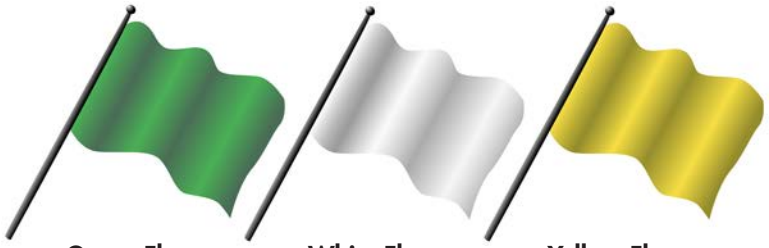
The World of NASCAR

A Reading A–Z Level W Leveled Book
Word Count: 1,214



Green Flag

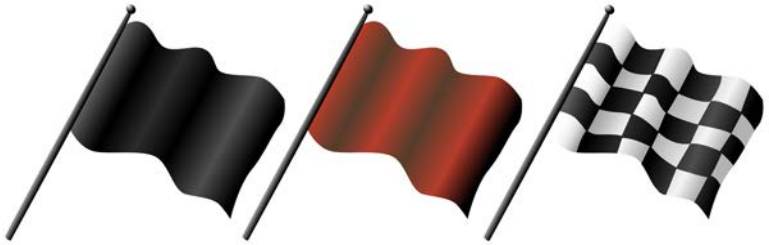
Go

White Flag

1 lap left in the race

Yellow Flag

Slow or Caution



Black Flag

Enter pits immediately

Red Flag

Stop, track unsafe

Checkered Flag

Finish, race over

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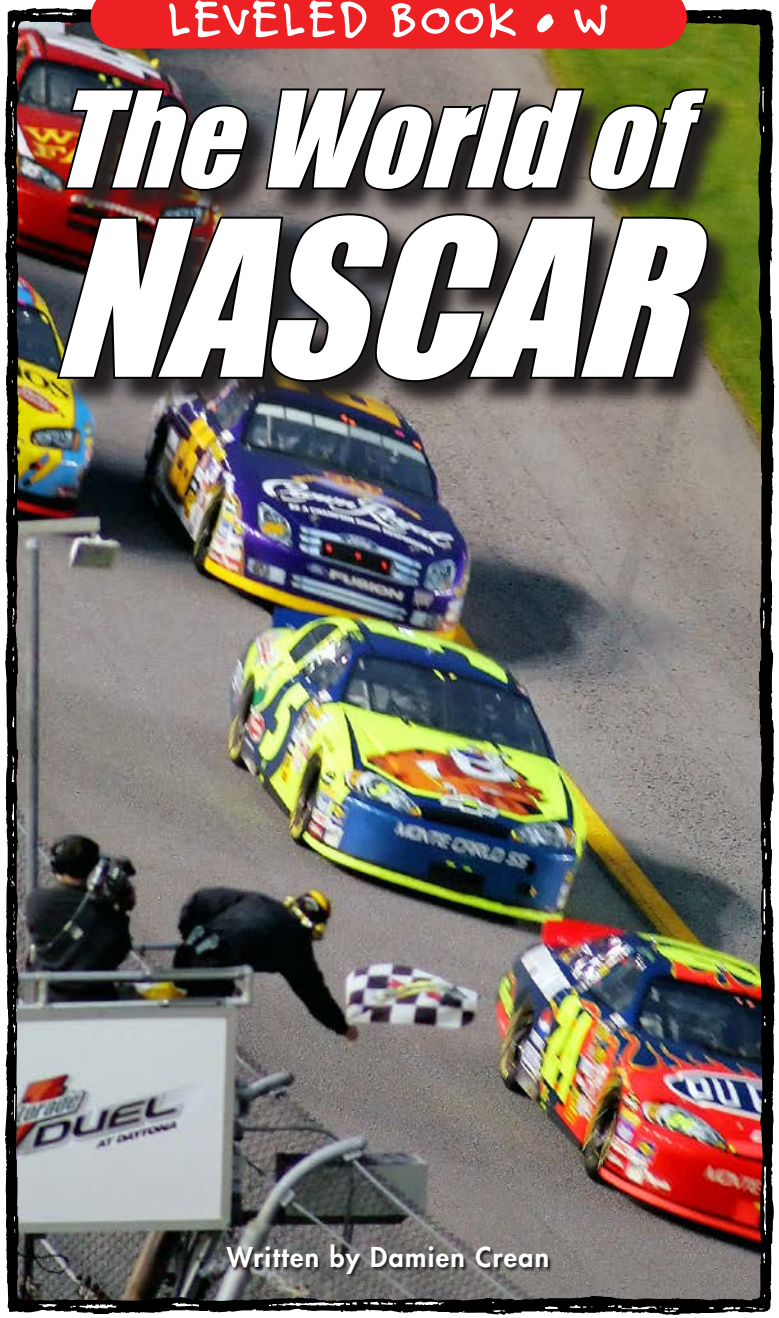

