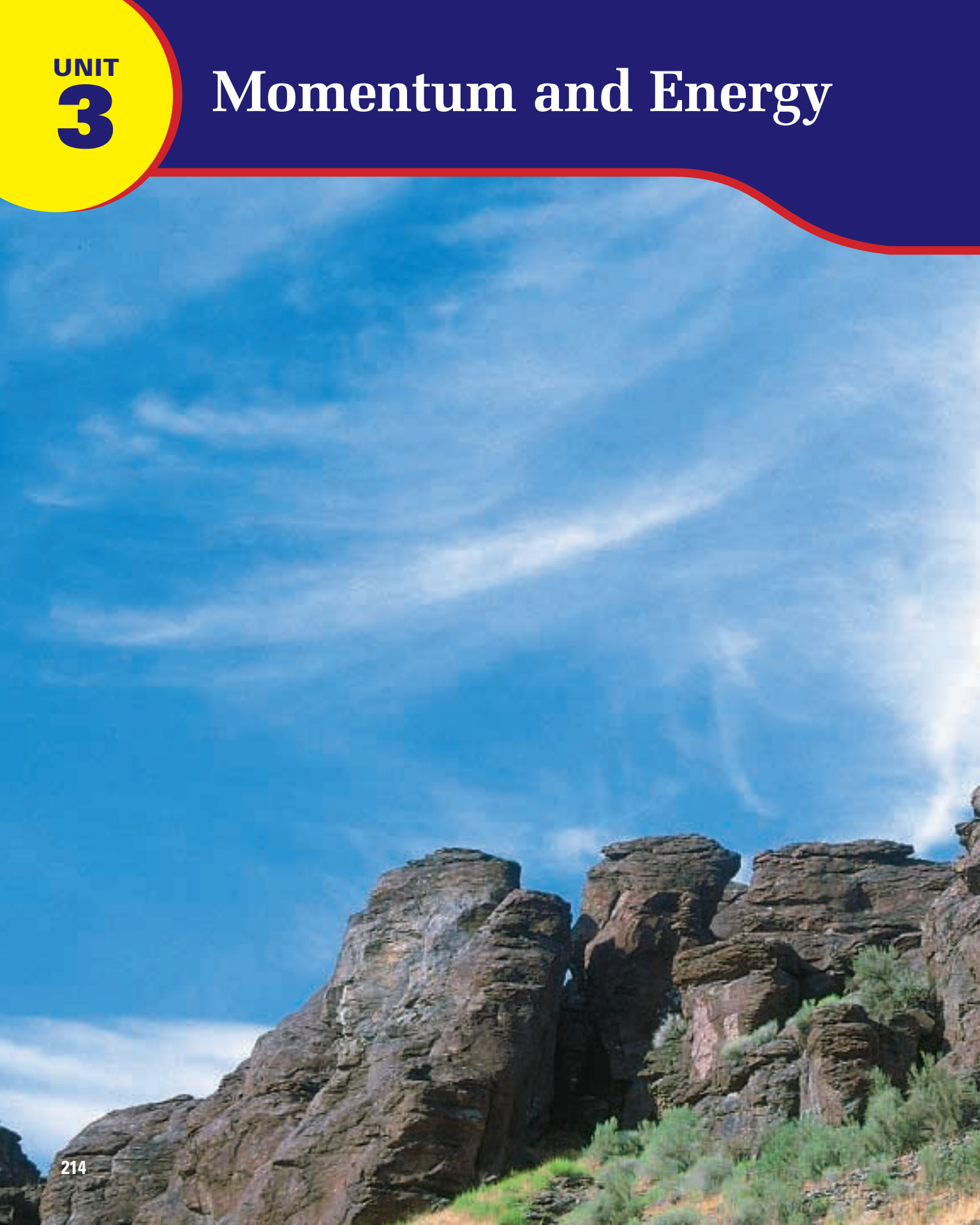
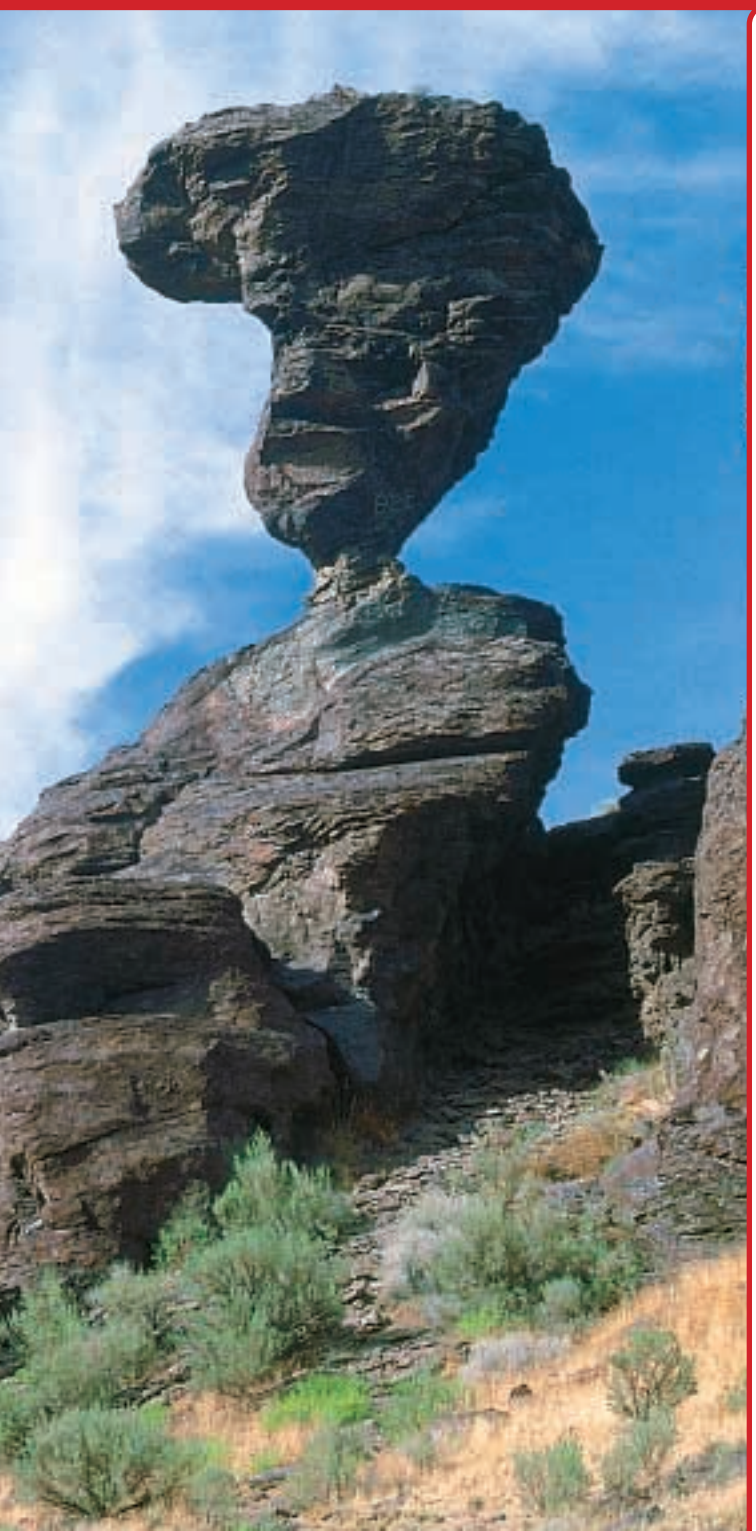
UNIT 3

