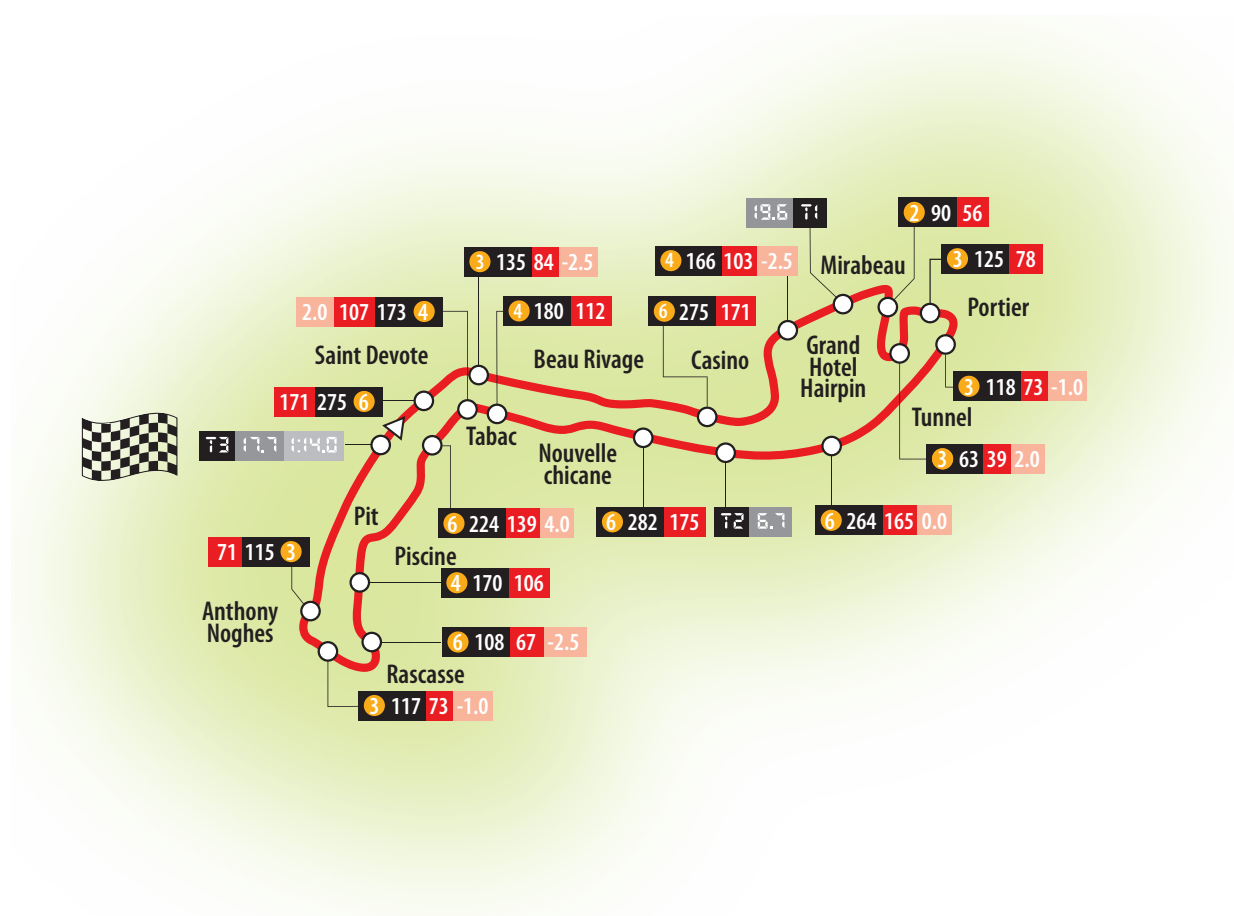# Monaco Grand Prix

Look at the information below about the Monaco Grand Prix in 2008, then use the information to answer the questions on pages 4 and 5.

Circuit map

This map shows the circuit for cars that raced on the streets of Monaco in the Monaco Grand Prix in May 2008. The gear that every car was in at certain points on the track is shown. The total circuit (lap) length was 3.34 km. There were 76 laps in the race.

Key

◁	**3**	117	165	0.0	T1	19.6	1:14.0	🏁
Start Location	Gear	Speed (km/h)	Speed (mph)	Lateral G-force	*Timing Sector	*Sector Time	**Target Lap Time	Finish Location

*The circuit is split into three timed sectors which, when added together, make up the lap time. The sector times given above are examples (not real data).
**A lap time that drivers aim for, based on pole position in 2004.

