

Chapter

18

HOLT PHYSICS

Mixed Review

Electrical Energy and Capacitance

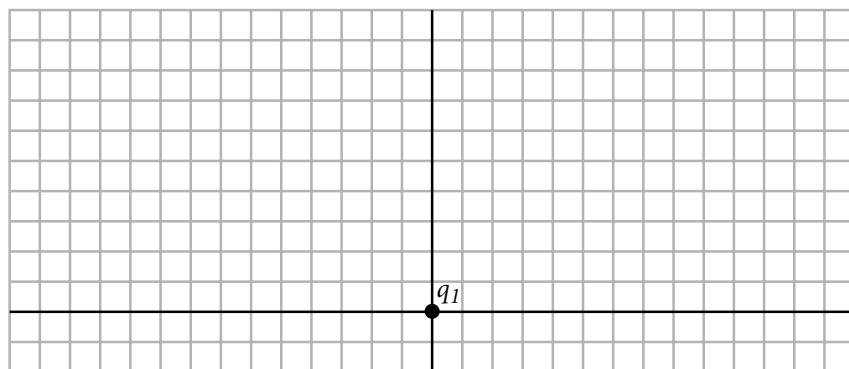
1. A positive charge, q_1 , of 5.00×10^{-9} C is placed at (0, 0) in a coordinate system.

a. Find the potential electrical energy of the two charges when a negative charge, q_2 , of 5.00×10^{-9} C is at the following positions in the coordinate system:

- (50.0 cm, 0 cm) _____
- (40.0 cm, 30.0 cm) _____
- (30.0 cm, 40.0 cm) _____
- (50.0 cm, 0 cm) _____
- (-30.0 cm, 40.0 cm) _____
- (-40.0 cm, 30.0 cm) _____
- (-50.0 cm, 0 cm) _____

b. Does the electrical potential energy of the two charges increase or decrease when q_2 moves around a circle? Explain.

c. In the space below, sketch the path of the point charge, q_2 , in this exercise, and draw the electric force vector acting on it at each of the points indicated in item 1a.



Chapter **18** HOLT PHYSICS
Mixed Review *continued*

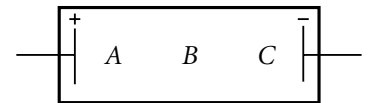
2. Electrons are accelerated in the picture tube of a television through a potential difference of 8.00×10^3 V. (Use the values $q_e = 1.60 \times 10^{-19}$ kg and $m_e = 9.109 \times 10^{-31}$ kg.)

a. What is the change in the potential energy of each electron traveling in this tube?

b. What is the change in the kinetic energy of the electrons?

c. At what speed do the electrons hit the screen?

3. The distance between two vertical plates in a vacuum tube is 6.00 cm. A potential difference of 300 V is applied between the plates. Point A is located 1.00 cm from the positive plate, point B is at 3.00 cm from it, and point C is at 5.00 cm from it.



a. What is the strength of the electric field at points A, B, and C? Is the electric field constant between parallel plates?

b. What is the potential difference between the positive plate and points A, B, and C? (Use $\Delta V = Ed$)

c. A positive ion with a charge of $+1.60 \times 10^{-19}$ C leaves the positive plate and travels to the negative one. What is its potential energy at the positive plate? at A? at B? at C? at the negative plate?

4. A 2.00×10^2 nF capacitor has a 4.0×10^1 μ C charge.

a. What is the potential difference between its plates?

b. What is the potential energy stored in the capacitor?
