(A) Lesson Context

BIG PICTURE of this UNIT:	• How can I analyze growth or decay patterns in data sets & contextual problems? • How can I algebraically & graphically summarize growth or decay patterns? • How can I compare & contrast linear and exponential models for growth and decay problems.		
CONTEXT of this LESSON:	Where we've been In Lesson 1, you generated data from a variety of activities	Where we are How do we analyze data in order to determine the patterns/relationships exist in data sets that exhibit growth & decay patterns	Where we are heading How can I develop equations that will help me make predictions about scenarios which feature exponential growth & decay?

(B) Lesson Objectives:

a. Generate data through various hands-on activities
b. Analyze the data to look for patterns in the data that was generated
c. Make predictions/extrapolations through numeric or algebraic analysis

DATA SET ANALYSIS #0

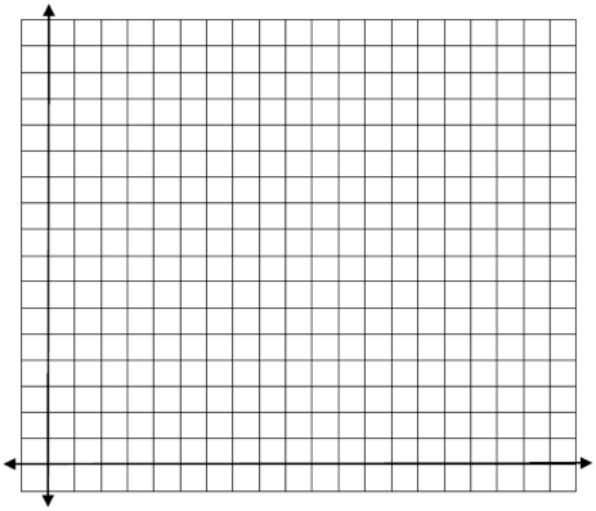
Data Set #0 ➔ {10,20,30,40,50,60,70,….} ➔ and as a data table

X	0	1	2	3	4	5	6
y	10	20	30	40	50	60	70

➔

Describe the pattern in words	List the next 6 numbers in the data set, given the pattern you determined	Formula/equation/method for determining the 25^{th} number in your data set

MATH ANALYSIS:



(1) Enter the data using STAT ➔ EDIT ➔ and enter data in L1 and L2

(2) Go to STAT PLOT (2^{nd} Y=) and turn ON PLOT 1

(3) Go to Y= and enter in your equation from our Math Analysis

(4) Set up your WINDOWS

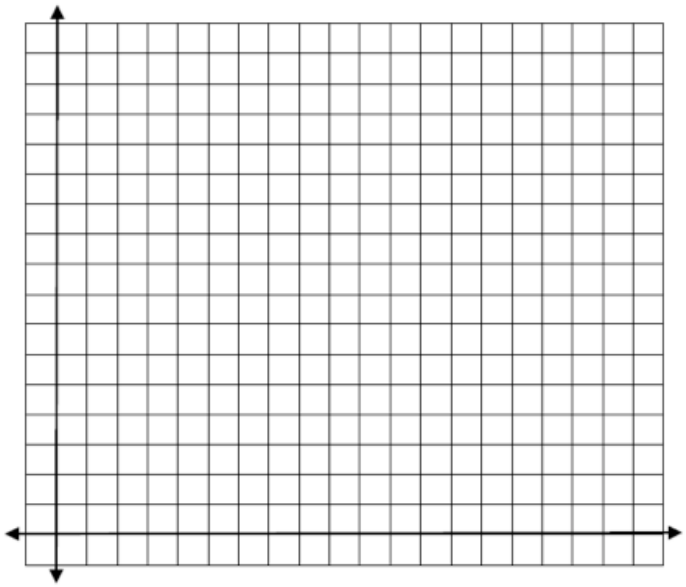
(5) Go to GRAPH

DATA SET ANALYSIS #1

Data Set #1 ➔ {1,2,4,8,16,32,64,….} ➔ and as a data table ➔

X	0	1	2	3	4	5	6
y	1	2	4	8	16	32	64

Describe the pattern in words



MATH ANALYSIS ➔ Common Ratio

Option #1: ➔ To calculate the common ratio, we will divide successive y values.

$ratio = \frac{y_2}{y_1} = \frac{y_3}{y_2} = \frac{y_4}{y_3} = \frac{y_5}{y_4}$ etc ..... ➔ observation ….. ?

