Title: Patterns, Patterns Everywhere!

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Activity overview:

Given you were offered a million dollars in salary for a 30 day period or be given a salary doubled each day, beginning with a penny on day one, how could we figure out a function that we could utilize for an instant salary output?

Concepts:

Exponents & Patterns
Exponential Growth

NYS Standards:

A.PS.5: Choose an effective approach to solve a problem from a variety of strategies including numeric, graphic and algebraic.

Classroom management tips

This lesson could be given as a group or individual activity.
It should be presented as a discovery type of activity.

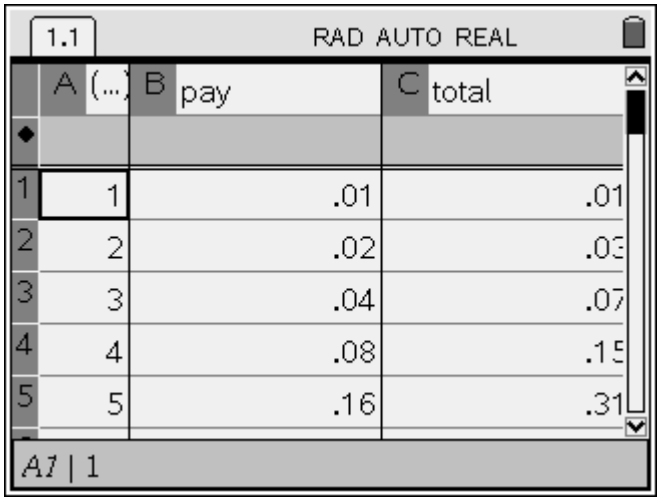
Step 1:

Let's look at a section of the spreadsheet from the "Shall I Double Up or Keep the Million activity.

Look very closely at the pay on days 1-5.

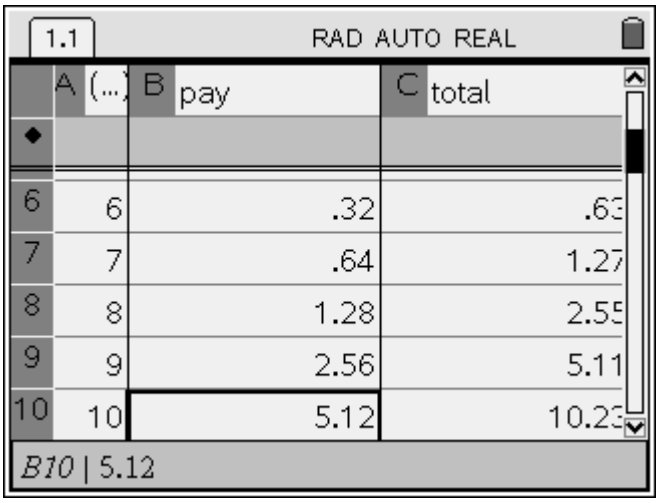
Do you notice any patterns in the pay column:

.01
.02
.04
.08
.16



Let's look at days 6-10:

.32
.64
1.28
2.56
5.12



Did you notice the Powers of 2:

Day Number	Pay for the Day in Pennies
1	$2^0 = 1$
2	$2^1 = 2$
3	$2^2 = 4$
4	$2^3 = 8$
5	$2^4 = 16$
6	$2^5 = 32$
7	$2^6 = 64$
8	$2^7 = 128$
9	$2^8 = 256$
10	$2^9 = 512$

Question: What is the relationship between the day number and the exponent?
Answer: Obviously it is one less…so

If n = any particular day

Then 2^{n-1} will give you the value of the pay scale on that day.

