

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Introduction

A graphic for the lesson introduction. It features a woman with dark curly hair and a pink top on the right side. On the left, there is a white text box with a pink header that says "Today's Lesson". The background is blue with faint mathematical symbols like pi, infinity, and numbers.

Today's Lesson

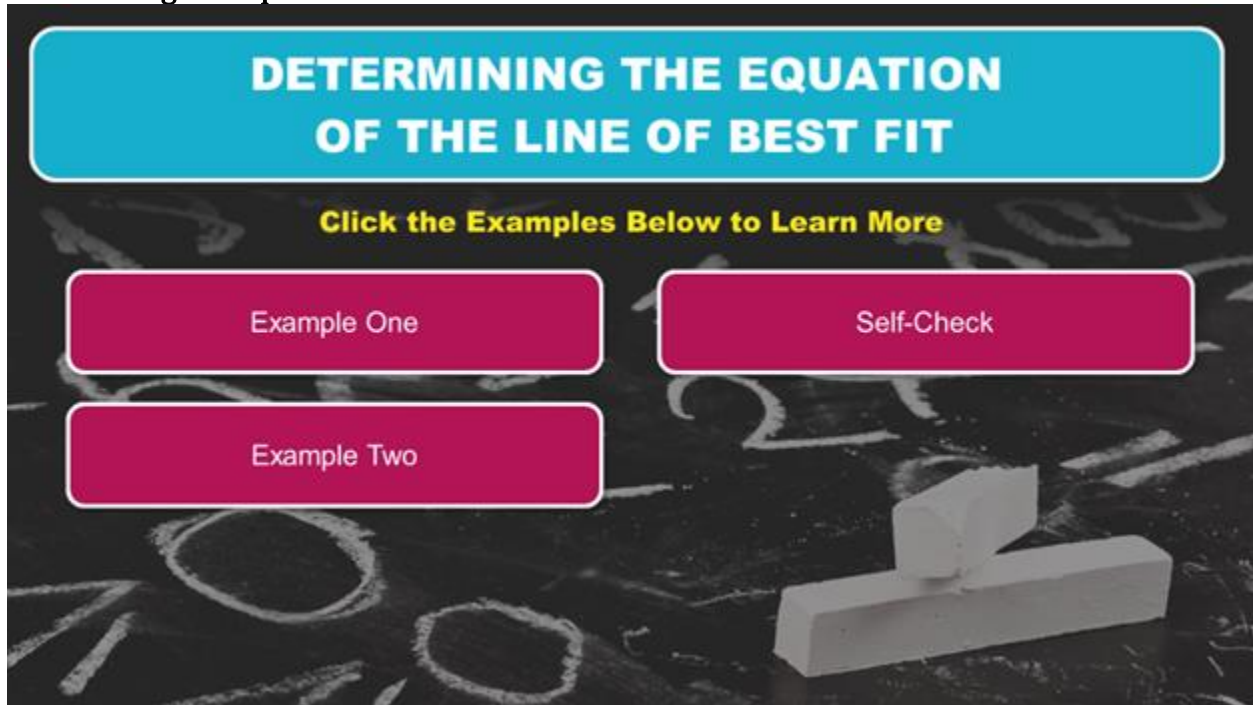
- You will learn how to use the graphing calculator to determine the equation of the line of best fit.

Hello and welcome! I'm so glad you could join me for this lesson in Algebra I. In this lesson, you will learn how to use the graphing calculator to determine the equation of the line of best fit.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Determining the Equation of the Line of Best Fit



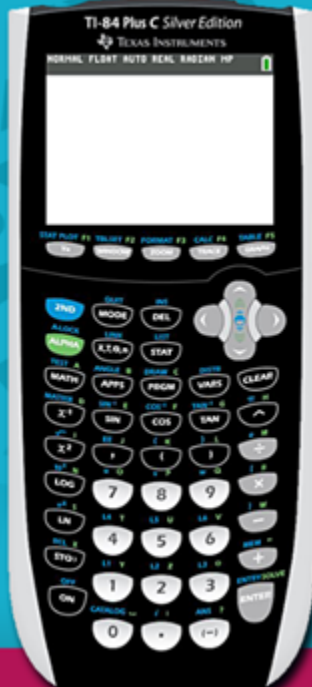
The graphic features a dark background with faint chalkboard-style drawings of a line of best fit and data points. At the top, a blue rounded rectangle contains the title "DETERMINING THE EQUATION OF THE LINE OF BEST FIT" in white, bold, uppercase letters. Below this, a yellow text prompt reads "Click the Examples Below to Learn More". Three pink rounded rectangular buttons are arranged in two rows: "Example One" and "Self-Check" in the top row, and "Example Two" in the bottom row. In the bottom right corner, there is a 3D rendering of a white rectangular block with a smaller white rectangular block resting on top of it.

Click the examples below to learn more.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1



Example 1

Given:

$$\{(-7,4), (-2,15), (6,74), (11,91), (0,50), (8,84)\}$$

Verify that a linear equation best fits the data.
Then, determine the equation of the line of best fit.

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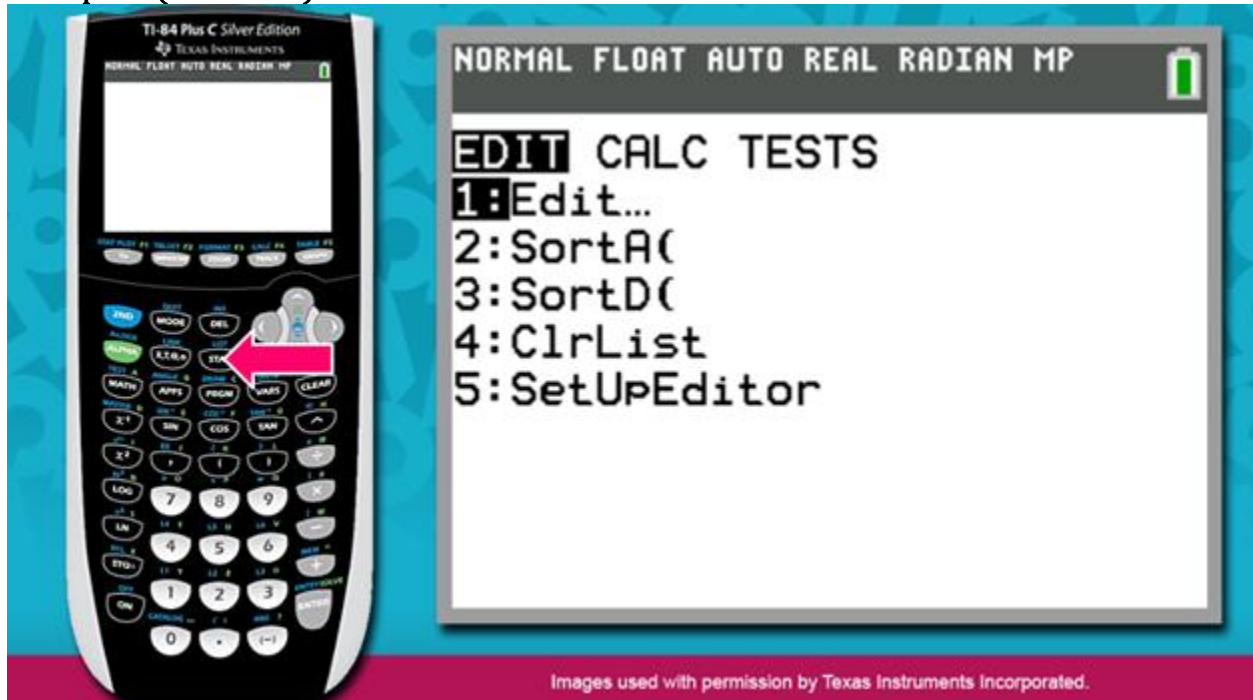
Given: $\{(-7, 4), (-2, 15), (6, 74), (11, 91), (0, 50), (8, 84)\}$

Verify that a linear equation best fits the data. Then, determine the equation of the line of best fit.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)



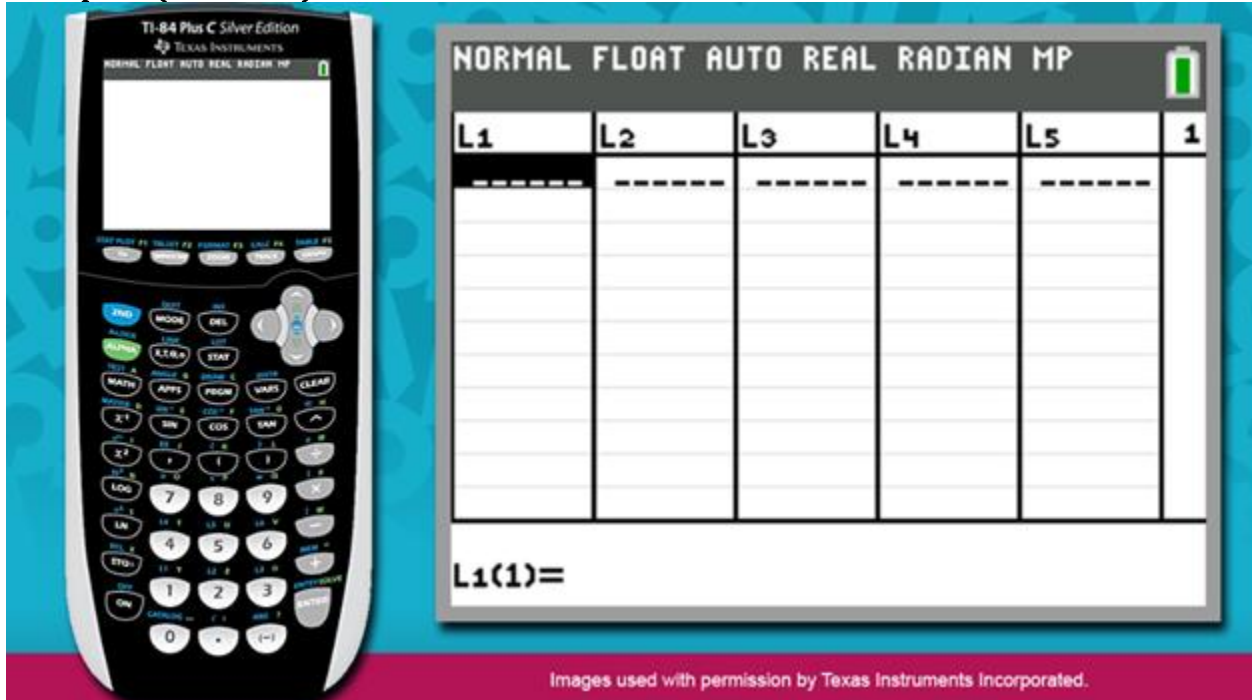
To verify that a linear equation best fits the data, begin by using the graphing calculator to generate a scatterplot.

Press the STAT key, located two keys to the right of the green ALPHA key. This key allows you to access the statistics functions of the calculator.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)



The image shows a TI-84 Plus C Silver Edition calculator on the left and its screen on the right. The screen displays the MODE menu with options: NORMAL, FLOAT, AUTO, REAL, RADIAN, and MP. A table editor is open, showing columns labeled L1, L2, L3, L4, L5, and 1. The table has several rows, with the first row containing dashed lines. Below the table, the text $L_1(1)=$ is displayed. A battery icon is visible in the top right corner of the screen.

