Comparing Quadratic Functions to Other Functions

Exponential functions have a fixed number as the base and a variable number as the exponent.

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			
1			
2			
3			
4			
5			
6			

★ **Conclusion** over a long period of time the _____ function will exceed the value of the other functions.

common 2nd Diff

6. Which statement BEST describes the comparison of the y-values for f(x) and g(x)?

A. The values of f(x) will always exceed the values of g(x).

B. The values of g(x) will always exceed the values of f(x).

C. The values of f(x) exceed the values of g(x) over the interval [0, 5].

D. The values of g(x) begin to exceed the values of f(x) within the interval [4, 5].

x	f(x)	g(x)	
0	0	-10	Q
1	2	-9	+1
2	4	-6	+3 (+2)
3	6	-1	+5 (+2)
4	8	6	+7 (+2)
	5	10	15 +9

7. Determine if the following sets of points or tables represent a linear, quadratic, or exponential function. Give a reason for your answer.

a.

x	y	
0	3	
1	6	×2
2	12	
3	24	

E

$y = 3(2)^x$

b.

x	y	
−2	−10	
−1	−8	+2
0	−6	
1	−4	

L

$y = 2x - 6$

c.

x	y	
0	2	+4 (+2)
1	6	+6 (+2)
2	12	+8
3	20	

Q

d.

{(−2, 0), (−1, −3), (0, −4) vertex, (1, −3), (2, 0)}

Q $a(x-h)^2 + k$

$(x-0)^2 - 4$

$x^2 - 4$

e.

$\left\{\left(-2, -\frac{3}{4}\right), \left(-1, -\frac{3}{2}\right), (0, -3), (1, -6), (2, -12)\right\}$

E $y = -3(2)^x$

G: $a_n = a_1(r)^{n-1}$

$= -6(2)^{n-1}$

Not the same

$y = a(b)^x$

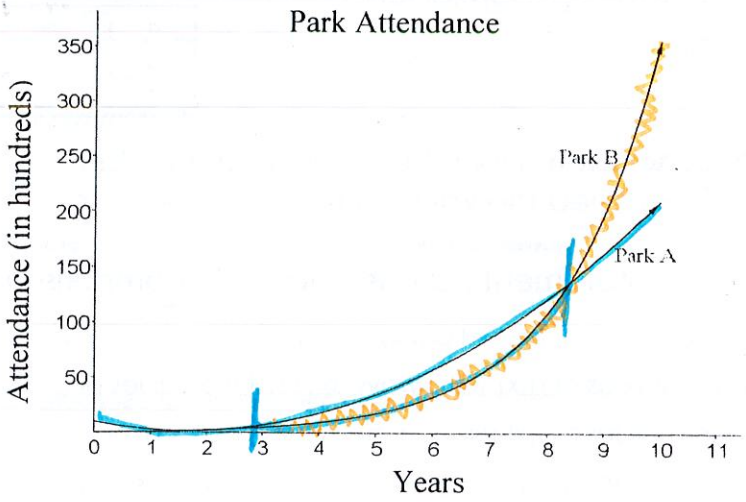
↑ y int ↑ rate

Algebra I Unit 5 Compare Quadratic and Exponential Functions

Name _____ Date_____

Two nature parks opened the same year in neighboring towns. Park A's attendance can be represented by the equation $y = 3x^2 - 10x + 10$, and Park B's attendance can be represented by the equation $y = 1.8^x - 1$, where x represents the number of years since opening, and y represents the attendance in hundreds. Tables and graphs for both parks are shown below.

Year	Park A	Park B
1	3	0.8
2	2	2.2
3	7	4.8
4	18	9.5
5	35	17.9
6	58	33.0
7	87	66.2
8	122	109.2
9	163	197.4



1. In which years does Park A have the greater attendance?

1-8
1, 3-8
3-8

2. In which years does Park B have the greater attendance?

After year 9 B is always

3. Describe how the functions are different.

A) Q
2nd Diff
y int 10

B) E
common ratio
y int 0
ROC >

4. If the trends continue, will Park A's attendance ever surpass Park B's attendance again? Explain.

NO, B is exponential and increases exponentially.

