

# THE SCIENCE OF SPEED

THE STUNNING SCIENCE  
ENGINEERS ARE USING  
TO MAKE RACE CARS GO

**FAST**



**DESIGN+DRIVE  
YOUR OWN  
RACE CAR!**

DETAILS ON BACK



# RACE TO THE

## Experience the speed, energy, and science in stock car racing

**IT'S RACE DAY!** The sun is beating down on the track. All at once, 40 NASCAR drivers surge forward and the track comes alive. The pack can accelerate to over 200 miles per hour and produce over 100 decibels of sound.

Air races up and over the top of each car and deflects toward the rear **spoiler**. The NASCAR race cars have been performance-built with **aerodynamics** in mind. Teams of engineers designed, built, tested, simulated, and adjusted—as many times as it took to create high-speed racing machines.

The drivers fly into a banked turn. The tilt of the track creates more **downforce**, making for good grip on the racers' tires. The pack careens around the corner, completing the turn with even more speed—their **potential (or unused) energy** at the height of the bank becomes **kinetic (or moving) energy** on the way down.

After the turn, packs of racers glide into **drafting** formation, a strategy that makes use of **fast-moving air** and pockets of **low pressure** that allow the pack to travel faster together.

NASCAR drivers remain focused throughout the entire race. One small error can result in a spin or slide. If a driver loses control, specially designed **flaps** on the roof of the car pop open, creating **drag**, slowing the racer, keeping them grounded, and bringing the car to a stop.

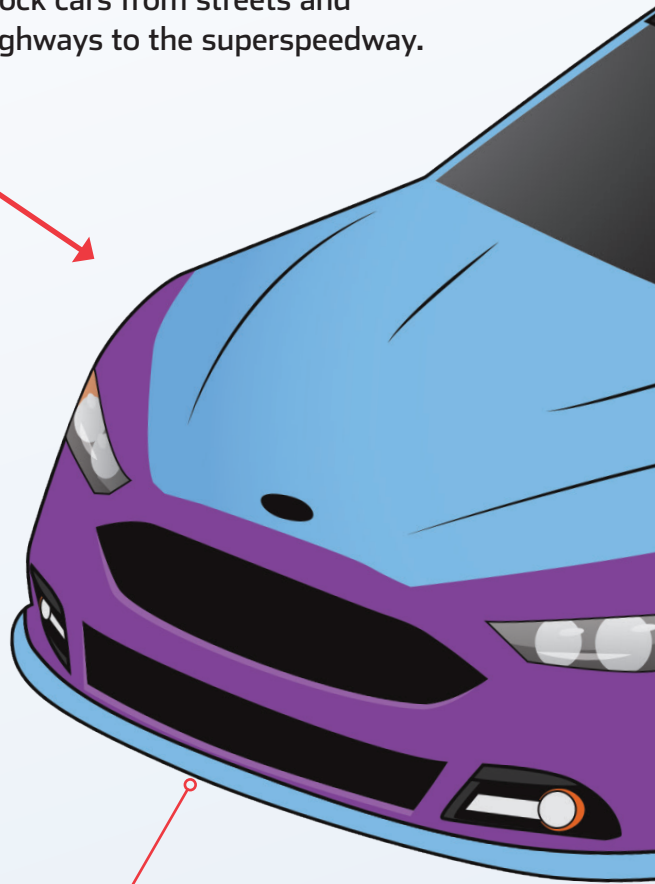
Thirty-eight laps into the race, the driver in second position is signaled by their team to pull in for a pit stop. Racers lose time when they stop, but low fuel and the wear and tear on their tires from **friction** make it a must. Working at lightning speed, the pit crew refuels, changes tires, and has the driver back in the race in as little as 13 to 15 seconds.

After hundreds of miles logged, announcers shout with excitement as a driver overtakes the others in the final lap and flies across the finish line. The crowd roars to celebrate today's race-day champion. ★

## HAVE YOU EVER RIDDEN IN A STOCK CAR?

It's likely you have! **Stock cars** are regular, factory-built cars that have been redesigned for high-speed racing. It's these extreme modifications that take stock cars from streets and highways to the superspeedway.

