

UNIT  
**2**

# Dynamics



## UNIT CONTENTS

**CHAPTER 4** Introducing Forces

**CHAPTER 5** Newton's Laws



**S**pectators are mesmerized by trapeze artists making perfectly timed releases, gliding through graceful arcs, and intersecting the paths of their partners. An error in timing and a graceful arc could become a trajectory of panic. Trapeze artists know that tiny differences in height, velocity, and timing are critical. Swinging from a trapeze, the performer forces his body from its natural straight-line path. Gliding freely through the air, he is subject only to gravity. Then, the outstretched hands of his partner make contact, and the performer is acutely aware of the forces that change his speed and direction.

In this unit, you will explore the relationship between motion and the forces that cause it, learning how to analyze forces and motion using Newton's laws of motion. You will be introduced to a concept that Newton called a "quantity of motion" and see how it helps engineers design safer vehicles.

### UNIT PROJECT PREP

Refer to the unit project in your e-book before beginning this unit. In the unit project, you will design and build a working catapult to launch small objects through the air.

- What impulse would be required to propel a half-tonne object a distance of 3 km?
- How does an explosion generate hurricane force winds?