Precalculus Curriculum Bundle #3

Title	Suggested Dates
Exponential and logarithmic functions	October 5 – October 23 (14 days)

Big Idea/Enduring Understanding	Guiding Questions
• Exponential and logarithmic functions are inverses. • Exponential and logarithmic functions exhibit asymptotic behavior. • Properties of exponents and logarithms are related and can be used to simplify expressions and solve equations	1. Why are exponential and logarithmic functions similar and different? 2. How are the properties for exponents and logarithms similar and different? 3. What is the importance of being able to model data in more than one form? 4. What situations in the real world can be modeled by exponential and logarithmic functions?

The resources included here provide teaching examples and/or meaningful learning experiences to address the District Curriculum. In order to address the TEKS to the proper depth and complexity, teachers are encouraged to use resources to the degree that they are congruent with the TEKS and research-based best practices. Teaching using only the suggested resources does not guarantee student mastery of all standards. Teachers must use professional judgment to select among these and/or other resources to teach the District Curriculum.

Knowledge & Skills with Student Expectations	District Specificity/Examples	Suggested Resources (See note above)	
PSAT sample problems intended for use as warm-ups starting on Sept 17th can be found in the campus shared folder called "PSAT Math Preparation 2009-10"			
P.1 The student defines functions, describes characteristics of functions, and translates among verbal, numerical, graphical, and symbolic representations of functions, including polynomial, rational, power (including radical), exponential, logarithmic, trigonometric, and piecewise-defined functions. P.1A describe parent functions symbolically and graphically, including $f(x) = x^n$, $f(x) = \ln x$, $f(x) = \log_a x$, $f(x)$ $y = 1/x$, $f(x) = e^x$, $f(x) = a^x$, $f(x) = \sin x$, and $f(x) = \arcsin x$, etc. Note: This bundle includes exponential and logarithmic functions only.	• Graph the parent function on a graphing calculator. • Graph the parent functions without a calculator using a table of values. • Derive a function from a table of values using the statistical function of a graphing calculator. • Recognize parent functions from values displayed in a table or a graph. • Recognize parent functions from equations.	**PreCalculus With Limits** Houghton Mifflin Company / Larson – Hostetler Section 3.1 Exponential Functions and Their Graphs Section 3.2 Logarithmic Functions and Their Graphs	**Laying the Foundation Connecting PreCalculus to Advanced Placement Mathematics** Advanced Placement Strategies, Inc. "E"xponential Growth pg. 248 – 251 Curvilinear Data – Activity 1 pg. 256 – 258 Curvilinear Data – Activity 2 pg. 265 – 267 **Navigating through Maesurement in Grades 9-12** NCTM

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			Starbucks Expansion pg. 73-75
P.1 The student defines functions, describes characteristics of functions, and translates among verbal, numerical, graphical, and symbolic representations of functions, including polynomial, rational, power (including radical), exponential, logarithmic, trigonometric, and piecewise-defined functions. P.1B determine the domain and range of functions using graphs, tables, and symbols.	• Modify the domain and range of an algebraic relation/function in the context of a given problem situation. • Connect domain and range with the concept of independent and dependent variables. • Describe domain and arrange with inequality notation, set notation, interval notation, and verbal descriptions. • Compare the domain and range of a transformed function and its parent. • Determine the domain and range from a graph. • Determine the domain and range from given data.	**PreCalculus With Limits** Houghton Mifflin Company / Larson – Hostetler Section 3.3 Properties of Logarithms Appendix A.2 Exponents and Radicals	**Laying the Foundation Connecting PreCalculus to Advanced Placement Mathematics** Advanced Placement Strategies, Inc. Logistic and Comperts Curves pg. 270 - 274
P.1 The student defines functions, describes characteristics of functions, and translates among verbal, numerical, graphical, and symbolic representations of functions, including polynomial, rational, power (including radical), exponential, logarithmic, trigonometric, and piecewise-defined functions. P.1D recognize and use connections among significant values of a function (zeros, maximum values, and minimum values, etc.), points on the graph of a function, and the symbolic representation of a function.		**PreCalculus With Limits** Houghton Mifflin Company / Larson – Hostetler Section 3.4 Exponential and Logarithmic Equations Section 3.5 Exponential and Logarithmic Models	
P.1 The student defines functions, describes characteristics of functions, and translates among verbal, numerical, graphical, and symbolic representations of functions, including polynomial, rational, power (including radical), exponential, logarithmic, trigonometric, and piecewise-defined functions. P.1E investigate the concepts of continuity, end behavior, asymptotes, and limits and connect these characteristics to functions represented graphically and numerically.		**PreCalculus With Limits** Houghton Mifflin Company / Larson – Hostetler Section 3.1 Exponential Functions and Their Graphs Section 3.2 Logarithmic Functions and Their Graphs	

