

Linear Regressions

Walk the Line

by John Hinojosa

Activity Overview

In this activity, students will count the number of steps required to walk a given distance. Each student will record their data. The students will then create a graph (scatter plot) of their data.

Concepts: Collecting data in a spreadsheet, creating a scatter plot of the data, Determining the linear regression that best fits the data.

Teacher Preparation

This activity is designed for use in an Algebra classroom. Prior to this activity, students should have basic knowledge of linear functions, how to enter data into a spreadsheet and create a scatter plot.

Classroom Management Tips

This activity is student centered. The teacher will begin the activity by describing the procedures that the students will follow. Students will work in groups but gather their data individually.

TI-Nspire Applications

Lists and Spreadsheets

Data and Statistics

Calculator

Materials needed:

TI Nspire calculator

Masking tape

Measuring tape (at least 50 ft.)

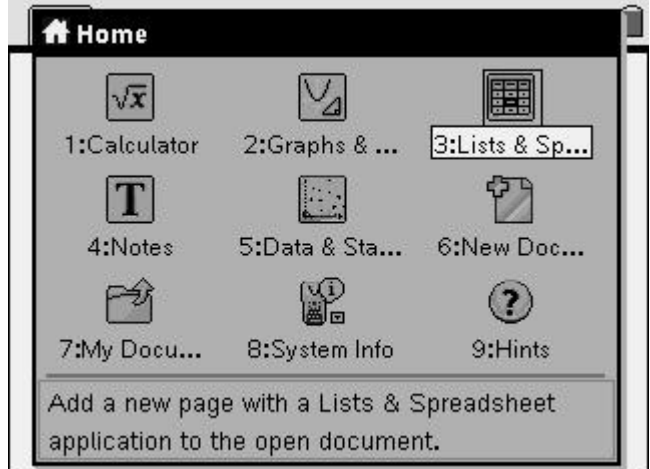
Step-by-step directions:

Prior to the activity, teacher will place a measuring tape on the floor and mark off 5 foot increments by placing masking tape along the measuring tape.

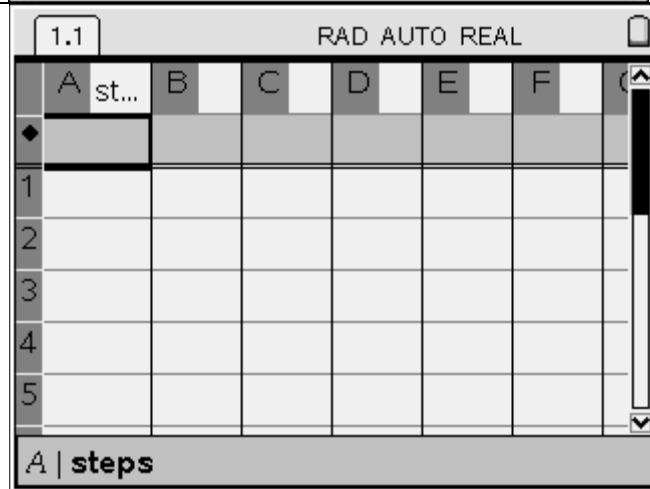
Students will work in pairs. Each student will begin to walk the line (measuring tape). Student partner will record how many steps the student takes to reach each marked measurement.

Once each student has recorded their data, they will enter the data using the List and Spreadsheets in the TI-Nspire.

Press the “Menu” button and open a new **Lists and Spreadsheets** document



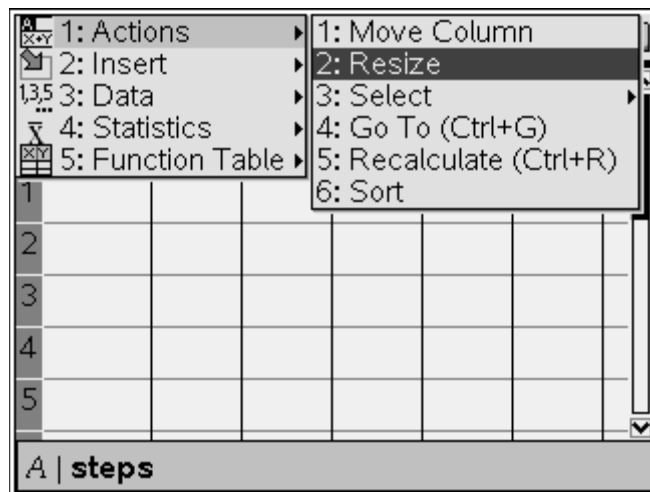
You will now use the “Nav Pad” to move the cursor up to the text box next to the letter “A” in the first column. You will now label the column “steps”

