Unpacked South Dakota State Mathematics Standards

Purpose: *In order for students to have the best chance of success, standards, assessment, curriculum resources, and instruction must be aligned in focus, coherence, and rigor. Unpacked standards documents are intended to help align instruction to the focus, coherence, and rigor of the South Dakota State Mathematics Standards. The standards have been organized in clusters as they are not so much built from topics, but rather woven out of progressions. Not all content in a given grade is emphasized equally in the mathematics standards. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. To say that some things have greater emphasis is not to say that anything in the standards can safely be neglected in instruction. Neglecting standards will leave gaps in student skill and understanding and may leave students unprepared for the challenges of a later grade.*

Domain: Algebra		**Grade Level: 4th Year**
HS4.A.APR.B Cluster: Rewrite rational expressions Students see how the structure of arithmetic is also used when working with rational expressions.		
This is a MAJOR cluster. *Students should spend the large majority of their time (65-85%) on the major work of the grade. Supporting work and, where appropriate, additional work should be connected to and engage students in the major work of the grade.* **A.APR.7** Discover 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.		
Aspects of Rigor of Student Learning: (Conceptual, Procedural, and/or Application)		
A.APR.7 Discover 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.		
Conceptual Understanding	***Procedural Fluency***	***Application***
Enable learners to see the similarities when adding, subtracting, and multiplying rational numbers to doing the same with rational expressions. Learners explain closure and explain why rational expressions are closed under addition, subtraction, multiplication, and division.	Learners will add, subtract, multiply, and divide rational expressions and explain their work.	
Enacting the Mathematical Practices - Evidence of Students Engaging in the Practices		
1. **Make sense of problems and persevere in solving them.** 2. **Reason abstractly and quantitatively.** 3. **Construct viable arguments and critique the reasoning of others.** 4. **Model with mathematics.** 5. **Use appropriate tools strategically.** 6. **Attend to precision.** 7. **Look for and make use of structure.** ● Students see how the structure of arithmetic is also used when working with rational expressions.		

8. Look for and express regularity in repeated reasoning.

Vertical and Horizontal Coherence and Learning Progressions

Previous Learning Connections	***Current Learning Connections***	***Future Learning Connections***
Explain how operations with integers is analogous to operations with polynomials. Concept of closure	Work with rational expressions, understand computation with rational expressions	Precalculus, calculus, finding limits, finding local extrema

Vocabulary (key terms and definitions)

- Rational expression
- Closure

Relevance, Explanations, and Examples:

For example, ½ + ⅓ works the same way as 1/(x+2) + 1/(x+3).
Adding two rational expressions will result in a rational expression describes closure under addition.