

## CHAPTER OVERVIEW

### 12: Rotational Energy and Momentum

#### Learning Objectives

- Understand how to define the rotational kinetic energy of an object as well as its total kinetic energy.
- Understand how to model rolling motion, and what slipping means in the context of rolling motion.
- Understand how to define the angular momentum of an object and when it is conserved.

In this chapter, we extend our description of rotational dynamics to include the rotational equivalents of kinetic energy and momentum. We also develop the framework for describing the motion of rolling objects. We will see that many of the relations that hold for linear quantities also hold for angular quantities.

#### Prelude

How can you model the motion of a downwards going yo-yo?

- It is similar to that of an object falling with a force of drag.
- It is similar to that of an object rolling down an incline.
- It is similar to that of an object sliding down an incline.
- It is similar to that of an object rotating about a fixed axis of rotation.

[12.1: Rotational Kinetic Energy of an Object](#)

[12.2: Rolling motion](#)

[12.3: Angular Momentum](#)

[12.4: Summary](#)

[12.5: Thinking about the material](#)

[12.6: Sample problems and solutions](#)

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