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: Expressions and Equations</td><td>Grade Level: 7th</td></tr>
<tr><td colspan="3">7.EE.A Cluster: Use properties of operations to generate equivalent expressions.

Students apply properties of operations to add, subtract, factor and expand linear equations with rational coefficients. Students then become able to rewrite expressions in different forms to solve a multi-step problem, explain the quantities and graph a solution.</td></tr>
<tr><td colspan="3">**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.

7.EE.1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients to include multiple grouping symbols (parentheses, brackets, and/or braces).

7.EE.2. Understand the reason for rewriting an expression in different forms in contextual problems is to provide multiple ways of interpreting the problem, and how the quantities in it are related. For example, a + 0.05a=1.05a means that increase by 5% is the same as "multiply by 1.05".</td></tr>
<tr><td colspan="3">Aspects of Rigor for Student Learning:(Conceptual, Procedural, and/or Application)</td></tr>
<tr><td>Conceptual Understanding</td><td>Procedural Fluency</td><td>Application</td></tr>
<tr><td>Expand understanding of properties of operations (commutative, associative, identity, distributive) to include rational numbers (fractions, negative integers). (7.EE.1)</td><td>Use conventions about the order of operations to create equivalent expressions, including adding, subtracting, factoring, and expanding linear expressions. (7.EE.1)

Combine like terms with rational coefficients. (7.EE.1)</td><td></td></tr>
<tr><td>Generate multiple equivalent algebraic expressions from a visual model or expression. (7.EE.2)</td><td></td><td>Recognize and explain the meaning of a given expression and its component parts in terms of a context. (7.EE.2)</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.
● Students create equations and inequalities based on real-world descriptions.
● Students solve a variety of multi-step problems.
2. Reason abstractly and quantitatively.</td></tr>
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- Students model equivalent expressions that are represented in a variety of forms (e.g. fractions, percents and decimals).
- Students solve problems by reasoning about equations and inequalities.

3. **Construct viable arguments and critique the reasoning of others.**
   - Students will use appropriate estimation strategies to justify that the solution is reasonable.
   - Students will explain the meaning of a given expression and its component parts in terms of a context.
4. **Model with mathematics.**
   - Students model equations and expressions using manipulatives and algebraic symbols**.**
   - Students model the solutions to inequalities using number lines.
5. **Use appropriate tools strategically.**
   - An optional tool would be to use online resources that allow students to solve equations using visual models.
6. **Attend to precision.**
   - Students will have a number of opportunities to round appropriately.
   - Students justify their reasoning using precise mathematical vocabulary
   - Students determine the reasonableness of answers based on estimation strategies..
7. **Look for and make use of structure.**
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***
In 6th grade, learners extend their knowledge of creating equivalent expressions to include situations in which a knowledge of the rules of integers are needed. In 6th grade, learners extend their understanding of repeated addition as multiplication (representing 3 + 3 + 3 + 3 as 4 x 3), to simplifying variable expressions (j+ j+ j+ j) be written as 4j. In 6th grade, using order of operations, learners broaden their work solving equations and inequalities to include those with more than one step, as well as those with negative coefficients.	In 7th grade, learners will develop an understanding of operations with rational numbers when working with expressions and linear equations. In 7th grade, learners will apply knowledge of working with expressions and equations to solve problems involving scale drawings and informal geometric constructions, and work with two- and three-dimensional shapes to solve problems involving area, surface area, and volume. In 7th grade, learners will use vertical angles, adjacent angles, angles on a line, and angles at a point in a multi-step problem to write and solve equations for an unknown angle in a figure.	In 8th grade, learners will solve linear equations in one variable. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms In 8th grade, learners will use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.

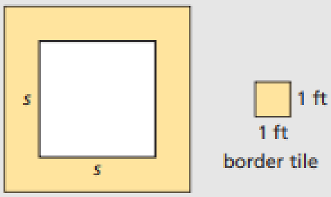
Vocabulary *(Key Terms Used by Teachers and Students in this Cluster):*

- Terms
- Coefficient
- Like terms
- Distribute
- Expression
- Simplify
- Expand
- Factor
- Rational numbers
- Linear expression
- Equivalent expressions
- Variable
- Distributive property
- Commutative property
- Associative property

Relevance, Explanations, and Examples:

Example for 7.EE.2

Writing expressions in different forms



In expressing the number of tiles needed to border a square pool with side length s feet (where s is a whole number), students might write $4(s+1)$, $s+s+s+s+4$, or $2s+2(s+2)$, each indicating a different way of breaking up the border in order to perform the calculation. They should see all these expressions as equivalent.

Achievement Level Descriptors

Cluster: **Use properties of operations to generate equivalent expressions.**

Concepts and Procedures	**Level 1:** Level 1 students should be able to apply properties of operations as strategies to add and subtract linear expressions with integer coefficients.
	Level 2: Level 2 students should be able to apply properties of operations as strategies to factor and expand linear expressions with integer coefficients. They should also be able to add and subtract linear expressions with rational coefficients.
	Level 3: Level 3 students should be able to apply properties of operations as strategies to factor and expand linear expressions with rational coefficients. They should understand that rewriting an expression can shed light on how quantities are related in a familiar problem solving context with minimal scaffolding**.**
	Level 4: Level 4 students should understand that rewriting an expression can shed light on how quantities are related in an unfamiliar problem-solving context with no scaffolding.