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

AP physics B web review ch 15 electric forces and fields

Please do not write on my tests

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

____ 1. If body M, with a positive charge, is used to charge body N by induction, what will be the nature of the charge left on the latter?
a. must be equal in magnitude to that on M
b. must be negative
c. must be positive
d. must be greater in magnitude than that on M
e. must be positive on the surface of N

____ 2. If the distance between two point charges is tripled, the mutual force between them will be changed by what factor?
a. 9.0
b. 3.0
c. 0.33
d. 1/9
e. 6.0

____ 3. Two point charges, separated by 1.5 cm, have charge values of +2.0 and −4.0 μC, respectively. What is the value of the mutual force between them? ($k_e = 8.99 \times 10^9$ N·m^2/C^2)
a. 320 N
b. 3.6×10^{-8} N
c. 8.0×10^{-12} N
d. 3.1×10^{-3} N
e. 16 N

____ 4. In a thundercloud there may be an electric charge of +40 C near the top of the cloud and −40 C near the bottom of the cloud. These charges are separated by about 2.0 km. What is the electric force between these two sets of charges? ($k_e = 8.99 \times 10^9$ N·m^2/C^2)
a. 3.6×10^4 N
b. 3.6×10^5 N
c. 3.6×10^6 N
d. 3.6×10^7 N
e. 3.6×10^8 N

____ 5. An electron is sent at high speed toward a gold nucleus (charge +79e). What is the electrical force acting on the electron when it is 3.0×10^{-14} m away from the gold nucleus? ($e = 1.6 \times 10^{-19}$ C, $k_e = 8.99 \times 10^9$ N·m^2/C^2)
a. 20 N
b. 0.25 N
c. 2.0×10^{-4} N
d. 2.1×10^{-6} N
e. 4.8×10^{-10} N

____ 6. Two electrons are separated by one cm. What is the ratio of the electric force to the gravitational force between them? (m_e = 9.11 × 10^{-31} kg, k_e = 8.99 × 10^9 N·m^2/C^2, G = 6.67 × 10^{-11} N·m^2/kg^2, and e = 1.6 × 10^{-19} C)
   a. 2.3 × 10^2
   b. 1.3 × 10^{20}
   c. 3.1 × 10^{22}
   d. 4.2 × 10^{42}
   e. 8.0 × 10^{44}

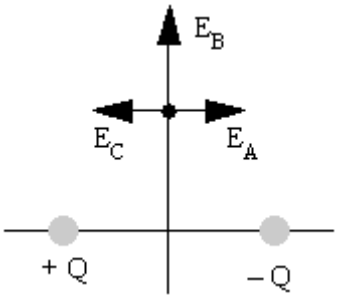
____ 7. A 6.00 μC charge is placed at the origin and a second charge is placed on the x-axis at x = 0.300 m. If the resulting force on the second charge is 6.40 N in the positive x-direction, what is the force on the charge at the origin?
   a. 6.40 N in the positive x-direction
   b. 6.40 N in the negative x-direction
   c. 0 N
   d. not able to be determined until the second charge is known
   e. a 6.00 μC charge cannot act with a force of 6.40 N

____ 8. Two point charges are separated by 10.0 cm and have charges of +2.00 μC and −2.00 μC, respectively. What is the electric field at a point midway between the two charges? (k_e = 8.99 × 10^9 N·m^2/C^2)
   a. 28.8 × 10^6 N/C
   b. 14.4 × 10^6 N/C
   c. 7.19 × 10^6 N/C
   d. 3.59 × 10^6 N/C
   e. zero

____ 9. 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? (k_e = 8.99 × 10^9 N·m^2/C^2)
   a. 4.5 × 10^6 N/C
   b. 3.1 × 10^6 N/C
   c. 1.6 × 10^6 N/C
   d. 4.8 × 10^6 N/C
   e. 7.5 × 10^6 N/C

