

## ABSS Math Unit Planning Template

### Introduction:

<b>Grade/Course:</b> 9_12   Adv Functions and Modeling		<b>Suggested Unit Pacing (# of days):</b>  5	
<b>Unit Number and Title:</b> Unit 8 - Exponential Functions		<b>Mathematical Practices</b>	
<b>Conceptual Overview</b>	This unit introduces exponential functions and allows for simplification and evaluation of exponential expressions with rational and irrational exponents. In addition, graphs and modeling of real-world problems will be found and solved.	<b>P1</b>	Make sense of problems and persevere in solving them.
		<b>P2</b>	Reason abstractly and quantitatively.
		<b>P3</b>	Construct viable arguments and critique the reasoning of others.
		<b>P4</b>	Model with mathematics.
		<b>P5</b>	Use appropriate tools strategically.
		<b>P6</b>	Attend to precision.
		<b>P7</b>	Look for and make use of structure.
		<b>P8</b>	Look for and express regularity in repeated reasoning.
<b>Essential Understandings</b>			
<b>SCS</b>	The learner will use functions to solve problems.	<u><a href="#">SCS.9 12.MA.2.03.b</a></u>	Interpret the constants, coefficients, and bases in the context of the problem.
<b>SCS</b>	The learner will use functions to solve problems.	<u><a href="#">SCS.9 12.MA.2.03</a></u>	Use power functions to model and solve problems; justify results.
<b>SCS</b>	The learner will use functions to solve problems.	<u><a href="#">SCS.9 12.MA.2.02.b</a></u>	Interpret the constants, coefficients, and bases in the context of the problem.
<b>CCSS</b>	The Real Number System	<u><a href="#">CCSS.9 12.MA.N.RN.CL1</a></u>	Extend the properties of exponents to rational exponents.
<b>CCSS</b>	The Real Number System	<u><a href="#">CCSS.9 12.MA.N.RN.1</a></u>	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.
<b>CCSS</b>	The Real Number System	<u><a href="#">CCSS.9 12.MA.N.RN.2</a></u>	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
<b>CCSS</b>	Write expressions in equivalent forms to solve problems	<u><a href="#">CCSS.9 12.MA.AL.A.SSE.3.c</a></u>	Use the properties of exponents to transform expressions for exponential functions. <i>For example the expression <math>1.15^t</math> 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>
<b>CCSS</b>	Analyze functions using	<u><a href="#">CCSS.9 12.MA.F.IF.7.e</a></u>	Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric

	different representations		functions, showing period, midline, and amplitude.	
CCSS	Analyze functions using different representations	<u><a href="#">CCSS.9 12.MA.F.IF.8.b</a></u>	Use the properties of exponents to interpret expressions for exponential functions. <i>For example, identify percent rate of change in functions such as <math>y = (1.02)^t</math>, <math>y = (0.97)^t</math>, <math>y = (1.01)^{12t}</math>, <math>y = (1.2)^{t/10}</math>, and classify them as representing exponential growth or decay.</i>	
CCSS		<u><a href="#">CCSS.9 12.MA.F.LE</a></u>	Linear, Quadratic, and Exponential Models★	
CCSS	Linear, Quadratic, and Exponential Models★	<u><a href="#">CCSS.9 12.MA.F.LE.CL1</a></u>	Construct and compare linear, quadratic, and exponential models and solve problems	
CCSS	Linear, Quadratic, and Exponential Models★	<u><a href="#">CCSS.9 12.MA.F.LE.1</a></u>	Distinguish between situations that can be modeled with linear functions and with exponential functions.	
CCSS	Construct and compare linear, quadratic, and exponential models and solve problems	<u><a href="#">CCSS.9 12.MA.F.LE.1.a</a></u>	Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.	
CCSS	Linear, Quadratic, and Exponential Models★	<u><a href="#">CCSS.9 12.MA.F.LE.2</a></u>	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).	
CCSS	Linear, Quadratic, and Exponential Models★	<u><a href="#">CCSS.9 12.MA.F.LE.3</a></u>	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.	
CCSS	Linear, Quadratic, and Exponential Models★	<u><a href="#">CCSS.9 12.MA.F.LE.4</a></u>	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.	
Learning Targets	<ul style="list-style-type: none"> <li>• Simplify and evaluate expressions containing rational and irrational exponents.</li> <li>• Use and graph exponential functions.</li> </ul>			
Essential Terminology	<ul style="list-style-type: none"> <li>• scientific notation</li> <li>• properties of exponents</li> <li>• rational exponents</li> <li>• irrational exponents</li> <li>• power function</li> <li>• exponential function</li> <li>• exponential decay</li> <li>• exponential growth</li> <li>• compound interest</li> </ul>			
Literacy Integration	Literacy Standards	Level	Standard	Standard Name
	Literature Connections			
Technology Integration	Technology Standards	Level	Standard	Standard Name
	Websites			
Assessment	Formative			
	Performance Tasks			

	<b>Summative</b>	
<b>Resources</b>		
<b>Learning Plan</b>	<b>Instructional Sequence</b>	<ul style="list-style-type: none"> <li>● Power Functions, Real Exponents (11-1)</li> <li>● Exponential Functions (11-2)</li> <li>● Modeling Real-world Data - Exponential (11-5)</li> <li>● Review</li> <li>● Assessment</li> </ul>
<b>Differentiation</b>	<b>Remediation</b>	
	<b>Enrichment</b>	