

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.A Cluster: Represent and solve problems involving multiplication and division.		
Multiplication and division of whole numbers to 100 to solve word problems or equations with unknown represented by a symbol in all locations using various strategies.		
<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>3.OA.1 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.</p> <p>3.OA.2 Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ 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.</p> <p>3.OA.3 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.</p> <p>3.OA.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers.</p>		
Aspects of Rigor for Student Learning: (Conceptual, Procedural, and/or Application)		
Conceptual Understanding	Procedural Fluency	Application
Learners will make equal groups of objects to find the total product. (3.OA.1)		
Learners take a total number of objects and partition them into equal shares to find how many are in each share (partitive division). (3.OA.2) Learners take a total number of objects and partition them into equal groups to find the total in each group (measurement division). (3.OA.2)		
Learners utilize strategies, solve word problems using multiplication and division within 100. (3.OA.3)		Learners solve word problems, and justify answers, within 100, using multiplication/division strategies. (3.OA.3)

Learners choose a strategy to solve for the unknown in an equation. (3.OA.4)		
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Enacting the Mathematical Practices - Evidence of Students Engaging in the Practices

1. **Make sense of problems and persevere in solving them.**
 - Solve a variety of problems as context for learning what it means to multiply or divide.
2. **Reason abstractly and quantitatively.**
 - Determine groups, items in a group, or total number of items.
3. **Construct viable arguments and critique the reasoning of others.**
 - Compare strategies between concrete models and numerical expressions/equations (notations).
4. **Model with mathematics.**
 - Use a variety of tools to model multiplication and division (area, arrays, sets, number line)
5. **Use appropriate tools strategically.**
 - Choose appropriate tools to model multiplication and division (area, arrays, sets, number line)
6. **Attend to precision.**
7. **Look for and make use of structure.**
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.</p> <p>Learners have 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. (2.OA.3)</p> <p>Learners have counted within 1000; skip-counted by 5s, 10s, and 100s. (2.NBT.2)</p> <p>Learners have 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. (2.OA.4)</p>	<p>In 3rd grade, learners develop their conceptual understanding of multiplication and division using various strategies, within 100.</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 will 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)</p> <p>Learners will interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ 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 $56 \div 8$. (3.OA.2)</p>	<p>In 4th grade, learners progress their understanding of multiplication and division, using various strategies to help with larger numbers.</p> <p>Learners will interpret a multiplication equation as a comparison, (4.OA.1)</p> <p>Learners will apply and extend previous understandings of multiplication to multiply a fraction by a whole number. (4.NF.4)</p> <p>Learners will multiply or divide to solve word problems involving multiplicative comparison. (4.OA.2)</p> <p>Learners will apply the area and perimeter formulas for rectangles in real world and mathematical problems. (4.MC.3)</p>

	<p>Learners will understand division as an unknown-factor problem. (3.OA.6)</p> <p>Learners will use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities. (3.OA.3)</p> <p>Learners will fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division. (3.OA.7)</p> <p>Learners will determine the unknown whole number in a multiplication or division equation relating three whole numbers. (3.OA.4)</p> <p>Learners will apply properties of operations as strategies to multiply and divide.(3.OA.5)</p> <p>Learners will relate area to the operations of multiplication and addition. (3.MD.7)</p>	
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Vocabulary (Key Terms Used by Teachers and Students in this Cluster):

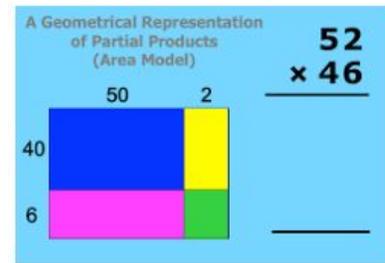
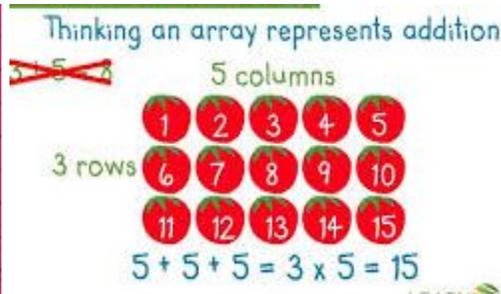
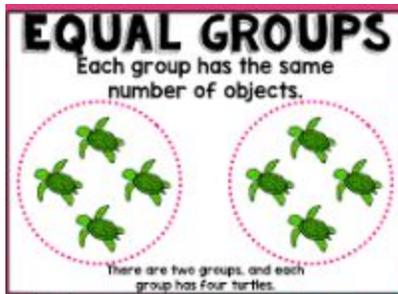
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| <ul style="list-style-type: none"> ● groups of ● arrays (columns and rows) ● equal shares ● factors ● products ● Equations ● dividends-divisor-division-quotients symbol | <ul style="list-style-type: none"> ● measurement quantities <ul style="list-style-type: none"> ○ Unknown Product ○ Partitive-Number of Groups Known ○ Measurement-Group Size Unknown | |
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Relevance, Explanations and Examples

