

Standards for Mathematical Practice

How you should *learn* mathematics

1. **Make Sense of Problems and Persevere in solving them.**
 ...
 Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables and graphs.
 ...
 Mathematically proficient students check their answers using a different method, and they continually ask themselves, "Does this make sense?"
 ...
2. **Reason abstractly and quantitatively.**
3. **Construct viable arguments and critique reasoning of others.**
 Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments.
 ...
 Mathematically proficient students are also able to ... distinguish correct logic or reasoning from that which is flawed
 ...
4. **Model with mathematics.**
5. **Use appropriate tools strategically.**
6. **Attend to precision.**
 Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning.
 ...
 In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
7. **Look for and make use of structure.**
8. **Look for and express regularity in repeated reasoning.**
 Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts.

"The Standards for Mathematical Practice describe ways in which developing student practitioners of the discipline of mathematics increasingly ought to engage with the subject matter as they grow in mathematical maturity and expertise throughout the elementary, middle, and high school years."
 "The Standards for Mathematical Content are a balanced combination of procedure and understanding."

From the Massachusetts curriculum framework for mathematics

Mathematics Teaching Practices

How you should *teach* mathematics

1. Establish Mathematics Goals to Focus Learning

establish clear goals for the material that students are learning, situate goals within learning progressions, and use goals to guide instructional decisions.

2. Implement tasks that promote reasoning and problem solving

engage students in solving and discussing tasks that promote mathematical reasoning and problem solving and allow multiple entry points and varied solution strategies

3. Use and connect mathematical representations

engage students in making connections among math representations to deepen understanding of math concepts and procedures and as tools for problem solving

4. Facilitate meaningful mathematical discourse

facilitate discourse among students to build shared understanding of math ideas by analyzing and comparing student approaches and arguments

5. Pose purposeful questions

use purposeful questions to assess and advance students' reasoning and sense making about mathematical ideas and relationships

6. Build procedural fluency from conceptual understanding

build fluency with procedures **on a foundation** of conceptual understanding **so that** students, over time, become skillful in using procedures flexibly as they solve contextual and mathematical problems

7. Support productive struggle in learning mathematics

consistently provide students with opportunities and supports to engage in productive struggle as they grapple with math ideas and relationships

8. Elicit and use evidence of student thinking

use evidence of student thinking to assess progress toward mathematical understanding and adjust instruction continually in ways that support and extend learning

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