

Crosswalk “Map” Showing Links from CCSSM, NCTM Standards, Length, Area, and Volume LTs (Sarama & Clements, 2009)

CCSSM	NCTM Measurement Standards	Length Learning Trajectory	Area Learning Trajectory	Volume Learning Trajectory
K.MD.A.1: Describe measurable attributes of objects	<p><u>Understand measurable attributes</u> of objects and the units, systems, and processes of measurement</p> <p><b>Expectations:</b> In prekindergarten through grade 2 all students should—</p> <ul style="list-style-type: none"> <li>recognize the attributes of length, volume, weight, area, and time;</li> <li>compare and order objects according to these attributes;</li> <li>understand how to measure using nonstandard and standard units; select an appropriate unit and tool for the attribute being measured.</li> </ul> <p><u>Apply appropriate techniques, tools,</u></p>	(2)Length Quantity Recognizer	(2)Area Simple Comparer	(1) Volume Quantity Recognizer
K.MD.A.2: Directly compare objects with a measurable attribute		(3a)Length Direct Comparer		
K.MD.B.3: Classify objects into categories; count and sort		(2)Length Quantity Recognizer		
K.G.B.4: Analyze and compare 2- and 3-dimensional shapes		(3a)Length Direct Comparer - Mental		
1.MD.A.1: Order three objects by length; compare the lengths of two objects indirectly by using a third object.		(3b)Indirect Length Comparer (3c)Serial Orderer to 6+		
1.MD.A.2: Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps.		(4)End-to-End Length Measurer		
2.NBT.A.1, 2.NBT.A.1a, 2.NBT.A.1b: Understand digits of a three-digit number represent amounts of hundreds, tens, and ones		(6)Consistent Length Measurer		
2.NBT.A.2: Count within 1000; skip-count by 5s, 10s, and 100s		(6)Consistent Length Measurer		
2.NBT.A.3: Read and write numbers to 1000 using base-ten numerals, number names, and expanded form		(6)Consistent Length Measurer		
2.NBT.B.5: Add and subtract within 100 using strategies based on place value, properties of operations, and/or relationships		(6)Consistent Length Measurer		
2.NBT.B.6: Add up to 4 two-digit numbers using strategies based on place value and properties of operations		(6)Consistent Length Measurer		
2.NBT.B.7: Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and (de)composes tens or hundreds		(6)Consistent Length Measurer		

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2.MD.A.1: Measure the length of an object by selecting and using tools such as rulers, yardsticks, meter sticks, and measuring tapes	<p>and formulas to determine measurements</p> <p><b>Expectations:</b> In prekindergarten through grade 2 all students should—</p> <ul style="list-style-type: none"> <li>measure with multiple copies of units of the same size, such as paper clips laid end to end;</li> <li>use repetition of a single unit to measure something larger than the unit, for instance, measuring the length of a room with a single meterstick;</li> <li>develop common referents for measures to make comparisons</li> </ul>	(5)Length Unit Relater and Repeater (6)Consistent Length Measurer		
2.MD.A.2: Measure the length of an object twice, using length units of different lengths; relate to the size of the unit chosen		(5)Length Unit Relater and Repeater		
2.MD.A.3: Estimate lengths using inches, feet, and (centi)meters		(7)Conceptual Ruler Measurer		
2.MD.A.4: Measure to determine how much longer one object is than another; express the difference in terms of a standard unit		(4)End to End Length Measurer		
2.MD.B.5; 2.OA.A.1: Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers); Use addition and subtraction within 100 to solve 1- and 2-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns		(5)Length Unit Relater and Repeater (6)Consistent Length Measurer (8)Integrated Conceptual Path Measurer		
2.MD.B.6: Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points		(4)End to End Length Measurer (5)Length Unit Relater and Repeater		
2.MD.D.9: Measure lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot		(5)Length Unit Relater and Repeater		
2.OA.C.4: Find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns			(7)Area Row and Column Structurer	