The World of NASCAR

Written by Damien Crean

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Correlation

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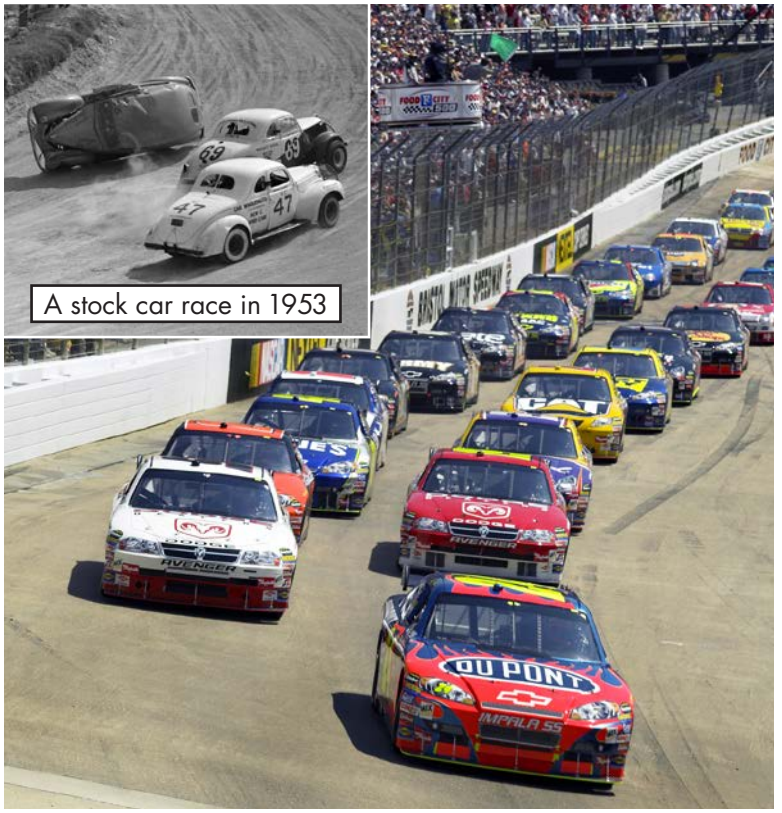


