

Answer Key Worksheet: Coulomb's Law

1) $F = \frac{kq_1q_2}{r^2}$ $q_1 = +10.0 \times 10^{-6} \text{ C}$ $r = 20.0 \text{ cm} \times \frac{1 \text{ m}}{100 \text{ cm}} = 0.200 \text{ m}$
 $q_2 = -50.0 \times 10^{-6} \text{ C}$

Watch your sig figs!

$$F = \frac{(9 \times 10^9 \frac{\text{Nm}^2}{\text{C}^2})(10.0 \times 10^{-6} \text{ C})(-50.0 \times 10^{-6} \text{ C})}{(0.200 \text{ m})^2}$$

$$F = -112.5 \text{ N} = \boxed{-113 \text{ N}} \quad (3 \text{ sig})$$

2) $\sqrt{\frac{r^2 \cdot F}{k}} = \sqrt{\frac{kx^2 \cdot kx}{k}} \rightarrow \sqrt{\frac{r^2 \cdot F}{k}} = x$

$$= \sqrt{\frac{(75 \text{ cm} \times \frac{1 \text{ m}}{100 \text{ cm}})^2 \cdot 0.30 \text{ N}}{9 \times 10^9 \frac{\text{Nm}^2}{\text{C}^2}}}$$

$$\boxed{x = 4.7 \times 10^{-6} \text{ C}} \quad 2 \text{ sb}$$

• they are the same sign, either both + or both neg. as the F is pos.

- 3) a) doubled
b) quadrupled
c) $1/4$
d) $16 \times$

4) $\sqrt{\frac{r^2 \cdot F}{k}} = \sqrt{\frac{kq_1q_2 \cdot r^2}{k \cdot F}} \rightarrow r = \sqrt{\frac{kq_1q_2}{F}}$
 $= \sqrt{\frac{9 \times 10^9 \frac{\text{Nm}^2}{\text{C}^2} \cdot (2.5 \times 10^{-6} \text{ C})^2}{0.50 \text{ N}}}$

$$\boxed{r = 0.34 \text{ m}} \quad 2 \text{ sb}$$