MIXED REVIEW

57. At some distance from a point charge, the electric potential is 600.0 V and the magnitude of the electric field is 200.0 N/C. Determine the distance from the charge and the charge.

58. A circular parallel-plate capacitor with a spacing of 3.0 mm is charged to produce a uniform electric field with a strength of 3.0×10^6 N/C. What plate radius is required if the stored charge is $-1.0\ \mu$C?

59. A 12 V battery is connected across two parallel metal plates separated by 0.30 cm. Find the magnitude of the electric field.

60. A parallel-plate capacitor has an area of 5.00 cm^2, and the plates are separated by 1.00 mm. The capacitor stores a charge of 400.0 pC.

- **a.** What is the potential difference across the plates of the capacitor?
- **b.** What is the magnitude of the uniform electric field in the region that is located between the plates?

61. A proton is accelerated from rest through a potential difference of 25 700 V.

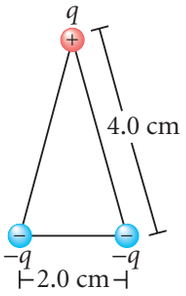
- **a.** What is the kinetic energy of this proton in joules after this acceleration?
- **b.** What is the speed of the proton after this acceleration?

62. A proton is accelerated from rest through a potential difference of 120 V. Calculate the final speed of this proton.

63. A pair of oppositely charged parallel plates are separated by 5.33 mm. A potential difference of 600.0 V exists between the plates.

- **a.** What is the magnitude of the electric field strength in the region that is located between the plates?
- **b.** What is the magnitude of the force on an electron that is in the region between the plates at a point that is exactly 2.90 mm from the positive plate?
- **c.** The electron is moved to the negative plate from an initial position 2.90 mm from the positive plate. What is the change in electrical potential energy due to the movement of this electron?

64. The three charges shown at right are located at the vertices of an isosceles triangle. Calculate the electric potential at the midpoint of the base if each one of the charges at the corners has a magnitude of 5.0×10^{-9} C.



65. A charge of -3.00×10^{-9} C is at the origin of a coordinate system, and a charge of 8.00×10^{-9} C is on the *x*-axis at 2.00 m. At what two locations on the *x*-axis is the electric potential zero?
(Hint: One location is between the charges, and the other is to the left of the *y*-axis.)

66. An ion is displaced through a potential difference of 60.0 V and experiences an increase of electrical potential energy of 1.92×10^{-17} J. Calculate the charge on the ion.

67. A proton is accelerated through a potential difference of 4.5×10^6 V.

- **a.** How much kinetic energy has the proton acquired?
- **b.** If the proton started at rest, how fast is it moving?

68. Each plate on a 3750 pF capacitor carries a charge with a magnitude of 1.75×10^{-8} C.

- **a.** What is the potential difference across the plates when the capacitor has been fully charged?
- **b.** If the plates are 6.50×10^{-4} m apart, what is the magnitude of the electric field between the two plates?

69. A net charge of 45 mC passes through the cross-sectional area of a wire in 15 s.

- **a.** What is the current in the wire?
- **b.** How many electrons pass the cross-sectional area in 1.0 min?

70. The current in a lightning bolt is 2.0×10^5 A. How many coulombs of charge pass through a cross-sectional area of the lightning bolt in 0.50 s?

17 REVIEW

57. 3.000 m; 2.00×10^{-7} C
58. 0.11 m
59. 4.0×10^3 V/m
60. **a.** 90.4 V
b. 9.04×10^4 V/m
61. **a.** 4.11×10^{-15} J
b. 2.22×10^6 m/s
62. 1.5×10^5 m/s
63. **a.** 1.13×10^5 V/m
b. 1.81×10^{-14} N
c. 4.39×10^{-17} J
64. −7800 V
65. 0.545 m, −1.20 m
66. 3.20×10^{-19} C
67. **a.** 7.2×10^{-13} J
b. 2.9×10^7 m/s
68. **a.** 4.67 V
b. 7180 V/m
69. **a.** 3.0×10^{-3} A
b. 1.1×10^{18} electrons
70. 1.0×10^5 C