

UNIT 3: BREEZY BLIMPS

IN THIS UNIT, students explore force, Newton's laws, air pressure, and buoyancy by making blimps out of helium-filled balloons.*

UNIT TABLE OF CONTENTS

Sky Floater challenge (pages 31–34)

- **Overview:** Students make a helium-filled Mylar® balloon hover by adding weight and making it neutrally buoyant. They move the balloon around the room without touching it by using a sheet of cardboard to make small pockets of low-pressure air into which the balloon moves.
- **Learning outcomes:** Students will be able to make a floating object neutrally buoyant and explain how a balloon moves in response to differences in air pressure. They will also use the design process to achieve neutral buoyancy and perfect a technique for moving the balloon.

Sky Glider challenge (pages 35–38)

- **Overview:** Students apply all they learned in *Sky Floater* to design and build a blimp that glides efficiently on a straight course across a room.
- **Learning outcomes:** Students will be able to explain how drag affects a blimp's flight, how its length affects its axis of rotation, and how blimps demonstrate Newton's 1st Law. They will also use the design process to design and build a neutrally buoyant blimp that has a long axis of rotation, is aerodynamic, and is able to travel in a straight path.

Blimp Jet challenge (pages 39–40)

- **Overview:** Students add a balloon-powered propulsion system to their blimps to make them fly across the room under their own power.
- **Learning outcomes:** Students will be able to explain how a blimp demonstrates Newton's 3rd Law and describe how they used the design process to get their "jet" to propel their blimps along a straight course.

Making It Real: The Breezy Blimps Unit (pages 41–42)

- **Overview:** Students present their blimps and discuss the science and engineering behind their designs. They also watch two short videos: They meet a young engineer who keeps a large blimp running smoothly, and they see how the *Design Squad* teams use the design process to redesign the blimps they made to film a rock concert from above.
- **Learning outcomes:** Students will be able to identify the science concepts exhibited in their work (e.g., force, Newton's laws, mass, buoyancy, aerodynamics, axis of rotation, friction, and air pressure), explain how the design process encourages them to think creatively to tackle a challenge, point out how they are thinking and working like engineers, and cite examples of how engineering is a profession centered on improving people's lives.

* For specific standards, see Appendix, page 48.

*Mylar® is a registered trademark of Dupont Teijin Films U.S. Limited Partnership.

PLANNING YOUR TIME

Only have one class period available? Do *Sky Floater*.

Two class periods? Do *Sky Floater* and *Making It Real*.

Three class periods? Do *Sky Floater*, *Sky Glider*, and *Making It Real*.

Four? If your students are very engaged with this unit and are able to work with patience and precision, include *Blimp Jet*.

"As a teacher for 31 years, the only thing that really excited middle school students is hands-on activities."

Bill D.
Fairgrounds Middle School
Nashua, NH