



About the Lesson

In this group activity, students will explore the relationship between temperature and relative humidity. As a result, students will:

- Make graphs of Temperature vs Time, Relative Humidity vs Time, and Relative Humidity vs Temperature.
- Look for patterns in the data.
- Use mean, median, mode, and range to compare and contrast different datasets.
- Compare data from various U.S. cities and times of the year.

Vocabulary

- relative humidity
- line of best fit

Teacher Preparation and Notes

- There are 10 sets of data with a data set for each group of students. Data sheet is at end of Student Activity Sheet. Data is from various U.S. cities, including the Northwest and Southwest, so students have some variety for comparison.
- If desired the graphs that students produce can be printed using TI-Connect CE that is available at education.ti.com. Students need to see the various graphs to discuss the similarities and differences.
- This activity is designed to promote classroom analysis using students' mathematical and scientific inquiry skills. With the datasets provided, students can compare the data from different geographic locations and different times of the year to arrive at their conjectures. To increase the sample size, you can encourage students to bring their own data sets to add to the sampling.

Activity Materials

- Compatible TI Technologies:

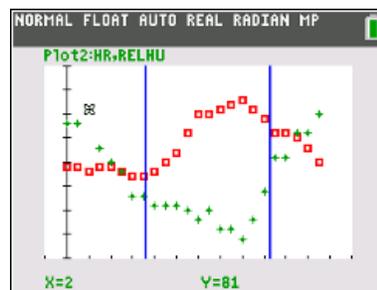
TI-84 Plus*

TI-84 Plus Silver Edition*

TI-84 Plus C Silver Edition

TI-84 Plus CE

* with the latest operating system (2.55MP) featuring MathPrint™ functionality.



Tech Tips:

- This activity includes screen captures taken from the TI-84 Plus CE. It is also appropriate for use with the rest of the TI-84 Plus family. Slight variations to these directions may be required if using other calculator models.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- Access free tutorials at <http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials>
- Any required calculator files can be distributed to students via handheld-to-handheld transfer.

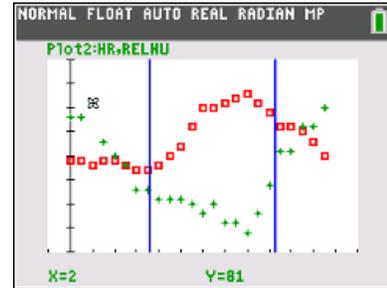
Lesson Files:

- Shedding_Light_on_Weather_Student.pdf
- Shedding_Light_on_Weather_Student.doc



Introduction

In this activity, students will use real-world data to analyze and investigate for patterns. They will need to think critically using their mathematical knowledge and graph interpretation skills.



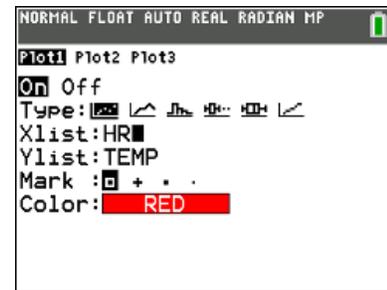
Teaching Notes

- This activity is written using the Stat Editor `[stat]`. Students may use the app, SciTools, if you prefer. With it you can enter the data into named lists in the same manner as described in the student activity. Note: Drawing the vertical lines for the time of sunrise and sunset requires leaving the SciTools app.

Entering the Data

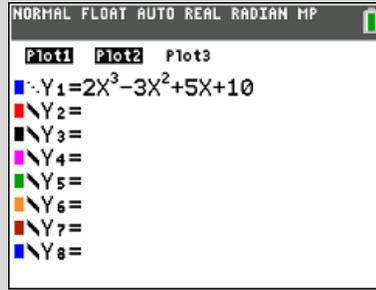
To enter the name of the lists for the Xlist and Ylist, students can use either the A-lock (alpha lock) to type in the list name or access the list names in y 9 and use the arrow keys to find the desired list name.

Since the graph displays two variables, students need to choose a different mark for each variable, especially if choosing a different color is not an option.



