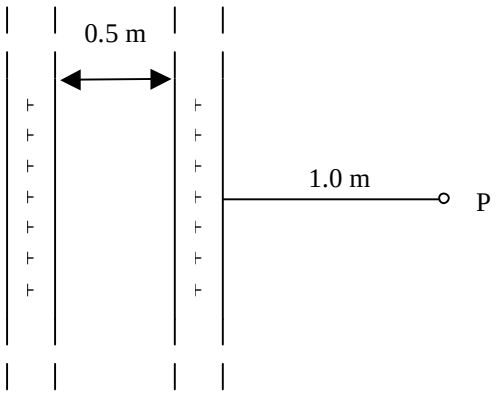
Chapter 24

1- Calculate the electric flux (phi) through the curved surface of a cone of base radius R and height h. The electric field E is uniform and perpendicular to the base of the cone, and the field lines enter through the base. The cone has no charge enclosed in it. [πR^2 E.]

2- A point charge of -50e lies at the center of a hollow spherical **metal** shell that has a net charge of -100e. Calculate the charge on the)a) shell's inner surface, and (b) on its outer surface. [e is the magnitude of the charge on the electron.[(a) 50e b) -150e].

3- A point charge of 2.0 micro-C is placed at the center of a cube 50 cm on edge. What is the flux through the bottom surface? [3.8*10**4 N*m**2/C.]

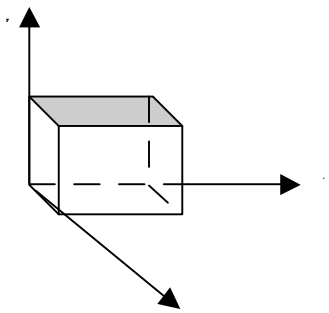
4- An isolated **conductor** of arbitrary shape has a net charge of -15*10**(-6) C. Inside the conductor is a cavity within which is a point charge q= -5.0*10**(-6) C. What is the charge on the cavity-wall, q(in), and what is the charge on the outer surface of the conductor, q(out)? [q(in) = 5.0*10**(-6) C; q(out) = -20*10**(-6) C.]



5- For the two infinite dielectric sheets, see figure find the magnitude of the electric field at a point P. Consider that each sheet has a positive surface charge density of 10^2 C/m^2. [1.1*10**13 N/C.]

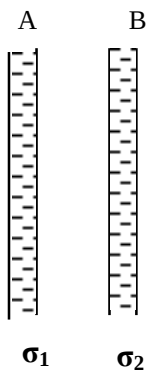
6- A point charge of +4.0 micro-C lies at the center of a hollow spherical conducting shell that has a net charge of -13.0 micro-C. If the inner radius of the shell is 2.0 cm and the outer radius is 3.0 cm, then the ratio between the charge density on the inner surface to the charge density on the outer surface is: [1 : 1.]

7- A cube, as in figure, has an edge length of 3.00 m in a region of a uniform electric field given by the equation: E = (- 5.00 j + 6.00 k) N/C, where i, j, and k are the unit vectors in the directions of x, y, and z respectively. Find the electric flux through the top face (shaded). [- 45 N*m**2/C.]



8- A point charge, q1 = -2.0*10**(-6) C, is placed inside a cube of side 5.0 cm, and another point charge q2 = 3.0*10**(-6) C is placed outside the cube. Find the net electric flux through the surfaces of the cube. [-2.3*10**5 N m**2/C]

9- Figure shows portions of two large, parallel, nonconducting sheets, A and B. The surface charge densities are: sigma1 = -4.5 micro-C/m^2 and sigma2 = -6.5 micro-C/m**2. Find the electric field at any point between the two sheets. [1.1*10^5 N/C towards B.



10- A hollow metallic sphere, of radius 2.0 cm, is filled with a non-conducting material which carries a charge of 5.0 pico-C distributed uniformly throughout its volume. What is the magnitude of the electric field 1.5 cm from the center of the sphere?[84 N/C.]