P #9

Ch 15 - pg 491

a) $q_1 = 12 \times 10^{-9} C$
$q_2 = -18 \times 10^{-9} C$
$r = .30\ m$

$$F_e = \frac{k_e \cdot |q_1| \cdot |q_2|}{r^2}$$

$$= \frac{(9.0 \times 10^9\ N \cdot m^2/C^2)(12 \times 10^{-9} C)(-18 \times 10^{-9} C)}{(.30\ m)^2}$$

$$F_e = 2.2 \times 10^{-5} N \text{ (attract)}$$

b) $q_1 = +12 \times 10^{-9} C$ and $q_2 = -18 \times 10^{-9} C$

$$q_{total} = q_1 + q_2 = (+12 \times 10^{-9} C) + (-18 \times 10^{-9} C) = -6 \times 10^{-9} C$$

If the 2 charges are in equilibrium, q_1 and q_2 are equal and add to be $-6 \times 10^{-9} C$.

$$q_1 = q_2 = (-6 \times 10^{-9} C) \div 2$$

$$q_1 = q_2 = -3 \times 10^{-9} C$$
$$r = .30\ m$$

$$F_e = \frac{k_e \cdot |q_1| \cdot |q_2|}{r^2}$$

$$= \frac{(9.0 \times 10^9\ N \cdot m^2/C^2)(-3 \times 10^{-9} C)^2}{(.30\ m)^2}$$

$$F_e = 9.0 \times 10^{-7} N \text{ (repulsive)}$$