

Name: KEY

Date: _____

LINEAR VERSUS EXPONENTIAL



Linear and exponential functions share many characteristics. This is because they are based on two different, but similar, sets of principles.

LINEAR VERSUS EXPONENTIAL

Linear functions are based on repeatedly adding the same amount (the slope). *Arithmetic*

Exponential functions are based on repeatedly multiplying by the same amount (the base). *geometric*

Exercise #1: The two tables below represent a linear function and an exponential function. Which is which? Explain how you arrive at your answer.

TABLE 1

x	0	1	2	3	4
y	5	10	20	40	80

x by 2 each time

TABLE 2

x	0	1	2	3	4
y	8	11	14	17	20

+3 each time

Geometric - Exponential

Arithmetic - linear

Exercise #2: Find equations in standard form for each of the functions from Exercise #1.

(a) Table 1 $y = a \cdot b^x$ $a = 5$
 $b = 2$

a - initial amount

b - multiplier

$y = 5 \cdot 2^x$

(b) Table 2 $y = mx + b$ $m = 3$
 $b = 8$

b - initial amount

m - common difference

$y = 3x + 8$

It is interesting that linear and exponential functions are ones where two points on the curve will always determine the equation of the curve.

Exercise #3: Consider the two points (0,12) and (1,3). Create a linear equation that passes through these points in $y = mx + b$ form and an exponential equation in $y = a(b)^x$ form that also passes through them. Then, using your calculator, graph both using a WINDOW of $-2 \leq x \leq 2$ and $-5 \leq y \leq 15$.

Linear:

x	0	1	2
y	12	3	-6

Subtract 9

$b = 12, m = -9$

$y = -9x + 12$



Exponential:

x	0	1	2
y	12	3	3/4

multiply by $\frac{1}{4}$

$= 12, b = \frac{1}{4}$

$y = 12(\frac{1}{4})^x$

