Physics Problem Set #6

Show your work if you want partial credit.
Due Thursday, Jan. 14

1. Two charged bodies exert a force of 0.48 N on each other. What will be the force if they are moved so that they are one-eighth as far apart?

2. How many electrons make up a charge of 100μC?

3. How far apart must two electrons be if the force between them is to be 2.0 x 10^{-12} N?

4. An electron is released a short distance above the surface of the Earth. A second electron directly below it exerts an electrostatic force on the first just great enough to the cancel the gravitational force of on it. How far below the first electron is the second?

5. A 2.2 x 10^{-9} C charge is on the x-axis at x = -1.5 m and a 5.4 x 10^{-9} C charge is on the x-axis at x = 2.0 m. Find the net force exerted on a 3.5 x 10^{-9} C located at the origin.

6. Balloon A and Balloon B are charged in a like manner by rubbing with animal fur. Each acquires an excess of 25 trillion electrons. If the mass of each balloon is 1 gram, then how far below Balloon B must Balloon A be held in order to levitate Balloon B?

7. Two 1.6-gram balloons are suspended from 6.7-meter long strings and hung from the ceiling. They are then rubbed ten times with animal fur to impart an identical charge Q to each balloon. The balloons repel each other and each string is observed to make an angle of 18 degrees with the vertical. Determine the electric force of repulsion and the charge on each balloon (assumed to be identical).