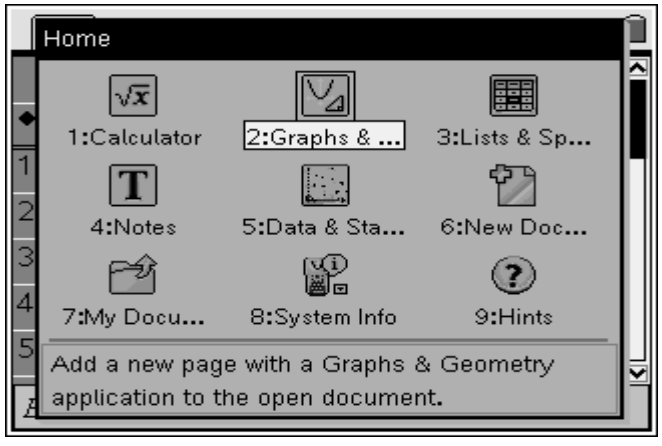
For example: Day 16 = 2^{16-1} = $327. 68 or 32768 pennies

Lets look at another representation:

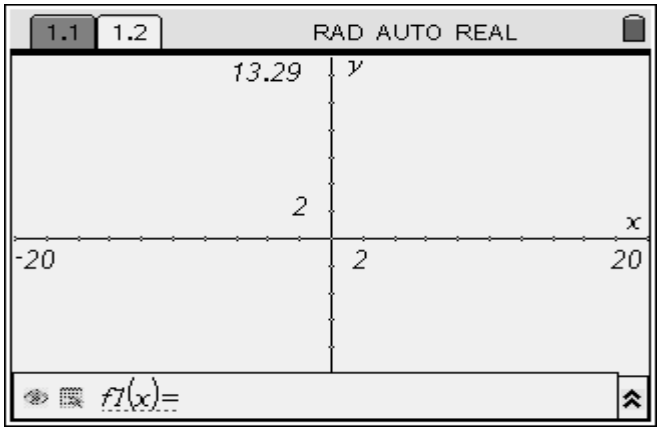
Does $f(x) = 2^{n-1}$ look familiar?
Is it in the form of an exponential growth function?
Let's look at the graph to see if it is so.

The graphing steps are via screen shots.

