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: Operations and Algebraic Thinking	**Grade Level: 3rd**
3.OA.B Cluster: Understand properties of multiplication and the relationship between multiplication and division. Using commutative, associative, distributive and identity properties solve multiplication problems. Using relationships between multiplication/division to solve.	
****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.* 3.OA.5 Apply properties of operations as strategies to multiply and divide. (Students need not use formal terms for these properties.) 3.OA.6 Understand division as an unknown-factor problem. For example, find 32÷8 by finding the number that makes 32 when multiplied by 8.	
Aspects of Rigor for Student Learning: (Conceptual, Procedural, and/or Application)	

Conceptual Understanding	***Procedural Fluency***	***Application***
Learners will explore and develop relationships between multiplication/division. **(3.OA.5)** Learners will notice relationships between multiplication/division. **(3.OA.5)** Learners will model knowledge of operations using appropriate tools to solve problems. **(3.OA.5)** Learners will explain how and why properties are used to solve problems. **(3.OA.5)**	Learners will demonstrate knowledge of properties to solve problems. **(3.OA.5)** Learners will write equations which support the property used. **(3.OA.5)**	
Learners understand relationship between multiplication and division. (fact families) **(3.OA.6)** Learners analyze the relationship of multiplication to support understanding of division.		

(fact families) **(3.OA.6)**		

Enacting the Mathematical Practices - Evidence of Students Engaging in the Practice.

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.**
   - Explain their thinking of the individual operations and how they are related.
4. **Model with mathematics.**
   - Use concrete models using numbers to justify their thinking.
5. **Use appropriate tools strategically.**
   - Utilize a variety of appropriate tools, available to students, to help relate multiplication and division.
6. **Attend to precision.**
   - Use precise language of multiplication and division.
7. **Look for and make use of structure.**
   - Knowing the relationships of the properties relating multiplication and division.
8. **Look for and express regularity in repeated reasoning.**
   - Look for and express patterns between multiplication and division.

Vertical and Horizontal Coherence and Learning Progressions

Previous Learning Connections	***Current Learning Connections***	***Future Learning Connections***
In 2nd grade, learners developed their understanding of equal groups, skip counting by 2, 5, 10, 100's, work with arrays up to 5 rows and 5 columns. **(2.OA.3, 2.OA. 4 and 2.NBT.2)**	**In 3rd grade, learners develop their conceptual understanding of the relationship between multiplication and division.** ** Standards have been listed in this column to show progression of learning and how instruction correlates (a mutual relationship or connection, in which one thing affects or depends on another.) with the focus standard which is boldfaced.* Learners interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7. **(3.OA.1)** Learners 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. **(3.OA.2)** Learners use multiplication and division within 100 to solve word	In 4th grade, learners utilize their previous knowledge of multiplication and division moving towards larger numbers. Learners multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **(4.NBT.5)** Learners find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **(4.NBT.6)**

	problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. **(3.OA.3)** Learners relate area to the operations of multiplication and addition. **(3.MD.7)** **Learners apply properties of operations as strategies to multiply and divide. (3.OA.5)** **Learners understand division as an unknown-factor problem. For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8. (3.OA.6)** Learners multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations. **(3.NBT.3)** Learners determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = ? ÷ 3, 6 × 6 = ?. **(3.OA.4)** Learners fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **(3.OA.7)** Learners solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. **(3.OA.8)** Learners identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that	

	4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends. **(3.OA.9)**	

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

- relationship
- unknown factor problems
- property
- operations

Relevance, Explanations, and Examples:

- Fact families with multiplication/division.
- Operations (+, -, x and ÷)
  - Division operation symbols include: ⁄, ÷,), -
- **Property Examples:**
  - **If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.)**
  - **3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.)**
  - **Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)**

Achievement Level Descriptors

Cluster: **Understand properties of multiplication and the relationship between multiplication and division.**

Concepts and Procedures	***Level 1:***
	Level 2: Students should be able to apply the commutative property of multiplication to mathematical problems with one-digit factors.
	Level 3: Students should be able to apply the commutative and associative properties of multiplication and the distributive property within 100. They should be able to understand the relationship between multiplication and division when solving an unknown factor problem.
	Level 4: Students should be able to communicate a deep understanding of the commutative and associative properties of multiplication and the relationship between multiplication and division.