4 Figure 23-24 shows, in cross section, two Gaussian spheres and two Gaussian cubes that are centered on a positively charged particle. (a) Rank the net flux through the four Gaussian surfaces, greatest first. (b) Rank the magnitudes of the electric fields on the surfaces, greatest first, and indicate whether the magnitudes are uniform or variable along each surface.

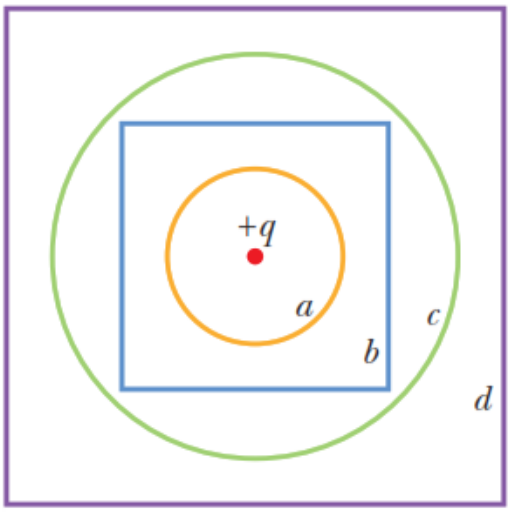

Figure 23-24 Question 4.

6 Three infinite nonconducting sheets, with uniform positive surface charge densities σ, 2σ, and 3σ, are arranged to be parallel like the two sheets in Fig. 23-19*a*. What is their order, from left to right, if the electric field $\vec{E}$ produced by the arrangement has magnitude $E = 0$ in one region and $E = 2\sigma/\varepsilon_0$ in another region?

•1 SSM The square surface shown in Fig. 23-30 measures 3.2 mm on each side. It is immersed in a uniform electric field with magnitude $E = 1800$ N/C and with field lines at an angle of $\theta = 35°$ 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.

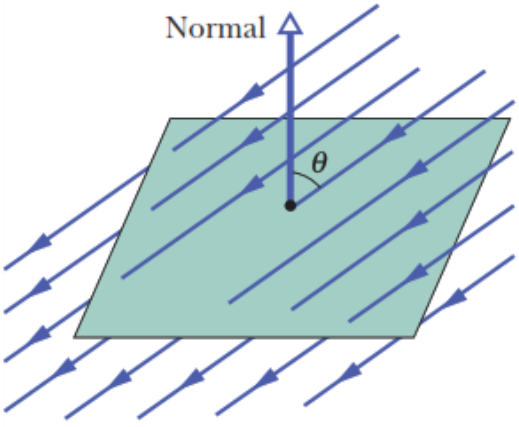

Figure 23-30 Problem 1.

••3 The cube in Fig. 23-31 has edge length 1.40 m and is oriented as shown in a region of uniform electric field. Find the electric flux through the right face if the electric field, in newtons per coulomb, is given by (a) $6.00\hat{i}$, (b) $-2.00\hat{j}$, and (c) $-3.00\hat{i} + 4.00\hat{k}$. (d) What is the total flux through the cube for each field?

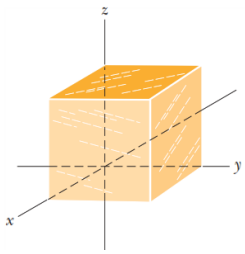

Figure 23-31 Problems 3, 6, and 9.

A 70 mC charge is at the center of a cube of side 12 cm. (i) what is the total flux through the cube ? (ii) What is the flux through the face ? (iii) would your answers to (i) or (ii) change if the charge were not at the center?

A spherical Gaussian surface surrounds a point charge q. Describe what happens to total flux through the surface if: (i) A charge is tripled? (ii) The radius of the surface is doubled. (iii)The surface is changed to a cube?

Show the variations of the electric field with respect to the distance for a symmetrical spherical charged distribution with the help of graphs only.(Plot must start from the origin up to the surface of the conducting sphere).

(b) A charged paint is spread in a very thin uniform layer over the surface of a plastic sphere of diameter 12.0 cm, giving it a charge of -49.0 μC. Find the electric field (i) just inside the paint layer; (ii) just outside the paint layer; (iii) 5.00 cm outside the surface of the paint layer.

(c) An infinite line of charge produces a field of 4.52×10^4 N/C at a distance of 1.96m. Calculate the linear charge density.

(a) Two irregular objects *A* and *B* carry charges of opposite sign. Figure- 3 shows the electric field lines near each of these objects. (a) Which object is positive, *A* or *B*? How do you know? (b) Where is the electric field stronger, close to *A* or close to *B*? How do you know?

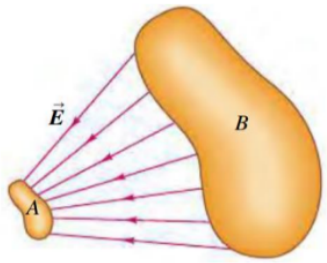

Fig-3

(a) Compare the variations of the electric field (E) with respect to the distance (r) for a spherically symmetrical charged distribution and a thin spherical shell distribution of same radius with the help of graphs only.