

Find a Line of Best Fit

ID: 9883

Time required
30 minutes

Activity Overview

Students make a scatter plot of heart rate versus age data and draw lines of best fit using three different methods—by hand, using the upper and lower quartiles, and using the handheld's regression feature.

Topic: Data Analysis & Probability

- Represent and interpret data displayed in line graphs and scatter plots.
- Display univariate data in a spreadsheet or table and determine the mean, mode, standard deviation, extrema and quartiles.

Teacher Preparation and Notes

- This activity is appropriate for an Algebra 1 classroom. Students should have experience with sequences of positive exponents.
- This activity relies on the handheld's Lists & Spreadsheet and Data & Statistics applications, including calculating one-variable statistics and plotting values and functions. If students are not familiar with these features of the handheld, extra time should be taken to explain them.
- This activity is intended to be **teacher-led** with students in **small groups**. You should seat your students in pairs so they can work cooperatively on their handhelds. You may use the following pages to present the material to the class and encourage discussion. Students will follow along using their handhelds
- **To download the student and solution TI-Nspire documents (.tns files) and student worksheet, go to education.ti.com/exchange and enter "9883" in the quick search box.**

Suggested Related Activities

To download any activity listed, go to education.ti.com/exchange and enter the number in the quick search box.

- Median-Median Fit Line (TI-Nspire Technology) — 8431
- Don't be Scatterbrained about Scatter Plots (TI-Nspire Technology) — 12794
- Population Predictions (TI-Nspire Technology and TI-Navigator) — 13800
- 400 Meter World Records (TI-Nspire Technology) — 9121

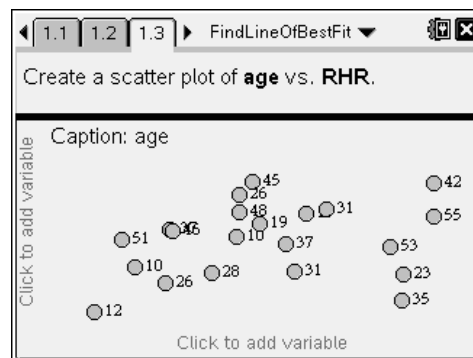
Heart rate versus age

The activity begins with a set of data: the ages and resting heart rates (rhr) of 21 individuals. Encourage students to scroll up and down the list to get a sense of the data. Discuss ways in which these two values, **age** and **rhr**, might be related, as well as any trends they observe. Students should realize that **age** is the independent variable and **rhr** is the dependent variable.

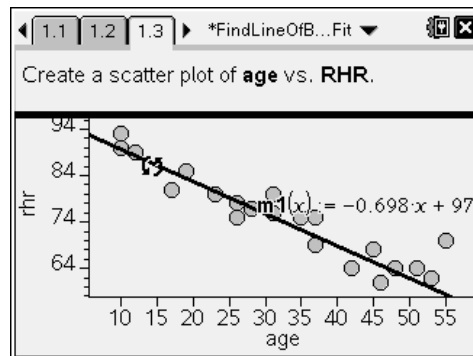
This table shows the age and resting heart rate (RHR) of 21 people. What is the relationship between age and RHR?

	A	B	C
	age	rhr	
1	10	90	
2	10	93	
3	12	89	
4	17	81	
5	19	85	

Students should create a scatter plot of the data on page 1.3. Detailed directions are given on the student worksheet. There is no need to adjust the window dimensions: the handheld adjusts them to match the data so automatically. Later they will add three lines of best fit, as well as horizontal and vertical lines marking the upper and lower quartiles of the data.



For the first method of finding a line of best fit, students place a movable line on the graph and adjust it by hand to make it as close to all of the data points as possible. Detailed directions are given on their worksheets.



For the second method of finding a line of best fit, students use **One-Variable Statistics** to find the upper and lower quartiles of each data set. The student should select **1** for Num of Lists. Note that the column titles will disappear after the calculation. Make sure students use Columns A and D to store the calculations. The first and third quartile values for both sets of data will be stored as age.q1, age.q3, rhr.q1, and rhr.q3.

	A	B	C	D
		=OneVar('ag		
8	MinX	10.	MinX	
9	Q ₁ X	21.	21.	Q ₁ X
10	MedianX	31.	MedianX	
11	Q ₃ X	45.5	45.5	Q ₃ X
12	MaxX	55.	MaxX	
A12	="MaxX"			

Next, student draw horizontal and vertical lines to mark the quartiles on the scatter plot. Using point-slope form, they should write the equation of a diagonal line that intersects two of the corners of the rectangle formed by these lines and follows the trend of the data.

$$y = 66 + \frac{80.5 - 66}{21 - 45.5}(x - 45.5)$$

Finally, for the third method of finding a line of best fit, students use the handheld's linear regression command. Detailed instructions are given on the student worksheet.

Lead a discussion comparing the different lines of best fit.

