

Could a marathon ever be run in under two hours?

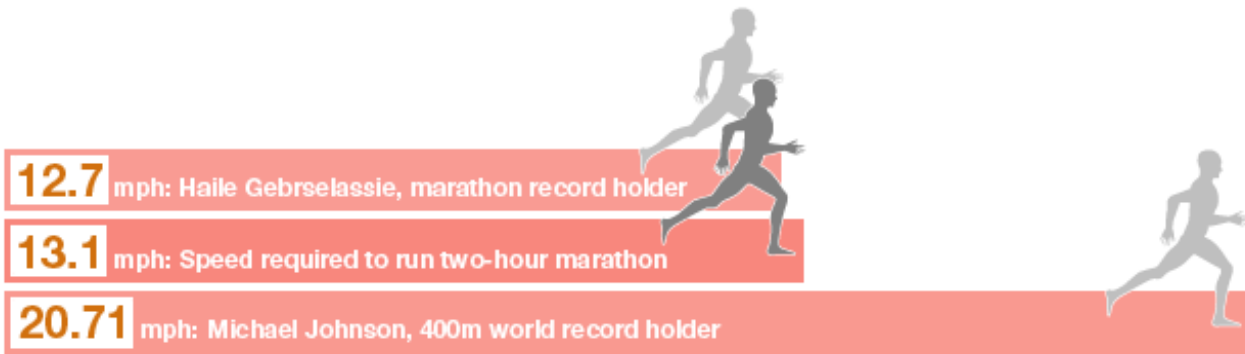


Figure 1 www.bbc.co.uk/news/magazine-12933932

An article by the BBC in April 2011, published just before the London Marathon was going to take place, asks the question:

Could a marathon ever be run in under two hours?

Task A

The article also displays Figure 2 (overleaf) 'Marathon records 1908 – to present'. Referring to this graph:

1. What type of graph is this?
2. What does the graph show?
3. Describe the shape of the graph?
4. Explain whether you think it is necessary to have a scale between 2 hours and 3 hours on the horizontal axis.
5. Comment on whether you think this is a good way to display the data.
6. For how many years was the world record for the marathon held for the longest time?
7. What variables do you think help or hinder the marathon runners?
8. Do you think the marathon will ever be run in under 2 hours by a man?

Task B

Figure 1 shows the speed Haile Gebrselassie ran the record breaking marathon, the speed you would need to run the marathon to break the 2 hour record and the speed Michael Johnson ran when he broke the 400m world record.

Using

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

and the data in the table below show that the speeds quoted in Figure 1 are correct. Note: 1760 yards = one mile. One metre = 1.0936 yards.

	Distance	Time
Haile Gebrselassie	26 miles 385 yds	2hours, 3 minutes, 59 seconds
2 hour Marathon	26 miles 385 yds	2 hours
Michael Johnson	400 m	43.18 seconds

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Marathon records 1908 - to present

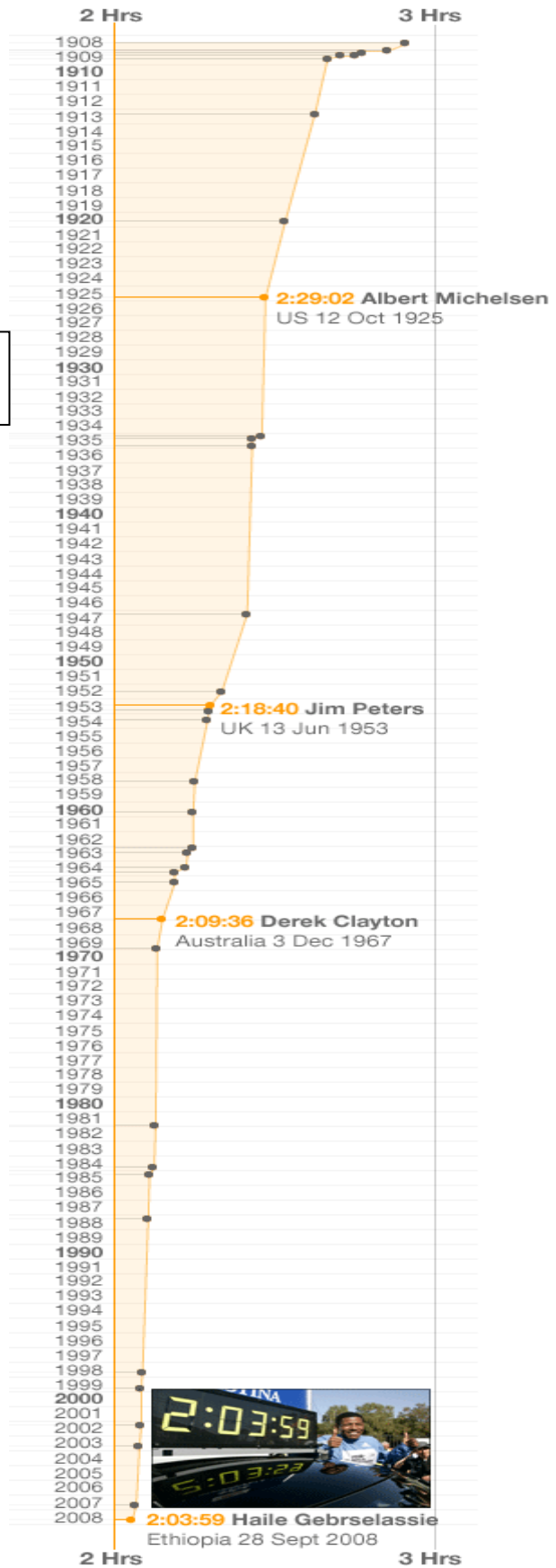


Figure 2
Men's marathon records 1908 – 2008

Source: IAAF



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Task C

Investigate if women will ever run the marathon in less than 2 hours?
(Using the Problem Solving Cycle)

