



## How to Help Students Succeed on Math Assessments: Standards of Mathematical Practice

The standards in mathematics include both **Content Standards** and **Practice Standards**. These standards outline what students should know at the end of each grade and what they should do while learning math. Standards also collectively define the math skills that students need to succeed in college, career and life.

There are two types of math standards: Content Standards and the Standards of Mathematical Practice. **Content Standards** define the knowledge and skills students are expected to learn. The Content Standards are sometimes described as the “nouns” of the learning. The **Standards of Mathematical Practice (SMP)** describe how students learn and how they demonstrate their understanding. The SMPs are sometimes described as the “verbs” of learning.

### What Are the Mathematical Practices? ●

There are eight Mathematical Practices that span grades K-12. The practices describe the behaviors that students engage in and develop in conjunction with the math content.

The SMPs offer the chance to reflect on the way mathematics is taught and provide a focus on developing students to become “practitioners of the discipline of mathematics” (CCSSI 2010, p. 8) rather than consumers of mathematics. Teaching them, however, requires explicit planning. Considerations should be made not just in terms of what content is to be taught but also how to facilitate critical thinking, perseverance, reasoning and problem-solving.



Incorporating Mathematical Practices into your planning and instruction holds unique learners to high expectations, giving them greater opportunity to achieve content standards and build confidence in their abilities.

The following chart briefly describes the Standards of Mathematical Practice and also provides an example of a student statement that aligns with the practice.

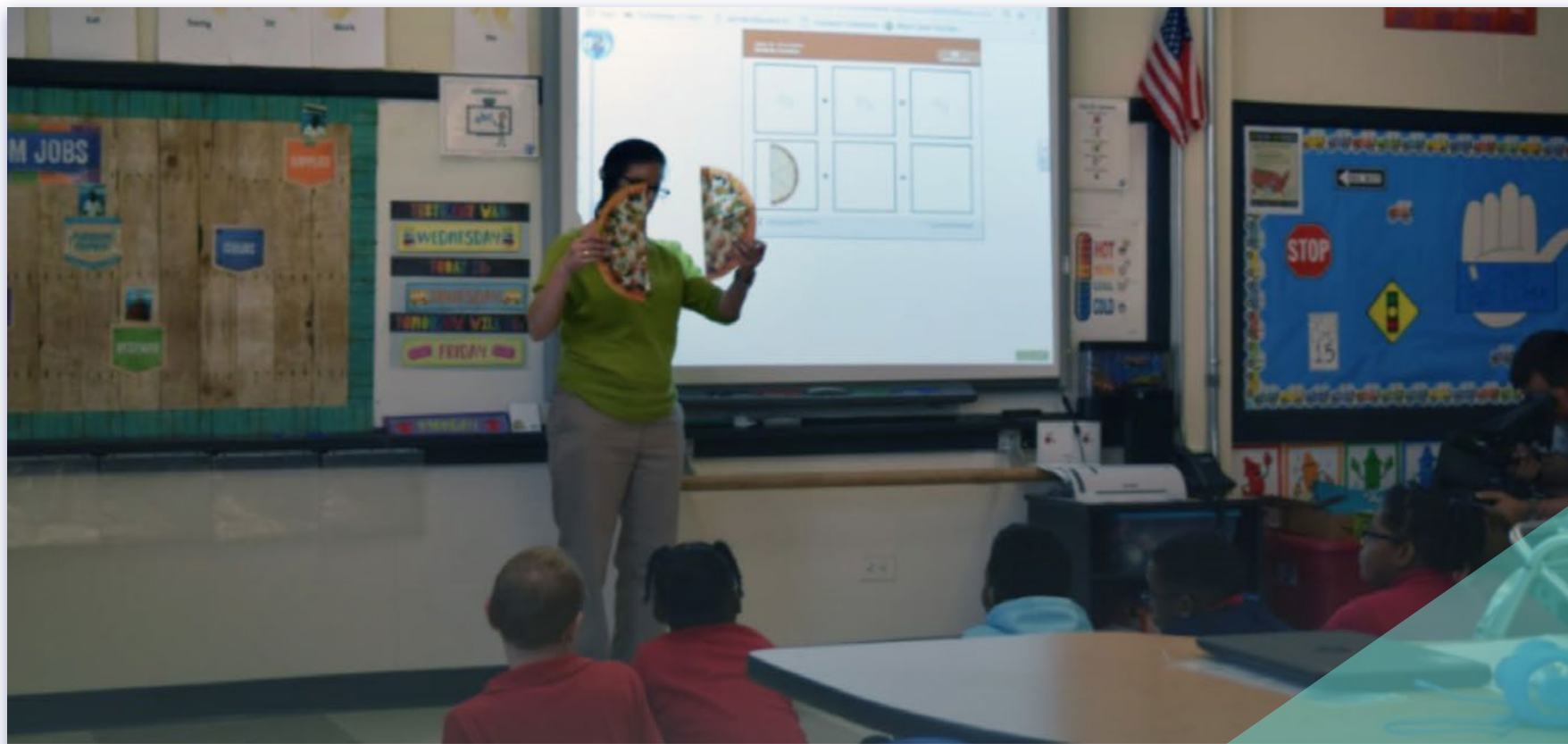
Mathematical Practices	Example of Student Statements						
<p>1. Make sense of problems and persevere in solving them.</p> <div data-bbox="208 646 688 971"> <p><b>Solving Math Problems</b></p> <p>Solving math problems can be challenging.</p> <p>Sometimes I know exactly what to do and other times I have to try more than once. Even though it can be frustrating, I know I can do it!</p> </div>	<p>I can work to understand the problem, find an entry point, work hard to solve, and reflect.</p> <div data-bbox="811 646 1345 971"> <p><b>Draw a Picture to Understand the Problem</b></p> <p>Sometimes drawing a picture of what is happening in the problem helps me better understand how to solve it.</p> <table border="1"> <tr> <td>Read the problem.</td> <td></td> </tr> <tr> <td>Underline important information.</td> <td></td> </tr> <tr> <td>Draw a picture to match the problem.</td> <td></td> </tr> </table> </div>	Read the problem.		Underline important information.		Draw a picture to match the problem.	
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Draw a picture to match the problem.							
2. Reason abstractly and quantitatively.	I can make connections between numbers/symbols and words/situations and vice versa.						
3. Construct arguments and critique reasoning of others.	I can discuss (talk and listen) mathematics with others.						
4. Model with mathematics.	I can recognize math in the real world around me. I can use math to solve everyday problems.						
5. Use appropriate tools strategically.	I can select appropriate math tools to help me solve problems.						
6. Attend to precision.	I am precise in math and explanations. I use math vocabulary, math symbols, and I label my thinking to show my understanding.						
7. Look for and make use of structure.	I can use what I already know to solve a new problem.						
8. Look for and express regularity in repeated reasoning.	I can see patterns and apply those to other problems.						

