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

AP physics B - Web Review ch 16 Electric Fields and Capacitance

Please do not write on my tests

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

____ 1. A proton ($+1.6 \times 10^{-19}$ C) moves 10 cm on a path in the direction of a uniform electric field of strength 3.0 N/C. How much work is done on the proton by the electrical field?
a. 4.8×10^{-20} J
b. -4.8×10^{-20} J
c. 1.6×10^{-20} J
d. -1.6×10^{-20} J
e. zero

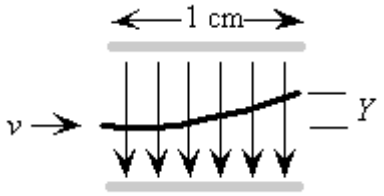
____ 2. A proton ($+1.6 \times 10^{-19}$ C) moves 10 cm along the direction of an electric field of strength 3.0 N/C. The electrical potential difference between the proton's initial and ending points is:
a. 4.8×10^{-19} V
b. 0.30 V
c. 0.033 V
d. 30 V
e. 330 V

____ 3. A free electron is in an electric field. With respect to the field, it experiences a force acting:
a. parallel.
b. anti-parallel (opposite in direction).
c. perpendicular.
d. along a constant potential line.
e. none of the above is correct in the general case.

____ 4. A uniform electric field, with a magnitude of 600 N/C, is directed parallel to the positive *x-axis*. If the potential at $x = 3.0$ m is 1 000 V, what is the change in potential energy of a proton as it moves from $x = 3.0$ m to $x = 1.0$ m? ($q_p = 1.6 \times 10^{-19}$ C)
a. 8.0×10^{-17} J
b. 1.9×10^{-16} J
c. 0.80×10^{-21} J
d. 500 J
e. 2.2×10^{-15} J

____ 5. An electron in a cathode ray tube is accelerated through a potential difference of 5.0 kV. What kinetic energy does the electron gain in the process? ($e = 1.6 \times 10^{-19}$ C)
a. 1.6×10^{-16} J
b. 8.0×10^{-16} J
c. 1.6×10^{-22} J
d. 8.0×10^{22} J
e. 1.6×10^{16} J

____ 6. An electron with velocity $v = 1.0 \times 10^6$ m/s is sent between the plates of a capacitor where the electric field is $E = 500$ V/m. If the distance the electron travels through the field is 1.0 cm, how far is it deviated (Y) in its path when it emerges from the electric field? ($m_e = 9.1 \times 10^{-31}$ kg, $e = 1.6 \times 10^{-19}$ C)



a. 2.2 mm
b. 4.4 mm
c. 2.2 cm
d. 4.4 cm
e. 0.44 mm

____ 7. Two point charges of values +3.4 and +6.6 μC are separated by 0.10 m. What is the electrical potential at the point midway between the two point charges? ($k_e = 8.99 \times 10^9$ N·m^2/C^2)
a. $+1.8 \times 10^6$ V
b. -0.90×10^6 V
c. $+0.90 \times 10^6$ V
d. $+3.6 \times 10^6$ V
e. -3.6×10^6 V

____ 8. A point charge of +3.0 μC is located at the origin of a coordinate system and a second point charge of −6.0 μC is at $x = 1.0$ m. At what point on the x axis is the electrical potential zero?
a. −0.25 m
b. +0.25 m
c. +0.33 m
d. +0.75 m
e. −0.33 m

____ 9. Two protons, each of charge 1.60×10^{-19} C, are 2.00×10^{-5} m apart. What is the change in potential energy if they are brought 1.00×10^{-5} m closer together? ($k_e = 8.99 \times 10^9$ N·m^2/C^2)
a. 1.15×10^{-23} J
b. 3.20×10^{-19} J
c. 3.20×10^{-16} J
d. 1.60×10^{-14} J
e. 1.60×10^{-11} J

____ 10. A solid conducting sphere of 10 cm radius has a net charge of 20 nC. If the potential at infinity is taken as zero, what is the potential at the center of the sphere?
a. 36 μV
b. 360 μV
c. 1.8×10^3 V
d. $=1.8 \times 10^4$ V
e. $>1.8 \times 10^4$ V

____ 11. At which location will the electric field between the two parallel plates of a charged capacitor be the strongest in magnitude?

a. near the positive plate
b. near the negative plate
c. midway between the two plates at their ends
d. midway between the two plates nearest their center
e. anywhere between the two plates

____ 12. A 0.25-μF capacitor is connected to a 400-V battery. Find the charge on the capacitor.

a. 1.2×10^{-12} C
b. 1.0×10^{-4} C
c. 0.040 C
d. 0.020 C
e. 0.010 C

____ 13. A parallel-plate capacitor has a capacitance of 20 μF. What potential difference across the plates is required to store 7.2×10^{-4} C on this capacitor?

a. 36 V
b. 2.2×10^{-2} V
c. 1.4×10^{-8} V
d. 68 V
e. 18 V

____ 14. If two parallel, conducting plates have equal positive charge, the electric field lines will:

a. leave one plate and go straight to the other plate.
b. leave both plates and go to infinity.
c. enter both plates from infinity.
d. be parallel to both plates.
e. none of the above.

____ 15. A 0.25-μF capacitor is connected to a 400-V battery. What potential energy is stored in the capacitor?

a. 1.2×10^{-12} J
b. 1.0×10^{-4} J
c. 0.040 J
d. 0.020 J
e. 0.80 J

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Answer Section

MULTIPLE CHOICE

1. A
2. B
3. B
4. B
5. B
6. B
7. C
8. C
9. A
10. C
11. D
12. B
13. A
14. B
15. D