Formula 1

What is Formula 1 ?

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Highest class of single seater auto racing

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Highest class of single seater auto racing
Way better than IndyCar/NASCAR*

* Personal opinion. Might not align with your views. Let’s not go to war over this. #peace #nonviolence

Totally crap history overview.

History

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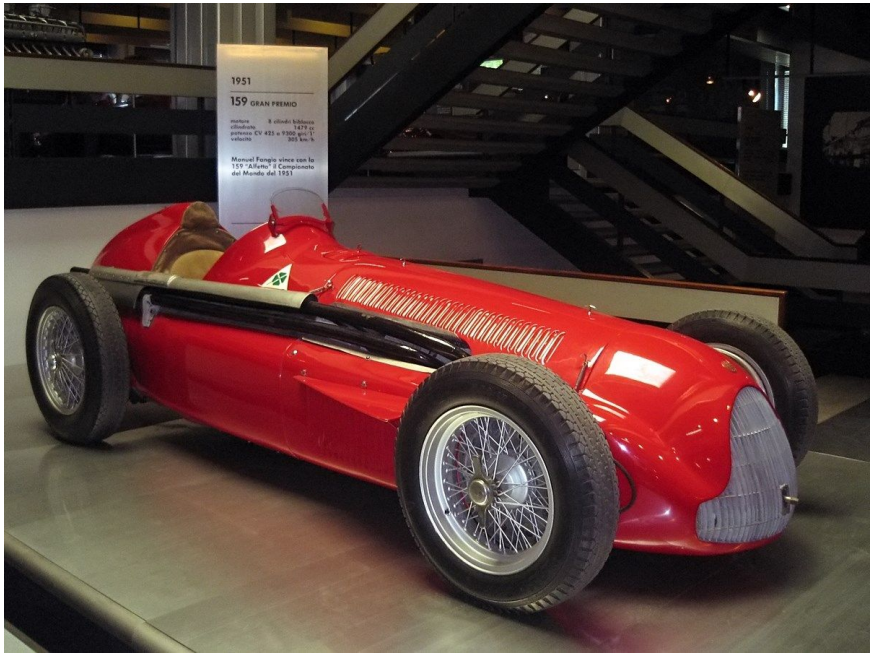
  - Only 6 races were counted towards the championship.
  - Alpha Romeo destroyed its competition.

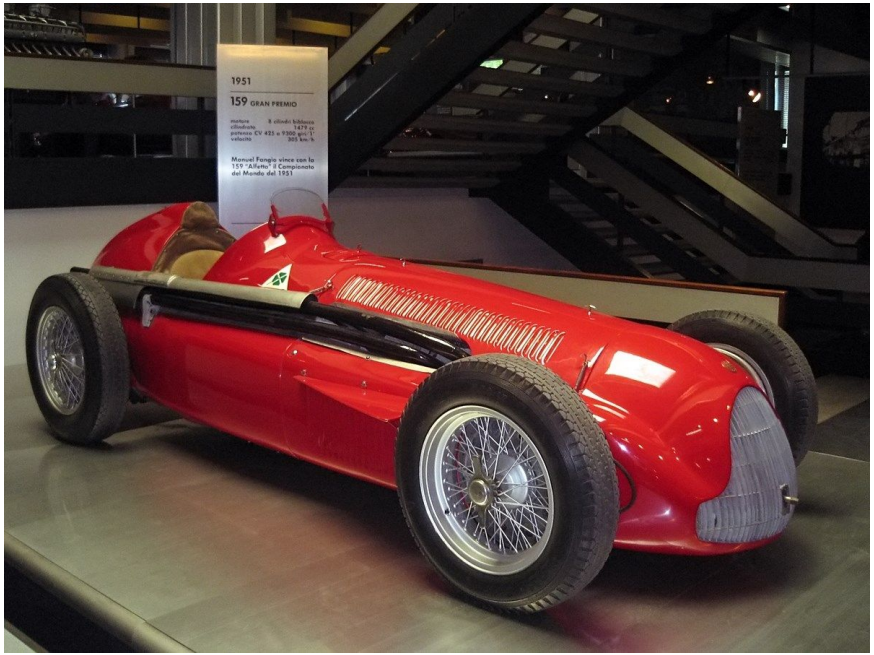
History

Alpha Romeo 158



History

Alpha Romeo 158



Ferrari SF71H

History

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- **1985:** First race in Australia.
- **1994:** Ayrton Senna and Roland Ratzenberger died in the San Marino race. This prompted F1 to improve car safety standards.

History

MAGNETI MARELLI
MAGNETI MARELLI
MAGNETI MARELLI
PARMIGIANO·REGGIANO
LIVE TELEVISION FEED

Let’s first address some misconceptions.

Wait. You are Indian. Why aren't you talking about cricket?

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Psych! This is a presentation on cricket.

Introduction to Cricket

- Cricket is a bat and ball game played between 2 teams.

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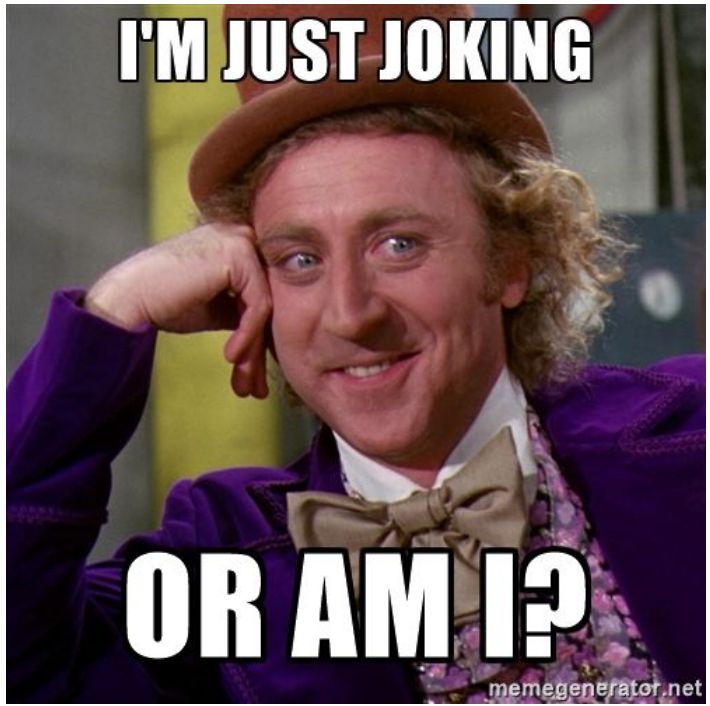

Sounds simple. Car. Race. Fastest car wins.

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Not just about the car.

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Not just about the car.
Drivers. Strategy. Teamwork. Efforts of a team of 100+ people.

Sounds simple. Car. Race. Fastest car wins.

Not just about the car.
Drivers. Strategy. Teamwork. Efforts of a team of 100+ people.
The fastest car doesn’t always win.

But F1 drivers just need to drive a car.
They aren't athletes.

But F1 drivers just need to drive a car. They aren't athletes.

They drive in upto 50°C temperatures. Sweat upto 3L a race.

But F1 drivers just need to drive a car. They aren't athletes.

They drive in upto 50°C temperatures. Sweat upto 3L a race. Handle G-Force of upto 5g. More than a space shuttle launch.

But F1 drivers just need to drive a car. They aren't athletes.

They drive in upto 50°C temperatures. Sweat upto 3L a race. Handle G-Force of upto 5g. More than a space shuttle launch. Heart rate is approximately 170 bpm for 2 hours.

F1 is boring. Cars just go around in circles.

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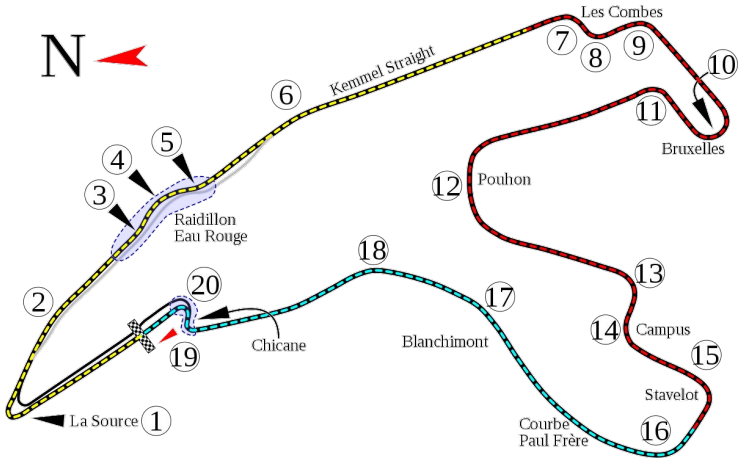
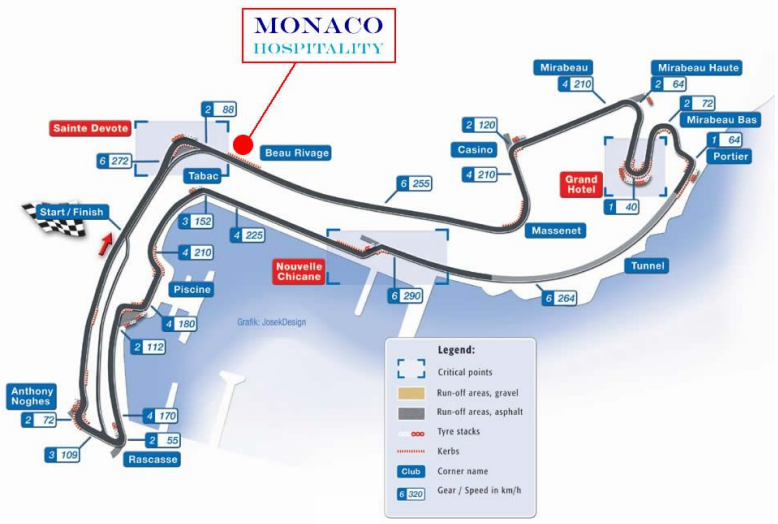
The tracks are not circular! Varying speeds, bumps and corners.

