

Section

18-1

HOLT PHYSICS

Concept Review*Electrical Potential Energy*

Use $k_C = 8.99 \times 10^9 \text{ N}\cdot\text{m}^2/\text{C}^2$.

1. A positive charge, q_1 , of $5.00 \times 10^{-9} \text{ C}$ is placed at $(-20.0 \text{ cm}, 0)$ of a coordinate system. An equal and opposite charge, q_2 , is at $(20.0 \text{ cm}, 0)$. Sketch a diagram for each of the questions below.
 - a. What is the potential energy of this pair of charges? Was work done to bring q_2 from infinity to its place near q_1 ? How much?

- b. A positive charge, q_3 , equal to q_1 is placed at $(60.0 \text{ cm}, 0)$. What is the potential energy of the three charges? Was work done on or by the charges for bringing q_3 from infinity to its place near q_1 and q_2 ? How much?

2. An alpha particle travels 5.00 cm in a uniform electric field of $6.00 \times 10^2 \text{ N/C}$. (Alpha particles are made of two protons and two neutrons. $m_p = 1.673 \times 10^{-27} \text{ kg}$; $m_n = 1.675 \times 10^{-27} \text{ kg}$; $q_e = 1.60 \times 10^{-19} \text{ C}$)

- a. What is the change in the potential energy of the particle? Does it increase or decrease?

- b. If the particle is initially at rest, what is its final kinetic energy?

- c. What is its speed?
