

Unit Five Information

Curriculum Map: Exponential and Logarithmic

Content Descriptors:

Concept 1: Exponential Functions

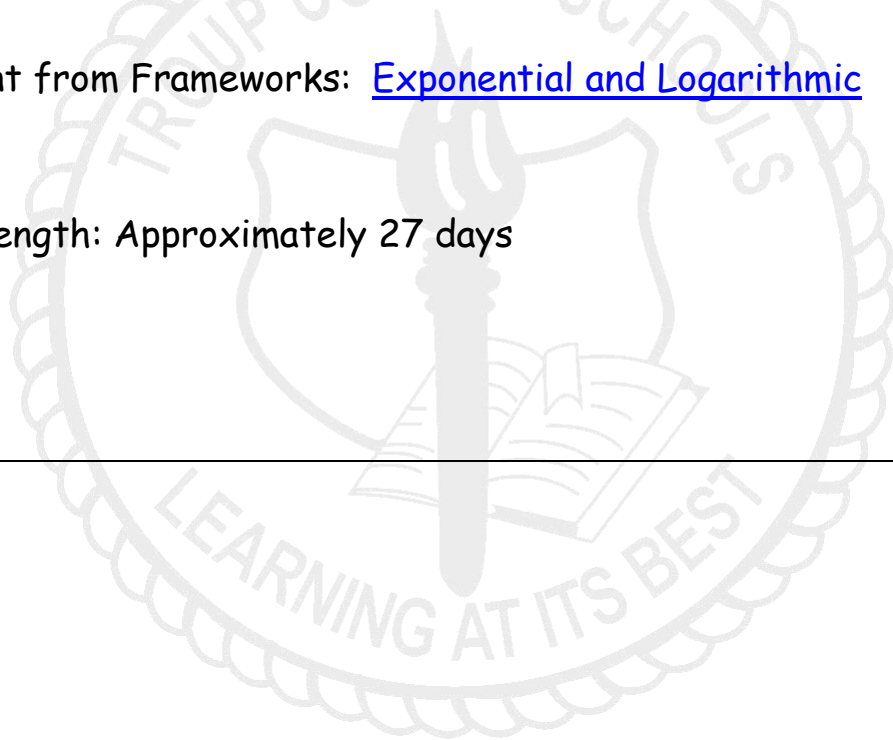
Concept 2: Logarithmic Functions

Concept 3: Solving Exponential and Logarithmic Equations

Concept 4: Graphing Exponential and Logarithmic Functions

Content from Frameworks: [Exponential and Logarithmic](#)

Unit Length: Approximately 27 days



TCSS – GSE Algebra 2 – Unit 5

Curriculum Map

<p>Unit Rational: <i>Students extend their work with exponential functions to include solving exponential equations with logarithms. They analyze the relationship between these two functions.</i></p>			
<p>Prerequisites: <i>As identified by the GSE Frameworks</i></p> <ul style="list-style-type: none"> ✓ The concept of a function ✓ Various representations of functions ✓ Exponential functions and characteristics of their graphs ✓ The solution of linear equations using algebra and graphing approaches ✓ Familiarity with graphing technology ✓ Use patterns to write a function to model a situation 			<p>Length of Unit 27 Days</p>
Concept 1	Concept 2	Concept 3	Concept 4
Exponential Functions	Logarithmic Functions	Solving Exponential & Logarithmic Equations	Graphing Exponential & Logarithmic Functions
GSE Standards	GSE Standards	GSE Standards	GSE Standards
<p>MGSE9-12.A.SSE.3c Use the properties of exponents to transform expressions for exponential functions. <i>For example, the expression 1.15^t, where t is in years, can be rewritten as $[1.15^{(1/12)}]^{(12t)} \approx 1.012^{(12t)}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.</i></p> <p>MGSE9-12.F.IF.8b Use the properties of exponents to interpret expressions for exponential functions. <i>(Limit to exponential and logarithmic functions.)</i></p> <p>MGSE9-12.A.CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.</p> <p>MGSE9-12.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 rational and exponential functions.</p>	<p>MGSE9-12.A.SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. <i>(Limit to exponential and logarithmic functions.)</i></p> <p>MGSE9-12.F.IF.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. <i>(Limit to exponential and logarithmic functions.)</i></p> <p>MGSE9-12.F.BF.4 Find inverse functions.</p> <p>MGSE9-12.F.BF.4b Verify by composition that one function is the inverse of another.</p>	<p>MGSE9-12.F.BF.4a Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse.</p> <p>MGSE9-12.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.</p> <p>MGSE9-12.F.BF.5 Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.</p>	<p>MGSE9-12.F.IF.7 Graph functions expressed algebraically and show key features of the graph, by hand and using technology. <i>(Limit to exponential and logarithmic functions.)</i></p> <p>MGSE9-12.F.IF.7e Graph exponential and logarithmic functions, showing intercepts and end behavior.</p> <p>MGSE9-12.F.BF.4c Read values of an inverse function from a graph or a table, given that the function has an inverse.</p>

