Suggested problems: Chapter 23- HRW-Principles of Physics- ISV 10th Edition.

6.Figure 23-23 gives magnitude of the electric fieldinside and outside a sphere with a positive charge distributed uniformly throughout its volume. The scale of the vertical axis is set by E_x= 10 x10^7 N/C(a) What is the charge on the sphere? (b) What is field magnitude at r=8.0 m?

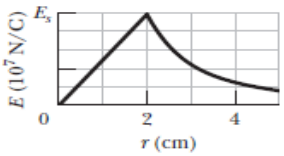

Fig. 23-23 Problem 6

Answer:(a) 4.4 x 10^{-6}C ; (b) 6.2 x 10^2 N?C

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7. In Fig. 23-24, two large, thin metal plates are parallel and close to each other. On their inner faces, the plates have excess surface charge densities of opposite signs and magnitude 2.31×10^{-22} C/m^2. In unit-vector notation, what is the electric field at points (a) to the left of the plates, (b) to the right of them, and (c) between them?

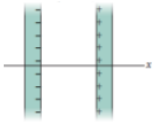
Fig. 23-24 Problem 7

Answer: (a) zero ; (b) zero ; (c) $-2.61\times10^{-11}\hat{\imath}$ N/C

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19. A long straight wire has fixed negative charge with a linear charge density of of magnitude 5.2 nC/m. The wire is to be enclosed by a coaxial, thin walled nonconducting cylinderical shell of radius 1.2 cm. The shell is to have positive charge on its outside surface with a surface charge density σ that makes the net electric field zero. Calculate σ.

Answer:6.9 x 10^{-8} C/m^2

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26. An electron is released 9.0 cm from a very long non conducting rod with a uniform 4.5 μC/m What is the magnitude of the electron's initial acceleration?

Answer:1.6×10^{17} m/s^2

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39. A uniform surface charge of density 8.0 nC/m^2 is distributed over the entire *xy*plane. Find (a) the net charge on the sphere (b) the total electric flux leaving the surface?(c) What is the net flux through a concentric Gaussian sphere of radius 2.0 cm?

Answer:(a) 6.4 μC; (b) 7.3 x 10^5 N.m^2/C (c) 7.3 x 10^5 N.m^2/C

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45. The square surface shown in Fig. 23-44 measures 6.8 mm on each side. It is immersed in a uniform electric field with magnitudeE = 1800 N/C and with field lines at an angle of θ = 35° with a normal to the surface, as shown. Take that normal to be directed "outward," as though the surface were one face of a box. Calculate the electric flux through the surface.

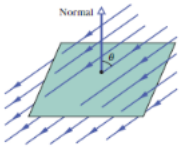

Fig. 23-44 Problem 45

Answer:–0.068 N.m^2/C

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48. Figure 23-48 shows two nonconductingspherical shells fixed inplace. Shell 1 has uniform surfacecharge density +6.0 μC/m^2 on itsouter surface and radius 3.0 cm;shell 2 has uniform surface chargedensity +4.0 μC/m^2 on its outersurface and radius 2.0 cm; the shellcenters are separated by *L*= 12 cm.In unit-vector notation, what is thenet electric field at *x*= 2.0 cm?

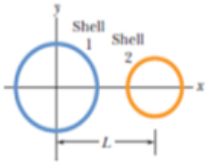

Fig. 23-46 Problem 48

Answer:$-1.8\times10^4\boldsymbol{j}$ N/C