6. Use the Pythagorean theorem to find the magnitude of the resultant force.

$$F_{3,tot} = \sqrt{(F_{x,tot})^2 + (F_{y,tot})^2} = \sqrt{(3.01 \times 10^{-9}\ \text{N})^2 + (6.50 \times 10^{-9}\ \text{N})^2}$$

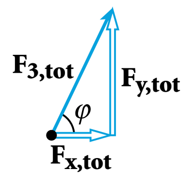
$$\boxed{F_{3,tot} = 7.16 \times 10^{-9}\ \text{N}}$$

7. Use a suitable trigonometric function to find the direction of the resultant force.

In this case, you can use the inverse tangent function:

$$\tan \varphi = \frac{F_{y,tot}}{F_{x,tot}} = \frac{6.50 \times 10^{-9}\ \text{N}}{3.01 \times 10^{-9}\ \text{N}}$$

$$\boxed{\varphi = 65.2°}$$



PRACTICE B

The Superposition Principle

1. Three point charges, q_1, q_2, and q_3, lie along the x-axis at $x = 0$, $x = 3.0$ cm, and $x = 5.0$ cm, respectively. Calculate the magnitude and direction of the electric force on each of the three point charges when $q_1 = +6.0\ \mu C$, $q_2 = +1.5\ \mu C$, and $q_3 = -2.0\ \mu C$.

2. Four charged particles are placed so that each particle is at the corner of a square. The sides of the square are 15 cm. The charge at the upper left corner is $+3.0\ \mu C$, the charge at the upper right corner is $-6.0\ \mu C$, the charge at the lower left corner is $-2.4\ \mu C$, and the charge at the lower right corner is $-9.0\ \mu C$.
   a. What is the net electric force on the $+3.0\ \mu C$ charge?
   b. What is the net electric force on the $-6.0\ \mu C$ charge?
   c. What is the net electric force on the $-9.0\ \mu C$ charge?

Consider an object that is in equilibrium. According to Newton's first law, the net external force acting on a body in equilibrium must equal zero. In electrostatic situations, the equilibrium position of a charge is the location at which the net electric force on the charge is zero. To find this location, you must find the position at which the electric force from one charge is equal and opposite the electric force from another charge. This can be done by setting the forces (found by Coulomb's law) equal and then solving for the distance between either charge and the equilibrium position. This is demonstrated in Sample Problem C.