

# 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.*

<b>Domain: Operations and Algebraic Thinking</b>		<b>Grade Level: 3rd</b>
<b>3.OA.C Cluster: Multiply and divide within 100.</b>		
Demonstrate fact fluency of multiplication using strategies.		
<p><b>**This is a MAJOR cluster.</b> <i>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.</i></p> <p><b>3.OA.7</b> Multiply and divide within 100</p> <ol style="list-style-type: none"> <li>Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g. knowing that <math>8 \times 5 = 40</math>, one knows 40 divided by 5 = 8) or properties of operations.</li> <li>Demonstrate fluency (skill in carrying out procedures flexibly, appropriately, effectively, and accurately) for all products of two one-digit numbers.</li> </ol>		
<b>Aspects of Rigor for Student Learning:</b> (Conceptual, Procedural, and/or Application)		
<b>Conceptual Understanding</b>	<b>Procedural Fluency</b>	<b>Application</b>
<p>Learners understand what it means to compose and decompose numbers. <b>(3.OA.7a)</b></p> <p>Learners understand how to use known facts to help learn unknown facts. <b>(3.OA.7a)</b></p> <p>Learners know relationships between multiplication and division. <b>(3.OA.7a)</b></p>	<p>Learners use strategies to fluently multiply and divide numbers within 100. <b>(3.OA.7a)</b></p>	
<p>Learners demonstrate the Commutative Property. <b>(3.OA.7b)</b></p> <p>Learners demonstrate the Zero Property. <b>(3.OA.7b)</b></p> <p>Learners demonstrate Identity Property of Multiplication. <b>(3.OA.7b)</b></p>	<p>Learners solve all products of two one-digit numbers effectively and efficiently. <b>(3.OA.7b)</b></p>	
<b>Enacting the Mathematical Practices - Evidence of Students Engaging in the Practices</b>		
<ul style="list-style-type: none"> <li>Your Mathematics Standards Companion Grades 3-5</li> </ul>		
<ol style="list-style-type: none"> <li><b>Make sense of problems and persevere in solving them.</b> <ul style="list-style-type: none"> <li>Make sense of the relationship between groups and numbers of items in a group.</li> </ul> </li> </ol>		

2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
  - Explain and justify strategies used between multiplication and division.
4. Model with mathematics.
  - Use various models to determine the product or the missing factor.
5. Use appropriate tools
  - Using equal set strategically.
6. Attend to precision.
  - Discuss what they notice, using math vocabulary, about the relationship between multiplication and division.
7. Look for and make use of structure.
  - Explore the relationship of the properties in order to lay the foundation for the structure of multiplication and division.
8. Look for and express regularity in repeated reasoning.

### Vertical and Horizontal Coherence and Learning Progressions

<u>Previous Learning Connections</u>	<u>Current Learning Connections</u>	<u>Future Learning Connections</u>
<p>In 2nd grade, learners have developed their understanding of equal groups, skip counting by 2, 5, 10, 100's, work with arrays up to 5 rows and 5 columns. <b>(2.OA.3 &amp; 4 and 2.NBT.2)</b></p> <p>Learners determined whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends. <b>(2.OA.3)</b></p> <p>Learners used addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends. <b>(2.OA.4)</b></p>	<p><b>In 3rd grade, this is the first time learners Multiply and divide within 100.</b></p> <p><i>* 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.</i></p> <p>Learners apply properties of operations as strategies to multiply and divide. <b>(3.OA.5)</b></p> <p>Learners relate area to the operations of multiplication and addition <b>(3.MD.7)</b></p> <p>Learners understand division as an unknown-factor problem. For example, find <math>32 \div 8</math> by finding the number that makes 32 when multiplied by 8. <b>(3.OA.6)</b></p> <p>Learners use multiplication and division within 100 to solve word 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. <b>(3.OA.3)</b></p> <p><b>Learners fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that <math>8 \times 5 = 40</math>, one knows <math>40 \div 5 = 8</math>) or properties of</b></p>	<p>Learners use metric/customary measurement from large to small or small to large. <b>(4.MD.1)</b></p> <p>Learners multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. <b>(4.OA.2)</b></p> <p>Learners multiply whole number up to four digits by one-digit and two-digit by two digit based on strategies. <b>(4.NBT.5)</b></p> <p>Learners find whole-number quotients and remainders with up to four digits dividends and a one- digit divisor based on strategies. <b>(4.NBT.6)</b></p> <p>Learners finding factors, multiples, prime or composite of whole numbers within 100. <b>(4.OA.4)</b></p>