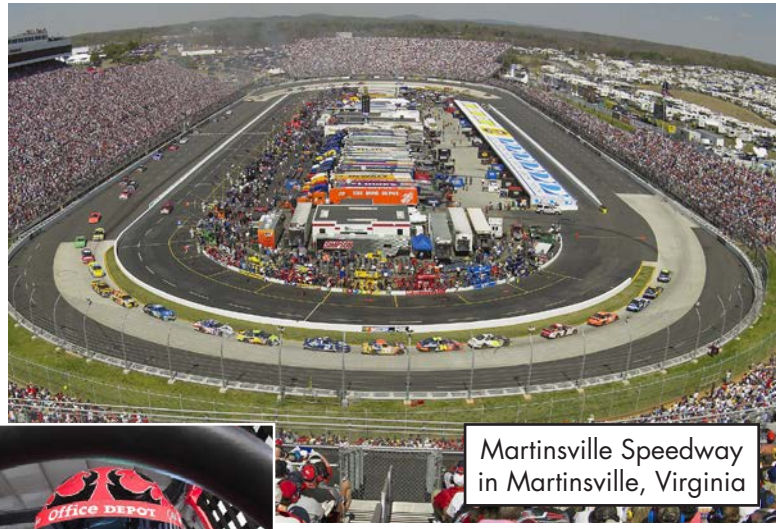
A NASCAR race at Bristol Motor Speedway

Start Your Engines

ZOOM! The cars race by at speeds of over 200 miles per hour. When racing in **NASCAR** (National Association for Stock Car Auto Racing) began in the 1940s, drivers raced regular road cars, also called **stock cars**, around dirt tracks. Since then, NASCAR racing has evolved into a major competitive event involving superior, custom-built cars.

A modern NASCAR car has four wheels, windows, an engine, and a driver's seat, but that's just about where its similarities to a normal road car end. Each **component** of a NASCAR car is engineered to enable it to travel at fast speeds, withstand the punishment of racing, and ensure the safety of the driver.

A modern NASCAR race car (above) and its interior (below)



Martinsville Speedway in Martinsville, Virginia

Gear for the drivers and cars keep races safer.

NASCAR racing events occur all around the United States. Tracks vary in shape with lengths of less than a mile to as long as three miles. A NASCAR race may cover from 250 to 600 miles. Besides moving in continual loops at speeds in excess of 200 mph, the cars race just inches from their rivals. As a result, a car's strength, durability, and speed are essential to its success.

Each part of a NASCAR car is finely tuned to make it a top-performing vehicle. A careful balance has to be made between driver safety and speed. Strength is needed for safety, and lighter materials are constantly being invented to improve the cars.

Safety First

The inside of a NASCAR car can reach temperatures of up to 150 degrees Fahrenheit (65°C). Many materials invented by NASA for space travel protect NASCAR drivers from extreme temperatures.

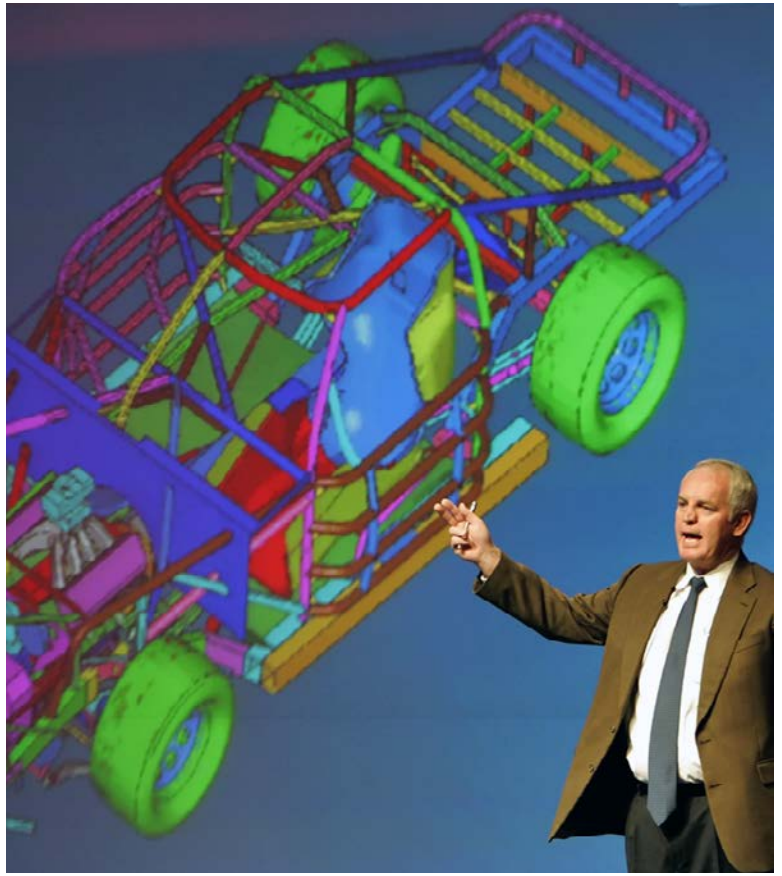
Driving suits:
contain vents that allow cool, dry air to replace hot, humid air near the driver's skin; cool temperature inside suit by 24 degrees

