Algebra I - Introduction to Exponential functions 2/3/14

Note Title 1/20/2014

Warm Up

Write a rule

1.

x	-2	-1	0	1	2
y	4	6	8	10	12
		2	2	2	2

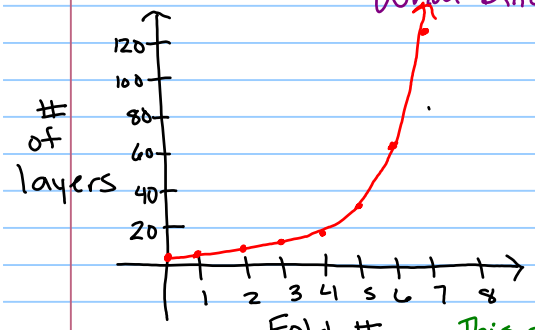
There is a constant increase in y-values so it must be a linear function.

$y = 2x + 8$

2. Grab a sheet of paper.
Copy the table
Wait for directions.

Fold	0	1	2	3	4	5	6	7	8	20
# of layers	1	2	4	8	16	32	64			

Too hard to fold.
Can you figure it out?
What kind of graph?



This pattern is doubling so it's not linear. We still need to use the y-intercept, but with a different type of equation:

$y = 2^x$

This is an "exponential function"

growth!

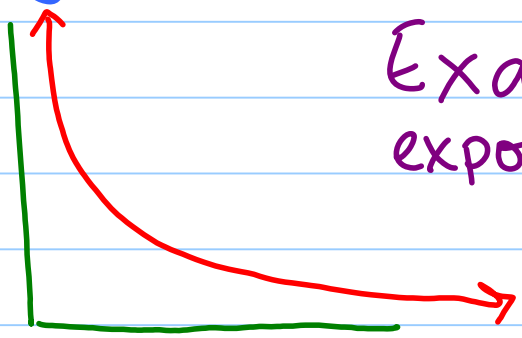
"growth factor"

hmmm...

Can you think of any other life examples of exponential growth?

"bunnies"
population growth

What do you think an exponential decay graph looks like?



Examples of exponential decay?

Car depreciation

Penny Activity

1. You are starting with 100 pennies. Put them all in the cup and record this "Initial Value" in your table.

2. Shake and toss the pennies in the plate. Move all the HEADS aside and count the remaining pennies (the tails). Record this number in the table as the 1st toss and return them to the cup.

3. Repeat the process until only one penny remains.

4. Look at your table with your partner. Do you see any sort of pattern emerging? What type of function do you think this is?

dividing in half each toss

Exponential decay

Toss #	Heads
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

5. What do you expect to see on your classmate's tables?

Similar pattern

6. Plot your points on the screen.

7. Can we write a function to represent the general shape of the graph?

$Y = 100 \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdots$

1st toss

2nd

3rd

In this case, the toss # $\rightarrow x$

$Y = 100\left(\frac{1}{2}\right)^x$

100 → Initial value

$\frac{1}{2}$ → growth factor

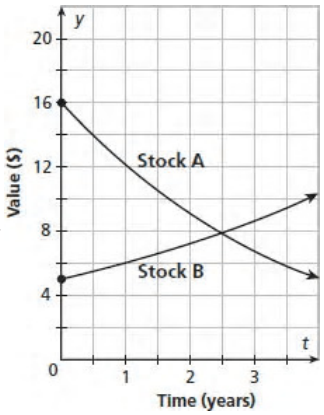
Note Title 1/16/2014

Exponential penny decay

2/3 **Name** _____

Comparing Exponential Growth and Exponential Decay

The graph shows the value of two different shares of stock over the period of four years since they were purchased. The values have been changing exponentially. Describe and compare the behaviors of the two stocks.



A The model for the graph representing Stock A is an exponential decay model.

The initial value is $16.00 and the decay factor is 12 ÷ 16 = 0.75

B The model for the graph representing Stock B is an exponential growth model. The initial value is $5.00 and the growth factor is 6 ÷ 5 = 1.2.

C The value of Stock A is going down over time. The value of Stock B is going up over time. The initial value of Stock A is greater than the initial value of Stock B. However, after about 2.5 years, the value of Stock A becomes less than the value of Stock B.

REFLECT

3a. What is the growth rate for the increasing function above? Explain your reasoning.

20%

3b. What is the decay rate for the decreasing function above? Explain your reasoning.

25%

3c. How did the values of the stocks compare initially? after four years?

Stock A was worth $1 more. After 4 years, Stock B was ≈$5

3d. In how many years was the value of Stock A about equal to the value of Stock B? Explain your reasoning.

About 2.5 years; $8 per share more

3e. In how many years was the value of Stock A about twice the value of Stock B? Explain your reasoning.

about 1 year. Stock B was $6 and Stock A was $12

Work with your partner to fill out the backside...