

Finding a Line of Best Fit

ID: 8192

Time required
35 minutes

Topic: Data Analysis & Probability

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

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 calculator's regression feature.

Teacher Preparation

- *This activity is appropriate for an Algebra 1 classroom. Students should have experience with sequences of positive exponents.*

Classroom Management

- *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.*
- *The student worksheet is intended to guide students through the main ideas of the activity. It also serves as a place for students to record their answers. Alternatively, you may wish to have the class record their answers on separate sheets of paper, or just use the questions posed to engage a class discussion.*

TI-84 Plus Applications

Inequality Graphing

Finding a Line of Best Fit

ID: 8192

In this activity we will

- Create a scatterplot representing resting heart rates versus age
- Graph vertical and horizontal lines to show Q1 and Q3 for both the ages and the heart rates
- Use the vertices of the Q1 and Q3 lines to calculate a line of best fit and graph it

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2011 CALC TESTS
1:Edit...
2:SortA(
3:SortD(
4:ClrList
5:SetUpEditor
    
```

Press **[STAT]** (see screen above). Press **[ENTER]**. Press **▲** to the top of **L1** and then right arrow to the top of the seventh list which has no heading. The calculator will be in Alpha Mode, so type the heading AGE. Right arrow to an eighth list and type the heading RHR (for resting heart rate). Enter the 21 data points shown in the screens below.

L6	AGE	RHR	?
-----			-----
AGE(1) =			

L6	AGE	RHR	?
-----	10	90	
	10	93	
	12	89	
	17	81	
	19	85	
	23	80	
	24	78	
AGE(7) = 26			

L6	AGE	RHR	?
	26	75	
	28	77	
	31	80	
	37	75	
	31	76	
	35	75	
	37	69	
AGE(14) = 37			

L6	AGE	RHR	?
	45	68	
	42	64	
	48	64	
	46	61	
	51	64	
	53	62	
	55	70	
AGE(21) = 55			

Press **[2nd][Y=]** for the **Stat Plots** menu. Press **[ENTER]** to select **Plot 1**.

```

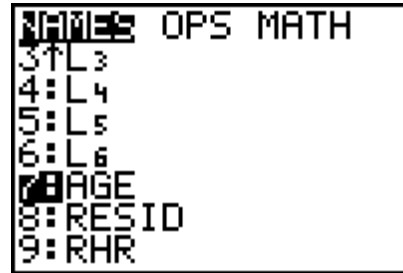
5:STAT PLOTS
1:Plot1...Off
  L1 L2
2:Plot2...Off
  L1 L2
3:Plot3...Off
  L1 L2
4:PlotsOff
    
```

Press **[ENTER]** to turn the plot on. Down arrow to **Xlist**.

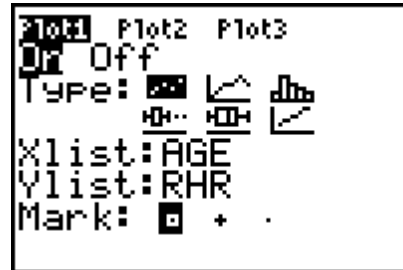
```

Plot1 Plot2 Plot3
Off
Type: [ ] [ ] [ ]
Xlist: L1
Ylist: L2
Mark: [ ] + .
    
