Name: _____ **Class:** _____ **Date:** _____ **ID: A**

AP REVIEW 4

Multiple Choice
Identify the letter of the choice that best completes the statement or answers the question.

____ 1. If a positively charged glass rod is used to charge a metal bar by induction,
a. the charge on the bar will be equal in magnitude to the charge on the glass rod.
b. the charge on the bar must be negative.
c. the charge on the bar must be positive.
d. the charge on the bar will be greater in magnitude than the charge on the glass rod.

____ 2. The process of charging a conductor by bringing it near another charged object and then grounding the conductor is called
a. charging by contact.
b. induction.
c. charging by polarization
d. neutralization.

____ 3. When a charged body is brought close to an uncharged body without touching it, a(n) ____ charge may result on the uncharged body. When a charged body is brought into contact with an uncharged body and then is removed, a(n) ____ charge may result on the uncharged body.
a. negative; positive
b. positive; negative
c. induced; residual
d. residual; induced

____ 4. Two point charges, initially 1 cm apart, are moved to a distance of 3 cm apart. By what factor do the resulting electric and gravitational forces between them change?
a. 3
b. 9
c. $\frac{1}{3}$
d. $\frac{1}{9}$

____ 5. Charge A and charge B are 2 m apart. Charge A is 1 C and charge B is 2 C. Charge C, which is 2 C, is located between them, and the force on charge C is zero. How far from charge A is charge C?
a. 1 m
b. 0.7 m
c. 0.8 m
d. 0.5 m

____ 6. Two point charges have a value of 30 μC each and are 4 cm apart. What is the electric field at the midpoint between the two charges? ($k_c = 8.99 \times 10^9$ N•m^2/C^2)
a. 4.5×10^7 N/C
b. 2.3×10^7 N/C
c. $.5 \times 10^7$ N/C
d. 0 N/C

____ 7. Two point charges are 10.0 cm apart and have charges of 2.0 μC and –2.0 μC, respectively. What is the electric field at the midpoint between the two charges?
a. 2.9×10^7 N/C
b. 1.4×10^7 N/C
c. 7.2×10^6 N/C
d. 0 N/C

____ 8. Charges of 4.0 μC and –6.0 μC are placed at two corners of an equilateral triangle with sides of 0.10 m. At the third corner, what is the electric field magnitude created by these two charges?
a. 4.8×10^6 N/C
b. 3.1×10^6 N/C
c. 1.6×10^6 N/C
d. 7.4×10^6 N/C

____ 9. If an irregularly-shaped conductor is in electrostatic equilibrium, charge accumulates
a. where the radius of curvature is smallest.
b. where the radius of curvature is largest.
c. evenly throughout the conductor.
d. in flat places.

____ 10. Which of the following is NOT a characteristic of electrical potential energy?
a. It is a form of mechanical energy.
b. It results from a single charge.
c. It results from the interaction between charges.
d. It is associated with a charge in an electric field.

____ 11. Two point charges with values of 3.4 μC and 6.6 C are separated by 0.20 m. What is the electrical potential energy of this two-charge system?
a. 0.34 J
b. –0.75 J
c. 1.0 J
d. –3.4 J

____ 12. Four point charges are positioned on the circumference of a circle with a radius of 10 cm. The charges are 0.5 μC, 1.5 μC, –1.0 μC, and –0.5 μC, respectively. If the electric potential at the center of the circle due to the 0.5 charge alone is 4.5×10^4 V, what is the total potential at the center due to the four charges combined? (Hint: Use the superposition principle.)
a. 1.80×10^4 V
b. 4.5×10^4V
c. 0.0 V
d. -4.5×10^4 V

____ 13. A uniform electric field with a magnitude of 500 N/C is directed parallel to the positive x-axis. If the potential at $x = 5$ m is 2500 V, what is the potential at $x = 2$ m?
a. 1000 V
b. 2000 V
c. 4000 V
d. 4500 V

____ 14. When a capacitor discharges,
a. it must be attached to a battery.
b. charges move back from one plate to another through the circuit until both plates are uncharged.
c. charges move from one plate to another until equal and opposite charges accumulate on the plates.
d. it cannot be connected to a material that conducts.

