

•4 In Fig. 23-28, a butterfly net is in a uniform electric field of magnitude $E = 3.0 \text{ mN/C}$. The rim, a circle of radius $a = 11 \text{ cm}$, is aligned perpendicular to the field. The net contains no net charge. Find the electric flux through the netting.

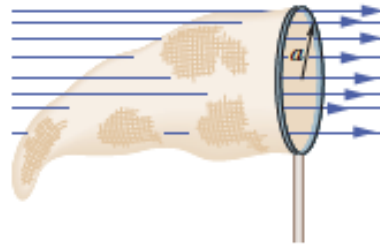


Fig. 23-28 Problem 4.

•5 In Fig. 23-29, a proton is a distance $d/2$ directly above the center of a square of side d . What is the magnitude of the electric flux through the square? (*Hint:* Think of the square as one face of a cube with edge d .)

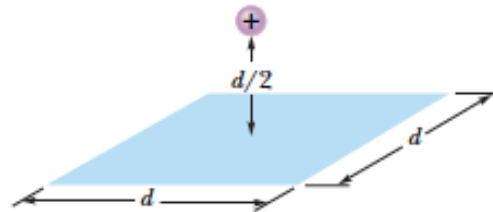


Fig. 23-29 Problem 5.


••11  Figure 23-31 shows a closed Gaussian surface in the shape of a cube of edge length 2.00 m , with one corner at $x_1 = 5.00 \text{ m}$, $y_1 = 4.00 \text{ m}$. The cube lies in a region where the electric field vector is given by $\vec{E} = -3.00\hat{i} - 4.00y^2\hat{j} + 3.00\hat{k} \text{ N/C}$, with y in meters. What is the net charge contained by the cube?

Fig. 23-30
Problem 10.

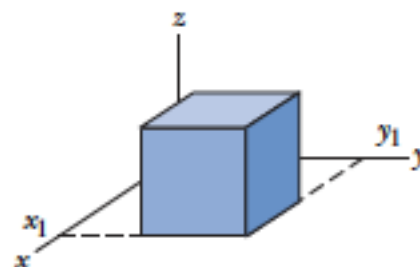


Fig. 23-31 Problem 11.

••21 An isolated conductor has net charge $+10 \times 10^{-6} \text{ C}$ and a cavity with a point charge $q = +3.0 \times 10^{-6} \text{ C}$. What is the charge on (a) the cavity wall and (b) the outer surface?

•25 **SSM** An infinite line of charge produces a field of magnitude $4.5 \times 10^4 \text{ N/C}$ at distance 2.0 m . Find the linear charge density.

••49 In Fig. 23-50, a solid sphere of radius $a = 2.00$ cm is concentric with a spherical conducting shell of inner radius $b = 2.00a$ and outer radius $c = 2.40a$. The sphere has a net uniform charge $q_1 = +5.00$ fC; the shell has a net charge $q_2 = -q_1$. What is the magnitude of the electric field at radial distances (a) $r = 0$, (b) $r = a/2.00$, (c) $r = a$, (d) $r = 1.50a$, (e) $r = 2.30a$, and (f) $r = 3.50a$? What is the net charge on the (g) inner and (h) outer surface of the shell?

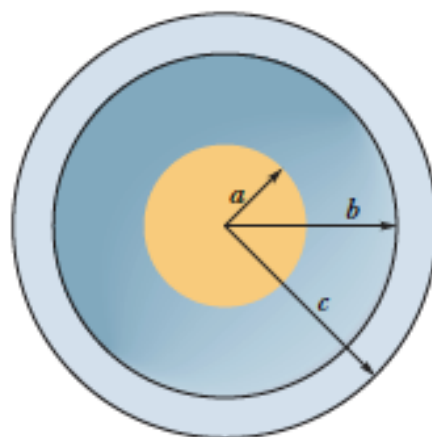



Fig. 23-50 Problem 49.

y
| Shell

•35  Figure 23-42a shows three plastic sheets that are large, parallel, and uniformly charged. Figure 23-42b gives the component of the net electric field along an x axis through the sheets. The scale of the vertical axis is set by $E_s = 6.0 \times 10^5$ N/C. What is the ratio of the charge density on sheet 3 to that on sheet 2?

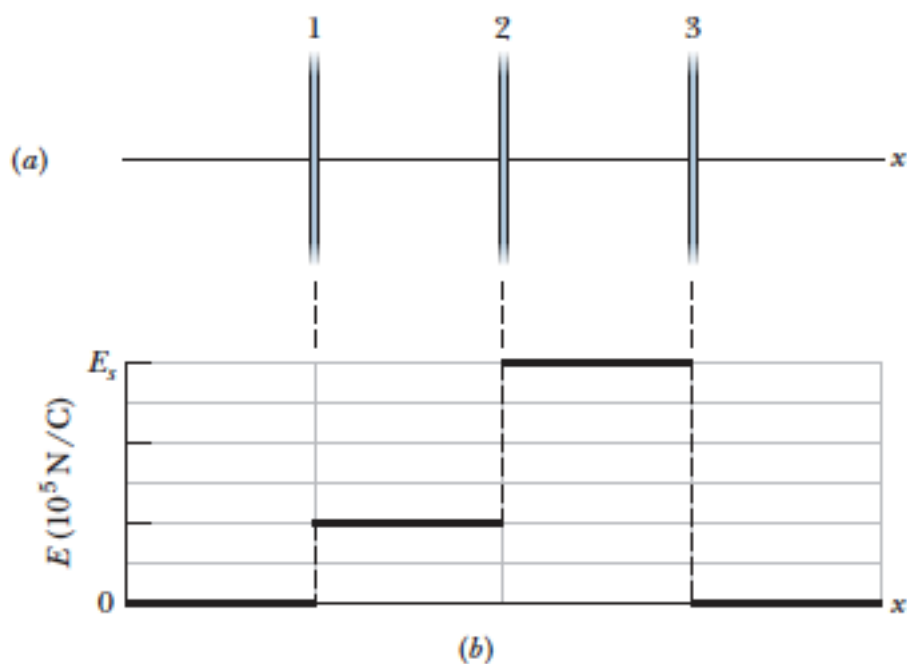


Fig. 23-42 Problem 35.