PHYSICS 12 **Electric Charge and Electric Force – Practice Problems**

Name:_____

Full solutions to the problems below can be submitted for additional marks. **/35**

1. What is the magnitude of the electric force of attraction between an iron nucleus ($q = +26e$) and its innermost electron if the distance between them is 1.5×10^{-12} m?

2. Two charged balls are 15.0 cm apart. They are moved, and the force on each of them is found to have been tripled. How far apart are they now?

3. Two small non-conducting spheres have a total charge of 90.0 μC. When placed 1.16 m apart, the force each exerts on the other is 12.0 N and is repulsive. What is the charge on each? What if the force were attractive?

4. Determine the quantity of charge on …

a. … a plastic tube which has been rubbed with animal fur and gained 3.8×10^{9} electrons.

b. … a vinyl balloon which has been rubbed with animal fur and gained 1.7×10^{12} electrons.

c. … an acetate strip which has been rubbed with wool and lost 7.3×10^{8} electrons.

5. Two vinyl balloons with an identical charge are given a separation distance of 52 cm. The balloons experience a repulsive force of 2.74×10^{-3} N. Determine the magnitude of charge on each one of the balloons.

6. Two different objects are given charges of +3.27 μC and -4.91 μC. What separation distance will cause the force of attraction between the two objects to be 0.358 N?

7. An electron has a mass of 9.11×10^{-31} kg. In the Bohr model of the hydrogen atom, the electron was viewed as orbiting the lone proton of the nucleus; the centripetal force requirement was met by the electrical attraction between the oppositely charged proton and electron. The radius of orbit was 5.29×10^{-11} m. Use circular motion and electrostatic principles to determine the speed at which the electron moves as it orbits the proton.