

Catching the Rays

by – Lynda Ferneyhough

Activity overview

Students will fit a sinusoidal function to a set of data. The data are the number of hours of daylight starting January 1st and collected on the first and sixteenth days of the months in Thunder Bay, Ontario, Canada.

Concepts

- Transformations of trigonometric functions.
- Determining the parameters in a sinusoidal function to fit the scenario given.

Teacher preparation

Distribute the data file to the students' calculators.

Classroom management tips

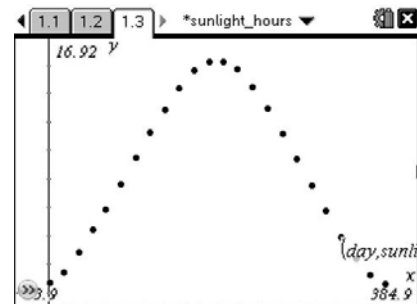
Students will have more success if they do some initial calculations before trying a trigonometric function.

TI-Nspire Applications

TI-Nspire Lists & Spreadsheets, Graphs

Step-by-step directions

Graph the data as a scatter plot. (menu) > Graph Type > Scatter Plot, put the data from “day” in the x-list (tab) and put the data from “sunlight” into the y-list. (menu) > Window/Zoom > Zoom-Data.



Change back to function mode and enter a sinusoidal curve to fit the data.

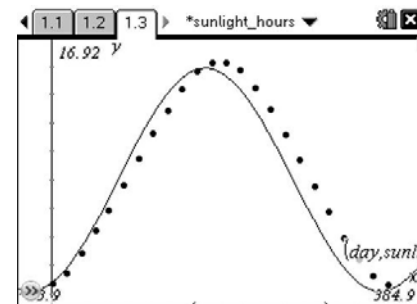
(menu) > Graph Type > Function

The estimate for a is half the distance between the top and bottom data points. $a \approx \frac{16.13 - 8.28}{2} = 3.925$.

The estimate for b is for the period of 1 year. $b \approx \frac{2\pi}{365}$.

The estimate for c is the March equinox (or the 70th day) adjustment. $c \approx -70 \cdot \frac{365}{2\pi}$.

The estimate for d is the average number of hours of daylight which is 12.

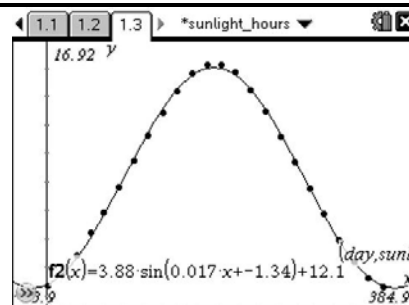


Materials: TI-Nspire

Adjust the values in the function to a more exact fit. It is easier to work with decimal numbers at this point.

Students may wish to hide the function line at this point. Press

ctrl **G**.



Student TI-Nspire Document
sunlight_hours.tns

The data on the next page is the number of hours of daylight starting January 1st, collected at Thunder Bay, Ontario, Canada. Graph the data as a scatter plot on the Graphs page. Adjust the window.

Fit a trigonometric function in the form $f(x) = a \sin(bx + c) + d$ to the data. Explain the values of the parameters in this scenario.

day	sunlight
1	8.33333
2	8.71667
3	9.4
4	10.2
5	10.9333

