



**tutorialspoint**  
SIMPLY EASY LEARNING



[www.tutorialspoint.com](http://www.tutorialspoint.com)



<https://www.facebook.com/tutorialspointindia>



<https://twitter.com/tutorialspoint>

## About the Tutorial

---

Formula One racing, also known as F1 racing, is the principal form of motor sport, usually associated with the thrill and excitement of speed racing. This tutorial explains all the elements involved in F1 racing, such as the rules and regulations and the essential gears involved in the sport. A brief on the best-in-class racers is also provided at the conclusion of the document.

The information here is meant to supplement your knowledge on the sport. However, it is not a comprehensive guide on how to play the sport.

## Audience

---

This tutorial is meant for those who want to know all about Formula One racing. It is prepared keeping in mind that the reader is unaware about the basics of the sport. It is a basic guide to help a beginner understand the sport.

## Prerequisites

---

Before proceeding with this tutorial, you are required to have a passion for the sport and an eagerness to acquire knowledge on the same.

## Copyright & Disclaimer

---

© Copyright 2015 by Tutorials Point (I) Pvt. Ltd.

All the content and graphics published in this e-book are the property of Tutorials Point (I) Pvt. Ltd. The user of this e-book is prohibited to reuse, retain, copy, distribute, or republish any contents or a part of contents of this e-book in any manner without written consent of the publisher.

We strive to update the contents of our website and tutorials as timely and as precisely as possible, however, the contents may contain inaccuracies or errors. Tutorials Point (I) Pvt. Ltd. provides no guarantee regarding the accuracy, timeliness, or completeness of our website or its contents including this tutorial. If you discover any errors on our website or in this tutorial, please notify us at [contact@tutorialspoint.com](mailto:contact@tutorialspoint.com)

# Table of Contents

---

About the Tutorial .....	i
Audience.....	i
Prerequisites.....	i
Copyright & Disclaimer .....	i
Table of Contents.....	ii
 1. FORMULA ONE – A RACING SPORT .....	 1
Overview .....	1
Objective .....	1
Formula One – History & Team Size .....	2
 2. FORMULA ONE – PARTICIPATING COUNTRIES .....	 3
Participating Countries.....	3
Number of Grand Prix in a Season .....	4
Grand Prix Naming.....	4
Grand Prix Racing Distance .....	5
Number of Teams in F1 World Championship .....	5
Grand Prix World Championships .....	5
 3. FORMULA ONE CAR – DESIGN, SPECS, RULES .....	 6
Construction .....	6
Gearbox .....	7
Steering Wheel .....	7
Fuel.....	7
Tires.....	7
Brakes.....	7
Speed and Performance.....	7

4. FORMULA ONE – SAFETY GEAR.....	8
5. FORMULA ONE – POPULAR TERMS .....	10
6. FORMULA ONE – RULES & REGULATIONS.....	12
Race Distance and Duration .....	13
Refueling.....	13
Racing Flags .....	13
Status Flags .....	13
Instruction Flags.....	14
The Chequered Flag .....	14
7. FORMULA ONE – GRAND PRIX FORMAT .....	15
Practice Sessions.....	15
Qualifying Sessions .....	15
Race Day .....	15
8. FORMULA ONE RACING – POINTS SYSTEM .....	16
9. FORMULA ONE – CHAMPIONS.....	17
World Drivers’ Championship Award .....	17
Constructors’ Championship Award .....	19
Current World Constructors’ Champion .....	19
List of Constructors for 2015 Season .....	19



# 1. FORMULA ONE – A RACING SPORT

## Overview

---

Formula One, also called F1 in short, is an international auto racing sport. F1 is the highest level of single-seat, open-wheel and open-cockpit professional motor racing contest.

Formula One racing is governed and sanctioned by a world body called the FIA - *Fédération Internationale de l'Automobile* or the International Automobile Federation. The name 'Formula' comes from the set of rules that the participating cars and drivers must follow.

## Objective

---

The objective of a Formula 1 contest is to determine the winner of a race. The driver who crosses the finish line first after completing a pre-determined number of laps is declared the winner.



Know more about F1 racing and its rules, regulations, contests and other details by reading further.

## Formula One – History & Team Size

---

Formula 1 racing originated during the 1920-30s in Europe from other similar racing competitions. In 1946, the FIA standardized racing rules and this formed the basis of Formula One racing. The inaugural Formula One World Drivers' championship was then held in 1950, the first world championship series.

