

PHYS-2201 Electricity and Magnetism

Assignment 1

Due: Tuesday, Sept. 22, 2015, by 3pm (at dropbox outside 3L24)

- (5 points) The form of Coulomb's law is very similar to that from Newton's law of universal gravitation. What are the differences between these two laws? Compare also gravitational mass and electric charge.
- (5 points) A nucleon (proton or neutron) weighs about 1.67×10^{-27} kg. Two protons in a helium nucleus are, at times, separated by 10^{-13} cm. Find the ratio of the gravitational force to the electrical force between the protons, and calculate the electrical force in Newtons.
- (5 points) What is the magnitude of the force between an iron nucleus $q = +26e$ and its innermost electron, if the distance between them is 1.5×10^{-12} m?
- (5 points) Three positive charges of $+8.0 \mu\text{C}$ are located at the corners of an equilateral triangle of side length 12.0 cm. Calculate the magnitude and direction of the net force on each charge.
- (5 points) Two small spheres, each of mass 2.5 g are suspended by massless strings 10.0 cm in length as shown in FIG. 1. A uniform electric field is applied in the x-direction. The spheres have charges equal to -7.0×10^{-7} C and $+7.0 \times 10^{-7}$ C. Determine the electric field that enables the spheres to be in equilibrium at an angle $\theta = 7.0^\circ$.

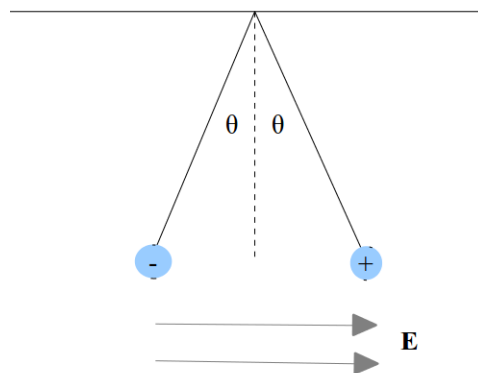


Figure 1: Problem 5.