Assessment

Electric Forces and Fields

Section Quiz: The Electric Field

Write the letter of the correct answer in the space provided.

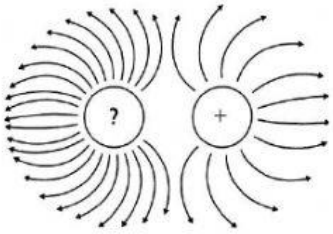
_____ 1. Which of the following would be the best to use to determine whether an electric field is present around an object?
   a. a magnetized pin
   b. light from a lamp
   c. a charged table tennis ball
   d. a mass suspended from a spring scale

_____ 2. Which of the following units is used to state the strength of an electric field?
   a. coulombs per cubic meter
   b. coulombs per newton
   c. newtons per coulomb
   d. meters per coulomb

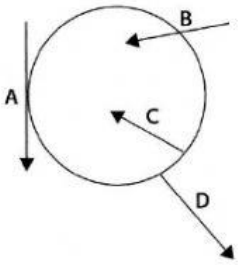
_____ 3. The strength of an electric field around a charged object depends on both the magnitude of the charge and
   a. the magnitude of a test charge.
   b. the sign of the object's charge.
   c. the distance from the object.
   d. the volume of space around the object.

_____ 4. The electric fields of two charges, A and B, are represented by diagrams showing electric field lines. If charge B is greater than charge A, the diagram of charge B will have _____ than the diagram of charge A.
   a. more lines per unit area
   b. longer field lines
   c. straighter field lines
   d. more curved field lines

_____ 5. The diagram on the right shows the electric field lines around two charges that have been brought near each other. From the diagram you can infer that the charge of the left is _____ than the charge on the right.
   a. negative and smaller in magnitude
   b. negative and larger in magnitude
   c. positive and smaller in magnitude
   d. positive and larger in magnitude



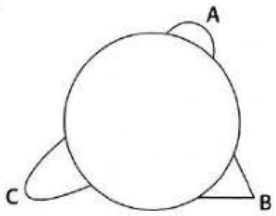
_____ 6. The diagram on the right represents a cross-section of a charged copper rod. Which of the arrows best represents a field line in the rod's electric field?



a. A
b. B
c. C
d. D

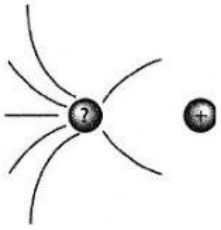
_____ 7. In a charged conductor, such as an aluminum rod, the charge is
a. distributed throughout the rod.
b. on the surface of the rod.
c. distributed along a line through the center of the rod.
d. in the exact center of the rod.

_____ 8. The diagram on the right represents a spherically shaped conductor with the protrusions shown. If this conductor is given an electrostatic charge, which letter best represents the location of the largest concentration of charge?



a. A
b. B
d. C
d. none; The charge is evenly distributed.

9. The drawing on the right is a partial diagram of an electric field showing only a few field lines (without arrowheads). The charge on the right is positive. Can the sign of the charge on the left be determined from the diagram? If so, what is the sign? Explain.



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10. An electric field of 2250 N/C is produced by a charge of 4.82×10^{-11} C. For this field strength, what is the distance to the charge? ($k_c = 8.99 \times 10^9$ N•m^2/C^2)

SHORT ANSWER

11. Materials, such as glass, in which electric charges do not move freely are called electrical _____.

_____

12. Any force between two objects that are not touching is called a(n) _____ force.

_____

13. The space around a charged object contains an electric _____.

_____

PROBLEM

14. What is the electric force between an electron and a proton that are separated by a distance of 1.0×10^{-10} m? Is the force attractive or repulsive? ($e = 1.60 \times 10^{-19}$ C, $k_C - 8.99 \times 10^9$ N•m^2/C^2)

15. An electron is separated from a potassium nucleus (charge $19e$) by a distance of 5.2×10^{-10} m. What is the electric force between these particles? ($e = 1.60 \times 10^{-19}$ C, $k_C = 8.99 \times 10^9$ N•m^2/C^2)

16. Charge A and charge B are 2.2 m apart. Charge A is 1.0 C, and charge B is 2.0 C. Charge C, which is 2.0 C, is located between them and is in electrostatic equilibrium. How far from charge A is charge C?