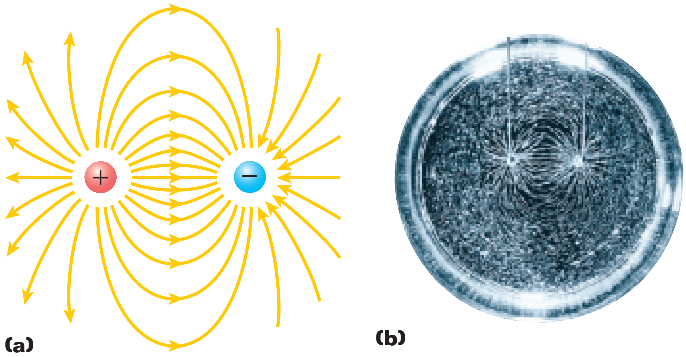

Figure 10
(a) This diagram shows the electric field lines for two equal and opposite point charges. Note that the number of lines leaving the positive charge equals the number of lines terminating on the negative charge. **(b)** In this photograph, grass seeds in an insulating liquid align with a similar electric field produced by two oppositely charged conductors.

Figure 10 shows the electric field lines for two point charges of equal magnitudes but opposite signs. This charge configuration is called an *electric dipole.* In this case, the number of lines that begin at the positive charge must equal the number of lines that terminate on the negative charge. At points very near the charges, the lines are nearly radial. The high density of lines between the charges indicates a strong electric field in this region.

In electrostatic spray painting, field lines between a negatively charged spray gun and a positively charged target object are similar to those shown in **Figure 10.** As you can see, the field lines suggest that paint droplets that narrowly miss the target object still experience a force directed toward the object, sometimes causing them to wrap around from behind and hit it. This does happen and increases the efficiency of an electrostatic spray gun.

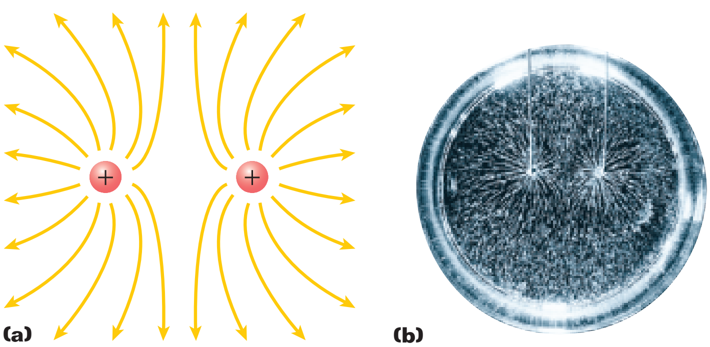

Figure 11
(a) This diagram shows the electric field lines for two positive point charges. **(b)** The photograph shows the analogous case for grass seeds in an insulating liquid around two conductors with the same charge.

Figure 11 shows the electric field lines in the vicinity of two equal positive point charges. Again, close to either charge, the lines are nearly radial. The same number of lines emerges from each charge because the charges are equal in magnitude. At great distances from the charges, the field approximately equals that of a single point charge of magnitude $2q$.

Finally, **Figure 12** is a sketch of the electric field lines associated with a positive charge $+2q$ and a negative charge $-q$. In this case, the number of lines leaving the charge $+2q$ is twice the number terminating on the charge $-q$. Hence, only half the lines that leave the positive charge end at the negative charge. The remaining half terminate at infinity. At distances that are great compared with the separation between the charges, the pattern of electric field lines is equivalent to that of a single charge, $+q$.

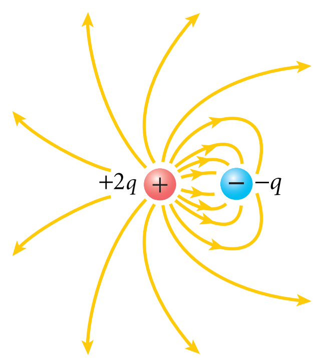

Figure 12
In this case, only half the lines originating from the positive charge terminate on the negative charge because the positive charge is twice as great as the negative charge.