CHAPTER OVERVIEW

17: Gauss' Law

Learning Objectives

- Understand the concept of flux for a vector field.
- Understand how to calculate the flux of a vector field through an open and a closed surface.
- Understand how to apply Gauss' Law quantitatively to determine an electric field.
- Understand how to apply Gauss' Law qualitatively to discuss charges on a conductor.

In this chapter, we take a detailed look at Gauss' Law applied in the context of the electric field. We have already encountered Gauss' Law briefly in Section 9.2 when we examined the gravitational field. Since the electric force is mathematically identical to the gravitational force, we can apply the same tools, including Gauss' Law, to model the electric field as we do the gravitational field. Many of the results from this chapter are thus equally applicable to the gravitational force.

prelude

A neutral spherical conducting shell encloses a point charge, Q, located at the center of the shell. Due to separation of charge, the outer surface of the shell will acquire a net positive charge. What is the magnitude of that charge?

- less than Q.
- exactly Q.
- more than Q.