L1	L2	L3	L4	L5	1
---	---	---	---	---	

$L_1(1)=$

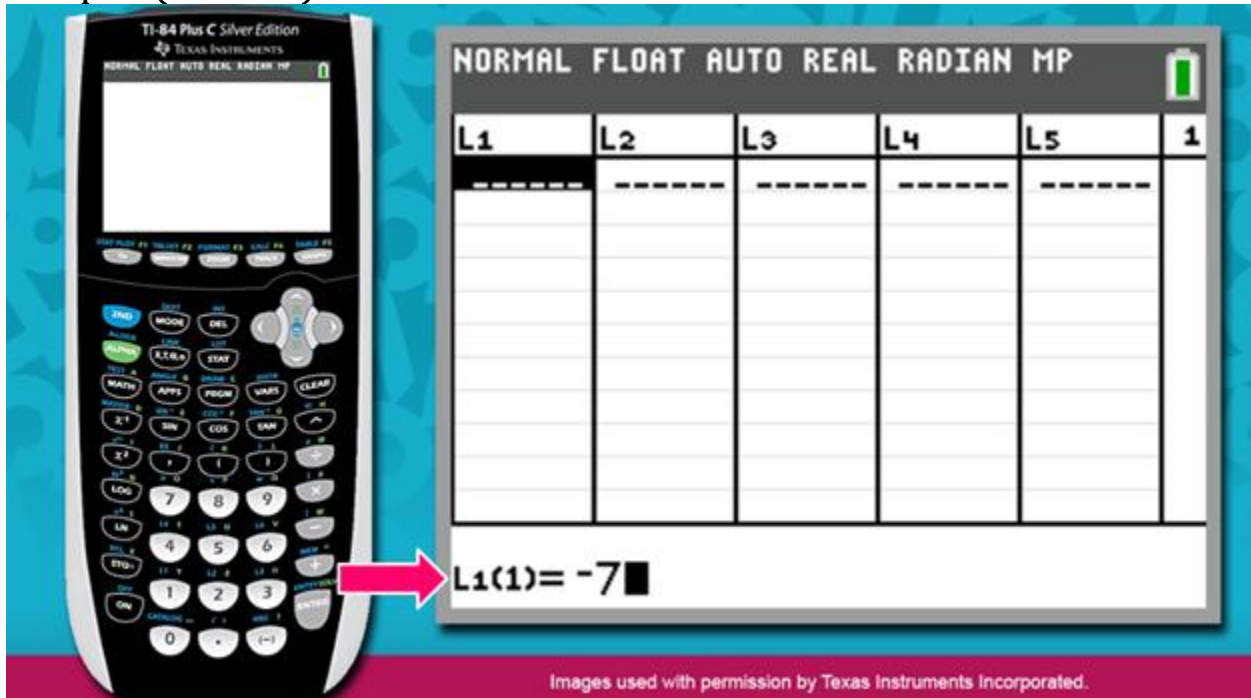
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Press ENTER to access the Edit function. Notice that a table appears with the headings L1, L2, L3, etc. Here is where you will enter the values of x and y .

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)

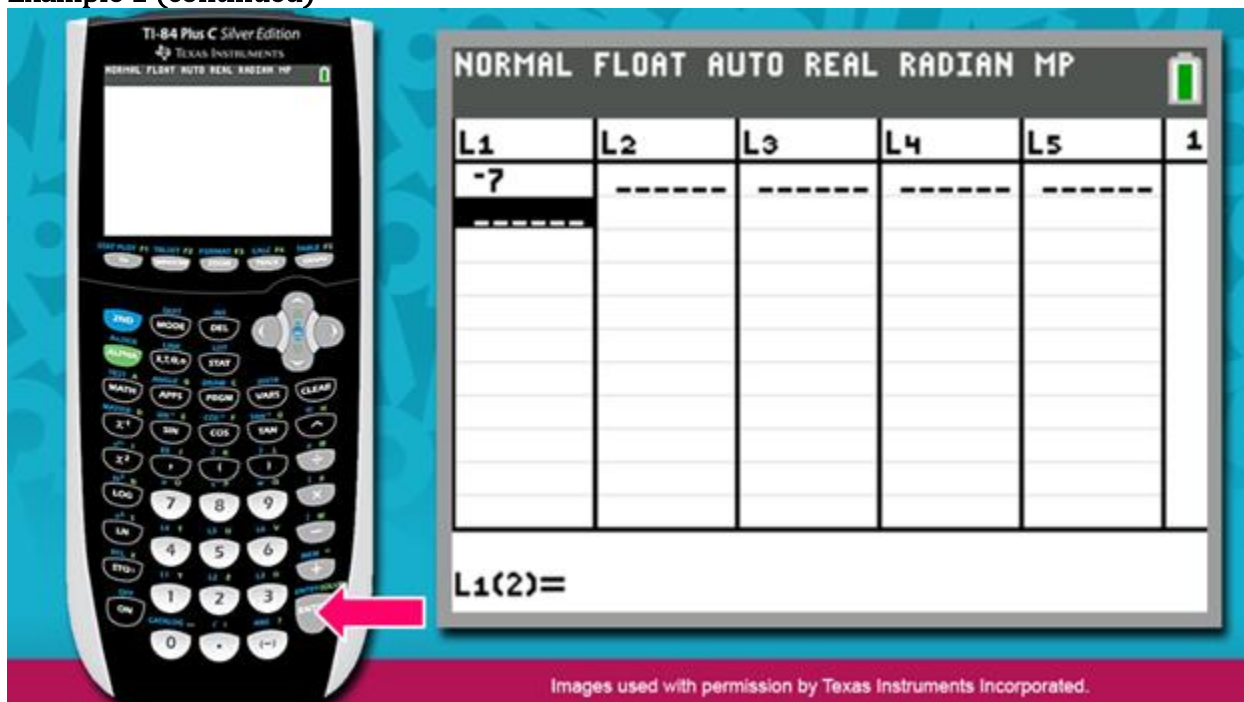


Enter the x -values into L1. To enter the first value, press the negative sign and then press 7. Notice that the value appears at the bottom of the window.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)



The image shows a TI-84 Plus C calculator on the left and its list editor screen on the right. The calculator screen is blank. The list editor screen displays the following table:

L1	L2	L3	L4	L5	1
-7	-----	-----	-----	-----	

Below the table, the text $L_1(2)=$ is displayed. A pink arrow points to the \rightarrow key on the calculator.

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Then, press ENTER to include the value in L1.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)

The image shows a TI-84 Plus C Silver Edition calculator on the left and a screenshot of its data list editor on the right. The calculator screen displays the mode menu with 'NORMAL' selected. The data list editor shows a table with columns labeled L1 through L5 and a cursor in the first row of the L1 column. The value '-7' is entered in the first row of the L1 column. Below the table, the calculator displays the equation $L1(2) = -2$.

L1	L2	L3	L4	L5	
-7	-----	-----	-----	-----	1

$L1(2) = -2$

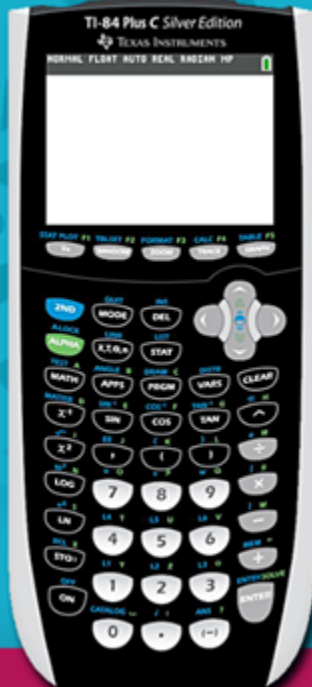
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To enter the next value, press the negative sign and then press 2.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)



Example 1

Given:

$$\{(-7,4), (-2,15), (6,74), (11,91), (0,50), (8,84)\}$$

Verify that a linear equation best fits the data.
Then, determine the equation of the line of best fit.

**Enter the remaining x -values into L1.
Then, continue.**

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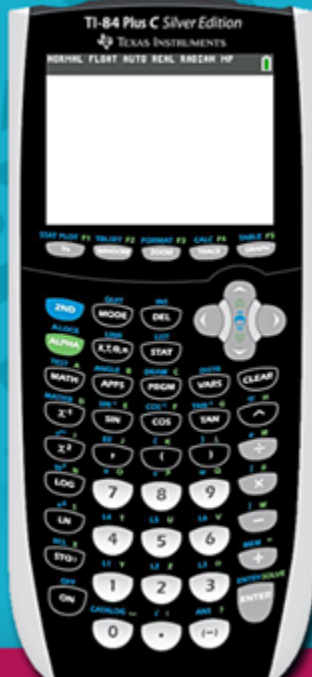
Continue this process until all of the x -values are entered into L1.

$$\{(-7, 4), (-2, 15), (6, 74), (11, 91), (0, 50), (8, 84)\}$$

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)



Example 1

Given:

$$\{(-7,4), (-2,15), (6,74), (11,91), (0,50), (8,84)\}$$

Verify that a linear equation best fits the data.
Then, determine the equation of the line of best fit.

Enter the y -value that corresponds to each x -value into L2. Then, continue.

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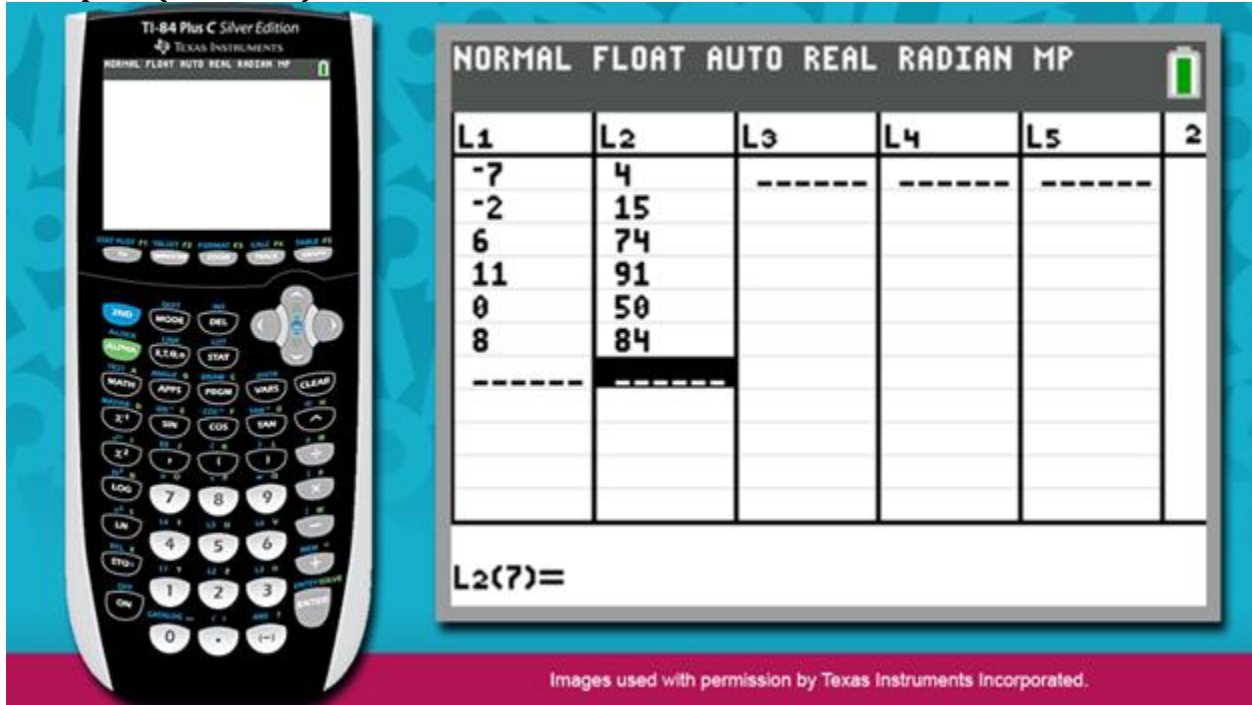
Next, press the right arrow key. Enter the y -value that corresponds to each x -value into L2.

$$\{(-7, 4), (-2, 15), (6, 74), (11, 91), (0, 50), (8, 84)\}$$

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)



A TI-84 Plus C Silver Edition calculator is shown on the left. To its right is a screenshot of the calculator's data list screen. The screen displays the following data in list L1 and L2:

L1	L2	L3	L4	L5	2
-7	4	-----	-----	-----	
-2	15				
6	74				
11	91				
0	50				
8	84				
-----	-----				

The screen also shows the mode settings at the top: NORMAL, FLOAT, AUTO, REAL, RADIAN, MP. At the bottom, the prompt $L_2(7)=$ is displayed.

