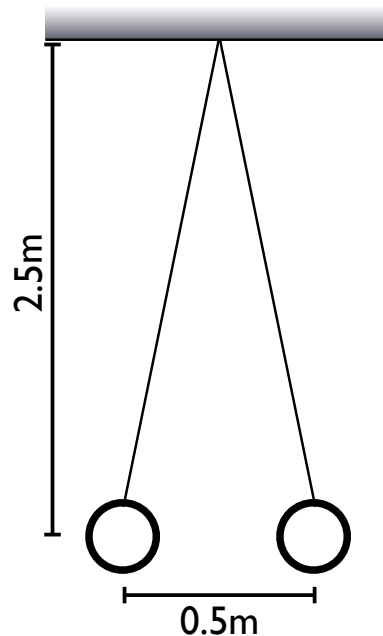


Problem Set 2: Electric forces and fields

Instructions:

1. Answer all questions below. Show your work for full credit.
2. All problems are due Wednesday 11 July 2012 by the end of the lab period.
3. You may collaborate, but everyone must turn in their own work.

1. Two volley balls, mass 0.3 kg, tethered by nylon strings and charged with an electrostatic generator, hang as shown below. What is the charge on each in coulombs, assuming the charges are equal?



2. On the unrealistic assumption that there are no other charged particles in the vicinity, at what distance below a proton would the upward force on an electron equal the electron's weight?
3. (a) How much negative charge and how much positive charge are there on the electrons and the protons in a cup of water (0.25 kg)? Note Avogadro's number is $N_A = 6.022 \times 10^{23}$, and each oxygen atom has 8 electrons. (b) What is the magnitude of the attractive force exerted by the electrons in a cup of water on the protons in a second cup of water at a distance of 10 m?

4. Two charges, $-2.5\ \mu\text{C}$ and $6.0\ \mu\text{C}$, are separated by 1 m as shown below. Determine all points (other than those an infinite distance away) at which the net electric field is zero.

