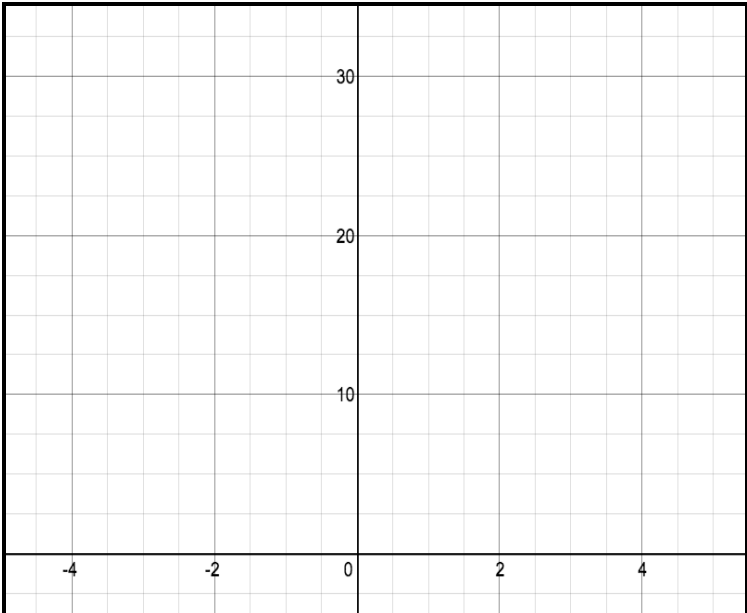## (A)Lesson Context

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 Lessons 5 & 6, you looked at how exponential equations can be used to model real world scenarios	Where we are How do we interpret and analyze graphs of exponential equations that model growth & decay patterns	Where we are heading How can I use graphs & equations that will help me make predictions about scenarios which feature exponential growth & decay?

(A)Lesson Objectives:

a. Understand the basic appearance and features of the graph of a simple exponential relation
b. Make predictions/extrapolations through graphic analysis
c. Understand the basic connection between the parameters in an equation and its appearance in a graph

(B) Graphs of Exponential Functions – Investigation #1- The BASIC graph of $y = Ca^x$

a. Use your TI-84 (or use DESMOS) to graph the equation $y = 2^x$. Then sketch the graph on the attached grid. Fill in the included data table as well.

GRAPH:

DATA TABLE:

X	0	1	2	3	4	5
Y						

X	-1	-2	-3	-4	-5
Y					

Domain ➔

Range ➔

y-intercept ➔

asymptote ➔

(C) **Graphs of Exponential Functions – Investigation #2 – Changing the value of C in y = Ca^x**

a. Use your TI-84 (or use DESMOS) to graph the equation y = 2^x. Then on the same graph, graph the following equations in order to compare the appearance of the graphs & compare the data points.

Equation to graph	Sketch	Compare the two graphs	Compare the two data tables
Y = 2(2)^x			
Y = 10(2)^x			
Y=0.5(2)^x			
Y = 0.1(2)^x			
Describe the effect of changing the value of C in the equation y = Ca^x.			

(D) Graphs of Exponential Functions – Investigation #3 – Changing the value of a in y = Caˣ

a. Use your TI-84 (or use DESMOS) to graph the equation $y = 2^x$. Then on the same graph, graph the following equations in order to compare the appearance of the graphs & compare the data points.

Equation to graph	Compare the two graphs	Compare the two data tables
$Y = (3)^x$		
$Y = (5)^x$		
$Y = (\frac{1}{2})^x$		
$Y = (\frac{1}{4})^x$		
Describe the effect of changing the value of a in the equation $y = Ca^x$.		

(E) **Graphs of Exponential Functions – Investigation #4 – Changing the signs in y = Ca^x**

a. Use your TI-84 (or use DESMOS) to graph the equation y = 2^x. Then on the same graph, graph the following equations in order to compare the appearance of the graphs & compare the data points.

Equation to graph	Compare the two graphs	Compare the two data tables
Y = -(2)^x		
Y = (2)$^{-x}$		
Y=(-2)^x		

Describe the effect of changing the signs in the equation y = Ca^x.

(F) **Graphs of Exponential Functions – Investigation #5 – Introducing a shift in y = Ca^x**

a.   Use your TI-84 (or use DESMOS) to graph the equation y = 2^x. Then on the same graph, graph the following equations in order to compare the appearance of the graphs & compare the data points.

Equation to graph	Compare the two graphs	Compare the two data tables
Y = (2)^x + 3		
Y = (2)^x + 8		
Y=(2)^x – 3		
Y = (2)^x – 7		
Describe the effect of adding/subtracting another value in the equation y = Ca^x + D		

(G) Consolidation of Concepts

Without a graphing calculator, use your understanding of the concepts that you learned in order to prepare a (i) data table and a (ii) graph of the following equations:

$Y = -(2)^x + 5$	$Y = -4 + \frac{1}{2}(2)^{-x}$.