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

Table 2-2. Standards for Mathematical Practice—Explanation and Examples for Grade Two

Standards for Mathematical Practice	Explanation and Examples
MP.1 Make sense of problems and persevere in solving them.	In grade two, students realize that doing mathematics involves reasoning about and solving problems. Students explain to themselves the meaning of a problem and look for ways to solve it. They 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?" They make conjectures about the solution and plan out a problem-solving approach.
MP.2 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. Students represent situations by decontextualizing tasks into numbers and symbols. For example, a task may be presented as follows: "There are 25 children in the cafeteria, and they are joined by 17 more children. How many students are in the cafeteria?" Students translate the situation into an equation (such as 25 + 17 = ___) and then solve the problem. Students also contextualize situations during the problem-solving process. To reinforce students' reasoning and understanding, teachers might ask, "How do you know?" or "What is the relationship of the quantities?"
MP.3 Construct viable arguments and critique the reasoning of others.	Grade-two students may construct arguments using concrete referents, such as objects, pictures, math drawings, and actions. They practice their mathematical communication skills as they participate in mathematical discussions involving questions such as "How did you get that?", "Explain your thinking," and "Why is that true?" They not only explain their own thinking, but also listen to others' explanations. They decide if the explanations make sense and ask appropriate questions. Students critique the strategies and reasoning of their classmates. For example, to solve 74 – 18, students might use a variety of strategies and discuss and critique each other's reasoning and strategies.
MP.4 Model with mathematics.	In 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.

Table 2-2 *(continued)*

Standards for Mathematical Practice	Explanation and Examples
	Students model real-life mathematical situations with an equation and check to make sure that their equation accurately matches the problem context. They use concrete manipulatives or math drawings (or both) to explain the equation. They create an appropriate problem situation from an equation. For example, students create a story problem for the equation 43 +☐ = 82, such as "There were 43 mini-balls in the machine. Tom poured in some more mini-balls. There are 82 mini-balls in the machine now. How many balls did Tom pour in?" 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 Use appropriate tools strategically.	In second grade, students consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be better suited than others. For instance, grade-two students may decide to solve a problem by making a math drawing rather than writing an equation. Students may use tools such as snap cubes, place-value (base-ten) blocks, hundreds number boards, number lines, rulers, virtual manipulatives, diagrams, and concrete geometric shapes (e.g., pattern blocks, three-dimensional solids). Students understand which tools are the most appropriate to use. For example, while measuring the length of the hallway, students are able to explain why a yardstick is more appropriate to use than a ruler. Students should be encouraged to answer questions such as, "Why was it helpful to use _____ ?"
MP.6 Attend to precision.	As 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. Students communicate clearly, using grade-level-appropriate vocabulary accurately and precise explanations and reasoning to explain their process and solutions. For example, when measuring an object, students carefully line up the tool correctly to get an accurate measurement. During tasks involving number sense, students consider if their answers are reasonable and check their work to ensure the accuracy of solutions.
MP.7 Look for and make use of structure.	Grade-two students look for patterns and structures in the number system. For example, students notice number patterns within the tens place as they connect counting by tens to corresponding numbers on a hundreds chart. Students see structure in the base-ten number system as they understand that 10 ones equal a ten, and 10 tens equal a hundred. Teachers might ask, "What do you notice when _____ ?" or "How do you know if something is a pattern?" Students adopt mental math strategies based on patterns (making ten, fact families, doubles). They use structure to understand subtraction as an unknown addend problem (e.g., 50 – 33 = __ can be written as 33 + __ = 50 and can be thought of as "How much more do I need to add to 33 to get to 50?").
MP.8 Look for and express regularity in repeated reasoning.	Second-grade students notice repetitive actions in counting and computation (e.g., number patterns to count by tens or hundreds). Students continually check for the reasonableness of their solutions during and after completion of a task by asking themselves, "Does this make sense?" 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.