**Answer on Question #45158, Physics, Electromagnetism**

Determine the electrostatic force and electrostatic field on particle A due to particles B and C. Express your result both in the unit vector notation and as magnitude. Given B is at origin A is at positive z axis C is at positive y axis forming a right triangle centered at B. Where side AB= 30 cm and side BC= 40 cm.

Charge on A= $-4 * 10^(-6)$ C B= $2 * 10^(-6)$ C C= $-6 * 10^(-6)$ C

Solution

Force on A due to B is

$$F_{ab} = k\frac{q_a q_b}{r_{ab}^2} = 9 \cdot 10^9 \frac{-4 \cdot 2 \cdot 10^{-12}}{0.3^2} \approx -88.9 \cdot 10^{-3}\, N$$

They are attracting and force is along y axis:

$$\vec{F}_{ab} = -88.9 \cdot 10^{-3}\vec{j}\, N$$

Force on A due to C is

$$F_{ac} = k\frac{q_a q_c}{r_{ac}^2} = 9 \cdot 10^9 \frac{-4 \cdot (-6) \cdot 10^{-12}}{0.3^2} \approx 266.7 \cdot 10^{-3}\, N$$

They are repelling and force under angle 45 degrees to axis z:

$$\vec{F}_{ac} = 266.7 \cdot 10^{-3} \cdot \left(\frac{\sqrt{2}}{2}\vec{j} + \frac{\sqrt{2}}{2}\vec{k}\right)\, N$$

Their sum will be

$$\vec{F} = \vec{F}_{ab} + \vec{F}_{ac} = \left((\frac{\sqrt{2}}{2}266.7 - 88.9)\vec{j} + \frac{\sqrt{2}}{2}266.7\vec{k}\right) \cdot 10^{-3}\, N = \left(99.7\vec{j} + 188.6\vec{k}\right) \cdot 10^{-3}\, N$$

Its magnitude is

$$F = \sqrt{99.7^2 + 188.6^2} \cdot 10^{-3}\, N \approx 213.3 \cdot 10^{-3}\, N$$