Plan – what data do you need? Where will you get the data?

Collect - the data in this investigation is provided.

The data in Table 1 show the times, years, names and nationalities of the athletes and the places the world record breaking marathons took place.

Process

Display this data in a graph. You will need to consider the following points:

1. The type of graph you will plot.
2. Whether you plot a vertical or horizontal graph.
3. If zero hours should be included in the graph.
4. Whether all the data is included.
5. The graph's title and labelling.
6. Scales to use.
7. By how much you should round the time values.

Discuss

Comment on your graph.

1. Are there any features of the data that stand out?
2. What shape is the data ie a straight line, curve?
3. Do you think women will ever run a marathon in less than 2 hours?
4. State whether you think you can use your graph to predict future times women will be able to run the marathon.

Task D

What was Paula Radcliffe's average speed for running the marathon when she broke the world record for the second time?

Task E

List other questions or investigations you would like to carry out in connection with world records.

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Year	Time (hours)	Time (hours, mins, secs)	Name	Nationality	Event/Place
1926	3.67	3:40:22	Violet Piercy	United Kingdom	London
1963	3.62	3:37:07	Merry Lepper	United States	Culver City, United States
1964	3.46	3:27:45	Dale Greig	United Kingdom	Ryde
1964	3.33	3:19:33	Mildred Sampson	New Zealand	Auckland, New Zealand
1967	3.26	3:15:23	Maureen Wilton	Canada	Toronto, Canada
1967	3.12	3:07:27.2	Anni Pedersen	West Germany	Waldniel, West Germany
1970	3.05	3:02:53	Caroline Walker	United States	Seaside, OR
1971	3.03	3:01:42	Elizabeth Bonner	United States	Philadelphia, United States
1971	2.92	2:55:22	Elizabeth Bonner	United States	New York City Marathon
1971	2.83	2:49:40	Cheryl Bridges	United States	Culver City, United States
1973	2.78	2:46:36	Michiko Gorman	United States	Culver City, United States
1974	2.77	2:46:24	Chantal Langlacé	France	Neuf-Brisach, France
1974	2.73	2:43:54.5	Jacqueline Hansen	United States	Culver City, United States
1975	2.71	2:42:24	Liane Winter	West Germany	Boston Marathon
1975	2.67	2:40:15.8	Christa Vahlensieck	West Germany	Dülmen
1975	2.64	2:38:19	Jacqueline Hansen	United States	Eugene, United States
1977	2.59	2:35:15.4	Chantal Langlacé	France	Oiartzun, Spain
1977	2.58	2:34:47.5	Christa Vahlensieck	West Germany	Berlin Marathon
1978	2.54	2:32:29.8	Grete Waitz	Norway	New York City Marathon
1979	2.46	2:27:32.6	Grete Waitz	Norway	New York City Marathon
1980	2.52	2:31:23	Joan Benoit	United States	Auckland, New Zealand
1980	2.52	2:30:57.1	Patti Catalano	United States	Montreal, Canada
1980	2.43	2:25:41.3	Grete Waitz	Norway	New York City Marathon
1980	2.51	2:30:27	Joyce Smith	United Kingdom	Tokyo, Japan
1981	2.50	2:29:57	Joyce Smith	United Kingdom	London Marathon
1982	2.48	2:29:01.6	Charlotte Teske	West Germany	Miami, United States
1982	2.44	2:26:12	Joan Benoit	United States	Eugene, United States
1983	2.42	2:25:28.7	Grete Waitz	Norway	London Marathon
1983	2.38	2:22:43	Joan Benoit	United States	Boston Marathon
1984	2.41	2:24:26	Ingrid Kristiansen	Norway	London Marathon
1985	2.35	2:21:06	Ingrid Kristiansen	Norway	London Marathon
1998	2.35	2:20:47	Tegla Loroupe	Kenya	Rotterdam Marathon
1999	2.35	2:20:43	Tegla Loroupe	Kenya	Berlin Marathon
2001	2.33	2:19:46	Naoko Takahashi	Japan	Berlin Marathon
2001	2.31	2:18:47	Catherine Ndereba	Kenya	Chicago Marathon
2002	2.29	2:17:18	Paula Radcliffe	United Kingdom	Chicago Marathon
2003	2.26	2:15:25	Paula Radcliffe	United Kingdom	London Marathon
2005*	2.30	2:17:42	Paula Radcliffe	United Kingdom	London Marathon