NASCAR helmet and the Hans device, which protects a driver's neck in a crash

Thermal-protection blankets:
protect cockpit of race car from heat created by engine, exhaust, and transmission; lower temperature in race car by 40 degrees

Kevlar and Nomex:
materials used to insulate and reflect heat; made into fireproof clothing (including gloves, socks, and underwear)

Source: *www.NASA.gov*



Gary Nelson, NASCAR Vice President of Research and Development, addresses the media in 2006.

Parts Leading to Victory Lane

Each year, NASCAR racing teams and car manufacturers introduce techniques to push performance boundaries. Race teams invest millions of dollars in wind tunnel testing, engine design, and car development to find the small advantages that can lead to the championship.

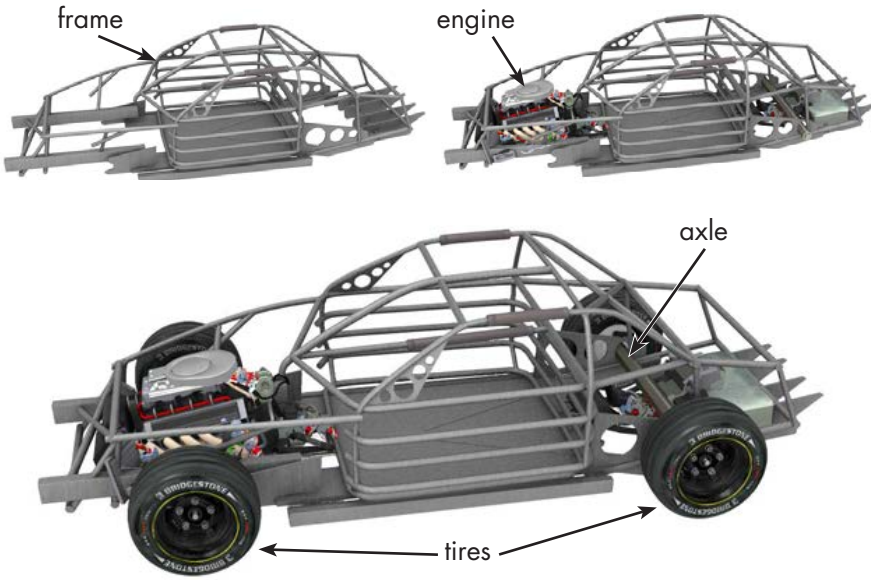
Did you know that each NASCAR team builds a fresh car for each race? This process can take weeks. First, the frame, engine, and body are completed. Then, the team installs the electronics, steering, and the driver's seat—and the car is almost ready. The team then tests the car, dismantles and checks it, and rebuilds it in time for the day of the race.

A crew works on their driver's car in the garage at Daytona International Speedway.

Designed and built by teams of highly skilled engineers and mechanics, a NASCAR car is made up of four major components: the frame, the engine, the body, and the tires.

The frame, also called the **chassis** (CHAH-see), has two main functions: to protect the driver and to form the main structure of the car. The roll cage, made from thick, rolled steel tubing, is the part of the frame that protects the driver.

The rest of the frame is made using thin, rolled steel tubing so that it crumples during a crash or on impact with a wall. Its purpose is to hold together the engine, body, and wheel **axle**, which are all attached to it.



NASCAR driver Kevin Harvick takes the inside lane at the Talladega Superspeedway in Talladega, Alabama.

