CHAPTER OVERVIEW

6: Applying Newton's Laws

Learning Objectives

- Understand when an object's motion can be modeled as one dimensional (linear).
- Be able to develop models for objects undergoing linear motion.
- Be able to develop models for objects undergoing circular motion.
- Be able to develop models for objects undergoing arbitrary three dimensional motion.
- Understand the forces involved in circular motion, and understand that "centripetal" and "centrifugal" forces are not really forces.

In this chapter, we take a closer look at how to use Newton's Laws to build models to describe motion. Whereas the previous chapter was focused on identifying the forces that are acting on an object, this chapter focuses on using those forces to describe the motion of the object.

Newton's Laws are meant to describe "point particles", that is, objects that can be thought of as a point and thus have no orientation. A block sliding down a hill, a person on a merry-go-round, a bird flying through the air can all be modeled as point particles, as long as we do not need to model their orientation. In all of these cases, we can model the forces on the object using a free-body diagram as the location of where the forces are applied on the object do not matter. In later chapters, we will introduce the tools required to apply Newton's Second Law to objects that can rotate, where we will see that the location of where a force is exerted matters.

prelude

If a person swings on a swing where the ropes are damaged, where are the ropes most likely to break?

A. at the bottom of the trajectory, when the speed is the greatest.
B. at the top of the trajectory, when the speed is zero.
C. at the point in the trajectory where the speed is one half of its maximal value.