

## Welcome Back to MYP Math 9!

	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
<b>Monday</b> Date: <u>2/19</u> Topic: <u>No School</u>	0 1 2	
<b>Tuesday</b> Date: <u>2/20</u> Topic: <u>Exponents and Logarithms</u>	0 1 2	
<b>Wednesday</b> Date: <u>2/21</u> Topic: <u>Logarithm Properties</u>	0 1 2	
<b>Thursday</b> Date: <u>2/22</u> Topic: <u>Project title, table, and graph</u>	0 1 2	
<b>Friday</b> Date: _____ Topic: _____	0 1 2	

## Warm-up:

What is the common ratio?

Number of years	Number of Kittens	Ratio of current year/previous year
0	12	XX
2	28	$28/12 \approx 2.33$
5	95	$95/28 \approx 3.39$
7	210	$210/95 \approx 2.21$
10	674	$674/210 \approx 3.21$
20	39,903	$39,903/674 \approx 59.2$

Discuss  
(No need  
to write)

Hmmm... something isn't right...



$$\frac{2.33 + 3.39 + 2.21 + 3.21 + 59.2}{5} \approx 14.07$$

What is the common ratio?  
 Notice: 3 years of cats multiplying  
 between years 2 and 5.



Number of years	Number of Kittens	Ratio of current year/previous year
0	12	XX
2	28	28 / 12 ≈ 2.33
5	95	95 / 28 ≈ 3.39
7	210	210 / 95 ≈ 2.21
10	674	674 / 210 ≈ 3.21
20	39,903	39,903 / 674 ≈ 59.2

$\sqrt[3]{2.33}$   
 $\sqrt[3]{3.39} \approx$

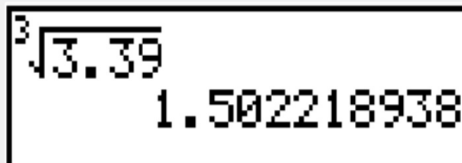
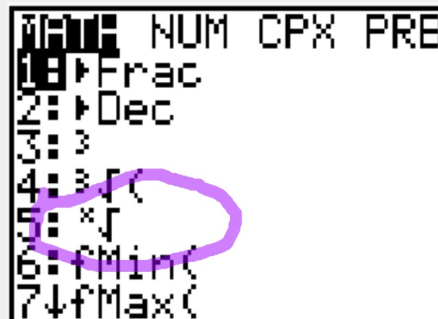
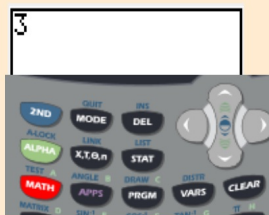
Multiplier between the 3 years?

$$\sqrt[3]{3.39} \approx \underline{\hspace{2cm}}$$

## Calculator Steps

1) Type root value

2) MATH, Choose 5



## Calculator Steps

Number of years	Number of Kittens
0	12
2	28
5	95
7	210
10	674
20	39,903

Ratio of current year/previ
XXXXXXXXXXXXXXXXXXXXXX
$28 / 12 \approx 2.33$
$95 / 28 \approx 3.39$
$210 / 95 \approx 2.21$
$674 / 210 \approx 3.21$
$39,903 / 674 \approx 59.2$

Roots

$\sqrt{2.33}$	1.526433752
$\sqrt[3]{3.39}$	1.502218938
$\sqrt{2.21}$	1.486606875
$\sqrt[3]{3.21}$	1.475146016
$\sqrt[10]{59.2}$	1.50394575

Average:

$1.53 + 1.5 + 1.49 + 1.5$	7.5
Ans/5	1.5

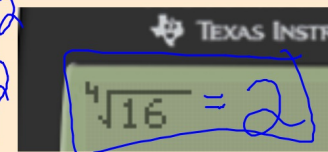
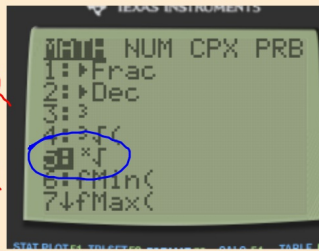
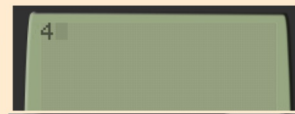
$$b = 1.5$$



**(50% growth)**

## Another Example:

X	y	Ratio (current/previous)
0	1	//////////
1	2	$2/1 = 2$
3	8	$8/2 = 4$ $\sqrt{4} = 2$
5	32	$32/8 = 4$ $\sqrt{4} = 2$
3 { 8	256	$\frac{256}{32} = 8$ $\sqrt[3]{8} = 2$
4 { 12	4096	$\frac{4096}{256} = 16$ $\sqrt[4]{16} = 2$



## Class Plan:

1. Warm-up
  2. Review checklist, Rubrics
  3. Worktime: Exponential Project
- If you were absent Wednesday:
- a) Choose data
  - b) Do: Step 1 and as much as you can of step 2!