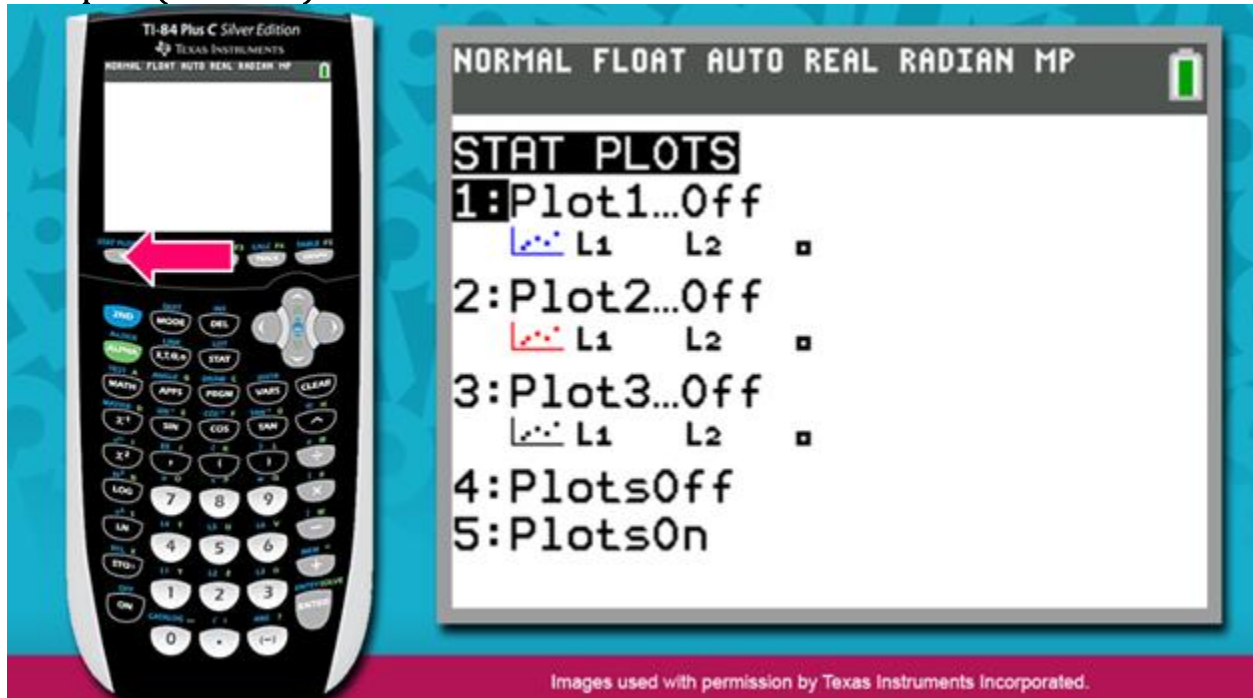
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Now that the data is entered into the calculator, you can generate a scatterplot.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)

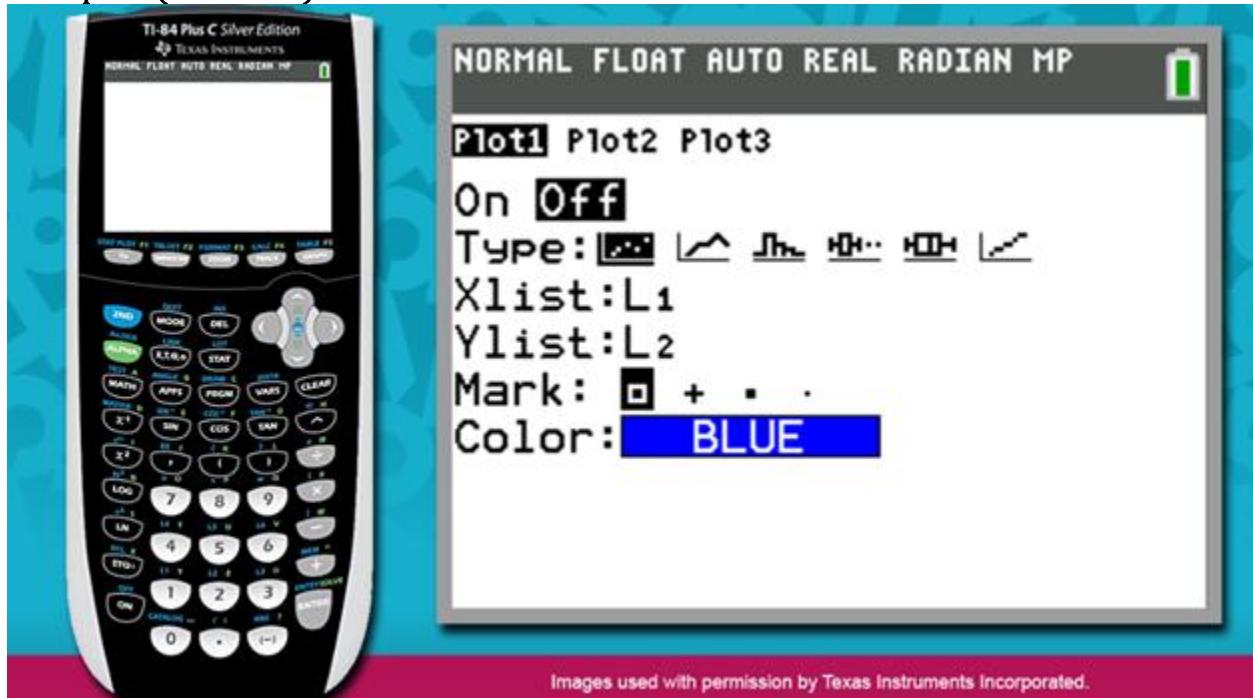


Press 2nd. This key allows you to access a function stamped above a calculator key. Now, press the $Y=$ key to access the STAT PLOTS menu. Press ENTER to choose Plot 1.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)



Notice that the plots are currently turned off. To view the scatterplot, you must turn the plots on.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)

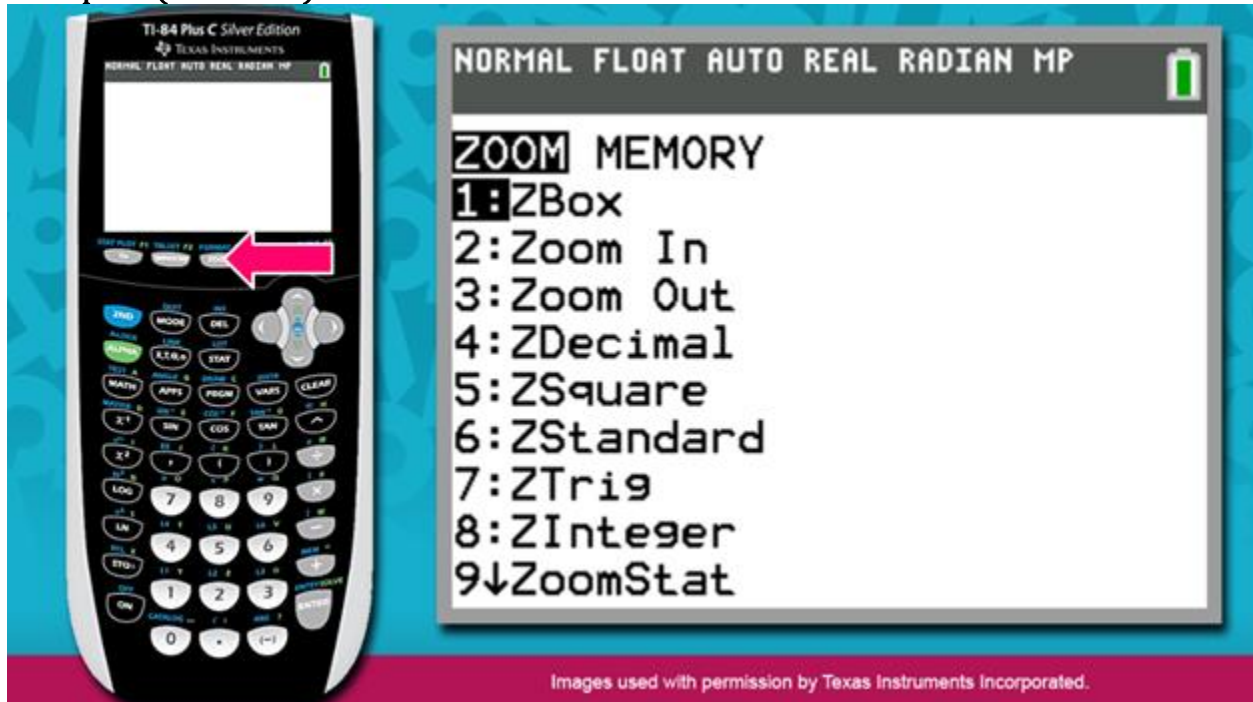


Make sure that the cursor is blinking on “On” and press ENTER. Also, verify that the type of graph that the calculator will generate based on the current data is a scatterplot. Confirm that L1 corresponds to the x -values and L2 corresponds to the y -values. Note that each point on the scatterplot will appear as a blue square.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)

