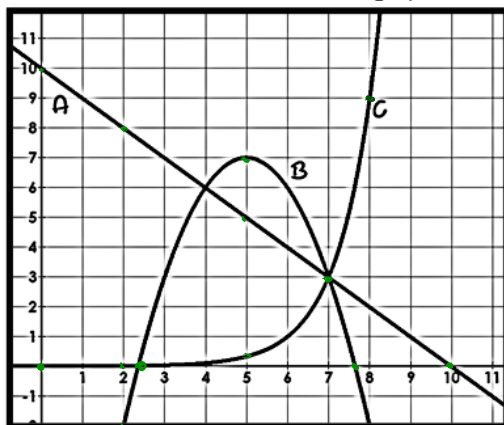

Day 2 – Comparing Multiple Representations of Functions

Standard(s):

MGSE9-12.F.IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one function and an algebraic expression for another, say which has the larger maximum.

Scenario 1: Use the graph below to answer the following questions:



a. Which function has the largest x-intercept?

Linear

b. Which function has the largest y-intercept?

Linear

c. List the functions in order from smallest to biggest when $x = 2$:

Quadratic, Exponential, Linear

d. List the functions in order from smallest to biggest when $x = 5$:

Exponential, Linear, Quadratic

e. List the functions in order from smallest to biggest when $x = 7$:

They all have the same y-value.

f. List the functions in order from smallest to biggest when $x = 9$:

Quadratic, Linear, Exponential

Algebra 1

Unit 5: Comparing Linear, Quadratic, and Exponential Functions

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g. List the functions in order from smallest to biggest when $x = 15$:

Quadratic, Linear, Exponential

h. Which functions have a positive rate of change throughout the entire graph?

Exponential

i. Which functions have a negative rate of change throughout the entire graph?

Linear

j. Which graph has a rate of change that is negative and positive?

Quadratic

k. Which function has the largest ROC from $[3, 5]$?

Linear ROC = -1 Quadratic ROC = 2
 $(3, 7)$ $(5, 5)$ $(3, 3)$ $(5, 7)$
 x_1, y_1 x_2, y_2 x_1, y_1 x_2, y_2

Exponential ROC = 0.25

$(3, 0)$ $(5, 0.5)$
 x_1, y_1 x_2, y_2

l. Which function has the largest ROC from $[7, 8]$?

Linear ROC = -1 Quadratic ROC = -5
 $(7, 3)$ $(8, 2)$ $(7, 3)$ $(8, -2)$

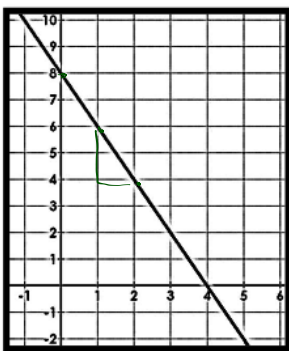
Exponential ROC = 6
 $(7, 3)$ $(8, 9)$

m. Which function will eventually exceed the others?

Exponential

Scenario 2: Consider the following:

f(x)



Linear $y = mx + b$

a. Write an equation for each representation.

$m = -2$ $b = 8$

$y = -2x + 8$

g(x)

	x	g(x)	
x_1	-2	-10	y_1
x_2	-1	-8	y_2
b	0	-6	
	1	-4	

} +2
} +2
} +2

$m = \frac{-8 - (-10)}{-1 - (-2)} = \frac{2}{1} = 2$

$b = -6$

$y = 2x - 6$

Algebra 1

Unit 5: Comparing Linear, Quadratic, and Exponential Functions

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b. Which function has the greater y-intercept?

$$f(x) - 8 > -6$$

c. Which function has the smaller rate of change?

$$f(x) - -2 < 2$$

Scenario 3: Consider the following representations:

a. $f(x)$

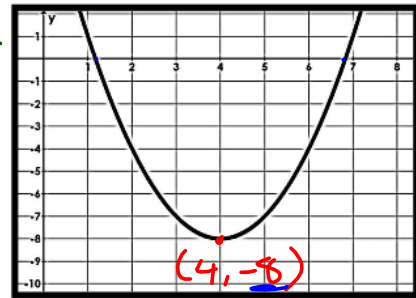
x	-4	-3	-2	-1	0	1	<u>2</u>
y	0	-5	-8	-9	-8	-5	<u>0</u>

y-int: (0, -8)

Vertex
(-1, -9)

Quadratic

b. $g(x)$



a. Which quadratic function has the smaller minimum value? Explain why.

$$f(x) = -9$$

y-value of
Vertex

b. Which quadratic function has the bigger y-intercept? Explain why.

$g(x)$ because it has a positive y-intercept.

c. Name the x-intercepts for each function (estimate if necessary):

$$f(x): (-4, 0); (2, 0)$$

$$g(x): (1.3, 0) \text{ and } (6.8, 0)$$

4. A table of values is shown for $f(x)$ and $g(x)$.

x	$f(x)$
0	0
1	1
2	4
3	9
4	16
5	25

x	$g(x)$
0	-2
1	-1
2	1
3	5
4	13
5	29

Which statement compares the graphs of $f(x)$ and $g(x)$ over the interval $[0, 5]$?

- A The graph of $f(x)$ always exceeds the graph of $g(x)$ over the interval $[0, 5]$.
- B The graph of $g(x)$ always exceeds the graph of $f(x)$ over the interval $[0, 5]$.
- C The graph of $g(x)$ exceeds the graph of $f(x)$ over the interval $[0, 4]$, the graphs intersect at a point between 4 and 5, and then the graph of $f(x)$ exceeds the graph of $g(x)$.
- D The graph of $f(x)$ exceeds the graph of $g(x)$ over the interval $[0, 4]$, the graphs intersect at a point between 4 and 5, and then the graph of $g(x)$ exceeds the

5. Which statement is true about the graphs of exponential functions?

- A. The graphs of exponential functions never exceed the graphs of linear and quadratic functions.
- B. The graphs of exponential functions always exceed the graphs of linear and quadratic functions.
- C. The graphs of exponential functions eventually exceed the graphs of linear and quadratic functions.
- D. The graphs of exponential functions eventually exceed the graphs of linear functions but not quadratic functions. X

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

L Q

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

5 10 15

} +1 } 2
 } +3 } 2
 } +5 } 2
 } +7 } 2
 } +9

- 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 $[4, 5]$.