

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: Measurement and Data	Grade Level: 3
3.MD.C Cluster: Geometric measurement: understand concepts of area and relate area to multiplication and to addition	
Students recognize area and perimeter of two-dimensional regions using addition and multiplication to solve real world and mathematical problems. Students also determine a value of collections of money.	
**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>	
3.MD.5. Recognize area as an attribute of plane figures and understand concepts of area measurement. <ul style="list-style-type: none">a. A square with side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area.b. A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.	
3.MD.6. Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).	
3.MD.7. Relate area to the operations of multiplication and addition. <ul style="list-style-type: none">a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.b. Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.	
3.MD.8. Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter Given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.	
3.MD.9. Determine the value of a collection of money using dollar sign and decimal point appropriately. Understand that the digits to the right of the decimal represent parts of a whole dollar.	
Aspects of Rigor for Student Learning: (Conceptual, Procedural, and/or Application)	

Conceptual Understanding	Procedural Fluency	Application
<p>Learners recognize a unit square, within a shape, is the same as one square unit and measures as 1. (3.MD.5)</p> <p>Learners understand unit squares will not overlap or have gaps (3.MD.5)</p> <p>Learners understand area is the measurement of a two-dimensional figure. (3.MD.5)</p>		
<p>Learners identify square units and count the square units to find the area. (3.MD.6)</p>		
<p>Learners understand and explain why multiplying side lengths of a rectangle is the same as counting the tiles. (3.MD.7)</p> <p>Learners use the area model to represent the distributive property. (3.MD.7)</p> <p>Learners understand and explain that the area of a rectangular region can be found either by multiplying the side lengths or by adding two products which illustrate the distributive property. (3.MD.7)</p>	<p>Learners recognize area as additive, use tiling to find the area of a rectangle using whole numbers. (3.MD.7)</p> <p>Learners decompose rectilinear figures into rectangles, and find the area of each part then add the areas of the various rectangles together. (3.MD.7)</p>	<p>Learners use real world problems to involve side lengths to find area using whole numbers. (3.MD.7)</p>
	<p>Learners find the perimeter given the side lengths. (3.MD.8)</p> <p>Learners find the perimeter given the side lengths. (3.MD.8)</p> <p>Learners find an unknown side length given the perimeter. (3.MD.8)</p> <p>Learners find rectangles with the same perimeter and different areas. (3.MD.8)</p> <p>Learners find rectangles with the same area and different perimeter. (3.MD.8)</p>	<p>Learners solve real world and mathematical problems involving perimeter. (3.MD.8)</p>
<p>Learners understand the digits left of the decimal point (.) are whole dollars. (3.MD.9)</p> <p>Learners understand the digits to the right of the decimal point (.) are parts of a whole dollar. (3.MD.9)</p> <p>Learners use the dollar (\$) and decimal point (.) to write the value of a</p>	<p>Learners use the dollar (\$) and decimal point (.) to write the value of a collection of coins and bills. (3.MD.9)</p>	

