Precalculus Curriculum Bundle #2

Title	Suggested Dates
Rational Functions	September 14 – October 2 (14 days)

Big Idea/Enduring Understanding	Guiding Questions
• A function can be continuous at some points and not at others. A function is generally said to be discontinuous if there is any point of discontinuity. • When determining domain and range of a rational function, restrictions (causing such things as vertical asymptotes and holes) may need to be considered. • Patterns in end behavior of rational functions can be used to quickly sketch graphs of functions or to quickly identify characteristics of rational functions from graphs. • Rational functions may have a limit and may not	1. Why is the domain and/ or range of a rational function restricted? 2. What are the characteristics of a continuous function? 3. What determines end behavior? 4. What is the purpose of (RA)²TEY?

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 $f(x) = x^n$, $f(x) = \ln x$, $f(x) = \log_a x$, $f(x) = 1/x$, $f(x) = e^x$, $f(x) = a^x$, $f(x) = \sin x$, and $f(x) = \arcsin x$, etc. Note: This bundle completes polynomial, linear and square root functions and begins rational functions.	• 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. • Factor polynomial and rational expressions and functions.	**PreCalculus with Limits** Houghton Mifflin Company/ Larson – Hostetler Section 1.4 Functions Section 1.5 Analyzing graphs of Functions Section 1.6 Library of Functions Appendix A.4 Rational Expressions Section 2.6 Rational Functions	**Laying the Foundation Connecting PreCalculus to Advanced Placement Mathematics** Advanced Placement Strategies, Inc. Rational Functions and their Asymptotes Pg. 76 – 78 Horizontal, Slant, and Oblique Asymptotes Pg. 82 – 88 (RA)²TEY – A Graphing

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		Appendix 3 Polynomials and Factoring Appendix 4 Rational Expressions	Organizer Pg. 96 – 102
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 2.6 Rational Functions	
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.1C describe symmetry of graphs of even and odd functions.	• Verify symmetry using algebraic procedures. • Discuss the two types of geometric symmetry (rotation symmetry and reflection symmetry).	**PreCalculus with Limits** Houghton Mifflin Company/ Larson – Hostetler Section 2.6 Rational Functions	
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 2.6 Rational Functions	

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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 2.2 Polynomial Functions of Higher Degree Section 2.6 Rational Functions	
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 • Trigonometric transformations: amplitude (vertical stretch/shrink), period (horizontal stretch/shrink), phase shift (horizontal translation), vertical shift.	**PreCalculus with Limits** Houghton Mifflin Company/ Larson – Hostetler Section 2.6 Rational Functions	
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.	• 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	**PreCalculus with Limits** Houghton Mifflin Company/ Larson – Hostetler Section 2.6 Rational Functions	

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	by proving algebraically that f(g(x)) = g(f(x)) = x.		
P.3 The student uses functions and their properties, tools and technology to model and solve meaningful problems. P.3A Investigate properties of trigonometric and polynomial functions.	• 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.	**PreCalculus with Limits** Houghton Mifflin Company/ Larson – Hostetler Section 2.6 Rational Functions	
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.	• Linear motion including position, velocity, and acceleration.	**PreCalculus with Limits** Houghton Mifflin Company/ Larson – Hostetler Section 2.1 Quadratic Functions and Models Section 2.2 Polynomial Functions of Higher Degree Section 2.3 Polynomial and Synthetic Division Section 2.5 Zeros of Polynomial Functions	
P.3 The student uses functions and their properties, tools and technology to model and solve meaningful problems. 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).		**PreCalculus with Limits** Houghton Mifflin Company/ Larson – Hostetler Section 1.3 Linear Equations in Two Variables	
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.	• 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.	**PreCalculus with Limits** Houghton Mifflin Company/ Larson – Hostetler Section 1.3 Linear Equations in Two Variables	