



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	

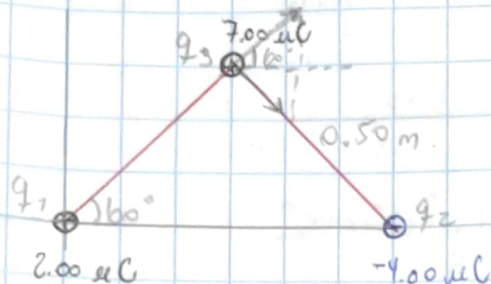
TAREA
HOJA DE TRABAJO
EXAMEN CORTO

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Problema 1.

$$F_e = \frac{k(19)(19)}{r^2}$$



$$F_1 = \frac{9 \times 10^9 (7 \mu)(4 \mu) \cos 60^\circ}{0.5^2} \hat{i} -$$

$$\frac{9 \times 10^9 (7 \mu)(4 \mu) \cos 30^\circ}{0.5^2} \hat{j}$$

$$F_1 = 0.504 \hat{i} - 0.873 \hat{j}$$

$$F_2 = \frac{9 \times 10^9 (7 \mu)(2 \mu) \cos 60^\circ}{0.5^2} \hat{i} + \frac{9 \times 10^9 (7 \mu)(2 \mu) \cos 30^\circ}{0.5^2} \hat{j}$$

$$F_2 = 0.252 \hat{i} + 0.436 \hat{j}$$

$$\theta = \tan^{-1} \left(\frac{-0.436}{0.756} \right)$$

$$F_T = 0.756 \hat{i} + 0.436 \hat{j}$$

$$\theta = 30^\circ$$

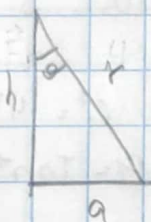
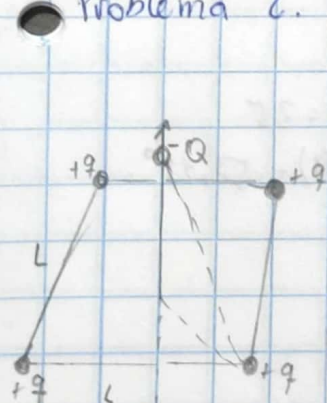
$$\theta = 330^\circ$$

$$F_T = \sqrt{0.756^2 + (0.436)^2} = 0.873 \text{ N}$$

$$F_T = 0.873 \text{ N}$$

$$\theta = 330^\circ$$

Problema 2.



$$r^2 = h^2 + a^2$$

$$a^2 = \left(\frac{L}{2}\right)^2 + \left(\frac{L}{2}\right)^2 = \frac{L^2}{2}$$

$$r^2 = h^2 + \frac{L^2}{2}$$

$$\vec{F}_R = 4F_2 = \frac{4kqQ}{r^2} \cos \theta (-\hat{r})$$

$$\vec{F}_R = \frac{4kqQh}{(\cos \theta)^{3/2}} (-\hat{r})$$

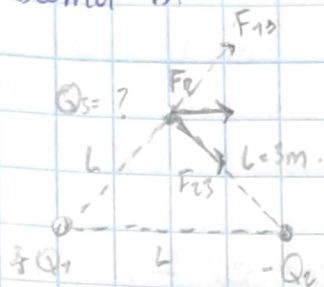
$$\vec{F}_R = \frac{4kqQh}{\left(h^2 + \frac{L^2}{2}\right)^{3/2}} (-\hat{r})$$

$$\cos \theta = \frac{h}{r}$$

$$\cos \theta = \frac{h}{\sqrt{h^2 + \frac{L^2}{2}}}$$

$$\vec{F}_R = \frac{4kqQh}{\left(h^2 + \frac{L^2}{2}\right)^{3/2}} (-\hat{r})$$

Problema 3:



$$Q_1 = 8 \text{ nC}$$

$$Q_2 = -8 \text{ nC}$$

$$F_{12/23} = 0.75 \text{ N (v)}$$

$$F_R = F_{3/1} + F_{3/2}$$

$$Q_1 = +$$

$$Q_2 = +$$

$$F_{3/1} = \frac{9 \times 10^9 (8 \text{ n})(9 \text{ n}) \cos 60^\circ}{3^2} + \frac{9 \times 10^9 (8 \text{ n})(9 \text{ n}) \sin 60^\circ}{3^2}$$

$$F_{3/1} = 493 + 6.9393$$

$$F_{3/2} = \frac{9 \times 10^9 (8 \text{ n})(9 \text{ n}) \cos 60^\circ}{3^2} - \frac{9 \times 10^9 (8 \text{ n})(9 \text{ n}) \sin 60^\circ}{3^2}$$

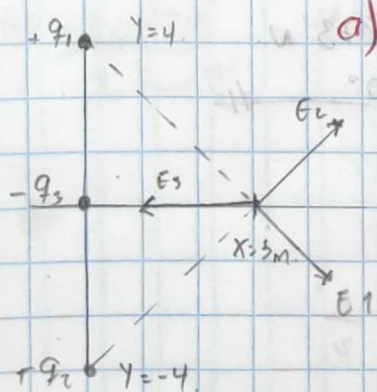
$$F_{3/2} = 493 - 6.9393$$

$$F_R = 893 \Rightarrow 0.75 = 893 \Rightarrow 93 = 0.09375$$

$$\frac{0.75}{8} = 93$$

$$Q_3 = 0.09375$$

Problema 4:



$$a) \quad Q_1 = Q_2 = +8 \mu\text{C}$$

$$Q_3 = -5 \mu\text{C}$$

$$E_R = \vec{E}_1 + \vec{E}_2 + \vec{E}_3$$

$$E_{1x} + E_{2x} = \frac{2k|Q_1| \cos \theta}{r_1^2}$$

$$E_{1y} + E_{2y} = 0$$

$$r_1^2 = 4^2 + 3^2 = 25$$

$$\theta = \tan^{-1}(4/3) = 53.13^\circ$$

$$E_{1x} + E_{2x} = \frac{2(9 \times 10^9)(8 \times 10^{-6}) \cos \theta}{5^2} = 3956.01 \text{ N/C (v)}$$

$$E_3 = \frac{k|Q_3|}{r_3^2} = \frac{9 \times 10^9 (5 \mu)}{9} = 5000 \text{ N/C (v)}$$

$$E_R = -1544 \text{ N/C (v)}$$

$$E_R = -1544 \text{ N/C (v)}$$

b) $Q = -10 \mu C$ y $20 mg$.

$$\vec{F} = Q E \vec{n} = 1.544 \times 10^{-4} N$$

$$a = \frac{\vec{F}}{m} = \frac{1.544 \times 10^{-4}}{20 \times 10^{-7}} = 772 m/s^2$$

$$a = 772 m/s^2$$

Problema 5:

$$E = 3.4 \times 10^5 N/C$$

$$m = 0.1 g$$

$$\theta = 6^\circ$$

$$g = 9.8 m/s^2$$



$$\sum F_y = 0$$

$$T \cos \theta - mg = 0$$

$$T = \frac{mg}{\cos \theta}$$

$$\sum F_x = ma$$

$$mg \tan \theta = ma$$

$$a = 1.030$$

$$F = 1 \times 10^{-4} (1.030) = 1.03 \times 10^{-4}$$

$$q = \frac{F}{E} = \frac{1.03 \times 10^{-4}}{3400} = 30.29 nC$$

$$q = 30.29 nC$$

b) $\frac{30.29}{1.6 \times 10^{-19}} = 1.893 \times 10^{11} = 18.93 \times 10^{10}$

$$N e^- = 18.93 \times 10^{10}$$