TPHYS 122 Workshop Week 3

Exercise 1

A point charge $+q = 2.0X10^{-6}C$ is placed at the center of a spherical Gaussian surface of radius $r = 0.10m$

    a What is the net electric flux through the spherical surface?

    b Does your answer change if the radius of the sphere is doubled? Why or why not?

Exercise 2

A long, uniformly charged line of charge with a linear charge density $\lambda = 1.0X10^{-6}\ C/m$ is initially located at a distace $r_1 = 0.50m$ from the wire. It is mobed radially outward to $r_2 = 1.00m$.

    a Use Gauss's Law to find the magnitude of the electric field a distance r from the wire.(find E as a function of r. $E(r)$

    b Compare the electric field strength at r_1 and r_2. Which is stronger and by what factor?

Exercise 3

A solid insulating sphere of radius $R = 0.10\,\text{m}$ has a uniform charge density $\rho = 3.0 \times 10^{-6}\,\text{C/m}^3$. Use Gauss's Law to find the electric field in different regions of space.

    a Find the electric field $E(r)$ inside the sphere, for $r < R$.

    b Find the electric field $E(r)$ outside the sphere, for $r > R$.

    c Sketch the electric field as a function of r from $r = 0$ to $r = 2R$.

Additional Resources

- Flipping Physics on youtube: `https://www.youtube.com/user/flippingphysics`