

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: Numbers and Operation in Base Ten		Grade Level: 4
4.NBT.B Cluster: Use place value understanding and properties of operations to perform multi-digit arithmetic.		
<p>This cluster asks learners to apply understanding of operations they have from previous grades, place value understanding and properties of addition and subtraction. They will add and subtract multi-digit numbers, multiply a one-digit number by a number up to four-digits, as well as multiplying two-digit by two-digit numbers, and divide a number with up to four-digits by one-digit. They will apply and extend strategies they have been using to develop fluent procedures to solve these problems.</p>		
<p>**This is a MAJOR cluster. <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>4.NBT.4 - Fluently add and subtract multi-digit whole numbers using an algorithm including, but not limited to, the standard algorithm.</p>		
<p>4.NBT.5 - 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.</p>		
<p>4.NBT.6 - 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.</p>		
Aspects of Rigor: (Conceptual, Procedural, and/or Application)		
Conceptual Understanding	Procedural Fluency	Application
	<p>Fluently add multi-digit whole numbers using one or more strategies. (4.NBT.4)</p> <p>Fluently subtract multi-digit whole numbers using one or more strategies. (4.NBT.4)</p>	
<p>Understand how to multiply a number up to four digits by a one digit number. (4.NBT.5)</p> <p>Understand how to multiply a two digit by two digit number. (4.NBT.5)</p>	<p>Multiply a number up to four digit by a one digit number by using strategies. (4.NBT.5)</p> <p>Multiply a two digit by a two digit number using strategies. (4.NBT.5)</p>	

Draw and explain multiplication strategies using different models. (4.NBT.5)		
Understand how to divide a number up to four digits by a one digit number. (4.NBT.6) Draw and explain division strategies using different models. (4.NBT.6) Understand the relationship between division and multiplication. (4.NBT.6)	Divide a number up to four digit by a one digit number by using strategies. (4.NBT.6)	

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.**
 - Explain the strategies used to solve problems and compare strategies with others.
4. **Model with mathematics.**
 - Use concrete models to prove strategies, such as arrays, area models and illustrations.
5. **Use appropriate tools strategically.**
 - Model using place value blocks, graph paper, and place value charts
6. **Attend to precision.**
 - Label answers with the correct unit to help with the meaning of the problem and determine if the answer makes sense.
7. **Look for and make use of structure.**
 - Continue to develop vocabulary and apply it to explanations.
8. **Look for and express regularity in repeated reasoning.**
 - Apply knowledge of the structure of place value in operations to solve problems, especially multiplication and division of multi-digit numbers.

Vertical and Horizontal Coherence and Learning Progressions

<u><i>Previous Learning Connections</i></u>	<u><i>Current Learning Connections</i></u>	<u><i>Future Learning Connections</i></u>
Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction (3.NBT.2) Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction (2.NBT.5) Add and subtract within 1,000 using concrete models or drawings (2.NBT.7) Interpret the products of whole numbers, such as interpreting 5×7 as the total number of objects in 5	Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. (4.NBT.1) Multiply or divide to solve word problems involving multiplicative comparison (4.OA.2) Solve multi-step word problems posed with whole numbers and having whole-number answers using multiplication (4.OA.3) Find factor pairs and recognize multiples (4.OA.4) Use the four operations to solve measurement word problems	Fluently multiply multi-digit whole numbers using the standard algorithm (5.NBT.5) Find quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies (5.NBT.6) Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies (5.NBT.7) Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm (6.NS.3) Explain patterns in the number of zeros of the product when multiplying a number by powers of 10 (5.NBT.2)

<p>groups of 7 objects each (3.OA.1)</p> <p>Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities (3.OA.3)</p> <p>Determine the unknown whole number in a multiplication or division equation relating three whole numbers (3.OA.4)</p> <p>Apply properties of operations as strategies to multiply and divide (3.OA.5)</p> <p>Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division or properties of operations. By the end of third grade, know from memory all products of two one-digit numbers (3.OA.7)</p> <p>Multiply one-digit whole numbers by multiples of 10 in the range 10–90, for example, 9×80 and 5×60 (3.NBT.3)</p> <p>Relate area to the operations of multiplication and addition (3.MD.7)</p> <p>Use addition to find the total number of objects arranged in rectangular arrays. Partition a rectangle into rows and column of same-sized squares and count to find the total number of squares (2.OA.4, 2.G.2)</p>	<p>(4.MD.2) Apply the area and perimeter formulas for rectangles in real-world and mathematical problems (4.MD.3)</p> <p>Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right (4.NBT.1)</p> <p>Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors (4.NBT.6)</p>	<p>Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction (using area models and partial products) (5.NF.4)</p> <p>Interpret a fraction as division of the numerator by the denominator (5.NF.3)</p> <p>Fluently divide multi-digit numbers using the standard algorithm (6.NS.2)</p>
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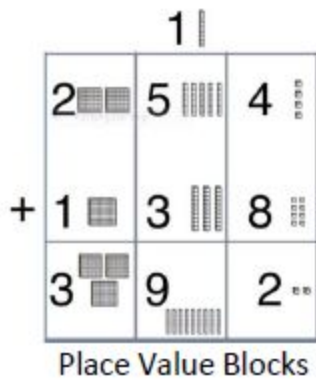
Vocabulary (Key Terms Used by Teachers and Students in this Cluster):

- | | | |
|--|---|--|
| <ul style="list-style-type: none"> ● Addition ● Area model ● Array ● Compare ● Difference ● Digit(s) ● Dividend | <ul style="list-style-type: none"> ● Division ● Divisor ● Equation ● Expanded form ● Factor ● Multiplication ● Place value | <ul style="list-style-type: none"> ● Quotient ● Remainder ● Round ● Subtraction ● Sum ● Fluently |
|--|---|--|

Relevance, Explanations, and Examples:

A fluent learner needs to carry out procedures flexibly, accurately, efficiently, and appropriately.