Apart from the world championship series, many other non-championship F1 races were also held, but as the costs of conducting these contests got higher, such races were discontinued after 1983.

Each F1 team can have maximum of four drivers per season. There is support staff with every F1 team that plays a vital role in the team's success.

## 2. FORMULA ONE – PARTICIPATING COUNTRIES

A series of Formula One races are conducted over a period of time, usually over a year called the 'Formula One World Championship season'. Each race in a season is called a '**Grand Prix**' or GP and all the races in a season combined are called 'Grands Prix' (plural of Grand Prix).

The term 'Grand Prix' is derived from French which means 'great prize'.

### Participating Countries

---

Drivers from the following countries have participated in Formula One races as of 2015:

1. Argentina
2. Australia
3. Austria
4. Bahrain
5. Belgium
6. Brazil
7. Canada
8. Chile
9. Colombia
10. Czech Republic
11. Denmark
12. East Germany
13. Finland
14. France
15. Germany
16. Hungary
17. India
18. Ireland
19. Italy
20. Japan
21. Liechtenstein

22. Malaysia
23. Mexico
24. Monaco
25. Morocco
26. Netherlands
27. New Zealand
28. Poland
29. Portugal
30. Rhodesia
31. Rhodesia and Nyasaland
32. Russia
33. South Africa
34. Spain
35. Sweden
36. Switzerland
37. Thailand
38. United Arab Emirates
39. United Kingdom
40. United States
41. Uruguay
42. Venezuela

**Constructors** from the following countries have participated in Formula One races as of 2015:

1. Brazil
2. Canada
3. East Germany
4. France
5. Germany
6. Hong Kong
7. Italy
8. Japan
9. Malaysia

10. Netherlands
11. New Zealand
12. Rhodesia
13. South Africa
14. Spain
15. Switzerland
16. United Kingdom
17. United States

The following countries are hosts for Formula One races in 2015:

1. Argentina
2. Australia
3. Austria
4. Bahrain
5. Belgium
6. Brazil
7. Canada
8. China
9. France
10. Germany
11. Hungary
12. India
13. Italy
14. Japan
15. Malaysia
16. Mexico

17. Monaco
18. Morocco
19. Netherlands
20. Portugal
21. Russia
22. Singapore
23. South Africa
24. Republic of Korea
25. Spain
26. Sweden
27. Switzerland
28. Turkey
29. United Arab Emirates
30. United Kingdom
31. United States

## Number of Grand Prix in a Season

The number of Grand Prix in a season has varied through the years, starting from 1950 which had 7 races. This number kept increasing up to a maximum of 20 GPs a year (in 2012). Normally there are 19 to 20 GPs in a season now. The 2015 F1 season has 19 Grand Prix, out of which 8 have been completed.

## Grand Prix Naming

Each GP in a season is hosted by a different country and are named after the host country. Example: A GP held in Australia is called an Australian Grand Prix, that held in Monaco is called the Monaco Grand Prix and so on. However, a GP can be held in same or different cities of the host country every year.



## **Grand Prix Racing Distance**

---

The minimum total distance of a Grand Prix race, including all the pre-defined number of laps must be 300 km or 190 miles. This is the standard distance for all races except for the Monaco GP which is 260 km or 160 miles.

## **Number of Teams in F1 World Championship**

---

10 teams with two cars each are permitted to compete in the F1 World Championship as of 2015. That is, a total of 20 cars can enter the competition. However, the FIA regulations allow a limit of 26 cars for the championship.

## **Grand Prix World Championships**

---

The results of all the Grand Prix races in a season are taken together to determine two annual Championship awards. They are:

1. Drivers' Championship Award (for the drivers)
2. Constructors' Championship Award (for the constructors)

The terms 'drivers' and 'constructors' are explained in later chapters.

### 3. FORMULA ONE CAR – DESIGN, SPECS, RULES

A Formula One car is an open-wheel, open-cockpit, single-seat racing car for the purpose of being used in Formula One competitions. It is equipped with two wings (front and rear) plus an engine, which is located behind the driver.

The F1 races are conducted on specifically built racing tracks called 'circuits'. Sometimes they are conducted on closed public roads as well.



#### Construction

---

Every F1 car is composed of two main components - the chassis and the engine.

