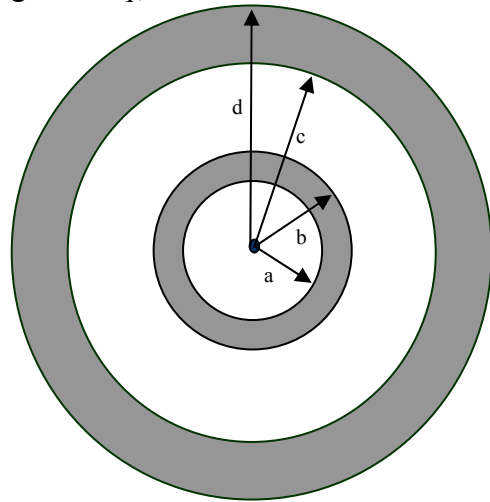


AP Physics C Review 14 Gauss's Law

1. A straight wire carrying a total charge of $+Q$, distributed uniformly throughout the entire length, L . Use Gauss's Law to find an expression for electric field created by the wire.
2. A non-conducting sphere of radius a has excess charge distributed throughout its volume so that the volume charge density ρ as a function of r (the distance from the sphere's center) is given by the equation $\rho(r) = \rho_0(r/a)^2$, where ρ_0 is a constant. Determine the electric field at points inside and outside the sphere.
3. A conducting spherical shell of inner radius a and outer radius b is inside (and concentric with) a larger conducting spherical shell of inner radius c and outer radius of d . The inner shell carries a net charge of $+2q$, and the outer shell has next charge of $+3q$.

a. Determine the electric field for

- i. $r < a$
- ii. $a < r < b$
- iii. $b < r < c$
- iv. $c < r < d$
- v. $r > d$



b. Show in the figure the charges that reside on or inside each of the two shells.

4. An infinitely long, solid insulating cylinder has radius, a , and uniform volume charge density, ρ .
 - a. Determine the magnitude of the electric field inside the cylinder, $r < a$.
 - b. Determine the magnitude of the electric field outside the cylinder, $r > a$.

