Chapter 4 / **Example 18**

Sum of an arithmetic series

a Find the sum of the arithmetic series −10 + (−6) + (−2) + … + 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.

$u_1 = -10$ and $d = 4$.

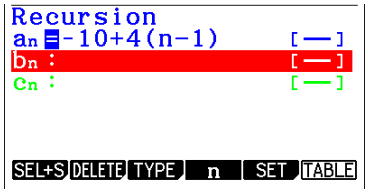
$u_n = -10 + 4(n-1)$.

Press MENU 8 RECUR to display the sequence entry screen.

Press F3 TYPE F1 a_n.

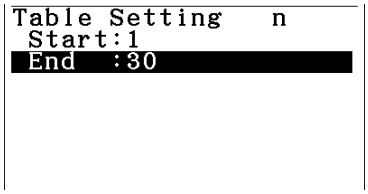
Type $-10 + 4(n-1)$ and press EXE to enter the first sequence as a_n.

Press F1 to enter n.



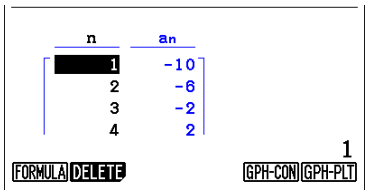
Press F5 SET and change the settings to start at 1 and end at 30.

Press EXIT.



Press F6 TABLE.

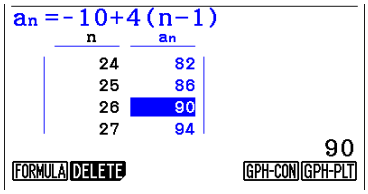
The GDC displays a table of values of the sequence a_n.



You can scroll down the table using ▼.

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

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

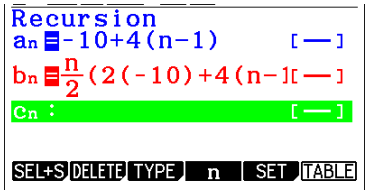


Chapter 4 / **Example 18**

Sum of an arithmetic series

In calculation mode, the fx-CG50 has a summation function, however this is not available when working in sequence mode. Instead of using the summation function, you must use the result: $\sum_{i=1}^{n} -10+4(i-1) = \frac{n}{2}\left(2(-10)+4(n-1)\right)$.

Type $\frac{n}{2}\left(2(-10)+4(n-1)\right)$ and press EXE to enter the function as b_n.

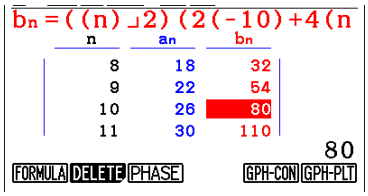


Press F6 TABLE.

You can scroll down the table using ▼.

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

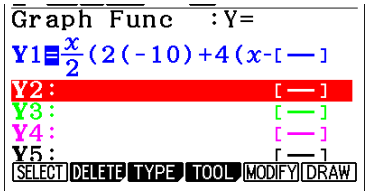
The the least number of terms is 11.



You can also approach this problem graphically.

Press MENU 5 GRAPH to display the equation entry screen.

Type $\frac{x}{2}\left(2(-10)+4(x-1)\right)$ and press EXE to enter the equation as Y1.

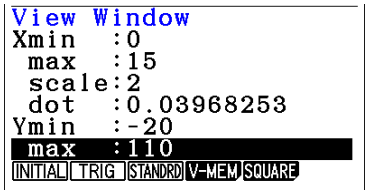


Choose suitable window settings to display the graphs.

Press SHIFT F3 V-WIN.

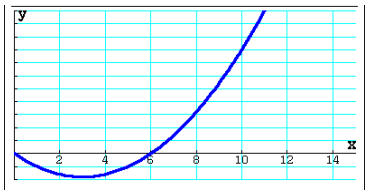
Set the axes to show $0 \le x \le 15$ with a scale of 2 and $-20 \le y \le 110$ with a scale of 10. Leave other items the same.

Press EXIT when you have finished.



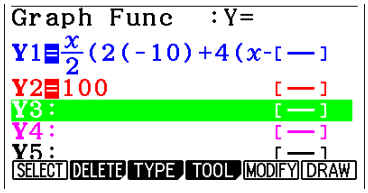
Press F6 DRAW to display the graph screen.

The GDC now displays the curve in a suitable window.



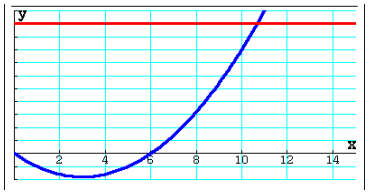
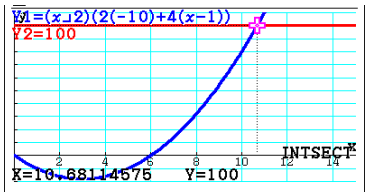
Press EXIT to display the equation entry screen.

Type 100 and press EXE to enter the equation as Y2.



Chapter 4 / **Example 18**

Sum of an arithmetic series

The GDC now displays the curve and the straight-line graph: $Y1 = \frac{x}{2}\left(2(-10) + 4(x-1)\right)$ $Y2 = 100$	
To find the intersection press F5 G-Solv F5 Intersect. Press EXE to display the coordinates. Press EXIT to leave G-Solv mode and F6 DRAW to display the graph screen again.	
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.