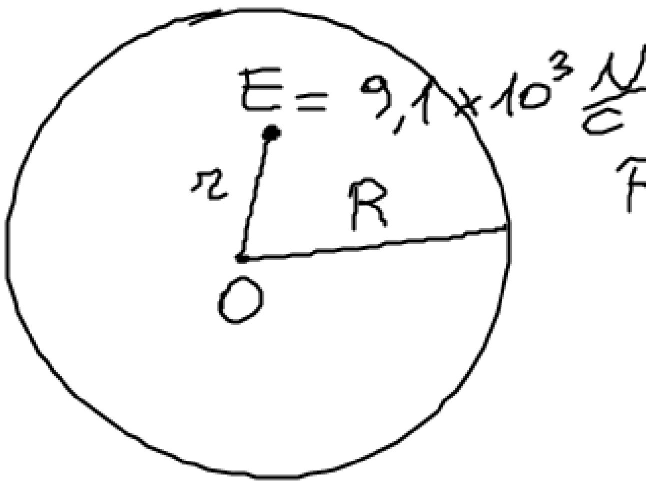
PAG. 1068 N 68

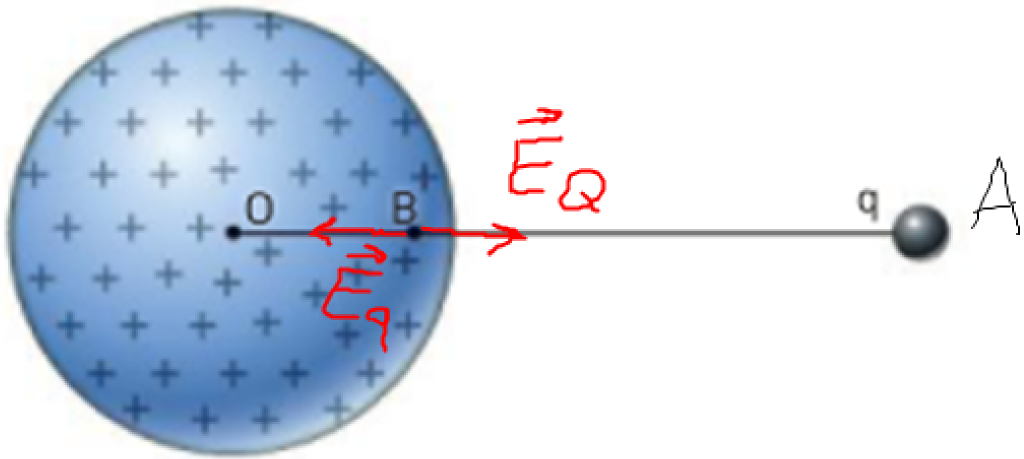
$Q = 3{,}2 \times 10^{-9}\ C$



$R = 2{,}5\ cm$

$$E = \frac{Q}{4\pi \varepsilon_0 R^3}\, r \Rightarrow r = \frac{4\pi \varepsilon_0 R^3 E}{Q} =$$

$$= \frac{4\pi \times 8{,}854 \times \cancel{10^{-12}} \times 0{,}025^3 \times 9{,}1 \times \cancel{10^{3}}}{3{,}2 \times \cancel{10^{-9}}}\ m \cong 4{,}9 \times 10^{-3}\ m$$



$d_{AO} = 5{,}0\ cm$

$d_{OB} = 1{,}5\ cm$

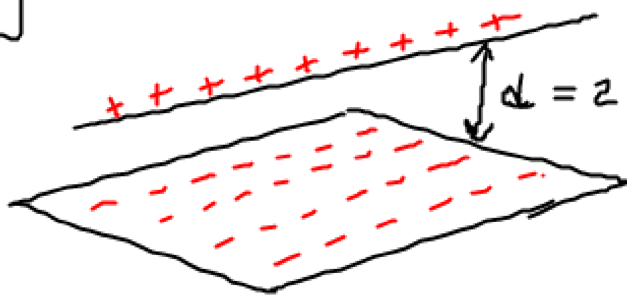
$Q = 3{,}2 \times 10^{-9}\ C$

$$\cancel{K_0}\,\frac{q}{AB^2} = \cancel{K_0}\,\frac{Q}{R^3}\,OB$$

$$q = \frac{Q \times OB \times AB^2}{R^3} = \frac{3{,}2\times10^{-9} \times 1{,}5 \times (3{,}5)^2}{(2{,}5)^3}\,C =$$

$$\cong 3{,}8 \times 10^{-9}\ C$$

69)