Which leads to an equation ➔ $y = ab^x$

MATH ANALYSIS ➔ Percent Change

Option #2: ➔ To calculate the percentage, we will calculate the percent change for each trial using the formula below.

$percentage\ change = r = \frac{y_2 - y_1}{y_1} = \frac{y_3 - y_2}{y_2} = \frac{y_4 - y_3}{y_3} = \frac{y_5 - y_4}{y_4} =$ etc .... ➔ observation ….. ?

Which leads to an equation ➔ $y = a(1+r)^x$ ➔

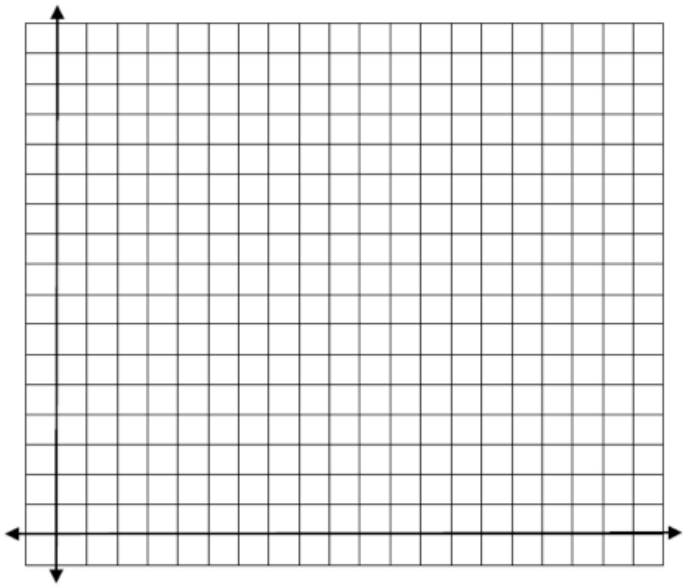
VERIFICATION ➔ use the TI-84 calculator to verify our equation:

DATA SET ANALYSIS #2

Data Set #2 ➔ {10,20,40,80,160,320,640,….} ➔as a data table ➔

X	0	1	2	3	4	5	6
y	10	20	40	80	160	320	640

Describe the pattern in words



MATH ANALYSIS ➔ Common Ratio

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Which leads to an equation ➔ $y = ab^x$

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Which leads to an equation ➔ $y = a(1+r)^x$ ➔

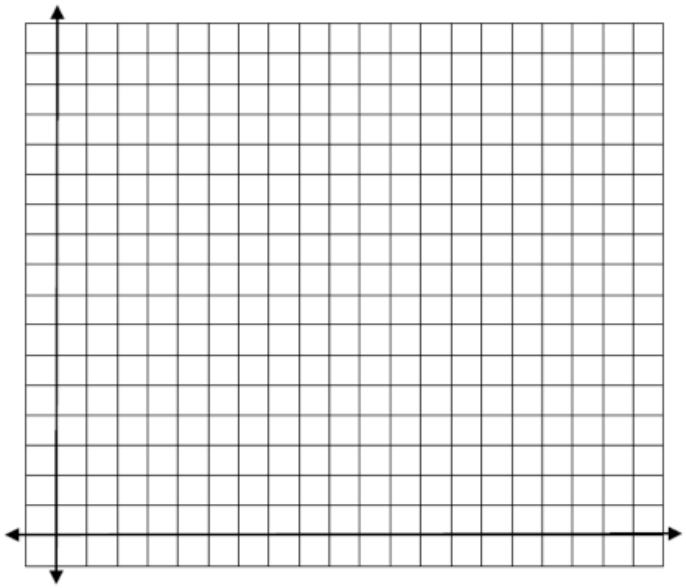
VERIFICATION ➔ use the TI-84 calculator to verify our equation:

DATA SET ANALYSIS #3

Data Set #3: $\left\{\frac{1}{27}, \frac{1}{9}, \frac{1}{3}, 1, 3, 9, 27, ...\right\}$ or as a data table

X	0	1	2	3	4	5	6
y	$\frac{1}{27}$	$\frac{1}{9}$	$\frac{1}{3}$	1	3	9	27

Describe the pattern in words



MATH ANALYSIS ➔ Common Ratio

Option #1: ➔ To calculate the common ratio, we will divide successive y values.

