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.*

<table>
<tr><td colspan="2">Domain: Algebra</td><td>Grade Level: Algebra 2</td></tr>
<tr><td colspan="3">A2.A.APR.B Cluster: Rewrite Rational Expressions

Manipulating rational expressions enables learners to explore equivalent forms that help students analyze functions and their graphs.</td></tr>
<tr><td colspan="3">**This is a SUPPORTING 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.

A2.A.APR.B.6 Rewrite simple rational expressions in different forms; using inspection, synthetic division, long division, box method or, for the more complicated examples, a computer algebra system.</td></tr>
<tr><td colspan="3">Aspects of Rigor for Students: (Conceptual, Procedural, and/or Application)</td></tr>
<tr><td colspan="3">A2.A.APR.B.6 Rewrite simple rational expressions in different forms; using inspection, synthetic division, long division, box method or, for the more complicated examples, a computer algebra system.</td></tr>
<tr><td>Conceptual Understanding</td><td>Procedural Fluency</td><td>Application</td></tr>
<tr><td>Learners understand why they need to rewrite an expression and recognize which method is appropriate in order to simplify a rational expression.</td><td>Learners will be able to:
● factor in a variety of ways
● use long division
● use synthetic division
● read a graph</td><td></td></tr>
<tr><td colspan="3">Enacting the Mathematical Practices - Evidence of Students Engaging in the Practices</td></tr>
<tr><td colspan="3">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.
● Students will be able to explain the steps in creating equivalent forms of rational expressions, including identifying the quotient and the remainder as a fraction with the divisor as the denominator.
4. Model with mathematics.
5. Use appropriate tools strategically.
● Students will recognize which method is appropriate to use in a variety of situations.
6. Attend to precision.
7. Look for and make use of structure.
● Students will gain procedural fluency and conceptual understanding of how and why to rewrite rational expressions as quotients and remainders.
8. Look for and express regularity in repeated reasoning.</td></tr>
<tr><td colspan="3">Vertical and Horizontal Coherence and Learning Progressions</td></tr>
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Previous Learning Connections	***Current Learning Connections***	***Future Learning Connections***
Students are building on their knowledge of factors of quadratics learned in Algebra 1.	*Students will use the skills learned to factor and divide polynomials to simplify rational expressions.*	*Students will be able to perform all operations with rational expressions.*

Vocabulary (key terms and definitions)

- Rational expressions

Relevance, Explanations, and Examples:

Examples:

$$\frac{x^2+1}{x} = x + \frac{1}{x}$$

$$\frac{x^4-1}{(x-1)(x+3)} = \frac{(x^2+1)(x+1)(x-1)}{(x-1)(x+3)} = \frac{(x^2+1)(x+1)}{x+3}$$

Achievement Level Descriptors

Cluster: Rewrite rational expressions

Concepts and Procedures	***Level 1:*** Students should be able to base arguments on concrete referents such as objects, drawings, diagrams, and actions and identify obvious flawed arguments in familiar contexts.
	Level 2: Students should be able to find and identify the flaw in an argument by using examples or particular cases. Students should be able to break a familiar argument given in a highly scaffolded situation into cases to determine when the argument does or does not hold.
	Level 3: Students should be able to use stated assumptions, definitions, and previously established results and examples to test and support their reasoning or to identify, explain, and repair the flaw in an argument. Students should be able to break an argument into cases to determine when the argument does or does not hold.
	Level 4: Students should be able to use stated assumptions, definitions, and previously established results to support their reasoning or repair and explain the flaw in an argument. They should be able to construct a chain of logic to justify or refute a proposition or conjecture and to determine the conditions under which an argument does or does not apply.