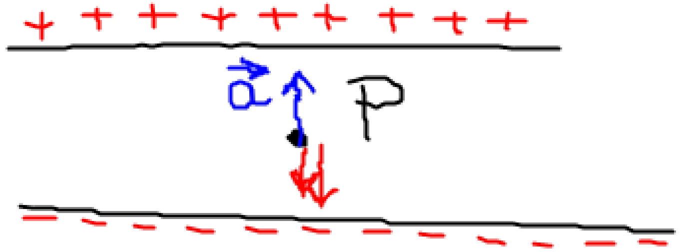
$\lambda = 8{,}1 \times 10^{-7}\ \frac{C}{m}$

$d = 28\ cm$

$\sigma = -1{,}86 \times 10^{-6}\ \frac{C}{m^2}$

$m = 7{,}5 \times 10^{-3}\ kg$

$q = -5{,}1 \times 10^{-10}\ C$



$$E_p = \frac{\lambda}{\cancel{2}\pi\varepsilon_0 \frac{d}{\cancel{2}}} + \frac{|\sigma|}{2\varepsilon_0} =$$

$$= \frac{1}{\varepsilon_0}\left(\frac{\lambda}{\pi d} + \frac{|\sigma|}{2}\right) =$$

$$= \frac{1}{8{,}854 \times 10^{-12}}\left(\frac{8{,}1 \times 10^{-7}}{\pi \times 0{,}28} + \frac{1{,}86 \times 10^{-6}}{2}\right)\frac{N}{C}$$

$$= \frac{10^6}{8{,}854}\left(\frac{0{,}81}{\pi \times 0{,}28} + \frac{1{,}86}{2}\right)\frac{N}{C} =$$

$$\simeq 2{,}1 \times 10^5\ \frac{N}{C}$$

$$F = ma$$

$$\Downarrow$$

$$a = \frac{\overbrace{qE}^{F}}{m} =$$

$$= \frac{5{,}1 \times 10^{-10} \times 2{,}09 \times 10^5}{7{,}5 \times 10^{-3}}\ \frac{m}{s^2}$$

$$\simeq 1{,}4 \times 10^{-2}\ \frac{m}{s^2}$$

72)

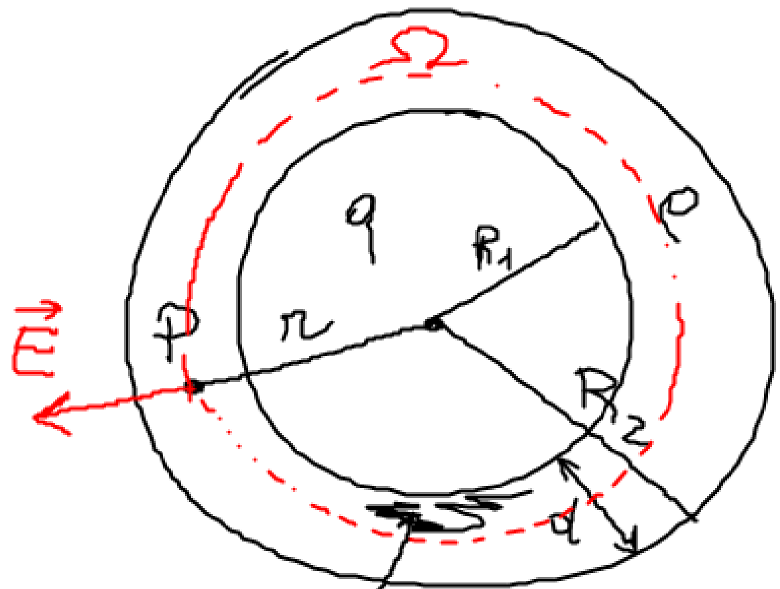
$r > R_1$

$R_1 = 11{,}4\ cm$

$d = 4{,}2\ cm$

$q = 4{,}2 \times 10^{-8}\ C$

$\rho = 3{,}1 \times 10^{-6}\ \frac{C}{m^3}$



TH. GAUSS

$$\Phi_\Omega = \frac{q + Q_\Omega}{\varepsilon_0}$$

$$\Phi_\Omega = \sum \vec{E} \cdot \Delta\vec{S} = \sum E \,\Delta S =$$
$$= E \sum \Delta S = E\, 4\pi r^2$$

$$Q_\Omega = (V_\Omega - V_1)\rho =$$
$$= \frac{4}{3}\pi \rho \left(r^3 - R_1^3\right)$$