Two fabricators put together the body of a NASCAR car by welding thin, rolled pieces of sheet metal. The body shape is primed, or prepared for painting, and then the car is sanded down and given the colors of its **sponsor**. It is also covered with the sponsor **logo**, the car number, the team name, and several advertiser decals.

Pulling Ahead of the Pack

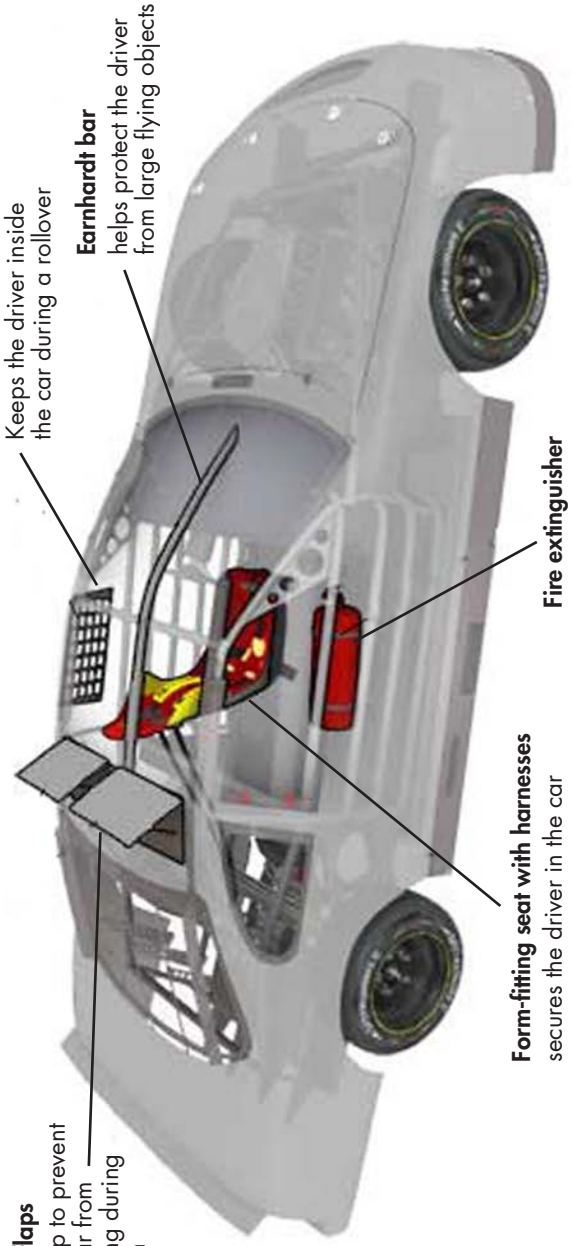
Designers give NASCAR cars a shape that resembles regular road cars. These cars are also designed to suit different track conditions, car speeds, and changing **aerodynamics**, or how air flows around the car. The shape also fits within strict regulations from NASCAR, which gives each design team a template, or model, to make sure they stay within rules for height, width, shape, and aerodynamics.