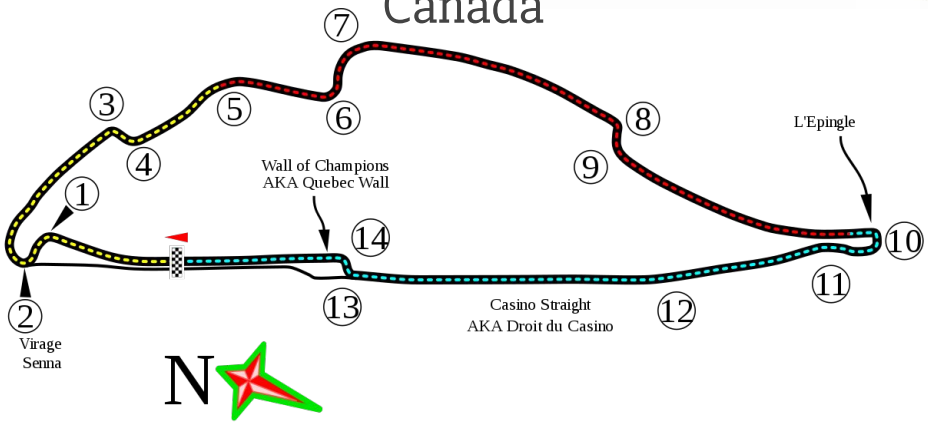
Belgium



Monaco



Canada



What do you need to know in order to watch F1 today.

Overview

10 teams

Overview

20 drivers

Overview

20 drivers

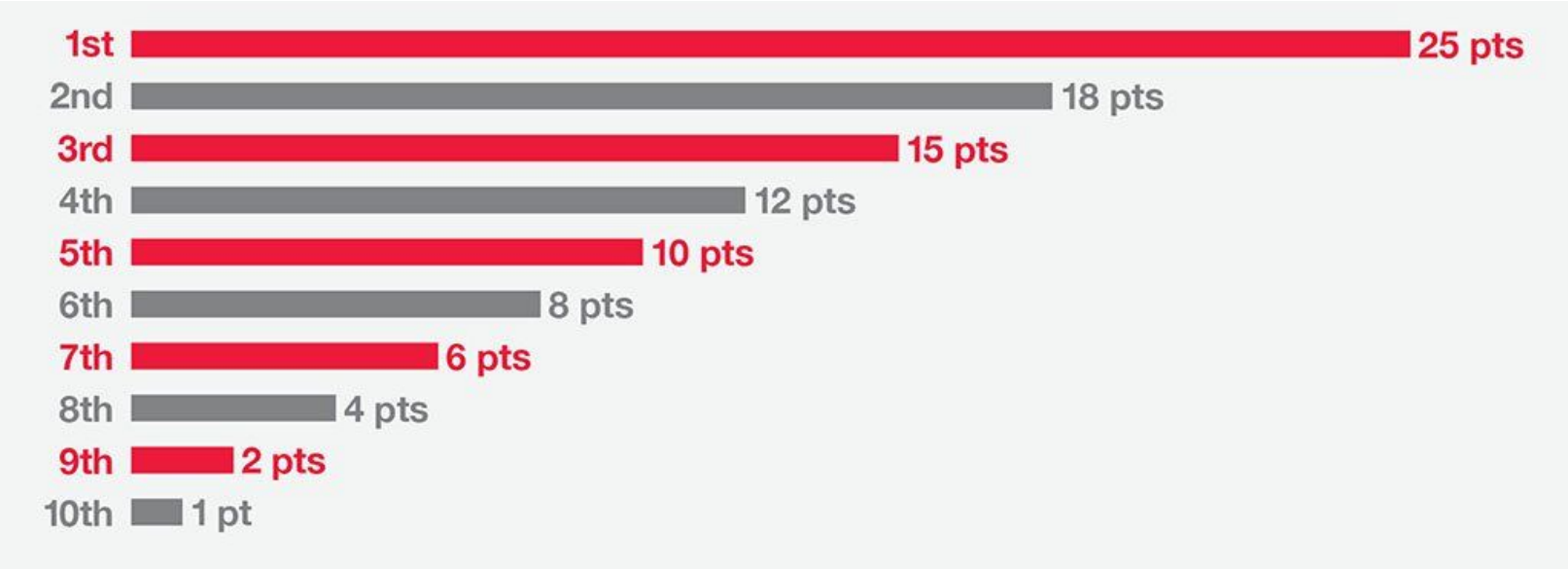
Overview

21 races. 5 continents.

Each race is called a Grand Prix.

Overview

Each race finish gives you points.



Overview

Each race finish gives you points.

Driver with the most points at the end wins the World Championship.

2018 Standings

Rank	Driver	Points	Wins	Podiums
1	L. Hamilton Mercedes	188	4	8
2	S. Vettel Ferrari	171	4	6
3	K. Räikkönen Ferrari	131	0	7
4	V. Bottas Mercedes	122	0	5
5	D. Ricciardo Red Bull	106	2	2

Overview

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Overview

Team with the most points wins the Constructors Championship.

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2018 Standings

Rank	Constructor	Points	Wins	Podiums
1	Mercedes	310	4	13
2	Ferrari	302	4	13
3	Red Bull	211	3	6
4	Renault	80	0	0
5	Force India	59	0	1

Let’s look at the Canadian Grand Prix to understand what happens during each race.

Race Weeknd

Race Weekend

Every race has events spread across 3 days.

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- **Friday:** 2 practice sessions of 90 min each.
- **Saturday:** 1 practice session of 60 min.

A driver must take part in at least 1 practice session to be eligible for the race.

Race Weekend

- **Saturday:** 3 Qualifying sessions to determine the starting positions on track.
  - Q1: 18 minutes. All 20 cars compete. Slowest 5 cars are eliminated.

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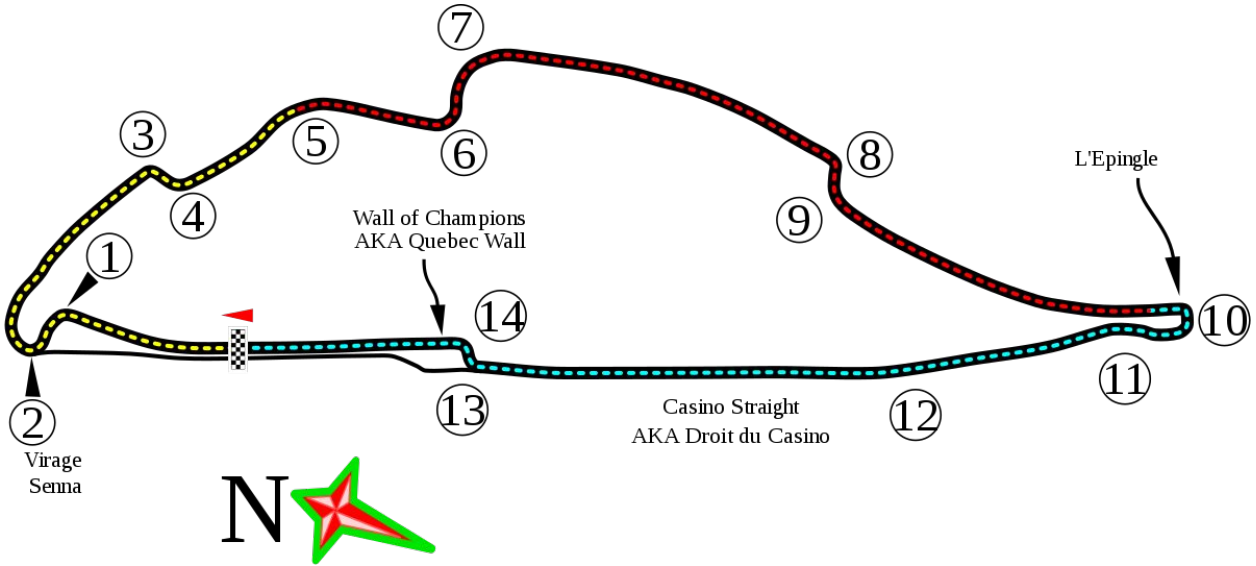
Race Weekend

- **Saturday:** 3 Qualifying sessions to determine the starting positions on track.
  - Q1: 18 minutes. All 20 cars compete. Slowest 5 cars are eliminated.
  - Q2: 15 minutes. 15 cars compete. Slowest 5 cars are eliminated.
  - Q3: 12 minutes. Decides the final ordering for the top 10 cars.

