equations of exponentials

agenda

Warm-Up

HW Check

Notes (foldable)

HW: Practice (#1-9)

reminders

HW 5.6 due today!

Test next Friday

warm up friday

1. Which of the following tables represents a function with a constant rate of change? Explain how you decided your answer. *(slope)*

x	y
1	1
2	2
3	4
4	8
5	16
6	32

exp.

x	y
1	9
2	4
3	1
4	0
5	1
6	4

quad.

x	y
1	10
2	5
3	0
4	-5
5	-10
6	-15

Linear

Algebra I Unit 9 Exponential Functions

Student Practice – Graphing Exponential Functions
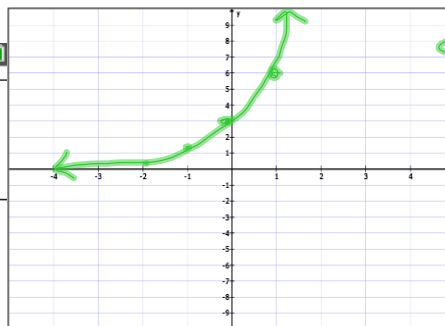
Name _____Date _____ Period _____

Plot the following points to graph each function and its asymptote. Identify the characteristics of each.

1. $y = 3 \cdot 2^x$

NORMAL FLOAT AUTO REAL DEGREE MP
PRESS + FOR △Tb1

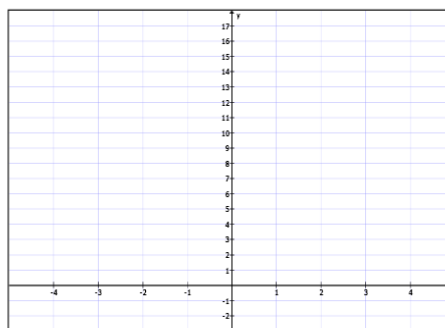| X	Y1
-2	.75
-1	1.5
0	3
1	6
2	12
3	24
4	48
5	96
6	192
7	384
8	768

X=8

3	

(Circle one)
~~Increasing~~/Decreasing

Domain: All Real #s

Range: Y > 0

y-intercept at (0, 3)

Asymptote: Y = 0

2. $y = 4 \cdot \left(\frac{1}{2}\right)^x - 2$

X	Y
-2	
-1	
0	
1	
2	
3	

(Circle one)
Increasing/Decreasing

Domain:_____

Range:_____

y-intercept at (,   )

Asymptote:_____

3. Which function is **not** decreasing?
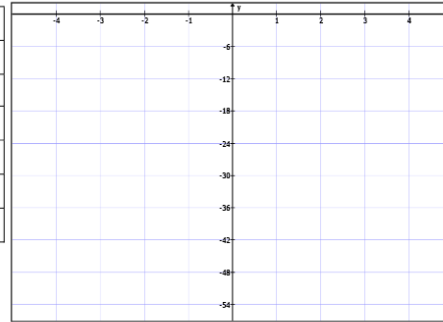
A. $f(x) = -(3)^x$

C. $f(x) = \frac{1}{4}(2)^x$

B. $f(x) = 2\left(\frac{1}{6}\right)^x$

D. $f(x) = \frac{2}{3}\left(\frac{1}{6}\right)^x$

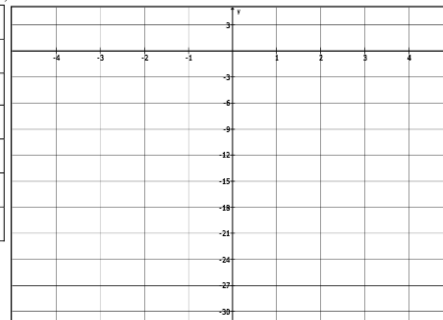Algebra I Unit 9 Exponential Functions

4. $f(x) = -2 \cdot 3^x$

X	y
-2	
-1	
0	
1	
2	
3	

(Circle one)
Increasing/Decreasing

Domain:_____

Range:_____

y-intercept at (,   )

