Howdy!!!!

Coach Watson & Coach Webb

FOA

Regression Models and their Interpretations Review

1. Tammy deposited $500 into a savings account in 1970. The table below shows the value of Tammy's saving account from 1970 to 2010. Answer the following questions:

Time Since 1970 (years)	0	5	10	15	20	25	30	35	40
Account Value (dollars)	500	650	900	1150	1600	2100	2750	3850	4800

a. Create an exponential regression model to represent Tammy's saving account.

b. Explain what the "a" value means in context of the problem.

c. Explain what the "b" value means in context of the problem.

d. How much will Tammy's saving account be worth after 50 years?

2. Mr. Bagwell is preparing his students to take the SAT test. He collected data from 10 student who took the test last year and presented this information to the student in a table. The highest math SAT score a student can achieve is 800.

a. Create a linear regression model to represent the relationship between SAT scores and time spent studying.

b. Explain what the "a" value means in context of the problem.

c. Explain what the "b" value means in context of the problem.

d. Predict what score a student would receive if they study for 18 hours.

Time Spent Studying (hours)	Math SAT Score
1	350
22	780
12	600
14	700
4	380
10	650
9	580
3	400
7	530
4	410

Algebra 1 Unit 11: Comparing Functions Practice
Day 7: Quadratic & Exponential Regression **Name:** _____

Practice Assignment

1. Write a quadratic function, in standard form, that passes through the given points.
   a. (-4, -1), (-2, 3), (-1, 8)
   b. (-2, 7), (-1, -6), (1, -20)

2. The following data table represents approximate heights for a ball thrown by a shot-putter as it travels x meters horizontally.
   a. Find a quadratic model that represents the data.
   b. What would be the height of a ball that travels 80 meters?
   c. Is the ball in the air after 110 meters (according to your model)?

Distance (m)	Height (m)
7	8
20	15
33	24
47	26
60	24
67	21

3. Gold's closing price each year is shown in the table.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Price ($/oz)	273	277	343	417	436	513	636	837	870	1088	1420

   a. Find a quadratic model for the gold price over time using x = 0 for 2000. Does the model provide a good fit for the data? Explain using your scatterplot and table on your calculator.
   b. What would be the price of gold in 2017 according to your model?
   c. Using Google, what is the actual closing price for gold as of yesterday? Is your model accurate for 2017?

Algebra 1 Unit 11: Comparing Functions Practice

4. A colony of bacteria grows exponentially. The table below shows the data collected daily.

a. Write an exponential regression equation for the data, rounding all values to the hundredths place.

b. Explain what the "a" and "b" values represent in terms of the problem context.

c. What is the growth rate?

d. How many bacteria will be present on Day 10?

Day (x)	Population (y)
0	200
1	425
2	570
3	800
4	1035
5	1650
6	2600

5. A cup of soup is left on a countertop to cool. The table below gives the temperatures, in degrees Fahrenheit, of the soup recorded over a 10-minute period.

a. Write an exponential regression equation for the data, rounding all values to the hundredths place.

b. Describe what the "a" and "b" values represents in terms of the problem context.

c. What is the decay rate?

d. If this trend continues, when will the soup reach 100 degrees Fahrenheit?

Time in Minutes (x)	Temperature in °F (y)
0	180.2
2	165.8
4	146.3
6	135.4
8	127.7
10	110.5

Algebra 1 Unit 11: Comparing Functions Practice
Day 7: Quadratic & Exponential Regression **Name:** _____

Practice Assignment

6. The table below gives the average annual cost (e.q. tuition, room, and board) for four year public universities. Let 1981 be t = 0.

a. Write an exponential regression equation for the data, rounding all values to the hundredths place.

b. Describe what the "a" and "b" values represents in terms of the problem context.

Year	Average Annual Cost
1981	$2,550
1991	$5,243
2001	$8,653
2011	$15,918

c. What is the growth rate?

d. If this trend continues, when will the average cost of attendance exceed $35,000?

7. The table below shows the amount of a decaying radioactive substance (in grams) that remained for selected years after 1990.

a. Write an exponential regression equation for the data, rounding all values to the hundredths place.

Years After 1990 (x)	0	2	5	9	14	17	19
Amount (y)	750	451	219	84	25	12	8

b. Describe what the "a" and "b" values represents in terms of the problem context.

c. What is the decay rate?

d. Using your equation, how much substance remained in 2002?

TODAYS NOTES

x x^2 x in exponent

Day 8– Distinguishing Between Linear, Quadratic, & Exponential Functions

You should refer to your All about Linear, Quadratic, and Exponential Functions graphic organizers throughout this entire unit.

Identifying Types of Functions from an Equation

Classify each equation as linear, quadratic, or exponential:

a. $f(x) = 3x + 2$ Linear

b. $y = 5^x$ Expo

c. $f(x) = 2$ Linear

d. $f(x) = 4(2)^x + 1$ Expo

e. $y = 7(.25)^{3x}$ Expo

f. $y = 4x^2 + 2x - 1$ Quad

Identifying Types of Functions from a Graph

Determine if the following graphs represent an exponential function, linear function, quadratic function, or neither.

a. Expo

b. Linear

c. Expo

d. Linear

e. Quadr

f. Linear

g. N/A

h. Expo

Identifying Types of Functions from a Table

Remember with linear functions, they have **constant** (same) **first differences** (add same number over and over).

Quadratic Functions have **constant second differences**.

Exponential functions have **constant ratios** (multiply by same number over and over).

Linear Function 1 time

x	y	
2	4	
5	3	+3, −1
8	2	+3, −1
11	1	+3, −1

Quadratic Function 2 times

x	y	
0	3	
1	2	−1
2	3	+1, +2
3	6	+3, +2
4	11	+5

Exponential Function

x	$f(x) = 2(3)^x$	
1	6	
2	18	+1, ×3
3	54	+1, ×3
4	162	+1, ×3

Determine if the following tables represent linear, quadratic, exponential, or neither and explain why.

a.

x	y	
−2	7	
−1	4	−3
0	1	−3
1	−2	−3
2	−5	−3

Linear

b.

x	y	
−1	1.5	
0	3	×2
1	6	×2
2	12	×2

Expo

c.

x	y	
−1	−9	
1	9	+18
3	27	+18
5	45	+18

Linear

d.

x	y		
−2	6		
−1	3	−3	
0	2	−1	+2
1	3	+1	+2
2	6	+3	+2

Quad

e.

Volleyball Tournament	
Round	Teams Left
1	16
2	8
3	4
4	2

Expo

f.

x	$f(x) = 2(3)^x$	
1	6	
2	18	×3
3	54	×3
4	162	×3

Expo

Algebra I Unit II: Comparing Linear, Quadratic, and Exponential Functions Notes

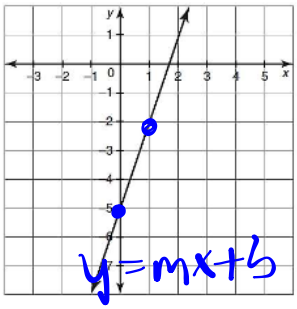
Writing Equations from a Graph or Table

Linear Functions	Quadratic Functions	Exponential Functions
y = mx + b y = (slope)x + y-intercept slope = # you add/sub each time y-intercept: starting amount or y-value when x = 0	**y = a(x – h)² + k** y = opens(x – x-value)² + y-value (h, k) is vertex **y = a(x – p)(x – q)** y = opens(x – zero)(x – zero) You then have to multiply your equation out to get to standard form.	**y = abˣ** y = y-intercept(constant ratio)ˣ y-intercept: starting amount or y-value when x = 0 constant ratio = # you multiply by each time

For each table or graph below, identify if it is linear, quadratic, or exponential. Then write an equation that represents it.