Whether they're a part of instruction, independent practice, or high-stakes assessments, Standards of Mathematical Practice teach students powerful skills and deepen their understanding of math.

For unique learners, Standards of Mathematical Practice can and should be differentiated and modified to meet their strengths and needs.

## Why Are the SMPs Important?

The Standards of Mathematical Practice are what it means to **do** math. These practices describe the **thinking processes** we want to develop in our students, no matter what grade, what curriculum, or what topic they are learning. These standards should empower them to use math and to think critically about the world around them.



The **thinking processes** provide natural opportunities to build a community of learning among peers, in which students have discussions and collaborate while building their math skills.

## What Do the Thinking Processes Look and Sound Like?

### Students are...

- engaged in relevant problem solving.
- monitoring their thinking/strategies by asking themselves, "Does my answer make sense?"
- using a variety of means (objects, manipulatives, drawings, diagrams, graphs, numbers, etc.) to represent concepts.
- discussing their thinking with peers.
- applying prior knowledge to solve similar problems.
- noticing patterns or relationships.

### Teachers are...

- providing opportunities that engage students in rich mathematical problems.
- promoting a classroom environment where the problem-solving process is taught and celebrated, rather than an environment that only celebrates finding the correct answer.
- asking students questions in order to prompt their thinking/learning further.
- providing opportunities for students to discuss their thinking and to listen to the thinking of others.
- encouraging multiple representations of concepts.
- making connections between multiple representations to develop meaning.

Effectively address the variety of individual student needs with n2y's engaging, research- and evidence-based solutions.