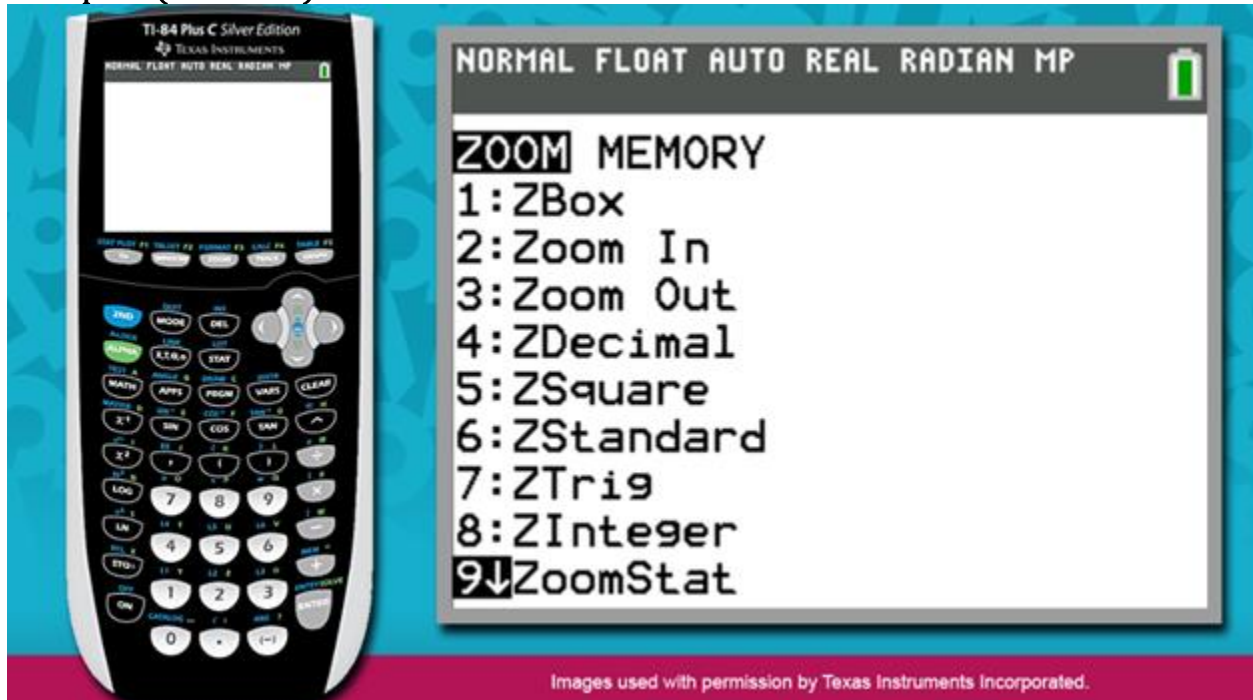


Next, press ZOOM, located in the very top row of keys.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)



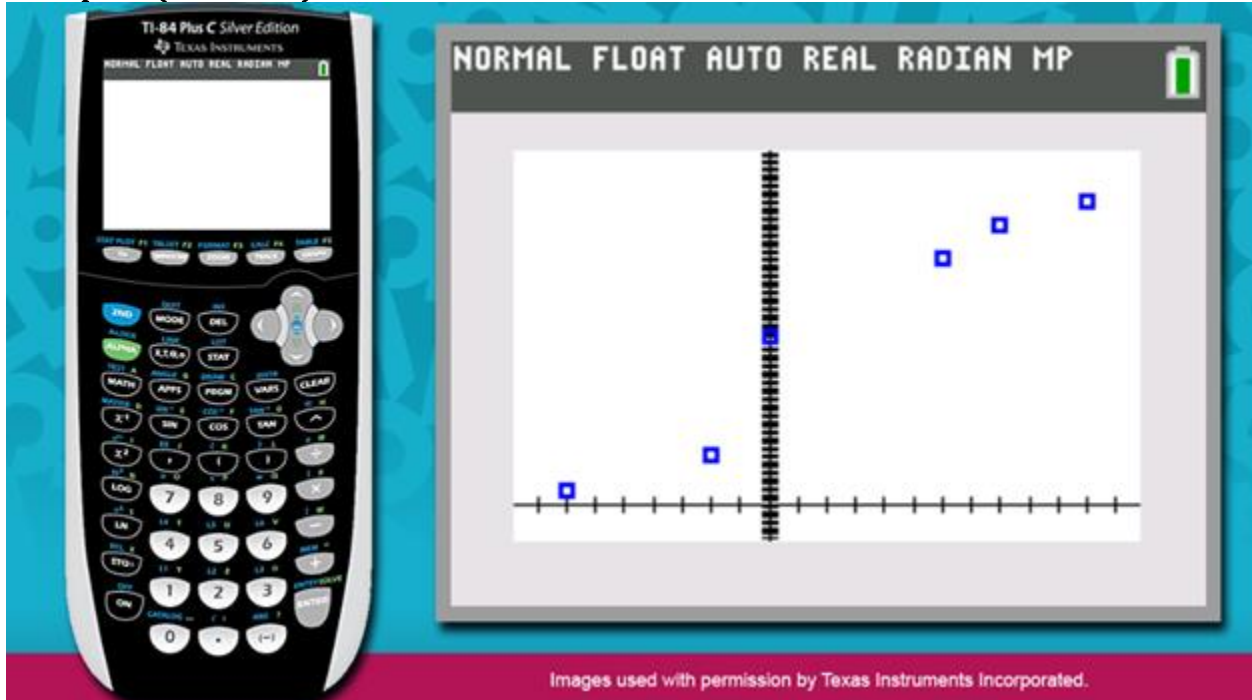
Then, press the down arrow key to move the cursor to the ninth option, ZoomStat. This option will inform the calculator to set the necessary window to view the scatterplot.

Press ENTER.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)



Because there is a linear trend, a linear equation would best fit the data. Note that there is a positive correlation between the x - and y -values. As x increases, y also increases.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)



Next, determine the equation of the line of best fit. Press STAT.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)



Press the right arrow key to access the Calculate functions.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)



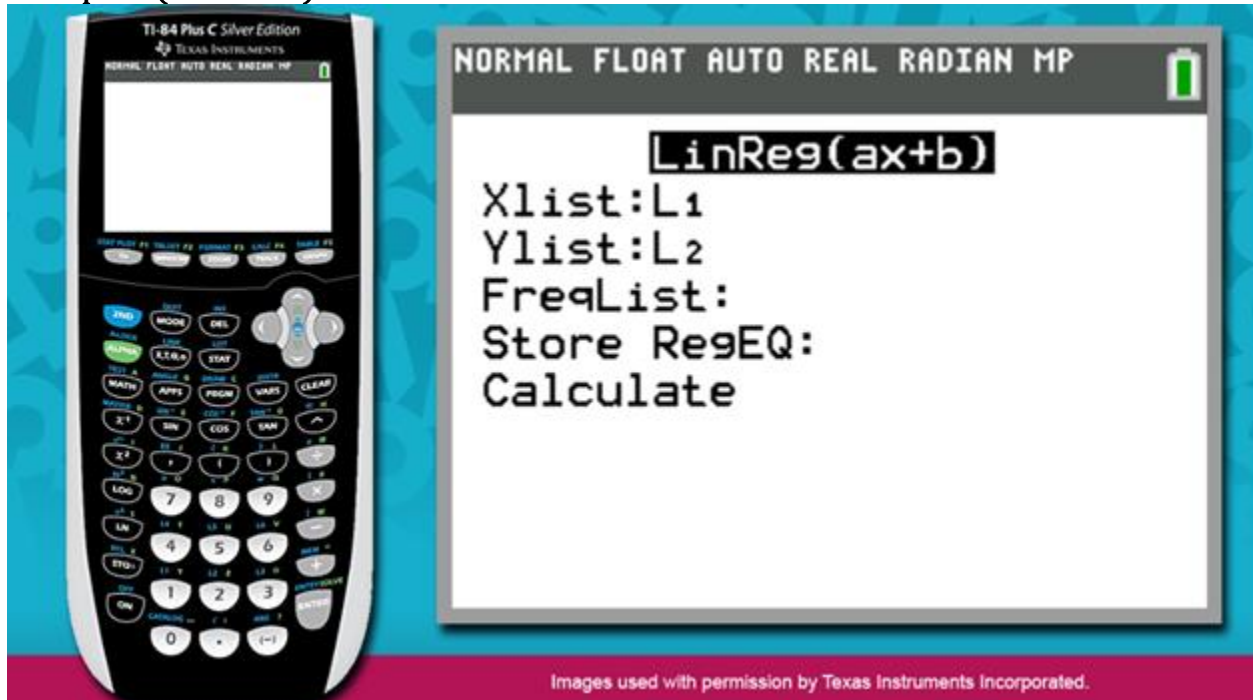
Press the down arrow key to select the fourth option in the list, LinReg, an abbreviation for linear regression. This option will prompt the calculator to generate a linear equation to best fit the data, in the form $y = ax + b$.

Press ENTER.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)

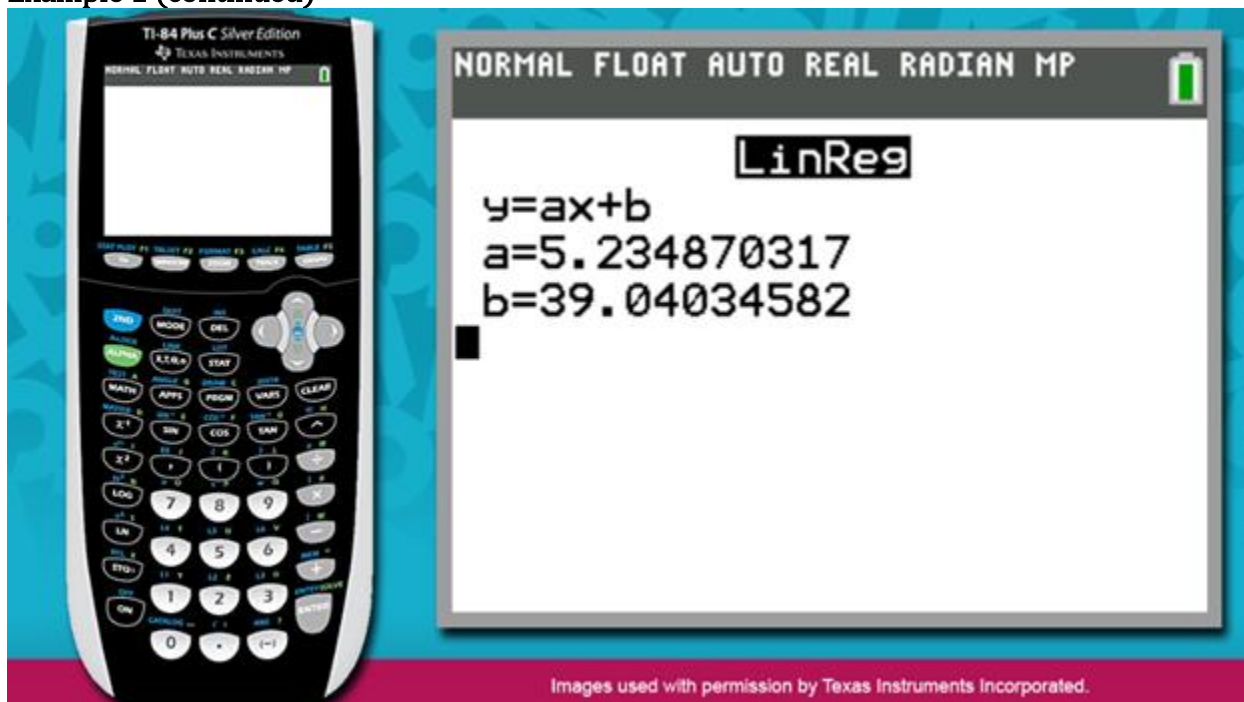


The Linear Regression menu now appears on the screen. Press ENTER to progress through each prompt. After you press ENTER at the Calculate prompt, a new screen appears.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)



