

Interactive Problem Set 2, SP212 Spring 2013

Topic: Chapter 21 Continuing with Coulomb's Law

IPS 2.1 (in-class) Consider the following the scenario: I charge up two identical balloons by rubbing them against my hair. The balloons are tied on opposite ends of a long light string. I hold the string at the midpoint and let the balloons hang down. The balloons are seen to repel one another.

What would you need to measure to ultimately be able to estimate the approximate charge on each balloon? (We'll assume each balloon carries the same charge.)

We'll carry out the needed measurements. Rough measurements are fine, we just want to get a realistic feel for the order of magnitude of the charge. Carry out a calculation of the approximate charge on each balloon. I suggest you work out a general solution and then plug in your numbers at the end.

IPS 2.2 (in-class) Convert the charge you calculated for each balloon to a number of electrons. Can you tell if the charge on the balloon is positive or negative?

IPS 2.3 (homework) Google "triboelectric series" and locate hair and rubber in the series. So is the charge on the balloon positive or negative? Is the hair donating electrons to the balloon or is the balloon donating electrons to the hair?

IPS 2.4 (homework) Three particles each carrying the same charge q are fixed on the three corners of an equilateral triangle of side length a . What is the net force on one of the these charges due to its interaction with the other two? Evaluate your general result for $q = +100$ nC and $a = 5$ cm.

Reading for next class: We will spend the next three IPS classes on Chapter 22 Electric Fields. Reread chapter 21 and then read chapter 22 of the WPC.