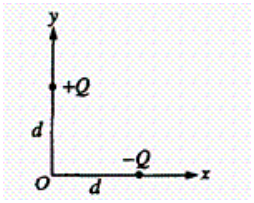
AP Physics TEST Name _____

statics 2014 2-3a 3b-4 5-6a 6b-7

Multiple Choice: Choose the one best answer for each of the following questions.
Write on this test; it is your copy. ***NOTA means "None Of These Answers"***

1. Charges -*Q* and +*Q* are located on the x- and y-axes, respectively, each at a distance d from the origin *O*, as shown below. What is the magnitude of the electric field at the origin *O*?

a. $\frac{\sqrt{2}kQ}{d^2}$ b. $\frac{kQ}{\sqrt{2}d^2}$ c. $\frac{kQ}{d^2}$ d. $\frac{kQ}{2d^2}$ e. $\frac{2kQ}{d^2}$



2. Two parallel conducting plates are connected to a constant voltage source. The magnitude of the electric field between the plates is 2,000 N/C. If the voltage is doubled and the distance between the plates is reduced to 1/5 the original distance, the magnitude of the new electric field is

a. 800 N/C b. 1,600 N/C c. 2,400 N/C d. 5,000 N/C e. 20,000 N/C

3. A point P is 0.50 meter from a point charge of 5.0 X 10^{-8} coulomb. The electric potential at point P is most nearly

a. 2.5 x 10^{-8} V b. 2.5 x 10^{1} V c. 9.0 x 10^{2} V d. 1.8x 10^{3} V e. 7.5x 10^{3} V

4. One coulomb per volt is a

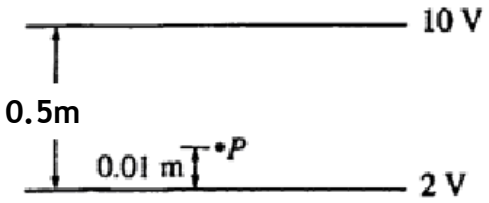
a. joule. b. electron-volt. c. farad. d. watt.

5. A hollow metal sphere of radius R is positively charged. Of the following distances from the center of the sphere, which location will have the greatest electric field strength?

a. 0 (center of the sphere) b. 3R/2 c. 5R/4 d. 2R e. NOTA

6. The magnitude of the electric field at point *P* is

a. 1000 V/m
b. 800 V/m
c. 160 V/m
d. 20 V/m
e. 16 V/m



7. A dielectric material such as paper is placed between the plates of a capacitor. What happens to the capacitance?

a. no change b. becomes larger c. becomes smaller d. becomes infinite

8. Two conducting spheres of different radii, as shown at right, each have charge -Q. Which of the following occurs when the two spheres are connected with a conducting wire?

a. Negative charge flows from the larger sphere to the smaller sphere until the electric potential of each sphere is the same.
b. Negative charge flows from the smaller sphere to the larger sphere until the electric field at the surface of each sphere is the same.
c. Negative charge flows from the smaller sphere to the larger sphere until the electric potential of each sphere is the same.
d. Negative charge flows from the larger sphere to the smaller sphere until the electric field at the surface of each sphere is the same.

9. A 4 mF capacitor is charged to a potential difference of 100 V. The electrical energy stored in the capacitor is
a. 2×10^{-10} J b. 2×10^{-8} J c. 2×10^{-6} J d. $2x\ 10^{-4}$ J e. 2×10^{-2} J

10. A parallel-plate capacitor has a capacitance C_o. A second parallel-plate capacitor has plates with twice the area and twice the separation. The capacitance of the second capacitor is most nearly
a. $\frac{1}{4}C_o$ b. $\frac{1}{2}C_o$ c. C_o d. $2C_o$ e. $4C_o$

11. A small charged ball is accelerated from rest to a speed v by a 500 V potential difference. If the potential difference is changed to 2000 V, what will the new speed of the ball be?
a. v b. 2v c. 4v d. 16v e. NOTA

12. One joule of work is needed to move one coulomb of charge from one point to another with no change in velocity. Which of the following is true between the two points?
a. The resistance is one ohm.
b. The current is one ampere.
c. The potential difference is one volt.
d. The electric field strength is one newton per coulomb.
e. The electric field strength is one joule per electron.

13. A battery charges a parallel-plate capacitor fully and then is removed. The plates are immediately pulled apart. (With the battery disconnected, the amount of charge on the plates remains constant.) What happens to the potential difference between the plates as they are being separated?

a. It increases. b. It decreases. c. It remains constant. d. cannot be determined from the information given

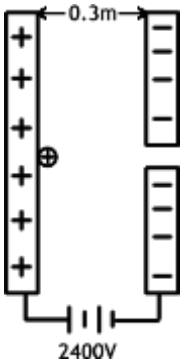
14. The plates of a parallel-plate capacitor are maintained with constant voltage by a battery as they are pulled apart. During this process, the amount of charge on the plates must

a. increase. b. decrease. c. remain constant. d. not enough information to determine

15. A solid conducting sphere is given a positive charge Q. How is the charge Q distributed in or on the sphere?
a. It is concentrated at the center of the sphere.
b. It is uniformly distributed throughout the sphere.
c. Its density decreases radially outward from the center.
d. Its density increases radially outward from the center.
e. It is uniformly distributed on the surface of the sphere only.

AP Physics
Electrostatics

Name:_____
Period: 2-3A 3B-4 5-6A 6B-7



A proton is placed between two parallel plates with a potential difference of 2400V across them. The plates are separated by a distance of 0.3m. The proton is released and moves through a small opening located directly across from it. Ignore all effects of energy.

a) What is the direction of the electric field between the plates?

b) What is the magnitude of the electric field between the plates?

c) How fast is the proton traveling when it exits the plates?

d) How much time does the proton spend between the plates?

e) If the proton is swapped with a POSITRON (a particle with the mass of an electron and the charge of a proton) what will happen to the following quantities.

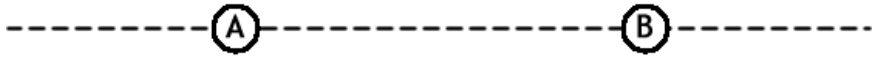
i) Force on the charge: INCREASE DECREASE STAY THE SAME

ii) Final KE of the charge: INCREASE DECREASE STAY THE SAME

iii) Time spent between the plates: INCREASE DECREASE STAY THE SAME

iv) Final velocity of the charge: INCREASE DECREASE STAY THE SAME

Charge A and charge B are 3 meters apart. Charge A carries a net charge of -6nC and charge B carries a net charge of +8nC.



a) Sketch the electric field for the scenario above.

b) What is the strength of the electric field at a point midway between the two charges?

c) What is the size and direction of the force on an electron midway between the two charges?

d) How much work would it take to move a proton from midway between the two charges to an infinite distance away?

e) On the diagram below, sketch where the electric field would be equal to zero?