Race Weekend



Importance of Qualifying

Importance of Qualifying

1	5	**Sebastian VETTEL** Scuderia Ferrari	1:10.764
3	33	**Max VERSTAPPEN** Aston Martin Red Bull Racing	1:10.937
5	7	**Kimi RAIKKONEN** Scuderia Ferrari	1:11.095
7	27	**Nico HULKENBERG** Renault Sport Formula One Team	1:11.973
9	55	**Carlos SAINZ** Renault Sport Formula One Team	1:12.168
11	20	**Kevin MAGNUSSEN** Haas F1 Team	1:12.606
13	16	**Charles LECLERC** Alfa Romeo Sauber F1 Team	1:12.661
15	2	**Stoffel VANDOORNE** McLaren F1 Team	1:12.865
17	18	**Lance STROLL** Williams Martini Racing	1:13.590
19	9	**Marcus ERICSSON** Alfa Romeo Sauber F1 Team	1:14.593

2	77	**Valtteri BOTTAS** Mercedes AMG Petronas Motorsport	1:10.857
4	44	**Lewis HAMILTON** Mercedes AMG Petronas Motorsport	1:10.996
6	3	**Daniel RICCIARDO** Aston Martin Red Bull Racing	1:11.116
8	31	**Esteban OCON** Sahara Force India F1 Team	1:12.084
10	11	**Sergio PEREZ** Sahara Force India F1 Team	1:12.671
12	28	**Brendon HARTLEY** Red Bull Toro Rosso Honda	1:12.635
14	14	**Fernando ALONSO** McLaren F1 Team	1:12.856
16	10	**Pierre GASLY** Red Bull Toro Rosso Honda	1:13.047
18	35	**Sergey SIROTKIN** Williams Martini Racing	1:13.643
20	8	**Romain GROSJEAN** Haas F1 Team	

Race Weekend

- **Sunday:** Race day!
  - Cars line up on the grid.

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  - 1 formation lap to warm the tyres.
  - It’s lights out and away we go!

Race Weekend

What happens if there is an accident?

First let's look at F1's obsession with flags

Flags

- 10 different types.

Flags

- 10 different types.

Flags

- **Chequered Flag**: Hooray! You have crossed the finish line

Flags

- **Chequered Flag:** Hooray! You have crossed the finish line
- **Yellow Flag:** Indicates danger.
  - 1 yellow flag: warns driver to slow down
  - 2 yellow flags: drivers must slow down
  - No overtaking!

Flags

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- **Black Flag:** Tells driver that they have been excluded from the race.
- **Red Flag:** Indicates that the session has been stopped. Maybe due to accident or poor race conditions.

Safety Cars

- In case of double yellow flags, there are two possible ways of dealing with it.

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No overtaking in any of the two cases!

Safety Cars

Number of Laps

Each race has several laps depending upon the track length.

The number of laps will be equal to the least number which exceeds a distance of 305 km (260 km for Monaco). However, should two hours elapse before the scheduled race distance is completed, the leader will be shown the chequered flag when he crosses the line.

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Canadian Grand Prix track is 4.361 km long. Therefore, the race has 70 laps.

Pit Stops

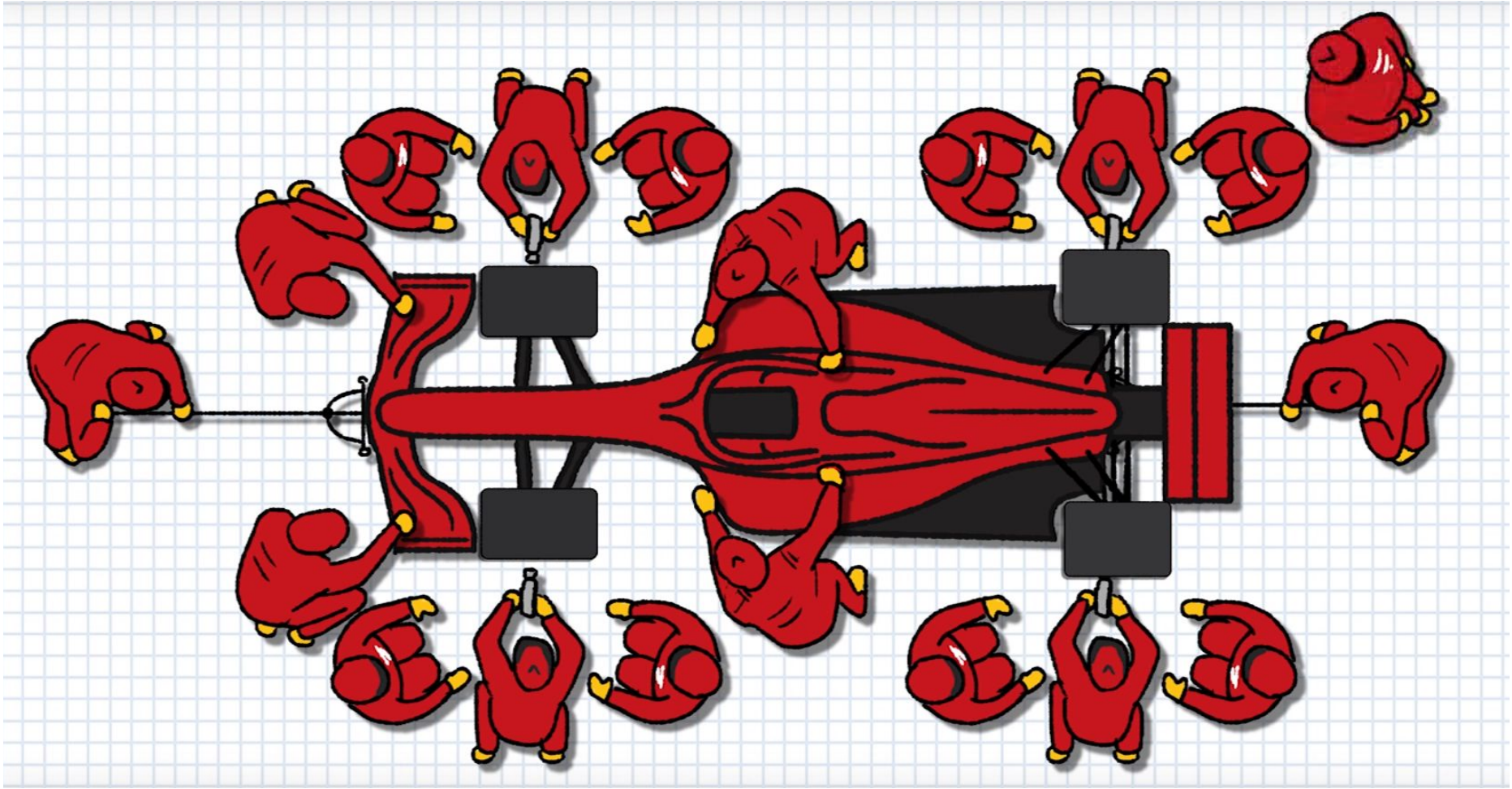
During each race, a car will go into the **pit lane** one or more times to change tyres/ do any repairs on the car.

Annual F1 Pop Quiz

How long should it take to change all 4 tyres on a car?

a. 10 sec
b. 10 min
c. 1 hour
d. Can’t do it. I am a CS grad student

Pit Stops



An exhausting diversion

An exhausting diversion
Tyres

Tyres

- Really important!

Tyres

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- All tyres are supplied by Pirelli.

Tyres

- Really important!
- All tyres are supplied by Pirelli.
- Two categories of tyres:
  - Dry weather compounds
  - Wet weather compounds

Annual F1 Pop Quiz

Annual F1 Pop Quiz

How many types of tyres were there during the 2011 season?

a. 6
b. 7
c. 8
d. 9

Annual F1 Pop Quiz

How many types of tyres were there during the 2011 season?

a. 6
b. 7
c. 8
d. 9

Annual F1 Pop Quiz

How many types of tyres were there during the 2014 season?

a. 6
b. 7
c. 8
d. 9

Annual F1 Pop Quiz

How many types of tyres were there during the 2014 season?

a. 6
b. 7
c. 8
d. 9

Annual F1 Pop Quiz

How many types of tyres were there during the 2016 season?

a. 6
b. 7
c. 8
d. 9

Annual F1 Pop Quiz

How many types of tyres were there during the 2018 season?

a. 6
b. 7
c. 8
d. 9

Annual F1 Pop Quiz

How many types of tyres were there during the 2018 season?

