

5.9 Technology: TI-83 Plus Calculator: Using Sinusoidal Regression to Find the Curve of Best Fit

Specific Expectations

- TF2.07 demonstrate facility in the use of radian measure in solving equations and in graphing
- TF3.04 sketch the graphs of simple sinusoidal functions [e.g., $y = a \sin x$, $y = \cos kx$, $y = \sin(x + d)$, $y = a \cos kx + c$]
- TF3.05 write the equation of a sinusoidal function, given its graph and given its properties
- TF4.04 pose and solve problems related to models of sinusoidal functions drawn from a variety of applications, and communicate the solutions with clarity and justification, using appropriate mathematical form

Evidence of Learning

Students should be able to

- determine whether data is sinusoidal from a scatter plot
- determine an equation and a graph from sinusoidal data

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Time Required Functions and Relations or Functions: 30 min

Materials and Equipment

- TI-83 graphing calculator and view screen

Overview

- Use lists to create a scatter plot.
- Use sinusoidal regression (**STAT** and **CALC**) to draw the curve of best fit.

Management Options

Groups or Pairs – Break the class into pairs or small groups so that there is at least one graphing calculator per group. Have students work through the steps, taking turns using the graphing calculator. Have students do the *Practice* questions in their groups while another student demonstrates using the TI-83 Plus view screen.

Independent Work – If each student has a graphing calculator, then have students work through the steps and complete the *Practice* questions. Use a TI-83 view screen to take up the answers to the questions.

ASSESSING LEARNING SKILLS

Independence

If you assign this lesson for independent study, circulate and observe how students handle the task on their own. Watch to see who is accepting responsibility for their own learning and who is not. Observe which students demonstrate persistence and the ability to focus. Use the Generic Rubric for Independence for assessment.

ASSESSING LEARNING SKILLS

Teamwork

Circulate to each pair or group and observe how students cooperate with each other. When one person is using the graphing calculator, do other group members assist if needed? Do they participate in the process even if they are not directly using the graphing calculator? Use the Generic Rubric for Teamwork.

The model for sinusoidal regression is $y = a \sin(bx + c) + d$. In this form, $\frac{c}{b}$ equals b (and $b = k$) in $y = a \sin k(\theta + b) + d$.

While the more data points the better, ensure that students plot at least four data points and at least two data points per cycle for scatter plots.

Note that the values in the **SinReg** screen are always in radians whether the mode is set to radians or degrees.

When checking students' answers to *Practice* question 3, remember that the calculator gives the equation in terms of the sine function. Students may have written a cosine function for previous work, so, in their responses, they should show how to convert algebraically or they should graph the two models and compare them.

ASSESSMENT SUGGESTION

Knowledge and Skill, Communication

Let students demonstrate their calculator skills using the TI-83 view screen. Look for students' ability to use the calculator correctly from entering data to graphing and finding the curve of best fit. As well, observe how students communicate while working with a partner or when demonstrating on the TI-83 view screen. Use the Generic Rubric for Knowledge and Understanding and the last two rows of the Generic Rubric for Communication.

Questions with a Functions and Relations or a Functions Focus:

1–3