

## Chapter 6 / Example 1

# Sketching a graph

When you “**sketch**” a graph, your sketch should:

- show the general shape of the graph accurately
- label the coordinates of any axes intercepts
- label the coordinates of any vertices.

- a** Sketch the graph of the function  $f(x) = 7 - 2x - x^2$ , for  $-5 \leq x \leq 3$ , and hence determine the range.
- b** What would the range be if the domain were unrestricted?

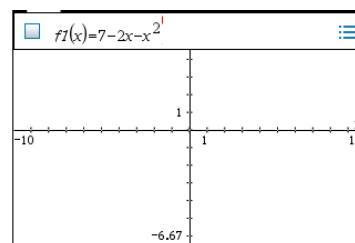
Open a new document and add a Graphs page.

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

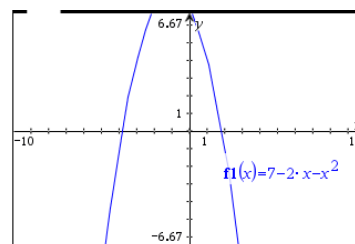
The default graph type is function, so 'f1(x)= ' is displayed.

The default axes are  $-10 \leq x \leq 10$  and  $-6.67 \leq y \leq 6.67$ .

Type  $7 - 2x - x^2$  and press **enter**.



The GDC displays the graph  $f1(x) = 7 - 2x - x^2$  with the default axes.

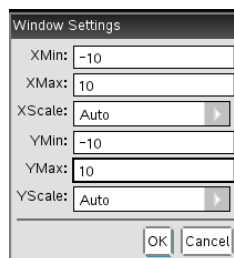


To see an appropriate window, press **menu** 4:Window/Zoom | 1:Window Settings...

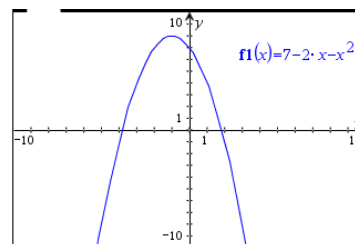
Set the axes to show  $-5 \leq x \leq 5$  and  $-8 \leq y \leq 12$

You can leave the scales set to Auto.

Press **enter** when you have finished.



The GDC shows the curve in an appropriate window.



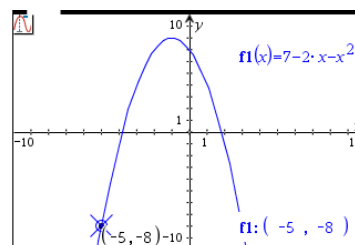
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To find the endpoints in the given domain press **menu** 5:Trace | 1:Graph Trace.

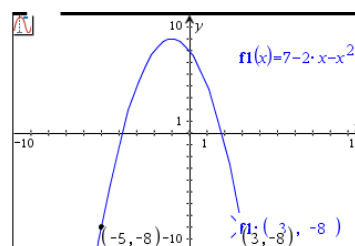
type  $-5$  and press **enter**.

Press **enter** again. There is an endpoint at  $(-5, -8)$ .



Type 3 and press **enter**.

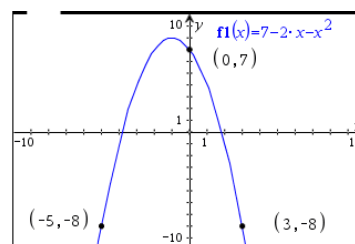
Press **enter** again. There is an endpoint at  $(3, -8)$ .



To find the y-intercept, type 0 and press **enter**.

Press **enter** again and then press **esc** to leave the graph trace mode.

The y-intercept is at  $(0, 7)$ .

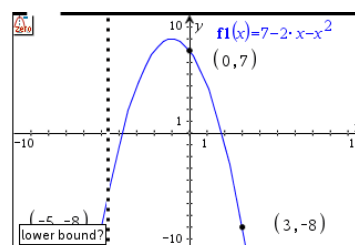


To find the x-intercepts or zeros press **menu** 6:Analyse Graph | 1:Zero.

You will need to give the lower and upper bounds of the region that includes the zero.

The GDC shows a line and asks you to set the lower bound. Move the line using the touchpad and choose a position to the left of the zero.

Click the touchpad.

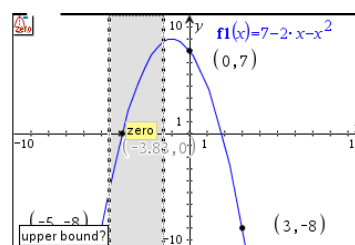


The GDC shows another line and asks you to set the upper bound.

Use the touchpad to move the line so that the region between the lower and upper bounds contains the zero.

When the region contains the zero, the calculator will display the word 'zero' in a box.

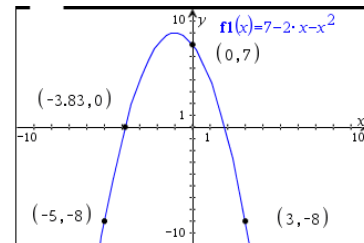
Click the touchpad.



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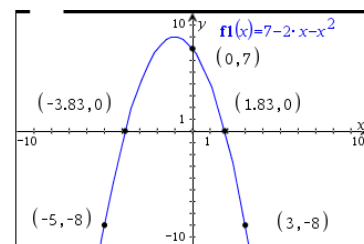
## Sketching a graph

The GDC displays a zero at  $(-3.83, 0)$ .



Repeat for the second zero.

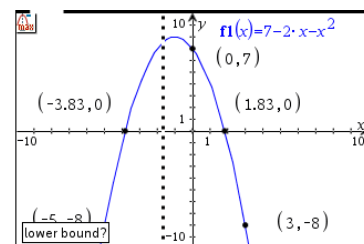
The GDC displays a zero at  $(1.83, 0)$ .



To find the vertex press **menu** 6:Analyse Graph | 3:Maximum.

You will need to give the lower and upper bounds of the region that includes the vertex.

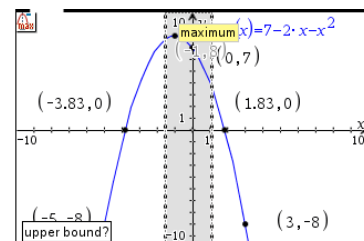
The GDC shows a line and asks you to set the lower bound. Move the line using the touchpad and choose a position to the left of the vertex. Click the touchpad.



The GDC shows another line and asks you to set the upper bound.

Use the touchpad to move the line so that the region between the lower and upper bounds contains the vertex.

When the region contains the zero, the calculator will display the word 'maximum' in a box. Click the touchpad.



The GDC displays the vertex.

The vertex of the quadratic function is at  $(-1, 8)$ .

The range of the function is  $-8 \leq y \leq 8$ .

With unrestricted domain the range is  $y \leq 8$ .