Results

The table on page 3 shows the results of the race. The information in the table is as follows:

- The first column (**Position**) shows the position that a driver achieved in the Grand Prix in Monaco in 2008. 'DNF' is shown if the driver did not finish.
- The second column (**Number**) indicates the number on that driver's car.
- The third column (**Driver**) shows the name of the person driving the car.
- The fourth column (**Team**) shows the name of the team to which the driver belongs.
- The fifth column (**Race time**) shows the time taken for each driver to complete the race. Only the winner's time is shown in full. Drivers after the winner are given the winner's time plus the time shown next to their name in this column. For drivers further behind in the race, the list shows the number of laps behind the winner. For drivers who failed to complete the race, a reason is given.
- The sixth column (**Qualifying 1 lap time**) shows the time taken to qualify. The qualifying process determines the position that each competitor starts in the race. The process involves three sessions, and only the first ('qualifying 1') includes all competitors, and is therefore used when comparing drivers.
- The seventh column (**Grid**) shows the position on the track on which each car started the race.
- The final column (**Points**) shows the number of points that a driver earns from their finishing position in the race (points are only awarded to the first eight drivers).

Results table

Position	Number	Driver	Team	Race time (hours: minutes: seconds)	Qualifying 1 lap time (hours: minutes: seconds)	Grid	Points
1	22	Lewis Hamilton	McLaren	2 h: 00 m: 42.7 s	0 h: 01 m: 15.58 s	3	10
2	4	Robert Kubica	BMW Sauber	+3.0 s	0 h: 01 m: 15.97 s	5	8
3	2	Felipe Massa	Ferrari	+4.8 s	0 h: 01 m: 15.19 s	1	6
4	10	Mark Webber	Red Bull	+19.2 s	0 h: 01 m: 16.07 s	9	5
5	15	Sebastian Vettel	Toro Rosso	+24.6 s	0 h: 01 m: 16.95 s	19	4
6	17	Rubens Barrichello	Honda	+28.4 s	0 h: 01 m: 16.21 s	14	3
7	8	Kasuki Nakajima	Williams	+30.1 s	0 h: 01 m: 16.76 s	13	2
8	23	Heikki Kovalainen	McLaren	+33.1 s	0 h: 01 m: 15.29 s	4	1
9	1	Kimi Raikkonen	Ferrari	+33.7 s	0 h: 01 m: 15.72 s	2	n/a
10	5	Fernando Alonso	Renault	+1 lap	0 h: 01 m: 16.64 s	7	n/a
11	16	Jenson Button	Honda	+1 lap	0 h: 01 m: 16.26 s	11	n/a
12	12	Timo Glock	Toyota	+1 lap	0 h: 01 m: 16.28 s	10	n/a
13	11	Jarno Trulli	Toyota	+1 lap	0 h: 01 m: 16.31 s	8	n/a
14	3	Nick Heidfeld	BMW Sauber	+4 laps	0 h: 01 m: 16.65 s	12	n/a
DNF	20	Adrian Sutil	Force India	Accident	0 h: 01 m: 17.20 s	18	n/a
DNF	7	Nico Rosberg	Williams	Accident	0 h: 01 m: 15.93 s	6	n/a
DNF	6	Nelsinho Piquet	Renault	Accident	0 h: 01 m: 16.93 s	17	n/a
DNF	21	Giancarlo Fisichella	Force India	Gearbox exploded	0 h: 01 m: 17.82 s	20	n/a
DNF	9	David Coulthard	Red Bull	Accident	0 h: 01 m: 16.09 s	15	n/a
DNF	14	Sebastian Bourdais	Toro Rosso	Accident	0 h: 01 m: 16.81 s	16	n/a

Activities

You can do the following calculations either using a spreadsheet or using a calculator. To make the average speed calculations, you will need to convert the times (currently presented in hours: minutes: seconds) to hours. Do not round them to a whole number of hours. To make this conversion, calculate the total number of seconds (do not round to a whole number) and divide the total by the number of seconds in an hour (ie 3600).

Throughout the following calculations, you need to consider the average speed rather than a specific speed measurement, since speed during a lap is not constant.

Show your answers to four decimal places.

Use the information provided on pages 1 to 3 to answer the following:

1 Calculate the average speed in kilometres per hour (km/h) for the whole race for the first nine finishers.

Driver 1 ....   Driver 6 ....

Driver 2 ....   Driver 7 ....

Driver 3 ....   Driver 8 ....

Driver 4 ....   Driver 9 ....

Driver 5 ....

2 Calculate the average speed in kilometres per hour (km/h) for the single qualifying 1 lap time for all drivers.

Driver 1 ....   Driver 11 ....

Driver 2 ....   Driver 12 ....

Driver 3 ....   Driver 13 ....

Driver 4 ....   Driver 14 ....

Driver 5 ....   Driver 15 ....

Driver 6 ....   Driver 16 ....

Driver 7 ....   Driver 17 ....

Driver 8 ....   Driver 18 ....

Driver 9 ....   Driver 19 ....

Driver 10 ....   Driver 20 ....

3 Which was faster for Lewis Hamilton: his average speed over the entire race or his average speed in qualifying 1 lap time? Show your working below.

4 Did the fastest car (based on qualifying speeds) win the race?

....

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5 What other information would you need to decide which was the fastest car?