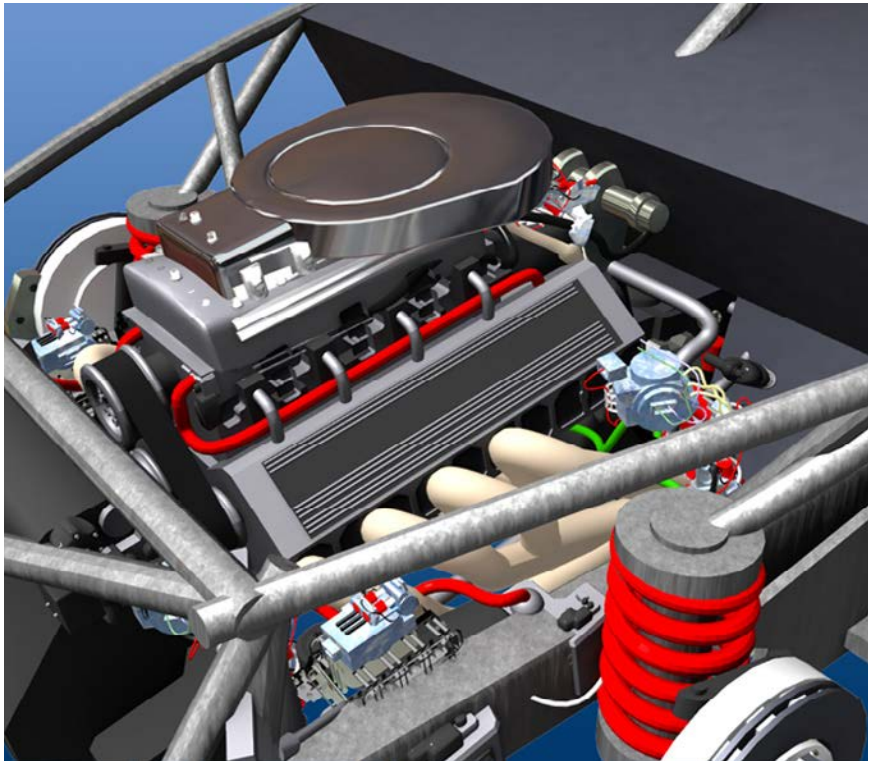
The 2006 Dodge Charger production car

The Dodge Charger, redesigned for NASCAR racing

Aerodynamics is an important consideration in NASCAR racing. Aerodynamics is the way air flows around a car and increases or decreases **downforce**, or the energy that pushes the car onto the track. When downforce is increased, a car has more grip, which helps it maneuver around corners, but it also has more **drag**, which robs the car of speed.

NASCAR determines the amount of downforce a car must have based on the type of track or race series. NASCAR has these regulations in car performance to ensure that the racing is exciting for the fans, safe for the drivers, and competitive for the racing teams.





The typical look of a NASCAR engine as it sits in a car's chassis

Under the Hood

A NASCAR engine is extremely powerful—it is a V8 engine (an engine with 8 **cylinders** in a "V" shape) that measures 5.87 liters (358 cubic inches) in size. It can produce up to 800 brake horsepower (**bhp**). By comparison, the average road car produces 150 bhp. The NASCAR engine sits under a hood in the front of the car, as in most road cars, in keeping with the stock car theme of the NASCAR car.

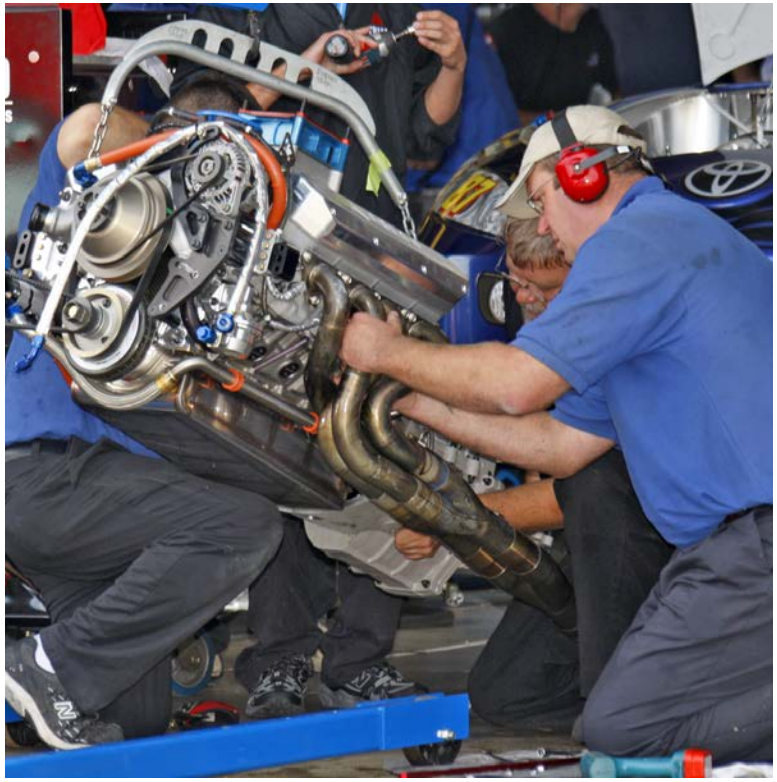
Besides regulating car body designs, NASCAR also regulates engine performance. For some races, restrictor plates are placed in the engine to reduce the amount of horsepower the engine can produce. **Turbo** and **fuel injection** systems are not allowed in NASCAR.