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Lesson Essential Question	Lesson Essential Question	Lesson Essential Question	Lesson Essential Question
<p>How are the properties of exponents used?</p> <p>What determines if an exponential function is a growth or decay?</p> <p>What is the formula for finding appreciation or depreciation?</p> <p>How is appreciation and depreciation used?</p> <p>How do you find compound interest?</p>	<p>How do you write equivalent forms for exponential and logarithmic equations?</p> <p>How are properties of logarithms used?</p> <p>How are logarithms related to exponential functions?</p>	<p>How do I use the properties of logarithmic and exponential functions to solve equations?</p>	<p>How do you graph exponential and logarithmic functions?</p> <p>How do you identify the characteristics of exponential and logarithmic functions?</p>
Vocabulary	Vocabulary	Vocabulary	Vocabulary
<ul style="list-style-type: none"> • exponential function • exponential growth • exponential decay • multiplier • principal • depreciation • appreciation • compound interest • natural base • natural exponential • continuous compounding interest 	<ul style="list-style-type: none"> • Base composition • Power logarithm • Logarithmic function • common logarithm • natural logarithm • product property • quotient property • power property • change-of-base formula 	<ul style="list-style-type: none"> • inverse 	<ul style="list-style-type: none"> • Domain • Range • Intercepts • End behavior • asymptote

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<i>Resources – Concept 1</i>	<i>Resources – Concept 2</i>	<i>Resources – Concept 3</i>	<i>Resources – Concept 4</i>
<ul style="list-style-type: none"> ❖ Solve Exponential equations Review <p style="text-align: center;"><i>These tasks were taken from the <u>GSE Frameworks.</u></i></p> <ul style="list-style-type: none"> ❖ Paper folding activity (A.SSE.3) – activator Teacher Student 	<ul style="list-style-type: none"> ❖ Inverse Graphic Organizer Blank ❖ Investigating Properties of Logarithms ❖ Review of logs worksheet ❖ Logarithms in the Real World Video <p style="text-align: center;"><i>These tasks were taken from the <u>GSE Frameworks.</u></i></p> <ul style="list-style-type: none"> ❖ Bacteria in the Swimming Pool Teacher Student 	<ul style="list-style-type: none"> ❖ Exponential growth and decay examples ❖ Exponential Growth & Decay (Calculator allowed) ❖ Word Problem Practice ❖ Properties of Logarithm Practice ❖ Solving and Graphing Logs 	<ul style="list-style-type: none"> ❖ Log Graphing Worksheet ❖ Unit Review Problems <p style="text-align: center;"><i>These tasks were taken from the <u>GSE Frameworks.</u></i></p> <ul style="list-style-type: none"> ❖ Graphs of Exponential Functions Teacher Student ❖ Guided notes – The Logarithmic Function Teacher Student
<i>Differentiated Activities Concept 1</i>	<i>Differentiated Activities Concept 2</i>	<i>Differentiated Activities Concept 3</i>	<i>Differentiated Activities Concept 4</i>
<ul style="list-style-type: none"> ❖ Recall Charts 	<ul style="list-style-type: none"> ❖ What is a Logarithm? Teacher Student ❖ Recall Charts 	<ul style="list-style-type: none"> ❖ Newton’s Law of Cooling Teacher Student ❖ Recall Charts 	<ul style="list-style-type: none"> ❖ FAL Graphing Logs ❖ Zombie Apocalypse Simulation (project idea) Teacher Student ❖ Article to go with Zombie Apocalypse ❖ Zombies Revisited Teacher Student

At the end of Unit 5 student’s should be able to say “I can...”

- ✓ Identify the characteristics of the graphs of exponential functions and logarithmic functions.
- ✓ Use logarithms to solve exponential equations.
- ✓ Understand that logarithms and exponential equations connect the same numeric data inversely.
- ✓ Given an exponential equation, write the corresponding logarithmic equation; given a logarithmic equation, write the corresponding exponential equation.
- ✓ Given a situation that can be modeled with an exponential function or logarithmic function, write the appropriate function and use it to answer questions about the situation.