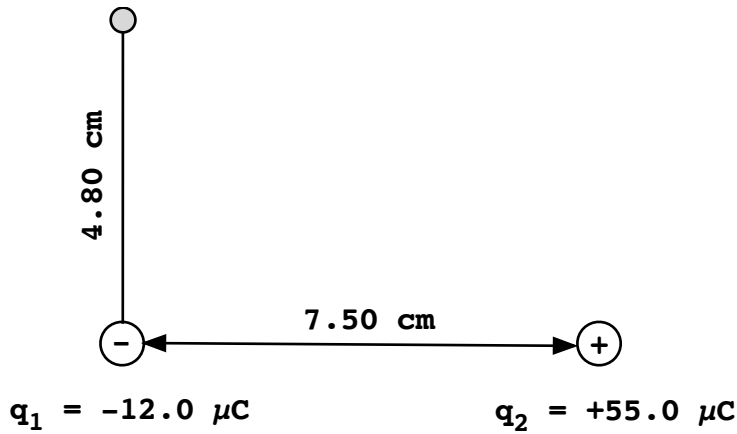


Physics 10164 - Exam 1C

Partial credit will be given provided you show all work and are solving parts of the problem correctly. Points will be deducted if you don't show your work even if you get the right answer. Clearly indicate your answer with a circle or a box and remember to include correct units and significant figures.

1. (30 pts) Two charges are arranged in a straight line as shown below and fixed in place. Charge q_1 is at the origin.
- a) Determine the magnitude and direction of the electric field at the coordinate $y = 4.80$ cm.
- b) Determine the magnitude and direction of the acceleration felt by an electron at $y = 4.80$ cm.



2. (35 pts) Starting at the origin, a 23.0-gram particle with a net charge of $-472 \mu\text{C}$ is moving in the +y direction with a velocity of 4.40 m/s. By the time the particle reaches a coordinate $y = +1.45 \text{ m}$, it has slowed to 1.80 m/s. The electric potential at the origin is 240 Volts, and the electric field in this region is uniform.

- a) Assuming the electric force is the only relevant force in the problem, how much work is done by the electric force?
- b) What is the electric potential at $y = +1.45 \text{ m}$?
- c) What is the magnitude and direction of the electric field that this particle is moving through?

#3. (35 pts) A circuit contains a 24-Volt battery, a switch, a 4.0 Ohm resistor and a 28 μF capacitor. When the switch is first closed to complete the circuit at $t=0$, the capacitor is uncharged. Answer the following with 2 SF.

- a) After two time constants have elapsed, what is the voltage drop across the capacitor?
- b) At this time, what is the voltage drop across the resistor?
- c) At what time is the capacitor at 98% of its maximum possible charge?