Australian Curriculum Year 10 Mathematics Sample assessment | Student booklet

A future world record

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| 23519766_26aae6eebe_o |
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| Analyse data for world record times to predict a record time forty years from now. |
| **You will:**   * analyse and interpret data to determine how world records have changed over time and to predict a future world record * evaluate the reasonableness of you prediction and the limitations of your strategy * present your findings as a mathematical report. |

## World record times for 1500 metres

World record times for the 1500 metres athletics event have been continually dropping, as shown in tables 1 and 2.

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| .Table 1: World record times: men’s 1500 metres | | | | | |
| Date | Athlete | Time (mm:ss.0) | Date | Athlete | Time (mm:ss.0) |
| 8/06/1912 | Abel Kiviat | 03:55.8 | 6/09/1955 | Gunnar Nielsen | 03:40.8 |
| 5/08/1917 | John Zander | 03:54.7 | 3/08/1956 | István Rózsavölgyi | 03:40.6 |
| 19/06/1924 | Paavo Nurmi | 03:52.6 | 11/07/1957 | Olavi Salsola | 03:40.2 |
| 11/09/1926 | Otto Peltzer | 03:51.0 | 11/07/1957 | Olavi Salonen | 03:40.2 |
| 5/10/1930 | Jules Ladoumegue | 03:49.2 | 12/07/1957 | Stanislav Jungwirth | 03:38.1 |
| 9/09/1933 | Luigi Beccali | 03:49.2 | 28/08/1958 | Herb Elliott | 03:36.0 |
| 17/10/1933 | Luigi Beccali | 03:49.0 | 6/09/1960 | Herb Elliott | 03:35.6 |
| 30/06/1934 | Bill Bonthron | 03:48.8 | 8/07/1967 | Jim Ryun | 03:33.1 |
| 6/08/1936 | Jack Lovelock | 03:47.8 | 2/02/1974 | Filbert Bayi | 03:32.2 |
| 10/08/1941 | Gunder Hägg | 03:47.6 | 15/08/1979 | Sebastian Coe | 03:32.1 |
| 17/07/1942 | Gunder Hägg | 03:45.8 | 15/07/1980 | Steve Ovett | 03:32.1 |
| 17/08/1943 | Arne Andersson | 03:45.0 | 27/08/1980 | Steve Ovett | 03:31.4 |
| 7/07/1944 | Gunder Hägg | 03:43.0 | 28/08/1983 | Sydney Maree | 03:31.2 |
| 15/07/1947 | Lennart Strand | 03:43.0 | 4/09/1983 | Steve Ovett | 03:30.8 |
| 29/06/1952 | Werner Lueg | 03:43.0 | 16/07/1985 | Steve Cram | 03:29.7 |
| 4/06/1954 | Wes Santee | 03:42.8 | 23/08/1985 | Saïd Aouita | 03:29.5 |
| 21/06/1954 | John Landy | 03:41.8 | 6/09/1992 | Noureddine Morceli | 03:28.9 |
| 28/07/1955 | Sándor Iharos | 03:40.8 | 12/07/1995 | Noureddine Morceli | 03:27.4 |
| 6/09/1955 | László Tábori | 03:40.8 | 14/07/1998**\*** | Hicham El Guerrouj | 03:26.0 |
|  |  |  | **\***Current record as of Oct 2013 | | |

Source: International Association of Athletics Federations (IAAF) 2013, [www.iaaf.org/records/toplists/middlelong/1500-metres/outdoor/men/senior](http://www.iaaf.org/records/toplists/middlelong/1500-metres/outdoor/men/senior)

