

Name: KEY

PHYSICS 2220 - QUIZ #1 - SPRING 2009

1. Two charges, q_1 and q_2 , are held a fixed distance d apart. Assume that $q_1 = -20 \mu\text{C}$ and $q_2 = 15 \mu\text{C}$ and $d = 25 \text{ cm}$. $k = 8.99 \times 10^9 \text{ Nm}^2/\text{C}^2$ and $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{Nm}^2$.

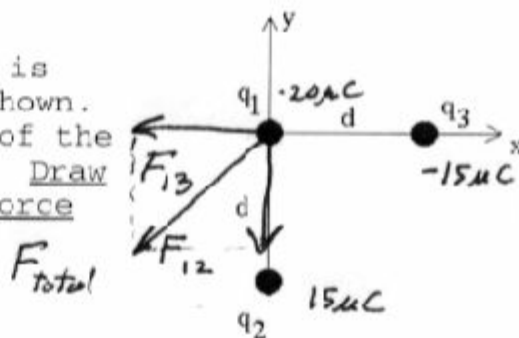
- a. What is the magnitude of the electrostatic force that acts on q_1 ?

$$|F_{12}| = k \frac{|q_1 q_2|}{r^2}$$

$$= (8.99 \times 10^9 \frac{\text{Nm}^2}{\text{C}^2}) \frac{(20 \times 10^{-6} \text{C})(15 \times 10^{-6} \text{C})}{(0.25 \text{m})^2}$$

$$= \boxed{43.2 \text{ N}}$$

- b. A third charge $q_3 = -15 \mu\text{C}$ is brought in and placed as shown. What now is the magnitude of the electrostatic force on q_1 ? Draw the direction of the net force on q_1 on the diagram.



$$|F_{13}| = \boxed{43.2 \text{ N}}$$

$$F_{\text{total}} = \sqrt{|F_{12}|^2 + |F_{13}|^2}$$

$$= \sqrt{(43.2 \text{ N})^2 + (43.2 \text{ N})^2}$$

$$= \boxed{61.0 \text{ N}}$$