	<b>operations. By the end of Grade 3, know from memory all products of two one-digit numbers. (3.OA.7)</b>	
--	--	--

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

<ul style="list-style-type: none"> <li>• Digit</li> <li>• Fluently</li> <li>• Relationship</li> <li>• Product</li> <li>• Factor</li> <li>• Division</li> </ul>	<ul style="list-style-type: none"> <li>• Divide</li> <li>• Dividend</li> <li>• Divisor</li> <li>• Quotient</li> <li>• Multiplication</li> <li>• Multiply</li> </ul>	<ul style="list-style-type: none"> <li>• Commutative Property (students need not use the formal term)</li> <li>• Distributive Property (students need not use the formal term)</li> </ul>
--	---	---

**Relevance, Explanations, and Examples:**

Sequence for introducing multiplication facts (Teaching Student-Centered Mathematics -Van de Walle)  
Commutative Property is important when learning facts.

99 Facts to learn:

- 0 and 1: 36 facts have at least a 1 factor that is 1 or 0 (Zero Property, Identity Property)
- 2: 19 facts with the factor of 2. (Facts that have 2 as a factor are equivalent to the addition doubles.)
- 5: 19 fact with the factor of 5. (Connections can be made to counting minutes on a clock)
- 9: Patterns in the tens and ones column help the students gain understanding.

Only 25 facts left (actually fewer, due to commutative property)

- 3:  $3 \times 8$  is connected to  $2 \times 8$  (double 8 and add 8 more)
- $4 \times 5$  (think-one-half of 4 is 2,  $2 \times 5 + 2 \times 5 = 10 + 10 = 20$ )
- 6:  $6 \times 7$  can be connected to  $3 \times 7$  and double ( $21 + 21 = 42$ ) or using a derived fact  $5 \times 7$  plus 7 more ( $35 + 7 = 42$ )
- 7:  $7 \times 8$  (half the even number then double  $7 \times 4 = 28$ ,  $28 + 28 = 56$  or by decomposing  $7 - 3 \times 8 + 4 \times 8$ )
- 8:  $8 \times 6$  ( think half then double or use a derived fact  $8 \times 5 = 40 + 8$  more)

It is important for Learners use direct Modeling to solve the given problem. (3.OA.7a)

Know from Memory has been moved to 4.OA.1b

Problems should also include 2 digit x 1 digit ( $26 \times 3$ ) for 3.OA.7a.

Fluency includes carrying out procedures flexibly, appropriately, efficiently and accurately.

Property Examples:

- If  $6 \times 4 = 24$  is known, then  $4 \times 6 = 24$  is also known. (Commutative Property of Multiplication.)
- $3 \times 5 \times 2$  can be found by  $3 \times 5 = 15$ , then  $15 \times 2 = 30$ , or by  $5 \times 2 = 10$ , then  $3 \times 10 = 30$ . (Associative Property of Multiplication.)
- Knowing that  $8 \times 5 = 40$  and  $8 \times 2 = 16$ , one can find  $8 \times 7$  as  $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$ . (Distributive Property.)

**Achievement Level Descriptors**

**Cluster: Multiply and divide within 100.**

<b>Concepts and Procedures</b>	<b>Level 1:</b> Students should be able to multiply a one-digit number by 1, 2, and 5.
	<b>Level 2:</b> Students should be able to recall all products of two one-digit numbers using strategies.
	<b>Level 3:</b> Students should be able to apply relevant strategies to fluently multiply and divide within 100 and recognize division as an unknown factor problem.
	<b>Level 4:</b> Students should be able to use relevant procedures to multiply or divide in a wide range of contexts.

