

Changes in Latitude

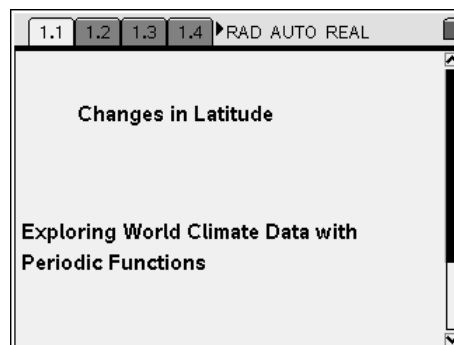
by – Bill Stiggers and Sheryl Edwards

Activity overview

Students will explore data from worldclimate.com. They will write a sine function to fit the data. They will compare and contrast the characteristics of the graph and the data and find a relationship between climate and distance from the equator.

Concepts

Describe and compare the characteristics of periodic functions; e.g., general shape, amplitude, period, using real data. Model bi-variate data with a sine function. Connect the characteristics of the function to the data. Compare and contrast several data sets involving World Climate, discuss the relationship between the latitude of a city and the amplitude, and shape of the sine graph.



Teacher preparation

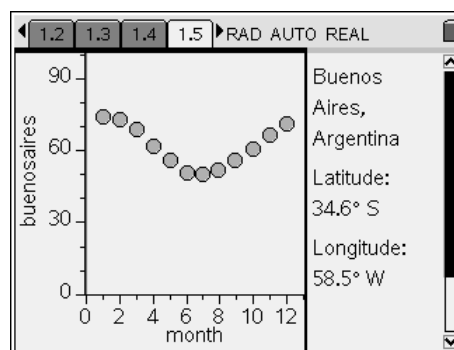
Review the transformation model for the sine function with the students. Make sure they know how to navigate from page to page; from split page to split page and that they know how to enter data and adjust window setting.

Classroom management tips

Make sure students are familiar with working with split screens.

TI-Nspire Applications

Spreadsheets, Notes, Data and Statistics.



Assessment and evaluation

Evaluate the work students do on this activity. Give them several data sets to model with a periodic function.

Activity extensions

- *Students can compare the average temperature in 10 cities in a particular month such as January. They can plot the distance from the equator vs. the average temp in a particular month.*

1.1 1.2 1.3 1.4 ▶ RAD AUTO REAL

Changes in Latitude

Exploring World Climate Data with Periodic Functions

1.1 1.2 1.3 1.4 ▶ RAD AUTO REAL

Recall the general form of a sine function:
 $y = a \sin(b(x-h)) + k$,
 a = amplitude
 $\frac{2\pi}{b}$ = period
 h = phase shift
 k = vertical shift

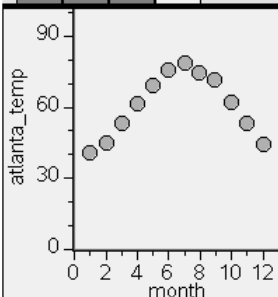
1.1 1.2 1.3 1.4 ▶ RAD AUTO REAL

Explore the graphs on pages 1.4, 1.5, and 1.6. Find the maximum, minimum, amplitude, period and phase and vertical shift for each graph. Record your answers in your notebook.

Use the above characteristics to write a sine function to fit each of the plots on the following pages.(1.4, 1.5, and 1.6)

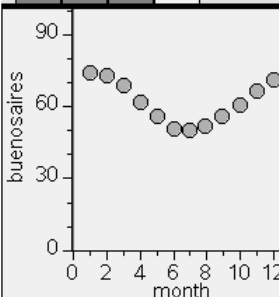
To graph your function make sure you are on

1.1 1.2 1.3 1.4 ▶ RAD AUTO REAL



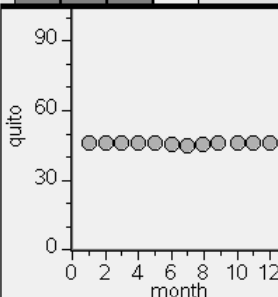
Atlanta, Georgia
 Latitude: 33 N
 Longitude: 83 W

1.2 1.3 1.4 1.5 ▶ RAD AUTO REAL



Buenos Aires, Argentina
 Latitude: 34.6° S
 Longitude: 58.5° W

1.3 1.4 1.5 1.6 ▶ RAD AUTO REAL



Quito, Ecuador
 Latitude: 0.60 S
 Longitude: 78.59 W

1.4 1.5 1.6 1.7 ▶ RAD AUTO REAL

Compare and contrast the climates of the two cities, in terms of temperature range, minimum, maximum temperatures. When does winter occur in each city?

1.5 1.6 1.7 2.1 ▶ RAD AUTO REAL

Go to www.worldclimate.com and research three more major World Cities. Be sure to record the Latitude for each city.

Fill in the date on the spreadsheet on the next page. The first column is month. Columns B, C and D are for average 24 hours temps for each of your cities. You can change city1, city2 and city3 to the names of your

1.6 1.7 2.1 2.2 ▶ RAD AUTO REAL

A	month	B city1	C city2	D city3	E
1	1				
2	2				
3	3				
4	4				
5	5				
A7	1				

1.7 2.1 2.2 2.3 ▶ RAD AUTO REAL ctrl

