

Connecting Mathematical Practices and Content

The Standards for Mathematical Practice (MP) are developed throughout each grade and, together with the content standards, prescribe that students experience mathematics as a rigorous, coherent, useful, and logical subject. The MP standards represent a picture of what it looks like for students to understand and do mathematics in the classroom and should be integrated into every mathematics lesson for all students.

Although the description of the MP standards remains the same at all grade levels, the way these standards look as students engage with and master new and more advanced mathematical ideas does change. Table K-2 presents examples of how the MP standards may be integrated into tasks appropriate for students in kindergarten. (Refer to the Overview of the Standards Chapters for a description of the MP standards.)

Table K-2. Standards for Mathematical Practice—Explanation and Examples for Kindergarten

Standards for Mathematical Practice	Explanation and Examples
<p>MP.1 Make sense of problems and persevere in solving them.</p>	<p>In kindergarten, students begin to build the understanding that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Real-life experiences should be used to support students' ability to connect mathematics to the world. To help students connect the language of mathematics to everyday life, ask students questions such as "How many students are absent?" or have them gather enough blocks for the students at their table. Younger students may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?", or they may try another strategy.</p>
<p>MP.2 Reason abstractly and quantitatively.</p>	<p>Younger students begin to recognize that a number represents a specific quantity and connect the quantity to written symbols. Quantitative reasoning entails creating a representation of a problem while attending to the meanings of the quantities. For example, a student may write the numeral 11 to represent an amount of objects counted, select the correct number card 17 to follow 16 on a calendar, or build two piles of counters to compare the numbers 5 and 8. In addition, kindergarten students begin to draw pictures, manipulate objects, or use diagrams or charts to express quantitative ideas. Students need to be encouraged to answer questions such as "How do you know?"—which reinforces their reasoning and understanding and helps student develop mathematical language.</p>
<p>MP.3 Construct viable arguments and critique the reasoning of others.</p>	<p>Younger students construct arguments using actions and concrete materials, such as objects, pictures, and drawings. They begin to develop their mathematical communication skills as they participate in mathematical discussions involving questions such as "How did you get that?" and "Why is that true?" They explain their thinking to others and respond to others' thinking. They begin to develop the ability to reason and analyze situations as they consider questions such as "Are you sure that _____?", "Do you think that would happen all the time?", and "I wonder why _____?"</p>

Table K-2 (continued)

Standards for Mathematical Practice	Explanation and Examples
MP.4 Model with mathematics.	In early grades, students begin to represent problem situations in multiple ways—by using numbers, objects, words, or mathematical language, acting out the situation, making a chart or list, drawing pictures, creating equations, and so forth. For example, a student may use cubes or tiles to show the different number pairs for 5, or place three objects on a 10-frame and then determine how many more are needed to “make a ten.” Students rely on manipulatives (or other visual and concrete representations) while solving tasks and record an answer with a drawing or equation.
MP.5 Use appropriate tools strategically.	Younger students begin to consider tools available to them when solving a mathematical problem and decide when certain tools might be helpful. For instance, kindergartners may decide to use linking cubes to represent two quantities and then compare the two representations side by side, or later, make math drawings of the quantities. Students decide which tools may be helpful to use depending on the problem or task and explain why they use particular mathematical tools.
MP.6 Attend to precision.	Kindergarten students begin to develop precise communication skills, calculations, and measurements. Students describe their own actions, strategies, and reasoning using grade-level-appropriate vocabulary. Opportunities to work with pictorial representations and concrete objects can help students develop understanding and descriptive vocabulary. For example, students analyze and compare two- and three-dimensional shapes and sort objects based on appearance. While measuring objects iteratively (repetitively), students check to make sure that there are no gaps or overlaps. During tasks involving number sense, students check their work to ensure the accuracy and reasonableness of solutions. Students should be encouraged to answer questions such as, “How do you know your answer is reasonable?”
MP.7 Look for and make use of structure.	Younger students begin to discern a pattern or structure in the number system. For instance, students recognize that $3 + 2 = 5$ and $2 + 3 = 5$. Students use counting strategies, such as counting on, counting all, or taking away, to build fluency with facts to 5. Students notice the written pattern in the “teen” numbers—that the numbers start with 1 (representing 1 ten) and end with the number of additional ones. Teachers might ask, “What do you notice when _____?”
MP.8 Look for and express regularity in repeated reasoning.	In the early grades, students notice repetitive actions in counting, computations, and mathematical tasks. For example, the next number in a counting sequence is 1 more when counting by ones and 10 more when counting by tens (or 1 more group of 10). Students should be encouraged to answer questions such as, “What would happen if _____?” and “There are 8 crayons in the box. Some are red and some are blue. How many of each could there be?” Kindergarten students realize 8 crayons could include 4 of each color ($8 = 4 + 4$), 5 of one color and 3 of another ($8 = 5 + 3$), and so on. For each solution, students repeatedly engage in the process of finding two numbers to join together to equal 8.

Adapted from Arizona Department of Education (ADE) 2010 and North Carolina Department of Public Instruction (NCDPI) 2013b.

Standards-Based Learning at Kindergarten

The following narrative is organized by the domains in the Standards for Mathematical Content. It highlights some necessary foundational skills and provides exemplars to explain the content standards, highlight connections to the various Standards for Mathematical Practice (MP), and demonstrate the importance of developing conceptual understanding, procedural skill and fluency, and application. A triangle symbol (▲) indicates standards in the major clusters (see table K-1).