

## 5.MD: MEASUREMENT & DATA

**Cluster Statement:** A: Convert like measurement units within a given measurement system.

**Supporting Cluster:** (Students should spend the large majority of their time (65-85%) on the major work of the grade/course. Supporting work and, where appropriate, additional work should be connected to and engage students in the major work of the grade.)

<p><b>Standard Text</b></p> <p><b>5.MD.A.1: Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.</b></p>	<p><b>Standard for Mathematical Practices</b></p> <p>SMP 1: Students can make sense of problems and persevere in solving them by solving word problems involving customary and standard measurement conversions.</p> <p>SMP 2: Students can reason abstractly and quantitatively by making sense of the number of units in relationship to the size of the unit when converting.</p> <p>SMP 7: Students can look for and make use of structure by discovering the relationship of base-ten conversions within the metric system.</p>	<p><b>Students who Demonstrate Understanding Can:</b></p> <ul style="list-style-type: none"> <li>Recognize units of measurement within the same system.</li> <li>Convert units of measurement within the same system by multiplying or dividing</li> <li>Solve multi-step, real world problems that involve converting units.</li> </ul>
		<p><b>Depth Of Knowledge:</b> 1-2</p>
		<p><b>Bloom's Taxonomy:</b> Remember, Understand and Apply</p>
<p><b>Previous Learning Connections</b></p> <ul style="list-style-type: none"> <li>Connect to understanding the relative sizes of measurement units within a system. <b>(4.MD.1)</b></li> <li>Connect to using the four operations to solve word problems including problems involving fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. <b>(4.MD.2)</b></li> </ul>	<p><b>Current Learning Connections</b></p> <ul style="list-style-type: none"> <li>Connect to the powers of 10, which relates to converting metric measurements. <b>(5.NBT.2)</b></li> <li>Connect to working to perform operations with multi-digit whole numbers and with decimals to hundredths. <b>(5.NBT.5-7)</b></li> </ul>	<p><b>Future Learning Connections</b></p> <ul style="list-style-type: none"> <li>Connect to using ratios to convert measurement units. Connect to manipulating and transforming units appropriately when multiplying or dividing quantities. <b>(6.RP.3d)</b></li> </ul>
<p><b>Clarification Statement:</b></p> <p>5.MD.A.1: In Grade 5, students extend their abilities from Grade 4 (4.MD.A.1) to express measurements in larger or smaller units within a measurement system. This is an excellent opportunity to reinforce notions of place value for whole numbers and decimals, and make connections between fractions and decimals (e.g., 2 1/2 meters can be expressed as 2.5 meters or 250 centimeters).</p>		
<p><b>Common Misconceptions</b></p> <ul style="list-style-type: none"> <li>Students may not pay attention to the units of measurement and try to perform operations without converting to a common unit first.</li> <li>Students may overgeneralize the base-10 structure and applying it to measurement conversions, such as when subtracting 4 inches from 3 feet, taking one foot from the 3 feet and regrouping it as 10 inches.</li> </ul>		

**Multi-Layered System of Supports (MLSS)/Suggested Instructional Strategies**

**Pre-Teach**

Pre-teach (targeted): *What pre-teaching will prepare students to productively struggle with the mathematics for this cluster within your HQIM?*

- For example, some learners may benefit from targeted pre-teaching that uses images/resources (especially those being used the first time) when studying conversion of like measurement units within a given measurement system, because in this cluster students begin with using a table to make conversions. They will convert both customary and standard measurements within the same system of measurement and solve multistep word problems. 5th graders will discover base 10 conversions within the metric system, 1 kilometer= 1,000 meters.

Pre-teach (intensive): *What critical understandings will prepare students to access the mathematics for this cluster?*

- 3.OA.C.7: This standard provides a foundation for work with conversion of like measurement units within a given measurement system, because students multiply and divide within 100. If students have unfinished learning within this standard, based on assessment data, consider ways to provide intensive pre-teaching support prior to the start of the unit to ensure students are ready to access grade level instruction and assignments.

**Core Instruction**

*Access*

Interest: *How will the learning for students provide multiple options for recruiting student interest?*

- For example, learners engaging with conversion of like measurement units within a given measurement benefit when learning experiences include ways to recruit interest such as, providing novel and relevant problems to make sense of complex ideas in creative ways, because this promotes student practice with the use of conversions in solving multistep, real world problems. Begin the problem solving with simple problems that focus on renaming units to represent the solution before experiencing problems that require renaming to find the solution.

*Build*

Effort and Persistence: *How will the learning for students provide options for sustaining effort and persistence?*

- For example, learners engaging with conversion of like measurement units within a given measurement benefit when learning experiences attend to students' attention and affect to support sustained effort and concentration such as, encouraging and supporting opportunities for peer interactions and supports, because these interactions will allow students to interpret and make sense of the word problems they solve using customary and standard measurement conversions. Students will make sense of the number of units in relation to the size of the unit when converting and discover the relationship of base ten conversions within the metric system.

