

Standards for Mathematical Practice

Tools for Teaching the Practices

Pre-K through High School

The Standards for Mathematical Practice

At their core, the Standards for Mathematical Practice support mathematical metacognition. Metacognition is related to the concept of student ownership—a mindset that leads to elevated academic achievement. Students who own their learning are not thinking on a superficial level. They can state what they are learning and why, can explain how they learn best, can articulate when they are learning and when they are struggling, and understand their role in any academic setting. This is one type of “thinking about thinking” that leads to greater academic success.

THE STANDARDS FOR MATHEMATICAL PRACTICE

Practice
1

Make sense of problems and persevere in solving them.

Practice
2

Reason abstractly and quantitatively.

Practice
3

Construct viable arguments and critique the reasoning of others.

Practice
4

Model with mathematics.

Practice
5

Use appropriate tools strategically.

Practice
6

Attend to precision.

Practice
7

Look for and make use of structure.

Practice
8

Look for and express regularity in repeated reasoning.

Fostering metacognition requires a balance of explicit instruction, teacher modeling, student-centered exploration, and responsive coaching that helps students first identify the thought processes they can apply, and then grow to use them on their own. Teachers, especially teachers of young children, will provide much more guidance, modeling, and support when teaching these processes, than teachers in the upper grades.

This guide provides tools for supporting students' metacognition as you teach the Standards for Mathematical Practice. For each standard you will find, a step-by-step process for learning the practice and a customized reflection that supports metacognition. On the back cover you will find the Student Ownership Statements that students will use when they are owning their learning of that practice.

Process 1 Make sense of problems and persevere in solving them.
"I can determine what the problem is asking me to do and not give up until I've solved it."

Process to make sense of problems:

1. Read the problem out loud.
2. Highlight and clarify each word that tells you what to do mathematically.
3. Explain the problem in your own words.
4. Explain how you will know you have solved the problem correctly.

Process to persevere in solving them:

1. Make a plan for solving the problem.
2. Begin to solve the problem.
3. Each time you get stuck, identify where you got stuck.
4. Ask for help as needed.
5. Keep working until you've solved the problem correctly.

A step-by-step process for initial instruction, modeling, and guiding students to master the mathematical practice

Reflection 1 Make sense of problems and persevere in solving them.
"I can determine what the problem is asking me to do and not give up until I've solved it."

	1	2	3	4	5
	never	sometimes	often	always	every day
▶ To what degree can you determine what the problem is asking you to do and not give up until you've solved it?					
▶ What does "make sense of problems" mean?					
▶ What does "persevere in solving them" mean?					
▶ How do you determine what the problem is asking you to do?					
▶ How do you not give up until you've solved the problem?					
▶ How does "making sense of problems and persevering in solving them" help you?					

A customized reflection to support students as they "think about their thinking" and where they are in the mastery of the mathematical practice

Student Ownership Statements that indicate when students are owning their learning of the mathematical practice

Student Ownership Statements

- 1 I can determine what the problem is asking me to do and not give up until I've solved it.
- 2 I can make sense of quantities and use math symbols, numbers, or words to represent and solve problems.
- 3 I can justify my conclusions with evidence from my work, and I can listen to or read others' arguments and decide if they make sense.
- 4 I can use what I know about math symbols, words, pictures, tools, and diagrams to solve everyday problems.
- 5 I can determine which tools are the right ones to use when solving problems.
- 6 I can communicate precisely what I'm doing and explain my thinking using mathematical language.
- 7 I can determine overall structures and patterns to help me solve problems.
- 8 I can use what I already know about problem solving strategies, patterns, and other shortcuts to solve problems.

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