

Lesson Plan

Classroom 500

Book: *Building Race Cars*

Series: Engineering Challenges

Level: Navigator

Objective

To help students practice engaging in group discussions, identifying key ideas in a text, drawing conclusions based on information from a text, and applying those conclusions to a project.

Supplies

- *Building Race Cars* book
- Long board
- Table or counter
- Stopwatch

Before the Activity

Read through the *Building Race Cars* book, or assign it to students to read on their own.

Activity

After reading the *Building Race Cars* book, ask the following questions:

- What materials did the instructions in Chapter 4 use to build a race car? (Answers: toilet paper tube, drinking straws, spools.)
- Who can summarize how the car is made? (Answers will vary, but should include punching holes, inserting the straws, and attaching the spools.)

Today, students will improve this basic design by using what they learned about how engineers design better cars. Ask the following questions to review the techniques and vocabulary words from the book:

- What does *aerodynamic* mean? (Answer: the qualities of an object that affect how easily it is able to move through the air.)
- What shape was the car? (Answer: a cylinder.)
- What shape might be more aerodynamic? (Answer: a shape with a point at the front.)
- How could you create this shape? (Sample answer: attaching a cone to the front, as shown on page 29.)
- What does *chassis* mean? (Answer: the body or frame of a vehicle.)
- What other materials does page 29 suggest using for the car's body? (Answers: paper

towel tube, plastic water bottle, paper cup.)

- What challenges might these different materials present? (Sample answer: a water bottle could be harder to punch holes in.)
- What other parts of the car could you use different materials to create? (Sample answer: using bottle caps for wheels.)

Besides changing the car's basic construction, students can also add additional parts to the car. Ask the following questions:

- What is a shark fin, and where is it located? (Answer: a fin that sticks up from the engine's cover and helps move air away from the rear wing.)
- What is downforce? (Answer: a force produced by air resistance that pushes down on a vehicle.)
- What parts of a car can help create downforce? (Answer: wings or spoilers.)
- What is a spoiler, and where is it located? (Answer: a fin at the front of a stock car that helps create a vacuum, which increases downforce and helps the car stick to the track.)

After discussing these things, have students brainstorm ways to build a better car. They can change the car's shape, use different materials, or include additional features.

For homework, have the students use objects they have at home to construct a car. Give them a week to work on building their cars. Then have all the students bring their cars to class for a race.

Use the board to create a ramp running from the table or counter to the floor. Use a stopwatch to time each car. Or, run multiple cars at once to make heats. Record each car's time to see which student's design created the fastest car.

Evaluation

Could the students answer the questions? Were they able to draw conclusions based on the text? Did they create their own designs? Could their cars roll quickly down the ramp?

Standards

This lesson may be used to address the Common Core State Standards' reading informational texts standards, grade 4 (RI 4.4) and speaking and listening standards, grade 4 (SL 4.1), and the National Science Education Standards, Content Standard E, grades K–4.