NASCAR official George Metrick examines a restrictor plate during a pre-race inspection at Talladega Superspeedway, where the plates are required by NASCAR.

A modern NASCAR engine

At the core of a NASCAR engine is a cast-iron block, not unlike those of engines that have been used for decades. Technology and modifications, however, have dramatically improved the performance of the modern NASCAR engine.

The NASCAR engine is highly tested and finely tuned. It is able to operate at 200 mph for more than three hours. The engine has to keep maximum output and run efficiently and reliably. Many new and radical elements are used in these engines, and these developments may be included in road cars within a few short years.



Mechanics replace a NASCAR engine.

Burning Rubber, Literally

NASCAR tires are made of several layers of rubber, fabric, and steel belts to increase strength. The tires are engineered to tolerate extreme speeds and temperatures. They have to be incredibly strong to prevent the risk of a tire blowout.

NASCAR tires are unlike road car tires in that they are not filled with air. Instead, they are filled with **nitrogen** because air expands under extreme temperatures, which changes the air pressure and makes tires unstable. Nitrogen is able to better withstand the extreme conditions of a NASCAR race and maintain tire pressure and performance.

A newly mounted NASCAR tire at California Speedway

A shredded NASCAR tire at Daytona International Speedway

A wheel-mounted race tire

A cutaway view of the race tire showing its interior

NASCAR tires are made to stick to the track, enabling the car to corner at very high speeds. The combination of track shape, downforce, and sheer speed places a NASCAR tire under extreme stress in a race. Each tire only lasts for about 150 miles. Since speed is essential in NASCAR racing, all four tires need to be replaced while a car is in a pit stop. This can be done in less than 15 seconds.

NASCAR driver Jeff Gordon during a pit stop at Talladega Superspeedway

The checkered flag signals that a winner has crossed the finish line.

Checkered Flag

Car designers are constantly looking for ways to alter a car's aerodynamics to help with its cornering or to increase its speed.

Today, NASCAR cars move at incredible speeds on an asphalt track, but cars in the future of NASCAR may actually hover above the track. One thing is certain, we will always be fascinated with speed and the vehicles that can get somewhere the fastest.

Glossary

aerodynamics *(n.)* the study of how air moves around the shape of an object (p. 13)

axle *(n.)* a steel bar between the left and right wheels (p. 10)

bhp *(n.)* stands for brake horsepower; measures the full power the engine has for high performance (p. 16)

chassis *(n.)* the car frame that holds the car together and protects the driver (p. 10)

component *(n.)* a part that combines and works together with other parts (p. 5)

cylinders *(n.)* the tubes in the engine where fuel is compressed and ignited (p. 16)

downforce *(n.)* the force of air that pushes a car down and helps keep it on the track (p. 14)

drag *(n.)* the force of air that holds a car back as it travels (p. 14)

fuel injection *(n.)* a system that delivers fuel more directly to the cylinders (p. 17)

logo *(n.)* a small design that represents a company and/or a product (p. 12)

NASCAR *(n.)* National Association for Stock Car Auto Racing; a racing organization and the events it organizes (p. 4)

nitrogen *(n.)* a gas that makes up 78 percent of Earth's atmosphere (p. 20)

sponsor *(n.)* a company that contributes money to the racing team for advertising space on stock cars (p. 12)

stock cars *(n.)* regular cars such as those used on city streets (p. 4)

turbo *(n.)* an enclosed turbine, or fan, that increases engine horsepower (p. 17)

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