GSE Algebra I | Unit 5 – Comparing Functions | 5.04 - Notes

Name _____ Date _____

Comparing Linear and Exponential Equations

Linear Rate of Change is ALWAYS the slope.

Let's fill out the table to compare linear, quadratic and exponential functions over time.

x	Linear $y = 2x + 2$	Quadratic $y = x^2 + 2$	Exponential $y = 2^x$
0	2	2	1
1	4	3	2
2	6	6	4
3	8	11	8
4	10	18	16
5	12	27	32

$R.o.C. = \frac{y_2 - y_1}{x_2 - x_1}$ ← I will always give you these

1. Calculate and compare the slopes for each function from $x_1 = 0$ to $x_2 = 1$.

Linear's R.O.C	Quadratic's R.O.C.	Exponential's R.O.C.
$\frac{4-2}{1-0} = \frac{2}{1} = 2$	$\frac{3-2}{1-0} = \frac{1}{1} = 1$	$\frac{2-1}{1-0} = \frac{1}{1} = 1$
Whose R.O.C. is the steepest? Linear		

2. Calculate and compare the slopes for each function from $x_1 = 2$ to $x_2 = 3$.

Linear's R.O.C	Quadratic's R.O.C.	Exponential's R.O.C.
$\frac{8-6}{3-2} = \frac{2}{1} = 2$	$\frac{11-6}{3-2} = \frac{5}{1} = 5$	$\frac{8-4}{3-2} = \frac{4}{1} = 4$
Whose R.O.C. is the steepest? Quadratic		

3. Calculate and compare the slopes for each function from $x_1 = 4$ to $x_2 = 5$.

Linear's R.O.C	Quadratic's R.O.C.	Exponential's R.O.C.
$\frac{12-10}{5-4} = 2$	$\frac{27-18}{5-4} = \frac{9}{1} = 9$	$\frac{32-16}{5-4} = \frac{16}{1} = 16$
Whose R.O.C. is the steepest? Exponential		

Linear - Adds the same thing every time Quadratic - adds BIGGER numbers every time

★**VERY IMPORATANT TO KNOW!**

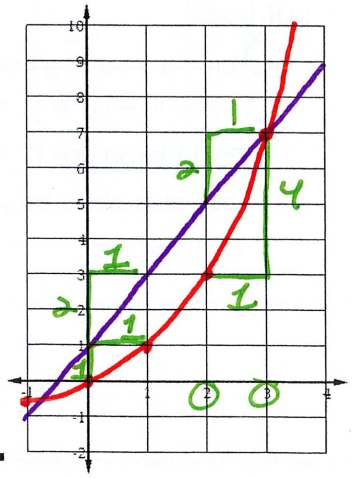
Conclusion over a LONG period of time the Exponential function will exceed the value of the other functions.

↑ MULTIPLIES every time

Which function increases faster, f(x) = 2x + 1 or g(x) = 2^x - 1? Make a table of values to help you decide.

x	f(x) = 2x + 1
-1	-1
0	1
1	3
2	5
3	7
4	9

x	g(x) = 2^x - 1	
-1	$-\frac{1}{2}$	$\frac{1}{2}$
0	0	1
1	1	2
2	3	4
3	7	8
4	15	16



Where will the two functions intersect? (3,7)

Compare each pair of functions based on their rate of change or y-intercept. Shade the correct statement at the bottom of each box in green.

1. Function 1:

x	y
-6	0
-5	3
-4	6
-3	9

+3

R.o.C = 3

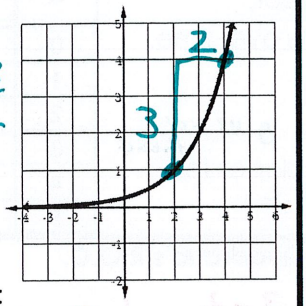
Function 2:

$y = 5x - 7$

R.o.C = 5

- Function 2 has a greater rate of change. ✓
- Function 1 and Function 2 have the same rate of change. ✗

2. Function 1:



$\frac{y-1}{4-2} = \frac{3}{2}$

Function 2:

$y = \frac{1}{2}x + 1$

R.o.C = 1/2

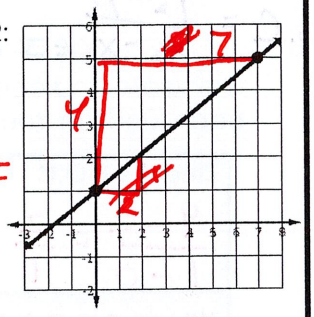
- Function 1 has a greater rate of change on the interval [2,4] ✓ (x_1 x_2)
- Function 2 has a greater rate of change on the interval [2,4] ✗

3. Function 1:

x	2	9	16	23
y	0	4	8	12

= 7/4 = 4/7

Function 2:



4/7 = 4/7

- Function 2 has a greater rate of change. ✗
- Function 1 and Function 2 have the same ✓

4. For each representation below, determine if they are linear or exponential, and then write the equations.

Problem 1, Function 1	Problem 2, Function 1	Problem 3, Function 2
Linear or Exponential?	Linear or Exponential?	Linear or Exponential?
f(x) =	f(x) =	f(x) =

5. What is the key in determining if a scenario is linear or exponential? Circle ALL of the exponential representations above in blue, and put a box around the linear representations in red.

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6. Based on the graph on the right, which statement is not true?

A. Functions f and g have the same x-intercept.

B. The ordered pair (1, 2) is a solution for f(x).

C. The ordered pair (2, 7) is a solution for g(x).

D. The value of f(x) begins to exceed g(x) during the interval x = 1 and x = 2.