Name _____ Period _____ **Unit 5 Review**

Use the figures to answer each question. There is one quadratic, one exponential, and one linear function.

FIGURE A

EXP

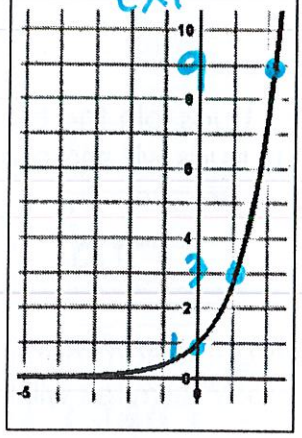


FIGURE B

x	f(x)
3	4
4	11
5	20
6	31
7	44

2nd common Diff

FIGURE C

0 1 2 3 4

12, 30, 48, 66, ...

+18 +18 +18

1) Which figure shows an exponential function? 2) What is the equation for this function?

Hint: It is a parent function with no transformations.

$y = a(b)^x$

Exponential Function: A Equation: $y = 1(3)^x$

3) Which figure shows a linear function? 4) What is the equation for this function?

$y = mx + b$

Linear Function: C Equation: $y = 18x - 6$

$a_n = a_1 + d(n-1) = 12 + 18n - 18$

$= 12 + 18(n-1)$

5) Which figure has the highest value when x = 6? 6) Which figure has the lowest value when x = 6?

A. 729 B. 31 C. 102

Highest Value Function: A Lowest Value Function: B

7) Which figure has end behavior of "As $x \to -\infty$, $y \to \infty$"? B

What is the end behavior for the other two functions when $x \to -\infty$?

8) The Exp (A) function has an end behavior of As $x \to -\infty$, $y \to$ 0.

Asym.

9) The Linear (L) function has an end behavior of As $x \to -\infty$, $y \to$ $-\infty$.

Directions: If $f(x) = 3x - 10$ and $g(x) = 3(x-4)^2$, find each of the following.

10) Which is greater at $x = 4$?

$f(4) = 3(4) - 10$
$= 2$

$g(4) = 3(4-4)^2$
$= 3(0)^2$
$= 3(0)$

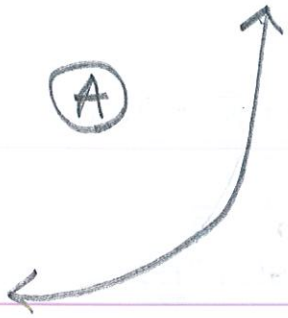
11) A population of 20 bugs are living under a log. Each day, 5 more bugs join the bug party. If Lucy finds a bug spray and uses it on the 10th day, how many bugs will she eliminate under this log? Linear $y = mx + b$

$y = 5x + 20$ 70

12) A population of 8,520 termites are living in a mound, but they caught a common cold. Every day they are losing ½ of the previous day's population. How many termites will there be by the end of the 5th day?

Exponential $y = a(b)^x$

$y = 8520(\frac{1}{2})^x$ 2664

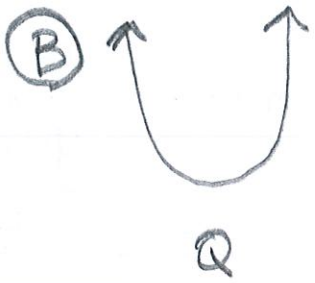


Exponential G

Asymptote

$x \to -\infty$ $y \to 0$

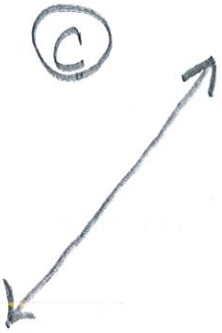
$x \to \infty$ $y \to \infty$



Q

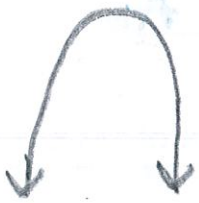
$x \to -\infty$ $y \to \infty$

$x \to \infty$ $y \to \infty$



$x \to -\infty$ $y \to -\infty$

$x \to \infty$ $y \to \infty$



$y \to -\infty$

$y \to -\infty$

$x \to -\infty$ $y \to \infty$

$x \to \infty$ $y \to -\infty$