8. What is the strength of the electric field at the surface of the conducting sphere?

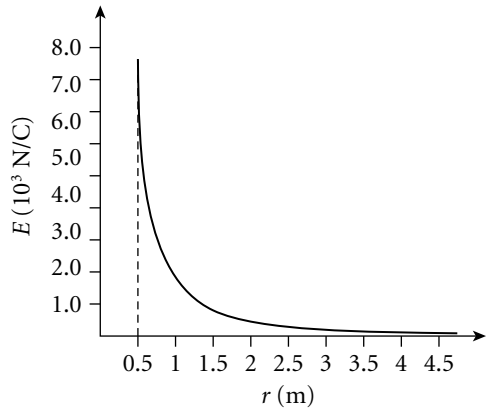
F. 0 N/C
G. 1.5×10^2 N/C
H. 2.0×10^2 N/C
J. 7.2×10^3 N/C

9. What is the strength of the electric field inside the conducting sphere?

A. 0 N/C
B. 1.5×10^2 N/C
C. 2.0×10^2 N/C
D. 7.2×10^3 N/C

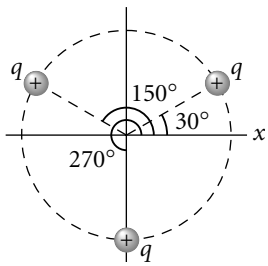
10. What is the radius of the conducting sphere?

F. 0.5 m
G. 1.0 m
H. 1.5 m
J. 2.0 m



SHORT RESPONSE

11. Three identical charges ($q = +5.0$ mC) are along a circle with a radius of 2.0 m at angles of 30°, 150°, and 270°, as shown in the figure below. What is the resultant electric field at the center?



12. If a suspended object is attracted to another object that is charged, can you conclude that the suspended object is charged? Briefly explain your answer.

13. One gram of hydrogen contains 6.02×10^{23} atoms, each with one electron and one proton. Suppose that 1.00 g of hydrogen is separated into protons and electrons, that the protons are placed at Earth's north pole, and that the electrons are placed at Earth's south pole. Assuming the radius of Earth to be 6.38×10^6 m, what is the magnitude of the resulting compressional force on Earth?

14. Air becomes a conductor when the electric field strength exceeds 3.0×10^6 N/C. Determine the maximum amount of charge that can be carried by a metal sphere 2.0 m in radius.

EXTENDED RESPONSE

Use the information below to answer questions 15–18.

A proton, which has a mass of 1.673×10^{-27} kg, accelerates from rest in a uniform electric field of 640 N/C. At some time later, its speed is 1.2×10^6 m/s.

15. What is the magnitude of the acceleration of the proton?

16. How long does it take the proton to reach this speed?

17. How far has it moved in this time interval?

18. What is its kinetic energy at the later time?

19. A student standing on a piece of insulating material places her hand on a Van de Graaff generator. She then turns on the generator. Shortly thereafter, her hairs stand on end. Explain how charge is or is not transferred in this situation, why the student is not shocked, and what causes her hairs to stand up after the generator is started.

Test TIP In problems for which resultant forces are asked, the solution can be made much easier by drawing a sketch of the situation described and seeing if a symmetrical arrangement of components, and thus a canceling of forces, exists.