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b. 7
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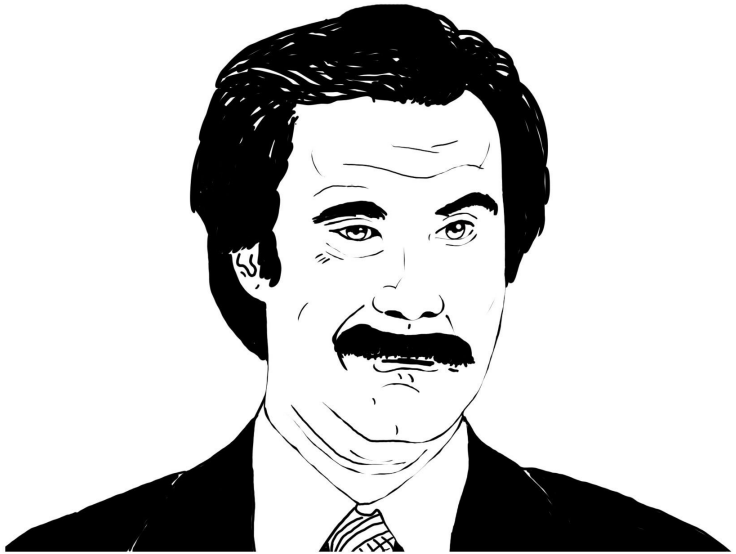
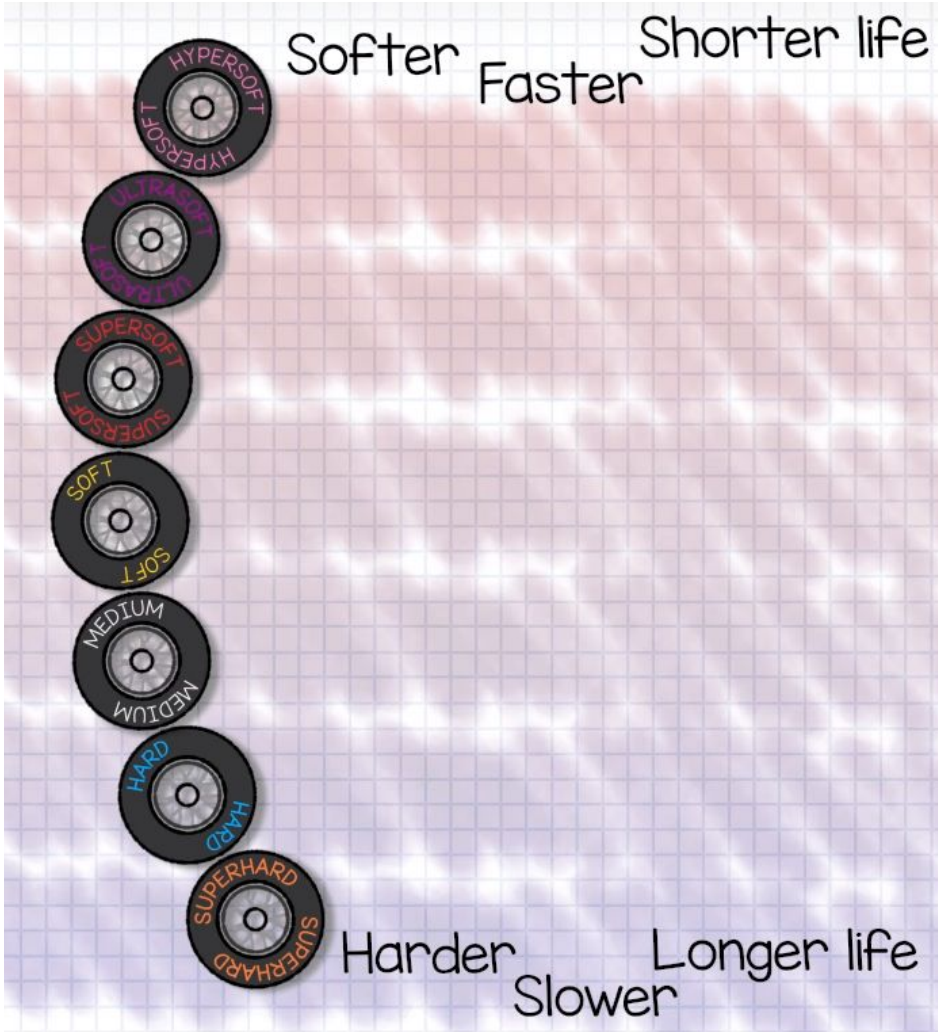
d. 9

THAT DOESN'T MAKE SENSE

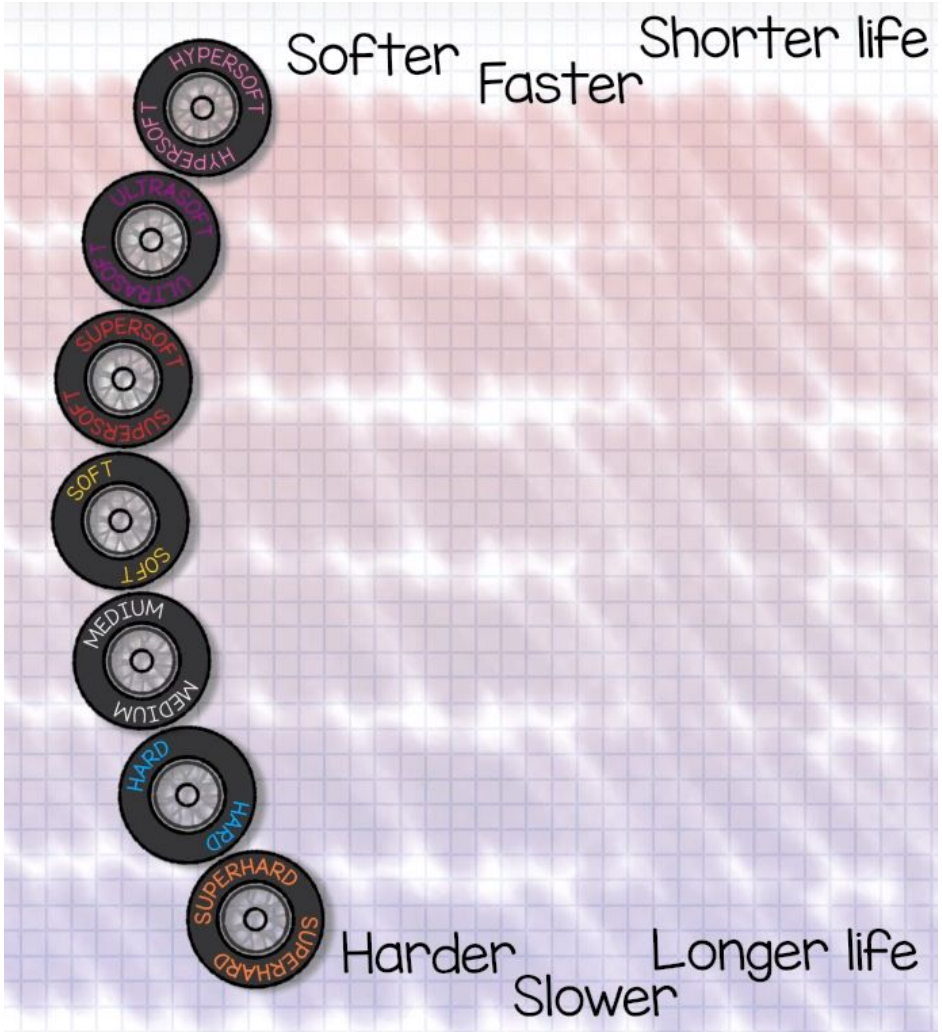


BUT KEEP GOING

Tyres


Softer
Faster
Shorter life
HYPERSOFT
ULTRASOFT
SUPERSOFT
SOFT
MEDIUM
HARD
SUPERHARD
Harder
Slower
Longer life

Tyres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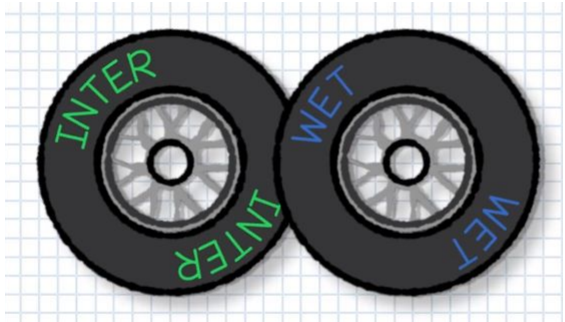

INTER
WET

Tyres

Simplified anatomy of a F1 car

Simplified anatomy of a F1 car

Inside a F1 car

- 6 major components.

Inside a F1 car

- 6 major components.
- Each team can develop/obtain the components as long as they satisfy the guidelines.