Asymptote:_____

5. $f(x) = -2 \cdot (0.25)^x + 3$

x	y
-2	
-1	
0	
1	
2	
3	

(Circle one)
Increasing/Decreasing

Domain:_____

Range:_____

y-intercept at (,   )

Asymptote:_____

6. Given the equation $f(x) = a \cdot (5)^x$, what value(s) of a will make the graph increase at a slower rate?

   A. $a < 0$ B. $0 < a < 1$ C. $a > 1$ D. None of these
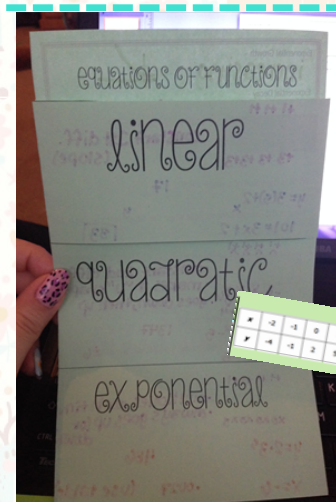
equations of exponentials

Foldable -
make a pocket

Equations of Exponentials

Glue

Fold in half. Cut along the 4 solid lines on the front. Cut off the very top flap - <u>but do not throw away.</u>

equations of exponentials

Cut out the tables from the green scrap. With your shoulder partner, decide if they represent Linear, Quadratic, or Exponential data sets. You must be able to justify your choices.

DO NOT GLUE DOWN UNTIL WE HAVE CHECKED AS A CLASS.