____ 15. A parallel-plate capacitor has a capacitance of C F. If the area of the plates is doubled while the distance between the plates is halved, the new capacitance will be
a. 2 C.
b. 4 C.
c. $\frac{C}{2}$.
d. $\frac{C}{4}$.

____ 16. How is current affected if the number of charge carriers decreases?
a. The current increases.
b. The current decreases.
c. The current initially decreases and then is gradually restored.
d. The current is not affected.

____ 17. The drift velocity in a wire is
a. the average speed of electrons between collisions.
b. the energy gained by electrons as they are accelerated by an electric field.
c. the speed at which an electric field reaches electrons throughout a conductor.
d. the net velocity of a charge carrier moving in an electric field.

____ 18. In alternating current, the motion of the charges
a. continuously changes in the forward and reverse directions.
b. is equal to the speed of light.
c. is greater than the speed of light.
d. in the direction of the electric field.

____ 19. What is the potential difference across a resistor of 5.0 Ω that carries a current of 5.0 A?
a. 1.0×10^2 V
b. 25 V
c. 4.0 V
d. 1.0 V

____ 20. A flashlight bulb with a potential difference of 4.5 V across it has a resistance of 8.0 Ω. How much current is in the bulb filament?
a. 3.7 A
b. 1.8 A
c. 9.4 A
d. 0.56 A

____ 21. Which of the following wires would have the LEAST resistance?
a. a copper wire 10 cm in length at 32°C
b. a copper wire 5 cm in length at 32°C
c. a copper wire 10 cm in length at 10°C
d. a copper wire 5 cm in length at 10°C

____ 22. Which of the following wires would have the LEAST resistance?
a. an aluminum wire 20 cm in diameter at 40°C
b. an aluminum wire 20 cm in diameter at 60°C
c. an aluminum wire 40 cm in diameter at 40°C
d. an aluminum wire 40 cm in diameter at 60°C

____ 23. What happens to the resistance of a superconductor when its temperature drops below the critical temperature?
a. The resistance is equal to that of a semiconductor with the same dimensions.
b. The resistance doubles.
c. The resistance drops to zero.
d. The resistance reduces by one-half.

____ 24. Consider a material that is cooled until it becomes a superconductor. If it is cooled even further, its resistance will
a. increase.
b. decrease.
c. stay constant and nonzero.
d. remain at zero.

____ 25. The power ratings on light bulbs are measures of the
a. rate that they give off heat and light.
b. voltage they require.
c. density of the charge carriers.
d. amount of negative charge passing through them.

____ 26. If a lamp has a resistance of 120 Ω when it operates at a power of 1.00×10^2 W, what is the potential difference across the lamp?
a. 110 V
b. 120 V
c. 130 V
d. 220 V

____ 27. If a lamp is measured to have a resistance of 45 Ω when it operates at a power of 80 W, what is the current in the lamp?
a. 2.10 A
b. 1.3 A
c. 0.91 A
d. 0.83 A

____ 28. A steam turbine at an electric power plant delivers 4500 kW of power to an electrical generator that converts 95 percent of this mechanical energy into electrical energy. What is the current delivered by the generator if it delivers energy at 3600 V?

a. 0.66×10^3 A
b. 1.0×10^3 A
c. 1.2×10^3 A
d. 5.9×10^3 A

____ 29. Which process will double the power dissipated by a resistor?

a. doubling the current while doubling the resistance
b. doubling the current and making the resistance half as big
c. doubling the current and doubling the potential difference
d. doubling the current while making the potential difference half as big

____ 30. A microwave draws 5.0 A when it is connected to a 120 V outlet. If electrical energy costs \$0.090/kW•h, what is the cost of running the microwave for exactly 6 h?

a. \$2.70
b. \$1.60
c. \$0.72
d. \$0.32

____ 31. If the potential difference across a pair of batteries used to power a flashlight is 6.0 V, what is the potential difference across the flashlight bulb?

