Chapter 2 / **Example 31**

Graphing a function and its reciprocal

Draw the graph of $y = x(x-4)$. On the same set of axes, sketch the graph of its reciprocal, $y = \dfrac{1}{x(x-4)}$. For both graphs, label any intercepts, zeros, extrema and asymptotes.

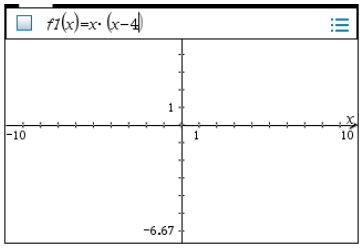
Open a new document and add a Graphs page.

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

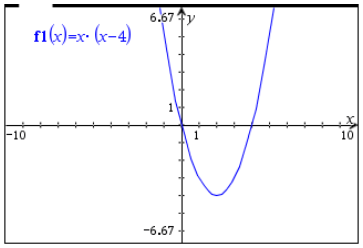
The default graph type is function, so '$f1(x)=$' is displayed.

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

Type $x \times (x-4)$ and press enter.

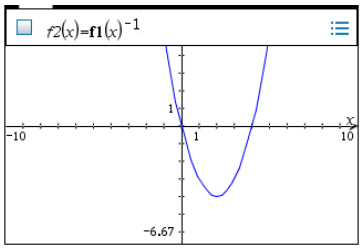


The GDC displays the graph $f1(x) = x(x-4)$ with the default axes.



Press tab to display the entry line again. This time '$f2(x)=$' is displayed.

Type f1(x) ^ (−) 1 and press enter.

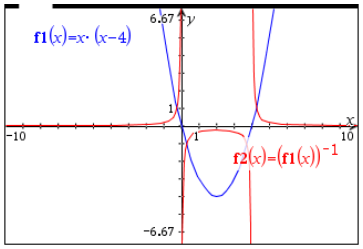


The GDC now displays both graphs:

$f1(x) = x(x-4)$

$f2(x) = \dfrac{1}{x(x-4)}$

with the default axes.

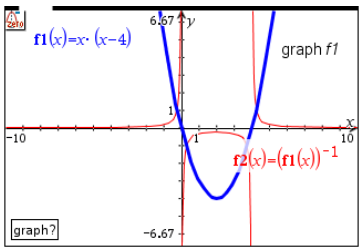


Chapter 2 / **Example 31**

Graphing a function and its reciprocal

To find the zeros of f1 press menu 6:Analyse Graph | 1:Zero

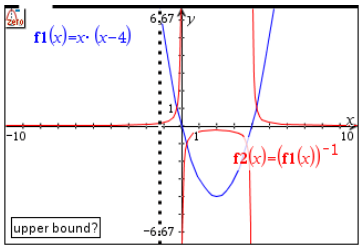
Select graph f1 with the touchpad.



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.

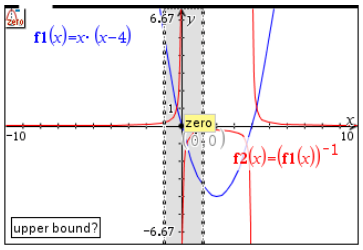


The GDC shows another line and asks you to set the upper bound.

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

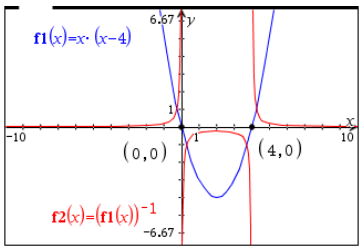
When the region contains the zero, the calculator will display the word 'zero' in a box.

Click the touchpad.



Repeat for the second zero.

The GDC displays the zeros at $(0,0)$ and $(4,0)$.

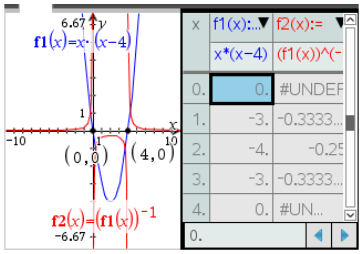


To view asymptotic behavior, it is helpful to use a table of values. Press ctrl T.

A table of values is displayed alongside the graph.

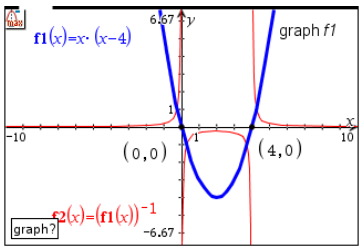
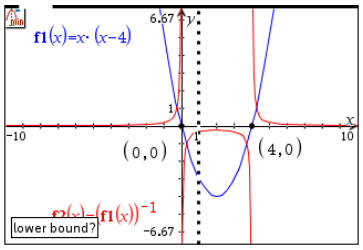
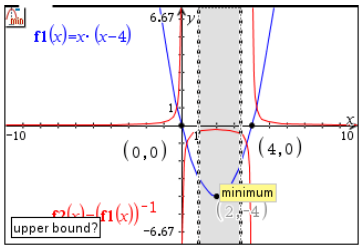
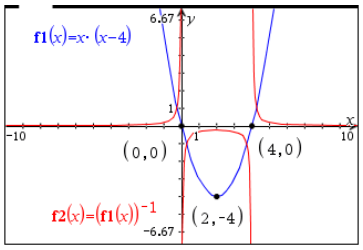
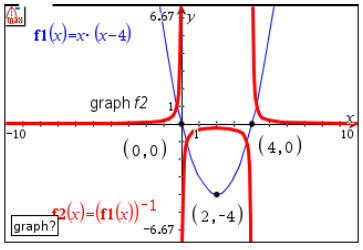
The table shows '#UNDEF' by $x = 0$ and $x = 4$.

This shows that $x = 0$ and $x = 4$ are vertical asymptotes of f2 corresponding to the zeros of f1.



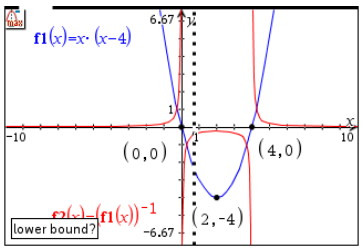
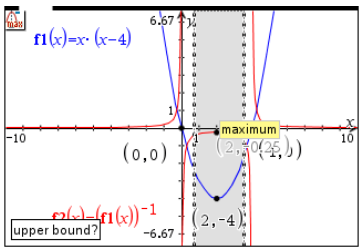
Chapter 2 / **Example 31**

Graphing a function and its reciprocal

Press ctrl T to close the table. To find the minimum of f1 press menu 6:Analyse Graph | 3: Minimum Select graph f1 with the touchpad.	
You will need to give the lower and upper bounds of the region that includes the minimum. 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 minimum. 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 minimum. When the region contains the minimum, the calculator will display the word 'minimum' in a box. Click the touchpad.	
The GDC displays the minimum at $(2,-4)$.	
To find the maximum of f2 press menu 6:Analyse Graph | 3:Maximum Select graph f2 with the touchpad.	

Chapter 2 / **Example 31**

Graphing a function and its reciprocal

You will need to give the lower and upper bounds of the region that includes the maximum. 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 maximum. 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 maximum. When the region contains the maximum, the calculator will display the word 'maximum' in a box. Click the touchpad.	
The GDC displays the local maximum point at $(2, -0.25)$. The maximum of f2 corresponds to the minimum of f1.