00:00 00

x	-2	-1	0	1	2
y	-4	-1	2	5	8

Linear

x	-2	-1	0	1	2
y	$\frac{2}{9}$	$\frac{2}{3}$	2	6	18

x	-2	-1	0	1	2
y	3	-3	-5	-3	3

Quadratic

equations of exponentials

linear

quadratic

exponential
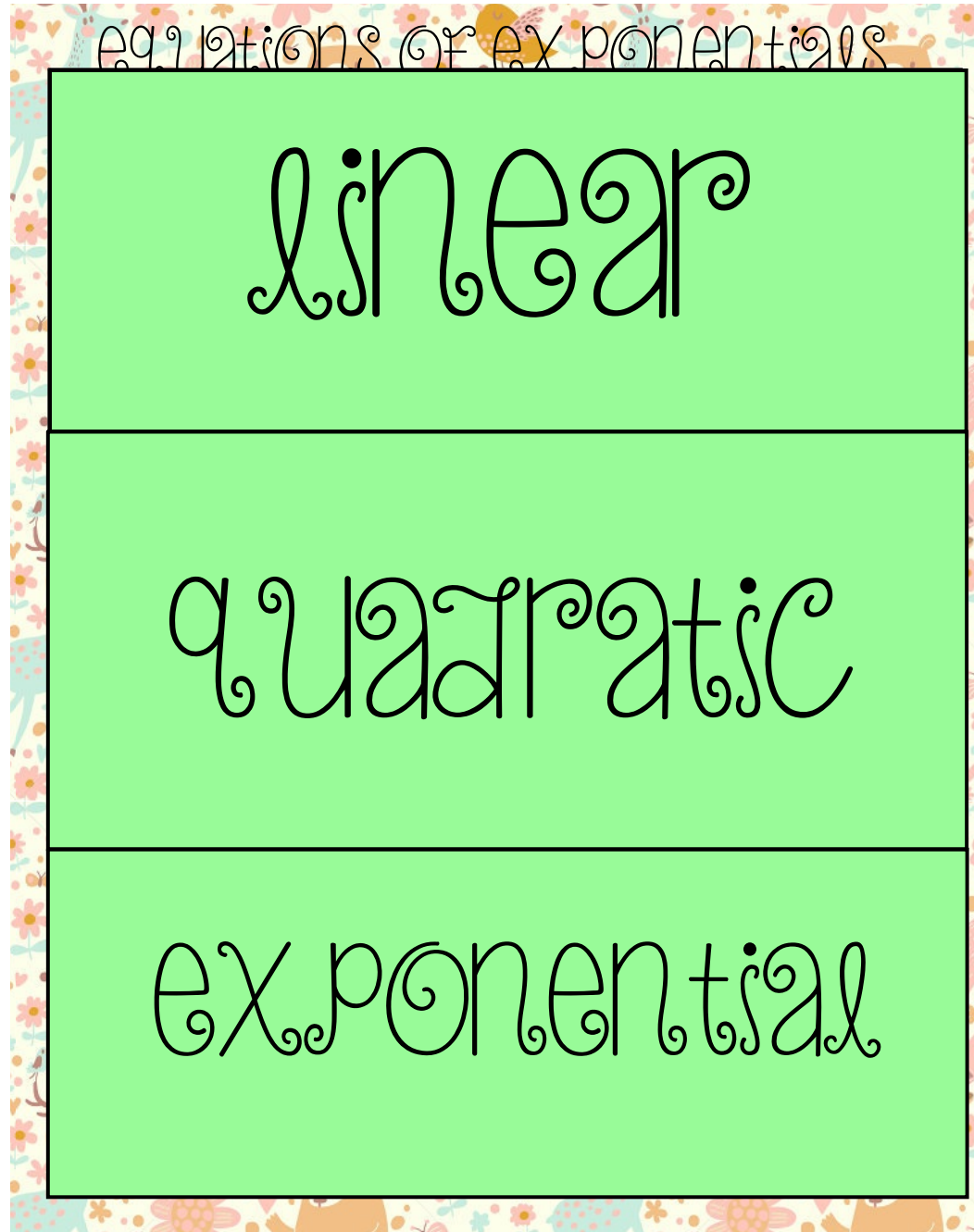
equations of exponentials

Linear

WHY is this table linear?

x	-2	-1	0	1	2
y	-4	-1	2	5	8

+3 +3 +3 +3

constant rate of change ∴ +

What is the value of y when x = 5? $y = 17$

What is the independent variable when the dependent variable is 101? $x = 33$

To write the equation of this function:

General Equation: $y = mx + b$ (slope, y-int)

When the x-values increase by 1, the y-values **increased by 3** $m = \frac{\Delta y}{\Delta x} = \frac{3}{1}$

When x = 0, y = __2__   y-int.

Equation: $y = 3x + 2$

Quadratic

WHY is this table quadratic?

x	-2	-1	0	1	2
y	3	-3	-5	-3	3

y-value repeats ∴ "u" shape

What is the value of y when x = 26? $y = 1347$

What is the value of x when the dependent variable is 67? $6, -6$

To write the equation of this function:

General Equation: $y = ax^2 + bx + c$
$y = a(x-h)^2 + k$

To find equation:
[STAT] 1:Edit $L_1 \rightarrow x$'s $L_2 \rightarrow y$'s
[STAT] ▷CALC 5:QuadReg

$y = 2x^2 + 0x - 5$

$y = 2x^2 - 5$

Exponential

WHY is this table exponential?

x	-2	-1	0	1	2
y	$\frac{2}{9}$	$\frac{2}{3}$	2	6	18

×3 ×3 ×3 ×3

Multiplies y every time

What is the dependent variable when x = 5? $y = 486$

What is the value of x when y = $\frac{2}{729}$? .0027 $x = -6$

To write the equation of this function:

General Equation: $y = a \cdot b^x$ (y-int., multiplier)

When the x-values increase by 1, the y-values **mult. by 3** $b = 3$

When x = 0, y = __2__ y-int $a = 2$

Equation: $y = 2 \cdot 3^x$

equations of exponentials

The data in the table below represents the relationship between the value of a car in relation to the age of the car.