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Which leads to an equation ➔ $y = ab^x$

MATH ANALYSIS ➔ Percent Change

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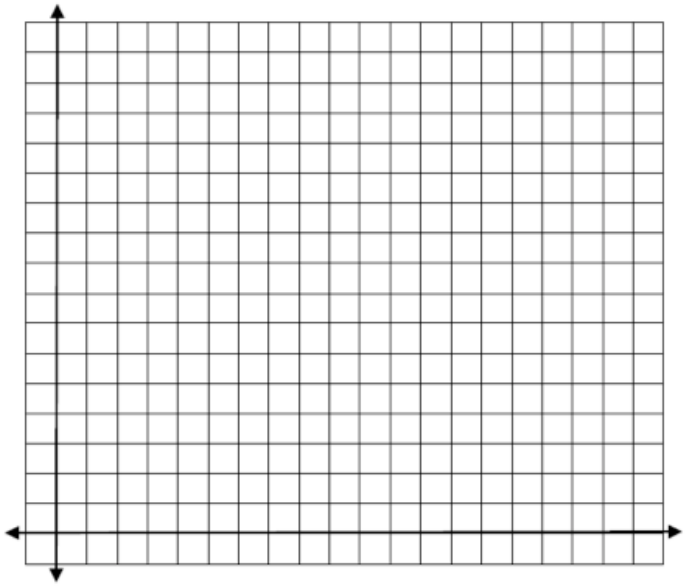
Which leads to an equation ➔ $y = a(1+r)^x$ ➔

VERIFICATION ➔ use the TI-84 calculator to verify our equation:

DATA SET ANALYSIS #4

Year	1825	1850	1875	1900	1925	1950	1975
Population (in thousands)	200	252	318	401	504	635	800

Describe the pattern in words



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Which leads to an equation ➔ $y = ab^x$

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Which leads to an equation ➔ $y = a(1+r)^x$ ➔

VERIFICATION ➔ use the TI-84 calculator to verify our equation:

(C) Data Analysis ➔ *Part I: Modeling Exponential Growth H&T Activity*

Trial #	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
# of chips	2															

MATH ANALYSIS ➔ Common Ratio

Option #1: ➔ To calculate the common ratio, we will divide successive y values.

$ratio = \frac{y_2}{y_1} = \frac{y_3}{y_2} = \frac{y_4}{y_3} = \frac{y_5}{y_4}$ etc ..... ➔ Complete the table below.

Trial #	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ratio	X															

Calculate the average of ALL the ratios: _____

Which leads to an equation ➔ $y = ab^x$

MATH ANALYSIS ➔ Percent Change

Option #2: ➔ To calculate the percentage, we will calculate the percent change for each trial using the formula below.

$percentage\ change = r = \frac{y_2 - y_1}{y_1} = \frac{y_3 - y_2}{y_2} = \frac{y_4 - y_3}{y_3} = \frac{y_5 - y_4}{y_4} =$ etc .... ➔ Complete the table below.

Trial #	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Percent ***(write as decimal)***	X															

Calculate the average of ALL the percents: _____

Which leads to an equation ➔ $y = a(1+r)^x$ ➔

VERIFICATION ➔ use the TI-84 calculator to verify our equation:

(D)DATA ANALYSIS ➔ *Part II: Modeling Exponential Decay*

Trial #	0	1	2	3	4	5	6	7	8	9	10
# of chips											

MATH ANALYSIS ➔ Common Ratio

Option #1: ➔ To calculate the common ratio, we will divide successive y values.

$ratio = \frac{y_2}{y_1} = \frac{y_3}{y_2} = \frac{y_4}{y_3} = \frac{y_5}{y_4}$ etc ..... ➔ Complete the table below.

Trial #	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ratio	X															

Calculate the average of ALL the ratios: _____

Which leads to an equation ➔ $y = ab^x$

MATH ANALYSIS ➔ Percent Change

Option #2: ➔ To calculate the percentage, we will calculate the percent change for each trial using the formula below.

$percentage\ change = r = \frac{y_2 - y_1}{y_1} = \frac{y_3 - y_2}{y_2} = \frac{y_4 - y_3}{y_3} = \frac{y_5 - y_4}{y_4} =$ etc .... ➔ Complete the table below.

Trial #	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Percent ***(write as decimal)***	X															

Calculate the average of ALL the percents: _____

Which leads to an equation ➔ $y = a(1+r)^x$ ➔

VERIFICATION ➔ use the TI-84 calculator to verify our equation: