

equations of exponentials

agenda

Warm-Up

HW Check

Notes (foldable)
p.116HW: Practice
(2 pages)

reminders

HW 6.1 due
Friday

Test next Tuesday

warm up monday

1. Which of the following tables represents a function with a constant rate of change ^{slope}?
Explain how you decided your answer.

A.

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

B.

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

C.

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

equations of exponentials

Foldable -

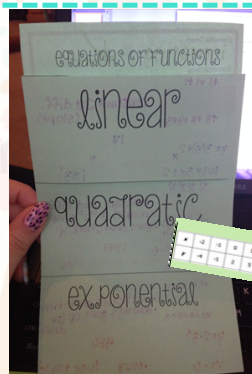
make a pocket
on p. 116-118.

p. 116

Equations of
Exponentials

Glue

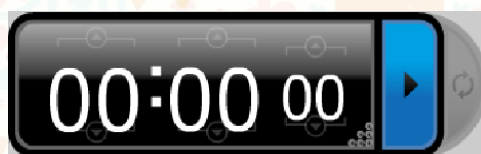
Fold in half. Cut along
the 4 solid lines on the
front. Cut off the very
top flap - but do not
throw away.



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.



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

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

equations of exponentials

linear

quadratic

exponential

equations of exponentials

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

WHY is this table linear?

• constant rate of change
• Line!

What is the value of y when x = 5?

$$y = 3(5) + 2$$

What is the independent variable when the dependent variable is 101?

$$101 = 3x + 2$$

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 increase by 3

$$m = \frac{\text{RISE}}{\text{RUN}} = \frac{3}{1}$$

When x = 0, y = 2

(0, 2) ← y-intercept

Equation:

$$y = 3x + 2$$

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

WHY is this table quadratic?

• "u" shaped
• y repeats
• goes down, then up

What is the value of y when x = 26?

$$y = 347$$

What is the value of x when the dependent variable is 67?

$$x = 6, -6$$

To write the equation of this function:

General Equation:

$$y = ax^2 + bx + c$$

To find equation:

Use calculator!

STAT

1: Edit

L1 → x's L2 → y's

STAT

CALC

5: Quad Reg

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

QuadReg
Y=3x^2+bx+c
a=2
b=0
c=-5

x	-2	-1	0	1	2
y	2	6	18	54	162

WHY is this table exponential?

• multiplies every time
• always goes up (or down)

What is the dependent variable when x = 5?

$$y = 486$$

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

$$x = -6$$

To write the equation of this function:

General Equation:

$$y = a \cdot b^x$$

↑ y-int. ↑ mult.

When the x-values increase by 1, the y-values

$$b = \frac{\text{2nd y}}{\text{1st y}} = \frac{6}{2} = 3$$

When x = 0, y = 2

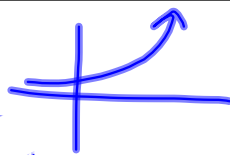
Equation:

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

equations of exponentials

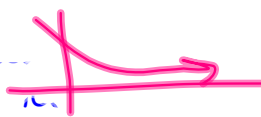
Exponential Growth -

increasing



Exponential Decay -

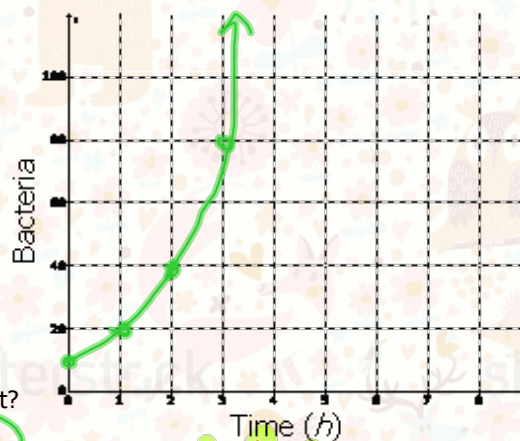
decreasing



4. The data in the table below represents the relationship between the amount of bacteria over time.

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

Bacteria Population



- A. Plot the data points and then connect.
B. What type of function does this data appear to represent?

exponential

- C. How do you know?

multiplying by 2

- D. What type of exponential function does this data represent?

growth (increases)

- E. Write an equation to represent this data.

$$y = 10 \cdot 2^x$$

$$a = 10$$

$$b = 2$$

- F. Predict how much bacteria there would be after half a day.

$$x = 12$$

40,960 bacteria

- G. After how many hours was the amount of bacteria 10,240?

$$y = 10240$$

10 hours



Algebra I - Unit 10: Topic 1 – Equations of Exponential Functions

Practice – Equations of Exponential Functions

pp 772-778, 789-795

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: _____

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 is an example of exponential decay?

A $y = -5\left(\frac{1}{3}\right)^x$

B $y = 5(3)^x$

C $y = 5\left(\frac{1}{3}\right)^x$

D $y = \left(\frac{1}{2}\right) \cdot 3^x$

6. 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 10: Topic 1 – Equations of Exponential Functions

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

7. 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: _____

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

9. 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? _____

10. 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: _____

KWHELP: 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. Decay means DECREASE!

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

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

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

9. Each day the tickets multiply by 0.8 and the "a" value will be 3750. You can round your answer (reasonably!) for day 8.

10. The sales are decreasing by 5% each year, so your multiplier (the b-value) will be 0.95.