Language and Symbols: *How will the learning for students provide alternative representations to ensure accessibility, clarity and comprehensibility for all learners? (e.g., a graph illustrating the relationship between two variables may be informative to one learner and inaccessible or puzzling to another; picture or image may carry very different meanings for learners from differing cultural or familial backgrounds)*

- For example, learners engaging with conversion of like measurement units within a given measurement benefit when learning experiences attend to the linguistic and nonlinguistic representations of mathematics to ensure clarity can comprehensibility for all learners such as. pre-teaching vocabulary and symbols, especially in ways that promote connection to the learners' experience and prior knowledge, because students will apply academic vocabulary associated with the metric system when explaining their mathematical reasoning about measurement tools and the ideas they are learning, (convert, conversion, metric, customary unit, relative size, liquid, mass, volume...).

Expression and Communication: *How will the learning provide multiple modalities for students to easily express knowledge, ideas, and concepts in the learning environment?*

- For example, learners engaging with conversion of like measurement units within a given measurement benefit when learning experiences attend to the multiple ways students can express knowledge, ideas, and concepts such as, providing multiple examples of novel solutions to authentic problems, because students will need practice and experience solving real world problems involving conversions of metric and customary units.

*Internalize*

Comprehension: *How will the learning for students support transforming accessible information into usable knowledge, knowledge that is accessible for future learning and decision-making?*

- For example, learners engaging with conversion of like measurement units within a given measurement benefit when learning experiences attend to students by intentionally building connections to prior understandings and experiences; relating important information to the learning goals; providing a process for meaning making of new learning; and, applying learning to new contexts such as, providing options for organizing and possible approaches (tables and representations for processing mathematical operations) because this will help students to convert measurements into larger or smaller units within a measurement system by reinforcing place value for whole numbers and decimals and then focus on the connection between fractions and decimals.

**Re-teach**

Re-teach (targeted): *What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisiting during a unit?*

- For example, students may benefit from re-engaging with content during a unit on conversion of like measurement units within a given measurement system by clarifying mathematical ideas and/or concepts through a short mini-lesson because focus should be on how to convert measurements into larger or smaller units within a measurement system by reinforcing place value for whole numbers and decimals.

Re-teach (intensive): *What assessment data will help identify content needing to be revisited for intensive interventions?*

- For example, some students may benefit from intensive extra time during and after a unit on conversion of like measurement units within a given measurement system by confronting student misconceptions because some students may not pay attention to the unit of measurement when subtracting. For example, when subtracting 5 inches from 2 feet (2ft-5in), students may incorrectly think the answer is 1 ft. 5 inches instead of 1 foot and 7 inches. To address this misconception, talk about and show the example of using 2 twelve-inch rulers, then subtract.

**Extension**

*What type of extension will offer additional challenges to 'broaden' your student's knowledge of the mathematics developed within your HQIM?*

- For example, some learners may benefit from an extension such as open ended tasks linking multiple disciplines when studying the conversion of like measurement units within a given measurement system because it promotes student practice to solve real world problems involving conversions, use the vocabulary associated with the metric and customary conversions, and gain understanding on the relationship between units and how to do conversions.

**Culturally and Linguistically Responsive Instruction:**

**Validate/Affirm:** How can you design your mathematics classroom to intentionally and purposefully legitimize the home culture and languages of students and reverse the negative stereotypes regarding the mathematical abilities of students of marginalized cultures and languages?

**Build/Bridge:** How can you create connections between the cultural and linguistic behaviors of your students' home culture and language the culture and language of school mathematics to support students

in creating mathematical identities as capable mathematicians that can use mathematics within school and society?

Using and Connecting Mathematical Representations: The standard for mathematical practice, use appropriate tools strategically, provides a strong foundation to validate and bridge for students. Mathematical representations are mathematical tools. The linguistic and cultural experiences of students provide different and varied types of representations for solving mathematical problems. By explicitly encouraging students to use multiple mathematical representations students can draw on their “mathematical, social, and cultural competence”. By valuing these representations and discussing them we can connect student representations to the representations of school mathematics and build a bridge for students to position them as competent and capable mathematicians. For example, when studying conversion of like measurement units within the given measurement system the use of mathematical representations within the classroom is critical because students’ knowledge and experiences will be used as resources for mathematical learning. Students will utilize their experience with conversions while using tools such as conversion charts and models of base ten conversions within the metric system. Students will discover the relationship between base ten conversions within the metric system to make connections to their background knowledge. They will use this experience to make sense of word problems they solve using customary and standard measurement conversions.

**Standards Aligned Instructionally Embedded Formative Assessment Resources:**

Source: PARCC Released Item 2017

Tanya buys 12 water bottles. Of these bottles, 5 hold 300 milliliters each and 7 hold 1.5 liters each.

Part A

How much water, in milliliters, does Tanya buy?

Part B

How much water, in liters, does Tanya buy?

**Answer Key**

Part A: 12,000 Part B: 12

**Relevance to families and communities:**

During a unit focused on conversion of like measurements within a given measurement system, consider options for learning from your families and communities the cultural and linguistic ways this mathematics exists outside of school to create stronger home to school connections for students. For example, students can measure the length of three items at home and express the length in standard and customary units.

**Cross-Curricular Connections:**

Science: In fifth grade the NGSS recommends students work with measurement related to conservation of mass. Consider providing a connection for students to determine the mass of an object in different states in two different units and then convert one unit unto the other to discover that they are equivalent.

Art: Making a model of an object involves having to convert from larger to small units. Consider providing a connection for students to make a scaled model of something involving simple polygons or polyhedrons.