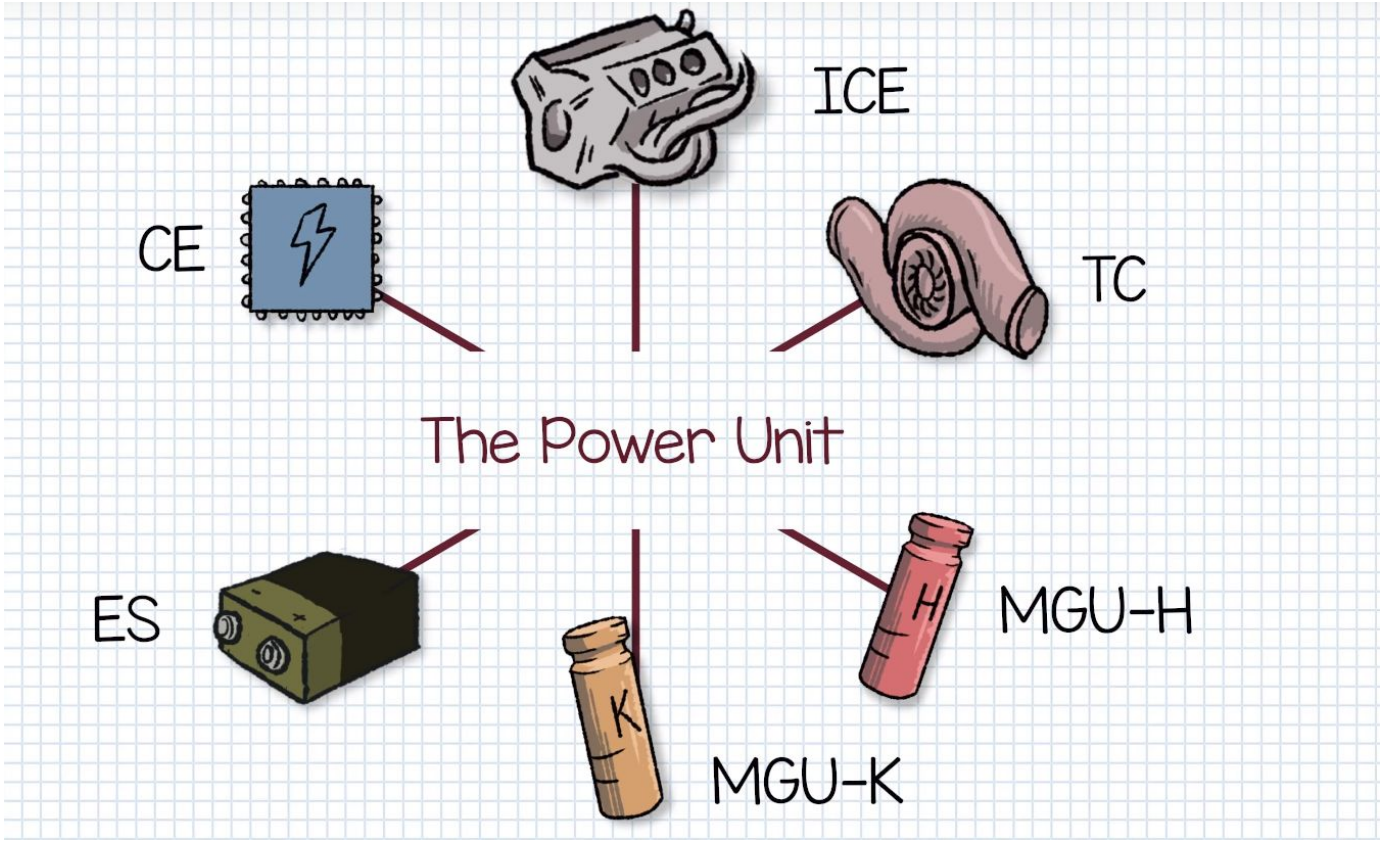
Inside a F1 car

- 6 major components.
- Each team can develop/obtain the components as long as they satisfy the guidelines.
- Teams only have a limited number of components for a particular season. If they exceed that number, they get a penalty.

Inside a F1 car

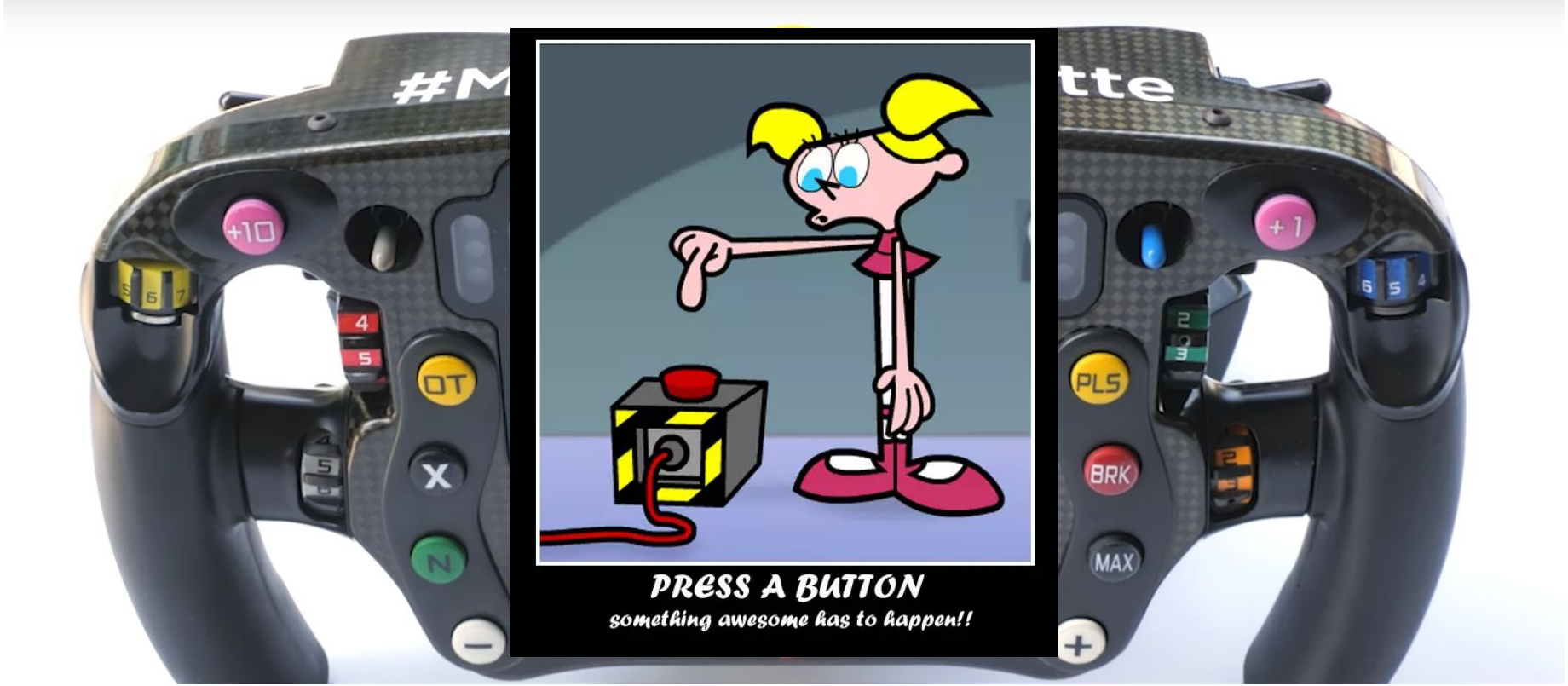
	ICE	TC	MGU-H	ES	MGU-K	CE
1						
2						
3						

Inside a F1 car



Steering wheel

Steering wheel



The art of overtaking.

