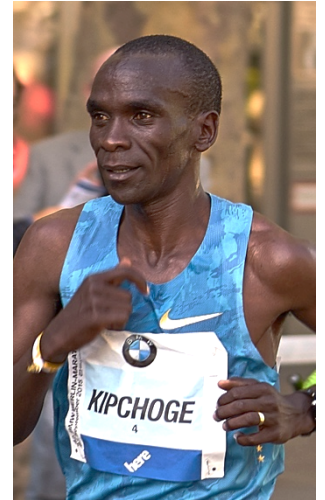


1:59:40.2

On October 12, 2019, Kenya's Eliud Kipchoge made history by running a marathon course in Vienna, Austria in under 2 hours.

To be clear, Eliud's time doesn't count as a world record since the run was not in an open event. Actually, the run was set up to give him the best possible chance of breaking the 2-hour marathon time boundary. Kipchoge ran on a closed 6-mile course with almost no elevation change. The run was scheduled for whichever day in the week of October 12 the weather would be best for running. Kipchoge was accompanied by world class pacesetter runners who formed an intentional wind-break around him.

His purpose in this run was to demonstrate what a human being was capable of accomplishing ... an under 2-hour marathon.



Here's the data for the fastest marathon's throughout the years:

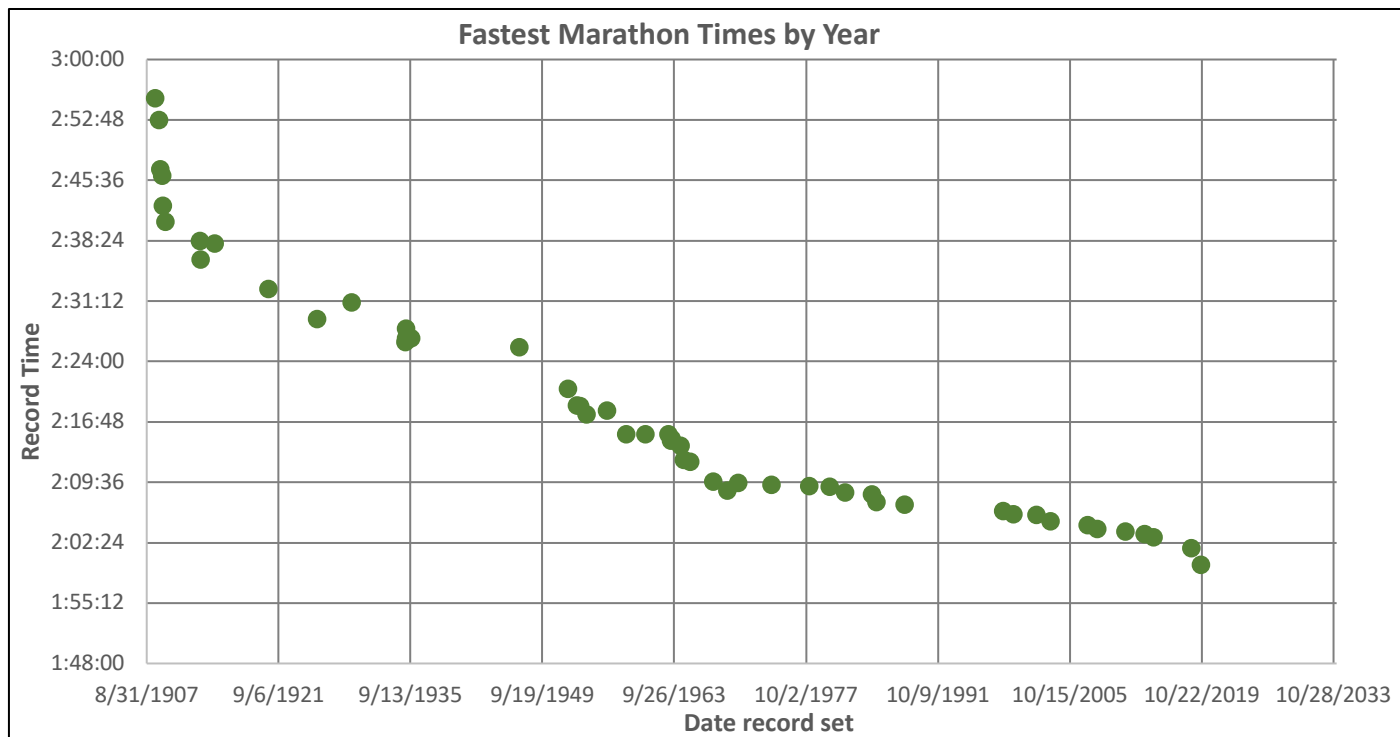
Time	Name	Date
2:55:18.4	Johnny Hayes	July 24, 1908
2:52:45.4	Robert Fowler	January 1, 1909
2:46:52.8	James Clark	February 12, 1909
2:46:04.6	Albert Raines	May 8, 1909
2:42:31.0	Henry Barrett	May 26, 1909
2:40:34.2	Thure Johansson	August 31, 1909
2:38:16.2	Harry Green	May 12, 1913
2:36:06.6	Alexis Ahlgren	May 31, 1913
2:38:00.8	Umberto Blasi	November 29, 1914
2:32:35.8	Hannes Kolehmainen	August 22, 1920
2:29:01.8	Albert Michelsen	October 12, 1925
2:30:57.6	Harry Payne	July 5, 1929
2:26:14	Sohn Kee-chung	March 21, 1935
2:27:49.0	Fusashige Suzuki	March 31, 1935
2:26:44.0	Yasuo Ikenaka	April 3, 1935
2:26:42	Sohn Kee-chung	November 3, 1935
2:25:39	Suh Yun-bok	April 19, 1947
2:20:42.2	Jim Peters	June 14, 1952
2:18:40.4	Jim Peters	June 13, 1953
2:18:34.8	Jim Peters	October 4, 1953
2:17:39.4	Jim Peters	June 26, 1954
2:18:04.8	Paavo Kotila	August 12, 1956
2:15:17.0	Sergei Popov	August 24, 1958
2:15:16.2	Abebe Bikila	September 10, 1960
2:15:15.8	Toru Terasawa	February 17, 1963
2:14:28	Leonard Edelen	June 15, 1963

