


Precalculus Curriculum Bundle #1

Title	Suggested Dates
Polynomial, linear, and square root functions	 August 25 – September 11 (13 Days)

Big Idea/Enduring Understanding	Guiding Questions
<ul style="list-style-type: none"> All functions have a parent. Even and odd functions involve symmetry. Functions can be represented by graphs, tables and symbols. Transformations involve vertical and horizontal shifting, stretching and compression. The number of roots of a polynomial function is related to its degree. Some functions require restrictions on their domain. 	<ol style="list-style-type: none"> 1. What is a function? 2. What methods can be used to find the domain and range of functions? 3. What conclusion can be drawn from a function or equation? 4. How can models of a function be used to make predictions in a real world situation? 5. How is the number of roots related to the degree of a polynomial function?

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)	
<p>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> <p>P.1A describe parent functions symbolically and graphically, including $f(x) = x^n$, $f(x) = \ln x$, $f(x) = \log_a x$, $f(x) = 1/x$, $f(x) = e^x$, $f(x) = a^x$, $f(x) = \sin x$, and $f(x) = \arcsin x$, etc.</p> <p><i>Note: This bundle includes polynomial, linear, and square root functions only.</i></p>	<ul style="list-style-type: none"> 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. 	<p>PreCalculus with Limits Houghton Mifflin Company/ Larson – Hostetler</p> <p>Section 1.4 Functions</p> <p>Section 1.5 Analyzing graphs of Functions</p> <p>Section 1.6 Library of Functions</p> <p>Appendix 3 Polynomials and Factoring</p> <p>Appendix 4 Rational Expressions</p>	<p>Laying the Foundation Connecting PreCalculus to Advanced Placement Mathematics Advanced Placement Strategies, Inc.</p> <p>A Generic Function Pg. 34 – 38</p> <p>Piecewise Function Pg. 42 – 44</p> <p>Gallery: Maths Online Will illustrate various functions and can be used in other bundles.</p> <p>John Eaton's Website Scroll to bottom of main page to see Precalculus link. Includes</p>

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			links to various websites, applets, and activities listed by topic. Can be used in other bundles.
<p>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> <p>P.1B determine the domain and range of functions using graphs, tables, and symbols.</p>	<ul style="list-style-type: none"> • 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. 	<p>PreCalculus with Limits Houghton Mifflin Company/ Larson – Hostetler</p> <p>Section 1.4 Functions</p> <p>Section 1.7 Transformations of Functions</p> <p>Section 1.8 Combinations of Functions: Composite Functions</p>	
<p>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> <p>P.1C describe symmetry of graphs of even and odd functions.</p>	<ul style="list-style-type: none"> • Verify symmetry using algebraic procedures. • Discuss the two types of geometric symmetry (rotation symmetry and reflection symmetry). 	<p>PreCalculus with Limits Houghton Mifflin Company/ Larson – Hostetler</p> <p>Section 1.5 Analyzing Graphs of Functions</p>	
<p>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> <p>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.</p>		<p>PreCalculus with Limits Houghton Mifflin Company/ Larson – Hostetler</p> <p>Section 1.4 Functions</p> <p>Section 1.5 Analyzing Graphs of Functions</p>	

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<p>P.2 The student interprets the meaning of the symbolic representations of functions and operations on functions within a context.</p> <p>P.2A apply basic transformations, including $a \cdot f(x)$, $f(x) + d$, $f(x - c)$, $f(b \cdot x)$, and composites with absolute value functions, including $f(x)$, $f(x)$, to the parent functions.</p>	<ul style="list-style-type: none"> • 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. 	<p>PreCalculus with Limits Houghton Mifflin Company/ Larson – Hostetler</p> <p>Section 1.7 Transformations of Functions</p>	
<p>P.2 The student interprets the meaning of the symbolic representations of functions and operations on functions within a context.</p> <p>P.2B perform operations including composition on functions, find inverses, and describe these procedures and results verbally, numerically, symbolically, and graphically.</p>	<ul style="list-style-type: none"> • Discuss a function as a composition of two or more functions. For example, decompose $f(x) = 3(x - 2)^2$ to $g(x) = 3x^2$ and $h(x) = x - 2$ where $g(h(x)) = f(x)$. • 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 $f(g(x)) = g(f(x)) = x$. 	<p>PreCalculus with Limits Houghton Mifflin Company/ Larson – Hostetler</p> <p>Section 1.8 Combinations of Functions: Composite Functions</p> <p>Section 1.9 Inverse Functions</p>	
<p>P.3 The student uses functions and their properties, tools and technology to model and solve meaningful problems.</p> <p>P.3A Investigate properties of trigonometric and polynomial functions.</p>	<ul style="list-style-type: none"> • Find roots using long division, synthetic division and calculator. • Find the roots (zeros, x-intercepts) by graphing the polynomial. • Confirm the values are roots by using synthetic division and the remainder theorem. • Using the roots and synthetic division to factor a polynomial in order to find irrational and imaginary roots. • Factor polynomial expressions and functions. 	<p>PreCalculus with Limits Houghton Mifflin Company/ Larson – Hostetler</p> <p>Section 2.1 Quadratic Functions and Models</p> <p>Section 2.2 Polynomial Functions of Higher Degree</p> <p>Section 2.3 Polynomial and Synthetic Division</p>	

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		Section 2.5 Zeros of Polynomial Functions Appendix 4 Factoring	
<p>P.3 The student uses functions and their properties, tools and technology to model and solve meaningful problems.</p> <p>P.3B use functions such as logarithmic, exponential, trigonometric, polynomial, etc. to model real-life data.</p>	<ul style="list-style-type: none"> Linear motion including position, velocity, and acceleration. 	<p>PreCalculus with Limits Houghton Mifflin Company/ Larson – Hostetler</p> <p>Section 2.1 Quadratic Functions and Models</p> <p>Section 2.2 Polynomial Functions of Higher Degree</p> <p>Section 2.3 Polynomial and Synthetic Division</p> <p>Section 2.5 Zeros of Polynomial Functions</p>	
<p>P.3 The student uses functions and their properties, tools and technology to model and solve meaningful problems.</p> <p>P.3C use regression to determine the appropriateness of a linear function to model real-life data (including using technology to determine the correlation coefficient).</p>		<p>PreCalculus with Limits Houghton Mifflin Company/ Larson – Hostetler</p> <p>Section 1.3 Linear Equations in Two Variables</p>	
<p>P.3 The student uses functions and their properties, tools and technology to model and solve meaningful problems.</p> <p>P.3D use properties of functions to analyze and solve problems and make predictions.</p>	<ul style="list-style-type: none"> Use linear 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. Linear motion including position, velocity, and acceleration. 	<p>PreCalculus with Limits Houghton Mifflin Company/ Larson – Hostetler</p> <p>Section 1.3 Linear Equations in Two Variables</p>	