

Lesson Plan from Marco Polo NY
(<http://www.nyiteez.org/MarcoPoloNY/index.php>)

by
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Class: Math B

Time required: One period

Title: Using linear regression analysis study Bathtub Water levels

In this lesson students need to record data at home. The student must fill the bathtub with water and measure the height of the water in centimeters. The students should measure the height in the middle of the bathtub away from the sides. Using a stopwatch or a timer the student will drain the water from the tub for one minute. The student will record in a table the depth of the water after one minute. They will continue this process every minute until the tub is empty. Time should be measured in minutes and depth of the water should be measured in centimeters.

Time (minutes)	Depth (centimeters)
0	

Below are questions for the student to answer

1. Graph the scatter plot of the data in your chart using time for the x-axis and depth for the y-axis.
2. Draw a straight line through the points. All of your points may not be on the line, but move your straight edge around until you get the best fitting line.
3. What is the slope of your line?
4. What is the relationship between the slope of the line and the rate of change of the water?
5. What is the y-intercept of your line? What does the y-intercept tell us about this application?
6. Write the equation of the line.
7. Use the TI-83 to create a stat plot and find the regression equation for the data. (see attached sheet if necessary)

Regression (Modeling) Analysis

I. To delete a list

Step 1: Press 2nd +.

Step 2: Press Delete.

Step 3: Press List.

Step 4: Press enter on the list you want to delete.

II. To *edit* the data into a list

Step 1: Press STAT.

Step 2: Press EDIT.

Step 3: Clear any old data from these lists by highlighting the list name and press clear or see above.

Step 4: Type in the name of each list using the green letters (If a letter is not appearing then press 2nd ALPHA). Press enter after each name is typed and use the cursor to move around. Use L1, L2, etc... if you do not want to use a name

Step 4: Type in the data into each list (type the number, enter, next number, enter, etc.). Arrow right to get to the next list and begin entering the data in the same manner.

III. To graph a scatter plot for the data in your lists

Step 1: Press 2nd STAT PLOT.

Step 2: Press enter on Plot 1.

Step 3: Press on and type of graph by highlighting the one of the six graph styles.

Step 4: Type in the name of the list you want to represent the x-list & y-list (type L1, L2, etc. if you did not name the lists)

To avoid retyping the name of the list

Step 1: press 2nd STAT.

Step 2: press enter on the name of the list.

Step 5: Select the type of MARK used to graph the data.

Step 6: Determine the WINDOW by analyzing the data.

Step 7: Graph and determine the type of function it represents.

IV. To find the curve (*regression model*) that best fits the data and graph

Step 1: Press STAT.

Step 2: Move cursor to CALC.

Step 3: Press enter on the regression model that applies.

Step 4: Press 2nd STAT.

Step 5: Press enter on the name of the list that represents the x-list.

Step 6: Press,

Step 7: Press 2nd STAT.

Step 8: Press enter on the name of the list that represents the y-list.

Step 9: Press,

Step 10: Type Y_1 (press vars, y-vars, function, Y_1)

Step 9: Press ENTER.