a. 3.0 V
b. 6.0 V
c. 9.0 V
d. 12 V

____ 32. If a 9.0 V battery is connected to a light bulb, what is the potential difference across the bulb?

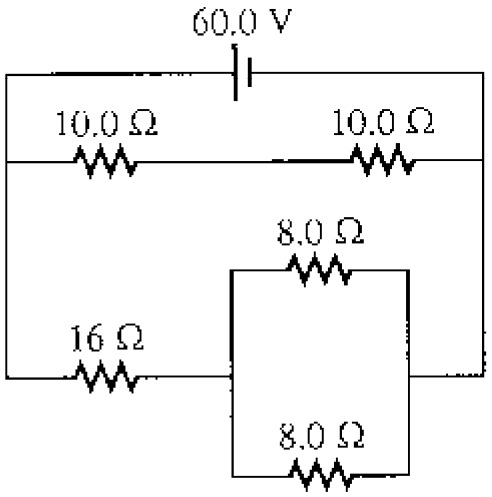
a. 3.0 V
b. 4.5 V
c. 9.0 V
d. 18 V

____ 33. Three resistors with values of 4.0 Ω, 6.0 Ω, and 8.0 Ω, respectively, are connected in series. What is their equivalent resistance?

a. 18
b. 8.0
c. 6.0
d. 1.8

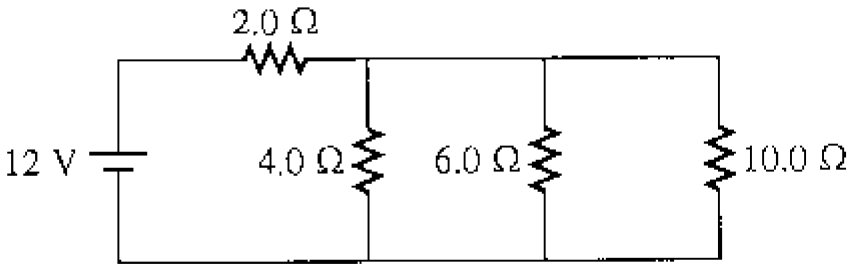
____ 34. Two resistors with values of 6.0 Ω and 12 Ω are connected in parallel. This combination is connected in series with a 4.0 Ω resistor. What is the overall resistance of this combination?

a. 0.50 Ω
b. 2.0 Ω
c. 8.0 Ω
d. 22 Ω



____ 35. What is the equivalent resistance for the resistors in the figure above?

a. 7.5 Ω
b. 1.0×10^1 Ω
c. 16 Ω
d. 18 Ω



____ 36. Three resistors connected in parallel have individual values of 4.0 Ω, 6.0 Ω, and 10.0 Ω, as shown above. If this combination is connected in series with a 12.0 V battery and a 2.0 Ω resistor, what is the current in the 10.0 Ω resistor?

a. 0.59 A
b. 1.0 A
c. 11A
d. 16A

____ 37. A current in a solenoid coil creates a magnetic field inside the coil. The field strength is directly proportional to the

a. coil area.
b. current.
c. coil area and current.
d. length.

____ 38. In a permanent magnet,

a. domain alignment persists after the external magnetic field is removed.
b. domain alignment becomes random after the external magnetic field is removed.
c. domains are always randomly oriented.
d. the magnetic fields of the domains cancel each other.

____ 39. An electron moves across Earth's equator at a speed of 2.5×10^6 m/s and in a direction 35° north of east. At this point, Earth's magnetic field has a direction due north, is parallel to the surface, and has a value of 0.10×10^{-4} T. What is the magnitude of the force acting on the electron due to its interaction with Earth's magnetic field? ($e = 1.60 \times 10^{-19}$ C)

a. 5.1×10^{-18} N
b. 4.0×10^{-18} N
c. 3.3×10^{-18} N
d. 2.3×10^{-18} N

____ 40. What is the path of an electron moving perpendicular to a uniform magnetic field?

a. a straight line
b. a circle
c. an ellipse
d. a parabola

AP REVIEW 4
Answer Section

MULTIPLE CHOICE

1. B
2. B
3. C
4. D
5. C
6. D
7. B
8. A
9. A
10. B
11. C
12. B
13. C
14. B
15. B
16. B
17. D
18. A
19. B
20. D
21. D
22. C
23. C
24. D
25. A
26. A
27. B
28. C
29. B
30. D
31. B
32. C
33. A
34. C
35. B
36. A
37. B
38. A
39. C

40. B