A. Enter the above data points into L1 and L2 on your calculator.

B. Look at the graph in STAT Plot, and ZOOM STAT.

C. What type of function does this represent? Justify your answer.

exponential

Value of a Car *exponential*

Car's Age (yr)	Value ($)
0	20,000
1	17,000
2	14,450
3	12,282.50
4	10,440

NORMAL FLOAT AUTO REAL DEGREE MP

exponential
— no constant rate of change

D. Calculate the equation based on the type of graph.

D: exp Reg

$$y = 20000(.85)^x$$

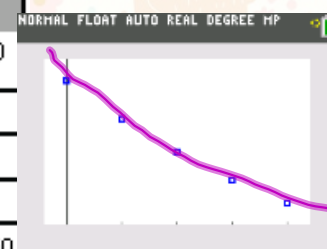E. Oscar likes to keep all of his cars for 10 years. What would be the value of his car after 10 years? x=10

$3937.40

F. Will the value of the car ever equal 0? Why or why not?

No, buy parts

Function Rule: Equation

Algebra I - Unit 9: Topic 1 —Exponential Functions
Practice — Writing Functions of Exponential Equations
Name _____ Date _____ Period _____

Write the function rule for each, then use your calculator to answer the questions.

1.

x	-2	-1	0	1	2
y	5	25	125	625	3125

Function Rule: _____
Equation

What is the value of y when x is -3?

What is the value of x when y is 390,625?

2.

x	-3	-2	-1	0	1
y	32	16	8	4	2

Function Rule: _____

What is the value of y when x is 5?

What is the value of x when y is 16,384?

3.

x	-2	-1	0	1	2
y	$\frac{1}{81}$	$\frac{1}{27}$	$\frac{1}{9}$	$\frac{1}{3}$	1

Function Rule: _____

What is the value of y when x is 6?

What is the value of x when y is 6561?

4. Use the data in the table to describe how the ladybug population is changing. Write a function that models the data. Use your function to predict the ladybug population after one year.

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

How data is changing:

Function rule: _____

Number of lady bugs after one year: _____

5. Which function best models the data
{(-4, -2), (-2, -1), (0, 0), (2, 1), (4, 2)}?

A $y = \left(\frac{1}{2}\right)^x$

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

C $y = \frac{1}{2}x^2$

D $y = \left(\frac{1}{2}x\right)^2$

Algebra I - Unit 9: Topic 1 –Exponential Functions

Use the data from each problem below to calculate an equation of best fit, then use the equation to answer the questions.

6. The table shows the number of computers in a school for four years. Write a function to model the data. Use your function to predict how many computers the school will have in 2006 if the pattern continues.

Number of Computers				
Year	'00	'01	'02	'03
Computers	14	28	56	112

Function Rule: _____

Prediction of computers in 2006: _____

7. What type of function does the data
   {(-6, 17), (-7, 20), (-8, 23), (-9, 26) represent?

8. The chart below shows the ticket sales for movies on a certain screen at one theater over four days.

Day	# Tickets
1	3000
2	2400
3	1920
4	1536

Function rule: _____

How many tickets were sold on Day 8? _____

9. Use the data in the table to describe how the restaurant's sales are changing. Then write a function that models the data. Use your function to predict the amount of sales after 10 years.

Restaurant				
Year	0	1	2	3
Sales ($)	20,000	19,000	18,050	17,147.50

How data is changing:

Function rule: _____

Amount of sales after ten years: _____

HW Help: equations of exponentials

NO WORK = NO CREDIT = NO KIDDING!!

All of the equations for #1-4 are exponential. To find the "a" value, find what is the y-value when x=0. To find the "b" value, find out what you are multiplying each time. You can take the 2nd y-value divided 1st y-value! Once you have the equation, you can plug your equation into y= and look at the table.

5. Plot the points to find the shape of the graph!

6. The number of computers multiplies by 2 each time!

7. Again, plot the points and see what shape the points make. Line = Linear, U = quadratic, curve = exponential

8 & 9. Use your calculator and an exponential regression model. Remember you can paste your equation into y1 by using the VARS menu.