

Investigating the Sine Curve

Concepts

VA TRIGONOMETRY

STANDARD SOL T.6

- The student, given one of the six trigonometric functions in standard form [e.g., $y = A \sin(Bx + C) + D$, where A , B , C , and D are real numbers], will
 - a) determine the amplitude, period, phase shift, and vertical shift; and
 - b) sketch the graph of the function by using transformations
- The graphing calculator will be used to investigate the effect of changing A , B , C , and D on the graph of a trigonometric function.

Materials

- TI Navigator System
- TI Interactive!
- TI 84+ graphing calculator
- TI Smart View

Background

- In this activity, students will begin class with a quick review of general graphing knowledge for sine curves. They will follow this up with an activity that reverses course. Instead of using an equation to determine a graph, they will take given parameters and develop an appropriate equation. Finally, they will utilize real-life data to create a model to fit that data, and analyze the parameters of their model.

Basic Graphing Review

1. Open TI Navigator and Begin Class
2. After students have logged into the NavNet APP, send the Learning Check file “Sine Graphs”.
(Note: This activity could be done as an informal assessment using Quick Poll.)
3. Students should choose Network Apps to retrieve the Learning Check file.
4. At the end of 5 minutes, collect the students’ responses using Class Analysis and review results.

Constructing a Graph (from given information)

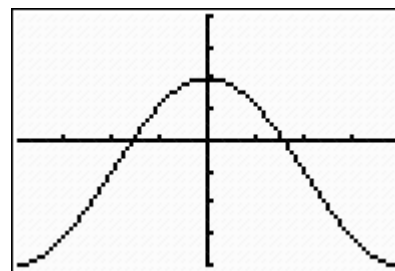
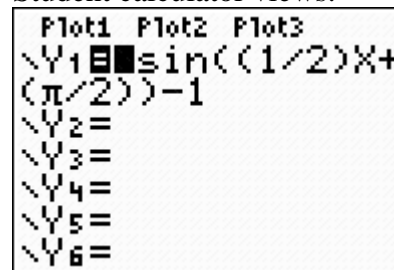
1. Present the students with the following problem. Determine a sine function that has the following parameters:
 - Amplitude = 3
 - Period = 4π
 - Phase Shift = $-\pi$
 - Vertical Shift = -1
 (e.g. $y = 3\sin\left(\frac{1}{2}x + \frac{\pi}{2}\right) - 1$)
2. Collect student work for class discussion using the Navigator screen capture function for a class discussion of the problem.
 - Split the class into two groups and have one group display their equation on their calculator while the other group has their graph displayed on their calculator. Then capture the screens and discuss each.
3. (Optional) If you want a formal assessment of the equations and graphs, have students save their information in a graphical data base (GDB).
 - Have all students save in GDB 1 and use Navigator to collect from class (use a force collect).
 - To open the files, associate them with the TI Smart View.

Teacher Notes

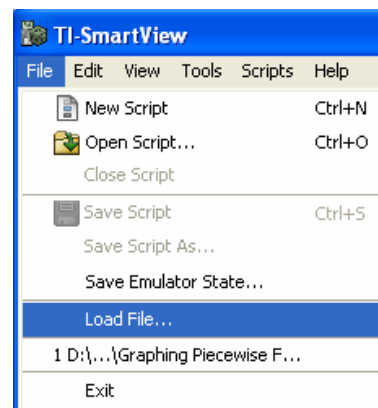
Student calculator view:



Student calculator views:



Teacher’s computer view:



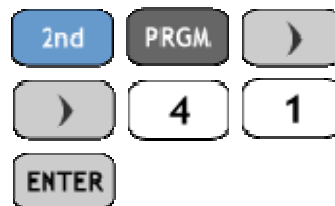
- Open Smart View and you can view each file individually by clicking on File and moving down to Load File.
- You will need to recall the GDB in Smart View after loading the file.

Data Collection and Modeling

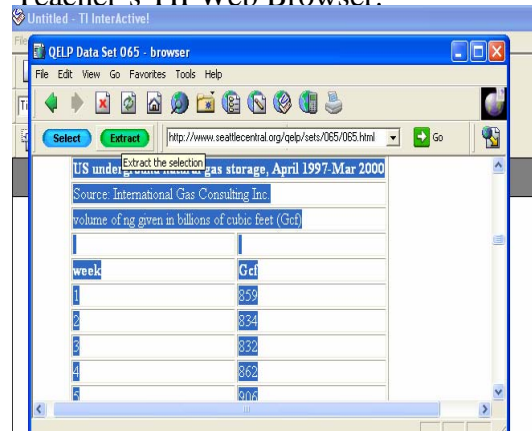
1. Hand out the background information sheet on Natural Gas Storage and have students read.
2. Open the TI Interactive! Web Browser and go to <http://www.seattlecentral.org/qelp/sets/065/065.html>.
3. Press Select until you get the table of data and then Extract this data into TII.
4. In the data editor, delete the first five rows so that you only have data that pertains to gas storage.
5. Send the data to the class through TII by clicking on the File pull down menu and selecting Export – To Class.
6. The equation should be something like:

$$y = 962 \sin(.130x - 2.52) + 2014$$
7. Students should not use the regression feature on the calculator to determine this equation. They may compare their answer to the calculator's answer when they have finished.
8. Have students type a report on this section of the lesson. The report should be completed by using a word processor along with screen shots from the calculator or by using TII.

Teacher's Smart View keystrokes:



Teacher's TII Web Browser:



Teacher's TII Data Editor:

