

Chapter 7 / Example 2

Modelling with a geometric sequence

Costis bought a car for €16 000. The value of the car depreciates by 10% each year.

- How much will the value of the car become at the end of the first year?
- How much will the value of the car become after 5 years?
- When will the value of the car fall below half its original value?

$$V_1 = 16\,000 \times 0.9 = 14\,400.$$

$$V_5 = 16\,000 \times 0.9^5 = 9\,447.84.$$

$$V_n = 16\,000 \times 0.9^n.$$

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

Type $16\,000 \times 0.9^x$ and press **EXE** to enter the equation as Y1.

Press **MENU** 7 **TABLE**. Press **F5** SET and change the settings so that the table starts from 0 and ends at 10.

Press **EXIT**.

Press **F6** TABLE.

A table of values is displayed.

Scroll down with **DOWN**.

From the table, you can see that the function reaches below 8000 between 6 and 7.

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

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

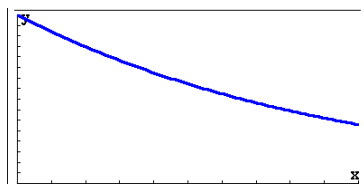
Press **SHIFT** **F3** V-WIN.

Set the axes to show $0 \leq x \leq 10$ with a scale of 1 and $0 \leq y \leq 16000$ with a scale of 1000, leaving the remaining items the same.

Press **EXIT** when you have finished.

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

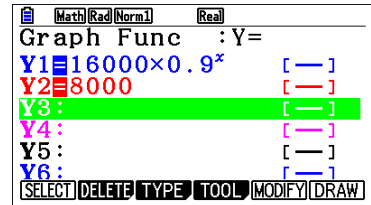
The GDC displays the graph of the value of the value of the car in a suitable window.



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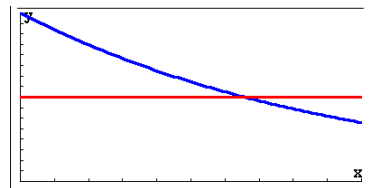
Press **EXIT** to return to the equation entry screen.

Type 8000 press **EXE** to enter the equation as Y2.



Press **F6** DRAW.

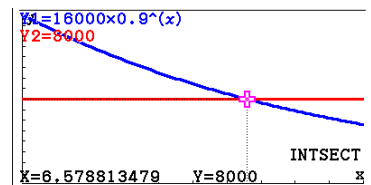
The GDC displays $Y1 = 16\,000 \times 0.9^x$ and $Y2 = 8000$.



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 $(6.58, 8000)$.

After 7 years the value of the car will first drop below half of its original value.

