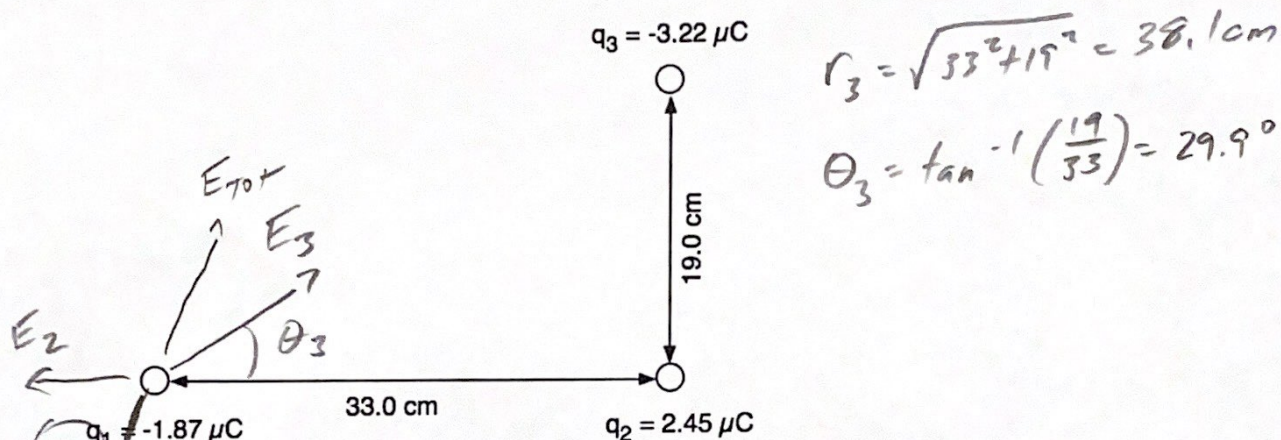


### Quiz 18.1E

Assume the three charges below are fixed in place.

- Find the magnitude and direction of the electric field (due to charges  $q_2$  and  $q_3$ ) in which charge  $q_1$  is immersed.
- Assume now  $q_1$  is free to move and has a mass of 37.0 grams. What is the magnitude and direction of the acceleration of  $q_1$ ?



$$|E_2| = \frac{(9 \times 10^9)(2.45 \times 10^{-6})}{.33^2} = 202480, -x \text{ dir}$$

$$|E_3| = \frac{(9 \times 10^9)(3.22 \times 10^{-6})}{.381^2} = 199640, 29.9^\circ \text{ above } +x$$

$$E_{2x} = -202480$$

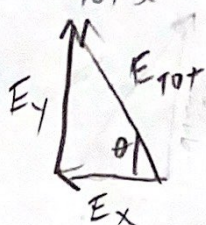
$$E_{2y} = 0$$

$$E_{3x} = +173070$$

$$E_{3y} = +99520$$

$$E_{\text{TOT}x} = -29410$$

$$E_{3y} = +99520$$



$$|E_{\text{TOT}}| = \sqrt{29410^2 + 99520^2} = 1.04 \times 10^5 \frac{\text{N}}{\text{C}}$$

$$\theta = \tan^{-1}\left(\frac{99520}{29410}\right) = 73.5^\circ \text{ above } -x$$

$F_E$ , a point opposite of  $\vec{E}$   
since  $q_1$  is negative.

$$a = \left| \frac{qE}{m} \right| = \frac{(1.87 \times 10^{-6})(1.04 \times 10^5)}{.037}$$

$$= 5.26 \text{ m/s}^2, 73.5^\circ \text{ below } +x$$