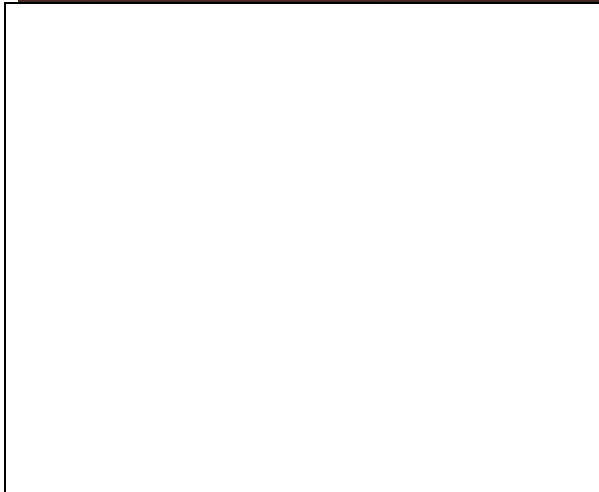


If you want to resize the row, click on the menu button, select “Actions”, 2:Resize, and then 1: Resize Column Width.

Then press the right side of the “Nav pad” to widen the column.

Once set to desired size, click the middle of “Nav pad” and then press bottom of “Nav pad.”





1.1 RAD AUTO REAL

	A steps	B	C	D	E	F
◆						
1						
2						
3						
4						
5						

A | steps

Once completed, you will need to use the “Nav pad” to move the cursor to the text box next to the letter “B”. Label the column “distance”

Resize as needed.

1.1 RAD AUTO REAL

	A steps	B distance	C	D	E
◆					
1					
2					
3					
4					
5					

B | distance

The student will now enter their data in the spreadsheet. The following screens will show sample data. Students will follow the next steps using their data.

1.1 RAD AUTO REAL


	A steps	B distance	C	D	E
◆					
1	3	5			
2	5	10			
3	8	15			
4	11	20			
5	15	25			

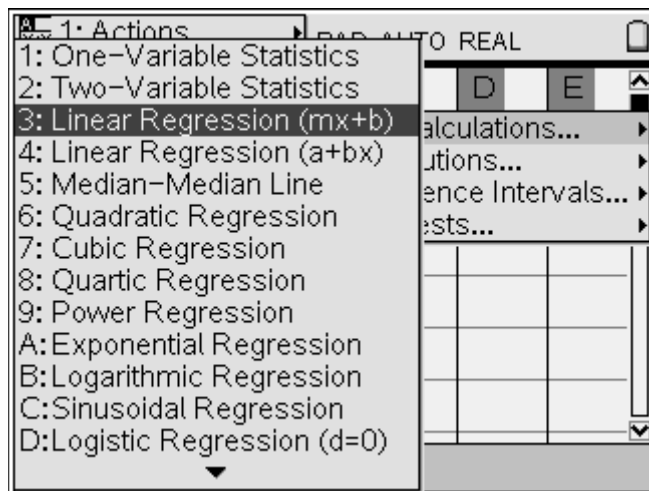
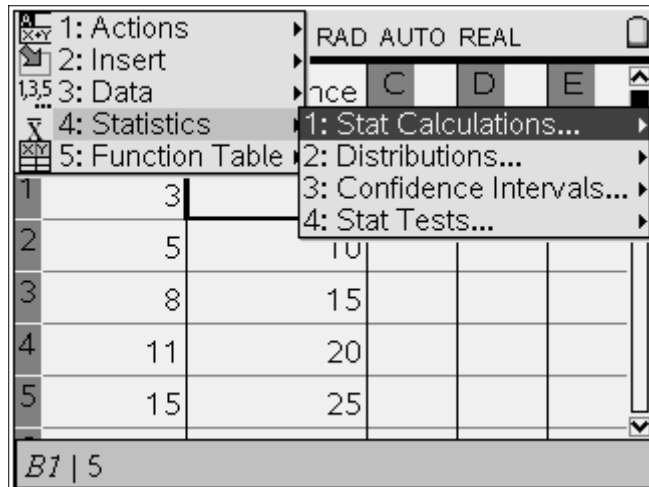
A7 | 3

Discovery Question:

Does the data show any type of relationship?

Now we will calculate a linear regression.

While in “Lists and Spreadsheet”, press the  button. Select “4: Statistics”, “1: Stat Calculations” and then select Linear regression (mx+b).



