

Problem Set #1

Due Thursday, January 11, 2001

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

Electric charge, electric force, and electric fields:

1. Chapter 27, Problem 6.
2. Assuming there are no other charged particles in the vicinity, at what distance below a proton would the upward force on an electron (electron mass 10^{-27} gm) equal the electron's weight?
3. Chapter 27, Problem 16.
4. Chapter 27, Problem 17.
5. One model for the hydrogen atom considers the atom to be composed of a nucleus containing a single proton, about which a single electron orbits with a radius of 5.292×10^{-11} m. There are both electric and gravitational forces between the electron and proton.
 - (a) Determine the ratio of the electric force to the gravitational force.
 - (b) If you could adjust the distance between the two particles, could you find a separation at which the electric and gravitational forces are equal? Explain.
6. Chapter 28, Problem 8.