Car Aerodynamics

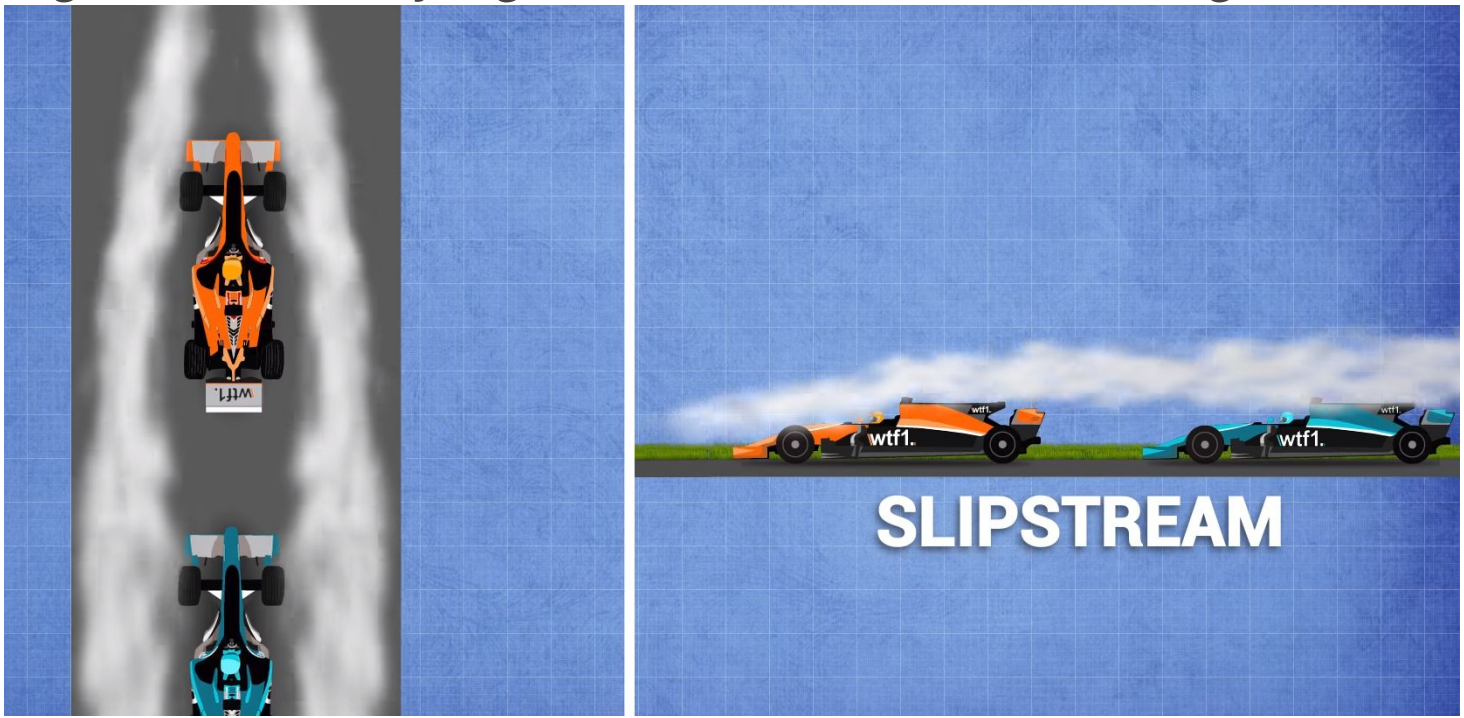
Downforce

Car Aerodynamics

Drag

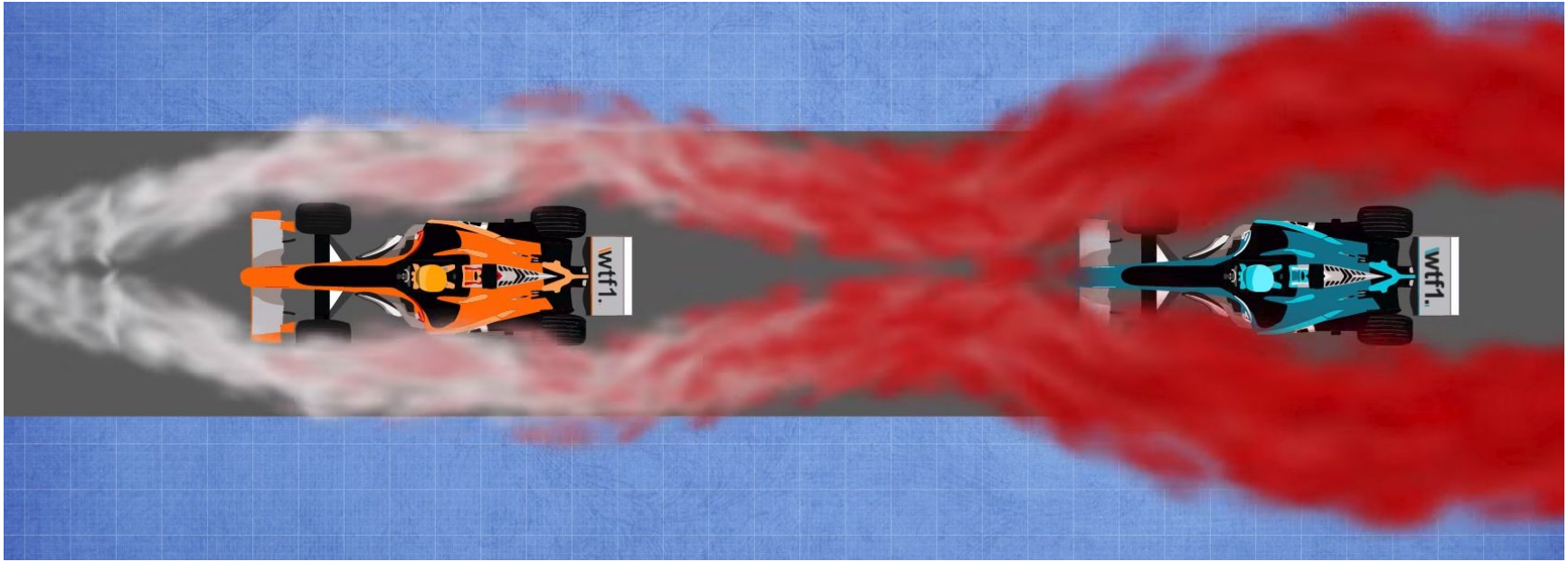
Slipstream

- Imagine Car A is trying to overtake Car B on a straight.



Dirty Air

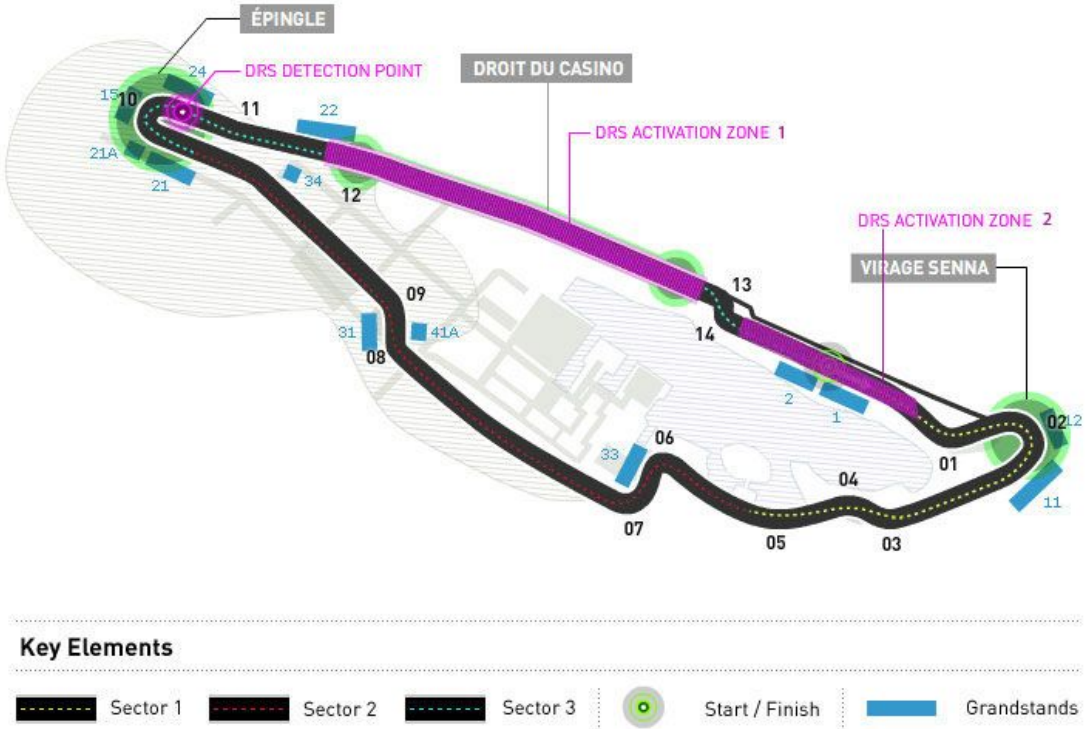
- Imagine Car A is trying to overtake Car B on a corner.



Drag Reduction System (DRS)

- If Car A is within 1 second of Car B when entering a particular region of the track, it can activate DRS to get a temporary speed boost.

Drag Reduction System (DRS)



Now that we know all the important things, let's look at some strategies.

Overtaking Strategies

- DRS + Slipstream = OP
- Late Braking

Overtaking Strategies

Tyre selection

- Depending on where you start on the grid, tyre selection dictates how many pit stops a car will make.

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  - If you are starting in front, you might want to go on the softer compound tyres.

