Answer on Question #70118-Physics-Mechanics

In the figure particle 1 of charge +6e is above a floor by distance d1 = 2.00 mm and particle 2 of charge +8e is on the floor, at distance d2 = 6.00 mm horizontally from particle 1. What is the x component of the electrostatic force on particle 2 due to particle 1?

Solution

The electrostatic force on particle 2 due to particle 1 is

$$F = k\frac{q_1 q_2}{d_1^2 + d_2^2} = k\frac{8e6e}{d_1^2 + d_2^2} = 8(6)(9 \cdot 10^9)\frac{(1.6 \cdot 10^{-19})^2}{0.002^2 + 0.006^2} = 2.7648 \cdot 10^{-22} N.$$

The x component of the electrostatic force on particle 2 due to particle 1 is

$$F_x = F\frac{d_2}{\sqrt{d_1^2 + d_2^2}} = (2.7648 \cdot 10^{-22})\frac{0.006}{\sqrt{0.002^2 + 0.006^2}} = 2.62 \cdot 10^{-22} N.$$

Answer: $\mathbf{2.62 \cdot 10^{-22} N}$.