

## **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  $Q_1 = 20 \mu\text{C}$  is at  $(-d, 0)$  while  $Q_2 = -10 \mu\text{C}$  is at  $(+d, 0)$ . Find the resultant field strength at a point with coordinates  $(x, y)$ . Take  $d = 1\text{m}$  and  $x=y=2\text{m}$ .
3. Consider the electric dipole shown in Figure -3. Show that the electric field at a distant

$$E_x \cong 4k_e qa / x^3.$$

point along the x axis is :

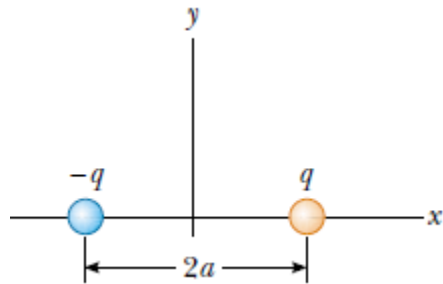
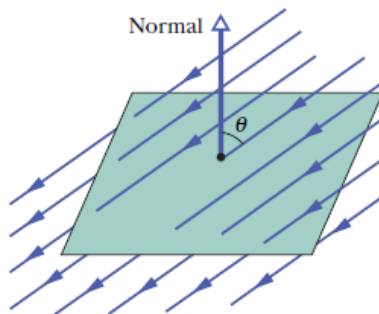


Fig-3

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  $-2 \times 10^{-7}\text{C}$  at  $x=6\text{cm}$  and particle 2 of charge  $+2 \times 10^{-7}\text{C}$  at  $x = 21\text{cm}$  . 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  $30^\circ$  angle to a uniform fields  $E = 450\text{N/C}$ , as shown in figure. What is the flux through the plate.



2. Two charges  $q_1 = 6 \mu\text{C}$  and  $q_2 = -8 \mu\text{C}$  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  $+10 \mu\text{C}$ . Inside the conductor is a hollow cavity within which is a point charge  $q = +3 \mu\text{C}$ . What is the charge (a) on the cavity wall and (b) on the outer surface of the conductor?
4. A point charge of  $1.8 \mu\text{C}$  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  $8.1 \mu\text{C}/\text{m}^2$ . (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  $4.52 \times 10^4 \text{ N/C}$  at a distance of 1.96m. Calculate the linear charge density.
7. A  $60 \mu\text{C}$  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  $0.1 \text{ nC}/\text{m}^2$ . Find the electric field (a) at the surface (b) at a distance 10 cm from the center.