**Step 1: Data Intro - Table - Graph**

- \_\_\_ Project Title
- \_\_\_ Organize data in a table
- \_\_\_ Display data using a scatterplot

**Begin  
Wednesday**

**Step 2: Equation  $y = a(b)^x$       $b = (1+r)^x$  OR  $b = (1-r)^x$**

- \_\_\_ Calculate the constant multipliers between each data value
- \_\_\_ Identify the starting value     \_\_\_ Justify your starting value
- \_\_\_ Identify the constant multiplier     \_\_\_ Justify your constant multiplier
- \_\_\_ Write Equation
- \_\_\_ Use the collected data values and verify the equation using *logs*.  
 $x = a^y \Leftrightarrow y = \log_a(x)$
- \_\_\_ Write a statement commenting on the validity of the equation

**Step 3: Analysis (Using Table-Graph-Equation)**

- Interpret the real-life meanings of your equation:
- \_\_\_ Starting value     \_\_\_ Constant multiplier
  - \_\_\_  $r$  (rate of growth / decay) What % is the data growing/decaying ?
  - \_\_\_ Dependent variable ( $y$ -value)     \_\_\_ Independent variable ( $x$ -value)
  - \_\_\_ Use *logarithms* to make a prediction *outside* the collected data set.  
   \_\_\_ Discuss the accuracy of the prediction
  - \_\_\_ Use *logarithms* to make a prediction *inside* the collected data set.  
   \_\_\_ Discuss the accuracy of the prediction
  - \_\_\_ Write a conclusion of the project.

**Project  
checklist**

(Finish step 1)

**Step 2:  
Thursday**

**Step 3:  
Friday**



## RUBRIC Criterion B: Investigations

-Calculate multiplier

-Identify and defend the multiplier and starting value

-Verify equation using 2 data pairs, LOGS!

7	The student is able to: <ul style="list-style-type: none"><li>• Select and apply mathematical problem-solving techniques to discover complex patterns</li></ul>		<ul style="list-style-type: none"><li>• Detailed work is shown to generate the equation model.</li></ul>
8	<ul style="list-style-type: none"><li>• Describe patterns as general rules consistent with correct findings</li><li>• Verify and justify these general rules.</li></ul>		<ul style="list-style-type: none"><li>• Parts of the equation are identified and justified <b>correctly</b>.</li><li>• Equation is verified using logs and at least two data pairs from original data set.</li></ul>

## **RUBRIC: Criterion C: Communication**

- Models: table, graph, equation
- Interpretations
- Predictions, LOGS for x-value!
- Conclusion
- Organized, neat work

7	The student is able to:	
	<ul style="list-style-type: none"><li>• Consistently use appropriate mathematical language</li><li>• Use appropriate forms of mathematical representation to consistently present information correctly.</li><li>• Move effectively between different forms of mathematical representation.</li></ul>	<ul style="list-style-type: none"><li>• Correct table, graph, and equation.</li><li>• Equation is interpreted: <b>Y-value, X-value, multiplier, rate, starting value.</b></li><li>• Multiple predictions are made using values from <i>within</i> and <i>outside</i> the given data range.<ul style="list-style-type: none"><li>-Logarithms are used to find x-values.</li></ul></li></ul>
8	<ul style="list-style-type: none"><li>• Communicate through lines of reasoning that are complete, coherent, and concise.</li><li>• Present work that is consistently organized using a logical structure.</li></ul>	<ul style="list-style-type: none"><li>• Conclusion is <b>complete, concise and coherent.</b></li><li>• The piece of work is organized and neat.</li></ul>

## Worktime: Exponential Project


**\*Use rubric as checklist**

7	The student is able to:				
8	<ul style="list-style-type: none"><li>Select and apply mathematical problem-solving techniques to discover complex patterns</li><li>Describe patterns as general rules consistent with correct findings</li><li>Verify and justify these general rules.</li></ul>			<ul style="list-style-type: none"><li>Detailed work is shown to generate the equation model.</li><li>Parts of the equation are identified and justified <b>correctly</b>.</li><li>Equation is verified using logs and at least two data pairs from original data set.</li></ul>	

7	The student is able to:				
8	<ul style="list-style-type: none"><li>Consistently use appropriate mathematical language</li><li>Use appropriate forms of mathematical representation to consistently present information correctly.</li><li>Move effectively between different forms of mathematical representation.</li><li>Communicate through lines of reasoning that are complete, coherent, and concise.</li><li>Present work that is consistently organized using a logical structure.</li></ul>			<ul style="list-style-type: none"><li>Correct table, graph, and equation.</li><li>Equation is interpreted: <b>Y-value, X-value, multiplier, rate, starting value.</b></li><li>Multiple predictions are made using values from <i>within</i> and <i>outside</i> the given data range.<ul style="list-style-type: none"><li>-Logarithms are used to find x-values.</li></ul></li><li>Conclusion is <b>complete, concise</b> and <b>coherent</b>.</li><li>The piece of work is organized and neat.</li></ul>	

## Remember...

How can we find a constant multiplier when the **x-values ARE NOT** constant?

Number of years	Number of Kittens	Ratio	
0	12	////////////////////	////////////////////
2	28		$\sqrt{2.33} \approx 1.53$
5	95		$\sqrt[3]{3.39} \approx 1.50$
7	210		$\sqrt{2.21} \approx 1.49$
10	674		$\sqrt[3]{3.21} \approx 1.48$
20	39,903		$\sqrt[10]{59.2} \approx 1.50$

Exercises...

Complete Project by Monday 2-26

Then you can focus on studying  
for the Unit 5 Test (March 2nd)