

3 / # 3

$$\Phi_1 = \frac{q_{enc}}{\epsilon_0} = \frac{-2Q + Q}{\epsilon_0} = -\frac{Q}{\epsilon_0}$$

$$\Phi_2 = \frac{-Q + Q}{\epsilon_0} = 0$$

$$\Phi_3 = \frac{-2Q + Q - Q}{\epsilon_0} = \frac{-2Q}{\epsilon_0}$$

$$\Phi_1 = -Q/\epsilon_0$$

$$\Phi_2 = 0$$

$$\Phi_3 = -2Q/\epsilon_0$$

$$\Phi_4 = 0 //$$

$$\Phi_4 = \frac{0}{\epsilon_0} = 0$$

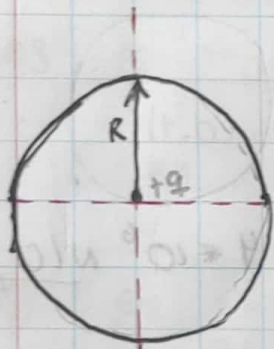
$$E = 9 \times 10^3 \text{ N/C}$$

4 / # 4

$$E = \frac{2\lambda K}{r} \Rightarrow \frac{rE}{2K} = \lambda$$

$$\lambda = \frac{(3)(9 \times 10^3)}{2(9 \times 10^9)} = 1.5 \times 10^{-6} \text{ C/m}$$

$$\lambda = 1.5 \times 10^{-6} \text{ C/m} //$$



$$\Phi_{E1} = +Q/\epsilon_0 \quad 15 / \# 5$$

$$-3Q \text{ en } x = -R/2$$

$$+5Q \text{ en } x = R/2$$

$$4Q \text{ en } x = 3R/2$$

$$\Phi_{E1} = \Phi_{E1} + \Phi_{E2} + \Phi_{E3} + \Phi_{E4}$$

$$\Phi_{E2} = \frac{-3Q}{\epsilon_0}$$

$$\Phi_{E3} = \frac{5Q}{\epsilon_0}$$

$$\Phi_{E4} = \frac{4Q}{\epsilon_0}$$

$$7 \Phi_{E1} //$$

$$\Phi_T = \frac{Q}{\epsilon_0} - \frac{3Q}{\epsilon_0} + \frac{5Q}{\epsilon_0} + \frac{4Q}{\epsilon_0} = \frac{7Q}{\epsilon_0}$$

$$7 \Phi_{E1} = \frac{7Q}{\epsilon_0}$$

$$E = 9 \times 10^3 \text{ N/C}$$

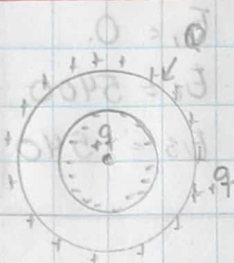
$$r = 3 \text{ m}$$

6 / # 6

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

$$\rightarrow \lambda = \frac{(3)(9 \times 10^3)}{2(9 \times 10^9)} = 1.5 \times 10^{-6} \text{ C/m}$$

$$\lambda = 1.5 \times 10^{-6} \text{ C/m}$$



$$Q = +4 \mu\text{C}$$

7 / # 7

$$q = +2 \mu\text{C}$$

$$\text{Sup interna} = -2 \mu\text{C}$$

$$= -2 \mu\text{C}$$

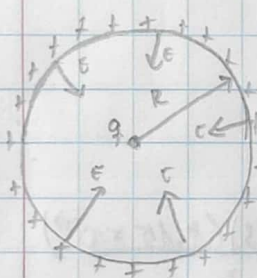
$$\text{Sup externa} = +2 \mu\text{C} + 4 \mu\text{C} = +6 \mu\text{C}$$

$$Q_{\text{Total}}$$

$$4 \mu\text{C}$$

$$\text{Sup interna} = -2 \mu\text{C}$$

$$\text{Sup. Externa} = +6 \mu\text{C}$$



$$E = 890 \text{ N/C}$$

8 / # 8

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

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

$$\frac{r^2 E}{k} = q$$

$$q = \frac{(0.75)^2 (890)}{(9 \times 10^9)} = -5.56 \times 10^{-8}$$

$$q = -5.56 \times 10^{-8}$$

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

$$\lambda = 30 \text{ nC/m}$$

$$\lambda = \frac{Q}{L}$$

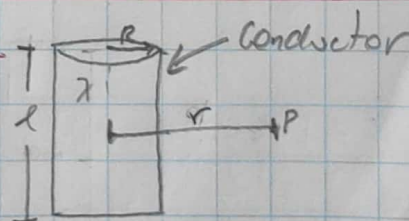
a) E en  $r = 0.03 \text{ m}$

$$E \text{ en } r < R = 0$$

b) E en  $r = 0.1 \text{ m}$

$$EA = \frac{q}{\epsilon_0}$$

$$E = \frac{\lambda L}{(2\pi r) \epsilon_0} = \frac{\lambda}{(2\pi r) \epsilon_0} = \frac{30 \text{ n}}{2\pi (0.1) \epsilon_0} = 5400 \text{ N/C}$$





d)  $E$  en  $r = 1m$ .

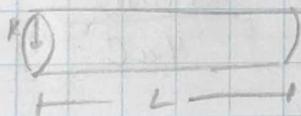
$$E A = \frac{\lambda l}{\epsilon_0}$$

$$E = \frac{\lambda l}{(2\pi r l) \epsilon_0} = \frac{\lambda}{(2\pi r) \epsilon_0} = \frac{30 n}{2\pi (1) \epsilon_0} = 540 \text{ N/C}$$

$$E_1 = 0$$

$$E_2 = 5400 \text{ N/C}$$

$$E_3 = 540 \text{ N/C} //$$



$$R = 0.05m$$

$$L = 1m$$

$$V = 0.3m \rightarrow E = 5.5 \times 10^7 \text{ N/C}$$

$$q_{enc} = P V_{enc}$$

$$q_{enc} = P (\pi R^2 L)$$

$$E A = \frac{q_{enc}}{\epsilon_0}$$

$$E (2\pi r l) = \frac{P (\pi R^2 L)}{\epsilon_0}$$

$$\frac{2E r \epsilon_0}{R^2} = P$$

$$\Rightarrow P = \frac{2(5.5 \times 10^7)(0.3)(8.85 \times 10^{-12})}{(0.05)^2}$$

$$P = 0.11682$$

$$P = 0.1168 \text{ C/m}^3 //$$