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| Table 2: World record times: women’s 1500 metres | | | | | |
| Date | Athlete | Time (mm:ss.0) | Date | Athlete | Time (mm:ss.0) |
| 19/08/1927 | [Anna Mushkina](http://en.wikipedia.org/w/index.php?title=Anna_Mushkina&action=edit&redlink=1) | 5:18.2 | 03/06/1967 | [Anne Rosemary Smith](http://en.wikipedia.org/wiki/Anne_Rosemary_Smith) | 4:17.3 |
| 16/09/1934 | [Anna Mushkina](http://en.wikipedia.org/w/index.php?title=Anna_Mushkina&action=edit&redlink=1) | 5:07.0 | 24/10/1967 | [Maria Gommers](http://en.wikipedia.org/wiki/Maria_Gommers) | 4:15.6 |
| 13/07/1936 | [Lydia Freiberg](http://en.wikipedia.org/w/index.php?title=Lydia_Freiberg&action=edit&redlink=1) | 5:02.0 | 02/07/1969 | [Paola Pigni](http://en.wikipedia.org/wiki/Paola_Pigni) | 4:12.4 |
| 30/07/1936 | [Yevdokiya Vasilyeva](http://en.wikipedia.org/w/index.php?title=Yevdokiya_Vasilyeva&action=edit&redlink=1) | 4:47.2 | 20/09/1969 | [Jaroslava Jehličková](http://en.wikipedia.org/w/index.php?title=Jaroslava_Jehli%C4%8Dkov%C3%A1&action=edit&redlink=1) | 4:10.7 |
| 13/09/1937 | [Yevdokiya Vasilyeva](http://en.wikipedia.org/w/index.php?title=Yevdokiya_Vasilyeva&action=edit&redlink=1) | 4:45.2 | 15/08/1971 | [Karin Burneleit](http://en.wikipedia.org/wiki/Karin_Burneleit) | 4:09.6 |
| 10/06/1940 | [Anna Zaytseva-Bosenko](http://en.wikipedia.org/w/index.php?title=Anna_Zaytseva-Bosenko&action=edit&redlink=1) | 4:41.8 | 18/07/1972 | [Ludmila Bragina](http://en.wikipedia.org/wiki/Ludmila_Bragina) | 4:06.9 |
| 17/08/1944 | [Yevdokiya Vasilyeva](http://en.wikipedia.org/w/index.php?title=Yevdokiya_Vasilyeva&action=edit&redlink=1) | 4:38.0 | 04/09/1972 | [Ludmila Bragina](http://en.wikipedia.org/wiki/Ludmila_Bragina) | 4:06.5 |
| 15/09/1946 | [Olga Ovsyannikova](http://en.wikipedia.org/w/index.php?title=Olga_Ovsyannikova&action=edit&redlink=1) | 4:37.8 | 07/09/1972 | [Ludmila Bragina](http://en.wikipedia.org/wiki/Ludmila_Bragina) | 4:05.1 |
| 30/08/1952 | [Nina Pletnyova](http://en.wikipedia.org/w/index.php?title=Nina_Pletnyova&action=edit&redlink=1) | 4:37.0 | 09/09/1972 | [Ludmila Bragina](http://en.wikipedia.org/wiki/Ludmila_Bragina) | 4:01.4 |
| 17/05/1956 | [Phyllis Perkins](http://en.wikipedia.org/w/index.php?title=Phyllis_Perkins&action=edit&redlink=1) | 4:35.4 | 28/06/1976 | [Tatyana Kazankina](http://en.wikipedia.org/wiki/Tatyana_Kazankina) | 3:56.0 |
| 16/05/1957 | [Diane Leather](http://en.wikipedia.org/wiki/Diane_Leather) | 4:30.0 | 06/07/1980 | [Tatyana Kazankina](http://en.wikipedia.org/wiki/Tatyana_Kazankina) | 3:55.0 |
| 19/07/1957 | [Diane Leather](http://en.wikipedia.org/wiki/Diane_Leather) | 4:29.7 | 03/08/1980 | [Tatyana Kazankina](http://en.wikipedia.org/wiki/Tatyana_Kazankina) | 3:52.47 |
| 08/12/1962 | [Marise Chamberlain](http://en.wikipedia.org/wiki/Marise_Chamberlain) | 4:19.0 | 11/09/1993\* | [Qu Yunxia](http://en.wikipedia.org/wiki/Qu_Yunxia) | 3:50.46 |
|  |  |  |  | **\***Current record as of Oct 2013 | |

Source: International Association of Athletics Federations (IAAF) 2013, www.iaaf.org/records/toplists/middlelong/1500-metres/outdoor/women/senior

## Future world record times for 1500 metres

**Using the data in table 1 or 2, write a mathematical report to predict the men’s or women’s 1500 metres world record time forty years from now.**

Use the checklist below to make sure your report is complete.

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| Checklist for your mathematical report |
| * Introduction   A brief introduction that describes the goals of the report and outlines what will be presented. |
| * Strategy   Clearly show the mathematical reasoning used. You should:   * state the variables * convert non-decimal variables to decimal form * generate a scatter plot and a line of best fit to represent the relationship between your variables * describe the trend displayed in your scatter plot * write an equation of a linear function that closely matches the set of points,  and support your answer by showing calculations * predict the 1500 metres men’s or women’s world record time forty years from now, supporting your answer by showing the mathematical processes used and any assumptions you make. |
| * Discussion of results   Refer to mathematical reasoning. You may wish to use other sources of information to support your discussion.  Discuss:   * Is your prediction reasonable? * What are the limitations of your strategy? * Should you reconsider your prediction because of the time elapsed since the world record was last broken? * Is your prediction consistent with the idea of a time in the future when the record could never again be broken? * Other ...? |
| * Conclusion   A summary of your findings. |
| * References   Include references to any sources of information used in your report. |