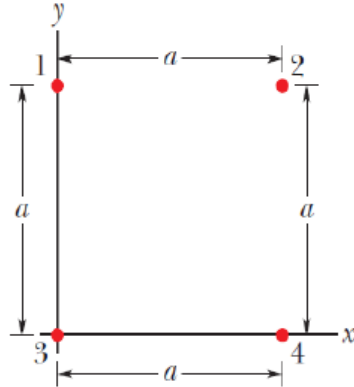


### Answer on Question #73235-Physics-Electromagnetism

In the figure, the particles have charges  $q_1 = -q_2 = 210 \text{ nC}$  and  $q_3 = -q_4 = 92 \text{ nC}$ , and distance  $a = 4.2 \text{ cm}$ . What are the (a) x and (b) y components of the net electrostatic force on particle 3?

#### Solution



The net electrostatic force on particle 3 is

$$\mathbf{F}_3 = \mathbf{F}_{31} + \mathbf{F}_{32} + \mathbf{F}_{34} = k \left( -\frac{q_3 q_1}{a^2} \mathbf{j} + \frac{q_3 q_1}{(\sqrt{2}a)^2} \left( \frac{1}{\sqrt{2}} \mathbf{i} + \frac{1}{\sqrt{2}} \mathbf{j} \right) + \frac{q_3 q_4}{a^2} \mathbf{i} \right)$$

(a)

$$F_{3x} = \frac{kq_3}{a^2} \left( \frac{q_2}{2\sqrt{2}} + q_4 \right) = \frac{(92 \cdot 10^{-9})(9 \cdot 10^9)}{(0.042)^2} \left( -\frac{(210 \cdot 10^{-9})}{2\sqrt{2}} - (92 \cdot 10^{-9}) \right) = -0.078 \text{ N.}$$

(b)

$$F_{3y} = \frac{kq_3}{a^2} \left( \frac{q_2}{2\sqrt{2}} - q_1 \right) = \frac{(92 \cdot 10^{-9})(9 \cdot 10^9)}{(0.042)^2} \left( -\frac{(210 \cdot 10^{-9})}{2\sqrt{2}} - (210 \cdot 10^{-9}) \right) = -0.13 \text{ N.}$$

Answer provided by <https://www.AssignmentExpert.com>