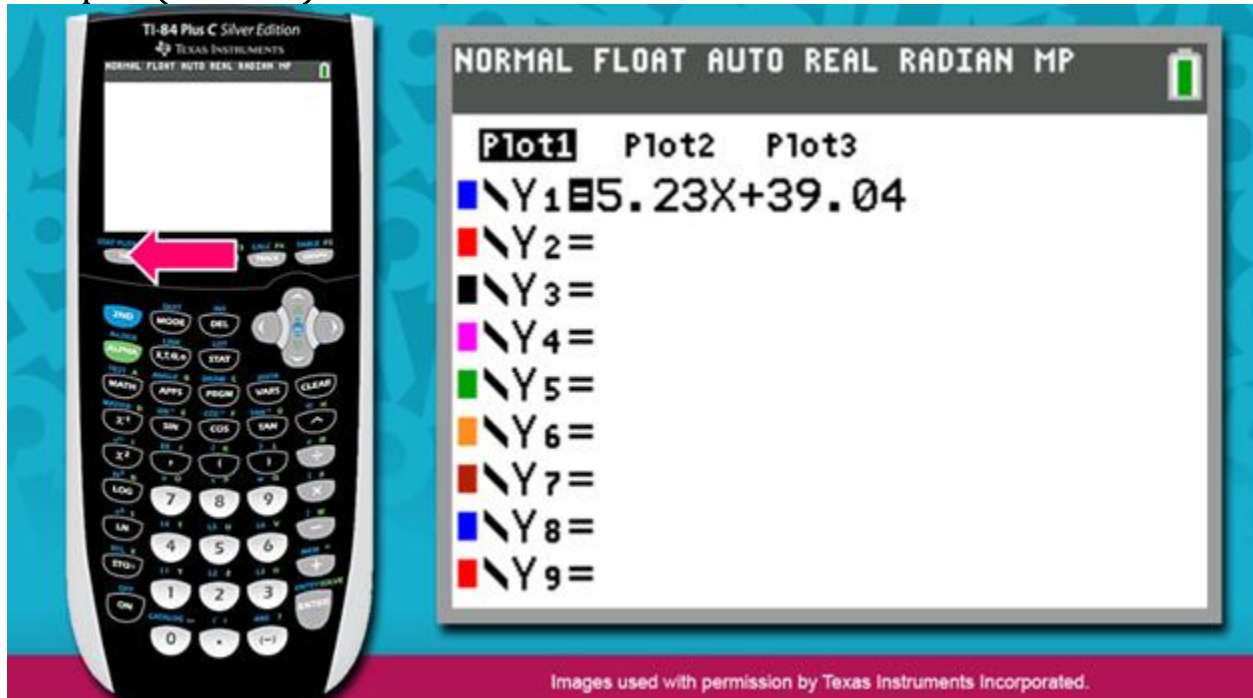
Here is the information needed to write the equation of the line of best fit. If the values of a and b are rounded to the nearest hundredths, the equation can be written as $y = 5.23x + 39.04$.

Graph the line to continue investigating the line of best fit.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)



The image shows a TI-84 Plus C Silver Edition calculator on the left and its screen on the right. The screen displays the 'NORMAL FLOAT AUTO REAL RADIAN MP' mode. Under the 'Plot1' tab, the equation $Y_1 = 5.23X + 39.04$ is entered. The calculator's keypad has a pink arrow pointing to the $Y=$ key.

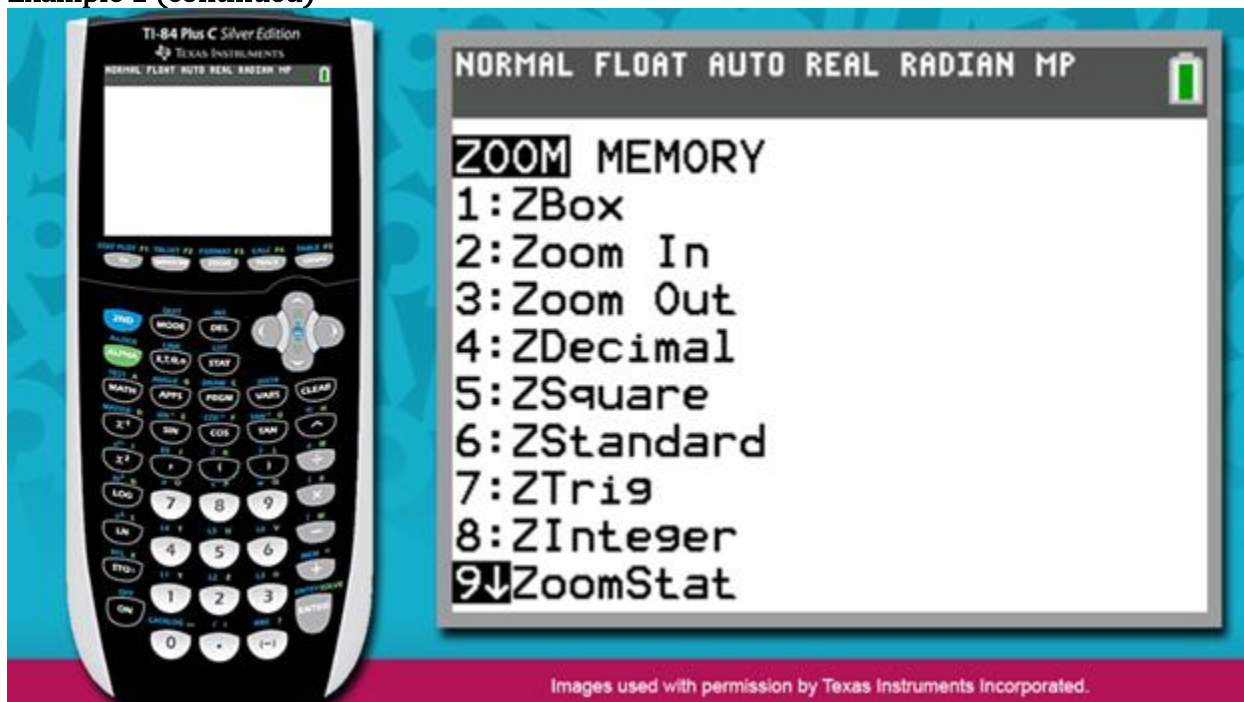
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Press the $Y=$ key. Then, enter the expression to the right of the equals sign in the equation of the line of best fit.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)

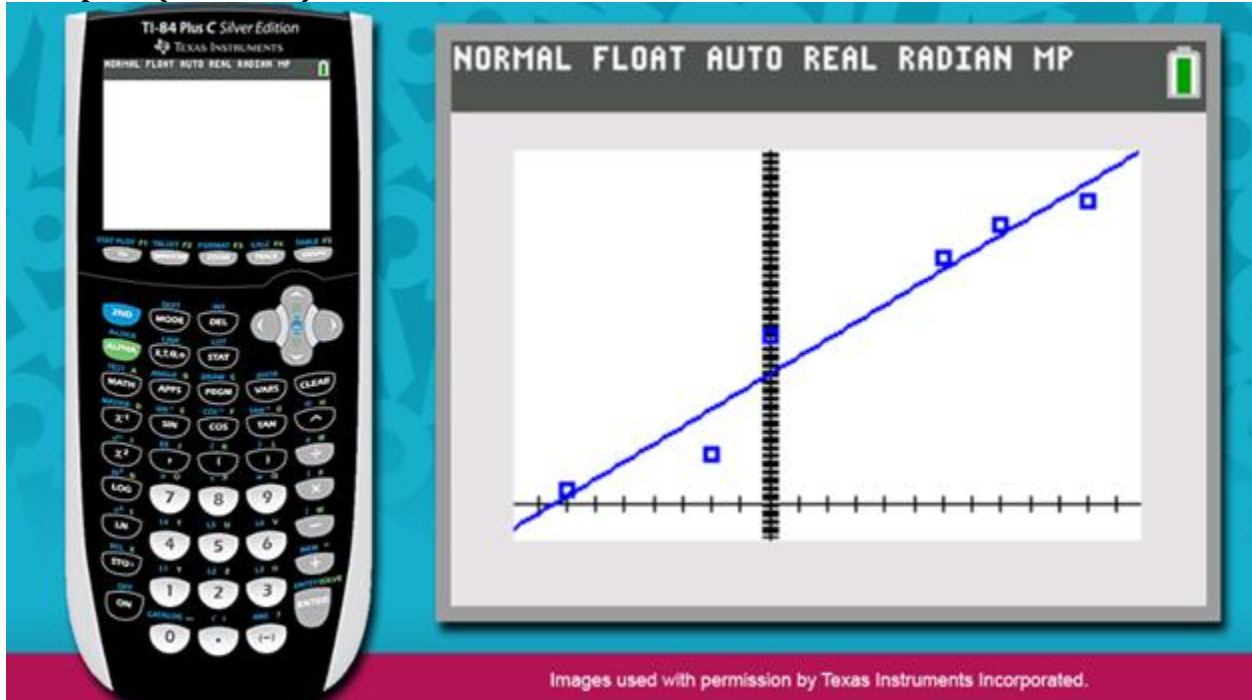


Next, press ZOOM. Once again, select the ninth option in the list, ZoomStat.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 1 (continued)

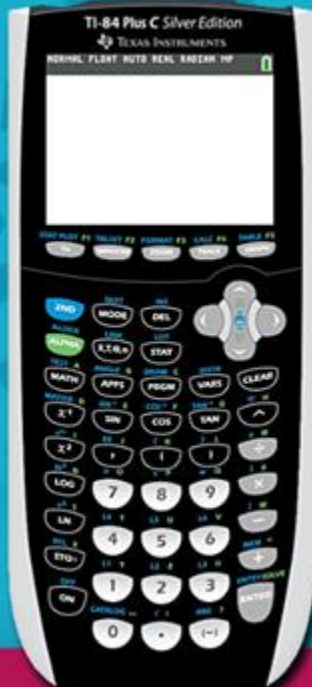


Notice that the graph of the line of best fit is now included in the scatterplot. The line appears to model a reasonable estimate of the pattern present in the data.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 2



Example 2
Determine the equation of the line that best fits the data.

x	y
1	37
2	20
3	22
4	17
5	10
6	-14
7	-19

Images used with permission by Texas Instruments Incorporated.