**Chassis:** Formula One cars these days are made from carbon fiber and ultra-lightweight components. The weight must be not less than 702 kg or 1548 lbs, including the driver and tires, but excluding the fuel.

The dimensions of a Formula One car must be maximum 180 cm (width) x 95cm (height); there is no specified number for maximum length, but all cars tend to be of almost the same length.

**Engine:** According to regulation changes in 2014, all F1 cars must deploy 1.6 liter turbocharged V6 engines.

## **Gearbox**

---

Semi-automatic sequential carbon titanium gearboxes are used by F1 cars presently, with 8 forward gears and 1 reverse gear, with rear-wheel drive.

## **Steering Wheel**

---

The steering wheel of an F1 car is equipped to perform many functions like changing gears, changing brake pressure, calling the radio, fuel adjustment, and so on.

## **Fuel**

---

The fuel used by Formula One cars is a tightly controlled mixture of ordinary petrol, and can only contain commercial gasoline compounds rather than alcohol compounds.

## **Tires**

---

Formula One cars have been using smooth tread, slick tires since 2009. The tire dimensions of an F1 car are:

- Front Tire - 245mm (width)
- Rear Tires - 355mm and 380mm (width)

## **Brakes**

---

Formula One cars use disc brakes with a rotor and caliper at each tire.

## **Speed and Performance**

---

All F1 cars can accelerate from 0 to 100 mph (160 kmph) and decelerate back to 0 in under 5 seconds. F1 cars have reached top speeds of about 300 kmph or 185 mph on an average.

However, some cars, without fully complying with F1 standards have attained speed of 400 kmph or more. These numbers are mostly same for all F1 cars but slight variations may exist due to the gears and aerodynamics configuration.

## 4. FORMULA ONE – SAFETY GEAR

Safety is high priority in motor sports. Formula One has seen many tragedies in its early days with many casualties that included drivers and spectators as cars crashed at high speeds. Engineers researched using latest technology to build safer cars and gear for drivers. This has certainly reduced the number of incidents over the last decade. Let's know about the different safety gears used by drivers in this chapter.

**Helmets:** Helmets are compulsory in F1 races. Their built is very strong and light so that it doesn't add extra weight on driver's head at high speeds. These are fire resistant also. Of course, the helmets have to meet FIA standards. The helmet comprises of several layers that undergo severe tests. Normally, the weight of the helmet is around 1.2 kg. Interestingly, the helmets of F1 are painted by hand.



**HANS:** HANS stands for Head and Neck Support. The purpose of HANS is to protect the driver's vertebrae and collision of head to the steering wheel in case of an accident. It is built using carbon fiber material and is attached to the seat belt in the cockpit. It is coupled with elastic straps. HANS was inducted by FIA after a major collision in 1995, Australian GP.



**Clothing:** The clothing of F1 drivers is designed to protect them from fire accidents in case of crash. It is a multilayered suit that matches specifications of NASA.

Nomex is the latest fiber material brand used to build suits for F1 drivers. The suit undergoes thermal testing; it is fire resistant and lightweight. The suit is worn by the pit crew also. The outfit is washed and dry-cleaned multiple times before undergoing tests. There are two handles on shoulders of suit so that it can be strapped with seat. This allows the pit crew to pull the driver out in one piece with seat during a crash to reduce injuries. Nomex fiber can survive temperatures up to 700-800 degree Celsius



for more than 10 seconds.

## 5. FORMULA ONE – POPULAR TERMS

This chapter consists of all the popular terminology used in Formula One. It is to understand the language of the sport better.

**107% rule** – A driver should not exceed 107 percent of fastest time in qualifying session; if he fails to do so, then he is not allowed to start the race. He is allowed to start if he sets a suitable time during the practice session.

**Backmarker** – The drivers lagging behind are called backmarkers. They are shown blue flag to give way for leading drivers.

**Blistering** – Improper selection of tire compound can cause excess heat that can lead to chunks of rubber breaking off from the tire. This is called blistering.

**Cockpit** – The seating area of the driver in a F1 car is called the cockpit.

**Delta Time** – The difference of time between two laps or two cars is referred to as delta time.

**Drive-through penalty** – A penalty imposed for minor offence or violation of rules on track. It requires the driver to drive at a minimum speed and enter the pit lane without stopping. The driver is allowed to re-join the race.

**Flat spot** – The portion of the tire where it is heavily worn out due to spin or extreme breaking is called the flat spot.