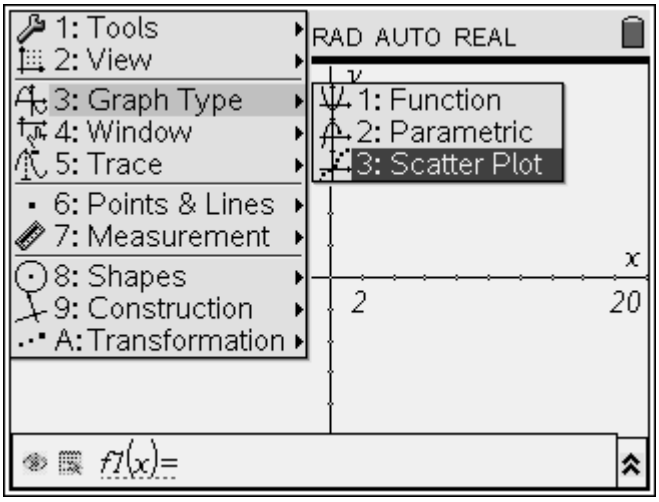
Screen 1



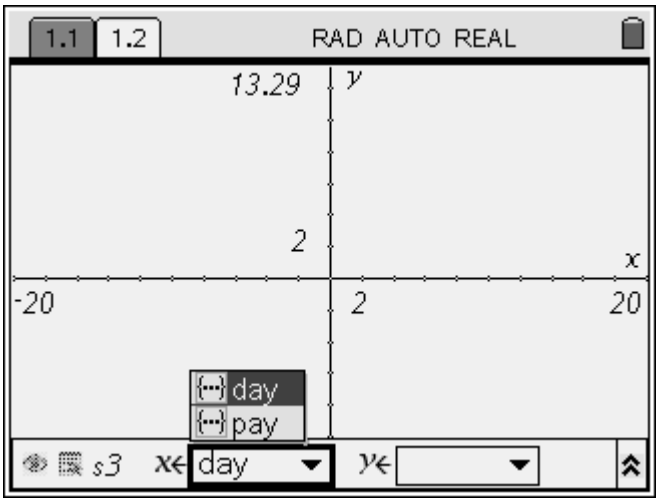
Screen 2



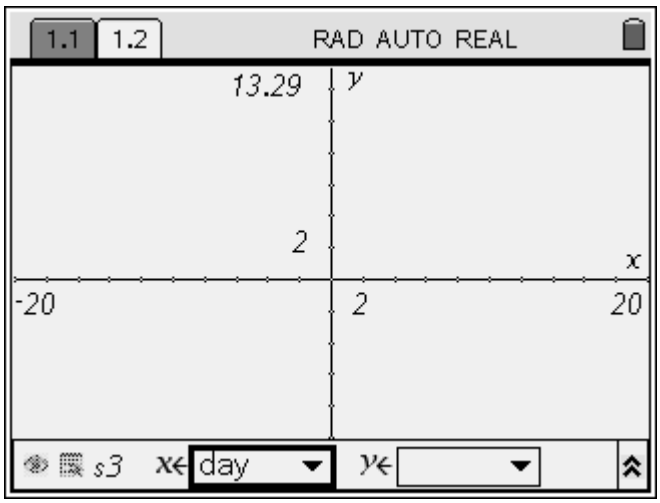
SCREEN 3



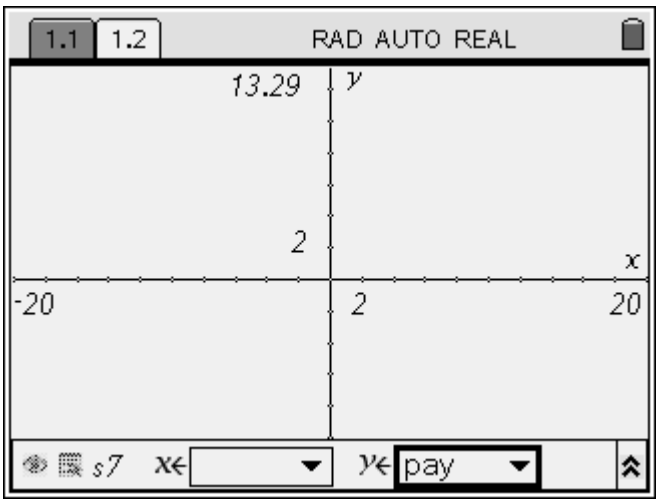
SCREEN 4



SCREEN 5



SCREEN 6



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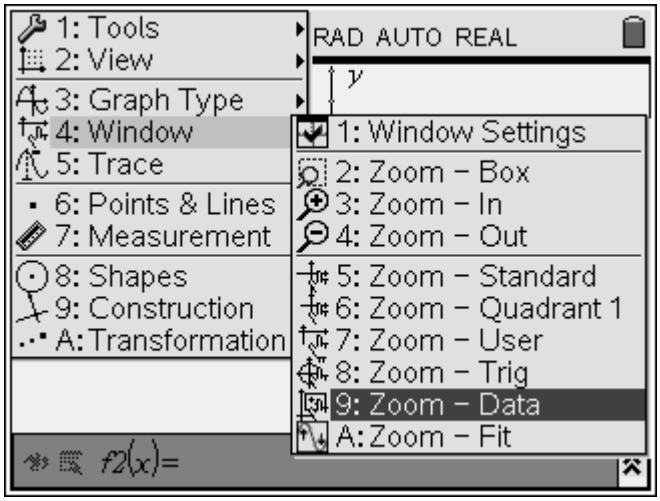
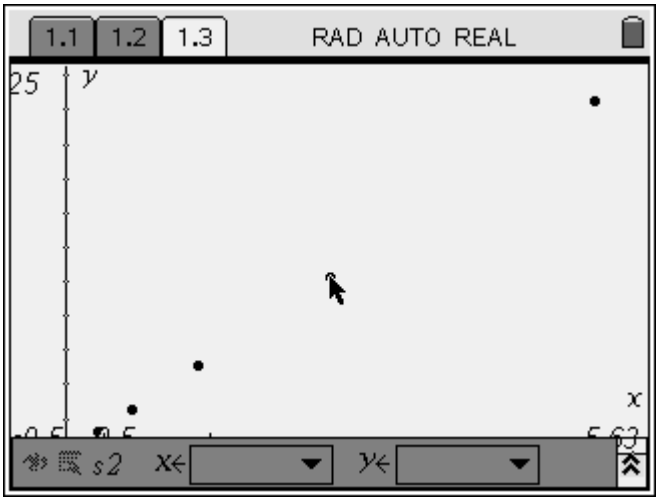


SCREEN 8



And so it is.

This activity can be continued with a linear regression as well!