- When developing the conceptual understanding of multiplication, teachers should use the language “groups of” when referring to the “x” symbol in an equation, expression or word problem. This will help students visualize and progress their multiplication skills in a more timely manner.
- Measurement quantities chart (from page 34, 5th grade South Dakota State Standards) - see below

Common multiplication and division situations. ¹

	UNKNOWN PRODUCT	GROUP SIZE UNKNOWN ("HOW MANY IN EACH GROUP?" DIVISION)	NUMBER OF GROUPS UNKNOWN ("HOW MANY GROUPS?" DIVISION)
	$3 \times 6 = ?$	$3 \times ? = 18$, and $18 \div 3 = ?$	$? \times 6 = 18$, and $18 \div 6 = ?$
EQUAL GROUPS	There are 3 bags with 6 plums in each bag. How many plums are there in all? <i>Measurement example.</i> You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? <i>Measurement example.</i> You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? <i>Measurement example.</i> You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
ARRAYS², AREA³	There are 3 rows of apples with 6 apples in each row. How many apples are there? <i>Area example.</i> What is the area of a 3 cm by 6 cm rectangle?	If 18 apples are arranged into 3 equal rows, how many apples will be in each row? <i>Area example.</i> A rectangle has area 18 square centimeters. If one side is 3 cm long, how long is a side next to it?	If 18 apples are arranged into equal rows of 6 apples, how many rows will there be? <i>Area example.</i> A rectangle has area 18 square centimeters. If one side is 6 cm long, how long is a side next to it?
COMPARE	A blue hat costs \$6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? <i>Measurement example.</i> A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?	A red hat costs \$18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost? <i>Measurement example.</i> A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first?	A red hat costs \$18 and a blue hat costs \$6. How many times as much does the red hat cost as the blue hat? <i>Measurement example.</i> A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?
GENERAL	$a \times b = ?$	$a \times ? = p$ and $p \div a = ?$	$? \times b = p$, and $p \div b = ?$



- Partition division (also known as partitive, sharing and grouping division) is a way of understanding division in which you divide an amount into a given number of groups. ... In the partitive interpretation, 6 is the number of objects in each group; in the measurement interpretation, 4 is the number of groups.
- Examples of one-step story problems. (Measurement Qualities)
 - Unknown Product- $4 \times 6 = ?$
 - There are 4 bags with 6 plums in each bag. How many plums are there in all?
 - Partitive Group size unknown- $4 \times ? = 24$ or $24 \div 4 = ?$
 - If 24 plums are shared equally into 4 bags, then how many plums will be in each bag?
 - Measurement Number of Groups Unknown- $? \times 6 = 24$ or $24 \div 6 = ?$
 - If 24 plums are to be packed 6 to a bag, then how many bags are needed?

Achievement Level Descriptors**Cluster: Represent and solve problems involving multiplication and division.****Concepts and Procedures**

Level 1: Students should be able to represent multiplication and division problems within 100 involving equal groups of objects.

Level 2: Student can partially explain and partially apply mathematical concepts. The Level 2 student interprets and carries out mathematical procedures with partial precision and fluency.

Level 3: Students should be able to select the appropriate operation (multiplication or division) within 100 to solve one-step problems involving measurement quantities of single-digit whole numbers and determine the unknown number in a division equation relating three whole numbers. They should be able to interpret the meaning of whole number quotients of whole numbers. (What do students need to understand in order to select the operation - conceptual understanding)

Level 4: Students should be able to use multiplication and division within 100 to solve one-step problems involving measurement quantities.