Ch 21 Electric Charge & Electric Field

Season 2 Episode 3 - *POINT CHARGES GO WHooOOSH*

In this episode of LARC Physics 3B, we're going to . . .

- Mourn our losses after Midterm 1
- Rebound by building a strong foundation for Midterm 2 based on Coulomb's Law with electric point charges.

Guided Practice

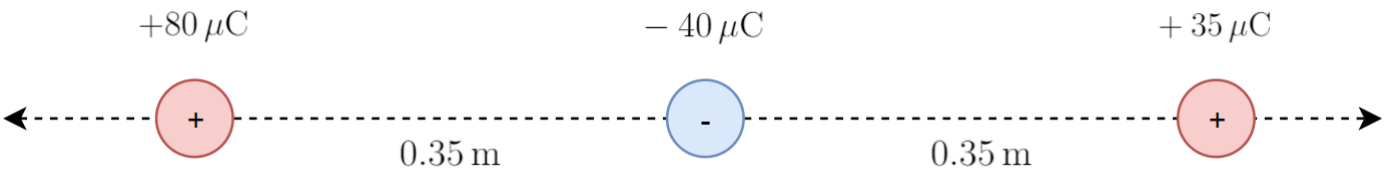
Particles of charge $+80\,\mu$C, $-40\,\mu$C, and $+35\,\mu$C are placed along a line shown in the figure below. They are equally spaced by a distance of 0.35 m. Find the net force $\vec{F}_{\text{net}}$ on the $+35\,\mu$C charge.

(a) Find $\vec{F}_{\text{net}}$ by first finding the net electric field $\vec{E}_{\text{net}}$ at where the $+35\,\mu$C charge is

(b) Find $\vec{F}_{\text{net}}$ directly by using Coulomb's Law $F = k\frac{q_1 q_2}{r^2}$

Beware of proper vector notation!

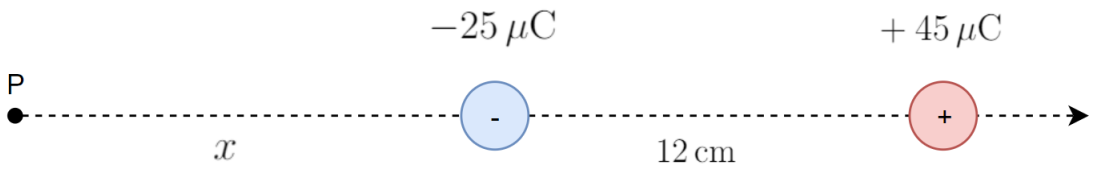
Answer: $\vec{F}_{\text{net}} = -(51.4\,\text{N})\,\hat{i}$



Breakout-Room Activity

Two point charges $Q_1 = -25\,\mu\text{C}$ and $Q_2 = +45\,\mu\text{C}$, are separated by a distance of 12 cm. The electric field at the point P is **zero**. What's the distance between Q_1 and point P?

Answer: $x = 35\,\text{cm}$



Challenge Problem

Find the magnitude and electric field at points A and B due to the two positive point charges with charge $Q = +5.7\,\mu\text{C}$.

Answer: $\vec{E}_A = -(5.30 \times 10^6\,\text{N/C})\,\hat{i} + (7.89 \times 10^6\,\text{N/C})\,\hat{j}$ $\quad$ $\vec{E}_B = (3.7 \times 10^6\,\text{N/C})\,\hat{j}$