Mendota Ice Duration Graphs by C Kohn, Agricultural Sciences, Waterford WI

Name: Hour Date:

Date Assignment is due: Why late? Score: + ✓ -  
 Day of Week Date If your project was late, describe why

**Directions**: In this lab you and a partner will be creating a line or bar graph showing how ice duration on Lake Mendota has changed year by year since 1855. Lake Mendota in Madison WI is the most-studied lake in the world. It is an excellent measurement of changes to climate because the amount of ice cover in this lake reflects the long term trends in temperature over the course of an entire year. This is precisely the problem with climate – it is long term and often beyond what daily temperatures can convey. Ice duration (the number of days that a lake is completely frozen over each winter) is a very valuable figure because it reflects ALL of the daily temperatures for that season. A single hot or cold day will not drastically change the ice duration. It takes *large* shifts in the climate to significantly alter the ice duration over a period of time. In this case, a significant change would be a shift of 10% or more in the number of days that the lake is completely frozen over.

To create your graph, you will need large graph paper, like the kind you’d use for drawing landscape designs or blueprints, not the notebook-sized paper. Use the following steps to create your graph (follow these steps carefully!):

1. Determine how much paper you will need and how you will create your graph. You will be graphing every year since 1855. The years will be graphed on the x-axis (horizontal axis), so make sure that you have enough space for 160 years of data.
2. The y-axis (vertical axis) will be used to measure ice duration for that year. This is the “Days of Ice” part of the data table. You can use whatever scale seems most appropriate to create your graph; for example, it might make sense to have each square on the graph paper represent 3 years.
   1. Keep in mind that your y-axis does not have to start at 0. You may want to find the year with the shortest days of ice and have your y-axis start at a number just below this figure in order to use less paper.
3. Your x-axis and y-axis need to be labeled with what they show. Be sure to label them clearly so that anyone can understand what the graph shows.
4. Include lines that show the 10-year averages of the ice duration. These lines should be drawn across the years they represent (e.g. 1855-1865).
5. Your graph should also include a caption that explains what this data shows, and what this data indicates. A great way to write a caption is with the following: “In this graph you can see…. This data indicates that…. This is important to understand because….” .
6. A good scientific presentation should be professional, with absolutely no spelling or grammar errors. You should also include color if possible to make your presentation eye-catching. Finally, the more that you can type and print, the better (although the graph itself must be created by hand, not on a computer).
   1. As you work, look for trends in what you see. Are the 10-year averages increasing, decreasing, or staying the same? What does this indicate?

You should work with a partner on this project (it is too big of a project for one person to complete in the time allotted). Students in the past have succeeded by starting at opposite ends of their graph. For example, Partner A may start with 1855 and work forward, while Partner B will start at 2015 and work backwards. Each of you should have your name on your graph. Use your time wisely and start your work in **pencil** in case you make a mistake. Do a nice job – your instructor may have a prize for the best graph.

**HISTORY OF FREEZING AND THAWING OF LAKE MENDOTA, 1852-53 to 2015**

***Wisconsin State Climatology Office***

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| **WINTER** | **CLOSED** | **OPENED** | **DAYS** |  | **WINTER** | **CLOSED** | **OPENED** | **DAYS** |
| 1852-53 1853-54 1854-55 1855-56 1856-57 1857-58 1858-59 1859-60 1860-61 1861-62 1862-63 1863-64 1864-65 1865-66 1866-67 1867-68 1868-69 1869-70 1870-71 1871-72 1872-73 1873-74 1874-75 1875-76 | --- 27 Dec --- 18 Dec 6 Dec 25 Nov 8 Dec 7 Dec 14 Dec 2 Dec 26 Dec 18 Dec 8 Dec 14 Dec 18 Dec 12 Dec 10 Dec 2 Dec 24 Dec 19 Dec 30 Nov 29 Nov 10 Dec 10 Jan | 5 Apr --- --- 14 Apr 6 May 26 Mar 14 Mar 26 Mar 10 Apr 13 Apr 9 Apr 21 Apr 5 Apr 18 Apr 20 Apr 31 Mar 16 Apr 12 Apr 2 Apr 23 Apr 23 Apr 14 Apr 15 Apr 10 Apr | --- --- --- 118 151 121 96 110 117 132 104 125 118 125 123 110 127 131 99 126 144 136 126 91 |  | 1876-77 1877-78 1878-79 1879-80 1880-81 1881-82 1882-83 1883-84 1884-85 1885-86 1886-87 1887-88 1888-89 1889-90 1890-91 1891-92 1892-93 1893-94 1894-95 1895-96 1896-97 1897-98 1898-99 1899-00 | 8 Dec 6 Jan 21 Dec 17 Dec 23 Nov 2 Jan 10 Dec 18 Dec 17 Dec 12 Dec 5 Dec 24 Dec 2 Jan 14 Jan 26 Dec 27 Dec 16 Dec 4 Dec 28 Dec 5 Jan 21 Dec 17 Dec 9 Dec 27 Dec | 17 Apr 9 Mar 12 Apr 25 Mar 3 May 21 Mar 13 Apr 15 Apr 20 Apr 19 Apr 15 Apr 15 Apr 31 Mar 30 Mar 16 Apr 2 Apr 7 Apr 15 Mar 8 Apr 5 Apr 10 Apr 27 Mar 18 Apr 17 Apr | 130 62 112 99 161 78 124 119 124 128 131 113 88 75 111 97 112 101 101 91 110 100 130 111 |