There's a NASCAR racetrack that is 2.5 miles long, and a 500-mile race takes 200 laps to complete.



### CLEAN CUT

Nearly grazing the ground, the **splitter** cuts a path, sending a rush of fast-moving air beneath the car to help drivers maintain speed around the track.

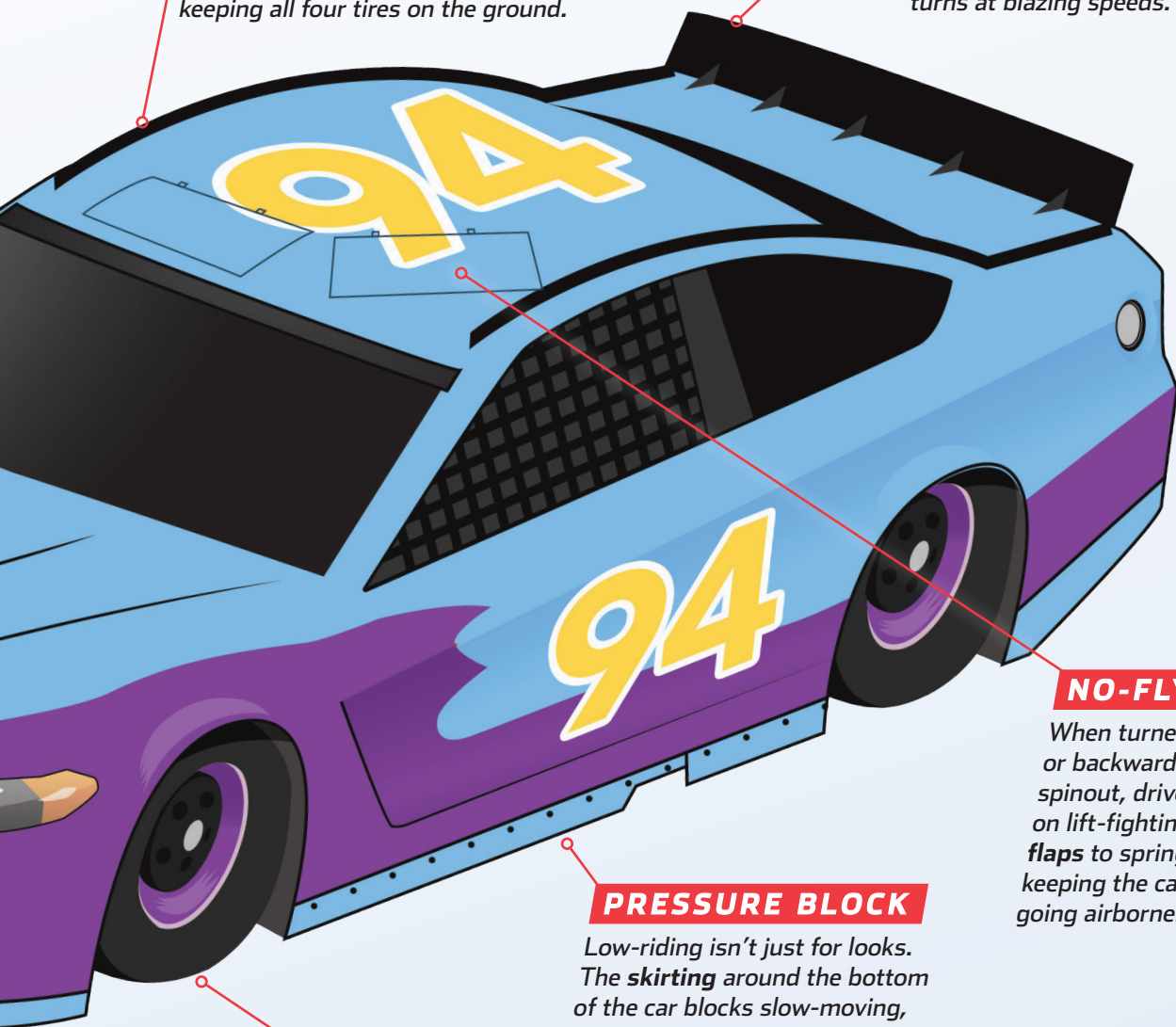
# FINISH

## STRAIGHT 'N' NARROW

In the event of a sideways slide, **roof strips** help to disrupt the airflow overhead, slowing the race car and keeping all four tires on the ground.

