

## HPISD Curriculum: Pre Calculus Pre-AP

Title		Estimated Duration	6 Weeks					
Unit 8: Rational Functions		14 days	1	2	3	<b>4</b>	5	6
<b>Unit Overview</b>								
Rational Functions								
<b>Generalizations/Enduring Understandings</b>								
The student will understand that:	<ul style="list-style-type: none"> <li>• A rational function is the quotient of two polynomial functions.</li> <li>• Partial fraction decomposition is a technique used to break down a rational function into smaller pieces.</li> <li>• The derivative of <math>f(x)</math> can be used for determining the behavior of <math>f(x)</math>.</li> </ul>							
<b>Concepts</b>		<b>Guiding/Essential Questions</b>						
<ul style="list-style-type: none"> <li>• Rationals</li> <li>• Limits</li> </ul>		<ul style="list-style-type: none"> <li>• How are asymptotes determined for rational functions?</li> <li>• How are partial fractions created?</li> <li>• How can the derivative of <math>f(x)</math> determine behavior of <math>f(x)</math>?</li> </ul>						
<b>Learning Targets</b>								
<ul style="list-style-type: none"> <li>• Students will determine and calculate asymptotes of rational functions.</li> <li>• Students will graph rational functions.</li> <li>• Students will formulate the partial fraction decomposition of rational functions.</li> <li>• Students will use the derivative of <math>f(x)</math> to determine behavior of <math>f(x)</math>.</li> </ul>								
<b>Formative Assessments</b>					<b>Summative Assessments</b>			

<b>TEKS:</b>	<b>Processes and Skills:</b> <b>What students should be able to DO</b>	<b>Facts:</b> <b>What students should KNOW</b>
<p>Graph exponential, logarithmic, rational, polynomial, power, trigonometric, inverse trigonometric and piecewise defined functions, including step functions. <b>P.2.F</b></p> <p>Graph functions, including exponential, logarithmic, sine, cosine, rational, polynomial, and power functions and their transformations, including <math>af(x)</math>, <math>f(x)+d</math>, <math>f(x-c)</math>, <math>f(bx)</math> for specific values of <math>a</math>, <math>b</math>, <math>c</math>, and <math>d</math>, in mathematical and real-world problems. <b>P.2.G</b></p> <p>Determine and analyze the key features of exponential, logarithmic, rational, polynomial, power, trigonometric, inverse trigonometric, and piecewise defined functions, including step functions such as domain, range, symmetry, relative maximum, relative minimum, zeros, asymptotes, and intervals over which the function is increasing or decreasing. <b>P.2.I</b></p> <p>Analyze and describe end behavior of functions, including exponential, logarithmic, rational, polynomial, and power functions using infinity notation to communicate this characteristic in mathematical and real-world problems. <b>P.2.J</b></p> <p>Analyze characteristics of rational functions and the behavior of the function around the asymptotes, including horizontal, vertical, and oblique asymptotes. <b>P.2.K</b></p> <p>Determine various types of discontinuities in the interval <math>(-\infty, \infty)</math> as they relate to functions such as rational and piecewise defined functions and explore the limitations of the graphing calculator as it relates to the behavior of the function around discontinuities. <b>P.2.L</b></p> <p>Describe the left-sided behavior and the right-sided behavior of the graph of a function around discontinuities. <b>P.2.M</b></p>	<ul style="list-style-type: none"> <li>• Graph rationals and their asymptotes.</li> <li>• Solve rational inequalities.</li> <li>• Formulate a partial fraction decomposition.</li> <li>• Determine the behavior of <math>f(x)</math> from the derivative of <math>f(x)</math>.</li> </ul>	<ul style="list-style-type: none"> <li>• A slant asymptote of a rational function occurs when the degree of the numerator is one greater than the degree of the denominator.</li> <li>• Sign analysis is required to solve a rational inequality.</li> <li>• When formulating a partial fraction decomposition, the numerator of the partial fraction depends on whether the denominator is a linear or irreducible quadratic factor.</li> </ul>

Analyze situations modeled by functions, including exponential, logarithmic, rational, polynomial, and power functions, to solve real-world problems such as problems involving growth and decay and optimization. <b>P.2.N</b>		
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<b>Topics</b>
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Rational Functions
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<b>Language of Instruction</b>
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<b>State Assessment Connections</b>	<b>National Assessment Connections</b>
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<b>Resources</b>
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