Determine the equation of the line that best fits the data.

x	y
1	37
2	20
3	22
4	17
5	10
6	-14
7	-19

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 2 (continued)

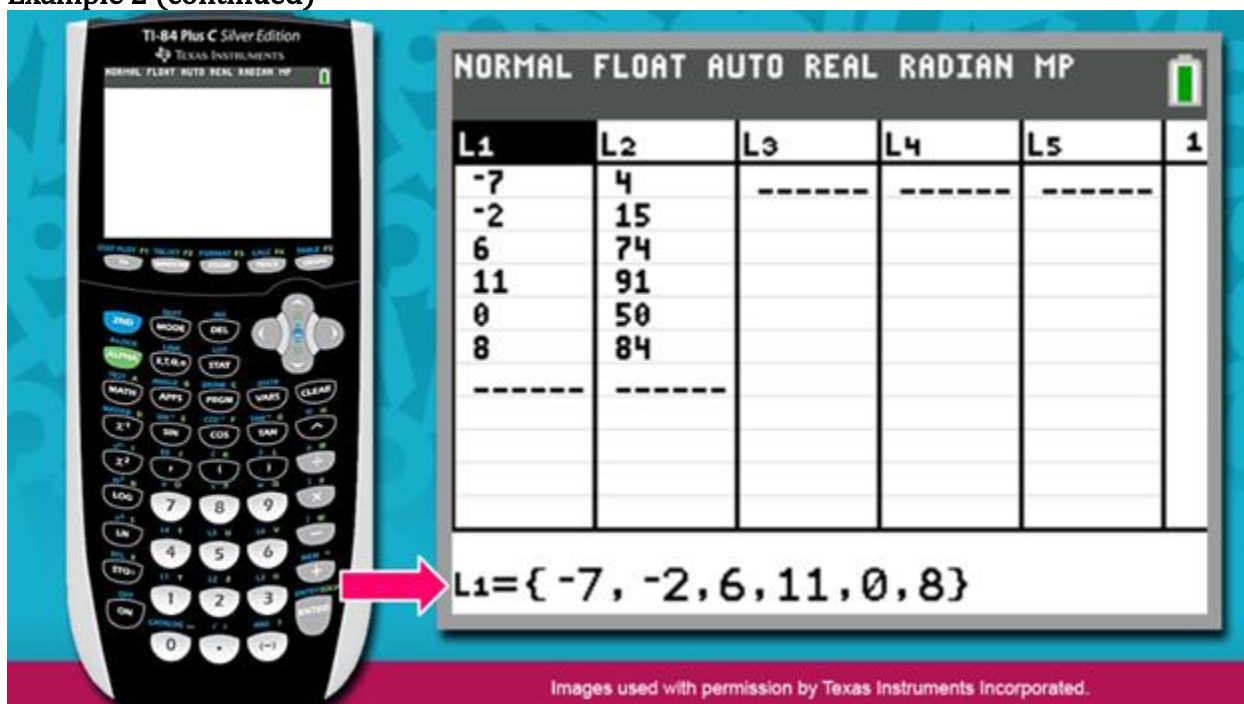


To enter the data for this example, you must first clear the data from the previous example. Press STAT. Then, press ENTER to choose the Edit function.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 2 (continued)



The image shows a TI-84 Plus C Silver Edition calculator on the left and a data editor window on the right. The data editor window displays a table with columns L1 through L5 and a page indicator of 1. The L1 column contains the x-values: -7, -2, 6, 11, 0, 8. The L2 column contains the y-values: 4, 15, 74, 91, 50, 84. The bottom of the window shows the set notation for the x-values: $L1 = \{-7, -2, 6, 11, 0, 8\}$. A pink arrow points from the calculator's cursor to the L1 header.

L1	L2	L3	L4	L5	1
-7	4	-----	-----	-----	
-2	15				
6	74				
11	91				
0	50				
8	84				
-----	-----				
$L1 = \{-7, -2, 6, 11, 0, 8\}$					

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Move the cursor to the L1 header. Notice that the set of x -values is shown at the bottom of the window.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 2 (continued)

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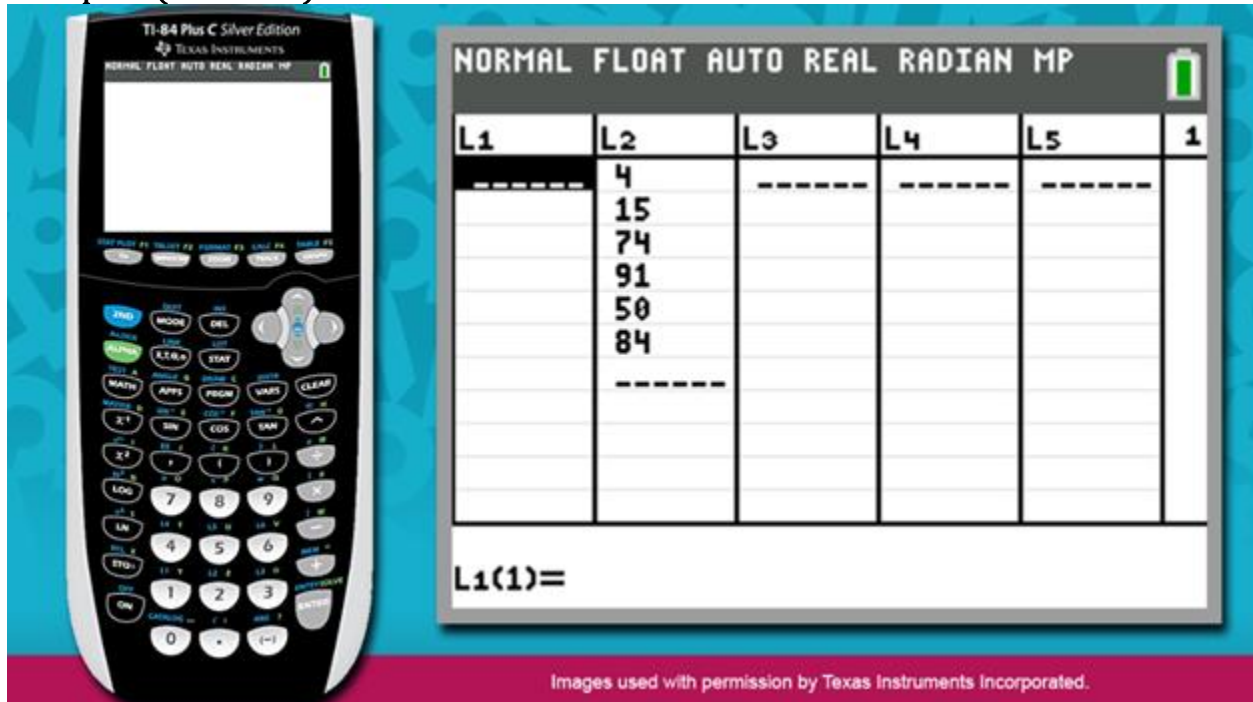
L1	L2	L3	L4	L5	1
-7	4	---	---	---	
-2	15				
6	74				
11	91				
0	50				
8	84				
---	---				

Press CLEAR.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 2 (continued)



The image shows a TI-84 Plus C Silver Edition calculator on the left and its data list screen on the right. The calculator screen is blank. The data list screen shows the following data:

L1	L2	L3	L4	L5	1
-----	4	-----	-----	-----	
	15				
	74				
	91				
	50				
	84				

Below the table, the screen displays $L1(1)=$.

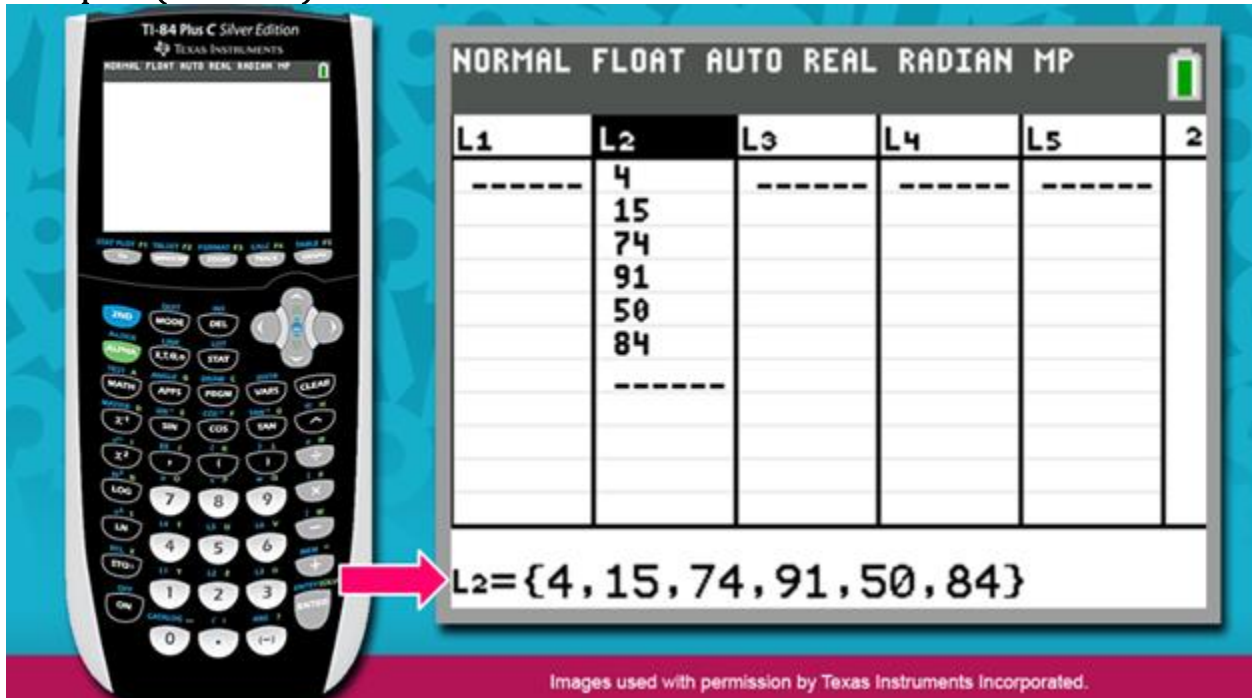
Images used with permission by Texas Instruments Incorporated.

Then, press ENTER. The x -values are now cleared from L1.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 2 (continued)



The image shows a TI-84 Plus C Silver Edition calculator on the left and its data list screen on the right. The calculator screen is blank. The data list screen shows a table with columns L1, L2, L3, L4, L5, and 2. The L2 column contains the values 4, 15, 74, 91, 50, and 84. A pink arrow points from the calculator to the L2 header. Below the table, the text $L_2 = \{4, 15, 74, 91, 50, 84\}$ is displayed.

