Unit 6 - *Exponential and Log Functions*

Overview

Students will understand exponential functions and their graphs. Students will be introduced to logarithms as the inverse of exponential functions. They will use the properties of logarithms to solve both exponential and logarithmic equations. Real world application problems will be introduced.

21st Century Capacities: Analyzing, Synthesizing

Stage 1 - Desired Results

ESTABLISHED GOALS/ STANDARDS

MP 1 Make sense of problems and persevere in solving them
MP2 Reason abstractly and quantitatively
MP4 Model with Mathematics
MP6 Attend to precision

A.SSE.1 Interpret expressions that represent a quantity in terms of its context.*

A.SSE.1b Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P.

A.CED.1 Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple*

Transfer:

Students will be able to independently use their learning in new situations to...

1. Manipulate equations and expressions to create order and establish relationships.
2. Draw conclusions about graphs and equations.(Synthesizing)
3. Make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution. (Analyzing)

Meaning:

UNDERSTANDINGS: *Students will understand that:*	ESSENTIAL QUESTIONS: *Students will explore & address these recurring questions:*
1. Mathematicians can describe patterns, relations, and/or exponential and logarithmic functions to access strategies to solve problems. 2. Mathematicians use models to represent and make meaning of quantitative relationships.	A. How do you express and describe an exponential or logarithmic pattern and use it to make predictions and solve a problem? B. How do I interpret this model?

rational and exponential functions.	Acquisition:	
F.IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*	*Students will know…* 1. The relationship between the laws of exponents and how they relate to the laws of logs 2. The difference between growth and decay 3. Vocabulary: exponential growth/decay, e, continuous, logarithm, common and natural logarithms, half-life	*Students will be skilled at…* 1. Changing an equation from log form to exponential form and back. 2. Using the laws of logs 3. Expanding and condense log expressions in order to solve problems 4. Solving problems related to growth and decay 5. Sketching the graph of a transformed exponential growth / decay 6. Using change of base formula 7. Solving problems involving compound interest 8. Identifying functions as models of exponential growth, exponential decay.

F.IF.7e Graph exponential and logarithmic functions, showing intercepts and end behavior.

A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

F.BF.3 Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology.

F.LE.4 For exponential models, express as a logarithm the solution to $ab^{(ct)} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.

F.BF.5 (+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.