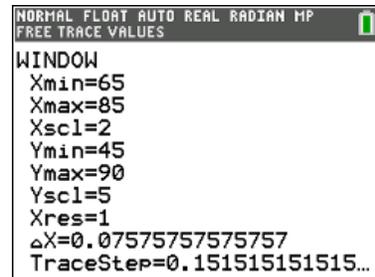
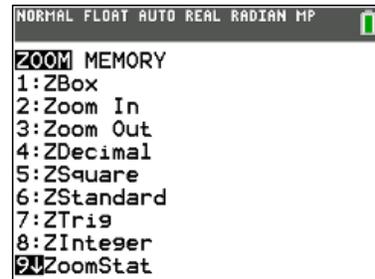


Tech Tip: Before graphing any data set, it is a good habit for your students to press $\boxed{Y=}$ to see if there are any functions that would interfere with the graph. Use the arrow keys to move up to the equation. Press $\boxed{\text{clear}}$ if you want to clear out the equation. If you want to keep the equation but only want to turn the equation off, left arrow to the highlighted equal sign and press $\boxed{\text{enter}}$. The equation will stay but will not appear on the graph.



The $\boxed{Y=}$ editor is also a quick way to see which Plots are already on. If desired, arrow up to the Plot that is highlighted, press $\boxed{\text{enter}}$ to turn the highlighted Plot off.

To set the window and depending on what skills your student need to develop, students can either set the window manually by entering the values in $\boxed{\text{window}}$ or let the calculator set it by pressing $\boxed{\text{zoom}}$ and selecting $\boxed{\text{ZoomStat}}$.



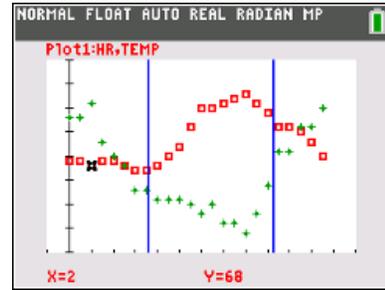


Looking at the Results

1. Make a sketch of the time plots of temperature and relative humidity with sunrise and sunset identified on one set of axes.

Student answers will vary.

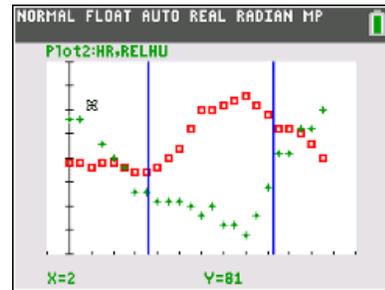
The student sketches of the Temperature and Relative Humidity data will vary but will resemble the one shown. This example is from Dallas, TX.



2. From the above graph, describe how Temperature and Relative Humidity are related.

Student answers will vary.

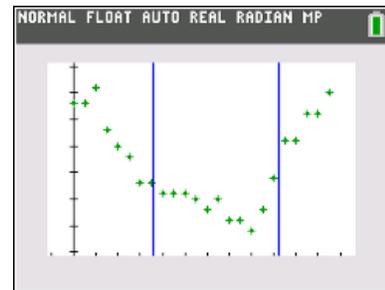
Sample response: From the graph, it appears that as the temperature increases the relative humidity decreases.



3. Describe how Relative Humidity varies during the 24-hr period.

Student answers will vary.

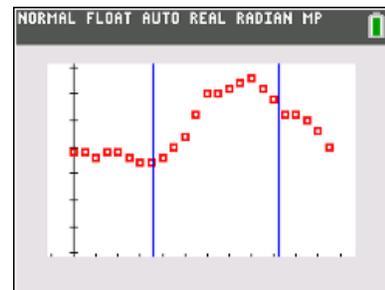
Sample response: Over the 24-hour period, as sunrise approaches, the relative humidity continues to decrease until about an hour before sunset when it starts to increase. The relative humidity at sunset is increasing at a fast rate.



4. Describe how the Temperature varies during the 24-hr period.

Student answers will vary.

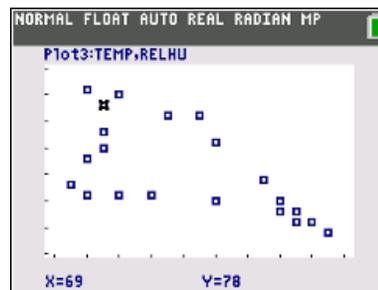
Sample response: Over the 24-hour period, a minimum temperature occurs at sunrise. About 2 hours before sunset, the temperature is at a local maximum.



