



Name:

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Quiz #2: Electrical Potential, Electrical Potential Energy, and Gauss's Law

1. A metal sphere has a charge of 2 nC, and a radius of 0.06 m. What is the electric potential at a point 0.09 m from the center of the sphere?
 - a) 0 V
 - b) 100 V
 - c) 200 V
 - d) 300 V
 - e) None of the Above
2. Which of the following statements are true concerning the Electric Field and the Electric Potential inside a conductor?
 - I. The electric field inside a conductor is constant throughout the conductor.
 - II. The electric field inside a conductor is 0 N/C.
 - III. The electric potential inside a conductor is constant throughout the conductor.
 - a) I only
 - b) II only
 - c) III only
 - d) II and III only
 - e) I, II, and III
3. An electron is placed in an electric field. The electric potential at the electron's position is 200V. What is the magnitude of the potential energy of the electron?
 - a) 3.6×10^{-38} J
 - b) 8×10^{-20} J
 - c) 3.2×10^{-17} J
 - d) 8×10^{-12} J
 - e) None of the above
4. Two point-charges, $q_1 = 9 \times 10^{-9}$ C and $q_2 = 1 \times 10^{-9}$ are placed 0.09 m apart. What is the electrical potential energy of this configuration?
 - a) 9×10^{-7} J
 - b) 1×10^{-5} J
 - c) 3×10^{-2} J
 - d) 2×10^{-1} J
 - e) 1 J
5. A particle of charge $q_a = 4 \times 10^{-5}$ C is placed 1 meter from a fixed charge, $q_b = 2 \times 10^{-3}$ C and released. How much potential energy would charge A have when it has moved very far from charge B?
 - a) 0 J
 - b) 8×10^{-8} J
 - c) 720 J
 - d) 3.6×10^5 J
 - e) 9×10^9 J



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6. An infinitely long, thin wire has a charge density of λ . What is the correct expression for the electrical field a distance of r from the wire?
- a) $\frac{\lambda}{2\pi\epsilon_0 r}$
- b) $\frac{\lambda l}{2\pi\epsilon_0 r}$
- c) $\frac{2\pi\epsilon_0 r}{\lambda}$
- d) $\lambda \oint 2\frac{\pi}{\epsilon_0} dA$
- e) ∞
7. The electric field 2 meters from a point charge is 400 N/C. What is the electrical potential at this point?
- a) 200 V b) 400 V c) 600 V d) 800 V e) 1600 V
8. A electron has 0 J of electrical potential energy. The electron could be -
- I. Very far away from all other charges.
II. Halfway between a positive charge and a negative charge of equal magnitude.
III. Very close to a positive charge.
- a) I only
b) II only
c) III only
d) I and II only
e) II and III only
9. Cell phones use changes in electric fields to send and receive messages (or more accurately, electromagnetic fields. For the purposes of this question, any magnetic effects can be ignored). A cell phone is placed inside a hollow metal ball. What will happen to the cell phone?
- a) The phone will be able to send and receive messages normally.
b) The phone will be able to send, but not receive messages.
c) The phone will be able to receive, but not send messages.
d) The phone will be able to neither send nor receive messages.
e) It is impossible to predict the effect.
10. An oil drop of mass $m=9 \times 10^{-6}$ kg is placed in an electric field, $E= 300$ N/C directed upward. If the oil drop remains stationary, hovering, what is the charge of the drop?
(you may use $g = 10$ m/s² to simplify calculations)
- a) 1.8×10^3 C
b) 3.333×10^{-3} C
c) 3×10^{-7} C
d) 9×10^{-15} C
e) It is impossible to tell