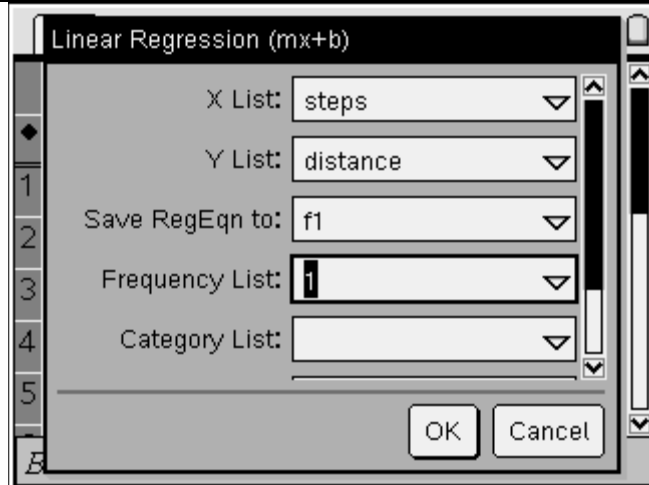
You will now select the parameters of the linear regression.

On the “X List:” press down with your “Nav pad” and select “steps”.

Tab to the next item “Y List:”. Again press down with your “Nav pad” and select “distance”

Tab to the next item “Save RegEqn to:” and make sure *f1* is selected.

Tab to the last item, “1st Result Column” and make sure that “c[]” is selected.



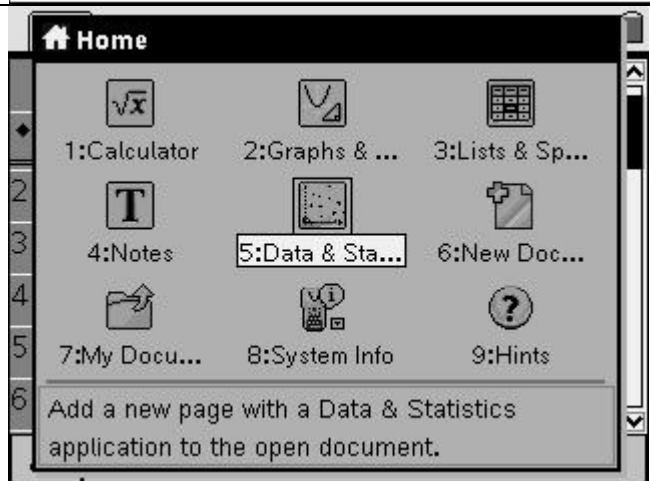
Select "OK" and your Linear Regression Equation will be listed and labeled using columns C and D.

Once again, you may resize column widths.

	A steps	B distance	C	D
				=LinR
2	5	10	RegEqn	m*x...
3	8	15	m	1.64...
4	11	20	b	1.18...
5	15	25	r ²	.986...
6			r	.993...

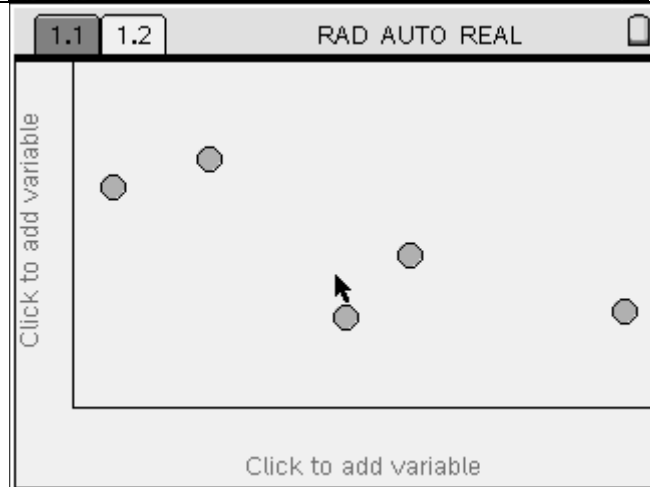
C6 | ="r"

We will now select the Home button and add a new page with a "Data and Statistics" Application to the open document.



We need to select the variables we wish to plot on the graph.

Use the "Nav pad" to move the cursor toward the bottom, middle of the screen (x axis).