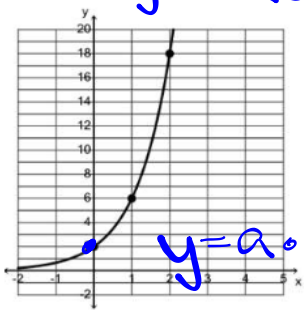
a. Type: Linear

Equation: $y = 3x - 5$



b. Type: Expo

Equation: $y = 2(3)^x$



x	y
0	2
1	6
2	18

×3 ×3

c. Type: Quadratic

Equation: $y = -1x^2 + 0x + 9$

x	–3	–2	–1	0	1	2	3
y	0	5	8	9	8	5	0

$y = ax^2 + bx + c$

$y = -1x^2 + 9$

d. Type: Linear

Equation: $y = 3x - 7$

x	–3	–2	–1	0	1	2	3
y	–16	–13	–10	–7	–4	–1	2

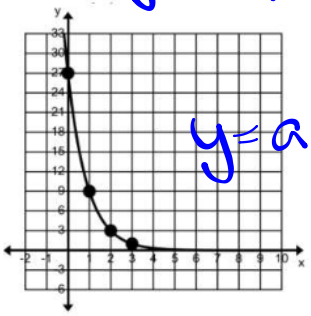
+3 +3 +3

16

Algebra I Unit II: Comparing Linear, Quadratic, and Exponential Functions Notes

e. Type: Expo

Equation: $y = 27\left(\frac{1}{3}\right)^x$

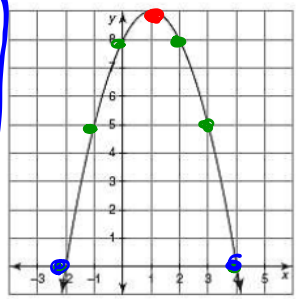


x	y
0	27
1	9
2	3

$y = ab^x$

f. Type: Quadratic

Equation: $y = -1x^2 + 2x + 8$



$y = -1(x-1)^2 + 9$

$y = -1(x+2)(x-4)$

$y = a(x-h)^2 + k$

$y = ax^2 + bx + c$

$y = (x-\#)(x-\#)$

g. Type: Linear

Equation: $y = 5x + 1$

x	−3	−2	−1	0	1	2	3
y	−14	−9	−4	1	6	11	16

+5

h. Type: Expo

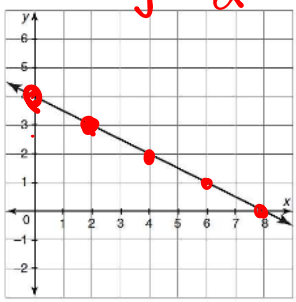
Equation: $y = 32(2)^x$

x	−3	−2	−1	0	1	2	3
y	4	8	16	32	64	128	256

×2

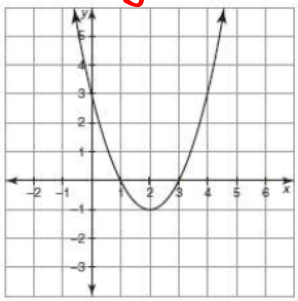
i. Type: Linear

Equation: $y = -\frac{1}{2}x + 4$



j. Type: Quad.

Equation: $y = x^2 - 4x + 3$



k. Type: Quad

Equation: $y = 1x^2 + 2x + 0$

x	−3	−2	−1	0	1	2	3
y	3	0	−1	0	3	8	15

−3 −1 +1 +3 +5 +7

+2 +2 +4

l. Type: Expo

Equation: $y = \frac{1}{16}(4)^x$

x	0	1	2	3	4	5
y	$\frac{1}{16}$	$\frac{1}{4}$	1	4	16	64

×4

17

Practice

Algebra 1 Unit11: Comparing Functions Practice

Day 8 – Comparing Linear, Quadratic, & Exponential Representations **Name:** _____

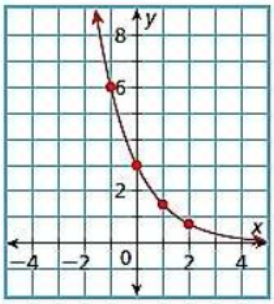
Practice Assignment

Determine if each equation below represents a linear, quadratic or exponential function:

1. $f(x) = 3x + 2$ 2. $y = 3^x$ 3. $y = 7^2$ 4. $f(x) = ½(2)^x + 1$ 5. $y = x^2$

Determine if each graph represents a linear, quadratic or exponential function.

5.



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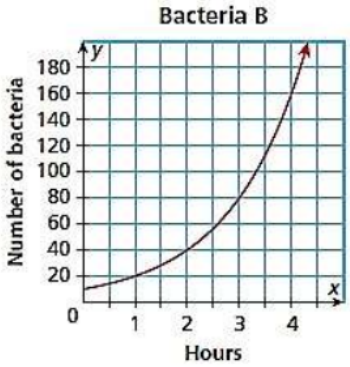
7.



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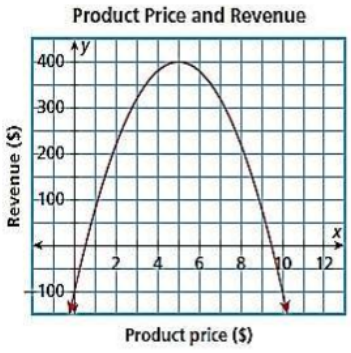

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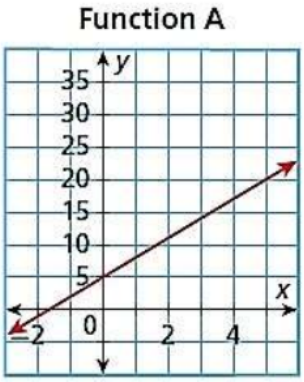

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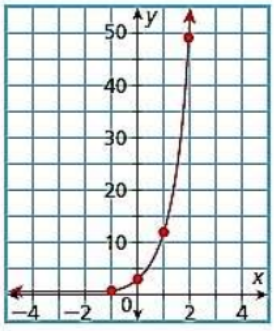


Algebra 1 Unit11: Comparing Functions Practice

Determine if each sets of ordered pairs or tables represent a linear, quadratic or exponential function and justify why:

11.