**Formation lap or warm-up lap** – Cars are driven for a lap from the grid before the start of the race and then get back to grid positions. This is known as the warm-up lap.

**Jump start** – Sensors are installed at grid positions to monitor the cars that start before all the red lights go off signaling the start of race. Such start is called jump start and the driver earns a penalty for it.

**Lollipop** – The sign board at the pit stop that signals the driver to apply brakes and stay in first gear before the car is lowered from jacks.

**Parc ferme** – A restricted area where no team members are allowed and all race cars are driven here after completion of practice or race. This area is supervised by race stewards only.

**Pit board** – A board held at pit wall to inform the driver about delta time, remaining number of laps, and current position.

**Pit wall** – It is F1 team area where the manager, engineers, and support staff keep close watch on their cars using small screens under a shelter.



**Pit** – An area of the track separated by a wall. Cars enter team's pit garage for change of wheels, refuel the car, and set up other changes.

**Pole position** – Driver who recorded fastest time during qualifying session is awarded the first grid position on race day.

**Steward** – A high-ranked official appointed for races to make decisions.

**Tire warmer** – An electronic blanket is wrapped around the tires before cars are positioned for race that keeps them at optimum temperatures before the start of the race.

**Visor strip** – The top edge of helmet needs extra protection and it is provided with a visor strip made of Zylon that is a high-resistant carbon fiber material.

**Constructor** – Since 1981, FIA has passed a rule that respective F1 teams have to build their own engine and chassis of the car. The owner of the engine and chassis is called the constructor.

**Circuit** - Formula One circuits are tracks specifically and purposefully built for conducting races. F1 circuits are of two types – Street Circuit and Road Circuit.

## 6. FORMULA ONE – RULES & REGULATIONS

A Formula One race starts with a warm-up lap, called the formation lap and the pit lanes are opened for this purpose 30 minutes before the actual race begins. Pit lanes are tracks away from the grid and are parallel to the start/finish line.

During this time, the drivers are free to take any number of warm-up drives, without actually going on the grid. After the pit lane closes, the drivers must take their places on the grid in their qualifying order.

Once all the cars have taken their positions on the grid, the race begins with the starting lights - 10 red lights in 5 pairs of columns.



Each column lights one after the other, at an interval of 1 second from left to right direction. After all 5 columns are illuminated, they stay in that way for a few seconds and then all of them are extinguished at once and the race begins.

If the start is interrupted due to any circumstances, the 5 red lights illuminate again but are not extinguished, instead orange lights are lit up and the race is restarted.

The drivers who finish at first, second and third positions at the end of the race stand on a podium and are awarded trophies. A constructor's trophy is also presented to the winner's team.

## Race Distance and Duration

---

The length of the race must be 305 km (260 km in case of Monaco GP) and is defined as "the smallest number of complete laps that exceeds 305 kilometers".

The number of laps in a race is obtained by dividing 305 by the length of a lap, which differs from track to track.

The duration of the race cannot be more than 2 hours. If the allocated time of 2 hours is exceeded, the race is considered to be finished at the end of the ongoing lap.

## Refueling

---

Refueling during races was allowed earlier, but from 2010 this has been abolished. As a result, every car must ensure a loaded tank before the race begins. However, refueling during races will be permitted again from the 2017 season.

## Racing Flags

---

Similar to motor sports and other racing competitions, racing flags are used in Formula One to send out various messages and signals to the drivers like the race start or finish, lap indication, bad weather indication, etc.

Three categories of flags are used in F1 racing. They are:

- **Status Flags**
- **Instruction Flags**
- **The Chequered Flag**

## Status Flags

---

There are 5 status flags –

1. **Green Flag:** It is used to indicate the start of a race or the restart of a race stopped due to a temporary delay.
2. **Yellow Flag:** It is an indication of caution to the drivers to go slow due to some accident or hazard on the track or due to rain.

3. **Red Flag:** It is an indication of danger, especially bad weather conditions and signals the drivers to stop or return to the pit immediately, depending on the situation.
4. **Red & Yellow Striped Flag:** It indicates that the conditions of the track have been modified by car debris, spilled oil or sand and could cause problems like loss of control and reduced grip.
5. **White Flag:** It is displayed at the end of free practice sessions (Friday & Saturday) on the last corner and pit straight, indicating to the drivers that other drivers are engaged in practice on pit straight.

