

## Chapter 4 / Example 20

# Linear regression

At a coach station, the maximum temperature in  $^{\circ}\text{C}$  ( $x$ ) and the number of bottles of water sold ( $y$ ) were recorded over 10 consecutive days. The collected data are summarized in the table.

Day	1	2	3	4	5	6	7	8	9	10
$x$	20	19	21	21.3	20.7	20.5	21	19.3	18.5	18
$y$	140	130	140	145	143	145	145	125	120	123

- Use a graph of the data to justify why a linear regression is appropriate.
- Find the regression line of  $y$  on  $x$ .
- Interpret the gradient and  $y$ -intercept of the regression equation in context.
- Use the regression equation to predict the number of bottles that will be sold at a temperature of  $19.5^{\circ}\text{C}$ .

Open a new document and add a Lists & Spreadsheet page.

Type ' $x$ ' in the first cell.

Enter the times in the first column.

Press **enter** or **▼** after each number to move to the next cell.

A	x	B	C	D
1	20			
2	19			
3	21			
4	21.3			
5	20.7			

Type ' $y$ ' in the cell to the right of 'height'.

Enter the temperatures in the second column.

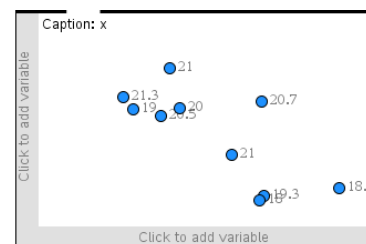
Use the **▲** **▼** **▶** **◀** keys on the touchpad to navigate the spreadsheet.

A	x	B	y	C	D
1	20	140			
2	19	130			
3	21	140			
4	21.3	145			
5	20.7	143			

Add a new Data & Statistics page to your document by pressing

**ctrl** **doc** **(+page)** 5: Add Data & Statistics.

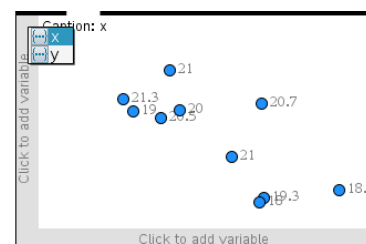
**Note:** Ignore the screen display that you see when this page first opens.



Press **menu** 2: Plot Properties | 5: Add X Variable.

The GDC displays the two variables you created in the spreadsheet: ' $x$ ' and ' $y$ '.

Select ' $x$ ' with the touchpad.



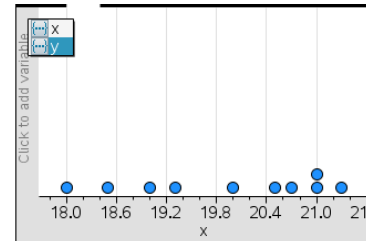
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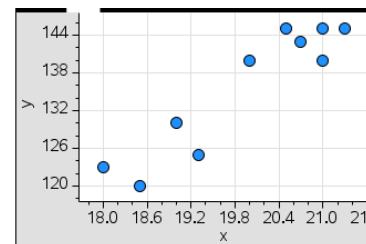
Press **menu** 2:Plot Properties | 8: Add Y Variable.

The GDC displays the two variables you created in the spreadsheet: 'x' and 'y'.

Select 'y' with the touchpad.



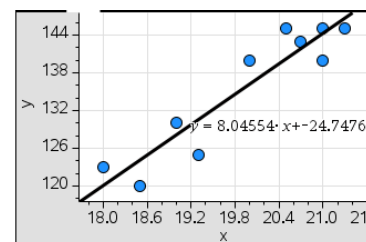
The GDC displays a scatter diagram of x against y.



Press **menu** 4:Analyze | 6: Regression | 1:Show Linear (mx+b).

The GDC displays the scatter diagram and the regression line.

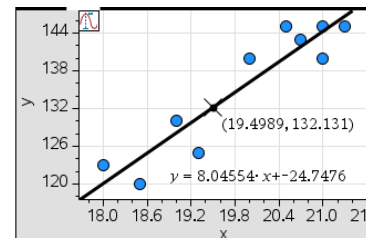
The equation is  $y = 8.05x - 24.7$ .



Press **menu** 4:Analyze | A: Graph Trace.

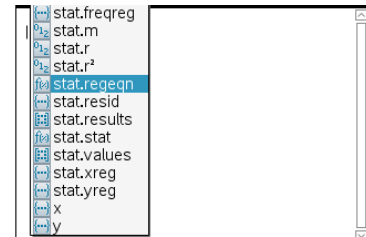
Use the **▶** **◀** keys to move along the line.

It is possible to get close to  $x = 19.5$ , but to get a better estimate there is another method.



Press **ctrl** **doc** (**+page**) 1:Calculator.

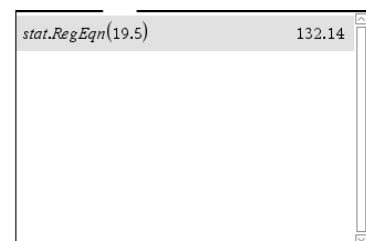
Press **var** and select stat.regeqn from the list.



Press **var** and select stat.regeqn from the list.

Type 19.5 and press **enter**.

The number of bottles of water that should be stocked is 133 (132 would be insufficient).



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