5. Graph Temperature as the independent variable and Relative Humidity as the dependent variable to verify your response to Question 1. Sketch the graph. In your own words, describe the relationship between Temperature and Relative Humidity.

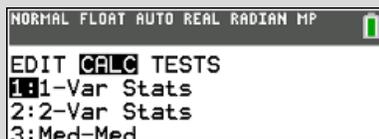
Student answers will vary.

Sample response: As the temperature increases, the relative humidity tends to decrease.

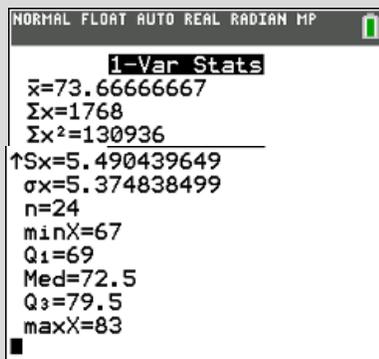


Teaching Note: Facilitate a class discussion for students to compare the results from the various U.S. locations and the data from the other times of the year.

Tech Tip: To calculate the mean and median and to find the range with one command. Press `[stat]` and select 1-Var Stats from the CALC menu



In order to see all the statistics, use the down arrow key `↓` to get all the way down to the last statistic. For this example, the mean $\bar{x} = 73.7$, the median $med = 72.5$, minimum $minX = 67$, and maximum $maxX = 83$.



6. Look at the mean, median, mode, and range of the Temperature and Relative Humidity.

Student answers will vary.

Summary Statistics for this example:

Temperature:	73.7 °F	72.5 °F	69 °F	16 °F
	Mean	Median	Mode	Range
Rel. Humidity:	66.5%	63.5%	61%	27%
	Mean	Median	Mode	Range

Teaching Note: Possible class discussion could compare the statistics of the various U.S. cities and the different times of the year looking for patterns.

Going Further

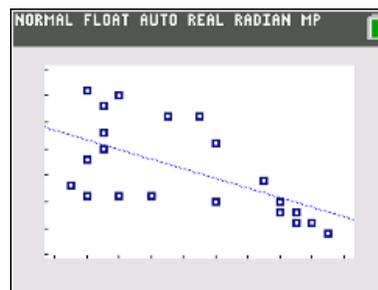
1. Find the line of best fit for the Relative Humidity-Temperature graph. Record the equation.

Student answers will vary.

Sample response:

The equation for the sample data is $y = -0.9x + 133$.

To do a regression to find the line of best fit, go to **[stat]** **[CALC]** **LinReg(ax+b)** or **LinReg(a+bx)**



Tech Tip: The screens below show a linear regression on the TI-84 family of calculators. To enter the variable Y_1 for the Store RegEQ, press **[vars]** **[Y-VARS]** **[Function]** and select **[Y₁]**. When students are viewing the graph of the data, storing the regression equation to the Y= editor enables them to see the graph of the data with the line of best fit.

NORMAL FLOAT AUTO REAL RADIAN MP EDIT CALC TESTS 1:1-Var Stats 2:2-Var Stats 3:Med-Med 4:LinReg(ax+b) 5:QuadReg 6:CubicReg 7:QuartReg 8:LinReg(a+bx) 9:LnReg	NORMAL FLOAT AUTO REAL RADIAN MP LinReg(ax+b) Xlist:TEMP Ylist:RELHU FreqList: Store RegEQ:Y ₁ Calculate	NORMAL FLOAT AUTO REAL RADIAN MP LinReg y=ax+b a=-0.9038461538 b=133.125
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2. Collect data in other areas of the U.S. or other times of the year to answer questions you may have. For example, is the relationship between temperature and relative humidity affected by the proximity with bodies of water or other geographic features?

Student answers will vary.

Sample response: Some possible sources of data are local airports or newspapers. The National Weather Service archival data tends to use the Dewpoint rather than Relative Humidity.