## ANTI-SKID

Redirecting high-pressure air and creating downforce on the back of the car, the **spoiler** increases rear-tire traction, making for controlled turns at blazing speeds.



## NO-FLY ZONE

When turned sideways or backward during a spinout, drivers count on lift-fighting **roof flaps** to spring open, keeping the car from going airborne.

## PRESSURE BLOCK

Low-riding isn't just for looks. The **skirting** around the bottom of the car blocks slow-moving, high-pressure air from getting underneath, making for good traction on the track.

## GET A GRIP

Built to withstand extreme speeds and temps, racing **tires** provide a ton of traction and are specially designed to be taken on and off in a flash.

## BEATING THE HEAT

It's about 130 degrees Fahrenheit inside a race car, and as high as 160 in the summer. Air-conditioning systems would add extra weight that would slow down cars and make them less safe. How would you keep your cool when temperatures exceed 100 degrees?





NASCAR drivers speed around the track using a combination of science, endurance, and focus to fight for a win.

## Pit Stop: Show What You Know!

**1** What is the main idea of the article?

- A. Friction and kinetic energy are the most important factors in stock car racing.
- B. There are lots of examples of aerodynamics, engineering, and energy science in stock car racing.
- C. Stock car drivers who make pit stops more frequently drive more efficiently.
- D. You can win a race even if you're behind when nearing the finish line.

**2** Use evidence from the article and your own ideas to explain the role of the following people in stock car racing:

**Engineer:**

\_\_\_\_\_

\_\_\_\_\_

**Driver:**

\_\_\_\_\_

\_\_\_\_\_

**Pit Crew:**

\_\_\_\_\_

\_\_\_\_\_

**3** Make a list of all the examples of quantitative measurement in the article and what units are used to measure them.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**4** A stock car at the top of a bank:

- A. has potential energy.
- B. should always use its roof flaps for safety.
- C. is going into the second turn.
- D. cannot be drafting.

### Design Your Own Race Car!

Want to see how it feels to be behind the wheel of your own race car? Check out the online simulation tool at [scholastic.com/nascarspeed/drive](http://scholastic.com/nascarspeed/drive).

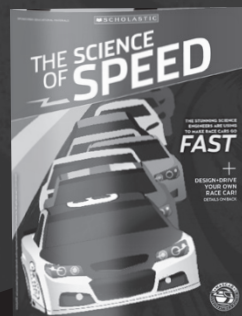


# THE SCIENCE OF SPEED

**BRING STEM  
SKILLS TO LIFE  
IN YOUR  
CLASSROOM**



- CLASS SET OF MAGAZINES →
- SEL LESSON ON MANAGING STRESS



## READY-TO-USE SCIENCE UNITS

Dig into our mix-and-match library of lessons, experiments, videos, and a digital tool.

### Unit 1: Aerodynamics

- ★ Drag
- ★ Downforce
- ★ Aero Balance
- ★ Drafting
- ★ Airflow

### Unit 2: Energy

- ★ Potential Energy
- ★ Kinetic Energy
- ★ Friction
- ★ Energy & Speed

Go to [scholastic.com/nascarspeed](http://scholastic.com/nascarspeed)



## Putting Science Into Action

**1** Hand out the *Science of Speed* magazine. Have students read it and complete questions.

**Answers:** 1. B; 2. Engineers design, build, and test race cars. Drivers race the cars. Pit crew members refuel, change tires, and make repairs; 3. Sound—decibels; speed—mph; width—millimeter; distance—laps and miles; time—seconds; 4. A.

**2** Distribute the *Talk Shop* activity sheet. Have students play the game in small groups to review their learning.

**3** Go to [scholastic.com/nascarspeed](http://scholastic.com/nascarspeed). Show the "Aerodynamics on the Racetrack" video and check out more resources, classroom experiments, videos, and even a digital simulation.

## LESSON

## Pros Under Pressure

NASCAR drivers know stress! Put your students in the driver's seat with strategies for performing under pressure.

