

## 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 7-2 presents examples of how the MP standards may be integrated into tasks appropriate for students in grade seven. (Refer to the Overview of the Standards Chapters for a complete description of the MP standards.)

**Table 7-2. Standards for Mathematical Practice—Explanation and Examples for Grade Seven**

Standards for Mathematical Practice	Explanation and Examples
<p><b>MP.1</b> Make sense of problems and persevere in solving them.</p>	<p>In grade seven, students solve problems involving ratios and rates and discuss how they solved them. Students solve real-world problems through the application of algebraic and geometric concepts. They seek the meaning of a problem and look for efficient ways to represent and solve it. They may check their thinking by asking themselves “Does this make sense?” or “Can I solve the problem in a different way?” When students compare arithmetic and algebraic solutions to the same problem (7.EE.4a▲), they identify correspondences between different approaches.</p>
<p><b>MP.2</b> Reason abstractly and quantitatively.</p>	<p>Students represent a wide variety of real-world contexts through the use of real numbers and variables in mathematical expressions, equations, and inequalities. Students contextualize to understand the meaning of the number or variable as related to the problem and decontextualize to manipulate symbolic representations by applying properties of operations.</p>
<p><b>MP.3</b> Construct viable arguments and critique the reasoning of others.</p>	<p>Students construct arguments with verbal or written explanations accompanied by expressions, equations, inequalities, models, graphs, and tables. They further refine their mathematical communication skills through mathematical discussions in which they critically evaluate their own thinking and the thinking of other students. For example, as students notice when geometric conditions determine a unique triangle, more than one triangle, or no triangle (7.G.2), they have an opportunity to construct viable arguments and critique the reasoning of others. Students should be encouraged to answer questions such as these: “How did you get that?” “Why is that true?” “Does that always work?”</p>
<p><b>MP.4</b> Model with mathematics.</p>	<p>Seventh-grade students model real-world situations symbolically, graphically, in tables, and contextually. Students form expressions, equations, or inequalities from real-world contexts and connect symbolic and graphical representations. Students use experiments or simulations to generate data sets and create probability models. Proportional relationships present opportunities for modeling. For example, for modeling purposes, the number of people who live in an apartment building might be taken as proportional to the number of stories in the building. Students should be encouraged to answer questions such as “What are some ways to represent the quantities?” or “How might it help to create a table, chart, or graph?”</p>

**Table 7-2 (continued)**

Standards for Mathematical Practice	Explanation and Examples
<p><b>MP.5</b> Use appropriate tools strategically.</p>	<p>Students consider available tools (including estimation and technology) when solving a mathematical problem and decide if particular tools might be helpful. For instance, students in grade seven may decide to represent similar data sets using dot plots with the same scale to visually compare the center and variability of the data. Students might use physical objects, spreadsheets, or applets to generate probability data and use graphing calculators or spreadsheets to manage and represent data in different forms. Teachers might ask, “What approach are you considering?” or “Why was it helpful to use _____?”</p>
<p><b>MP.6</b> Attend to precision.</p>	<p>Students continue to refine their mathematical communication skills by using clear and precise language in their discussions with others and in their own reasoning. Students define variables, specify units of measure, and label axes accurately. Students use appropriate terminology when referring to rates, ratios, probability models, geometric figures, data displays, and components of expressions, equations, or inequalities. Teachers might ask, “What mathematical language, definitions, or properties can you use to explain _____?”</p>
<p><b>MP.7</b> Look for and make use of structure.</p>	<p>Students routinely seek patterns or structures to model and solve problems. For instance, students recognize patterns that exist in ratio tables, making connections between the constant of proportionality in a table with the slope of a graph. Students apply properties to generate equivalent expressions and solve equations. Students compose and decompose two- and three-dimensional figures to solve real-world problems involving scale drawings, surface area, and volume. Students examine tree diagrams or systematic lists to determine the sample space for compound events and verify that they have listed all possibilities. Solving an equation such as <math>8 = 4\left(x - \frac{1}{2}\right)</math> is easier if students can see and make use of structure, temporarily viewing <math>\left(x - \frac{1}{2}\right)</math> as a single entity.</p>
<p><b>MP.8</b> Look for and express regularity in repeated reasoning.</p>	<p>In grade seven, students use repeated reasoning to understand algorithms and make generalizations about patterns. After multiple opportunities to solve and model problems, they may notice that <math>\frac{a}{b} = \frac{c}{d}</math> if and only if <math>ad = bc</math> and construct other examples and models that confirm their generalization. Students should be encouraged to answer questions such as “How would we prove that _____?” or “How is this situation both similar to and different from other situations using these operations?”</p>

Adapted from Arizona Department of Education (ADE) 2010, Georgia Department of Education 2011, and North Carolina Department of Public Instruction (NCDPI) 2013b.

## Standards-Based Learning at Grade Seven

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 7-1).