

## PHY 212: First week assignment

Reading: Study sections 16.1 through 16.8 of Reese.

In section 16.8 you will meet the "vector product". Read about this in your Physics 211 text (to make a first acquaintance, possibly). It will play a very important role later this term.

Tues, Aug 29, Stolkin auditorium, 9:30 am. Initial lecture.

Homework problems to be handed in at the beginning of the Workshop on Wed, Aug 30:

Problems 1, 7 and 13 in Chapter 16 (pages 754 and 755). Hint for prob. 13: you can find the speed of the Earth in its orbit by using the fact that it takes a year (convert to seconds) for the Earth to orbit the Sun.

Wed, Aug 30, first Workshop. You will work in groups on:

(I) Deriving Kepler's third law relating the period,  $T$  and radius,  $r$  of any planet circling the sun:  $r^3 = \text{constant} \times T^2$ . First make a picture showing the gravity force,  $GMm/r^2$  acting on a planet of mass,  $m$  and radius,  $r$  in a circular orbit of the sun (which has mass,  $M$ ). Next, equate this force to the mass of the planet times its inward acceleration when it is moving in a circular orbit with constant speed,  $v$ . Finally, relate  $v$  to the period of the planet's orbit (ie, the time it takes to go once around the sun) and do some algebra.

This problem is interesting because it summarizes the main results of Physics 211. Secondly it is very analogous to the problem of the Hydrogen atom- the computation of the orbit of the light electron about the heavy proton. In this case the force law has the same structure but it is due to electricity instead of gravity!

(II) Question 1 of Reese (page 711)

(III) Problem 5 (page 754)

(IV) Problem 8 (page 754)

Thurs, Aug 31. Second Lecture.

Homework Problems to be handed in at the beginning of the Workshop on Fri, Sept 1: Problems 17, 22 and 23 of Chapter 16 (pages 755-757).

Fri, Sept 1. In this Workshop you will be entertained by consideration of (I) Question 13 (page 751), (II) Problem 24 (page 757), (III) Problem 25, (IV) problem 30.