

by: Beth Loughry Grade level: secondary Subject: mathematics Time required: 45 to 90 minutes

Materials: Yardsticks or meter sticks, Masking tape, Projector, Transparency of table or TI-Nspire computer software, Activity sheets

Name:

Date:__

Catch A Thief with a Scatterplot

A spreadsheet is comprised of rows and columns. The **rows** are labeled **numerically**; the **columns** are labeled **alphabetically**. Each **cell** is found where a row and a column intersect and its address is noted with a letter and a number. A **function** is a mathematical relationship, which has only one **output** (answer) for each **input**. A graph is a representation of mathematical data.

Essential Questions:

- 1. What tools are included in the Lists and Spreadsheets application that will help the student be more efficient, effective, and productive in examining numerical data?
- 2. How is a linear regression generated from data in a table?
- 3. How can various sampling strategies create more reliable predictions?
- 4. What difficulties could be encountered in learning how to use a spreadsheet, and how can these problems be overcome?

Objectives:

- 1. Use correct terminology to identify the features of Lists and Spreadsheets.
- 2. Create a spreadsheet and use that spreadsheet to manipulate data.
- 3. Graph data from a spreadsheet.
- 4. Make a reliable prediction.

I. TI-Nspire Lists and Spreadsheets

The students are to make a judgment about the height of a thief who left a shoeprint at the scene of a crime. The length of the shoeprint corresponds to a woman's size 7 shoe, or a man's shoe that is size five. Each student will collect and organize data, create a scatterplot, then determine a linear regression to describe the data, then make a judgment about the height of the unknown person.

A. Each student should stand with his/her back to the wall with attached measurement instruments (yardstick, meter sticks, or measuring tape.) The height of the student will be marked, then recorded on a projected transparency or in Column A of Lists and Spreadsheets from TI-Nspire software that is being projected on a screen.



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- B. Next, each student should measure the length of his/her shoe.
- C. Record this data in the projected table.
- D. Each student should complete an individual table and enter the class data

Title:				
	Stu	dent		
Name:	Height in inches	Shoe Length		
_				

1. After turning on the TI-Nspire handheld, Choose Home and select **3. Lists and Spreadsheets.** Press **Enter** or the **Click**

Catch



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Button 🕄

INSTRUMENTS

- 2. Highlight the white space just to the right of A in column A, type "height".
- 3. While the space is still highlighted, press (menu) (1) to choose Menu, Action. Press the **RIGHT ARROW** on the navpad for **ACTION** choices.
- 4. From this menu, highlight **2.Resize**, and press (2).
- 5. With the entire column highlighted, press the right arrow on the navpad to widen the column. Make sure the entire text is visible, then press () and press ().
- 6. Highlight the white space just to the right of B in column B, type "Shoe.length" and press (
- 7. Use the same procedure to widen column B as you used to widen Column A.
- 8. Enter individual heights of students with corresponding shoe length, in Column A and Column B.
- E. Analyzing Data Graph
 - *1.* Use the shortcut (m) (1) to insert a new page in your document.
 - 2. Choose 2:Add Graphs & Geometry
 - *3. Press* (menul) (3) (3) *to choose Menu, 3:Graph Type, 3:Scatter Plot*

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A height	B shoe.length	С	D	E	
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4. Press (2) to open the x-values, insure "height" is highlighted and press (2) (1)
5. Move to the right to highlight the y-values list, and press (2)
6. Select shoe.length, and press (2)

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1 5: Trace	0 2: Zoom – Box
6: Points & Lines	🗩 3: Zoom – In
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19: Construction	捸 6: Zoom – Quadrant 1
 A:Transformation 	埂7:Zoom – User
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	🕰 A: Zoom – Fit
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7. Press (menu) (4)(9) to choose Menu,
4:Window, 9:Zoom – Stat.

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	(height,shoe.length) x
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F. Analyzing Data – Linear Regression Next, determine the regression equation for the set of data.

1. Press $(tr) \neq (to the left of the NavPad) to$



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return to the spreadsheet.

2. Press (menu) $\langle 4 \rangle \langle 1 \rangle$ to choose Menu, 4:Statistics, 1:Stat Calculations

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3. Press press $\langle 3 \rangle$ to choose 3:Linear Regression (mx + b)

4. The Linear Regression set up box will

a. Press the down arrow on the NavPad cursor control to choose 'height,' and press 🕄

b. Press the (tab) key to change to the Ylist. Press the down arrow key and choose 'shoe.length.'

c. Press the (tab) *until OK is highlight and* press the (\mathbb{R}) button.

P. Two Warlable Chatletics	DE	
2: Two-Variable Statistics 3: Linear Regression (mx+b) 4: Linear Regression (a+bx) 5: Median-Median Line 6: Quadratic Regression 8: Quadratic Regression 9: Outric Regression 9: Power Regression 9: Power Regression 8: Logarithmic Regression 8: Logarithmic Regression 0: Cisinusoidal Regression 0: Logistic Regression (d=0)	Lulations ns te Intervals	



appear on the screen.

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3	59	11	m	.2	m	.2	
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F	F1 ="Linear Regression (mx+b)"						

5. Press (m) (c) to return to the Graphs & Geometry page.



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 7: Measurement . (height,shoe.length) (height,shoe.length) Ķ ® ≣ s5 x€ Y€ Ŧ •

6. Press (menu)(3)(1) to choose Menu, 3: Graph

Type, 1:Function.

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INSTRUMENTS



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7. Press the \blacktriangle key so that the f1(x) appears in the Entry Line, and then press the (\widetilde{res}) key to discover the Linear Regression that describes this data.

8. At the scene of the crime, the shoeprint measured 14 inches long. Use the linear regression to predict the height of the suspect. Show your work, then state, in writing, your conclusion. Justify your answer.





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Assessment and evaluation

- Did all students measure in the same units? Will the results change if the units are not all the same? Justify your answer. Why or why not?
- Will the sample size make a difference in the reliability of the prediction? Justify your answer.

Activity extensions

- Shoe sizes for men and women differ in America. Will shoe length determine if the shoe was worn by a man or by a woman?
- Research the differences in shoe size for men and women. Is there a direct correlation of foot length and size for men and/or for women. If both sets of data are graphed, what relationship is revealed?