

Chapter 3 / Example 8

Solving inequalities

Find the values of r for which the equation $x^2 + 3rx + 1 = 0$ has

a two distinct real roots

b one real repeated root

c no real roots.

If there are two distinct roots then $9r^2 - 4 > 0$. One repeated root $9r^2 - 4 = 0$ and no real roots $9r^2 - 4 < 0$.

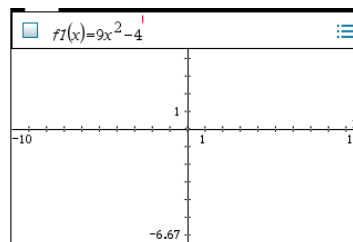
Open a new document and add a Graphs page.

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

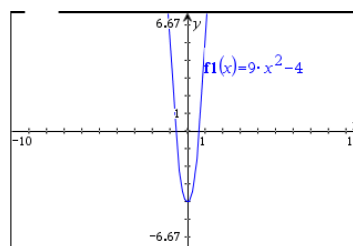
The default graph type is function, so 'f1(x)= ' is displayed.

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

Type $9x^2 - 4$ and press **enter**.



The GDC displays the graph $f1(x) = 9x^2 - 4$ with the default axes.



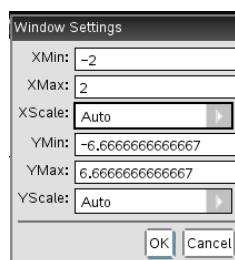
To see both zeros better, change the window settings

Press **menu** 4:Window/Zoom | 1:Window Settings...

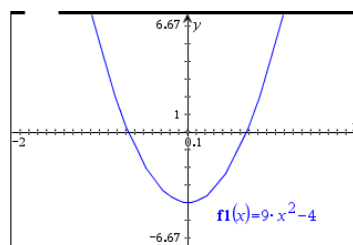
Change the settings to $-2 \leq x \leq 2$.

Leave everything else the same.

Press **enter** when you have finished.



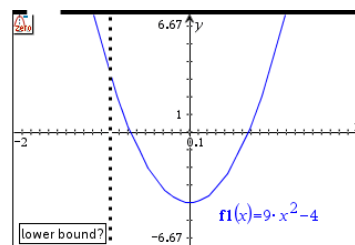
The GDC displays the graph in a suitable window.



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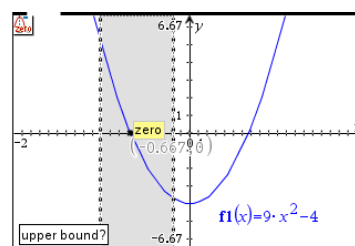
To find the zeros press **menu** 6:Analyse Graph | 1:Zero



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.

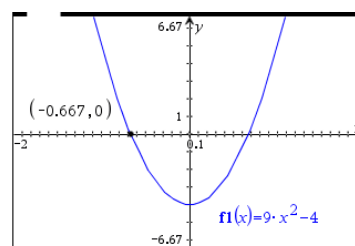


The GDC shows another line and asks you to set the upper bound.

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.



Repeat for the second zero.

The GDC displays the zeros at $(-0.667, 0)$ and $(0.667, 0)$.

There are two distinct roots when $r < -0.667$ or $r > 0.667$, one repeated root when $r = -0.667$ or $r = 0.667$ and no real roots when $-0.667 < r < 0.667$.

