

Problem Set #2

Due Wednesday, January 17, 2001

All problems are from *Physics*, by Halliday, Resnick, and Krane.

Electric fields:

1. Chapter 28, Problem 31. Also, show that when $y \gg L$, your answer reduces to the electric field of a point charge.

Electric potential:

2. Chapter 30, Problem 2.
3. A sphere the size of a basketball (radius = 0.15 m) is charged to a potential of -1000 Volts.
 - (a) About how many extra electrons are on it, per cm^2 of surface?
 - (b) Sketch the electric field lines and the equipotential surfaces.
 - (c) Sketch the potential $V(r)$ as a function of r .
4. Chapter 30, Problem 20.
5. Chapter 30, Problem 32.
6. A spherical volume of radius a is filled with charge of uniform density ρ . How much work was done in assembling these charges? (Hint: calculate it by building up the sphere layer by layer.) Express the result in terms of the total charge Q in the sphere.
7. Chapter 30, Problem 51.
8. Chapter 30, Problem 58.