Gauss' Law Tutorial

Objective: I can apply Gauss' Law by determining how the electrical flux changes through a 3D surface based on the amount of charge contained inside the surface.

This guided worksheet is designed to help you learn about what Gauss' Law is and how to apply it. Gauss' Law is commonly used in electrostatics to help us find the electric field due to complex shapes and weird charge distributions. Today, we will restrict our study to point charges.

To do this, we need to know about flux and how it relates to charge inside an imaginary surface. Flux represents the amount of "stuff" (vector field) goes in or out of the imaginary surface.

Go to https://www.compadre.org/Physlets/electromagnetism/illustration24_1.cfm and answer the following questions:

1. Select the green surface and do not move it. What is the flux through the surface?

   none

2. Move the green surface such that it encloses the little red dot at the center of the frame. What is the flux now?

   62.8

3. Select the orange surface. What is the flux through it if there is no dot inside it? What about when the dot is inside the surface?
   0, +62.8
4. Finally, select the blue surface. The two dots represent a positive and a negative charge with equal magnitudes. What is the flux if
   a. the surface contains all the charges?
      0
   b. The surface contains one charge?
      Positive if positive charge enclosed, negative if negative enclosed
   c. The surface contains no charge?
      0
5. Formulate a conclusion: how does the flux relate to the amount of charges inside the imaginary surface?
   It is directly proportional.
6. Speculate: Given how the arrows look in the simulations, why does having no dots inside the surface mean that the flux should be 0?
   There are no sources of charge so the flux