

UNIT 1

THREE DS OF SPEED

DRAG • DOWNFORCE • DRAFTING

★ **NASCAR THREE DS OF SPEED LEARNING OUTCOMES** ★

LESSON 1: DRAG START YOUR ENGINES

At the end of Lesson 1, students will be able to:

1. Define the science of aerodynamics
2. Explain how drag influences moving objects
3. Identify elements of a racecar that create drag

LESSON 2: DOWNFORCE UNDER PRESSURE

At the end of Lesson 2, students will be able to:

1. Explain how air pressure influences moving objects
2. Identify how the speed of air determines the amount of pressure moving air exerts
3. Determine which combinations of air pressure create downforce and lift

LESSON 3: AIRFLOW TUNNEL TESTING

At the end of Lesson 3, students will be able to:

1. Explain how engineers study drag and downforce to improve a racecar's performance
2. Describe how a wind tunnel works

LESSON 4: DRAFTING GAME CHANGER

At the end of Lesson 4, students will be able to:

1. Define the strategy of drafting
2. Explain how aerodynamics principles help drafting cars move faster

BEFORE YOU BEGIN: Have students complete the pre-assessment.

PRE-ASSESSMENT ANSWER KEY: 1. C; 2. B; 3. A; 4. C; 5. A; 6. A; 7. A; 8. B; 9. E; 10. D

CORE CONCEPTS AND SKILLS SPOTLIGHT

NEXT GENERATION SCIENCE STANDARDS

Three Ds of Speed covers overarching concepts and skills relevant to a range of principles that can be easily applied to your state’s science and reading standards.

DISCIPLINARY CORE IDEAS: PHYSICAL SCIENCE

Matter and Its Interactions

- ▶ A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects.

Related Standard:

Develop a model to describe that matter is made of particles too small to be seen.

Motion and Stability: Forces and Interactions

- ▶ The sum of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. For any given object, a larger force causes a larger change in motion.

Related Standard:

Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.

SCIENCE AND ENGINEERING PRACTICES

Planning and Carrying Out Investigations

- ▶ Conduct an investigation and/or evaluate and/or revise the experimental design to produce data to serve as the basis for evidence that meets the goals of the investigation.

Developing and Using Models

- ▶ Develop and/or use a model to predict and/or describe phenomena.

Constructing Explanations and Designing Solutions

- ▶ Construct an explanation using models or representations.

Engaging in Argument From Evidence

- ▶ Construct, use, and/or present an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.

Obtaining, Evaluating, and Communicating Information

- ▶ Communicate scientific and/or technical information (e.g., about a proposed object, tool, process, system) in writing and/or through oral presentations.

Source: NGSS Lead States. 2013. *Next Generation Science Standards: For States, By States*. Washington, DC: The National Academies Press.

COMMON CORE READING STANDARDS

ENGLISH LANGUAGE ARTS: READING INFORMATIONAL TEXT

Key Ideas and Details

- ▶ Determine central idea of a text and draw inferences by citing textual evidence and analyses of key individuals, events, or ideas.

Craft and Structure

- ▶ Determine meaning of words, phrases, and sentences in the context of their significance to the passage.

Source: Common Core State Standards Initiative. 2017.