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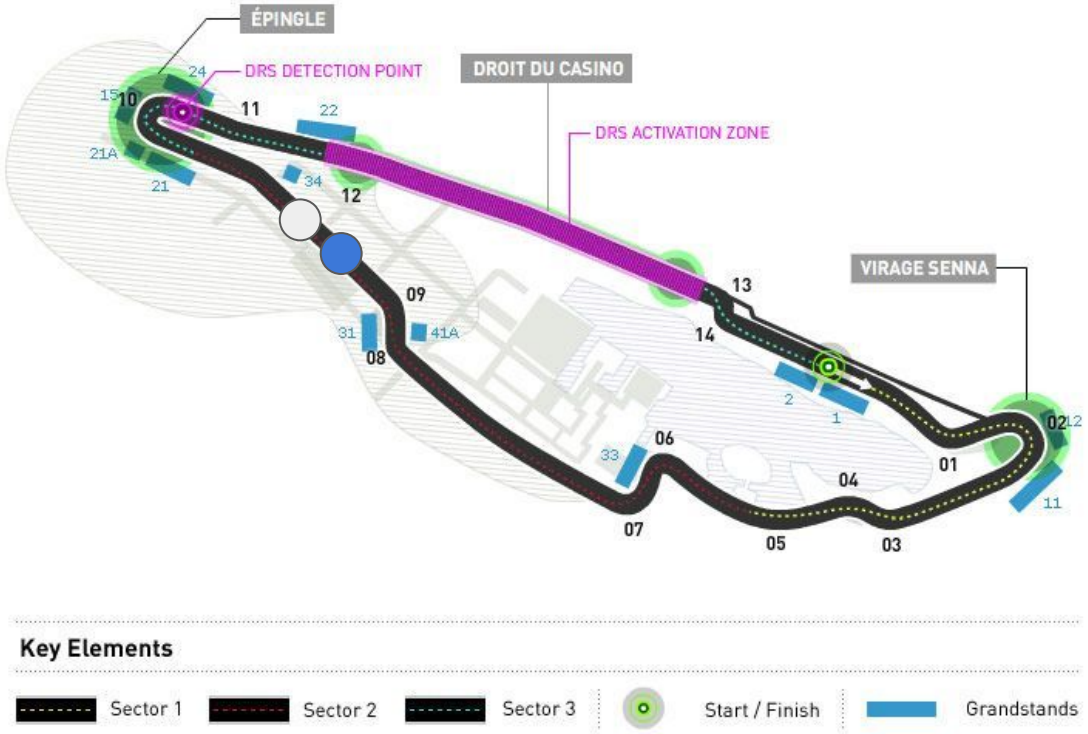
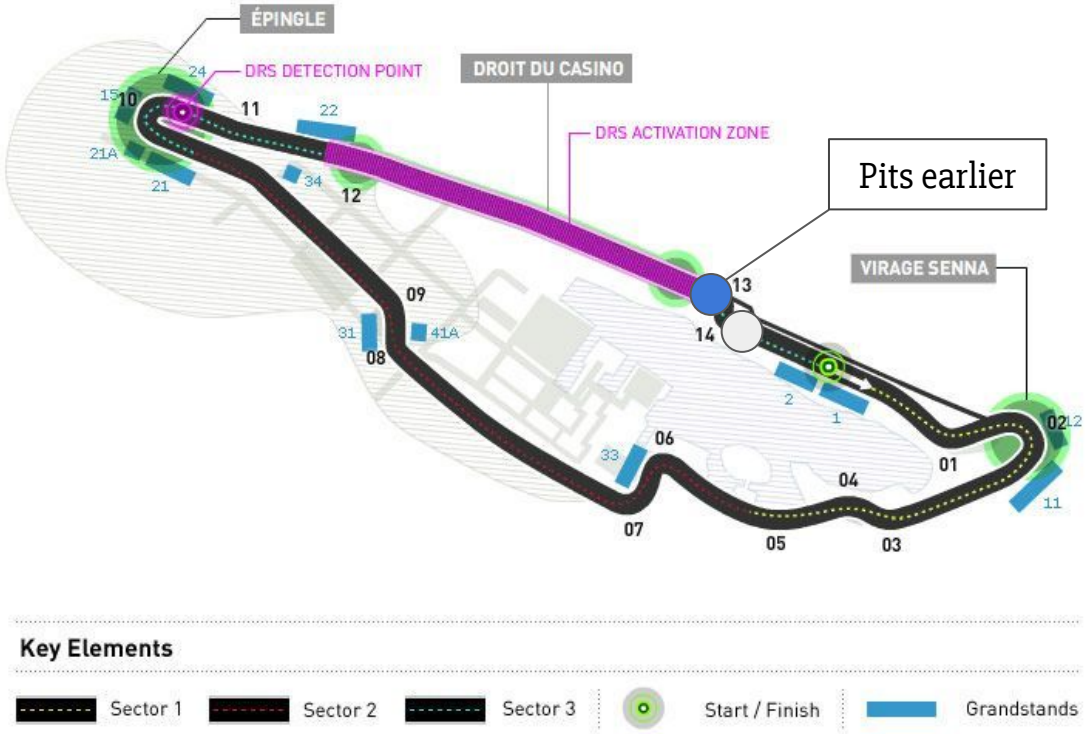
  - If you are starting in front, you might want to go for the softer compound tyres.
  - If you are starting at the end, you might want to go for the harder compound tyres.

Undercut


ÉPINGLE
DRS DETECTION POINT
DROIT DU CASINO
DRS ACTIVATION ZONE
VIRAGE SENNA
24
15
10
11
22
21A
21
34
12
09
31
41A
08
13
14
2
1
02
12
33
06
01
04
11
07
05
03
Key Elements
Sector 1
Sector 2
Sector 3
Start / Finish
Grandstands

Undercut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DRS DETECTION POINT
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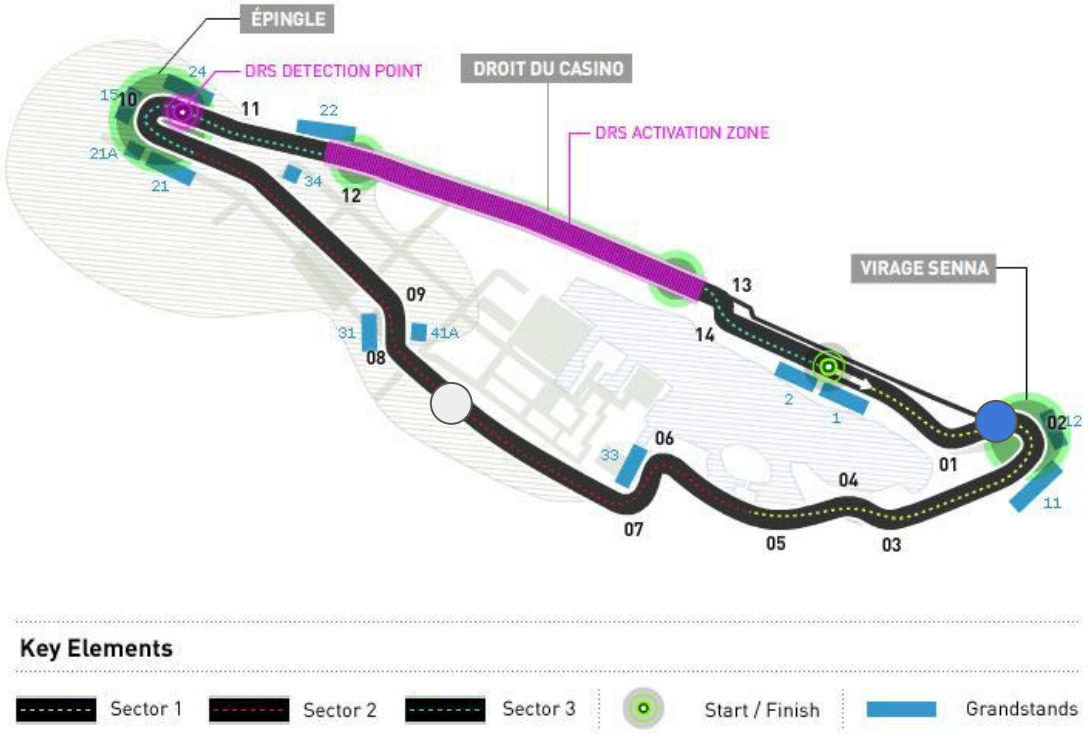
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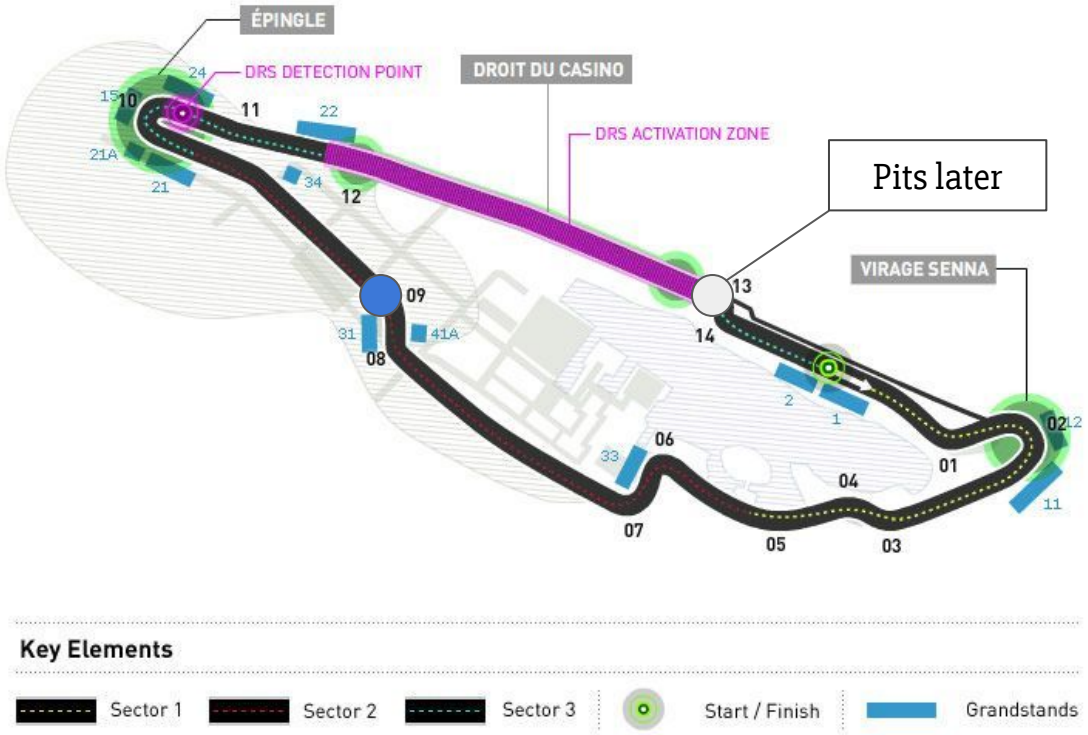
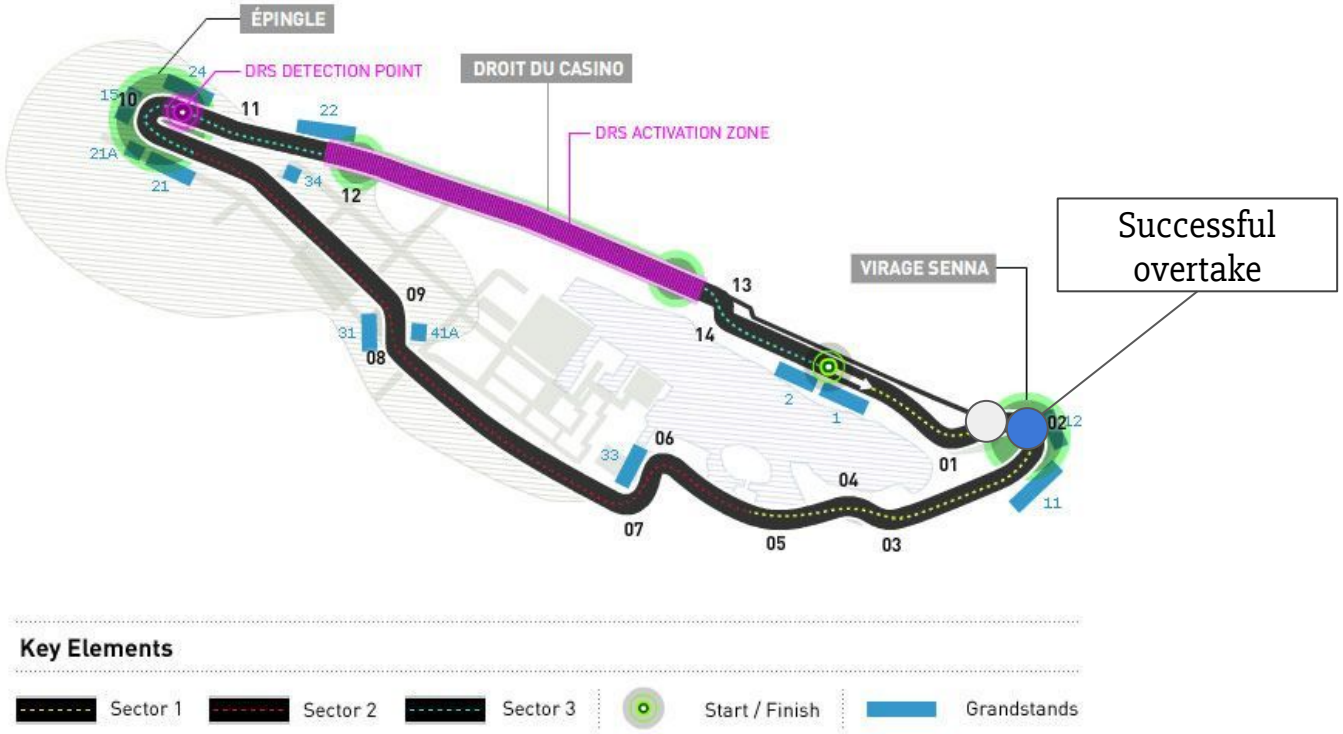
13
14
2
1
02
12
33
06
01
04
11
07
05
03
Key Elements
Sector 1
Sector 2
Sector 3
Start / Finish
Grandstands

