Welcome Back to MYP Math 9!

	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
Monday Date: 2/19 Topic:_____	No School 0 1 2	
Tuesday Date: 2/20 Topic: Growth and Decay Review	0 1 2	
Wednesday Date: 2/21 Topic: Practice Project conclusion!	0 1 2	
Thursday Date: 2/22 Topic: Project title, data table, and graph	0 1 2	
Friday 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	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
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	$39,903/674 \approx 59.2$

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.

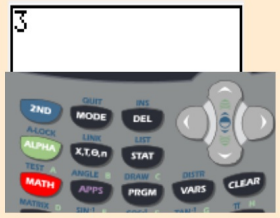
Number of years	Number of Kittens	Ratio of current year/previous year
0	12	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
2	28	$28/12 \approx 2.33$
5	95	$95/28 \approx 3.39$
7	210	$210/95 \approx 2.21$
10	674	$674/210 \approx 3.21$
20	39,903	$39,903/674 \approx 59.2$

Multiplier between the 3 years?

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

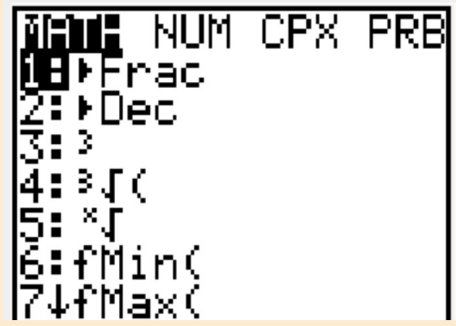
Calculator Steps

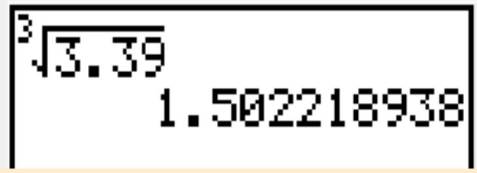
1) Type root value



2) MATH,Choose 5

$\sqrt[3]{3.39}$





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/previou
xxxxxxxxxxxxxxxxxxxxxx
28 / 12 ≈ 2.33
95 / 28 ≈ 3.39
210 / 95 ≈ 2.21
674 / 210 ≈ 3.21
39,903 / 674 ≈ 59.2

$\sqrt{2.33}$ 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 ▶ 7.5

Ans/5 1.5

$y = 12(1.5)^x$

b = 1.5

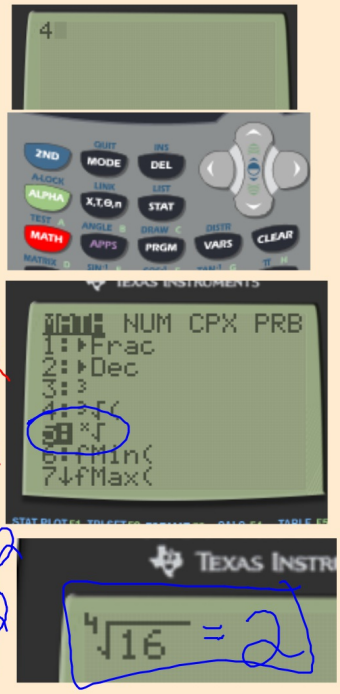
(50% growth)

Another Example:

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

3

4



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

Wednesday Workday

___Project **Title**

___Organize data in a table

___Display data using a scatterplot

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

___Verify the equation by substituting data from your table into equation.

____ 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***)

____Dependent variable (*y-value*) ____Independent variable (*x-value*)

___Use equation to make a prediction that is ***outside*** the collected data.

___Discuss the accuracy of the prediction

___Use equation to make a prediction that is ***inside*** the collected data set.

___ Discuss the accuracy of the prediction

____ Write a conclusion of the project.

Project checklist

Step 2: Thursday

Step 3: Friday

Project Equation - SL checklist

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

___Verify the equation by substituting data from your table into equation.

____ Write a statement commenting on the validity of the equation

Recall our Exponential Equation:

a: Starting value $y = a \cdot b^x$

b: Constant multiplier (multiplier is always positive.)

r: Rate of growth/decay, interpreted as a %

Exponential Growth

b>1

$$y = a(1+r)^x$$

Ant Population Example:

$$y = 16(1.5)^x$$

r = 50% growth

Exponential Decay

0<b<1

$$y = a(1-r)^x$$

Car Value Example:

$$y = 21{,}700(0.83)^x$$

r = 17% depreciation

Project Analysis - SL checklist

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

Interpret the real-life meanings of your equation:

____Starting value _____Constant multiplier

____ r (***rate % of growth/decay***)

____Dependent variable (*y-value*) ____Independent variable (*x-value*)

___Use equation to make a prediction that is ***outside*** the collected data.

___Discuss the accuracy of the prediction

___Use equation to make a prediction that is ***inside*** the collected data set.

___ Discuss the accuracy of the prediction

____ Write a conclusion of the project.

RUBRIC Criterion B: Investigations

-Calculate mulitplier
-Identify and defend the multiplier and starting value
-Verify equation using 2 data pairs

7 8	The student is able to: • Select and apply mathematical problem-solving techniques to discover complex patterns • Describe patterns as general rules consistent with correct findings • Verify these general rules			• Detailed work is shown to generate the equation model. • Parts of the equation are identified and justified **correctly**. • Equation is verified using at least two data pairs from original data set.

RUBRIC: Criterion C: Communication

-Models: table, graph, equation
-Interpretations
-Predictions
-Conclusion
-Organized, neat work

7 8	The student is able to: • Consistently use appropriate mathematical language • Use appropriate forms of mathematical representation to consistently present information correctly. • Move effectively between different forms of mathematical representation. • Communicate through lines of reasoning that are complete, coherent, and concise. • Present work that is consistently organized using a logical structure.	• Correct table, graph, and equation. • Equation is interpreted: **Y-value, X-value, multiplier, rate, starting value.** • Multiple predictions are made using values from *within* & *outside* the given data range. • Conclusion is ***complete, concise*** and ***coherent***. • The piece of work is organized and neat.

Worktime: Exponential Project

*Use rubric as checklist

7 8	The student is able to: • Select and apply mathematical problem-solving techniques to discover complex patterns • Describe patterns as general rules consistent with correct findings • Verify these general rules			• Detailed work is shown to generate the equation model. • Parts of the equation are identified and justified **correctly**. • Equation is verified using at least two data pairs from original data set.
7 8	The student is able to: • Consistently use appropriate mathematical language • Use appropriate forms of mathematical representation to consistently present information correctly. • Move effectively between different forms of mathematical representation. • Communicate through lines of reasoning that are complete, coherent, and concise. • Present work that is consistently organized using a logical structure.			• Correct table, graph, and equation. • Equation is interpreted: **Y-value, X-value, multiplier, rate, starting value.** • Multiple predictions are made using values from *within* & *outside* the given data range. • Conclusion is ***complete, concise*** and ***coherent***. • The piece of work is organized and neat.

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

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