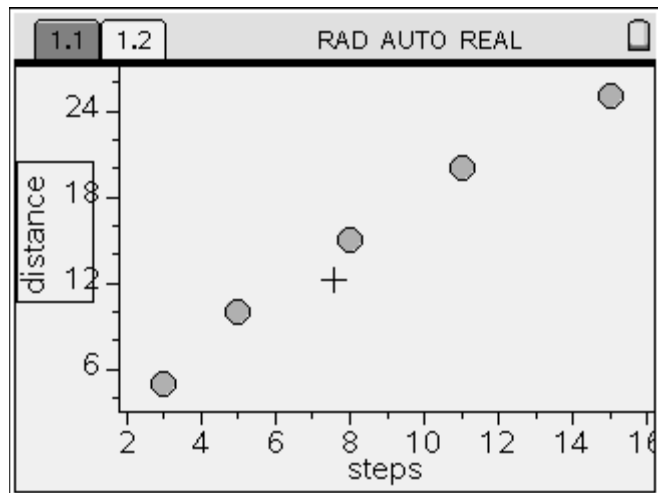
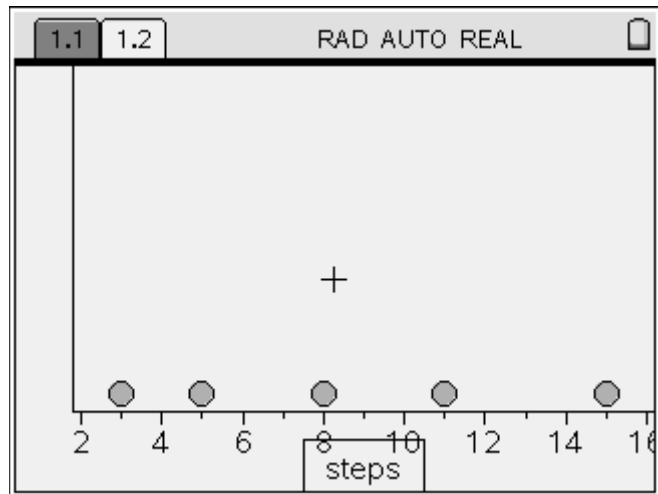
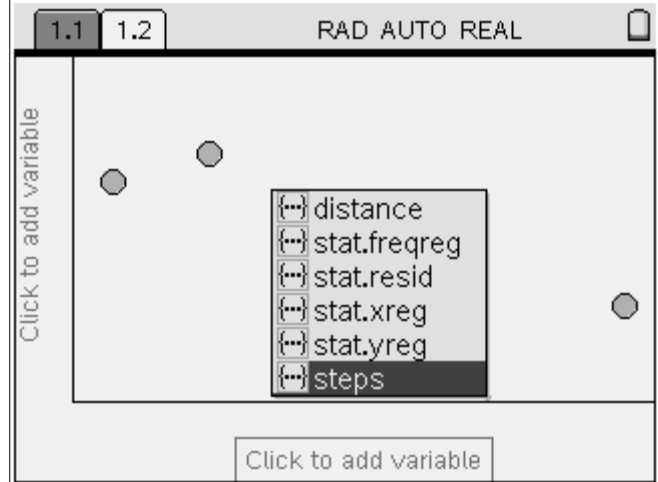


When "Click to change variable" appears select "steps".

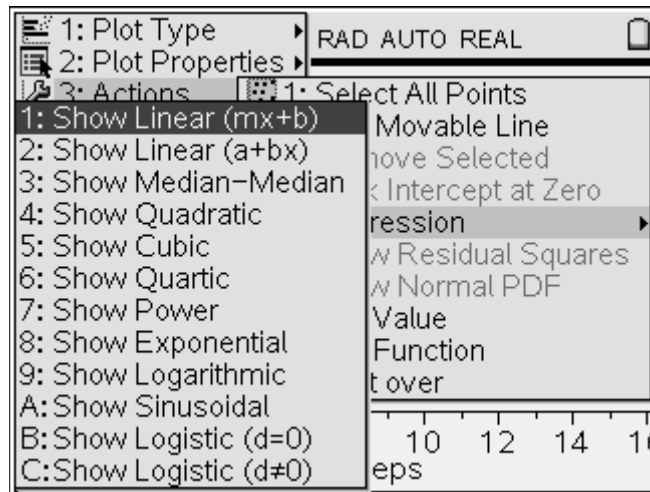
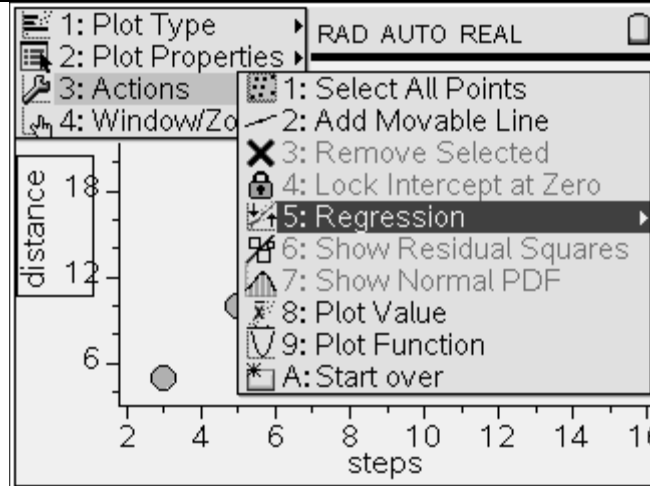
You will now use the “Nav pad” to move the cursor the the “y axis”.