Undercut


ÉPINGLE
DRS DETECTION POINT
DROIT DU CASINO
DRS ACTIVATION ZONE
Pits later
VIRAGE SENNA
Key Elements
Sector 1
Sector 2
Sector 3
Start / Finish
Grandstands

Undercut


ÉPINGLE
DRS DETECTION POINT
DROIT DU CASINO
DRS ACTIVATION ZONE
VIRAGE SENNA
Successful overtake
Key Elements
Sector 1
Sector 2
Sector 3
Start / Finish
Grandstands

Free Pit Stop

- A pit stop usually costs time.

Free Pit Stop

- A pit stop usually costs time.
- But depending on the situation, you can get a free pit stop if there is a safety car.

A bit of teamwork

- Each team has two drivers.

A bit of teamwork

- Each team has two drivers.
- The team can strategically make
  - One driver pass the other
  - Pit one car hoping to achieve an undercut

Car Setup

- Drivers can manually set their cars up depending on what they see during practice.
    - They can go for more downforce if the track has a lot of turns

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  - They can go for more downforce if the track has a lot of turns
  - They can change front and rear wing angles for responsive turning.
  - Change suspension - hardness/softness

Penalties

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- **Grid Penalties:** Drop down grid position.

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- **Grid Penalties:** Drop down grid position.
- **Race Penalties:** Extra time added to your race / You are asked to stop in the pits for a certain amount of time.

F1 technology in real life

- Use of carbon fiber

F1 technology in real life

- Use of carbon fiber
- Using brakes to generate energy

F1 technology in real life

- Use of carbon fiber
- Using brakes to generate energy
- Traction control

F1 technology in real life

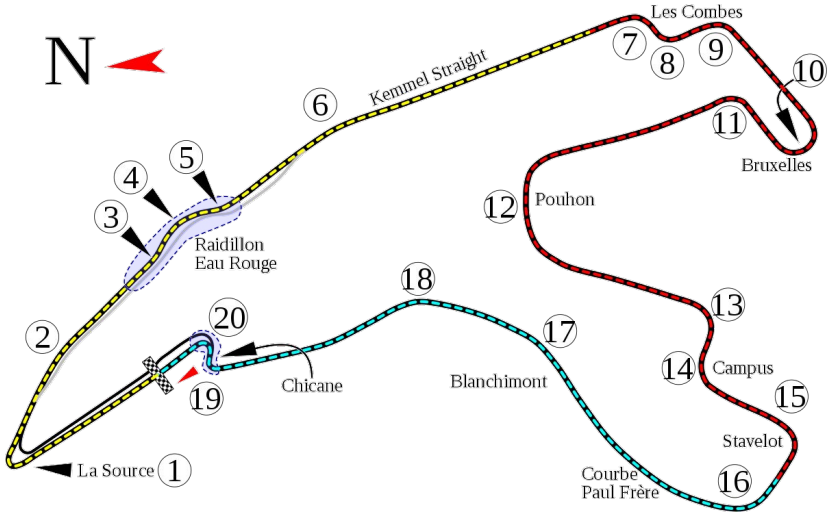
- Use of carbon fiber
- Using brakes to generate energy
- Traction control
- Improved suspension

Best Race Last Year

Time for some iconic F1 tracks/corners.

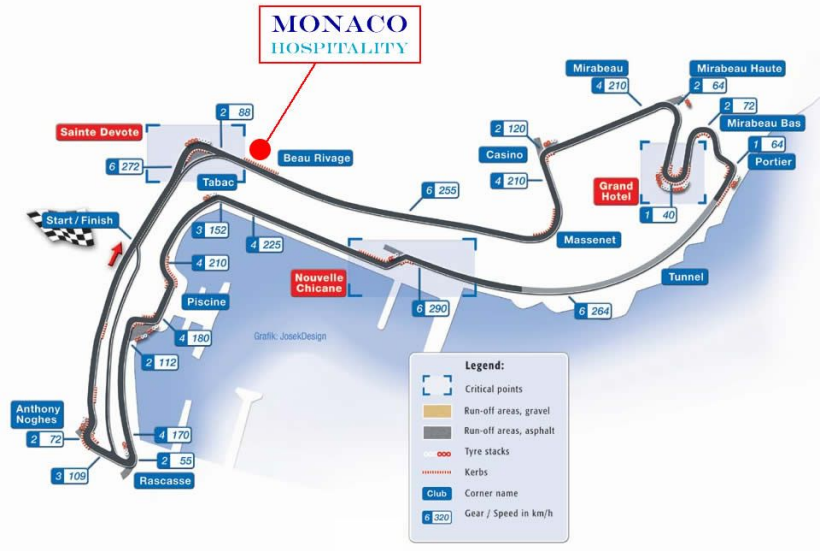
Iconic tracks/corners

- Eau Rouge, Spa, Belgium Grand Prix



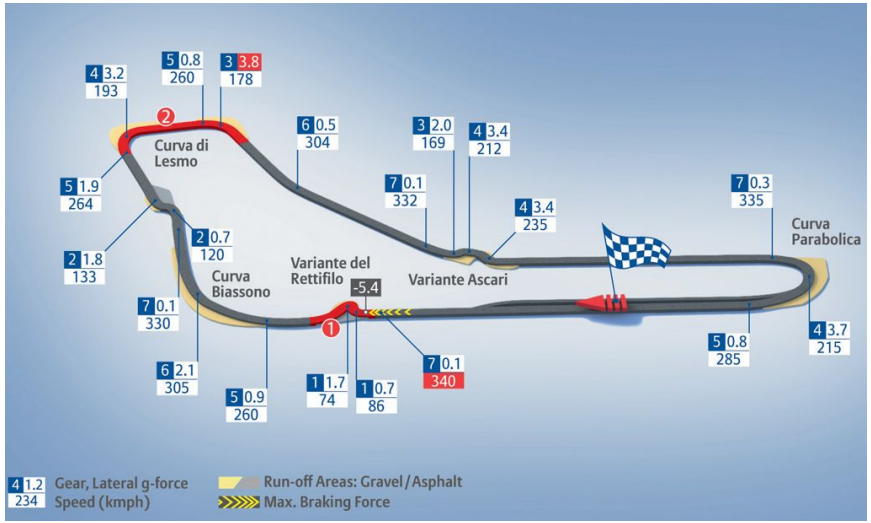
Iconic tracks/corners

- Circuit de Monaco, Monaco Grand Prix



Iconic tracks/corners

- Monza, Italian Grand Prix



Excited to watch a race?
You don’t have to wait that long.

Hungarian Grand Prix. This Weekend!

Hope this wasn't too long. It's time for some questions.