Momentum and Energy



UNIT CONTENTS



When you first glanced at the photograph on the left, did you almost catch your breath? Many people do. Without conscious thought, you realized that if the pedestal supporting the rock yielded to its weight and this giant rock began to tumble, it would exert tremendous forces on everything in its path. As it continued to roll down into the valley, gaining momentum as it went, not even a freight train could stop it. You would probably be able to hear the rumble miles away. This rock has engendered similar responses from people for many centuries by standing in place and never releasing its potential energy. For how many more centuries will it stand precariously balanced?

This balanced rock stands about 15 m tall and has a mass of over 36 t, yet the base is only about 1 m by 0.5 m. In this unit, you will learn how to use data such as these to determine the amount of energy that is stored in objects like this rock. You will learn how mass and position high above the valley floor can be used to determine how fast the rock might move and how much energy it would carry if it descended down the slopes into the valley below. You will be able to predict what could happen if it were to collide with a smaller boulder in its path. You will apply this knowledge to a wide variety of situations and conditions. In the process of learning about energy transformations, you will examine two of the most fundamental laws of nature — the law of conservation of energy and the law of conservation of momentum.

UNIT INVESTIGATION PREP

At the end of this unit, you will have a chance to analyze a sport or sports equipment. Refer to your e-book to learn about questions to consider as you read this chapter, such as:

- How do skateboarders "jump" their boards?
- What energy transformations are designed into hockey helmets for player protection?