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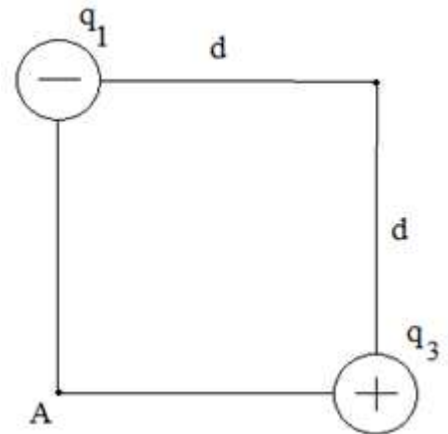
I. Electric Field created by two point charges

Two charges are held at the corners of a box as shown with:

$$q_1 = -3.6 \times 10^{-10} \text{ C}, \quad m_1 = 1.87 \times 10^{-17} \text{ kg}$$

$$q_3 = 2.2 \times 10^{-9} \text{ C}, \quad m_3 = 5.64 \times 10^{-17} \text{ kg} \quad d = 4.8 \times 10^{-10} \text{ m}$$

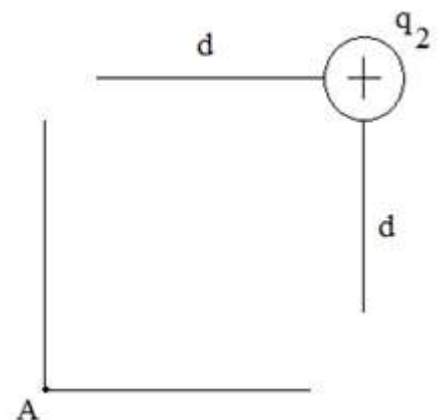
- Find the electric field at point A from q_1 .
- Find the electric field at point A from q_3 .
- Find the total electric field at point A.
- If you put a new charge with $q_4 = -5.00 \text{ nC}$ at point A, what electrical force would it experience?



One charge is held at the corners of a box as shown with:

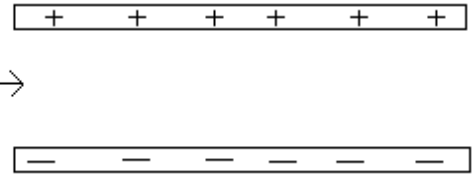
$$q_2 = 4.2 \times 10^{-9} \text{ C}, \quad m_2 = 2.27 \times 10^{-17} \text{ kg}, \quad d = 4.8 \times 10^{-10} \text{ m}$$

- Find the electric field at point A from q_2 .
- If you put a new charge with $q_4 = -5.00 \text{ nC}$ at point A, what electrical force would it experience?



II. Electric Force from multiple electric fields

A negative charge q_a passes between two large, charged plates, as shown. These plates have an electric field between them equal to $\|E\| = 22 \text{ N/C}$ $q_a = -4.0 \text{ } \mu\text{C}$ $m_q = 8.1 \times 10^{-6} \text{ kg}$ $v_{oq} = 4.0 \text{ m/s}$ $\ominus \rightarrow$



- Draw a few of the electric field lines in the region between the two plates, that come from the plates' charge.
- Calculate the total electric force that acts on the charge.
- Calculate the acceleration of the charge due this force.
- If the charge has an initial horizontal velocity (v_{oq}) to the right, and it takes 1.2 seconds to travel the length of the plates, how far will the charge move vertically in this time?

(see below for hints)

Steps to solve:

- Brainstorm some general concepts and equations related to this type of problem from class
- How do we know which way the electric field lines point?
- How is force and acceleration related?
- Do we need to consider the effect of gravity on this charge? Why not?
- What types of concepts and equations relate velocity, acceleration, and distance traveled?
- What does the phrase "initial horizontal velocity" tell us about the object's initial vertical velocity?