



Pre-College Algebra & Trigonometry - Unit 5 - Rational Functions

Unit Focus

The main goals of this unit include improving students' fluency with rational expressions - understanding difference between expressions and equations and the strategies/approaches we can use to simplify each. Students will build confidence to handle more complex math problems they will encounter in future math classes. Students will make connections between equations and graphs in terms of asymptotes and domain and limits.

Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer	
Common Core Mathematics: 9-12 - Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system. (CCSS.MATH.CONTENT.HSA.APR.D.6) - Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions. (CCSS.MATH.CONTENT.HSA.APR.D.7) - Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. (CCSS.MATH.CONTENT.HSF.IF.C.7.D) - Make sense of problems and persevere in solving them. (CCSS.MATH.MP.1) - Reason abstractly and quantitatively. (CCSS.MATH.MP.2) - Construct viable arguments and critique the reasoning of others. (CCSS.MATH.MP.3) - Attend to precision. (CCSS.MATH.MP.6) - Look for and make use of structure. (CCSS.MATH.MP.7) Madison Public Schools Profile of a Graduate - Analyzing: Examining information/data/ evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. (POG.1.2)	<i>Students will be able to independently use their learning to...</i> T1 manipulate equations/expressions or objects to create order and establish relationships. T2 draw conclusions about graphs, shapes, equations, or objects. T3 demonstrate fluency with math facts, computation and concepts. T4 use appropriate tools to make reaching solutions more efficient, accessible and accurate.	
	Meaning	
	Understanding(s)	Essential Question(s)
	<i>Students will understand that...</i> U1 Mathematicians represent and analyze mathematical situations and structures using algebraic symbols to communicate thinking. U2 Mathematicians use numbers, ways of representing numbers, relationships among numbers, and number systems to build meaning. U3 Mathematicians flexibly use different tools, strategies, and operations to build conceptual knowledge or solve problems. U4 Mathematicians continually evaluate their process and the reasonableness of the intermediate results.	<i>Students will keep considering...</i> Q1 How can I break a problem down into manageable parts? Q2 What is another way that this problem could be solved? Q3 What math tools/models/ strategies can I use to solve the problem? Q4 How do I think about what is equal and not equal?
	Acquisition of Knowledge and Skill	
	Knowledge	Skill(s)
	<i>Students will know...</i> K1 The only thing you can do to a fraction (and not change its value) is to multiply by ONE K2 Only FACTORS can divide out to one	<i>Students will be skilled at...</i> S1 simplifying rational expressions S2 solving rational equations S3 finding the domain of a function

Stage 1: Desired Results - Key Understandings

- Collective Intelligence: Working respectfully and responsibly with others, exchanging and evaluating ideas to achieve a common objective. (POG.3.1)

K3 Addition/Subtraction requires common denominator because different order of operation
K4 Vertical asymptotes arise from domain restrictions
K5 Other asymptotes arise from quotient of long division
K6 Vocabulary: factor, term, cancel, complex fraction, extraneous solution, domain, asymptote

S4 determining asymptotes of rational functions
S5 graphing rational functions