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***

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **WINTER**  | **CLOSED**  | **OPENED**  | **DAYS**  |   | **WINTER**  | **CLOSED**  | **OPENED**  | **DAYS**  |
| 1852-531853-541854-551855-561856-571857-581858-591859-601860-611861-621862-631863-641864-651865-661866-671867-681868-691869-701870-711871-721872-731873-741874-751875-76 | ---27 Dec---18 Dec6 Dec25 Nov8 Dec7 Dec14 Dec2 Dec26 Dec18 Dec8 Dec14 Dec18 Dec12 Dec10 Dec2 Dec24 Dec19 Dec30 Nov29 Nov10 Dec10 Jan | 5 Apr------14 Apr6 May26 Mar14 Mar26 Mar10 Apr13 Apr9 Apr21 Apr5 Apr18 Apr20 Apr31 Mar16 Apr12 Apr2 Apr23 Apr23 Apr14 Apr15 Apr10 Apr | ---------118151121961101171321041251181251231101271319912614413612691 |   | 1876-771877-781878-791879-801880-811881-821882-831883-841884-851885-861886-871887-881888-891889-901890-911891-921892-931893-941894-951895-961896-971897-981898-991899-00 | 8 Dec6 Jan21 Dec17 Dec23 Nov2 Jan10 Dec18 Dec17 Dec12 Dec5 Dec24 Dec2 Jan14 Jan26 Dec27 Dec16 Dec4 Dec28 Dec5 Jan21 Dec17 Dec9 Dec27 Dec | 17 Apr9 Mar12 Apr25 Mar3 May21 Mar13 Apr15 Apr20 Apr19 Apr15 Apr15 Apr31 Mar30 Mar16 Apr2 Apr7 Apr15 Mar8 Apr5 Apr10 Apr27 Mar18 Apr17 Apr | 13062112991617812411912412813111388751119711210110191110100130111 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **WINTER**  | **CLOSED**  | **OPENED**  | **DAYS**  |   | **WINTER**  | **CLOSED**  | **OPENED**  | **DAYS**  |
| 1900-011901-021902-031903-041904-051905-061906-071907-081908-091909-101910-111911-121912-131913-141914-151915-161916-171917-181918-191919-201920-211921-221922-231923-241924-251925-26 | 25 Dec15 Dec25 Dec13 Dec14 Dec1 Jan20 Dec1 Jan22 Dec18 Dec9 Dec28 Dec24 Dec12 Jan16 Dec28 Dec16 Dec11 Dec3 Jan9 Dec25 Dec25 Dec16 Dec1 Jan19 Dec16 Dec | 11 Apr30 Mar24 Mar17 Apr1 Apr8 Apr24 Mar24 Mar7 Apr26 Mar20 Mar14 Apr2 Apr10 Apr10 Apr8 Apr11 Apr5 Apr26 Mar28 Mar16 Mar31 Mar20 Apr14 Apr3 Apr19 Apr | 10710589126108979483106981011089988115102116115821108196125104105124 |   | 1926-271927-281928-291929-301930-311931-321932-331933-341934-351935-361936-37"1937-381938-391939-401940-411941-421942-431943-441944-451945-461946-471947-481948-491949-50 | 6 Dec17 Dec21 Dec3 Dec16 Dec30 Jan10 Dec25 Dec24 Dec20 Dec7 Dec5 Jan7 Dec28 Dec2 Jan5 Jan3 Jan7 Dec16 Dec18 Dec13 Dec30 Dec21 Dec24 Dec23 Dec | 19 Mar1 Apr27 Mar20 Mar24 Mar4 Apr4 Apr26 Mar28 Mar30 Mar30 Dec13 Apr22 Mar4 Apr16 Apr11 Apr26 Mar2 Apr8 Apr20 Mar21 Mar10 Apr3 Apr30 Mar11 Apr | 1031069610798651159194101-121105971059682116114929810110496109 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **WINTER**  | **CLOSED**  | **OPENED**  | **DAYS**  |   | **WINTER**  | **CLOSED**  | **OPENED**  | **DAYS**  |
| 1950-511951-521952-531953-541954-551955-561956-571957-581958-591959-601960-611961-621962-631963-641964-651965-661966-671967-681968-69"1969-701970-711971-721972-731973-741974-751975-76 | 11 Dec16 Dec30 Dec30 Dec2 Jan12 Dec14 Dec30 Dec9 Dec29 Dec19 Dec16 Dec12 Dec20 Dec15 Dec11 Jan26 Dec27 Dec17 Dec25 Dec16 Dec24 Dec5 Jan7 Dec21 Dec2 Jan27 Dec | 12 Apr8 Apr21 Mar25 Mar4 Apr4 Apr4 Apr4 Apr14 Apr12 Apr6 Apr12 Apr3 Apr11 Apr14 Apr17 Mar3 Apr27 Mar19 Dec10 Apr8 Apr13 Apr19 Apr14 Mar5 Apr19 Apr24 Mar | 12211481859211411195126105108117112113120659891-1081131101059710510788 |   | 1976-771977-78"1978-79"1979-801980-811981-821982-831983-841984-85"1985-861986-871987-881988-891989-901990-911991-921992-931993-941994-951995-961996-971997-981998-991999-00 | 3 Dec7 Dec10 Dec10 Dec25 Dec29 Dec20 Dec28 Dec13 Jan19 Dec25 Dec2 Jan14 Dec13 Dec2 Jan29 Dec12 Dec26 Dec18 Dec24 Dec27 Dec6 Jan10 Dec20 Dec11 Jan30 Dec14 Jan | 28 Mar8 Dec11 Apr13 Dec19 Apr6 Apr23 Mar3 Apr8 Mar8 Apr26 Dec27 Mar31 Mar12 Mar29 Mar5 Apr15 Mar24 Mar26 Mar11 Apr31 Mar21 Mar7 Apr1 Apr27 Feb21 Mar7 Mar | 115-123-11899939654111-851078987979388991089474119102478253 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **WINTER**  | **CLOSED**  | **OPENED**  | **DAYS**  |   | **WINTER**  | **CLOSED**  | **OPENED**  | **DAYS**  |
| 2000-012001-02"2002-032003-042004-052005-06 | 13 Dec2 Jan4 Mar4 Jan7 Jan25 Dec19 Dec | 7 Apr12 Jan15 Mar3 Apr27 Mar5 Apr24 Mar | 115-- 21 89 80101 95 |   | 2006-072007-082008-092009-102010-112011-122012-132013-14 2014-15 | 20 Jan26 Dec16 Dec29 Dec15 Dec14 Jan14 Jan16 Dec 2 Jan | 27 Mar10 Apr23 Mar26 Mar 3 Apr11 Mar11 Apr12 Apr3 Apr |  66106 97 87109 57 87117 91 |

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**

## 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**

## 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**