



About the Lesson

In this activity, students will examine data about fish, graph the data and compare the graphs.

Vocabulary

- endothermic
- ectothermic
- scatter plot

Teacher Preparation and Notes

- Students should know how to input data into lists and graph a scatter plot.

Activity Materials

- Compatible TI Technologies:

TI-84 Plus*

TI-84 Plus Silver Edition*

 TI-84 Plus C Silver Edition

 TI-84 Plus CE

* with the latest operating system (2.55MP) featuring MathPrint™ functionality.



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Tech Tips:

- This activity includes screen captures taken from the TI-84 Plus CE. It is also appropriate for use with the rest of the TI-84 Plus family. Slight variations to these directions may be required if using other calculator models.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- Access free tutorials at <http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials>
- Any required calculator files can be distributed to students via handheld-to-handheld transfer.

Lesson Files:

- Somethings_Fishy_Student.pdf
- Somethings_Fishy_Student.doc



Data Table

Northern Pike Length in cm	Northern Pike Mass in kg	Walleye Length in cm	Walleye Mass in kg	Largemouth Bass Length in cm	Largemouth Bass Mass in kg
60	1.74	36	.46	20	.18
62	1.80	38	.54	22	.26
64	2.00	40	.67	24	.28
66	2.27	42	.70	26	.37
68	2.52	44	.84	28	.49
70	2.77	46	1.00	30	.63
72	2.85	48	1.13	32	.67
74	3.18	50	1.34	34	.84
76	3.48	52	1.39	36	1.00
78	3.82	54	1.56	38	1.27
80	4.15	56	1.77	40	1.52
82	4.26	58	2.03	42	1.81
84	4.64	60	2.29	44	1.89
86	5.06	62	2.36	46	2.23
88	5.47	64	2.61	48	2.57
90	5.60	66	2.95	50	2.99
92	6.07	68	3.24	52	3.11
94	6.59	70	3.62	54	3.59
96	7.08	72	3.73	56	4.10
98	7.58	74	4.11	58	4.65
100	7.74	76	4.53	60	5.23
		78	4.95	62	5.41
		80	5.40		

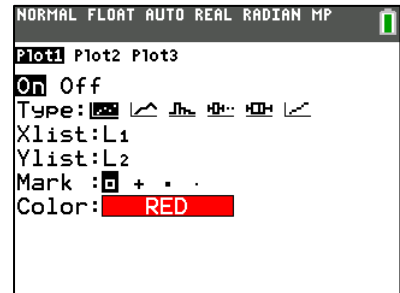
Entering the Data

1. Press $\boxed{y=}$. If there are any equations on this screen, press $\boxed{\nabla}$ to place the cursor next to **Y1=**, and then press $\boxed{\text{clear}}$, to clear the equation. Repeat this sequence to clear all equations.
2. Press $\boxed{\text{mode}}$ and make sure the defaults are set.
3. Press $\boxed{2\text{nd}} \boxed{\text{format}}$ and make sure the defaults are set.
4. Press $\boxed{\text{stat}} \boxed{\text{enter}}$.
5. Press $\boxed{\uparrow}$ to move to the heading **L1**. Press $\boxed{\text{clear}} \boxed{\text{enter}}$. Repeat this procedure for any list that has data.

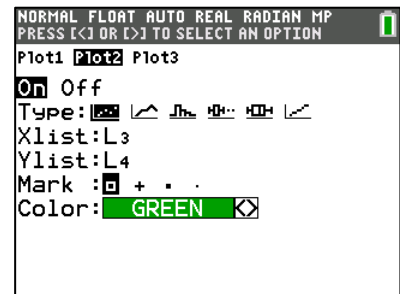


- Using the data table on the previous page, enter the data into **L1** (northern pike length) and **L2** (northern pike mass). In **L3** and **L4**, do the same for the walleye, and in **L5** and **L6** for the bass.
- To do this, type in the first number in **L1** and then press either `enter` or `↓` to move down to the next spot in the list. Continue until you have entered all of the northern pike length data in **L1**. When you complete the data from **L1**, press `→` to move to **L2** and enter the northern pike mass data. Repeat this for the walleye and the bass in the remaining lists.

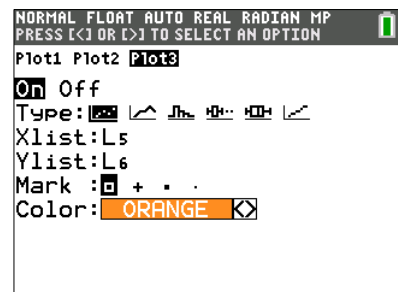
- Press `2nd` [stat plot]. Press `enter` to select **1:Plot1**. Set your TI-84 as shown at the right.



- Press `2nd` [stat plot]. Press `enter` to select **2:Plot2**. Set your TI-84 Plus CE as shown at the right.



- Repeat for **Plot3**. Set your TI-84 Plus CE as shown at the right.



- Press `window` and make appropriate settings for the size of your graph. Your window must reflect ALL of the data in your lists, because you will be graphing all of the data at one time. A suggestion when setting your window is to set the **Xmax** value slightly lower than the lowest value in your lists, and the **Ymax** value slightly higher than the highest value in your lists. Remember, you have three x-lists and three y-lists to consider, and you will use one window setting for all of them.
- Press `graph` to see your data displayed graphically.



Data Analysis

1. When you construct your graphs, what is the independent variable?

Answer: The independent variable is length.

2. What is the dependent variable?

Answer: The dependent variable is mass.

3. Which species of fish appears to gain the most mass per cm of length?

Answer: The species of fish that appears to gain the most mass per cm of length is probably the bass.

4. Suppose that you are out fishing, and you catch a 61-cm fish of each species. Draw what each fish would look like.

a. Northern Pike

Walleye

Bass

Student answers will vary. Drawings will vary. Look for the northern pike to be the thinnest, the walleye to be fatter than the northern pike, and the bass to be the fattest.

5. As a northern pike grows from 68.6 cm to 71.1 cm, how much mass would the fish likely gain?

Answer: The fish will likely gain .27 kg.

6. As a northern pike grows from 92.9 cm to 96.5 cm, how much mass would the fish likely gain?

Answer: The fish will likely gain .54 kg.

7. What do you notice about the rate of mass gain in each fish? Explain why the mass gain per cm changes as the fish gets longer and longer.

Student answers will vary. Mass gain increases with each cm as the fish gets longer. Rate is not the same because the fish also increases in girth.

8. Fish of the same species and the same age but found in lakes of much different latitudes may be dramatically different in size. Describe some factors that may lead to these differences.

Student answers will vary. Some factors that may lead to these differences are: temperature of the water, metabolism of the fish, food sources, and so on.



Going Further

1. Find out what your state record and the world record masses are for each of these three species of fish. Using your graphical models, determine the predicted lengths of each of these record fish, and then compare your prediction to the actual lengths, if they are available.

Student answers will vary by location.

2. Draw two graphs of the growth of a pet hamster. Make age the independent variable for each graph. Make length the dependent variable on one graph and mass the dependent variables on the other. Explain why you drew your graphs the way you did. After you have finished drawing the graphs, try to duplicate them using your TI-84 Plus CE.

Student answers will vary, but all graphs should level off at a certain reasonable size limit for a hamster.