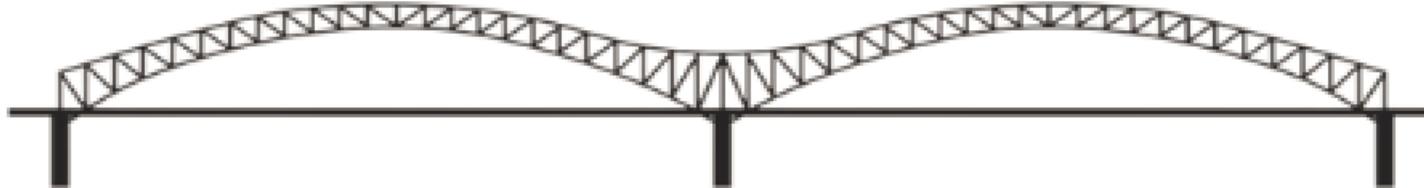


## Bridging for Math Strength Resources

### Standards of Learning Curriculum Framework (SOL)

**Standard of Learning (SOL) 5.9b** Solve practical problems involving length, mass, and liquid volume using metric units



Student Strengths	Bridging Concepts	Standard of Learning
Students have experience using a ruler and scales to measure a variety of objects. Students can compare objects using customary units.	Students can measure an object in centimeters and meters and know their relationship. Students can compare objects using metric units.	Students can solve practical problems involving length, mass, and liquid volume using metric units.

#### Understanding the Learning Trajectory

##### **Big Ideas:**

*Note: This standard focuses on students' ability to estimate and measure to solve practical problems that involve metric units, while 5.9a focuses on naming equivalencies.*

- The magnitude of the attribute to be measured and the accuracy needed determines the appropriate measurement unit (Charles, 2005). Measuring length, mass, and volume requires students to determine first which metric measurement they are trying to find, then pick an appropriate instrument to measure accurately. Finally, students must choose an appropriate unit to label their measurement.
- Weight and mass are different. Mass is the amount of matter in an object. Weight is determined by the pull of gravity on the mass of an object. The mass of an object remains the same regardless of its location. The weight of an object changes depending on the gravitational pull at its location. In everyday life, most people are actually interested in determining an object's mass, although they use the term weight (e.g., "How much does it weigh?" versus "What is its mass?").
- Metric measurement units are related by tens. Students must see the fractional relationship between metric units (base 10) and relate to the prefixes (milli-, cent-, kilo-) in order to help estimate more accurately.

##### **Formative Assessment:**

- [Just in Time Mathematics Quick Check 5.9b PDF](#)
- [Just in Time Mathematics Quick Check 5.9b Google Slides](#)

##### **Important Assessment Look Fors:**

- The student can determine whether they are looking to find length, mass or liquid volume.

- The student can determine options for measurement units (grams/kilograms, milliliters/liters, millimeters/centimeters/meters/kilometers), choose one unit to utilize for their estimate, and justify its use for each of the scenarios.
- The student can check their estimate or actual measurement for reasonableness.

**Purposeful Questions:**

- How did you determine if you were finding length, mass, or liquid volume?
- What units of measurement could you use to measure this item but which one did you decide to use and why?
- When estimating, what objects do you associate with the base units? (I.e. “I think of the weight of a paperclip for one gram or a dictionary for 1 kilogram).

