

## General Education Math Lesson Plan

### Determining Functions Using Regression

**Source:** <http://illuminations.nctm.org/LessonDetail.aspx?ID=L725>

**Standard:** 8.PRF.2e1 Distinguish between functions and non-functions, using equations, graphs or tables

#### Using a Calculator for Finding the Equation of a Function

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To determine the function of best fit for a set of data, students should recognize which category of function bests fit the data and know how to use technology to obtain a function. This lesson teaches these skills and prepares students for the subsequent lesson(s), in which they will collect their own data.

Instructions on using TI83 and TI84 calculators for regression is available [here](#).

#### Learning Objectives

By the end of this lesson, students will:

- Analyze data to determine the type of function that most closely fits the data
- Use a calculator to find the curve of best fit for a set of data

#### Materials

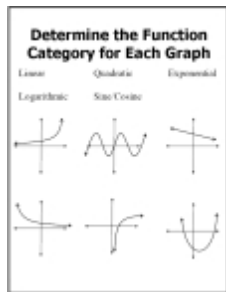
- Graphing calculator
- [Overhead - Determine the Function](#)
- Activity Sheet - [Corn Height](#)
- Activity Sheet - [Which Function Is Better?](#)

#### Instructional Plan

##### Part 1: Review of Graphs

Students should recognize which type of function a graph represents, so they can use technology to determine the best function for the data set. It is worthwhile to review these functions since students may not have seen some of them in a while. Also, displaying all the graphs together, as this activity does, can aide students later, as they have to determine the best graph for the data.

Distribute copies of the [Determine the Function review sheet](#), or use it as an overhead. Ask students to match each graph with its proper general description.



[Determine-the-Function overhead](#)

**Part 2: Using the Technology:** Whether students are using a calculator or a spreadsheet to do regression, this section is designed to introduce or review the process of finding regression functions.

Present students with the following table of data for the height of a crop of corn over time. This table also appears on [Activity Sheet 1](#)

DAY	HEIGHT (IN CM)
1	1.31
2	2.10
3	4.09
5	6.37
12	14.42

**General Steps for Using Regression:**

(Specific TI-83 and TI-84 instructions are available [here](#))

1. Enter the data points into the calculator
2. View the scatter plot of the data.
  - Most likely, the window for viewing the graph is  $x=\{-10,10\}$  and  $y=\{-10,10\}$ . When the students first enter the data, and look at the scatter plot they will notice that only 4 of the 5 data points are visible. This is great time to discuss determining the appropriate domain and range for a specific set of data.
3. Determine the best function category for the available data.
  - Students may have different opinions about the best category from the points given. Discuss that in some situations, you may want to try more than one function to determine which is most appropriate for the data.
4. Find the function of best fit for the data.
5. Graph the function of best fit over the data to verify its reasonableness.

Allow some time for the students to answer the questions on [Activity Sheet 1](#). Students may use the graph or the equation to help find their answers.

You may want to ask students some questions about the activity, such as:

- How do you think the calculator finds the equation of the line? Explain how you would get the equation of the line by hand?
- What makes the calculator easy to use?
- What do you have to remember in order to repeat the process?
- What did you write as a response to Question 11?

Consider collecting the Activity Sheet to use for assessment.

**Part 3: Finding the Best Function:** Sometimes it may not be clear from the given data points which regression to use. This example will elicit a discussion of “best” function.

1. Distribute Activity Sheet 2, [Finding the Best Function](#).
2. Students can work in pairs or small groups to complete the activity sheet.
  - Different groups will get different answers. Most students will determine that the function is exponential because they only see the increase for the positive  $x$ -values.
  - Encourage students to experiment with other functions until they choose a quadratic form. They should notice that since the negative  $x$ -values are unknown, it may be tricky to determine the *best* function.
3. Discuss the results a whole class.
  - What function category did you determine was best? Why?
  - What would help determine which function is better [more points, or knowing the context or trend for the data]

[Here](#) are the answers to the Best Function Activity Sheet.

Once students can determine the function category and use technology to find the specific function, they are ready to explore the next lesson and determine the function resulting from various experiments.

**Activity: Create a universally designed version of the above lesson**

UDL Planning	My ideas
Representation- adaptations in materials (e.g., adapt for sensory impairments)	Provide students with models of graphs so they can compare provided graphs to the model the “Review of Graphs”; color code calculator to assist in entering data; simplify data sets so student doesn’t have so much information to enter
Expression- how will student show learning (e.g., use of assistive technology; alternative project)	Create response cards or ask questions so that students can respond yes/no pertaining to which graph fits best; use computer software that will allow students to scan and select correct answers using assistive technology
Engagement- how will student participate in the activity	Students can complete the activities in pairs; create a color coded task analysis for students to follow for entering information in the graphing calculator or how to use the functions to find the equation for the function