2:14:43	Brian Kilby	July 6, 1963
2:13:55	Basil Heatley	June 13, 1964
2:12:11.2	Abebe Bikila	October 21, 1964
2:12:00	Morio Shigematsu	June 12, 1965
2:09:36.4	Derek Clayton	December 3, 1967
2:08:33.6	Derek Clayton	May 30, 1969
2:09:28.8	Ron Hill	July 23, 1970
2:09:12	Ian Thompson	January 31, 1974
2:09:05.6	Shigeru So	February 5, 1978
2:09:01	Gerard Nijboer	April 26, 1980
2:08:18	Robert De Castella	December 6, 1981
2:08:05	Steve Jones	October 21, 1984
2:07:12	Carlos Lopes	April 20, 1985
2:06:50	Belayneh Dinsamo	April 17, 1988
2:06:05	Ronaldo da Costa	September 20, 1998
2:05:42	Khalid Khannouchi	October 24, 1999
2:05:38	Khalid Khannouchi	April 14, 2002
2:04:55	Paul Tergat	September 28, 2003
2:04:26	Haile Gebrselassie	September 30, 2007
2:03:59	Haile Gebrselassie	September 28, 2008
2:03:38	Patrick Makau	September 25, 2011
2:03:23	Wilson Kipsang	September 29, 2013
2:02:57	Dennis Kimetto	September 28, 2014
2:01:39	Eliud Kipchoge	September 16, 2018
1:59:40.2	Eliud Kipchoge	October 12, 2019

Present World Record

1. What observations can you make from looking at this historical list of fastest marathon times?

Here is the same information shown as a scatter plot:



2. What observations can you make now?
3. Using either source of data, what is the rate of change in total marathon finish times over years? That is, on average how is the time to run a marathon changing?

A marathon length is defined as 26.2188 miles or 42.195 kilometers.

4. Find and compare the average speed per mile that Johnny Hayes ran in 1908 with Eluid Kipchogi's average speed per mile on October 12, 2019.
5. Based on the data make some predictions for the time it will take to run a marathon in the future.

Sources: <https://www.washingtonpost.com/sports/2019/10/12/eliud-kipchoge-breaks-two-hour-marathon-record/>
<https://www.businessinsider.com/kenyan-marathoner-broke-2-hour-record-doesnt-count-2019-10>
<https://slate.com/news-and-politics/2019/10/eliud-kipchoge-runs-first-ever-marathon-in-under-two-hours.html>
https://en.wikipedia.org/wiki/Ineos_1:59_Challenge