## Instruction Flags

---

These flags communicate with only one driver at a time and are of 5 types –

1. **Black Flag:** It is shown to impose penalty when a driver has broken some rules and instruct the driver to get back to the pit.
2. **Black Flag with Orange Circle:** It indicates that a car is being asked to return to the cockpit due to technical problems like fuel leak, water leak or oil leak, that might interfere with the proceedings of the race.
3. **Per-bend black/white flag:** One diagonal of this flag is black and the other diagonal is white and is an indication of penalty on the driver due to lack of sportsmanship behavior.
4. **Black flag with white cross:** This flag is black with two white diagonal crosses and is waved when a driver ignores other black flags and instructs the driver that his car is not scoring anymore.
5. **Blue Flag:** It indicates to the driver that another faster car is coming towards his direction and that he should make way for the faster car.

## The Chequered Flag

---

The chequered flag is waved at the finish line, indicating that the race is officially over.

# 7. FORMULA ONE – GRAND PRIX FORMAT

A Formula One Grand Prix takes place over a weekend i.e., on 3 days - Friday, Saturday and Sunday. Different events take place on each of these 3 days. They are -

- **Friday - Free Practice Sessions**
- **Saturday - Free Practice Session plus Qualifying Session**
- **Sunday - Race Day**

## Practice Sessions

---

Every Grand Prix begins with 3 free practice sessions, with 2 of them held on Friday; each of 90 minutes, one in the morning and the other in the afternoon. The last practice session takes place on Saturday.

Drivers other than regular drivers, called third drivers can participate in Friday practice sessions in place of the regular driver. The third drivers are usually newcomers, trying to gain experience and exposure at such events.

## Qualifying Sessions

---

The second day, Saturday, begins with the 3rd practice session in the morning, for a duration of one hour. The qualifying session follows in the afternoon and this session is used to determine the starting order for the race day (Sunday).

The qualifying session lasts one hour and is divided into 3 knock-out stages - Q1, Q2, Q3, with small intervals in between.

Q1 lasts 18 minutes and all 20 cars race on the circuit. Of these the five slowest cars are eliminated and they occupy the places - 16, 17,18,19,20, on the grid.

Q2 begins after a brief interval with 16 cars and lasts 15 minutes. Again, the five slowest cars are eliminated and they occupy the places - 11, 12,13,14,15, on the grid.

Finally, Q3 begins with the 10 remaining cars and is 12 minutes long and fill the remaining 10 positions on the grid. The fastest driver occupies 'pole position', a position on the grid that is considered best to begin a game.

## Race Day

---

The main event of a Grand Prix, the race day is held on a Sunday afternoon.

## 8. FORMULA ONE RACING – POINTS SYSTEM

The present system of Formula One World Championship points scoring was adopted in 2010 and has been continuing since.

According to this system, the top 10 drivers at the end of each Grand Prix will receive points based on the positions they finished and these points will contribute towards determining both, the World Drivers' and World Constructors' Championships at the end of the season.

The winner receives 25 points (25 Drivers' Championship points as well as 25 Constructors' Championship points) and other drivers receive points according to the following table:

<b>1<sup>st</sup> place</b>	<b>25 points</b>
<b>2<sup>nd</sup> place</b>	<b>18 points</b>
<b>3<sup>rd</sup> place</b>	<b>15 points</b>
<b>4<sup>th</sup> place</b>	<b>12 points</b>
<b>5<sup>th</sup> place</b>	<b>10 points</b>
<b>6<sup>th</sup> place</b>	<b>8 points</b>
<b>7<sup>th</sup> place</b>	<b>6 points</b>
<b>8<sup>th</sup> place</b>	<b>4 points</b>
<b>9<sup>th</sup> place</b>	<b>2 points</b>
<b>10<sup>th</sup> place</b>	<b>1 point</b>

In order to receive points, a driver must be classified as a finisher. For this, the driver must have completed 90% of the distance covered by the winner, regardless of whether he completes the race or not.

If a race is stopped or cannot be restarted due to difficult weather conditions or any other circumstances, the top 10 finishers will get half the points given in the table, provided the winner has covered 75% of the race distance.

If both cars of a team finish in the top 10, they both contribute to the Constructors' Championship points.

If a driver changes teams in between a season, the points he gained with the previous team will still be added to his Drivers' points. However, the Constructors' points go to the respective teams.



## 9. FORMULA ONE – CHAMPIONS

In Formula One racing up to 4 drivers can be used by teams in a season. Following are some of the charismatic and fastest drivers of all times in the history of F1 racing.