L1	L2	L3	L4	L5	2
-----	4	-----	-----	-----	
	15				
	74				
	91				
	50				
	84				

$L_2 = \{4, 15, 74, 91, 50, 84\}$

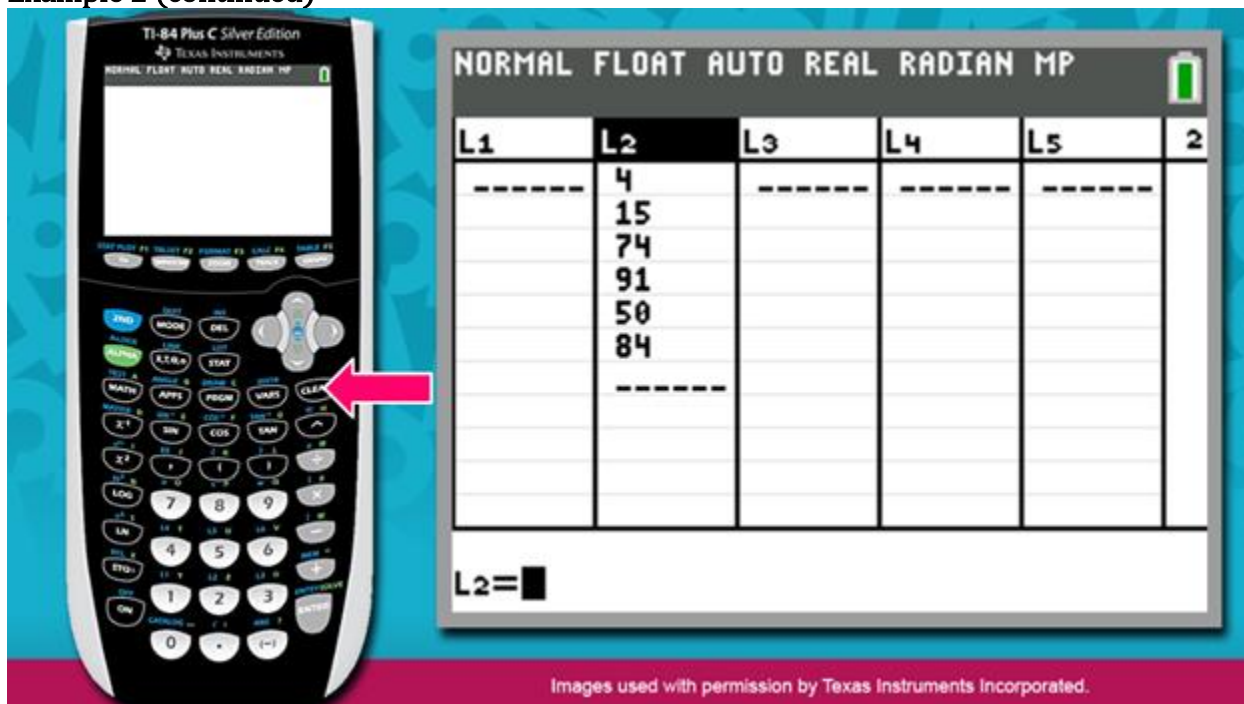
Images used with permission by Texas Instruments Incorporated.

Now, move the cursor to the L2 header. Notice that the set of y-values is shown at the bottom of the window.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 2 (continued)



The image shows a TI-84 Plus C Silver Edition calculator on the left and a screenshot of its data table on the right. The calculator's screen displays the mode menu with 'NORMAL' selected. A pink arrow points to the 'CLEAR' button on the calculator's keypad. The data table on the right is titled 'NORMAL FLOAT AUTO REAL RADIAN MP' and has columns labeled L1, L2, L3, L4, L5, and 2. The L2 column contains the values 4, 15, 74, 91, 50, and 84. The bottom of the table shows 'L2=' followed by a cursor.

L1	L2	L3	L4	L5	2
-----	4	-----	-----	-----	
	15				
	74				
	91				
	50				
	84				

L2= █

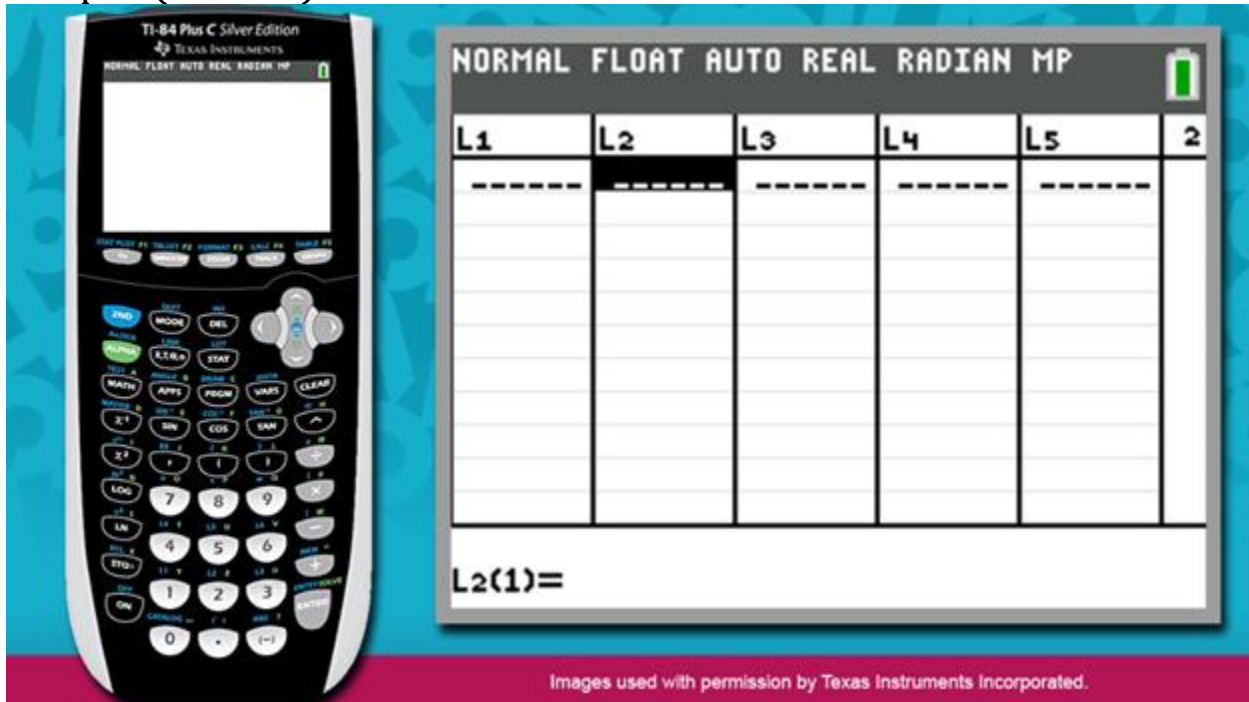
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Press CLEAR.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 2 (continued)



The image shows a TI-84 Plus C Silver Edition calculator on the left and its Data Editor screen on the right. The calculator screen is blank. The Data Editor screen shows a table with five columns labeled L1, L2, L3, L4, and L5, and a sixth column labeled 2. The L2 column is highlighted with a black background. Below the table, the text "L2(1)=" is displayed.

L1	L2	L3	L4	L5	2
-----	-----	-----	-----	-----	

L2(1)=

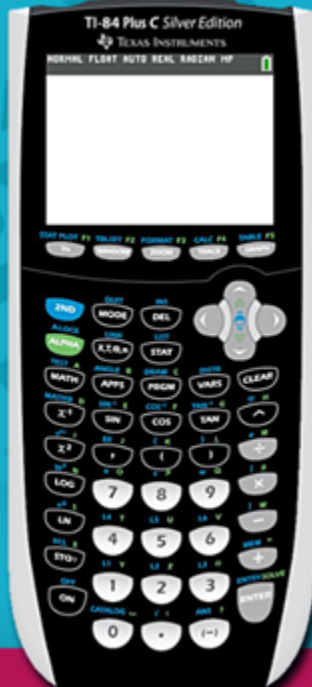
Images used with permission by Texas Instruments Incorporated.

Then, press ENTER. The y-values are now cleared from L2.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 2 (continued)



TI-84 Plus C Silver Edition
TEXAS INSTRUMENTS
NORMAL FLOAT AUTO REAL ANGLE DDP

Enter the x -values into L1.

x	y
1	37
2	20
3	22
4	17
5	10
6	-14
7	-19

Hint Next

Images used with permission by Texas Instruments Incorporated.

Now that you have cleared both L1 and L2, you can enter the appropriate values into each column. Enter the x -values into L1.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 2 (continued)

Hint

Type the first value, then press **ENTER**.

Type the second value, then press **ENTER**.

Continue this process until each x -value is entered into the list.

NORMAL FLOAT AUTO REAL RADIAN MP 🔋

L1	L2	L3	L4	L5	1
1	-----	-----	-----	-----	
2					
3					
4					
5					
6					
7					

L1(8)= Next

Images used with permission by Texas Instruments Incorporated.

Hint: Type the first value, then press ENTER.

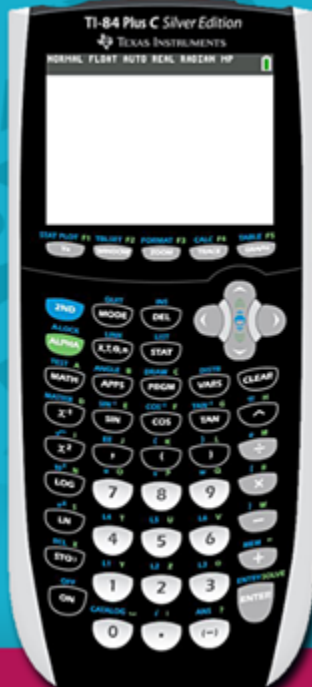
Type the second value, then press ENTER.

Continue this process until each x -value is entered into the list.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 2 (continued)



TI-84 Plus C Silver Edition
TEXAS INSTRUMENTS
NORMAL FLOAT AUTO REAL ANGLE DDP

Enter the y -values into L2.

x	y
1	37
2	20
3	22
4	17
5	10
6	-14
7	-19

Hint Next

Images used with permission by Texas Instruments Incorporated.

Enter each corresponding y -value into L2.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 2 (continued)

Hint

Press the **right arrow** to move the cursor to L2.

Type the first value, then press **ENTER**.

Type the second value, then press **ENTER**.

Continue this process until each *y*-value is entered into the list.

NORMAL FLOAT AUTO REAL RADIAN MP🔋

L1	L2	L3	L4	L5	2
1	37	-----	-----	-----	
2	20				
3	22				
4	17				
5	10				
6	-14				
7	-19				
-----	-----				

L2(8)=Next

Images used with permission by Texas Instruments Incorporated.

Hint: Press the right arrow to move the cursor to L2.

Type the first value, then press ENTER.

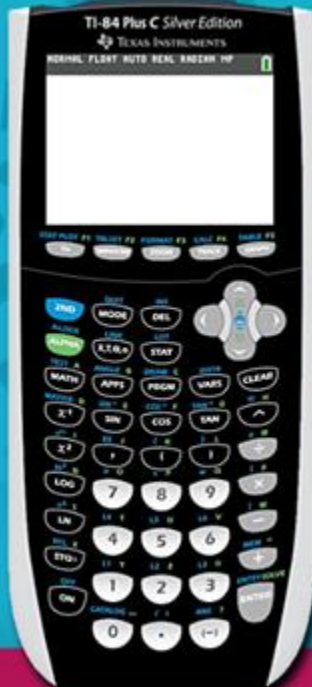
Type the second value, then press ENTER.

Continue this process until each *y*-value is entered into the list.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 2 (continued)



The equation of the line of best fit is

$$y = \boxed{}x + \boxed{}$$

Round the appropriate values to the nearest hundredths.
Then, enter the values above and click submit.

[Hint](#) [Submit](#)

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Next, generate the equation of the line of best fit.

