

1. What is the potential due to a spherical shell of radius R for $r > R$?

- A) kQ/r
- B) kQ/r^2
- C) kQ^2/r
- D) kQ/R
- E) kQ^2/R

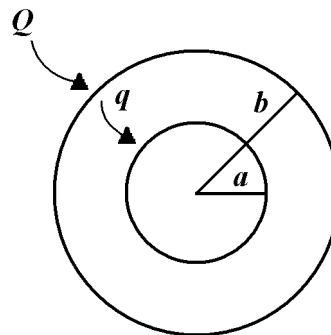
2. What is the potential due to a spherical shell of radius R for $r < R$?

- A) kQ/r
- B) kQ/r^2
- C) kQ^2/r
- D) kQ/R
- E) kQ^2/R

3. What is the ratio of potential due to a spherical shell of radius R and a solid conducting sphere of radius R , for $r < R$?

- A) 1:1
- B) 1:2
- C) 2:1
- D) -1:1
- E) -1:2

4.



The figure above shows two concentric, conducting, thin spherical shells of radii a and b , and charges q and Q . What is the work required to bring a test charge of q_0 from the outer shell to the inner shell?

- A) $kQq(a-b)$
- B) $kQq(b-a)$
- C) $kQq(1/a-1/b)$
- D) $kQq/(b-a)^2$
- E) $kQq/(b-a)$

5. What is the electric potential of a very long conducting cylinder of radius R and a uniform linear charge density λ a distance r away from the center of the cylinder?

- A) $k\lambda\ln(R/r)$
- B) $2k\lambda\ln(R/r)$
- C) $4k\lambda\ln(R/r)$
- D) $2k/\lambda\ln(R/r)$
- E) $k/\lambda\ln(R/r)$

6. The electric potential a distance r away from a cylinder can be calculated by dividing a charge q into

- A) the work done on the magnetic field as a charge q moves from a point on the cylinder to a point outside the cylinder.
- B) the work done on the magnetic field as a charge q moves from a point on the cylinder to a point inside the cylinder.
- C) the work done on the electric field as a charge q moves from a point on the cylinder to a point outside the cylinder.
- D) the work done on the electric field as a charge q moves from a point on the cylinder to a point inside the cylinder.
- E) the force on a charge q as it moves from a point on the cylinder to a point inside the cylinder.

7. A conducting spherical shell of radius R carries a charge Q . What is the potential inside the sphere a distance r away from the center?

- A) KQ/r
- B) KQ/R
- C) KQ/r^2
- D) KQ/R^2
- E) $KQ/2R$

8. All of the following about a sphere of charge that has spherical symmetry are true **EXCEPT**

- A) The electric field and the potential outside of the distribution is the same as if all the charge was concentrated at the center of the sphere
- B) A charged metal shell produces the field of an ordinary point charge
- C) Inside a charged metal shell the electric field and the potential are equal to zero
- D) All of the charge on a solid metal sphere resides on the surface
- E) The electric field inside a solid metal sphere is zero and the potential is constant

9. All of the following are true about an infinitely long cylindrically symmetric distribution of charge **EXCEPT**

- A) The electric field is perpendicular to the axis of the cylinder
- B) For a positive charge, the electric field points away from the cylinder axis
- C) For a positive charge, the potential decreases as the distance to the cylinder axis increases
- D) The potential difference between two points outside the distribution is the derivative of the electric field
- E) For a negative charge, the electric field points towards the cylinder axis

10. What is the potential due to a spherical shell with charge Q of radius R for $r = R$?

- A) 0
- B) kQ/R
- C) kQ^2/R
- D) $-kQ/R$
- E) $-kQ/R^2$

Base your answers to questions **11** through **13** on the information below.

A conducting cylindrical shell of inner radius a and outer radius b initially has a charge of $+Q$. A wire of the same length as the cylindrical shell with charge $-Q$ is then inserted along the axis of the cylindrical shell.

11. What is the charge on the cylindrical shell after the wire is put inside it?

- A) 0
- B) Q/a
- C) Q/b
- D) $Q/2$
- E) Q

12. What is the electric field at a distance of $r < a$?

- A) 0
- B) kQ/a^2
- C) kQ/r^2
- D) $-kQ/r^2$
- E) $-kQr/(a^2 + b^2)^{3/2}$

13. If the charge on the wire were changed to $+Q$, what is now the charge on the outer surface of the cylinder?

- A) 0
 - B) $-Q$
 - C) $-2Q$
 - D) $+Q$
 - E) $+2Q$
-

Answer Key
Voltage & Energy MC Questions [Mar 28, 2011]

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

Name _____

Class _____

Date _____

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