PH201 Reading Week 6

Chapter 6: Circular Motion, Orbits and Gravity

Now that we have laid a solid base of concepts around Newton's Laws and kinematics it is time to see what insights we might gain by applying these ideas to the setting of circular motion At the end of chapter 3 we have looked for a bit at uniform circular motion. Now we will dig few steps deeper into this particular motion. Circular motion is important because conceptually it allows to study all kinds of curved motion every curve is somehow a line of small pieces of circles with different radii. Isn't it fun how physicists think? And circular motion offers some interesting opportunities to explore conceptual challenges.

Student Learning Objectives

In covering the material of this chapter, students will learn to

- Extend their understanding of the kinematics of circular motion beyond the basics presented in Chapter 3.
- Apply Newton's laws in the context of circular motion, and solve a range of problems.
- Understand the circular orbits of satellites and planets as another case of circular motion.
- Develop an understanding of the long-range force of gravity.

Some questions that successful students can answer after reading the text

What is uniform circular motion (and by extension non-uniform circular motion)?

Why must there be some acceleration associated with this motion just from a conceptual point of view?

In which direction does the net force point in the case of uniform circular motion?

What is the equation that decribes the net radial force?

What is the equation that decribes the acceleration of uniform circular motion?

What physical forces can result in uniform circular motion, give examples like the ones below:

Car in a roundabout:

Ball swinging on a string around your head:

What criteria should I apply when choosing coordinate axes in circular motion to minimize headaches?

What is the equation of Newton's Universal Law of gravity?

Why is W = mg not a universal law?