```

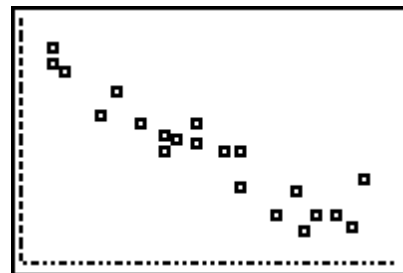
Press **2nd****STAT** to access the lists. Down arrow to the **AGE** list and press **ENTER**. This will paste **AGE** in as the **Xlist**.



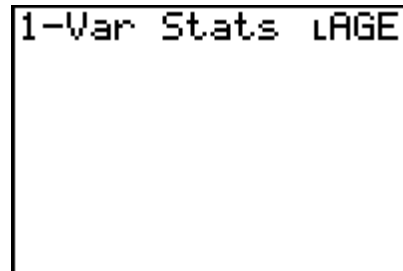
Down arrow to **Ylist** and repeat the process to select **RHR**.



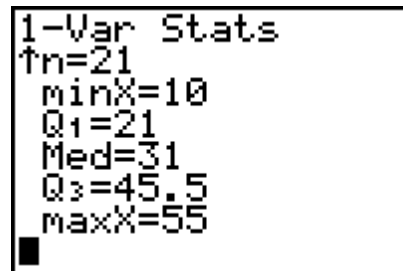
Press **ZOOM****9** (or ZoomStat) to automatically set a window based on the data in your lists).



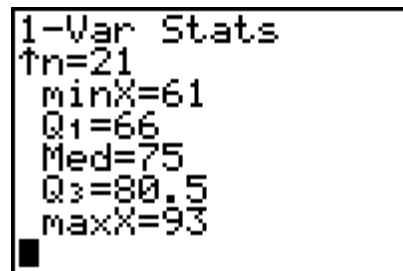
To find Q1 and Q3 for both the ages and the resting heart rates follow these steps. Press **STAT****▸****ENTER** to select **1: 1-Var Stats**. This pastes the command on the home screen. Press **2nd****STAT** and scroll down to select the **AGE** list. Press **ENTER****ENTER**.



Press the down arrow to find the five number summary, including Q1 and Q3 of the ages. Record these numbers.



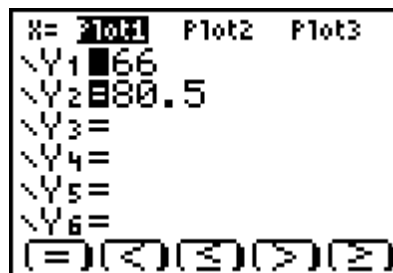
Repeat the process to find Q1 and Q3 for the heart rates.



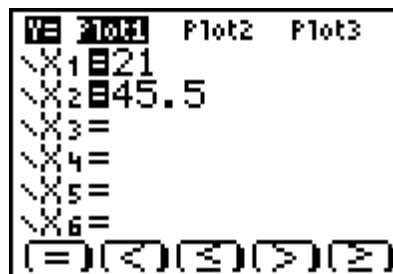
Press **[APPS]**. Select the Inequality Graphing APP (**INEQUALZ**). Press any key as directed. This will take you to a modified **Y=** screen. The five symbols along the bottom can be accessed by pressing **[ALPHA]** followed by the appropriate function key. To enter an inequality in terms of **x** arrow to the top (**X=**) and press **[ENTER]**. There are no inequalities in this problem, but you will need to enter two vertical lines.



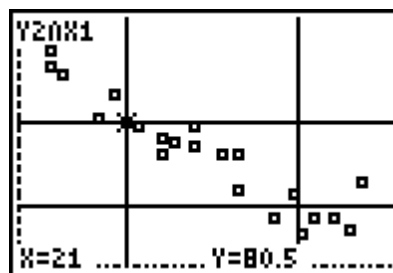
Type Q1 for the heart rates into **Y1** and Q3 for the heart rates into **Y2**.



Arrow up to the top (**X=**) and press **[ENTER]**. Type Q1 for the ages into **X1** and Q3 for the ages into **X2**.



Press **[GRAPH]** to view the scatter plot with the Q1 and Q3 lines. Press **[ALPHA]** **[F4]** to find the intersections of these lines. Identify the diagonal across the center rectangle that follows the direction of the points. In the example, heart rate decreases as age increases, so the diagonal will connect (21, 80.5) to (45.5, 66).



Use the two points to write the equation for the line that will form the diagonal using the point-slope form. Type the equation into **Y3**.

