MITOCW | MIT8_01F16_Intro_03_360p

This week, we will consider the special case of circular motion.

The case where we know that the motion is exactly constrained to have a circular geometry.

This will consist of two parts.

First, we will consider the kinematics of circular motion.

How do we describe the trajectory, velocity, and acceleration of a particle undergoing circular motion?

We will consider both the simple case of uniform circular motion, where the object moves with constant speed, and also nonuniform circular motion, where the object is speeding up and/or slowing down as a function of time.

We will see that a Cartesian coordinate system proves awkward for describing circular motion.

And instead, we will introduce the so-called polar coordinate system in terms of the radius vector from the origin and its position angle, which provides a much more elegant description for circular motion.

We will then examine the dynamics of circular motion using Newton's second law to understand what sorts of forces are required in order to cause circular motion in both the uniform and nonuniform cases.

This will be the first of several examples we will see in this course of constrained motion.

In this case, the constraint is that the object moves in a circular path.