Once again, when “Click to change variable” appears, select “distance”.

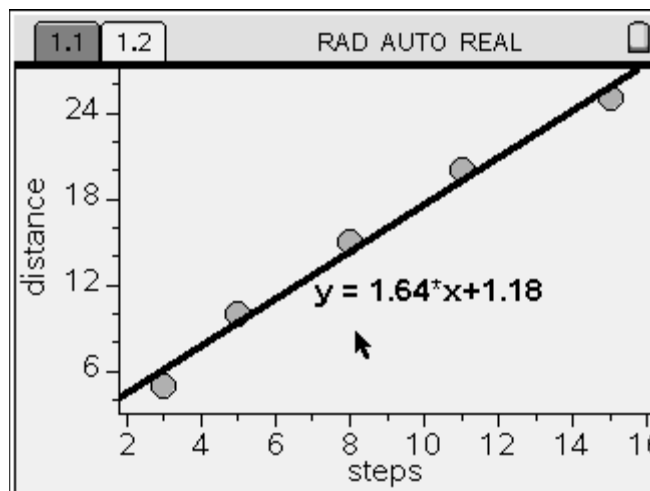
You will see your data points from your spreadsheet plotted.



At this point, select “Menu” button and scroll down (using your “Nav pad”) to “3: Actions”, select “5: Regression” and then “1: Show linear (mx + b).



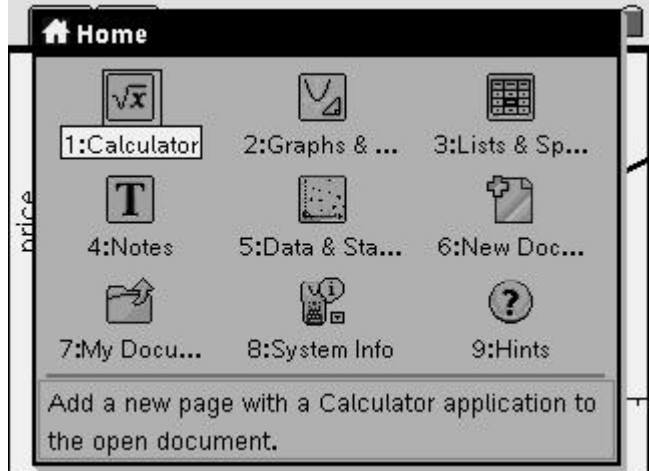
Your regression is now plotted along with your data points.



Discovery Question:

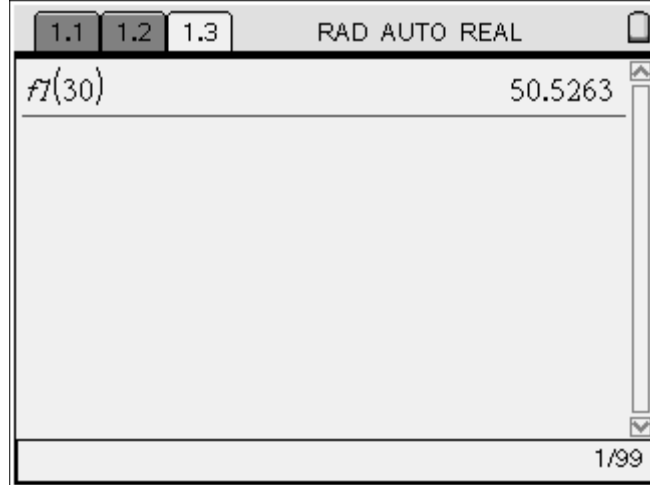
Does the “Linear Regression” model the data points? Why or why not?

We will now select the “Home” button and add a new page with a “Calculator” Application to the open document.



You can now use the linear regression equation saved in $f1$ to “guess” what the distance would be if you took a certain number of steps.

In the Calculator application, type $f1(30)$ and press to calculate “guess”.



Discovery Question:

What other types of Regression Equations might model this data more accurately? Why? Questions to Answer?

1. What does the graph represent?
2. How would you describe the graph?
3. What are the variables in this problem?
4. Which is the independent variable? And... which is the dependent variable?
5. Using the data, could you predict how many steps you would take when walking 30 feet? 60 feet?
6. Why would your data be different from one of your fellow students?