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P.2 The student interprets the meaning of the symbolic representations of functions and operations on functions within a context. P.2A apply basic transformations, including a • *f*(x), *f*(x) + d, *f*(x - c), *f*(b • x), and composites with absolute value functions, including |*f*(x)|, *f*(|x|), to the parent functions.	• Examine the change in ordered pairs when discussing transformations. • Recognize algebraic transformations including vertical and horizontal translations (shifts), horizontal stretches/shrinks, vertical stretches/shrinks, or any combination. • Graph functions using transformations.	**PreCalculus With Limits** Houghton Mifflin Company / Larson – Hostetler Section 3.1 Exponential Functions and Their Graphs Section 3.2 Logarithmic Functions and Their Graphs	
P.2 The student interprets the meaning of the symbolic representations of functions and operations on functions within a context. P.2B perform operations including composition on functions, find inverses, and describe these procedures and results verbally, numerically, symbolically, and graphically.	• Graph an inverse by exchanging the coordinates of the points. • Compare domain and ranges of the function and its inverse. • Find inverse of functions algebraically. • Compare graphs of functions and inverse as a reflection over y = x. • Discuss the difference between inverses and reciprocals. • Define one-to-one correspondence and connect the concept to the graph of a function and its inverse (horizontal line test). • Discuss if the inverse is a relation or a function and why. • Determine if f(x) and g(x) are inverse functions by proving algebraically that f(g(x)) = g(f(x)) = x.	**PreCalculus With Limits** Houghton Mifflin Company / Larson – Hostetler Section 3.1 Exponential Functions and Their Graphs Section 3.2 Logarithmic Functions and Their Graphs Section 3.4 Exponential and Logarithmic Equations	
P.2 The student interprets the meaning of the symbolic representations of functions and operations on functions within a context. P.2C investigate identities graphically and verify them symbolically, including logarithmic properties, trigonometric identities, and exponential properties.		**PreCalculus With Limits** Houghton Mifflin Company / Larson – Hostetler Section 3.3 Properties of Logarithms Appendix A.2 Exponents and Radicals	
P.3 The student uses functions and their properties, tools and technology to model and solve meaningful problems. P.3B use functions such as logarithmic, exponential, trigonometric, polynomial, etc. to model real-life data.	• Positive growth models (including compound interest and continuous compound interest). • Negative growth models (including half-life and depreciation).	**PreCalculus With Limits** Houghton Mifflin Company / Larson – Hostetler Section 3.5 Exponential and Logarithmic Models	

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P.3 The student uses functions and their properties, tools and technology to model and solve meaningful problems. P.3D use properties of functions to analyze and solve problems and make predictions.	Including but not limited to • Use regression models to predict values between gathered points (interpolation) and outside of gathered points (extrapolation). • Connect equations to problem situations. • Connect the solution to an equation to a graphical solution.	**PreCalculus With Limits** Houghton Mifflin Company / Larson – Hostetler Section 3.1 Exponential Functions and Their Graphs Section 3.2 Logarithmic Functions and Their Graphs Section 3.3 Properties of Logarithms Section 3.4 Exponential and Logarithmic Equations Section 3.5 Exponential and Logarithmic Models	