Chapter 4 / **Example 18**

Sum of an arithmetic series

<A short introductory text, where appropriate>

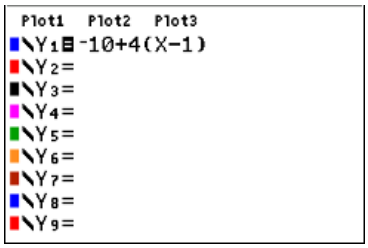
a Find the sum of the arithmetic series −10 + (−6) + (−2) + … + 90.
b Write down this series in sigma notation.
c Find the least number of terms from this series needed to obtain a sum greater than 100.

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

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

Press [F1] [Y=] to display the equation entry screen.

Type $-10+4(x-1)$ and press [ENTER].

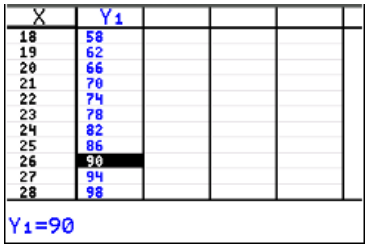


Press [2nd] [F5] ([TABLE]).

You can scroll down the table using [▼].

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

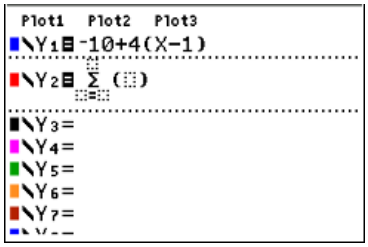
$$S_{26} = \frac{26}{2}(-10+90) = 1040$$



Press [F1] [Y=] to display the equation entry screen.

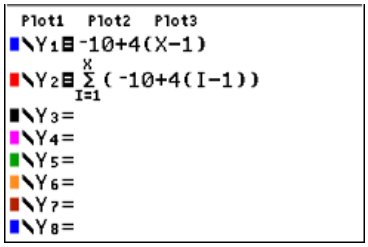
Press [ALPHA] [F2] 2:summation Σ(

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



Type $I = 1$, X and $-10+4(I-1)$ in the template as Y_2.

Press [ENTER].



Chapter 4 / **Example 18**

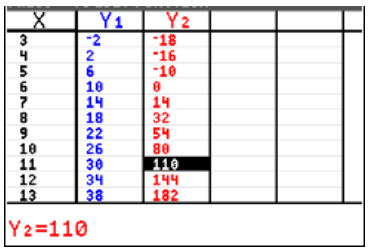
Sum of an arithmetic series

Press 2nd [F5] ([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.



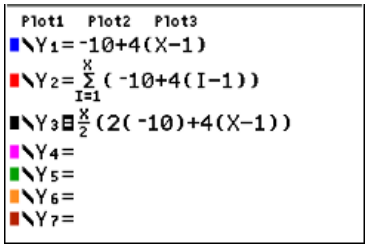
Alternatively, the sum can be expressed as

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

Press [F1] Y= to display the equation entry screen.

Type $\frac{x}{2}\left(2(-10)+4(x-1)\right)$ and press ENTER to enter the function as Y_3.

You can deselect Y_1 and Y_2 by scrolling up to the = alongside the function and pressing ENTER.

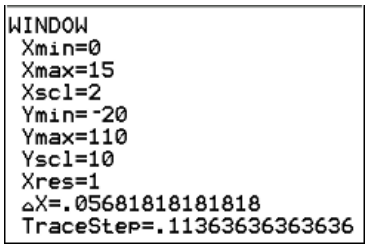


To show the graph in an appropriate window.

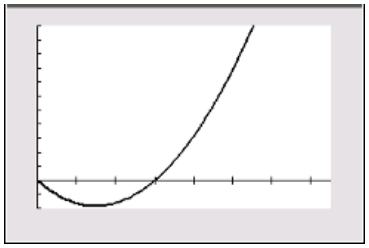
Press [F2] WINDOW

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 [F5] GRAPH when you have finished.

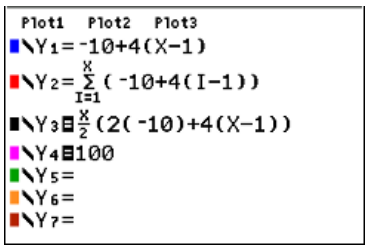


The GDC displays Y_3 with suitable axes.



Press [F1] Y= to display the equation entry screen.

Type 100 and press ENTER to enter the function as Y_4.



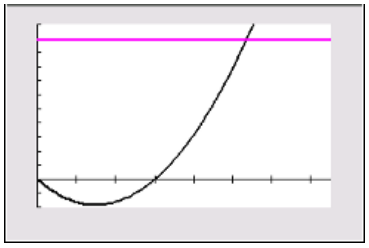
Chapter 4 / **Example 18**

Sum of an arithmetic series

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

$Y_3 = \frac{x}{2}\left(2(-10)+4(x-1)\right)$

$Y_4 = 100$

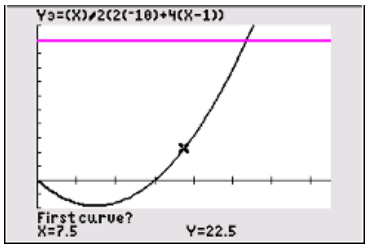


Press [2nd] [F4][CALC] 5:intersect

To find the intersection you need to choose the two lines that intersect.

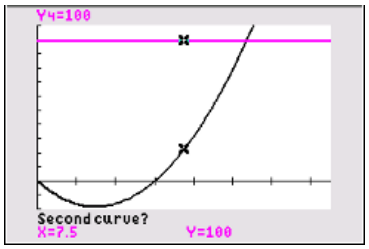
The GDC shows a cross on one of the lines and 'First curve?'.

Press [ENTER].



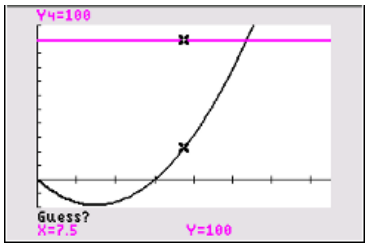
The GDC shows a cross on the other line and 'Second curve?'.

Press [ENTER].



The GDC requires an initial guess for the position of the intersection. Choose the default position.

Press [ENTER].



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.