

10 Seconds Flat: Make the Call



Grade Level: High School

At the Track

Pre-Race Preparation

Crew chiefs will review previous data and performance information before each race. One source of information for a new crew chief will either be data from other crew chiefs or NASCAR Analysis. The data season analysis for the Las Vegas spring race from the 2019 season and 2020 season (download PDF) provide critical information.

Looking at the two sets of data, analyze the following information:

- What are the top finishers (top 10) between the two races?
- What was the average speed? What were the speed trends for the top drivers?
- What are trends for number of green flag laps (no laps under a caution or slower speed)?
- Between the two years, who led laps constantly?
- Who led the most miles?
- What is the average speed in each segment for 2019 versus 2020?
- If you are the crew chief of a Ford, who are your competitors? See <https://www.nascar.com/racing-teams>
- What information do you learn about your competitors from the same manufactures?
- Based on the data from the two races, what is your prediction for the fall 2020 race? Who is going to be within the top 10?

In the Garage

Resources and parts need to be prepared before the hauler leaves for the track. Team members must think about the number of springs, shocks and even lug nuts they'll need based on what can happen at the track. Space and money are limited.

Let's start thinking of the cost for a race week.





Tires and Lug Nuts

Pit crew team members must 'glue' the lugs nuts onto each of the tires before the race. Each tire has 5 lug nuts. Your team can purchase up to 6 sets of tires.

Each tire cost \$500 a piece. What is your investment in tires for the weekend? You can have an additional three sets of tires for both practice sessions and qualifying.

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Tire wear is a concern for the Las Vegas track. The race is 250 laps, and after 20 laps, the tires start to lose their grip. You can push to 45 laps if you have clean air or no cautions. Calculate at what intervals will you change the tires (after how many laps) given how many sets of tires you have. What other strategy for tires can you use? Using old tires from practice or qualifying, how far can you extend your tire changes?



Lug nuts are purchased in cases, and one case of 1,000 lug nuts costs \$350. What is the cost per unit for a lug nut?

How many lugs nuts will be used for this race weekend?

Part of NASCAR's role is to monitor or identify opportunities to control cost for teams. They changed the rule that you can no longer use your own pit lug wrench; you must borrow the pneumatic wrench from NASCAR. The wrench is \$1,500 for practice, \$1,500 for qualifying and \$2,500 for race day.

What is your investment?





Fuel

Fuel is supplied from a single source, and you need to receive fuel from Sunoco on-site. Each car has two cans of fuel that are refilled after pitting. Each can holds 22 pounds of fuel and weighs 94 lbs. You are charged \$6.25 per pound of fuel. During each pit stop, you add 1 ½ cans of fuel. The fuel window should be every 50 to 65 laps. The entire race is 375 laps.

How many times will you need to stop?

How much gas will you use over the course of the race?

What are your anticipated fuel costs?

Inspection

All cars must pass inspection before race day. NASCAR has specific guidelines and regulations for how the cars can be built, what the tolerance for variances are, what the car can weigh and even the shape of the car. Let's look at one of the components: weight.

NASCAR rules state the total weight of the car and driver's weight can only be within the following range.



Total: 3,400 to 3,525 lbs

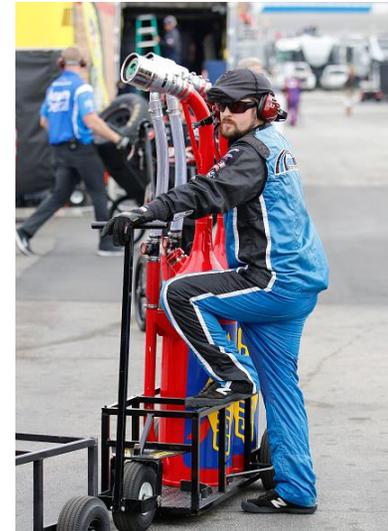
Car weight: 3,425 lbs

Driver weight: 145 lbs

Will your car pass the weight station?

Another team's driver weighs 170 lbs. Will their car pass inspection?

What do you do as the crew chief? Where do you make up the failure from?





Practice

Teams practice to see how their car is handling, not to mention the driver gets a chance to understand the conditions on the track.

A race car makes a lap around the track based on the how long the track is and how the car is performing.

At Phoenix, Austin Dillon makes 10 practice laps. What is his average time?

Laps	Times (seconds)
Lap 1	:38
Lap 2	:36
Lap 3	:34
Lap 4	:37
Lap 5	:38
Lap 6	:38
Lap 7	:30
Lap 8	:32
Lap 9	:33
Lap 10	:36
Average	





Race Day



Races can be won or lost in the pits. Pit crew members must be spot on each and every time a driver comes in. Seconds lost on changing tires or adding fuel take positions away on the track.

Run this scenario. It takes one tire changer 2.5 to 3 seconds to take off an old tire and replace it with a new tire. During the race, your driver comes into the pit six times for tires. How much time over the course of the whole race will be taken up by changing tires?

During your pit road stops, it takes 14 seconds to complete the stop. On average, a normal pit stop should take 11 to 12 seconds. You lost 2 seconds on that pit stop.

Generally, for every second you can lose 3 to 5 positions on the track. Your driver was in 10th position. When they exit the pit, what position are they now in?

