Sample Problem Set 1

Amy Farrah Fowler and Leonard Hofstadter are conducting a new experiment regarding electrostatics of point charges. In their new experiment, three point charges are fixed at the corners of an equilateral triangle, as shown in the following figure. The distance between any two of these charges is 1.0 m. Their goal is to measure the total electric force exerted on charge q_3 by the other two charges q_1 and q_2.
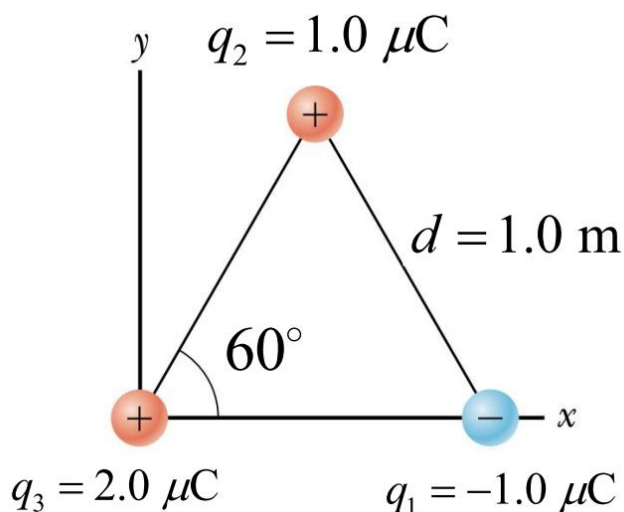
SP 1.1
Amy is calculating the electric force exerted on charge q_3 by charge q_1. She calls this force $\vec{F}_{13}$. The magnitude of the electric force exerted on charge q_3 by charge q_1 should be:

$F_{13} =$ _____ $\times 10^{-2}$ (N).

SP 1.2
What is the direction of the electric force $\vec{F}_{13}$ (exerted on charge q_3 by charge q_1)?

This electric force $\vec{F}_{13}$ points to the _____.

SP 1.3

Leonard is calculating the electric force exerted on charge q_3 by charge q_2. He calls this force $\vec{F}_{23}$. The magnitude of the electric force exerted on charge q_3 by charge q_2 should be:

$F_{23} = $ _____ $\times 10^{-2}$ (N).

SP 1.4

To which quadrant should this electric force $\vec{F}_{23}$ point?

This electric force $\vec{F}_{23}$ (exerted on charge q_3 by charge q_2) points to the _____ quadrant.

SP 1.5

Then, Amy is calculating the vector sum of these two electric forces acting on q_3, namely:

$$\vec{F}_3 = \vec{F}_{13} + \vec{F}_{23},$$

And she gets the resultant force vector $\vec{F}_3$. *To which quadrant* should this resultant electric force $\vec{F}_3$ point?

This resultant electric force $\vec{F}_3$ (exerted on charge q_3) points to the _____quadrant.

SP 1.6

What is the magnitude of this resultant electric force $\vec{F}_3$?

The magnitude of this resultant electric force $\vec{F}_R$ (exerted on charge q_3) is
$F_3 = $ _____ $\times 10^{-2}$ (N).