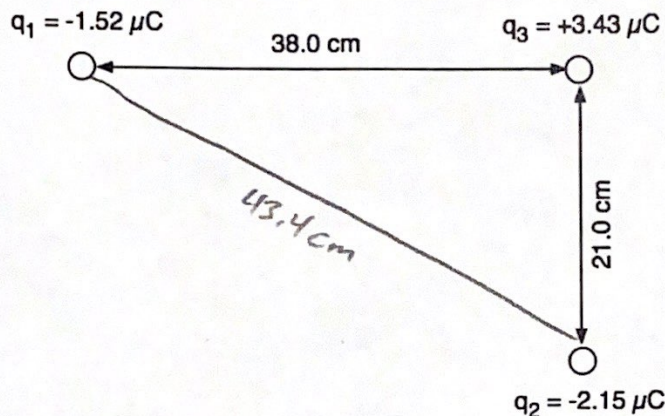


Quiz 19.2C

Three charges are arranged in the distribution shown below. Charges q_1 and q_3 are fixed in place and do not move. q_2 is a small ball with a mass of 32.0 grams, and it is initially at rest.



- What is the voltage at the initial location of q_2 ?
- An applied force helps move q_2 to a location at the midpoint between charges q_1 and q_3 . When q_2 arrives at that location, it has a speed of ~~1.22~~ m/s. What is the voltage at this final location?
- How much work is done by the electric force as q_2 moves to its final location?
- How much work is done by the applied force as q_2 moves to its final location?

$$a) V_{TOT} = \frac{k_e q_1}{r_1} + \frac{k_e q_3}{r_3} = \frac{(9 \times 10^9)(-1.52 \times 10^{-6})}{.434} + \frac{(9 \times 10^9)(3.43 \times 10^{-6})}{.21}$$

$$= -31521 + 147000 = \boxed{115479 \text{ V}}$$

$$b) V_{TOT} = \frac{(9 \times 10^9)(-1.52 \times 10^{-6})}{0.19} + \frac{(9 \times 10^9)(3.43 \times 10^{-6})}{0.19}$$

$$= -72000 + 162474 = \boxed{90474 \text{ V}}$$

$$c) W_E = -q_2 \Delta V = -(-2.15 \times 10^{-6})(90474 - 115479)$$

$$= \boxed{-0.0538 \text{ J}}$$

$$d) W_E + W_{App} = \Delta K$$

$$-0.0538 + W_{App} = \frac{1}{2}(.032)(1.22)^2 = .0238$$

$$W_{App} = .0238 + .0538 = \boxed{0.0776 \text{ J}}$$