

Title _____ Sunrise in Sineland _____

Curriculum Mathematics _____

Grade Level Span 9-12 _____

Purpose

In this activity students will see how real world data can be modeled as a trig function.

Description

Students research the sunrise and sunset times for cities in various latitudes. This data is entered into a graphing calculator in order to study the characteristics of the functions.

Activities	Curriculum Standards	NETS for Students
1. Access the internet to find the sunrise and sunset data for several cities in different latitudes. Determine the number of daylight hours for each date considered. Thirty dates over the course of the year should be adequate and give accurate results. At least two dates should be included from each month.	5	1, 2, 7
2. Enter the data into a graphing calculator. Use the number of the day (i.e. February 10 is day # 41) as the time (independent) variable and the number of daylight hours (rounding to the nearest minute is helpful) as the dependant variable.	2, 5, 10	5, 8
3. Generate a graph. Print it out if the technology is available or sketch a graph if the technology is not available to print.	2, 5, 10	5, 8
4. Determine the trig regression for each graph by hand. Check these regressions using the capabilities of the graphing calculator.	2, 5, 9, 10	5, 8
5. Compare and contrast the three graphs.	2, 5, 10	
6. Write a short paragraph explaining why the graphs are different.	8, 10	10

Tools and Resources

(List all Web sites, specific software and hardware needs)

1. **Graphing calculator.**
2. **Access to the internet.**
3. **TI Graphlink for printing the graphs. (Freeware available at www.ti.com/calc/ Cable must be purchased separately)**
4. **http://aa.usno.navy.mil/data/docs/RS_OneYear.html is among the websites with the sunrise/sunset times for various cities.**

Assessment

(How will you assess the students' learning? If you have a rubric, record it here. Be as specific as possible)

Students will be assessed on

- the accuracy of their representation of the data.
- The correctness of the mathematical model they derive.
- Their interpretation of the graphs.
- Their explanation of the physical reasons for the differences in the graphs.

Authors (including contact information)

(Record the names and email addresses, if possible, of those who contributed to the development of this lesson sequence)

Book:

Adapted from a project found in Functions, Statistics, and Trigonometry, UCSMP (1992)

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Personal Account

(Have you taught this lesson sequence before? What are the great learning/experiences you had?)

- **The cities chosen should be at different latitudes, not too close together.**
- **It's reasonably easy to find the data for cities within the United States.**

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