Bridging Activity to Support Standard	Instructional Tips
<p><b>Routines</b></p> <p><a href="#"><u>Would you Rather?</u></a></p>	<p>Pull out visual supports for your students.</p> <p>Start with easy comparisons such as milliliters and liters and move to more complex ones with more than one option (millimeters, centimeters meters).</p> <p>There are benefits of using similar quantities or similar units. Eventually, for standard 5.9a you can even use equivalents for this strategy (ex. Would you rather eat 999 grams of cake or .9 kilograms of cake?)</p>
<p><b>Rich Tasks</b></p> <p>Task One: <a href="#"><u>Measuring Around the Room</u></a></p> <p>Task Two: <a href="#"><u>All Jumbled Up</u></a></p>	<p>Students will measure different objects around the room either by length, mass, or volume</p> <p>Students move the entries in the table to the correct place until all the measurements match up sensibly. For some items there are a few numbers which might be valid. You have to juggle them to find a combination where every measurement is valid.</p> <p><a href="#"><u>All Jumbled Up</u></a> on Nrich's website allows students to put in order some jumbled up measurements.</p> <p>The following sets of cards are available from Nrich if you want to work away from the computer.</p> <p><a href="#"><u>Card Set 1</u></a></p> <p><a href="#"><u>Card Set 2</u></a></p> <p><a href="#"><u>Card Set 3</u></a></p>
<p><b>Games/Tech</b></p> <p><a href="#"><u>Measure to the nearest tenth</u></a></p>	<p>Students measure the vertical rulers.</p>

<p><a href="#">on a centimeter ruler.</a></p> <p><a href="#">Quick check “What is the best measurement” game?</a></p> <p><a href="#">Practice conversions with these various games</a></p> <p><a href="#">Desmos 5.9b Estimating Appropriate Units of Measurement</a></p>	<p>Given examples, students decide which measurement unit is the best.</p> <p>Tug-of-War, Snap, Matching, or simply Multiple Choice practice.</p> <p>In this activity, students will select the appropriate units of measure for length, weight/mass, and capacity. They will develop reasonable estimates through connections to real world objects.</p>
<p><b>Other Resources:</b></p>	
<ul style="list-style-type: none"> <li>● <a href="#">SmashMaths Area and Perimeter</a>: Students will use appropriate units of measurement for length, area, volume, capacity and mass, and calculate perimeter and area of rectangles. Students will have to calculate perimeter and area of rectangles using metric units.</li> <li>● <a href="#">Mixed Up Measurements</a>: Given measurements and records from the Olympic Games that have been all mismatched, students can work together to regroup them correctly. Option: take out a few to make this a more accessible task. Allow students to do a little research if needed.</li> <li>● <a href="#">Interactive Volume Finder</a> by Illuminations: In this interactive, students fill a box with cubes, rows of cubes, or layers of cubes to determine the rule for finding the volume of a box.</li> <li>● VDOE Mathematics Instructional Plans (MIPS) <ul style="list-style-type: none"> <li>○ <a href="#">5.9ab - Measurement Mania</a> (Word) / <a href="#">PDF Version</a></li> </ul> </li> <li>● VDOE Co-Teaching Mathematics Instruction Plans (MIPS) <ul style="list-style-type: none"> <li>○ <a href="#">5.9 - Measurement</a> (Word) / <a href="#">PDF Version</a></li> </ul> </li> <li>● VDOE Word Wall Cards: Grade 5 <a href="#">(Word)</a>   <a href="#">(PDF)</a> <ul style="list-style-type: none"> <li>○ Kilometer</li> <li>○ Meter</li> <li>○ Centimeter</li> <li>○ Kilograms</li> <li>○ Grams</li> <li>○ Milliliters</li> <li>○ Liters</li> </ul> </li> <li>● VDOE Instructional Videos for Teachers <ul style="list-style-type: none"> <li>○ <a href="#">Converting Units (grades 3-8)</a></li> </ul> </li> </ul>	
<p><b>Learning Trajectory Resources:</b></p>	
<p>Charles, R. (2005). <a href="#">Big ideas and understandings as the foundation for elementary and middle school mathematics</a>. <i>Journal of Mathematics Education Leadership</i>, 7(3), NCSM.</p>	
<p>Common Core Standards Writing Team. (2019). <a href="#">Progressions for the Common Core State Standards for Mathematics</a>. Tucson, AZ: Institute for Mathematics and Education, University of Arizona.</p>	
<p>Van De Walle, J., Karp, K. S., &amp; Bay-Williams, J. M. (2018). <i>Elementary and Middle School Mathematics: Teaching Developmentally</i>. (10th edition) New York: Pearson (2019:9780134802084)</p>	
<p>VDOE Curriculum Framework for All Grades - <a href="#">Standard of Learning Curriculum Framework (SOL)</a></p>	