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2.G.A.2: Partition a rectangle into rows and columns of same-size squares and count to find the total number of them	and estimates.		(5)Area Unit Relater and Repeater (6)Partial Row Structurer (7)Area Row and Column Structurer	
3.NF.A.1: Understand a fraction $1/b$ as the quantity formed by 1 part when $a$ whole is partitioned into $b$ equal parts	<u>Understand measurable attributes</u> of objects and the units, systems, and processes of measurement <b>Expectations:</b> In grades 3–5 all students should— <ul style="list-style-type: none"> <li>understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute;</li> <li>understand the need for measuring with standard units and become familiar with standard units in the customary and</li> </ul>	(6)Consistent Length Measurer		
3.NF.A.2, 3.NF.A.2a, 3.NF.A.2b: Understand a fraction as a number on the number line; represent fractions on a number line diagram		(6)Consistent Length Measurer		
3.NF.A.3, 3.NF.A.3a, 3.NF.A.3b, 3.NF.A.3c, 3.NF.A.3d: Explain equivalence of fractions, and compare fractions		(6)Consistent Length Measurer		
3.MD.A.2: Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Use drawings (e.g., beaker with a measurement scale)				(5)Capacity Relater and Repeater
3.MD.B.4: Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data using units— whole numbers, halves, or quarters		(5)Length Unit Relater and Repeater  (6)Consistent Length Measurer		
3.MD.C.5, 3.MD.C.5a, 3.MD.C.5b: Recognize area as an attribute of plane figures and understand concepts of area measurement			(4)Primitive Coverer	
3.MD.C.6: Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units)			(5)Area Unit Relater and Repeater	
3.MD.C.7: Relate area to the operations of multiplication and addition			(7)Area Row and Column Structurer (9)Array Structurer (8)Area Conserver	

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3.MD.D.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	<ul style="list-style-type: none"> <li>metric systems</li> <li>• carry out simple unit conversions, such as from centimeters to meters, within a system of measurement;</li> <li>• understand that measurements are approximations and how differences in units affect precision;</li> <li>• explore what happens to measurements of a two-dimensional shape such as its perimeter and area when the shape is changed in some way.</li> </ul> <p><u>Apply appropriate techniques, tools, and formulas to determine measurements</u></p> <p><b>Expectations:</b> In</p>	(7)Conceptual Ruler Measurer (8)Integrated Conceptual Path Measurer (9)Coordinated and Integrated Abstract Measurer with Derived Units		
3.OA.A.1: Interpret products of whole numbers, e.g., interpret $5 \times 7$ as the total number of objects in 5 groups of 7 objects each			(9)Array Structurer	
3.OA.A.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			(7)Area Row and Column Structurer (9)Array Structurer	
3.OA.A.4: Determine the unknown whole number in a multiplication or division equation relating three whole numbers				
3.G.A.2: Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole				
4.OA.A.2: Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings; distinguish multiplicative comparison from additive comparison			(7)Conceptual Ruler Measurer	
4.NBT.B.5: Illustrate and explain multiplication by using rectangular arrays, and/or area models				
4.NF.A.1: Explain why a fraction $a/b$ is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, noticing that the number and size of the parts differ but the fractions are the same			(8)Integrated Conceptual Path Measurer	
4.NF.B.4a, 4.NF.B.4b: Apply and extend previous understandings of multiplication to multiply a fraction by a whole number				

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4.MD.A.2: Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems that require expressing measurements given in a larger unit in terms of a smaller unit.	grades 3–5 all students should— <ul style="list-style-type: none"> <li>develop strategies for estimating the perimeters, areas, and volumes of irregular shapes;</li> <li>select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles;</li> <li>select and use benchmarks to estimate measurements;</li> <li>develop, understand, and use formulas to find the area of rectangles and related triangles and parallelograms;</li> <li>develop strategies to determine the</li> </ul>	(5)Length Unit Relater and Repeater (6)Consistent Length Measurer		
4.MD.A.3: Apply the area and perimeter formulas for rectangles		(6)Consistent Length Measurer	(9)Area: Array Structurer	
4.MD.C.5, 4.MD.C.5a, 4.MD.C.5b: Recognize angles as two rays sharing a common endpoint; understand angle measurement		(8)Integrated Conceptual Path Measurer		
5.NBT.B.5: Fluently multiply multi-digit whole numbers using the standard algorithm				
5.NBT.B.6: Illustrate and explain division by using equations, rectangular arrays, and/or area models				
5.NBT.B.7: Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings				
5.NF.A.1: Add and subtract fractions with unlike denominators by replacing given fractions with equivalent fractions		(8)Integrated Conceptual Path Measurer		
5.NF.A.2: Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models		(8)Integrated Conceptual Path Measurer		
5.NF.B.4, 5.NF.B.4a, 5.NF.B.4b: Multiply a fraction or whole number by a fraction				
5.MD.A.1: Convert among different-sized standard measurement units within a given measurement system, and use these conversions in solving multi-step, real world problems		(6)Consistent Length Measurer		
5.MD.C.3, 5.MD.C.3a, 5.MD.C.3b: Recognize volume as an attribute of solid figures and understand concepts of volume measurement				(6)Volume/Spatial Structuring: Partial 3-D Structurer
5.MD.C.4: Recognize volume as an attribute of solid figures and understand concepts of volume measurement				(6)Volume/Spatial Structuring: Partial 3-D Structurer

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5.MD.C.5, 5.MD.C.5a, 5.MD.C.5b: Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume	surface areas and volumes of rectangular solids.			(9)Volume/Spatial Structuring: 3-D Array Structurer