Electric Field

1. On a clear day there is an electric field of approximately 100N/C directed vertically down at the earth's surface. Compare the electrical and gravitational field on an electron.5.6

2. A point charge Q1 =20 µC is at (-d, 0)while Q2 =-10 µC is at (+d,0). Find the resultant field strength at a point with coordinates (x, y). Take d= 1m and x=y=2m.

3. Consider the electric dipole shown in Figure -3. Show that the electric field at a distant point along the x axis is : $E_x \cong 4k_e qa/x^3.$
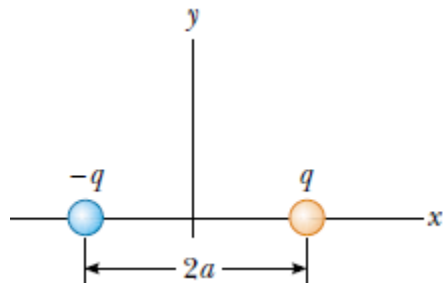

Fig-3

4. What is the electric field strength needed to balanced the weight of the following particles near the Earth's surface :(a) an electron and (b) a proton.

5. What is the magnitude of a point charge that would create an electric filed of 1 N/C at a at point 1 m away ?

6. Two particles are fixed to an x axis : particle 1 of charge -2x 10^{-7}C at x=6cm and particle 2 of charge +2 x 10^{-7}C at x = 21cm . Mid way between the particles, what is their net electric field in unit-vector notation?

Gauss Law

1. A circular plate has a radius of 12 cm. The plane of the plate is set at a 30° angle to a uniform fields E= 450N/C, as shown in figure. What is the flux through the plate.
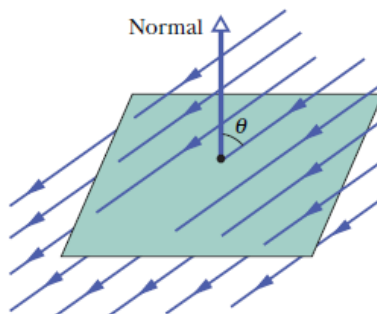
2. Two charges q1 = 6 µC and q2 = -8 µC are within a spherical surface of radius 5 cm. What is the total flux through the surface?

3. An isolated conductor of arbitrary shape carries a net charge +10 µC. Inside the conductor is a hollow cavity within which is a point charge q = +3 µC. What is the charge (a) on the cavity wall and (b) on the outer surface of the conductor?

4. A point charge of 1.8 µC is at the center of a cubical Gaussian surface 55cm on edge. What is the net flux through the surface?

5. A uniform charged conducting sphere of 1.2 m diameter has a surface charge density of 8.1 µC /m2.(a) Find the net charge on the sphere (b) what is the total electric flux leaving the surface of the sphere?

6. An infinite line of charge produces a field of 4.52 x 104 N/C at a distance of 1.96m. Calculate the linear charge density.

7. A 60 µC charge is at the center of a cube of side 10 cm .(a) what is the total flux through the cube ?(b) What is the flux through the face ? (c) would your answers to (a) or (b) change if the charge were not at the center?

8. A spherical conductor of radius 8cm has a uniform surface charge density 0.1 nC/m2. Find the electric field (a) at the surface (b) at a distance 10 cm from the center.