

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

Basic Graphing Review

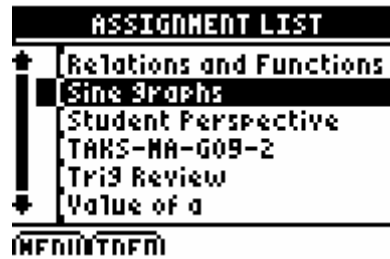
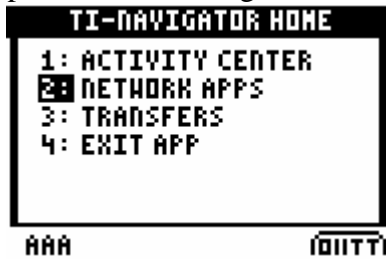
1. After your teacher begins class in TI Navigator, log into the system by pushing the APPS key on your calculator and scrolling down until you get to NavNet.



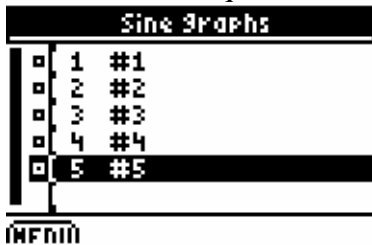
2. Your teacher will send you a Learning Check file titled “Sine Graphs”. After you have received this file, you will need to push the “zoom” key on your calculator to get back to the NavNet home screen.



3. Press 2 on your calculator to get to the Learning Check file and select “Sine graphs” from the assignment list.



4. You have 5 minutes to complete this assignment. Make sure that you have answered all of the questions. All of the questions will have boxes next to them.



Constructing a Graph (from given information)

1. Determine a sine function that has the following parameters. Show all work necessary for deriving your equation.
 - Amplitude = 3
 - Period = 4π
 - Phase Shift = $-\pi$
 - Vertical Shift = -1

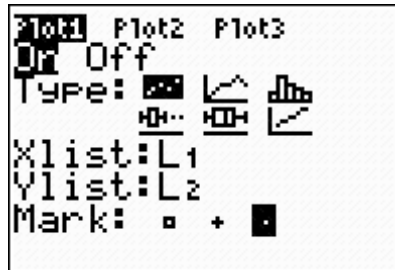
- When you finish, place your equation in your graphing calculator, set an appropriate window, and graph the function.
- Save your settings as a Graphical Database (GDB) by following these keystrokes:



Data Collection and Modeling

- While your teacher extracts and sends you data on the storage of natural gas, you should read the background information that you have been given on this issue.

- Set up your Stat Plot as follows:



- Look at the data in your lists (L1 and L2). Based on these numbers, what would be appropriate window settings?

Xmin = _____ Ymin = _____

Xmax = _____ Ymax = _____

Xscl = _____ Yscl = _____

- Determine an equation of best fit in the form $y = A \sin(Bx + C) + D$ for this data. Show all work related to the development of your parameters A , B , C , and D . Calculate these values to three significant figures.

Equation: _____

- What is the significance of the parameters A and D as they relate to the data?
- Type up this portion of the lesson (Data Collection and Modeling) using TI Interactive! or by using screen shots from your calculator and a word processor.