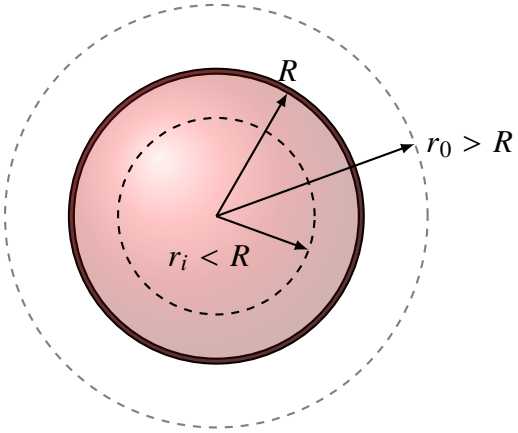
Gauss' Law In-Class Worksheet for Class 15

Uniformly-Charged Thin Shell

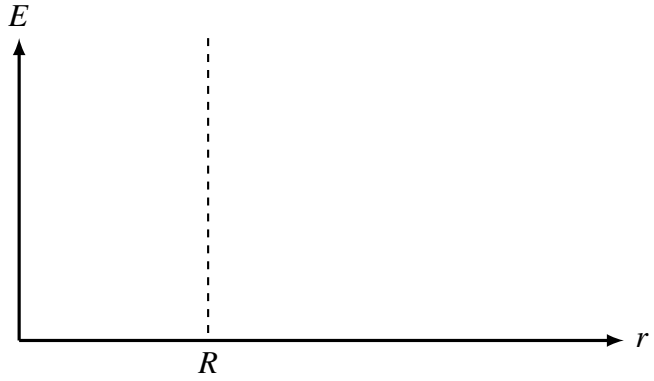


Consider a thin shell with radius R and a total charge Q uniformly distributed over its surface.

1. What is the electric field inside the sphere?
2. What is the electric field outside the sphere?

Steps:

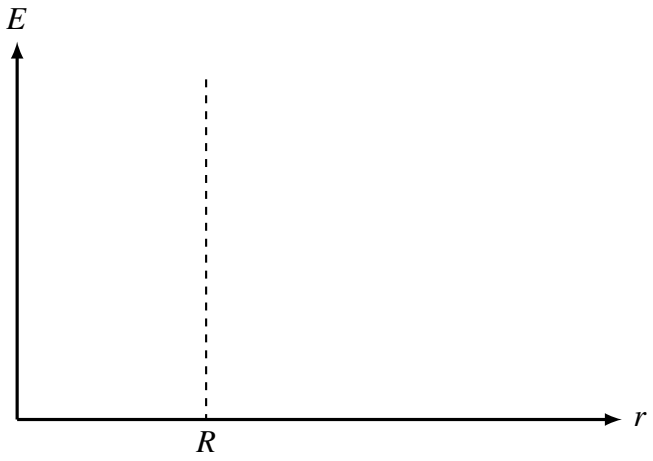
- Construct a spherical Gaussian surface with its center coinciding with the center of the shell with radii r_i (for inside the shell) and r_0 (for outside the shell)
- Find the enclosed charge
- Calculate the electric field using Gauss's law



We have seen this distribution before, for but for gravitational field inside a hollow shell. Relate the permittivity of free-space to the Coulomb's constant, then derive a Gauss' law for gravity.

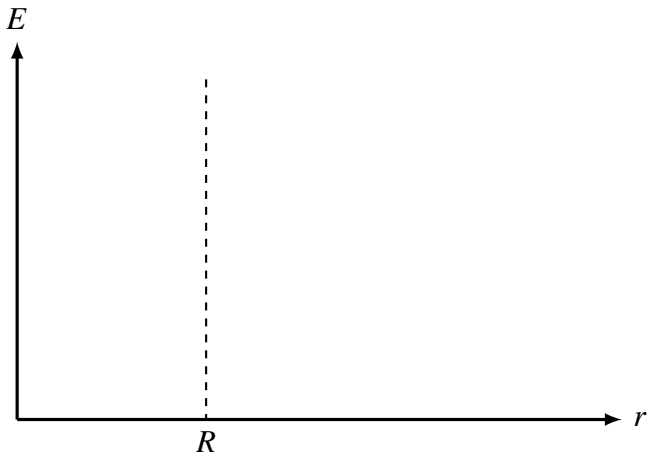
Uniformly-Charged Sphere Consider a uniformly-charged sphere with a radius R and a total charge Q.

1. What is the electric field inside the sphere?
2. What is the electric field outside the sphere?



Charged Sphere with Variable Charge Density

1. What is the electric field inside the sphere?
2. What is the electric field outside the sphere?



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1 Electric Field Inside and Second law: Equal area in equal time