An algorithm is a process or set of rules to be followed in calculations.



$$\begin{array}{r}
 203 \quad (-4) = 199 \\
 - \quad 46 \quad (-4) = -42 \\
 \hline
 157
 \end{array}$$

Compensation

$$\begin{array}{r}
 832 - 371 \\
 \begin{array}{r}
 7 \quad 13 \\
 \cancel{8} \quad \cancel{3} \quad 2 \\
 - \quad 3 \quad 7 \quad 1 \\
 \hline
 4 \quad 6 \quad 1
 \end{array}
 \end{array}$$

Standard Algorithm

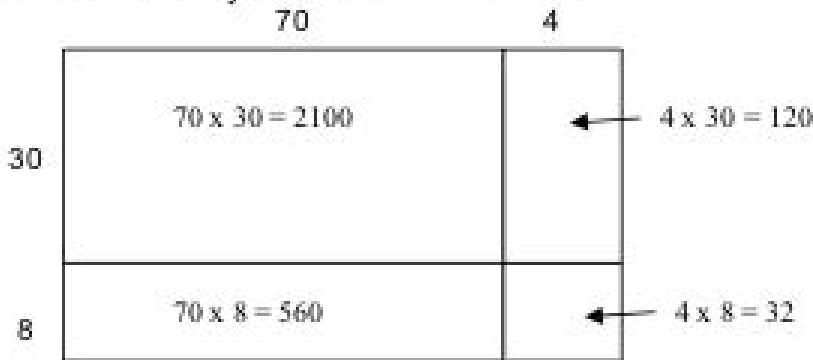
$$\begin{array}{r}
 38 \\
 + 24 \\
 \hline
 50 \text{ tens} \\
 + 12 \text{ ones} \\
 \hline
 62 \\
 \text{Place Value}
 \end{array}$$

4.NBT.5 Examples

Student 1	Student 2	Student 3
25×12 I broke 12 up into 10 and 2 $25 \times 10 = 250$ $25 \times 2 = 50$ $250 + 50 = 300$	25×12 I broke 25 up into 5 groups of 5 $5 \times 12 = 60$ I have 5 groups of 5 in 25 $60 \times 5 = 300$	25×12 I doubled 25 and cut 12 in half to get 50×6 $50 \times 6 = 300$

Example:

What would an array area model of 74×38 look like?



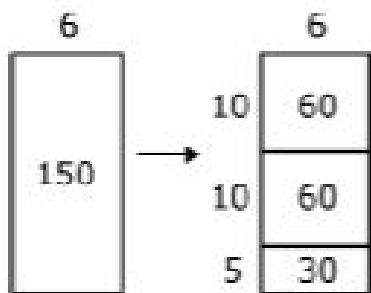
4.NBT.6 Examples

Example:

Using an Open Array or Area Model

After developing an understanding of using arrays to divide, students begin to use a more abstract model for division. This model connects to a recording process that will be formalized in the 5th grade.

150 divided by 6



592 divided by 8

Student 1	Student 2			Student 3
592 divided by 8. There are 70 8's in 560. $592 - 560 = 32$ There are 4 8's in 32. $70 + 4 = 74$	592 divided by 8. I know that 10 8's is 80. If I take out 50 8's that is 400 $592 - 400 = 192$ I can take out 20 more 8's which is 160. $192 - 160 = 32$. 8 goes into 32 4 times. I have none left. I took out 50, then 20 more, then 4 more. That's 74.	592 -400	50	I want to get to 592. $8 \times 25 = 200$ $8 \times 25 = 200$ $8 \times 25 = 200$ $200 + 200 + 200 = 600$ $600 - 8 = 592$ I had 75 groups of 8 and took one away, so there are 74 teams
		192 -160	20	
		32 -32	4	
		0		

Achievement Level Descriptors

Cluster: Use place value understanding and properties of operations to perform multi-digit arithmetic.

Concepts and Procedures

Level 1: 1 Students should be able to add and subtract one- and two-digit whole numbers using strategies based on place value; multiply two one-digit whole numbers based on place value and properties of operations; and find whole-number quotients with no remainders with up to two-digit dividends and one-digit divisors using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division.

Level 2: Students should be able to use place value understanding to add and subtract two- and three-digit whole numbers using a standard algorithm; multiply whole numbers up to and including four digits by one digit based on place value and properties of operations; find whole-number quotients and remainders with up to two-digit dividends and one-digit divisors using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division; and illustrate multiplication and division by using equations, arrays, and/or area models.

Level 3: Students should be able to fluently add and subtract multi-digit whole numbers using the standard algorithm; multiply whole numbers including two digits by two digits based on place value and properties of operations; find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors using strategies based on place value understanding, the properties of operations, and/or the relationship between multiplication and division; and explain multiplication and division using equations, arrays, and/or

	area models.
	<i>Level 4:</i>