

## Examples of Standards for Mathematical Practice 7 and 8 Found in the Progressions Documents

### *Examples of SMP 7 Found in the Progressions Documents*

(Please note: These are not the only references in the progressions.)

Measurement	
Grade 1	As in Kindergarten, area and volume are not instructional foci for first grade, but some everyday activities can form an experiential foundation for later instruction in these topics. For example, in later grades, understanding area requires seeing how to decompose shapes into parts and how to move and recombine the parts to make simpler shapes whose areas are already known (MP7). First graders learn the foundations of such procedures both in composing and decomposing shapes, discussed in the Geometry Progression, and in comparing areas in specific contexts.
Grade 3	<p>Students might then find the areas of other rectangles. As previously stated, students can be taught to multiply length measurements to find the area of a rectangular region. But, in order that they make sense of these quantities (MP2), they first learn to interpret measurement of rectangular regions as a multiplicative relationship of the number of square units in a row and the number of rows. 3.MD.7a This relies on the development of spatial structuring. (MP7)</p> <p>Differentiating perimeter from area is facilitated by having students draw congruent rectangles and measure, mark off, and label the unit lengths all around the perimeter on one rectangle, then do the same on the other rectangle but also draw the square units. This enables students to see the units involved in length and area and find patterns in finding the lengths and areas of non-square and square rectangles (MP7). Students can continue to describe and show the units involved in perimeter and area after they no longer need these.</p>
Grade 5	<p>Students then learn to determine the volumes of several right rectangular prisms, using cubic centimeters, cubic inches, and cubic feet. With guidance, they learn to increasingly apply multiplicative reasoning to determine volumes, looking for and making use of structure (MP7).</p> <p>Students also recognize that volume is additive (see Overview) and they find the total volume of solid figures composed of two right rectangular prisms. (5.MD.5c) For example, students might design a science station for the ocean floor that is composed of several rooms that are right rectangular prisms and that meet a set criterion specifying the total volume of the station. They draw their station (e.g., using an isometric grid, MP7) and justify how their design meets the criterion (MP1).</p>

### *Examples of SMP 8 Found in the Progressions Documents*

(Please note: These are not the only references in the progressions.)

Measurement	
Grade 1	Measurement activities can also develop other areas of mathematics, including reasoning and logic. In one class, first graders were studying mathematics mainly through measurement, rather than counting discrete objects. They described and represented relationships among and between lengths (MP2, MP3), such as comparing two sticks and symbolizing the lengths as "A B." This enabled them to reason about relationships. For example, after seeing the following statements recorded on the board, if $V > M$ , then $M < V$ , $V \neq M$ , and $M \neq V$ , one first-grader noted, "If it's an inequality, then you can write four statements. If it's equal, you can only write two" (MP8) This indicates that with high-quality experiences (such as those described in the Grade 2 section on length), many first graders can also learn to use reasoning, connecting this to direct comparison, and to measurement performed by laying physical units end-to-end.
Grade 3	To build from spatial structuring to understanding the number of (MP7 See the Geometry Progression) area-units as the product of number of units in a row and number of rows, students might draw rectangular arrays of squares and learn to determine the number of squares in each row with increasingly sophisticated strategies, such as skip-counting the number in each row and eventually multiplying the number in each row by the number of rows (MP8). They learn to partition a rectangle into identical squares by anticipating the final structure and forming the array by drawing line segments to form rows and columns. They use skip counting and multiplication to determine the number of squares in the array.
Grade 4	Perimeter problems often give only one length and one width, thus remembering the basic formula can help to prevent the usual error of only adding one length and one width. The formula $P = 2(1 + w)$ emphasizes the step of multiplying the total of the given lengths by 2. Students can make a transition from showing all length units along the sides of a rectangle or all area units within (as in Grade 3, p. 18) by drawing a rectangle showing just parts of these as a reminder of which kind of unit is being used. Writing all of the lengths around a rectangle can also be useful. Discussions of formulas such as $P = 2l + 2w$ , can note that unlike area formulas, perimeter formulas combine length measurements to yield a length measurement. Such abstraction and use of formulas underscores the importance of distinguishing between area and perimeter in Grade 3 (3.MD.8) and maintaining the distinction in Grade 4 and later grades, where rectangle perimeter and area problems may get more complex and problem solving can benefit from knowing or being able to rapidly remind oneself of how to find an area or perimeter. By repeatedly reasoning about how to calculate areas and perimeters of rectangles, students can come to see area and perimeter formulas as summaries of all such calculations (MP8).