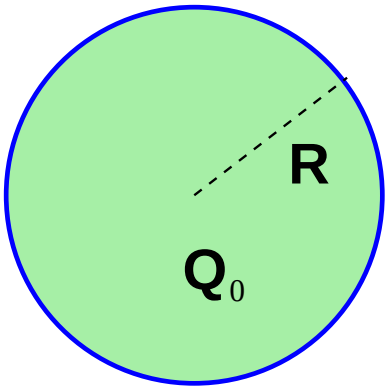
Physics 122: Practice Problem of the Day

Problem #12: Gauss' Law for a Uniform Charged Sphere

Tuesday February 10, 2009



You are given a solid sphere of insulating material of a given radius R. Inside the sphere, is a continuous uniform charge density. The total charge of the sphere is given as Q_0.

Part a) What is the charge density inside the sphere in terms of the given parameters?

Part b) Calculate the charged *enclosed* by an imaginary surface of radius r centered on the sphere. Give you answers in terms of the given parameters.

Part c) Calculate the magnitude and direction of the electric field *everywhere*.

Part d) What is the voltage $V(r)$ as a function of radial distance in terms of the given parameters? Here we define the zero-point reference for the voltage as the point corresponding to r at infinity.