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: Number System	Grade Level: 6

6.NS.B Cluster: Compute fluently with multi-digit numbers and find common factors and multiples.

Students will continue their previous understanding of adding, subtracting, multiplying, and dividing to fluently use algorithms to solve problems. They will also work with finding GCF to begin the early stages of factoring.

This is an ADDITIONAL 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.*

6.NS.2 Fluently divide multi-digit numbers using an algorithm including but not limited to the standard algorithm.

6.NS.3 Fluently add, subtract, multiply, and divide multi-digit decimals using an algorithm including but not limited to the standard algorithm for each operation.

6.NS.4 Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.

Aspects of Rigor for Students: (Conceptual, Procedural, and/or Application)

Conceptual Understanding	*Procedural Fluency*	*Application*
	Fluently divide multi-digit numbers. **(6.NS.2)**	
	Fluently add, subtract, multiply and divide multi-digit decimals. **(6.NS.3)**	
	Find the GCF of two whole numbers less than or equal to 100. **(6.NS.4)** Find the LCM of two whole numbers less than or equal to 12. **(6.NS.4)** Use the distributive property to express a sum of two whole numbers (1-100) with a common factor as a multiple of a sum of two whole numbers with no common factor (e.g. $50 + 10 = 10(5 + 1)$). **(6.NS.4)**	

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.**
   - Students communicate precisely with others and use clear mathematical language when discussing the algorithms
7. **Look for and make use of structure.**
   - Apply division algorithms to divide multi-digit numbers.
   - Use tree diagrams and venn diagrams to show LCM and GCF
8. **Look for and express regularity in repeated reasoning.**
   - Consider the reasonableness of an estimated quotient.

Vertical and Horizontal Coherence and Learning Progressions

Previous Learning Connections	*Current Learning Connections*	*Future Learning Connections*
In Grade 3, learners understand division as an unknown-factor problem. For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8 **AND** interpret whole-number quotients of whole numbers e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8. In Grade 4, learners find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors In Grade 5, learners write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product. In Grade 5, learners find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value	The conceptual understanding of the distributive property comes in **6.EE.A.**	In Grade 7 learners apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. In Grade 7, learners solve real-world and mathematical problems involving the four operations with rational numbers. In high school, learners continue to use the distributive property to express a sum of two whole numbers with a common factor as a multiple of a sum of two whole numbers with no common factor as they learn factorization.

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

● Numerator ● Denominator ● Reciprocal ● Quotient ● Multiplicative Inverse ● Division	● Dividend ● Divisor ● Quotient ● Algorithm ● Estimate ● Multi-digit Decimals	● Distributive Property ● Greatest Common Factor ● Least Common Multiple ● Multiple ● Prime Factorization ● Factor Trees

Relevance, Explanations, and Examples:

The standard using factors and multiples **(6.NS.4)** is a supporting standard and can be woven into **6.NS.1**, especially when using the common denominators method of dividing.

6.NS.2 and **6.NS.3** are also additional standards. The conceptual understanding is learned in previous grades. Grade 6 focuses on fluency with an algorithm.

LCM EXAMPLE:
Hot dogs come in a package of 8 and buns in a package of 12. How many packages of hot dogs and packages of buns would you need to purchase to have an equal number of hot dogs and buns?

GCF EXAMPLE:
You are making balloon arrangements for a birthday party. There are 16 white balloons and 24 red balloons. Each arrangement must be identical. What is the greatest number of arrangements you can make using every balloon?

Achievement Level Descriptors

Cluster: **Multiply and divide multi-digit numbers and find common factors and multiples.**

Concepts and Procedures	*Level 1:* Students should be able to add, subtract, and multiply multi-digit whole numbers and decimals to hundredths. They should be able to use the distributive property to express the sum of two whole numbers with a common factors.
	Level 2: Students should be able to divide multi-digit whole numbers and add and subtract multi-digit decimal numbers. They should be able to find common factors of two numbers less than or equal to 100 and multiples of two numbers less than or equal to 1.
	Level 3: Students should be able to fluently divide multi-digit numbers and add, subtract, multiply, and divide multi-digit decimal numbers. They should be able to find the greatest common factor of two numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12.
	Level 4: Students should be able to make generalizations regarding multiples and factors of sets of numbers (e.g. state that a particular set of numbers is relatively prime).