



ALGEBRA II ACTIVITY 3: GENERATING RECURSIVE SEQUENCES TO EXPLORE EXPONENTIAL PATTERNS

<p>ACTIVITY OVERVIEW: In this activity we will</p> <ul style="list-style-type: none"> • Define an exponential pattern recursively • Generate a recursive sequence using the calculator using two methods • Use recursion to answer questions 	<table border="1"> <thead> <tr> <th>Years</th> <th>Number of Swallow-wort Vine Seedlings</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>3</td> </tr> <tr> <td>2</td> <td>9</td> </tr> <tr> <td>3</td> <td>27</td> </tr> </tbody> </table>	Years	Number of Swallow-wort Vine Seedlings	0	1	1	3	2	9	3	27
Years	Number of Swallow-wort Vine Seedlings										
0	1										
1	3										
2	9										
3	27										
<p>A swallow-wort vine is an invasive vine that can take over a forest or field. On the home screen, type the number of seedlings in the first year from the table above (1) and press ENTER. Then press ×3 ENTER. This will show how the number of seedlings multiplies when the next year passes.</p>											
<p>Press ENTER, ENTER, ENTER to show the number of seedlings for the next three years. This method will not be very useful if you are asked how many years must pass before there are over 2,000 seedlings.</p>											
<p>Clear the home screen. Press 2nd(0,12nd). Then press ENTER. This defines your first term as 0 years, 1 seedling.</p>											
<p>Now you need to show that as the number of years increase by one, the seedlings triple. Press 2nd(2nd(-(1)+1,2nd(-(2))×32nd). Press ENTER. The result {1 3} indicates that after 1 year there will be three seedlings.</p>											

Press **ENTER**, **ENTER**, **ENTER** to show the number of years and number of seedlings for the next three years. After how many years will there be more than 2,000 seedlings?

(0 1)
(Ans(1)+1, Ans(2)
*3)
(1 3)
(2 9)
(3 27)
(4 81)

To return to the beginning, press **2nd****ENTER** repeatedly until the entry {0,1} appears. Press **ENTER** to set this as the start again. Then press **2nd****ENTER** until the entry {Ans(1)+1, Ans(2)*3} appears. Press **ENTER**.

(3 27)
(4 81)
{0, 1}
(0 1)
(Ans(1)+1, Ans(2)
*3)
(1 3)

Press **ENTER** to answer questions like “How many seedlings will there be after 10 years? When will the number of seedlings exceed 100,000?”

(5 243)
(6 729)
(7 2187)
(8 6561)
(9 19683)
(10 59049)
(11 177147)

Since having a *constant factor* is a characteristic of an exponential pattern, this sequence can be produced with an exponential function in the form $y = a \cdot b^x$. Use your knowledge of exponential equations to create a function rule that you think will produce a table to match the sequence (where x is number of years and y is number of seedlings).

Press **Y=** and enter your equation.

Plot1 Plot2 Plot3
Y1=3^X
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=

Press **2nd****GRAPH** to observe the table. Determine if your equation is correct by checking the table against the sequence on the home screen.

X	Y1	
0	1	
1	3	
2	9	
3	27	
4	81	
5	243	
6	729	
X=0		