Weeks	0	1	2	3
Account Balance ($)	425	375	325	255

12.

Time (h)	0	1	2	3
Bacteria	10	20	40	80

13.

Height of Bridge Suspension Cables	
Cable's Distance from Tower (ft)	Cable's Height (ft)
0	400
100	256
200	144
300	64

14.

Ladybug Population	
Time (mo)	Ladybugs
0	10
1	30
2	90
3	270

15.

{(-4, 0), (-3, -5), (-2, -8), (-1, -9), (0, -8), (1, -5)}

16.

$\{(-2, 8), (-1, 4), (0, 2), (1, 1), (2, 0.5)\}$

Practice

Algebra 1 Unit11: Comparing Functions Practice

Day 8 – Writing Linear, Quadratic, & Exponential Equations **Name:** _____

Practice Assignment

Directions: Identify the type of function. Then write an equation that represents each linear, quadratic, or exponential function. You must write all quadratic functions in standard form ($y = ax^2 + bx + c$).

x	−3	−2	−1	0	1	2	3
y	14	10	6	2	−2	−6	−10

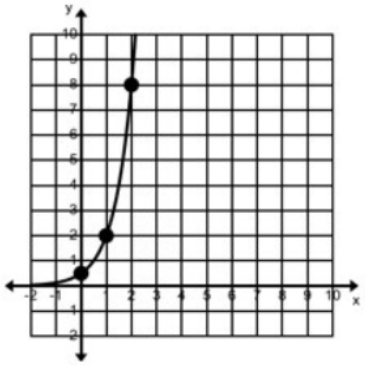
1. Type: _____

Equation: _____

x	−3	−2	−1	0	1	2	3
y	½	1	2	4	8	16	32

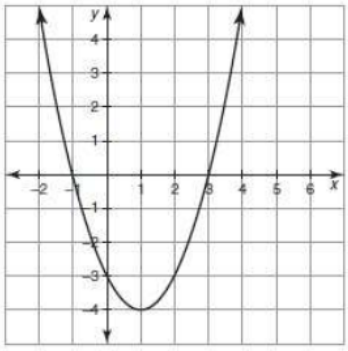
2. Type: _____

Equation: _____



3. Type: _____

Equation: _____



4. Type: _____

Equation: _____

x	2	4	6	8	10
y	4	−5	−8	−5	4

5. Type: _____

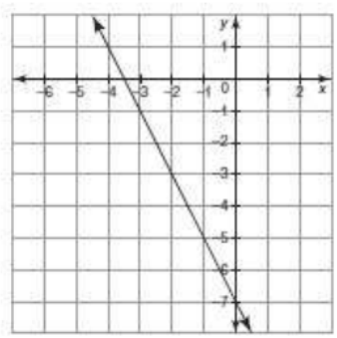
Equation: _____

x	0	1	2	3	4
y	27	9	3	1	1/3

6. Type: _____

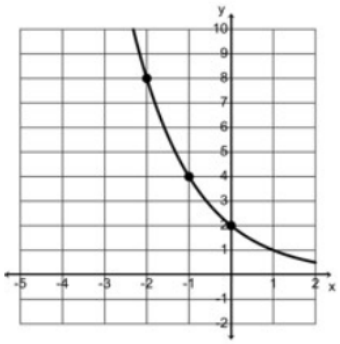
Equation: _____

Algebra 1 Unit11: Comparing Functions Practice



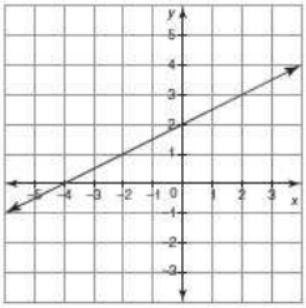
7. Type: _____

Equation: _____



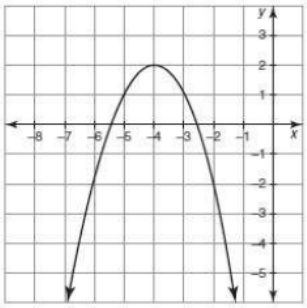
8. Type: _____

Equation: _____



9. Type: _____

Equation: _____



10. Type: _____

Equation: _____

X	1	2	3	4	5	6	7
Y	8	3	0	-1	0	3	8

11. Type: _____

Equation: _____

x	−3	−2	−1	0	1	2	3
y	11	9	7	5	3	1	−1

12. Type: _____

Equation: _____

Attachments

Syllabus - Math I A.doc