



LESSON 6

FRICION AND TIRE PRESSURE

START YOUR ENGINES!

ASK: What happens when you rub your hands together quickly for 15 seconds? (Allow students time to experiment and respond.) Do you think the same might happen if you rub your finger back and forth on your forehead? (Allow time to speculate and experiment.) Why do you think this happens?

SAY: **FRICION** is the action when one surface of an object rubs against another. Scientists have known for a long time that friction always causes heat. In racing, heat affects the way a car turns and handles the curves. Today we're going to learn why this happens, why it is a concern and what **PIT CREWS—mechanics who take care of a race car for a driver**—do about it.

GO!

Give your child the "Friction and Tire Pressure" Worksheet

SAY: Look at the bold headings on this sheet. What do they say? (A: Friction and Tire Pressure, High Temp Tires and Pit Crew Pressure). As you read the first two sections, "Friction and Tire Pressure" and "High Temp Tires," you will read about the science that happens inside the **TIRE—or rubber part of a car's wheel**—as drivers complete their **LAPS (loops around the race track)**. Let's use a chart as a graphic organizer to record the connections between cause and effect.

Have your child copy the chart in their Engineer's Journal. Write the first words (shown in **bold**) on the effect side.

ASK your child to complete the "Effect" side as they read the first two sections.

CAUSE	EFFECT
Because the tires move on the track surface ...	
Because the tire heats up ...	
Because the molecules move faster and with more force ...	

ANSWERS: Because the tires move on the track surface ... **friction** is created and heats up the tire. Because the tire heats up ... **molecules** inside move faster and with more force. Because the molecules move faster and with more force ... **air pressure**—a steady force upon a surface—increases inside the tire.

OBJECTIVES

Your child will:

- Understand the relationship between friction and air pressure
- Learn academic vocabulary (friction, air pressure, molecules, nitrogen) in lesson context
- Determine cause and effect
- Read expository text closely to cite evidence that supports claims

You will need:

- Friction and Tire Pressure Worksheet
- Engineer's Journal (see Lesson 1)

NOTE: Vocabulary words and definitions for the crossword puzzle are in bold. Check for understanding of the vocabulary as you facilitate this lesson.



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SAY: *Let's learn more about molecules.* **TECH OPTION:** Use the internet to answer the questions: *What is a molecule? What is an atom? What is friction?* Allow time to explore and review definitions.

SAY: **A MOLECULE is the smallest possible amount of a certain substance that has all the properties of that substance.** For example, a molecule of water is the smallest unit that is still water. An air molecule is the smallest unit of air that is still air. Molecules are created when two or more atoms stick together. Let's use the information in this graphic to show the cause/effect relationship in a different way:



SAY: As you read the section, "Pit Crew Pressure," find evidence to determine if the following claims are true or false.

CLAIM	T OR F	EVIDENCE
Air pressure is a critical factor in racing.		
Race car tires are filled with oxygen.		

ANSWERS: Air pressure is a critical factor in racing. **TRUE.** *Affects how a tire grips curve and handles.* Race car tires are filled with oxygen. **FALSE.** *Filled with **nitrogen—a gas with no color or smell.***

EXPLAIN: In "Do the Math" 1,100 is the total number of turns in 110 laps. Have your child solve the problem. Underline the question, then circle the information needed to answer the question.

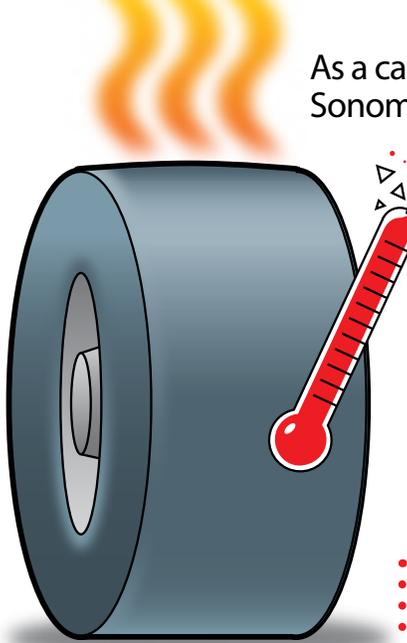
VICTORY LANE!

- 1. Critical Thinking and Talking!** Discuss the relationship between friction, molecules and air pressure. Why is this important in racing?
- 2. Imagin-eer!** In your Engineer's Journal, illustrate what happens to molecules inside a cool tire and a hot tire. Label your illustrations.
- 3. Write On!** Imagine you're a molecule of nitrogen inside a tire on race day. Write about your experience from the molecule's point of view.

STUDENT NAME: _____

SCIENCE AT SONOMA RACEWAY:

Friction and Tire Pressure

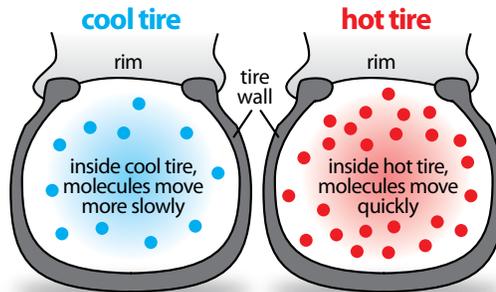


As a car races around the track at Sonoma Raceway, the **friction** of the tire as it rides over the ground heats up the tire. In fact, during a race, tires can reach temperatures of 250° to 325° Fahrenheit!



High Temp Tires

When the tires heat up, the air **molecules** inside the tire move faster and with more force. This causes the air pressure inside the tire to increase.



Sonoma Raceway Fun Facts

The **NASCAR**® configuration of the Sonoma Raceway road course is lined with 1,000 tire packs made up of 25,000 tires, 90,000 screws, 90,000 clips and 180,000 washers.



Do the Math

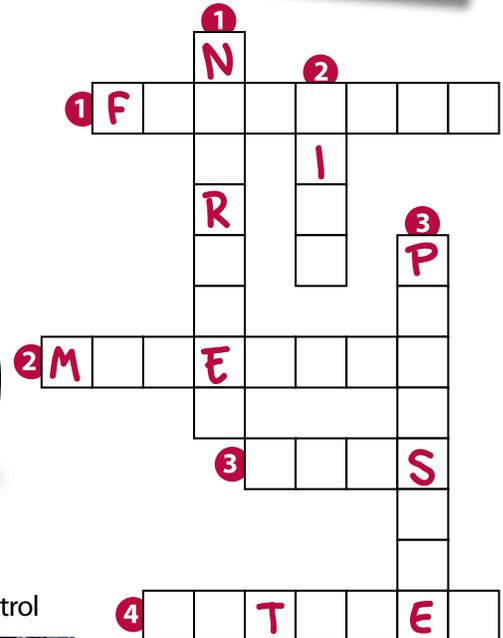
Drivers who complete the Toyota/Save Mart 350 NASCAR Cup Series race will make 1,100 turns around the road course. The race spans 110 laps. How many turns will they make each lap?

Pit Crew Pressure

Race car drivers and **pit crews** want to control how much **air pressure** is in the tire. Air pressure affects how well a car grips the curves and handles.



Race car tires are filled with **nitrogen gas** instead of air. Nitrogen is a drier gas and gives the race team more control over how fast the air pressure builds in the tires.



Across

- The action of one surface or object rubbing against another
- The smallest unit of a substance that has all of the properties of that substance
- One complete circuit, or loop, of a race track. (plural)
- The workers who take care of a race car for a driver (two words)

Down

- A gas with no color or smell that is one of the earth's elements, it replaces air in a race car tire
- The rubber part of a car's wheel
- A steady force upon a surface