### Objective

Students will identify stress-causing factors and strategies for reducing stress.

### Time

30 minutes

### Materials

- Drafting video at [scholastic.com/nascarspeed](http://scholastic.com/nascarspeed)
- Projector or screen
- Identify Stress-Busting Strategies activity sheet
- Markers

**1** Show students the *Drafting video*. Ask them to picture themselves in the driver's seat of a race car. What kinds of stress can they imagine feeling in each of the following scenarios: the day before the race, waiting for the race to begin, hurtling down the track at 200 miles per hour. Capture your students' input on the board.

**2** Distribute the *Identify Stress-Busting Strategies activity sheet* to your students. Have a few volunteers read aloud about the strategies that race car drivers use to combat stress.

**3** Race car drivers experience stress and so do we! What are some of the things that make your students feel pressure in their everyday lives? Create a brainstorming list on the board together as a class.

**4** Ask students to suggest ways to feel calmer or less anxious for each scenario on the board. Can they think of other activities or strategies that are good for keeping stress levels down?

**5** Ask students to consider the scenarios on the bottom of the activity sheet. Have them create a strategy they would use to combat the stress in each scenario and suggest a fun or mindful activity to keep the stress away.

**6** Have students reflect on the stress-busting ideas generated during the lesson. Instruct them to pick three go-to strategies to apply when they're feeling pressure. Have them use markers to write their list in bold letters. Encourage them to display it in an easy-to-see location, like the inside cover of their notebook or on their bedroom wall.

# Talk Shop

Team up with three or four classmates to brush up on your race car terminology. Cut out and fold each card. Place them in a box and take turns choosing a card. Set a timer at the start of play. How quickly are you and your pit crew able to guess all 12 terms?



Have your crew members guess what you are **DRAWING**.



Have your crew members guess what you are **ACTING OUT**.



Have your crew members guess what you are **EXPLAINING**.

## Aerodynamics

The study of air and the way it flows around objects.



## Drag

The force that slows an object when air pushes against it.



## Downforce

A force created by low pressure below an object and high pressure above. The opposite of lift.



## Lift

A force created by low pressure above an object and high pressure below. The opposite of downforce.



## Drafting

The practice of lining up race cars to use aerodynamics to help drivers move faster as a group.



## Friction

The resistance that one surface experiences when moving over another.



## Potential Energy

The unused energy stored in an object at rest.



## Kinetic Energy

The energy of an object in motion.



## Skirting

Edging around the bottom of the car that blocks airflow underneath it and prevents unwanted lift.



## Splitter

Strip on the car's front bumper that blocks airflow underneath it and helps to prevent lift.



## Roof Flaps

Flaps that open in emergencies to help slow sliding or spinning race cars and keep them grounded.



## Spoiler

Strip on the rear of the car that restricts airflow to provide good traction and safer speeds.





# Identify Stress-Busting Strategies

Race car drivers career around courses at speeds over 200 miles per hour in front of hundreds of thousands of roaring fans. Learn the strategies they use to handle the stress.

## Pre-Race Jitters



**JIMMIE JOHNSON**

### STRESS STRATEGY:

"I put on my helmet and enter into a calm, centered, and balanced mind-set. I have work to do, and I need to stay focused."

**TIP:** Exercise. "A workout helps me clear my head."

## Adapting to Change



**DANIEL SUAREZ**

### STRESS STRATEGY:

"I like to think of changes as a fresh start and a new challenge rather than a setback."

**TIP:** Make time for your hobbies. "I like working on cars—it's my therapy."

## Facing Failure



**JOEY LOGANO**

### STRESS STRATEGY:

"I stick to the plan we've developed as a team. If we don't win, it's just another step in our climb to victory."

**TIP:** Keep perspective. "You have to make sure you're having fun!"

Read each scenario below. Discuss with a group the fun or mindful practices you would use to help "bust" the stress!

- ★ Your team is playing in the finals tomorrow. You are so anxious that you can't sleep.
- ★ You handed in your test to your teacher. You didn't know many of the answers. You think you failed. You're scared your mom will be upset with you.
- ★ Your friends won't talk to you. You're not sure what you did wrong. You worry they don't want to be friends with you anymore.