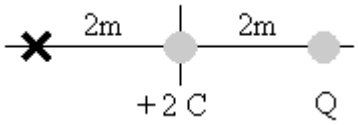
____ 10. A proton initially moves left to right long the x axis at a speed of 2.00 × 10^3 m/s. It moves into an electric field, which points in the negative x direction, and travels a distance of 0.200 m before coming to rest. What acceleration magnitude does the proton experience?
   a. 6.67 × 10^3 m/s^2
   b. 1.00 × 10^7 m/s^2
   c. 9.33 × 10^9 m/s^2
   d. 2.67 × 10^{11}m/s^2
   e. 5.52 × 10^{14}m/s^2

____ 11. Two charges, $+Q$ and $-Q$, are located two meters apart and there is a point along the line that is equidistant from the two charges as indicated. Which vector best represents the direction of the electric field at that point?



a. Vector E_A
b. Vector E_B
c. Vector E_C
d. The electric field at that point is zero.
e. The electric field is opposite to E_B.

____ 12. A charge of +2 C is at the origin. When charge Q is placed at 2 m along the positive x axis, the electric field at 2 m along the negative x axis becomes zero. What is the value of Q?



a. −3 C
b. −6 C
c. −7 C
d. −8 C
e. −10 C

____ 13. Electrons in a particle beam each have a kinetic energy of 3.2×10^{-17} J. What is the magnitude of the electric field that will stop these electrons in a distance of 0.1 m? ($e = 1.6 \times 10^{-19}$ C)
a. 200 N/C
b. 1 000 N/C
c. 2 000 N/C
d. 4 000 N/C
e. 10 000 N/C

____ 14. The electric field associated with a uniformly charged hollow metallic sphere is the greatest at:
a. the center of the sphere.
b. the sphere's inner surface.
c. infinity.
d. the sphere's outer surface.
e. points inside the sphere.

____ 15. At what point is the charge per unit area greatest on the surface of an irregularly shaped conducting solid?
a. where surface curves inward
b. where surface is flat
c. where curvature is least
d. where curvature is greatest
e. where surface curves outward

____ 16. We have an initially uncharged hollow metallic sphere with radius of 5.0 cm. I place a small object with a charge of +10 μC at the center of the sphere through a hole in the surface. Find the electric field present at a point 10 cm from the sphere's center. ($k_e = 8.99 \times 10^9$ N·m^2/C^2)
a. 1.1×10^6 N/C
b. 2.3×10^6 N/C
c. 9.0×10^6 N/C
d. 36×10^6 N/C
e. 97×10^6 N/C

____ 17. A ping-pong ball covered with a conducting graphite coating has a mass of 5.0×10^{-3} kg and a charge of 4.0 μC. What electric field directed upward will exactly balance the weight of the ball? (g = 9.8 m/s^2)
a. 8.2×10^2 N/C
b. 1.2×10^4 N/C
c. 2.0×10^{-7} N/C
d. 5.1×10^6 N/C
e. 3.4×10^{-3} N/C

____ 18. Two identical balls have the same amount of charge, but the charge on ball A is positive and the charge on ball B is negative. The balls are placed on a smooth, level, frictionless table whose top is an insulator. Which of the following is true?
a. Since the force on A is equal but opposite to the force on B, they will not move.
b. They will move together with constant acceleration.
c. Since the force on both balls is negative they will move in the negative direction.
d. Since the forces are opposite in direction, the balls will move away from each other.
e. None of the above is correct.

____ 19. A thin uncharged conducting spherical shell has a charge q carefully placed at its center through a small hole in the shell. The charge q does not touch the shell. What is the charge on the shell?
a. q
b. −q
c. 2q
d. 0
e. −2q

____ 20. In Millikan's oil drop experiment, if the electric field between the plates was of just the right magnitude, it would exactly balance the weight of the drop. Suppose a tiny spherical oil droplet of radius 1.6×10^{4} cm carries a charge equivalent to one electron. What electric field is required to balance the weight? (The density of oil is 0.85 g/cm^3, $e = 1.6 \times 10^{-19}$ C.)

a. 1.1×10^{5} N/C
b. 2.2×10^{5} N/C
c. 4.5×10^{5} N/C
d. 8.9×10^{5} N/C
e. 17×10^{5} N/C

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Answer Section

MULTIPLE CHOICE

1. B
2. D
3. A
4. C
5. A
6. D
7. B
8. B
9. D
10. B
11. A
12. D
13. C
14. D
15. D
16. C
17. B
18. E
19. D
20. D