

Chapter 4 / Example 2

Modelling with functions

Raquel invests \$1200 in a savings account whose value increases over time. The future value, V , of the account is a function of the time t (in years) invested, represented by the equation $V(t) = 1200 \times (1.03)^t$ for $0 \leq t \leq 50$.

- a** Find
- $V(0)$
 - $V(50)$
- Interpret each of these in context.
- b** If Raquel keeps her money invested for 50 years, determine how much she will earn on her initial \$1200.
- c** Sketch a graph of the function V for $0 \leq t \leq 50$.
- d** If Raquel invests her money in 2015, determine the year when the value of her account will reach \$2500.

Press **MENU** 5 **GRAPH** to display the equation entry screen.

Type $1200 \times (1.03)^x$ and press **EXE** to enter the equation as Y1.

In order to choose window settings view the function in a table.

Press **MENU** 7 **TABLE**. Press **F5** SET and change the settings so that the table starts from 0 and ends at 50.

Press **EXIT**.

Press **F6** TABLE.

A table of values is displayed.

The values of Y1 are increasing from 1200.

Scroll down with **▼** until you get to $x = 50$. The maximum value of Y1 is 5260.

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

Press **MENU** 5 **GRAPH** **PAUSE**

Press **SHIFT** **F3** V-WIN.

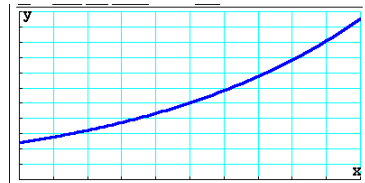
Set the axes to show $0 \leq x \leq 50$ with a scale of 5 and $0 \leq y \leq 5500$ with a scale of 500. You can leave the other items as they are.

Press **EXIT** when you have finished.

View Window
 Xmin : 0
 max : 50
 scale : 5
 dot : 0.13227513
 Ymin : 0
 max : 5500
 [INITIAL] [TRIG] [STANDARD] [V-MEM] [SQUARE]

Press **F6** DRAW to display the graph screen.

The GDC displays the graph of the value of Raquel's savings in a suitable window.

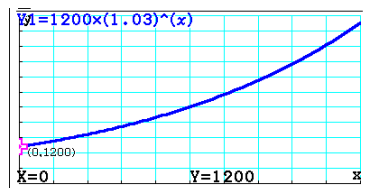


To find the value of $V(0)$ press **F1** Trace.

Type 0, the value of the x-coordinate, and press **EXE**.

The GDC displays the coordinates of the y-intercept (0, 1200).

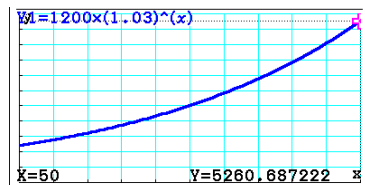
Raquel invested \$1200 initially.



Type 50 and press **EXE** to change the x coordinate to 50.

The GDC displays the coordinates of the point (50, 5260).

Raquel will have \$5260 in the account after 50 years.



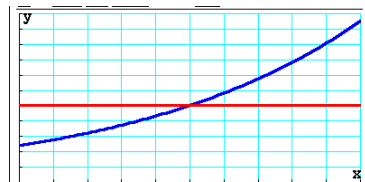
Press **EXIT** to return to the equation entry screen.

Type 2500 press **EXE** to enter the equation as Y2.

Graph Func : Y=
 Y1 = 1200 * (1.03)^x [—]
 Y2 = 2500 [—]
 Y3 : [—]
 Y4 : [—]
 Y5 : [—]
 Y6 : [—]
 [SELECT] [DELETE] [TYPE] [TOOL] [MODIFY] [DRAW]

Press **F6** DRAW.

The GDC displays $Y1 = 1200 \times (1.03)^t$ and $Y2 = 2500$.



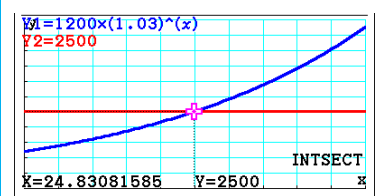
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To find the intersection press **F5** G-Solv **F5** Intersect.

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 (24.8, 2500).

Raquel's account will reach a value of \$2500 during the year 2039.

