} + U_{23} + U_{13} = K(q^2 + 2q^2)$$

$$W = 0$$

$$0 = -U_2 - \cancel{U_1}$$

$$0 = -U_2$$

$$K(q^2 + 2q^2) = 0$$

$$q^2 + 2q^2 = 0$$

$$2q^2 = -q^2$$

$$q_3 = \frac{-q^2}{2q}$$

$$q_3 = -q/2$$

$$q_3 = -q/2$$

$$q = 28 \text{ nC}$$

15/23.2

H4

$$E = 4.00 \times 10^4 \text{ V/m} \uparrow$$

$$a) W \text{ a } 0.450 \text{ m (+z)}$$

$$V = Ed$$

$$W = Vq$$

$$V = (4 \times 10^4)(0.450) = 18 \times 10^3 \text{ V}$$

$$W = (18 \times 10^3)(28 \text{ n}) = 5.04 \times 10^{-4} \text{ J}$$

$$W = 5.04 \times 10^{-4} \text{ J}$$

$$b) W \text{ a } 0.670 \text{ m (+z)}$$

$$V = (4 \times 10^4)(0.670) = 26800$$

$$W = (26800)(28 \text{ n}) = 7.50 \times 10^{-4} \text{ J}$$

$$W = 7.50 \times 10^{-4} \text{ J}$$

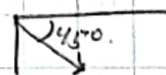
$$c) 2.60 \text{ m a. } 45^\circ$$

$$V = (4 \times 10^4)(1.8384) = 73536$$

$$W = (73536)(28 \text{ n}) = -2.06 \times 10^{-3} \text{ J}$$

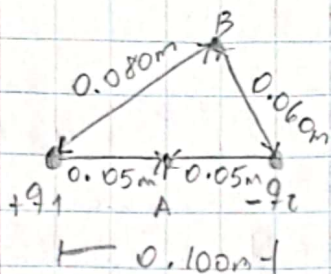
$$2.60 \cos 45 = 1.838$$

$$2.6 \sin 45 = 1.838$$



$$W = -2.06 \times 10^{-3} \text{ J}$$





$$q_1 = 2.40 \text{ nC}$$

$$q_2 = -6.50 \text{ nC}$$

$$a) V_A = V_1 + V_2$$

$$V_1 = \frac{k(2.40 \text{ n})}{0.05} = 432 \text{ V}$$

$$V_2 = \frac{k(-6.50 \text{ n})}{0.05} = -1170 \text{ V}$$

$$V_A = 432 - 1170 = -738 \text{ V}$$

$$V_A = -738 \text{ V}$$

$$b) V_B = V_1 + V_2$$

$$V_1 = \frac{k(2.40 \text{ n})}{0.08} = 270 \text{ V}$$

$$V_2 = \frac{k(-6.50 \text{ n})}{0.06} = -975 \text{ V}$$

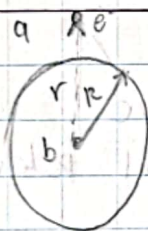
$$V_B = 270 - 975 = -705 \text{ V}$$

$$V_B = -705 \text{ V}$$

$$c) W = q(V_B - V_A) \quad q = 2.5 \text{ nC}$$

$$W = (2.50 \text{ n})(-705 - (-738)) = 8.25 \times 10^{-8} \text{ J}$$

$$W = 8.25 \times 10^{-8} \text{ J}$$



$$R = 0.15 \text{ m}$$

$$Q = 24 \text{ nC}$$

$$r = 0.30 \text{ m}$$

a) La fuerza del  $e^-$  produce movimiento oscilatorio del  $e^-$  en el eje del anillo.

$$b) K_a + U_a = K_b + U_b$$

$$U_a = K_b + U_b$$

$$K_b = U_a - U_b$$

$$K_b = qV_a - qV_b$$

$$K_b = eV_a - eV_b$$

$$\frac{1}{2} m v_b^2 = eV_a - eV_b$$

$$v_b = \sqrt{\frac{2e(V_a - V_b)}{m}}$$

$$V_A = \frac{k(24 \text{ n})}{\sqrt{(0.3)^2 + (0.15)^2}} = 643 \text{ V}$$

$$V_B = \frac{k(24 \text{ n})}{0.15} = 1438 \text{ V}$$

$$v_b = \sqrt{\frac{2(1.6022 \times 10^{-19})(1438 - 643)}{(9.1094 \times 10^{-31})}}$$

$$v_b = 1.67 \times 10^7 \text{ m/s}$$

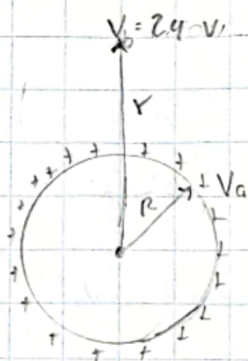
$$v_b = 1.67 \times 10^7 \text{ m/s}$$

$$R = 0.400 \text{ m}$$

[28/23.3]

#7.

$$V = 24.0 \text{ V a } 1.70 \text{ m del centro.}$$



$$r = 1.70 \text{ m} + R$$

$$q = q_c$$

$$V_b = \frac{kq}{r}$$

$$\frac{V_b r}{k} = q$$

$$\frac{V_b r}{k} = \frac{V_a R}{k}$$

$$V_a = \frac{kq}{R}$$

$$\frac{V_a R}{k} = q$$

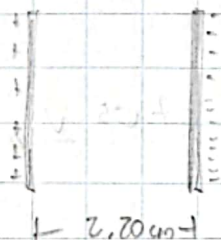
$$\frac{V_b r}{R} = V_a$$

$$V_a = \frac{(24)(1.70)}{0.4} = 72 \text{ V}$$

$$V = 72 \text{ V}$$

[36/23.3]

#8.



$$a) \sigma = 47 \text{ nC/m}^2$$

$$E = \frac{\sigma}{\epsilon_0} = \frac{47 \times 10^{-9}}{8.8542 \times 10^{-12}} = 5308.2 \text{ N/C}$$

$$E = 5308 \text{ N/C}$$

$$b) V = Ed$$

$$V = (5308)(0.0220) = 116.77 \text{ V}$$

$$V = 117 \text{ V}$$

c) El campo eléctrico se mantiene ya que no depende de la distancia, mientras que el potencial eléctrico se duplicaría.