

Chapter 7 / Example 6

Geometric sequences

Sheldon is carrying out an experiment that involve adding decreasing amounts of a chemical to a series of test solutions.

He adds 60 ml to the first and 50 ml to the second. The amounts added form a geometric sequence.

- Find the amount added to the fifth solution.
- Find which solution will be the first to have less than 10 ml added.

$$u_n = 60 \times \left(\frac{5}{6}\right)^{n-1}.$$

Open a new document and add a Graphs page.

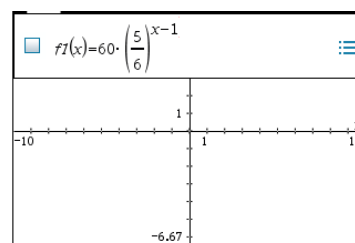
The entry line is displayed at the top of the work area.

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

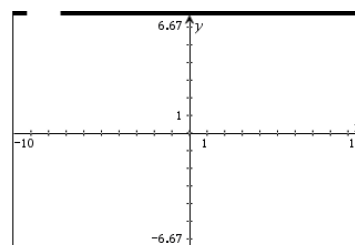
The default axes are $-10 \leq x \leq 10$ and $-6.67 \leq y \leq 6.67$.

Type $60 \times \left(\frac{5}{6}\right)^{x-1}$ and press **enter**.

Press **ctrl** **[$\frac{\square}{\square}$]** to use the fraction template.



The GDC displays the graph $f1(x) = 60 \times \left(\frac{5}{6}\right)^{x-1}$ with the default axes, but there is nothing to be seen with these scales.

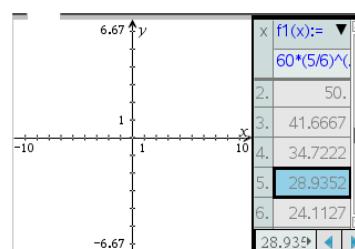


To get a better idea of the best window to view the graph in, it is helpful to use a table of values. Press **ctrl** **[T]**.

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 $u_5 = 28.9$ ml.



Chapter 7 / Example 6

Geometric sequences

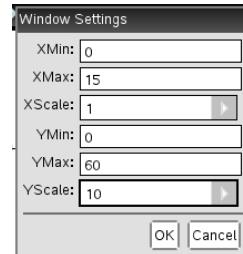
Use this information to choose suitable window settings to display the graph.

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

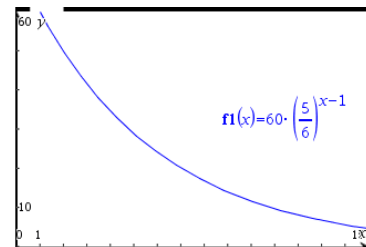
Press **menu** 4:Window/Zoom | 1:Window Settings...

Set the axes to show $0 \leq x \leq 15$ with a scale of 1 and $0 \leq y \leq 60$ with a scale of 10.

Press **enter** when you have finished.

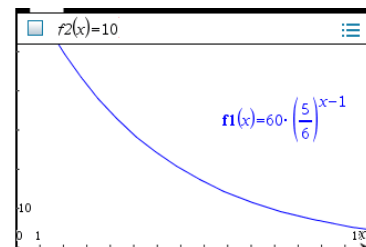


The GDC displays the graph of the sequence in a suitable window.

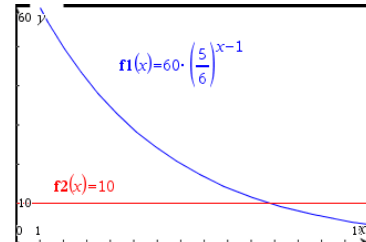


Press **tab** to display the entry line again. This time 'f2(x)= ' is displayed.

Type 10 and press **enter**.



The GDC displays $f1(x) = 60 \times \left(\frac{5}{6}\right)^{x-1}$ and $f2(x) = 10$.

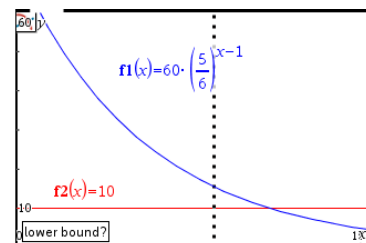


Press **menu** 6:Analyze Graph | 4:Intersection.

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.



Chapter 7 / Example 6

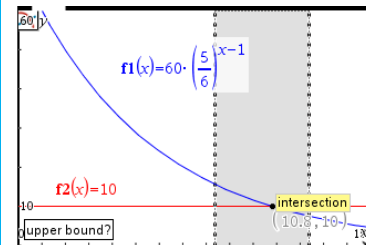
Geometric sequences

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 curve and the line at the point $(10.8, 10)$.

Since $n > 10.8$, $n = 11$ as it must be an integer.

