

36. (a) Since $q_A = -2Q$ and $q_C = +8Q$, Eq. 22-4 leads to

$$\left| \vec{F}_{AC} \right| = \frac{|(-2Q)(+8Q)|}{4\pi\epsilon_0 d^2} = \frac{4Q^2}{\pi\epsilon_0 d^2} .$$

(b) After making contact with each other, both A and B have a charge of

$$\left(\frac{-2Q + (-4Q)}{2} \right) = -3Q .$$

When B is grounded its charge is zero. After making contact with C , which has a charge of $+8Q$, B acquires a charge of $[0 + (-8Q)]/2 = -4Q$, which charge C has as well. Finally, we have $Q_A = -3Q$ and $Q_B = Q_C = -4Q$. Therefore,

$$\left| \vec{F}_{AC} \right| = \frac{|(-3Q)(-4Q)|}{4\pi\epsilon_0 d^2} = \frac{3Q^2}{\pi\epsilon_0 d^2} .$$

(c) We also obtain

$$\left| \vec{F}_{BC} \right| = \frac{|(-4Q)(-4Q)|}{4\pi\epsilon_0 d^2} = \frac{4Q^2}{\pi\epsilon_0 d^2} .$$