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| **WINTER** | **CLOSED** | **OPENED** | **DAYS** |  | **WINTER** | **CLOSED** | **OPENED** | **DAYS** |
| 1900-01 1901-02 1902-03 1903-04 1904-05 1905-06 1906-07 1907-08 1908-09 1909-10 1910-11 1911-12 1912-13 1913-14 1914-15 1915-16 1916-17 1917-18 1918-19 1919-20 1920-21 1921-22 1922-23 1923-24 1924-25 1925-26 | 25 Dec 15 Dec 25 Dec 13 Dec 14 Dec 1 Jan 20 Dec 1 Jan 22 Dec 18 Dec 9 Dec 28 Dec 24 Dec 12 Jan 16 Dec 28 Dec 16 Dec 11 Dec 3 Jan 9 Dec 25 Dec 25 Dec 16 Dec 1 Jan 19 Dec 16 Dec | 11 Apr 30 Mar 24 Mar 17 Apr 1 Apr 8 Apr 24 Mar 24 Mar 7 Apr 26 Mar 20 Mar 14 Apr 2 Apr 10 Apr 10 Apr 8 Apr 11 Apr 5 Apr 26 Mar 28 Mar 16 Mar 31 Mar 20 Apr 14 Apr 3 Apr 19 Apr | 107 105 89 126 108 97 94 83 106 98 101 108 99 88 115 102 116 115 82 110 81 96 125 104 105 124 |  | 1926-27 1927-28 1928-29 1929-30 1930-31 1931-32 1932-33 1933-34 1934-35 1935-36 1936-37 " 1937-38 1938-39 1939-40 1940-41 1941-42 1942-43 1943-44 1944-45 1945-46 1946-47 1947-48 1948-49 1949-50 | 6 Dec 17 Dec 21 Dec 3 Dec 16 Dec 30 Jan 10 Dec 25 Dec 24 Dec 20 Dec 7 Dec 5 Jan 7 Dec 28 Dec 2 Jan 5 Jan 3 Jan 7 Dec 16 Dec 18 Dec 13 Dec 30 Dec 21 Dec 24 Dec 23 Dec | 19 Mar 1 Apr 27 Mar 20 Mar 24 Mar 4 Apr 4 Apr 26 Mar 28 Mar 30 Mar 30 Dec 13 Apr 22 Mar 4 Apr 16 Apr 11 Apr 26 Mar 2 Apr 8 Apr 20 Mar 21 Mar 10 Apr 3 Apr 30 Mar 11 Apr | 103 106 96 107 98 65 115 91 94 101 - 121 105 97 105 96 82 116 114 92 98 101 104 96 109 |

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| **WINTER** | **CLOSED** | **OPENED** | **DAYS** |  | **WINTER** | **CLOSED** | **OPENED** | **DAYS** |
| 1950-51 1951-52 1952-53 1953-54 1954-55 1955-56 1956-57 1957-58 1958-59 1959-60 1960-61 1961-62 1962-63 1963-64 1964-65 1965-66 1966-67 1967-68 1968-69 " 1969-70 1970-71 1971-72 1972-73 1973-74 1974-75 1975-76 | 11 Dec 16 Dec 30 Dec 30 Dec 2 Jan 12 Dec 14 Dec 30 Dec 9 Dec 29 Dec 19 Dec 16 Dec 12 Dec 20 Dec 15 Dec 11 Jan 26 Dec 27 Dec 17 Dec 25 Dec 16 Dec 24 Dec 5 Jan 7 Dec 21 Dec 2 Jan 27 Dec | 12 Apr 8 Apr 21 Mar 25 Mar 4 Apr 4 Apr 4 Apr 4 Apr 14 Apr 12 Apr 6 Apr 12 Apr 3 Apr 11 Apr 14 Apr 17 Mar 3 Apr 27 Mar 19 Dec 10 Apr 8 Apr 13 Apr 19 Apr 14 Mar 5 Apr 19 Apr 24 Mar | 122 114 81 85 92 114 111 95 126 105 108 117 112 113 120 65 98 91 - 108 113 110 105 97 105 107 88 |  | 1976-77 1977-78 " 1978-79 " 1979-80 1980-81 1981-82 1982-83 1983-84 1984-85 " 1985-86 1986-87 1987-88 1988-89 1989-90 1990-91 1991-92 1992-93 1993-94 1994-95 1995-96 1996-97 1997-98 1998-99 1999-00 | 3 Dec 7 Dec 10 Dec 10 Dec 25 Dec 29 Dec 20 Dec 28 Dec 13 Jan 19 Dec 25 Dec 2 Jan 14 Dec 13 Dec 2 Jan 29 Dec 12 Dec 26 Dec 18 Dec 24 Dec 27 Dec 6 Jan 10 Dec 20 Dec 11 Jan 30 Dec 14 Jan | 28 Mar 8 Dec 11 Apr 13 Dec 19 Apr 6 Apr 23 Mar 3 Apr 8 Mar 8 Apr 26 Dec 27 Mar 31 Mar 12 Mar 29 Mar 5 Apr 15 Mar 24 Mar 26 Mar 11 Apr 31 Mar 21 Mar 7 Apr 1 Apr 27 Feb 21 Mar 7 Mar | 115 - 123 - 118 99 93 96 54 111 - 85 107 89 87 97 93 88 99 108 94 74 119 102 47 82 53 |

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| **WINTER** | **CLOSED** | **OPENED** | **DAYS** |  | **WINTER** | **CLOSED** | **OPENED** | **DAYS** |
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Learn how this data affects ice fishing! Visit <http://climatewisconsin.org/story/ice-fishing>

## Lake Mendota Grading Sheet

Names: Hour:

Accuracy & Completeness: 1 2 3 4 5

Neatness & Effort: 1 2 3 4 5

Axes labeled accurately? 1 2 3 4 5

Caption written accurately? 1 2 3 4 5

10-yr averages shown accurately? 1 2 3 4 5

**Total Score: / 25**

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