

# *Accelerated GSE Geometry B/Advanced Algebra*

2015-  
2016

## Unit Eight Information

Curriculum Map: Exponential and Logarithmic

Content Descriptors:

Concept 1: Exponential Functions

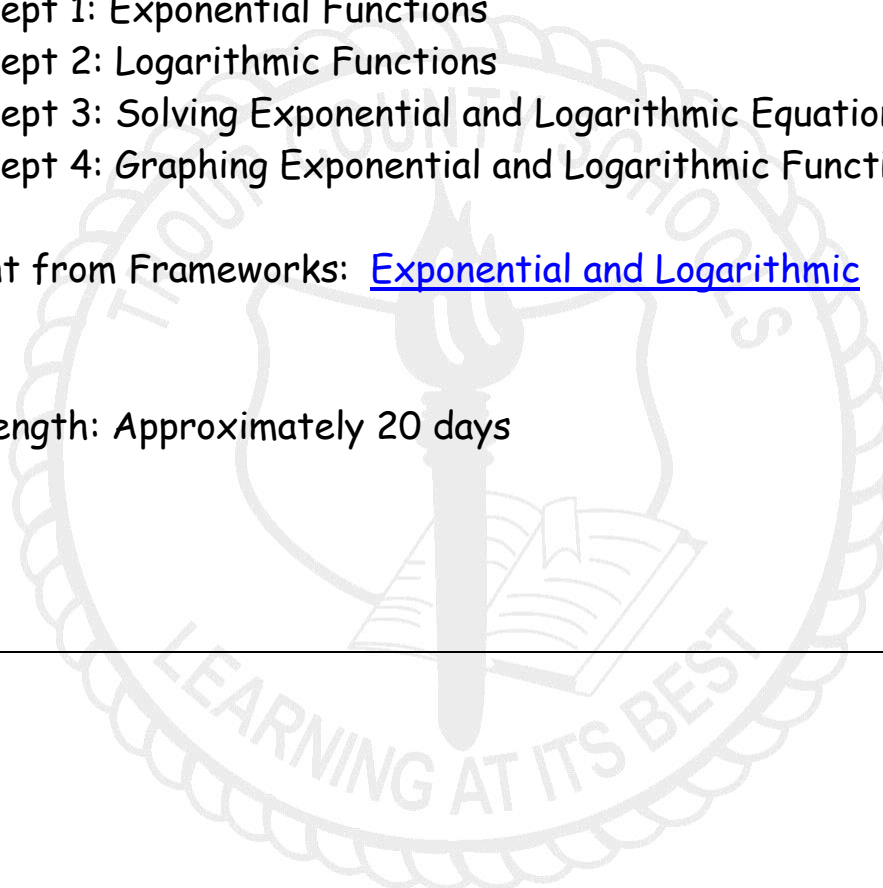
Concept 2: Logarithmic Functions

Concept 3: Solving Exponential and Logarithmic Equations

Concept 4: Graphing Exponential and Logarithmic Functions

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

Unit Length: Approximately 20 days



# TCSS – Accelerated GSE Geometry B/Advanced Algebra – Unit 8

## Curriculum Map

<p><b>Unit Rational:</b> <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><b>Prerequisites:</b> <i>As identified by the GSE Frameworks</i></p> <ul style="list-style-type: none"> <li>✓ The concept of a function</li> <li>✓ Various representations of functions</li> <li>✓ Exponential functions and characteristics of their graphs</li> <li>✓ The solution of linear equations using algebra and graphing approaches</li> <li>✓ Familiarity with graphing technology</li> <li>✓ Use patterns to write a function to model a situation</li> </ul>			<p><b>Length of Unit</b> 20 Days</p>
<b>Concept 1</b>	<b>Concept 2</b>	<b>Concept 3</b>	<b>Concept 4</b>
Exponential Functions	Logarithmic Functions	Solving Exponential & Logarithmic Equations	Graphing Exponential & Logarithmic Functions
<b>GSE Standards</b>	<b>GSE Standards</b>	<b>GSE Standards</b>	<b>GSE Standards</b>
<p><b>MGSE9-12.A.SSE.3c</b> Use the properties of exponents to transform expressions for exponential functions. <i>For example, the expression <math>1.15^t</math>, where <math>t</math> is in years, can be rewritten as <math>[1.15^{(1/12)}]^{(12t)} \approx 1.012^{(12t)}</math> to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.</i></p> <p><b>MGSE9-12.F.IF.8b</b> Use the properties of exponents to interpret expressions for exponential functions. <i>(Limit to exponential and logarithmic functions.)</i></p> <p><b>MGSE9-12.A.CED.4</b> Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.</p> <p><b>MGSE9-12.A.CED.1</b> 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><b>MGSE9-12.A.SSE.3</b> 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><b>MGSE9-12.F.IF.8</b> 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><b>MGSE9-12.F.BF.4</b> Find inverse functions.</p> <p><b>MGSE9-12.F.BF.4b</b> Verify by composition that one function is the inverse of another.</p>	<p><b>MGSE9-12.F.BF.4a</b> Solve an equation of the form <math>f(x) = c</math> for a simple function <math>f</math> that has an inverse and write an expression for the inverse.</p> <p><b>MGSE9-12.F.LE.4</b> For exponential models, express as a logarithm the solution to <math>ab^{(ct)} = d</math> where <math>a</math>, <math>c</math>, and <math>d</math> are numbers and the base <math>b</math> is 2, 10, or <math>e</math>; evaluate the logarithm using technology.</p> <p><b>MGSE9-12.F.BF.5</b> Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.</p>	<p><b>MGSE9-12.F.IF.7</b> 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><b>MGSE9-12.F.IF.7e</b> Graph exponential and logarithmic functions, showing intercepts and end behavior.</p> <p><b>MGSE9-12.F.BF.4c</b> Read values of an inverse function from a graph or a table, given that the function has an inverse.</p>

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<i>Lesson Essential Question</i>	<i>Lesson Essential Question</i>	<i>Lesson Essential Question</i>	<i>Lesson Essential Question</i>
<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 I find the inverse of a functions?</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>
<b>Vocabulary</b>	<b>Vocabulary</b>	<b>Vocabulary</b>	<b>Vocabulary</b>
<ul style="list-style-type: none"> <li>• exponential function</li> <li>• exponential growth</li> <li>• exponential decay</li> <li>• multiplier principal</li> <li>• depreciation</li> <li>• appreciation</li> <li>• compound interest</li> <li>• natural base</li> <li>• natural exponential</li> <li>• continuous compounding interest</li> </ul>	<ul style="list-style-type: none"> <li>• Base composition</li> <li>• Power logarithm</li> <li>• Logarithmic function</li> <li>• common logarithm</li> <li>• natural logarithm</li> <li>• product property</li> <li>• quotient property</li> <li>• power property</li> <li>• change-of-base formula</li> <li>• inverse</li> </ul>		<ul style="list-style-type: none"> <li>• Domain</li> <li>• Range</li> <li>• Intercepts</li> <li>• End behavior</li> <li>• asymptote</li> </ul>

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

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## At the end of Unit 8 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.

