



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

F2 B	Nota:
DIC.2022	
AUX. CESAR FERNANDEZ	

TAREA  
HOJA DE TRABAJO  
EXAMEN CORTO

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☐

No.  
2

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22.1

$$A = 0.250 \text{ m}^2$$

$$\theta = 60^\circ$$

$$\vec{E} = 14 \text{ N/C}$$

$$a) \Phi_E = EA \cos \theta$$

$$\Phi_E = (14)(0.250) \cos 60^\circ$$

$$\Phi_E = 1.75 \text{ N}\cdot\text{m}^2/\text{C}$$

$$\Phi_E = 1.75 \text{ N}\cdot\text{m}^2/\text{C}$$

b) No depende de la forma de la hoja, solo del área.

c) i) Máxima.

$$\cos \theta = 1$$

$$\theta = \cos^{-1}(1)$$

$$\theta = 0$$

$$\theta = 0^\circ$$

ii) Mínimo.

$$\cos \theta = 0$$

$$\theta = \cos^{-1}(0)$$

$$\theta = 90^\circ$$

$$\theta = 90^\circ$$

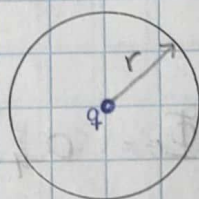
22.3

# 2

$$\vec{E} = 1.25 \times 10^6 \text{ N/C}$$

$$r = 0.150 \text{ m}$$

a)



$$\Phi_E = E \cdot A$$

$$\Phi_E = E(4\pi r^2)$$

$$\Phi_E = (1.25 \times 10^6)(4\pi(0.150)^2)$$

$$\Phi_E = 353429.17 \text{ N}\cdot\text{m}^2/\text{C} = 3.53 \times 10^5 \text{ N}\cdot\text{m}^2/\text{C}$$

$$\Phi_E = 3.53 \times 10^5 \text{ N}\cdot\text{m}^2/\text{C}$$

$$b) \Phi_E = \frac{q_{\text{enc}}}{\epsilon_0} \rightarrow \epsilon_0 \Phi_E = q_{\text{enc}}$$

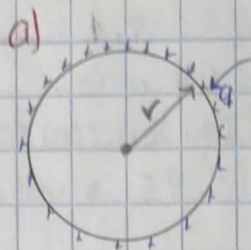
$$q_{\text{enc}} = (8.85 \times 10^{-12})(3.53 \times 10^5) = 3.12 \times 10^{-6} \text{ C}$$

$$q_{\text{enc}} = 3.12 \times 10^{-6} \text{ C}$$



$d = 12.0 \text{ cm}$   
 $q = -49.0 \text{ nC}$

$r = 0.06 \text{ m}$



$E = \frac{kq}{r^2}$

$E = \frac{k(0)}{r^2} = 0$

$E = 0$

b)  $E = \frac{k|q|}{r^2} = \frac{9 \times 10^9 (-49 \times 10^{-9})}{(0.06)^2} = 1.22 \times 10^8 \text{ N/C}$

$E = 1.22 \times 10^8 \text{ N/C}$

c)  $E = \frac{9 \times 10^9 (49 \times 10^{-9})}{(0.06 + 0.05)^2} = 3.64 \times 10^7 \text{ N/C}$

$E = 3.64 \times 10^7 \text{ N/C}$

22.10

#4

$q_1 = 4.00 \text{ nC}$

$q_2 = -6.00 \text{ nC}$

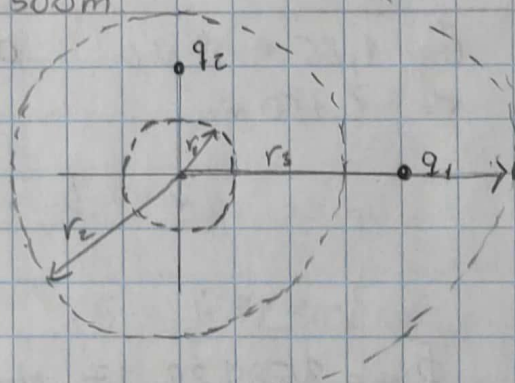
$x = 2.00 \text{ m}$

$y = 1.00 \text{ m}$

a)  $r = 0.500 \text{ m}$

$\Phi_E = \frac{q_{\text{enc}}}{\epsilon_0} = 0$

$\Phi_E = 0$



b)  $r = 1.50 \text{ m}$

$\Phi_E = \frac{-6.00 \times 10^{-9}}{8.85 \times 10^{-12}} = -678 \text{ N}\cdot\text{m}^2/\text{C}$

$\Phi_E = -678 \text{ N}\cdot\text{m}^2/\text{C}$

c)  $r = 2.50 \text{ m}$

$\Phi_E = \frac{q_1 + q_2}{\epsilon_0} = \frac{(4 \text{ n} - 6 \text{ n})}{8.85 \times 10^{-12}} = -225.98 \text{ N}\cdot\text{m}^2/\text{C}$

$\Phi_E = -226 \text{ N}\cdot\text{m}^2/\text{C}$



22.14

$$r = 0.450 \text{ m}$$

$$q_{\text{net}} = 0.250 \text{ nC}$$

$$a) r = 0.100 \text{ m}$$

$$E = \frac{k q_{\text{net}}}{r^2} = \frac{9 \times 10^9 (0.250 \times 10^{-9})}{(0.450 + 0.100)^2}$$

$$E = 7.44 \text{ N/C}$$

$$E = 7.44 \text{ N/C}$$

$$b) r = 0.350 \text{ m}$$

$$E = \frac{q_{\text{enc}}}{\epsilon_0} = 0$$

$$E = 0$$

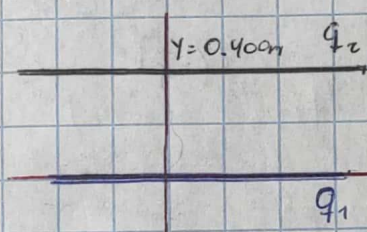
22.17

#6

$$\lambda_1 = 4.80 \text{ } \mu\text{C/m}$$

$$\lambda_2 = -2.40 \text{ } \mu\text{C/m}$$

$$E = \frac{2\lambda}{r}$$



$$a) y = 0.200 \text{ m}$$

$$E = \frac{2k(\lambda_1 + \lambda_2)}{r} = \frac{2(9 \times 10^9)(4.80 + 2.4)}{0.200} = 6.48 \times 10^5 \text{ N/C}$$

$$E = 6.48 \times 10^5 \text{ N/C}$$

$$b) y = 0.600 \text{ m}$$

$$E_1 = \frac{2(9 \times 10^9)(4.80 \times 10^{-6})}{0.600} = 1.44 \times 10^5 \text{ N/C}$$

$$E_2 = \frac{2(9 \times 10^9)(2.40 \times 10^{-6})}{0.200} = 2.16 \times 10^5 \text{ N/C}$$

$$E_T = -1.44 \times 10^5 + 2.16 \times 10^5 = 7.2 \times 10^4 \text{ N/C}$$

$$E_T = 7.2 \times 10^4 \text{ N/C}$$