

## 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.

Press **STAT** 1:Edit and press **ENTER**

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

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

[illegible]

Press  to move to the next column.

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

[illegible]

Press [F2] WINDOW

Set the axes to show  $-2 \leq x \leq 12$

You can leave the last three items as they are.

```
WINDOW
Xmin=-2
Xmax=12
Xscl=1
Ymin=-10
Ymax=10
Yscl=1
Xres=1
 $\Delta X=.053030303030303$ 
TraceStep=.10606060606061
```

Press **[F1]** **[Y=]** to display the equation entry screen.

Press  to navigate to Plot1 at the top of the screen.

Press **ENTER**.

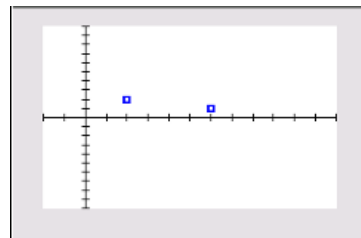
Press **[F5]** **GRAPH**.

Plot1 Plot2 Plot3

Blue \ 1 =  
 Red \ 2 =  
 Black \ 3 =  
 Magenta \ 4 =  
 Green \ 5 =  
 Orange \ 6 =  
 Brown \ 7 =  
 Blue \ 8 =  
 Red \ 9 =

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The GDC displays the points A and B.



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

Press **[STAT]** and **[>]** to access the CALC menu.

Select 4:LinReg(ax+b) and press **[ENTER]**.

Leave the X List as  $L_1$  and the Y List as  $L_2$ .

Enter  $Y_1$  as the place to store the regression equation. To enter  $Y_1$  press **[ALPHA]** **[F4]** 1: $Y_1$

Navigate down to Calculate and press **[ENTER]**.

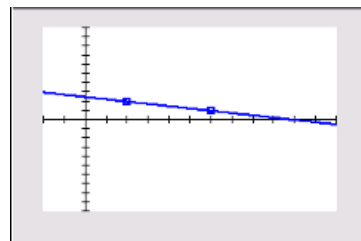
```
LinReg(ax+b)
Xlist:L1
Ylist:L2
FreqList:
Store RegEQ:Y1
Calculate
```

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

```
LinReg
y=ax+b
a=-.25
b=2.5
```

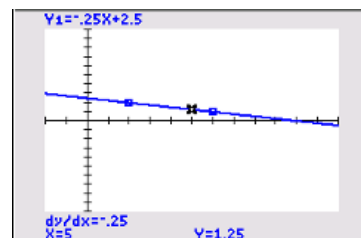
Press **[F5]** **[GRAPH]**.

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



To find the gradient of the line press **[2nd]** **[CALC]** 6:dy/dx and press **[ENTER]**.

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



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The required range for the y-axis can be found from the table function.

Press **[MODE]**. Use the **[←]** **[↑]** **[→]** **[↓]** keys to place the cursor on GRAPH-TABLE in the Mode menu, and then press **[ENTER]** to highlight it.

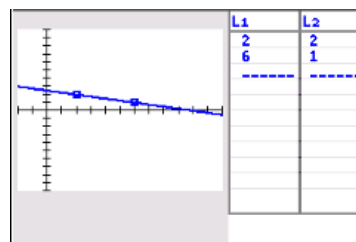
```
MATHPRINT CLASSIC
NORMAL SCI ENG
FLOAT 0 1 2 3 4 5 6 7 8 9
RADIAN DEGREE
FUNCTION PARAMETRIC POLAR SEQ
THICK DOT-THICK THIN DOT-THIN
SEQUENTIAL SIMUL
REAL a+bi re^(θi)
FULL HORIZONTAL GRAPH-TABLE
FRACTIONTYPE: n/d Un/d
ANSWERS: AUTO DEC FRAC-APPROX
GO TO 2ND FORMAT GRAPH: NO YES
STAT DIAGNOSTICS: OFF ON
STAT WIZARDS: ON OFF
SET CLOCK 09/04/18 1:04PM
```

Press **[F5]** **[GRAPH]**.

A table of values is displayed alongside the graph.

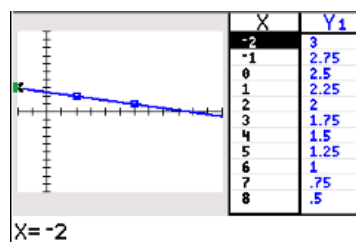
Press **[2nd]** **[F5]** **[TABLE]** to move the cursor into the table.

Press **[→]** **[→]** to show the table values for the line  $Y_1$ .

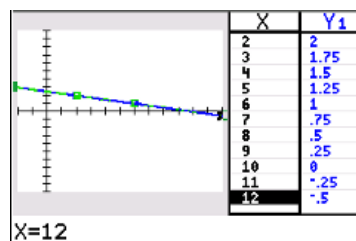


You can scroll through the table using **[↑]** and **[↓]** on the touchpad.

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



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 **[MODE]**. Use the **[←]** **[↑]** **[→]** **[↓]** keys to place the cursor on FULL in the Mode menu, and then press **[ENTER]** to highlight it.

Press **[F2]** **[WINDOW]**

Change the settings to show  $-0.5 \leq y \leq 3$

You can leave the last three items as they are.

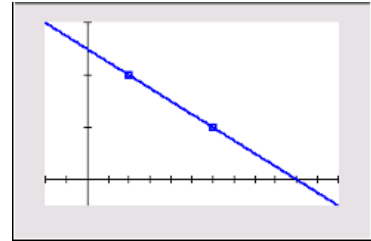
Press **[F5]** **[GRAPH]** when you have finished.

```
WINDOW
Xmin=-2
Xmax=12
Xscl=1
Ymin=-.5
Ymax=3
Yscl=1
Xres=1
ΔX=.07608695652173
TraceStep=.15217391304348
```

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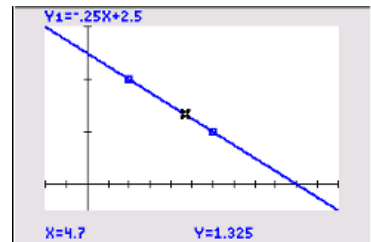
# Equation of a straight line

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  $\boxed{2\text{nd}} \boxed{\text{CALC}} \boxed{1:\text{value}}$ .  
Type 4.7 and press  $\boxed{\text{ENTER}}$ .

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



Press  $\boxed{0} \boxed{\text{ENTER}}$  to change the  $x$  coordinate to 0.

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

