

Chapter 7 / **Example 2****Modelling with a geometric sequence**

Costis bought a car for €16 000. The value of the car depreciates by 10% each year.

- How much will the value of the car become at the end of the first year?
- How much will the value of the car become after 5 years?
- When will the value of the car fall below half its original value?

$$V_1 = 16\,000 \times 0.9 = 14\,400.$$

$$V_5 = 16\,000 \times 0.9^5 = 9\,447.84.$$

$$V_n = 16\,000 \times 0.9^n.$$

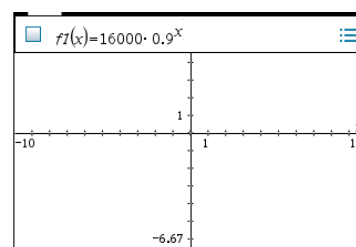
Open a new document and add a Graphs page.

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

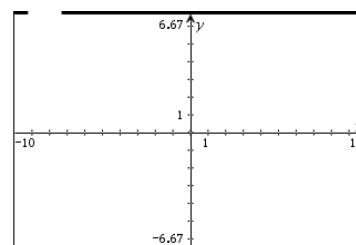
The default graph type is function, so 'f1(x)= ' is displayed.

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

Type $16\,000 \times 0.9^x$ and press **enter**.



The GDC displays the graph $f1(x) = 16\,000 \times 0.9^x$ with the default axes, but there is nothing to be seen with these scales.

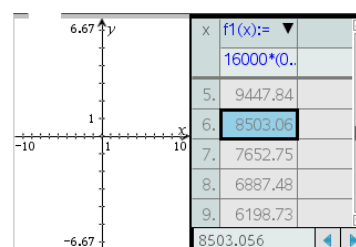


To get a better idea of the best window to view the graph in, it is helpful to use a table of values. Press **ctrl** **T**.

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 graph can see that the function reaches below 8000 between 6 and 7.



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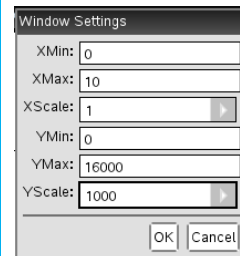
Use this information to choose suitable window settings to display the graph.

Press **ctrl** **T** again to remove the table.

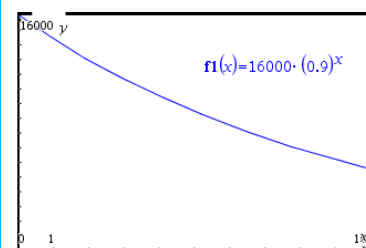
Press **menu** 4:Window/Zoom | 1:Window Settings...

Set the axes to show $0 \leq x \leq 10$ with a scale of 1 and $0 \leq y \leq 16000$ with a scale of 1000.

Press **enter** when you have finished.

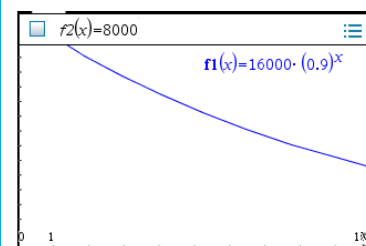


The GDC displays the graph of the value of the car in a suitable window.

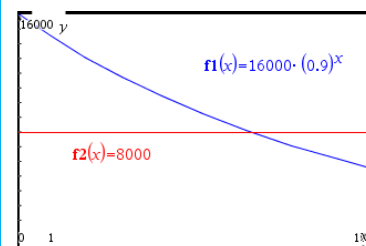


Press **tab** to display the entry line again. This time 'f2(x)= ' is displayed.

Type 8000 and press **enter**.



The GDC displays $f1(x) = 16\,000 \times 0.9^x$ and $f2(x) = 8000$.

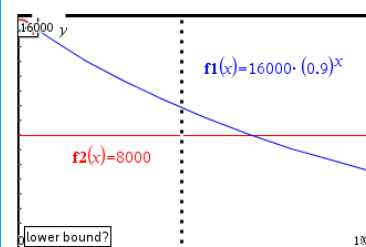


Press **menu** 6:Analyse Graph | 4:Intersection.

To find the intersection you need to give the lower and upper bounds of the region that includes the intersection.

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 intersection.

Click the touchpad.



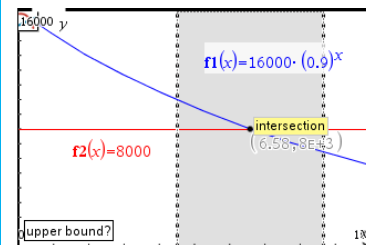
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The GDC shows another line and asks you to set the upper bound.

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

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

Click the touchpad.



The GDC displays the intersection of the two straight lines at the point $(6.58, 8000)$.

After 7 years the value of the car will first drop below half of its original value.

