## 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 1-2 presents examples of how the MP standards may be integrated into tasks appropriate for students in grade one. (Refer to the Overview of the Standards Chapters for a description of the MP standards.)

**Table 1-2. Standards for Mathematical Practice—Explanation and Examples for Grade One**

| Standards for Mathematical Practice | Explanation and Examples |
|---|---|
| **MP.1**<br><br>Make sense of problems and persevere in solving them. | In first grade, students realize 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. Younger students may use concrete objects or math drawings to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They are willing to try other approaches. |
| **MP.2**<br><br>Reason abstractly and quantitatively. | Younger students recognize that a number represents a specific quantity. They connect the quantity to written symbols. Quantitative reasoning entails creating a representation of a problem while attending to the meanings of the quantities.<br><br>First-grade students make sense of quantities and relationships while solving tasks. They represent situations by decontextualizing tasks into numbers and symbols. For example, "There are 14 children on the playground, and some children go line up. If there are 8 children still playing, how many children lined up?" Students translate the problem into the situation equation 14 – ___ = 8, then into the related equation 8 + ___ = 14, and then solve the task. Students also contextualize situations during the problem-solving process. For example, students refer to the context of the task to determine they need to subtract 8 from 14, because the number of children in line is the total number less the 8 who are still playing. To reinforce students' reasoning and understanding, teachers might ask, "How do you know" or "What is the relationship of the quantities?"<br><br>Students might also reason about ways to partition two-dimensional geometric figures into halves and fourths. |
| **MP.3**<br><br>Construct viable arguments and critique the reasoning of others. | First-graders construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They practice mathematical communication skills as they participate in mathematical discussions involving questions such as "How did you get that?" or "Explain your thinking" and "Why is that true?" They explain their own thinking and listen to the explanations of others. For example, "There are 9 books on the shelf. If you put some more books on the shelf and there are now 15 books on the shelf, how many books did you put on the shelf?" Students might use a variety of strategies to solve the task and then share and discuss their problem-solving strategies with their classmates. |

**Table 1-2** *(continued)*

| Standards for Mathematical Practice | Explanation and Examples |
|---|---|
| **MP.4**<br>Model with mathematics | In the early grades, students experiment with representing problem situations in multiple ways, including writing numbers, using words (mathematical language), drawing pictures, using objects, acting out, making a chart or list, or creating equations. Students need opportunities to connect the different representations and explain the connections. They should be able to use any of these representations as needed.<br><br>First-grade students model real-life mathematical situations with an equation and check to make sure equations accurately match the problem context. Students use concrete models and pictorial representations while solving tasks and also write an equation to model problem situations. For example, to solve the problem, "There are 11 bananas on the counter. If you eat 4 bananas, how many are left?", students could write the equation 11 – 4 = 7. Students should be encouraged to answer questions such as "What math drawing or diagram could you make and label to represent the problem?" or "What are some ways to represent the quantities?" |
| **MP.5**<br>Use appropriate tools strategically. | Students begin to consider the available tools (including estimation) when solving a mathematical problem and decide when particular tools might be helpful. For instance, first-graders decide it might be best to use colored chips to model an addition problem.<br><br>Students use tools such as counters, place-value (base-ten) blocks, hundreds number boards, concrete geometric shapes (e.g., pattern blocks or three-dimensional solids), and virtual representations to support conceptual understanding and mathematical thinking. Students determine which tools are appropriate to use. For example, when solving 12 + 8 = ____, students might explain why place-value blocks are appropriate to use to solve the problem. Students should be encouraged to answer questions such as "Why was it helpful to use _____?" |
| **MP.6**<br>Attend to precision. | As young children begin to develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and when they explain their own reasoning.<br><br>In grade one, students use precise communication, calculation, and measurement skills. Students are able to describe their solution strategies for mathematical tasks using grade-level-appropriate vocabulary, precise explanations, and mathematical reasoning. When students measure objects iteratively (repetitively), they check to make sure there are no gaps or overlaps. Students regularly check their work to ensure the accuracy and reasonableness of solutions. |
| **MP.7**<br>Look for and make use of structure. | First-grade students look for patterns and structures in the number system and other areas of mathematics. While solving addition problems, students begin to recognize the commutative property—for example, 7 + 4 = 11, and 4 + 7 = 11. While decomposing two-digit numbers, students realize that any two-digit number can be broken up into tens and ones (e.g., 35 = 30 + 5, 76 = 70 + 6). Grade-one students make use of structure when they work with subtraction as an unknown addend problem. For example, 13 – 7 = ____ can be written as 7 + ____ = 13 and can be thought of as "How much more do I need to add to 7 to get to 13?" |

**Table 1-2** *(continued)*

| Standards for Mathematical Practice | Explanation and Examples |
|---|---|
| **MP.8**<br><br>Look for and express regularity in repeated reasoning. | In the early grades, students notice repetitive actions in counting and computation. When children have multiple opportunities to add and subtract 10 and multiples of 10, they notice the pattern and gain a better understanding of place value. Students continually check their work by asking themselves, "Does this make sense?"<br><br>Grade-one students begin to look for regularity in problem structures when solving mathematical tasks. For example, students add three one-digit numbers by using strategies such as "make a ten" or doubles. Students recognize when and how to use strategies to solve similar problems. For example, when evaluating 8 + 7 + 2, a student may say, "I know that 8 and 2 equals 10, then I add 7 to get to 17. It helps if I can make a ten out of two numbers when I start." Students use repeated reasoning while solving a task with multiple correct answers—for example, the problem "There are 12 crayons in the box. Some are red and some are blue. How many of each color could there be?" For this particular problem, students use repeated reasoning to find pairs of numbers that add up to 12 (e.g., the 12 crayons could include 6 of each color [6 + 6 = 12], 7 of one color and 5 of another [7 + 5 = 12], and so on). Students should be encouraged to answer questions such as "What is happening in this situation?" or "What predictions or generalizations can this pattern support?" |

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

## Standards-Based Learning at Grade One

The following narrative is organized by the domains in the Standards for Mathematical Content and highlights some necessary foundational skills from previous grade levels. It also provides exemplars to explain the content standards, highlight connections to 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 1-1).

### Domain: Operations and Algebraic Thinking

In kindergarten, students added and subtracted small numbers and developed fluency with these operations with whole numbers within 5. A critical area of instruction for students in grade one is to develop an understanding of and strategies for addition and subtraction within 20. First-grade students also become fluent with these operations within 10.

Students in first grade represent word problems (e.g., using objects, drawings, and equations) and relate strategies to a written method to solve addition and subtraction word problems within 20 (**1.OA.1–2▲**). Grade-one students extend their prior work in three major and interrelated ways:

- They use Level 2 and Level 3 problem-solving methods to extend addition and subtraction problem solving from within 10, to problems within 20 (see table 1-3).
- They represent and solve for all unknowns in all three problem types: add to, take from, and put together/take apart (see table 1-4).
- They represent and solve a new problem type: "compare" (see table 1-5).