Q21.4. Your clothing tends to cling together after going through the dryer. Why? Would you expect more or less clinging if all your clothing were made of the same material (say, cotton) than if you dried different kinds of clothing together? Again, why? (You may want to experiment with your next load of laundry.)

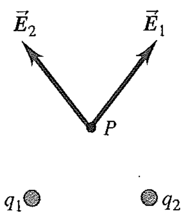
Q21.6. The free electrons in a metal are gravitationally attracted toward the earth. Why, then, don't they all settle to the bottom of the conductor, like sediment settling to the bottom of a river?

Q21.13. You have a negatively charged object. How can you use it to place a net negative charge on an insulated metal sphere? To place a net positive charge on the sphere?

Q21.15. A point charge of mass m and charge Q and another point charge of mass m but charge $2Q$ are released on a frictionless table. If the charge Q has an initial acceleration a_0, what will be the acceleration of $2Q$: a_0, $2a_0$, $4a_0$, $a_0/2$, or $a_0/4$? Explain.

Q21.22. The electric fields at point P due to the positive charges q_1 and q_2 are shown in Fig. 21.35. Does the fact that they cross each other violate the statement in Section 21.6 that electric field lines never cross? Explain.

Figure **21.35**
Question Q21.22.

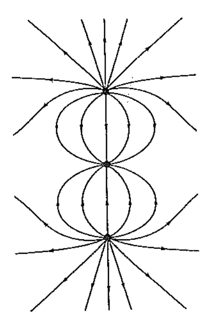


21.58 Infinite sheet A carries a positive uniform charge density σ, and sheet B, which is to the right of A and parallel to it, carries a uniform negative charge density -2σ. (a) Sketch the electric field lines for this pair of sheets. Include the region between the sheets as well as the regions to the left of A and to the right of B. (b) Repeat part (a) for the case in which sheet B carries a charge density of $+2\sigma$.

21.59. Suppose the charge shown in Fig. 21.29a is fixed in position. A small, positively charged particle is then placed at some point in the figure and released. Will the trajectory of the particle follow an electric field line? Why or why not? Suppose instead that the particle is placed at some point in Fig. 21.29b and released (the positive and negative charges shown in the figure are fixed in position). Will its trajectory follow an electric field line? Again, why or why not? Explain any differences between your answers for the two different situations.

21.62. Figure 21.41 shows some of the electric field lines due to three point charges arranged along the vertical axis. All three charges have the same magnitude. (a) What are the signs of the three charges? Explain your reasoning. (b) At what point(s) is the magnitude of the electric field the smallest? Explain your reasoning. Explain how the fields produced by each individual point charge combine to give a small net field at this point or points.

Figure **21.41**
Exercise 21.62.



21.29 Electric field lines for three different charge distributions. In general, the magnitude of $\vec{E}$ is different at different points along a given field line.