### World Drivers' Championship Award

---

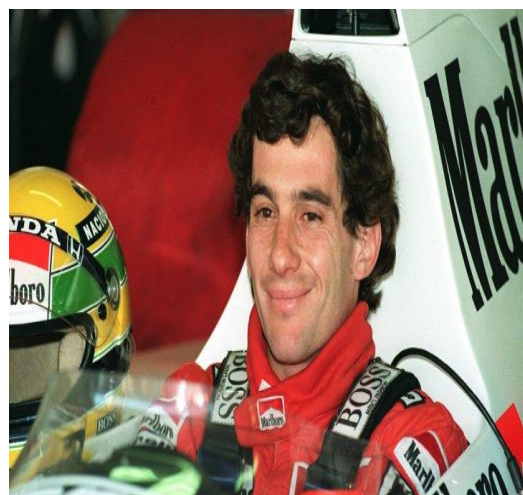
The driver, who scores the most points in a Formula One World Championship season, is awarded the Formula One World Driver's Championship.

Formula One has produced some greatest sportsmen and legends. There will always be the argument of who is the best F1 driver, but here are some of the best F1 drivers of all time.

**Michael Schumacher**, the living legend and the greatest Formula 1 driver, is the winner of 7 world championships for the year 1994, 1995, 2000, 2001, 2002, 2003 and 2004. Other than winning maximum championships, his other records include fastest laps and maximum number of races won during a single season. Schumacher, is the only F1 driver to have made history by finishing in the top three rank in every race of a season. Formula One official website quotes him as "statistically the greatest driver the sport has ever seen".



**Ayrton Senna**, was the most successful and leading driver of the modern era. Senna, who unfortunately lost his life in an accident leading the San Marino Grand Prix in 1994, won three championships in the year 1988, 1990, and 1991. During his short career, he was acclaimed for qualifying speed over one lap and wet weather performances. He held the record, for most pole positions for most pole positions during the period 1989-2006.



**Juan Manuel Fangio**, reigned the first decade of F1 racing, having won the world championship five times in the year 1951, 1954, 1955, 1956 and 1957. This record stood unbeaten for 47 years till it was beaten by Michael Schumacher. Fangio also holds the record of reserving the highest winning percentage (46.15) in F1, winning 24 races out of the 52 races that he entered into.



**Niki Lauda**, is three times F1 world champion to have won the races in the year 1975, 1977 and 1984. He is the only accomplished driver to have won the championship for both Ferrari and McLaren.



**Alain Prost**, is the four-time F1 world champion. He held the record of maximum Grand Prix conquests during the period 1987-2001. Out of the total 202 races that he entered into, Prost won 52 of them. He was the recipient of the *World Sports Awards of the Century* in the motor sport category in 1999.



**Sebastian Vettel**, one of the most successful F1 driver, is the four-time winner of F1 world championship for consecutive years 2010, 2011, 2012 and 2013. In 2009, Vettel was declared as the youngest driver ever to have finished the world championship as a runner-up. He also went on to become the youngest



driver to have won his first world championship in 2010.

## Constructors' Championship Award

The constructor, who scores the most points in a Formula One World Championship season, is awarded the Formula One World Constructor's Championship. The different cases for awarding this title are:

- If the chassis and engine of a car is constructed by the same entity, then the car's make is the name of that one constructor. Eg: Toyota, Ferrari, etc, and the Constructor's championship is given to that one constructor.
- If the chassis and engine of a car is constructed by 2 separate entities, then the car's make is also taken as two separate makes and points are scored individually. Eg: Lotus-Climax McLaren-Mercedes, etc. In this case, the Constructor's championship is given to the maker of the chassis.

## Current World Constructors' Champion

The Formula One World Constructors' Champion for 2014 is Mercedes.

## List of Constructors for 2015 Season

S. No.	Constructor	Engine	Country
1	Ferrari	Ferrari	Italy
2	Force India	Mercedes	India
3	Lotus	Mercedes	United Kingdom
4	Manor	Ferrari	United Kingdom
5	McLaren	Honda	United Kingdom
6	Mercedes	Mercedes	Germany
7	Red Bull	Renault	Austria
8	Sauber	Ferrari	Switzerland
9	Toro Rosso	Renault	Italy
10	Williams	Mercedes	United Kingdom