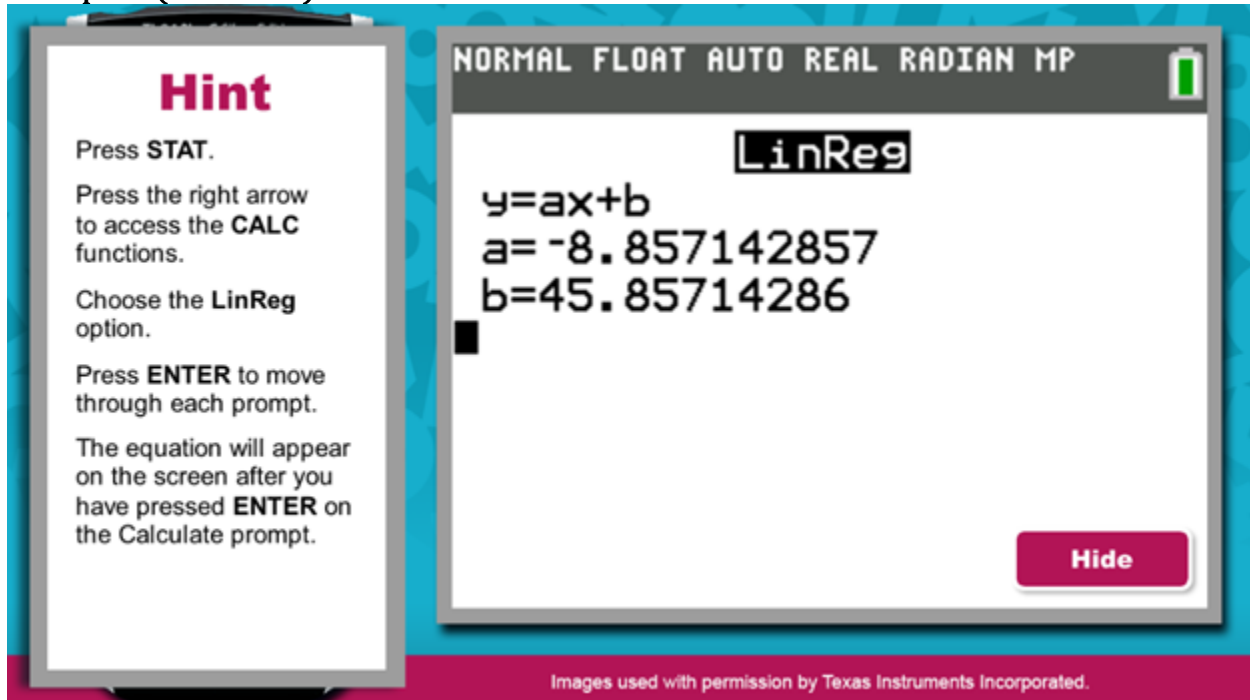
The equation of the line of best fit is $y = \underline{\quad}x + \underline{\quad}$.

Round the appropriate values to the nearest hundredths. Then, enter the values above and click submit.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 2 (continued)



Hint

Press **STAT**.

Press the right arrow to access the **CALC** functions.

Choose the **LinReg** option.

Press **ENTER** to move through each prompt.

The equation will appear on the screen after you have pressed **ENTER** on the Calculate prompt.

Hide

Images used with permission by Texas Instruments Incorporated.

Hint: Press **STAT**.

Press the right arrow to access the **CALC** functions.

Choose the **LinReg** ($ax + b$) option.

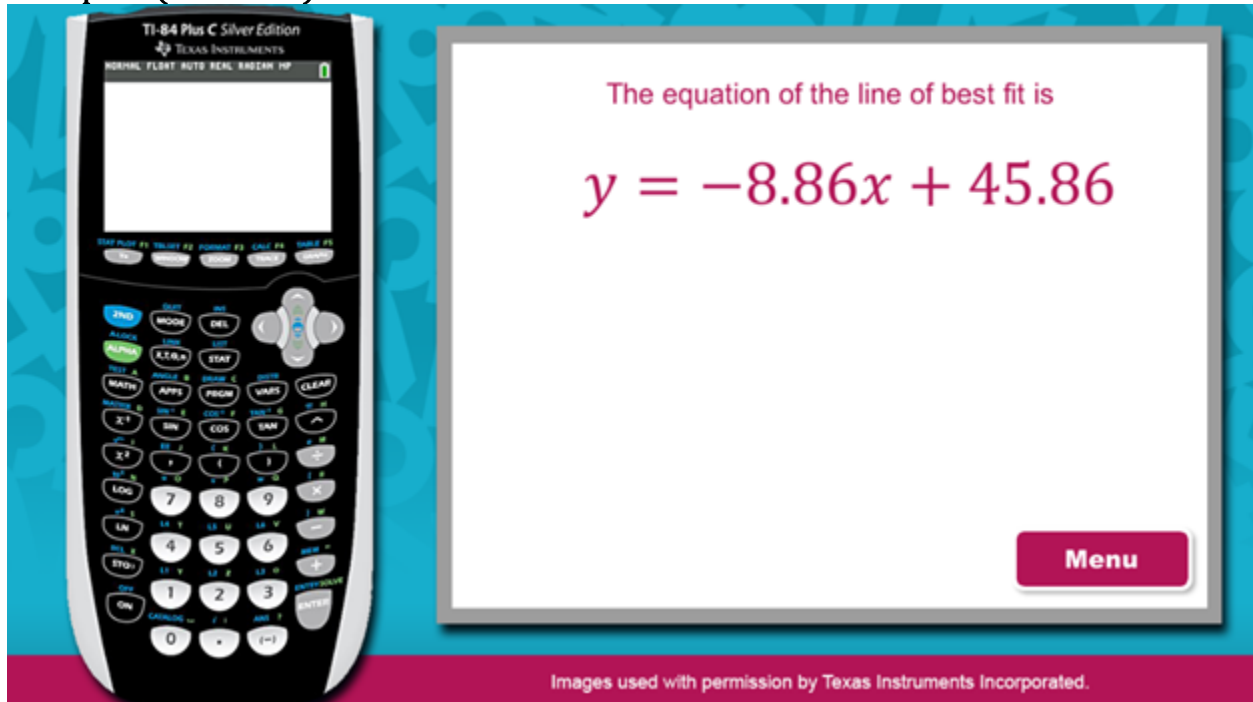
Press **ENTER** to move through each prompt.

The equation will appear on the screen after you have pressed **ENTER** on the Calculate prompt.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Example 2 (continued)

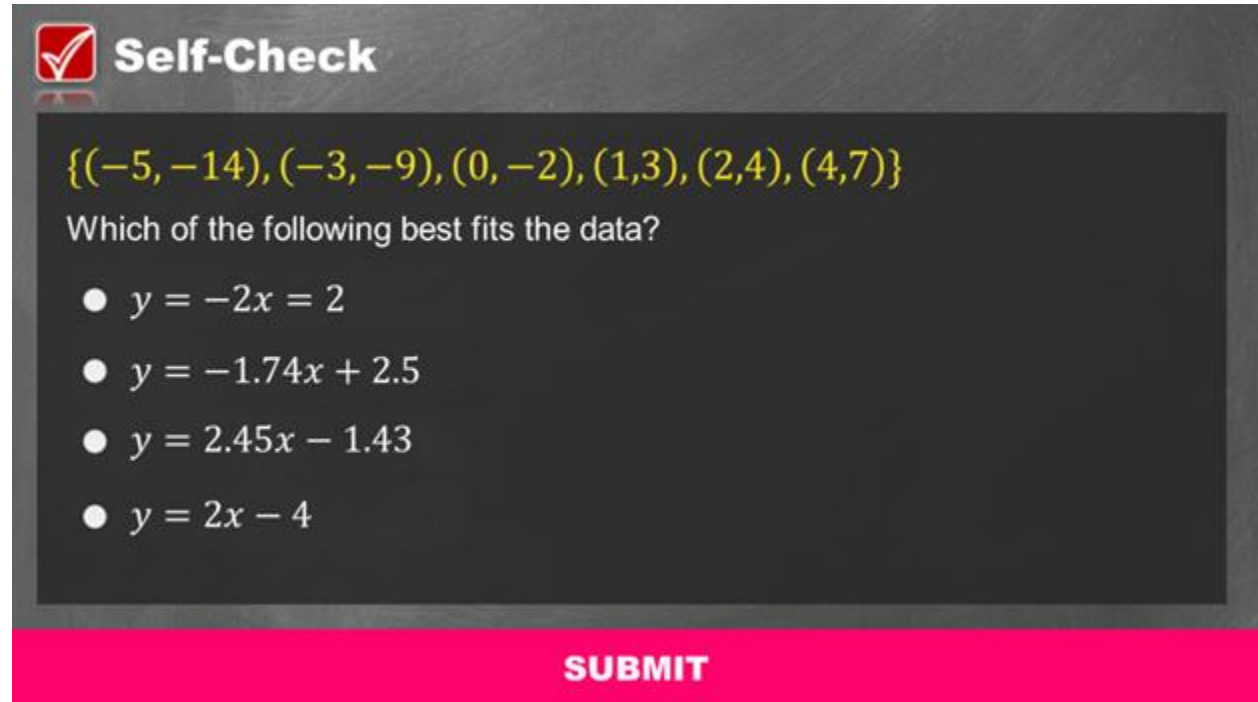


The image shows a TI-84 Plus C Silver Edition calculator on the left and a whiteboard on the right. The whiteboard displays the equation of the line of best fit in red text: $y = -8.86x + 45.86$. Above the equation, it says "The equation of the line of best fit is". A red "Menu" button is located in the bottom right corner of the whiteboard. Below the whiteboard, there is a small text credit: "Images used with permission by Texas Instruments Incorporated."

The equation of the line of best fit is $y = -8.86x + 45.86$

Module 12: Statistics
Topic 1: Determining the Equation of the Line of Best Fit

Self-Check 1



Self-Check

$\{(-5, -14), (-3, -9), (0, -2), (1, 3), (2, 4), (4, 7)\}$

Which of the following best fits the data?

- $y = -2x = 2$
- $y = -1.74x + 2.5$
- $y = 2.45x - 1.43$
- $y = 2x - 4$

SUBMIT

Solve the problem in the image above to check your understanding of the content.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Self-Check 1: Answer

Correct

That's correct!

L1	L2	L3	L4	L5	2
-5	-14				
-3	-9				
0	-2				
1	3				
2	4				
4	7				

Press **STAT**. Choose the **Edit** option. Clear the data in L1 and L2. Then, enter the current data.

```
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:nReg
```

Press **STAT**. Press the right arrow key to access the **CALC** menu. Select the fourth option, **LinReg (ax + b)**, and press **ENTER**.

Part One Part Two Continue

SUBMIT

Correct

```
LinReg(ax+b)
Xlist:L1
Ylist:L2
FreqList:
Store RegEQ:
Calculate
```

Press **ENTER** to progress through all of the prompts in the **LinReg** menu.

```
LinReg
y=ax+b
a=2.446808511
b=-1.425531915
```

The equation of the line of best fit is in the form $y = ax + b$. If the values are rounded to the nearest hundredths, the equation can be written as $y = 2.45x - 1.43$.

Part One Part Two Continue

SUBMIT

For your reference, the images above show the correct solution to the self-check problem.

Module 12: Statistics

Topic 1: Determining the Equation of the Line of Best Fit

Conclusion



The image shows a digital lesson conclusion screen. On the left, a white box with a pink header titled "Today's Lesson" contains a checkmark and the text "Used the graphing calculator to determine the equation of the line of best fit". Below this are two pink buttons: "Exit Lesson" and "Restart Lesson". On the right, a cartoon illustration of a young woman with dark curly hair and a pink top is set against a blue background with faint mathematical symbols like pi, infinity, and numbers.

You have reached the conclusion of this lesson where you learned how to use the graphing calculator to determine the equation of the line of best fit.