

Chapter 4 / **Example 18****Sum of an arithmetic series**

- a** Find the sum of the arithmetic series  $-10 + (-6) + (-2) + \dots + 90$ .  
**b** Write down this series in sigma notation.  
**c** Find the least number of terms from this series needed to obtain a sum greater than 100.

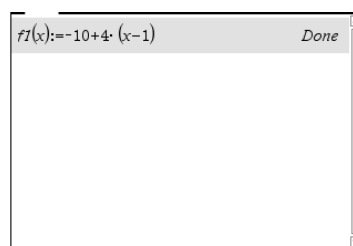
$$u_1 = -10 \text{ and } d = 4.$$

$$u_n = -10 + 4(n-1).$$

Open a new document and add a Calculator page.

Type  $f1(x) := -10 + 4(x-1)$  and press **enter**.

To enter,  $:=$  press **ctrl** **[=]** (**[:=]**).



Press **ctrl** **[doc]** (**[+page]**) and add a Lists & Spreadsheet page.

Press **ctrl** **[T]** to change from a spreadsheet to a table.

Press **enter**.

Scroll down the table using **▼**.

From the table,  $u_n = 90$  when  $n = 26$

$$S_{26} = \frac{26}{2}(-10 + 90) = 1040.$$

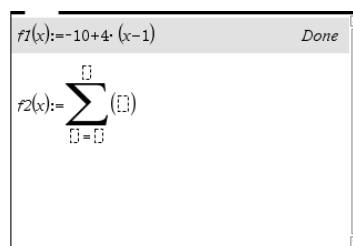
x	f1(x):= -10+4*(x-1)
25.	86.
26.	90.
27.	94.
28.	98.
29.	102.
26.	

Press **ctrl** **[◀]** to return to the Calculator page.

Type  $f2(x) :=$

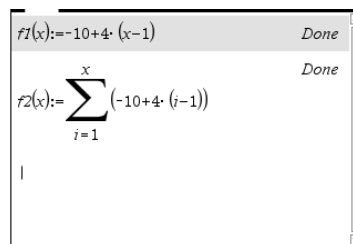
Press **[Σ]** and select **[Σ]** with the trackpad.

The template has spaces for the variable,  $i$ , the limits and the function.



Type  $I = 1$ ,  $X$  and  $-10 + 4(I-1)$ .

Press **enter**.



Chapter 4 / **Example 18****Sum of an arithmetic series**

Press **ctrl** **▶** to return to the Lists & Spreadsheets page.

Press **▶** to move into the second column.

Use the trackpad to select f2.

Scroll down the table using **▼**.

The sum is smaller than 100 when  $n = 10$ , and larger when  $n = 11$ .

The the least number of terms is 11.

x	f1(x):=	f2(x):=
	-10+4*(x..	Σ(-10+4*
9.	22.	54.
10.	26.	80.
11.	30.	110.
12.	34.	144.
13.	38.	182.
110.		

Alternatively, the sum can be expressed as

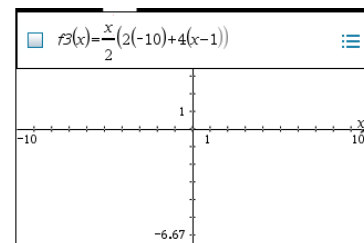
$$S_n = \frac{n}{2}(2(-10) + 4(n-1)).$$

Press **ctrl** **doc** **(+page)** and add a Graphs page.

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

The default graph type is function, so 'f3(x)= ' is displayed.

Type  $\frac{x}{2}(2(-10) + 4(x-1))$  and press **enter**.

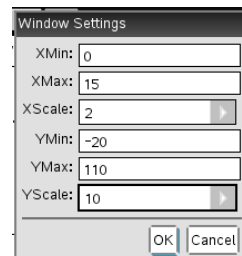


Change the window settings for a suitable view.

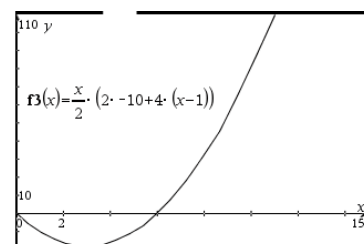
Press **menu** 4:Window/Zoom | 1:Window Settings...

Set the axes to show  $0 \leq x \leq 15$  with a scale of 2 and  $-20 \leq y \leq 110$  with a scale of 10.

Press **enter** when you have finished.

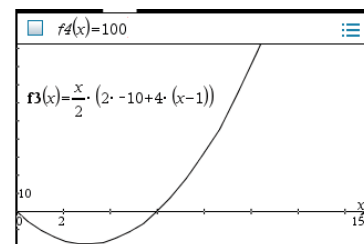


The GDC displays f3(x) with suitable axes.



Press **tab** to display the entry line again. This time 'f4(x)= ' is displayed.

Type 100 and press **enter**.

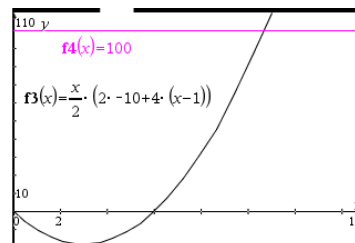


Chapter 4 / **Example 18****Sum of an arithmetic series**

The GDC now displays the curve and the straight-line graph:

$$f3(x) = \frac{x}{2}(2(-10) + 4(x-1))$$

$$f4(x) = 100$$

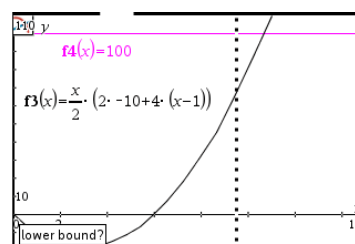


Press **menu** 6:Analyse Graph | 4:Intersection.

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.

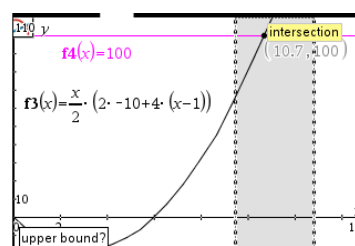


The GDC shows another line and asks you to set the upper bound.

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  $(10.7, 100)$ .

As  $n$  must be a whole number and the sum must be greater than 100, you choose the next largest whole number, so  $n = 11$ .

