

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?

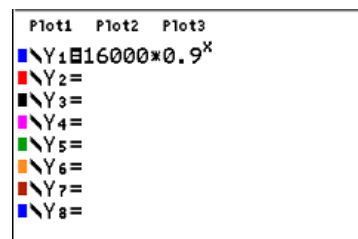
$$V_1 = 16\,000 \times 0.9 = 14\,400$$

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

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

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

Type $16\,000 \times 0.9^x$ and press **[ENTER]** to enter the equation as Y_1 .



Press **[2nd]** **[F5]** **[TABLE]** to display a table of values for

$$Y_1 = 16\,000 \times 0.9^x$$

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

X	Y1				
0	16000				
1	14400				
2	12960				
3	11664				
4	10498				
5	9447.8				
6	8503.1				
7	7652.8				
8	6887.5				
9	6198.7				
10	5578.9				

X=0

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

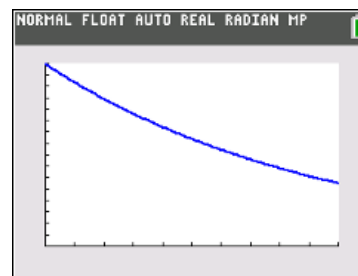
Press **[F2]** **[WINDOW]**

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 **[F5]** **[GRAPH]** when you have finished.

WINDOW
 Xmin=0
 Xmax=10
 Xscl=1
 Ymin=0
 Ymax=16000
 Yscl=1000
 Xres=1
 $\Delta X = .03787878787878$
 TraceStep=.07575757575757

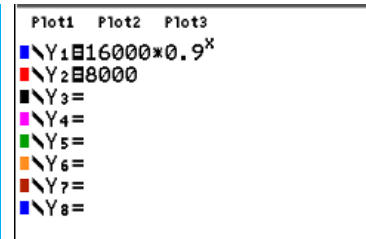
The GDC displays the graph of the value of the car in a suitable window.



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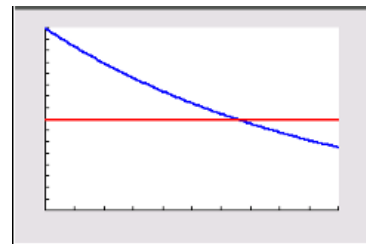
Press **[F1]** **[Y=]** to display the equation entry screen.

Type 8000 and press **[ENTER]** to enter the equation as Y_2 .



Press **[F5]** **[GRAPH]**.

The GDC displays $Y_1 = 16\,000 \times 0.9^x$ and $Y_2 = 8000$

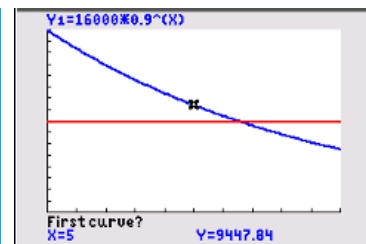


Press **[2nd]** **[F4]** **[CALC]** 5:intersect

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

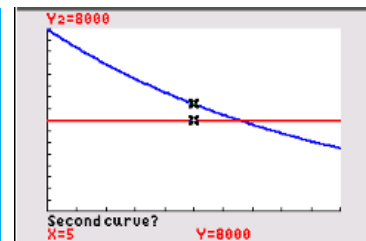
The GDC shows a cross on one of the lines and 'First curve?'.

Press **[ENTER]**.



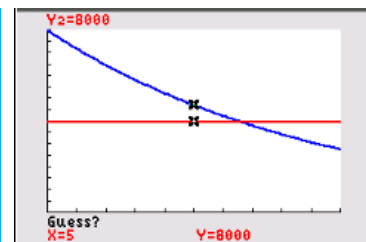
The GDC shows a cross on the other line and 'Second curve?'.

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 (6.58, 8000)

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

