Optional Homework!

1 Electric Field

Three charges of magnitude $-q$ are located at three corners of a rectangle whose sides are length a and $2a$. What is the electric field in the center of the rectangle?

2 Conductors

At electrostatic equilibrium, a spherical conductor of radius r creates an electric field just outside its surface of magnitude E. What is the total charge on the sphere?

3 Gauss' Law

Using an appropriate Gaussian surface, find the electric field of an infinite plane carrying a uniform surface charge density σ.

4 Electric Potential

Show the mathematical connection between the *potential energy* of a charge-field system and the *electric potential* of the field. Explain the connection in words.

5 Potential Difference

The positive terminal of a 9-V battery is connected to a large circular conducting plate of radius r. The negative terminal is connected to another identical plate. The plates are arranged parallel to each other, separated by a distance d. A charge q of mass m is released halfway between the plates. How fast is it going when it reaches the negative plate?