

Chapter 1 / **Example 18**

Finding the number of terms in a geometric sequence

The first term of a geometric sequence is 16 and the common ratio is $\frac{1}{2}$

Find the biggest term that is smaller than $\frac{1}{1000}$

$$u_1 = 16, r = \frac{1}{2}$$

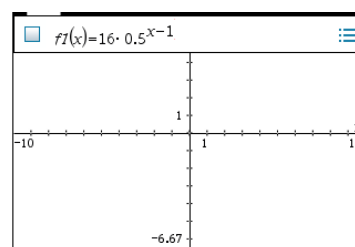
$$u_n = 16 \times \left(\frac{1}{2}\right)^{n-1} > \frac{1}{1000}$$

Open a new document and add a Graphs page.

The entry line is displayed at the top of the work area.

The default graph type is function, so 'f1(x)= ' is displayed.

Type $16 \times 0.5^X - 1$ and press **enter**.

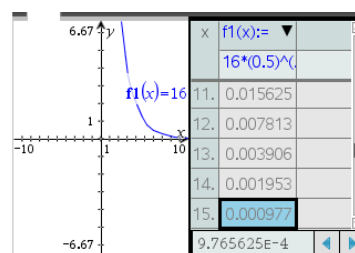


Press **ctrl** **T**.

A table of values is displayed alongside a graph.

You can scroll down the table using **▼** on the touchpad.

From the table, $Y_1 = 0.000977$ when $n = 15$



An alternative method is to solve $16 \times \left(\frac{1}{2}\right)^{n-1} > \frac{1}{1000}$ using the numerical solver.

Add a new Calculator page to your document by pressing

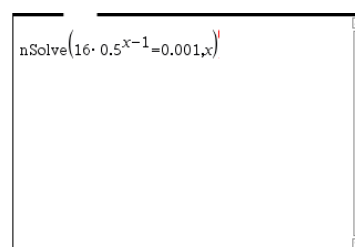
ctrl **doc** **(+page)** 1: Add Calculator.

menu 3: Algebra | 1: Numerical Solve



Type $16 \times 0.5^X - 1$ in E1 and press **enter**.

Type 0.001 in E2 and press **enter**.



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Press **enter** to obtain a solution to the problem.

$$16 \times \left(\frac{1}{2}\right)^{n-1} = \frac{1}{1000} \text{ when } n = 14.96\dots$$

Hence the smallest value of n for which $u_n < \frac{1}{1000}$ is 15.

TI-Nspire CX calculator screen showing the command `nSolve(16*(0.5)^(x-1)=0.001,x)` and the result `14.9658`.

Calculate $16 \times 0.5^{15-1}$

The biggest term that is smaller than $\frac{1}{1000}$ is $u_{15} = 0.000977$

TI-Nspire CX calculator screen showing the command `nSolve(16*(0.5)^(x-1)=0.001,x)` and the result `14.9658`, followed by the calculation `16*(0.5)^(15-1)` and the result `0.000977`.