

## Meaningful Operations with Rational Expressions through Analogical Reasoning

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### Synopsis

How many times have we heard, “I can’t do fractions?” Middle and high school teachers and college professors have observed weaknesses in students’ ability to operate on rational numbers for decades. This curriculum unit addresses three major sources of errors – vocabulary/terminology, operations with rational numbers, and the connection between rational numbers and rational expressions. My goal is to eliminate errors from inappropriate operations on *factors* and *terms* and from use of the word *cancel* as a valid operation.

I wrote this curriculum unit for my Pre-calculus students, but it is also appropriate for Algebra students. The keyword in the CCSS HSA.APR.D.7 standard that connects this curriculum unit to my seminar “Mathematical Proof and Reasoning” is the word *analogous*. In this unit, students will very deliberately compare operations with rational expressions to analogous operations with rational numbers to evaluate the validity of each step. The activities make use of Analogical Reasoning to justify operations and procedures. Students will produce side-by-side comparisons of operations on rational expressions versus rational numbers. At the end of the unit, I expect students to have improved number sense from a greater comfort level with rational numbers, as well as more confidence with algebraic manipulations.