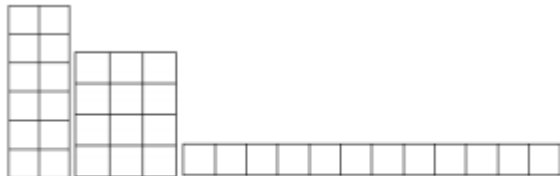
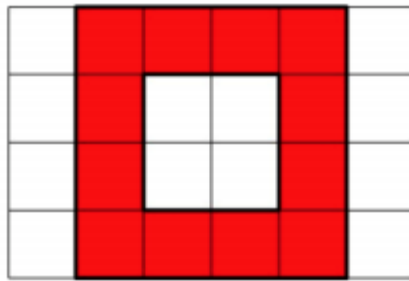
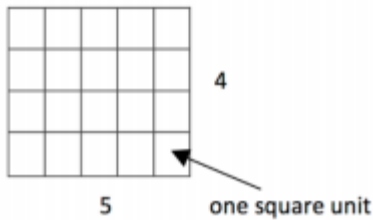
collection of coins and bills. (3.MD.9)		
Enacting the Mathematical Practices - Evidence of Students Engaging in the Practices		
<ol style="list-style-type: none"> 1. Make sense of problems and persevere in solving them. <ul style="list-style-type: none"> • Student will solve word problems using rectilinear figures. • Students will solve one and two step problems using information presented in the graphs. 2. Reason abstractly and quantitatively. <ul style="list-style-type: none"> • Students must make sense of collections of coins and bills using dollar (\$) and decimal point (.) symbols appropriately. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. <ul style="list-style-type: none"> • Students will apply multiplication and addition to solve area problems. • Students will solve problems using graphs. 5. Use appropriate tools strategically. 6. Attend to precision. <ul style="list-style-type: none"> • Students will use appropriate vocabulary to describe decomposing rectilinear figures. • Students will use bar graphs, picture graphs and line plots. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. 9. 		
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 will recognize and use unit measurements, including time and money, to solve addition and subtraction problems.</p> <p>Learners measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tape. (2.MD.1)</p> <p>Learners partition a rectangle into rows and columns of same-size squares and count to find the total number of them. (2.G.2)</p> <p>Learners identified and counted coins and bills and applied that understanding to solve word problems. 8a. Recognize and know the value of coins up to one dollar. 8b. Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using \$ and ¢ symbols appropriately. (2.MD.8)</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. (2.OA.4)</p>	<p>In 3rd grade, learners will solve problems involving measurement and estimation of intervals of time, liquid volume, masses of objects and money. Learners will also understand concepts of area and perimeter and relate to multiplication and addition.</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 understand division as an unknown-factor problem. For example, find $32 \div 8$ by finding the number that makes 32 when multiplied by 8. (3.OA.6)</p> <p>Learners recognize area as an attribute of plane figures and understand concepts of area measurement. (3.MD.5)</p> <p>Learners measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units). (3.MD.6)</p>	<p>In 4th grade, learners will solve problems involving area and perimeter in world world and mathematical problems.</p> <p>Learners apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor. (4.MD.3)</p>

	<p>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)</p> <p>Learners solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters. (3.MD.8)</p> <p>Learners apply properties of operations as strategies to multiply and divide. (3.OA.5)</p> <p>Learners relate area to the operations of multiplication and addition. (3.MD.7)</p> <p>Learners determine the value of a collection of money using the dollar sign and decimal point appropriately and understand the digits to the right represent parts of a whole number. (3.MD.9)</p>	
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Vocabulary (Key Terms Used by Teachers and Students in this Cluster):

<ul style="list-style-type: none"> ● Polygon ● Side length ● Area ● Perimeter ● Linear ● Plane figure ● Tiling ● Product 	<ul style="list-style-type: none"> ● Additive ● Distributive property ● Rectilinear ● Decompose ● Array ● Square unit ● Square 	<ul style="list-style-type: none"> ● Square centimeter ● Square ft, cm, m, in ● Attribute ● Unit square ● Square unit ● Gaps ● Overlaps
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Relevance, Explanations, and Examples:

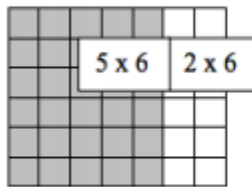


Each rectangle has an area of 12 square units, but the perimeters are 16 units, 14 units, and 26 units.

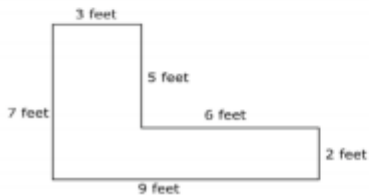
Tile the rectangle and then multiply the side lengths to show it is the same. To find the area one could count the squares or multiply $3 \times 4 = 12$.

1	2	3	4
5	6	7	8
9	10	11	12

This standard extends students' work with the distributive property. For example, in the model below the area of a 7×6 figure can be determined by finding the area of a 5×6 and 2×6 and adding the two sums.



Find the area of the figure in square feet by decomposing the figure into rectangles and adding the areas of the rectangles.



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 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.)

Achievement Level Descriptors

Cluster: Geometric measurement: understand concepts of area and relate area to multiplication and to addition

Concepts and Procedures

Level 1 students should be able to recognize area as an attribute of plane figures and recognize that a square with side lengths of one unit is called a unit square.

Level 2 students should be able to find the area of a rectilinear figure by counting unit squares.

Level 3 students should be able to find the area of a rectilinear figure by multiplying side lengths and by decomposing a rectilinear figure into non-overlapping rectangles and adding them together.

Level 4 students should be able to find the area of a rectilinear figure in a word problem.