Chapter 3 / **Example 1**

# Equation of a straight line

For the two points A(2, 2) and B(6, 1)

**a** Find the gradient $m$ of (AB) (the line passing through A and B).

**b** Find the equation of (AB) in the form $y = mx + c$.

**c** Sketch the line for $-2 \leq x \leq 12$.

**d** Find:

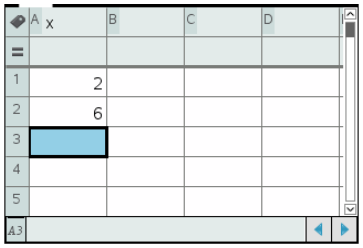
**i** the value of $y$ when $x$ is 4.7 **ii** $y$-intercept.

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

Type 'x' in the first cell.

Type the $x$-coordinates of the two points in the first column.

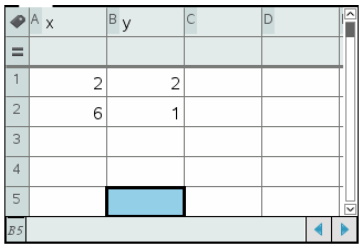
Press enter or ▼ after each number to move to the next cell.




Type 'y' in the cell to the right of 'x'.

Enter the $y$-coordinates of the two points in the second column.

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

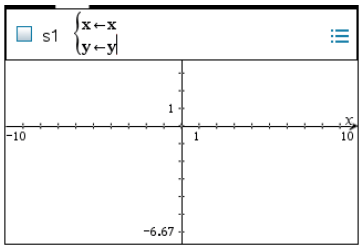



Press ctrl doc (+page) and add a Graphs page.

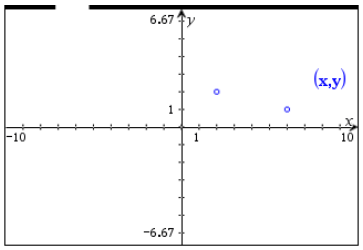
Press menu 3:Graph Entry/Edit | 6:Scatter Plot.

The entry line is displayed at the top of the work area.

Type the names of the lists, x and y and press enter.




The GDC displays the points A and B with the default axes $-10 \leq x \leq 10$ and $-6.67 \leq y \leq 6.67$.



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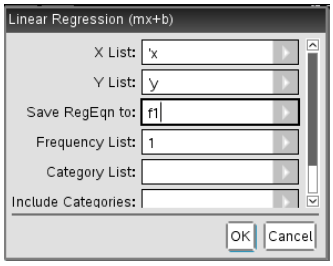
To find the equation of the line through A and B, calculate the equation of the regression line.

Return to the Lists & Spreadsheet page by pressing ctrl del

Press menu 4:Statistics | 1:Stat Calculations | 3:Linear Regression (mx+b)…

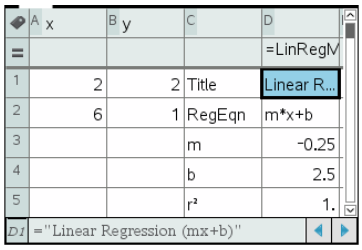
Open the drop down lists with ▶ and select using ▼ and enter del

Choose 'x' for X List, 'y' for Y List, f1 for Save RegEqn to and leave the remaining fields unchanged.




Click the touchpad on OK or press enter del

The equation of the line is $y = -0.25x + 2.5$.



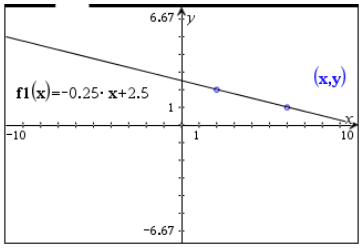

Return to the Graphs page by pressing ctrl ▶ del

Press menu 3:Graph Entry/Edit | 1:Function.

Press ▲ to scroll up to f1 and press enter del

The regression equation is already pasted as f1, but this will select it to display.

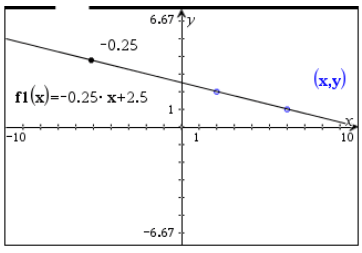
The GDC displays the points A and B and a straight line passing through them.




To find the gradient of the line press

menu 6:Analyse Graph | 5:dy/dx and press enter del

The GDC displays a point on $y = -0.25x + 2.5$ and the gradient at that point, which is –0.25.

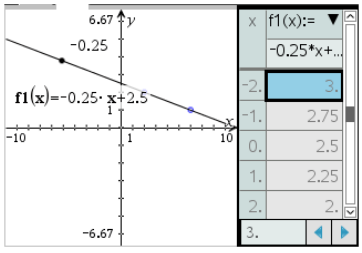



The required range for the *y*-axis can be found from the table function. Press ctrl T.

A table of values is displayed alongside the graph.

You can scroll through the table using ▲ and ▼ on the touchpad.

From the table, you can see that the largest value of *y* in the domain $-2 \le x \le 12$ is 3.



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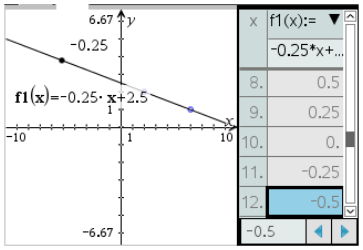
Scrolling down you can see that the smallest value of $y$ is $-0.5$.




Use this information to choose suitable window settings to display the graph.

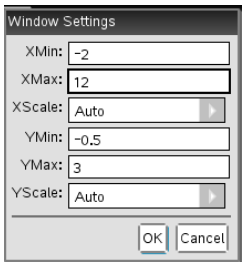
Press ctrl T again to remove the table.

Press menu 4:Window/Zoom | 1:Window Settings…

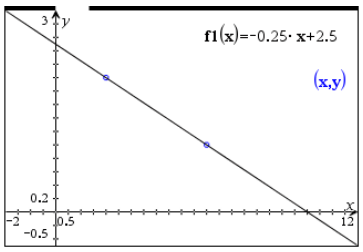
Change the settings to show $-2 \leq x \leq 12$ and $-0.5 \leq y \leq 3$

Leave the scales as Auto.

Press enter when you have finished.




The GDC shows the straight line in a window that corresponds to the given domain and range.

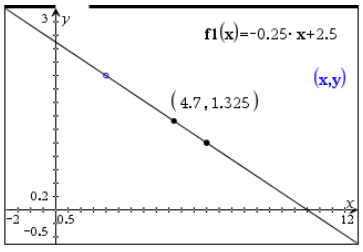



To find the value of y when x is 4.7 press menu 5:Trace | 1:Graph Trace.

Press ▲ to select f1.

Type 4.7 and press enter. Press enter again.

The GDC displays the coordinates of the point $(4.7, 1.325)$.




Press 0 enter to change the $x$-coordinate to 0. Press enter again and press esc.

The GDC displays the coordinates of the $y$-intercept $(0, 2.5)$.