

As you arrive...



Review the yellow handout with the descriptions of the eight Standards for Mathematical Practice (SMP).

Think about how you would complete these sentences:

- Something I know about the SMP is...
- One challenge I have experienced/seen around teaching with the SMP in mind...



Planning Instruction to Engage Students in the Standards for Mathematical Practice

Victor Mateas

Who?



Paul Goldenberg, Al Cuoco, Mark Driscoll, June Mark, Deborah Spencer, Katherine Schwinden, Victor Mateas, Johannah Nikula, Matt McLeod, Jane Kang, Mary Fries

Advisors: *Diane Briars, Dan Chazan, Brad Findell, Bill McCallum, Barbara Reys, Mike Shaughnessy*



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Project Goals



- Increase awareness of the Standards for Mathematical Practice (SMP)
- Support understanding of the SMP connected to content standards
- Cultivate teachers' capacity to identify these SMP in student thinking
- **Develop teachers' ability to plan instruction to support these SMP**

Plan for Session

- **Background:** Learn about resources we are developing to support teacher learning and implementation of the SMP.
- **Experience:**
 - Engage as learners in one mathematics task.
 - Engage as teachers in a planning activity for the same task.
 - Look at some example student work (time permitting)
- **Debrief Supports for Teachers:** Discuss ways to support teachers using these resources in your settings.

Illustrations of the SMP

- 30+ Illustrations developed and reviewed to date
(mathpractices.edc.org; see bookmark with QR code)
- Illustrations include math tasks, student dialogues, teacher reflection questions, math overviews, and student questions
 - Grade levels from 5-10
 - Number, algebra, geometry, data and statistics
 - Range of tasks, both open and close ended
 - Multiple SMP per Illustration; multiple Illustrations for each SMP
- Development included input and review from:
 - Middle and high school mathematics teachers
 - Mathematicians and mathematics educators

Implementing the Mathematical Practice Standards

5. Use appropriate tools strategically.



[Login](#) [Sign up](#)

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Need help understanding the mathematical practices?

Explore this site to learn more about the Common Core Standards for Mathematical Practice (SMP) and how they can be connected to the content standards. Use our Illustrations, centered on student dialogues, to see the Standards for Mathematical Practice in action.

[See All Illustrations](#)



About Illustrations

Each Illustration of the Standards for Mathematical Practice (SMP) consists of a mathematics task; a student dialogue based on that task; information about grade level, standards, and the context for the dialogue; teacher reflection questions; a mathematical overview; and optional student materials. While the primary use of Illustrations is for teacher learning about the SMP, some components are designed for classroom use with students. Go to "Browse Illustrations" to find Illustrations for particular SMP.

About the Project

Implementing the Mathematical Practice Standards is an EDC project funded by the National Science Foundation to develop Illustrations of the

Spotlight on...

Mathematical Practice 1: Make sense of problems and persevere in solving them.

[Choosing Samples](#)

In this Illustration students are investigating what samples of 5 rectangles will give them the best estimate of the average area of a set of 100 rectangles. They generate and test two ideas for how to take samples—having their peers choose 5 random numbers and using those numbers to select samples and having their peers choose 5 rectangles by looking at the rectangles—and then they begin to discuss the difference in the two estimates their two methods generate.



Browse Illustrations

Click on one of the Standards for Mathematical Practice (SMP) below to view a list of matching Illustrations, or else [See All Illustrations](#).



MP 1: Make sense of problems and persevere in solving them.



MP 2: Reason abstractly and quantitatively.



MP 3: Construct viable arguments and critique the reasoning of others.



MP 4: Model with mathematics.



MP 5: Use appropriate tools strategically.



MP 6: Attend to precision.



MP 7: Look for and make use of structure.



MP 8: Look for and express regularity in repeated reasoning.

Results

Displaying 1 - 10 of 31

Title	Mathematical Practice Standards	Grade Level	Content Domain
Choosing Samples	MP 1: Make sense of problems and persevere in solving them. MP 3: Construct viable arguments and critique the reasoning of others. MP 6: Attend to precision.	Grade 6 Grade 7	Statistics and Probability

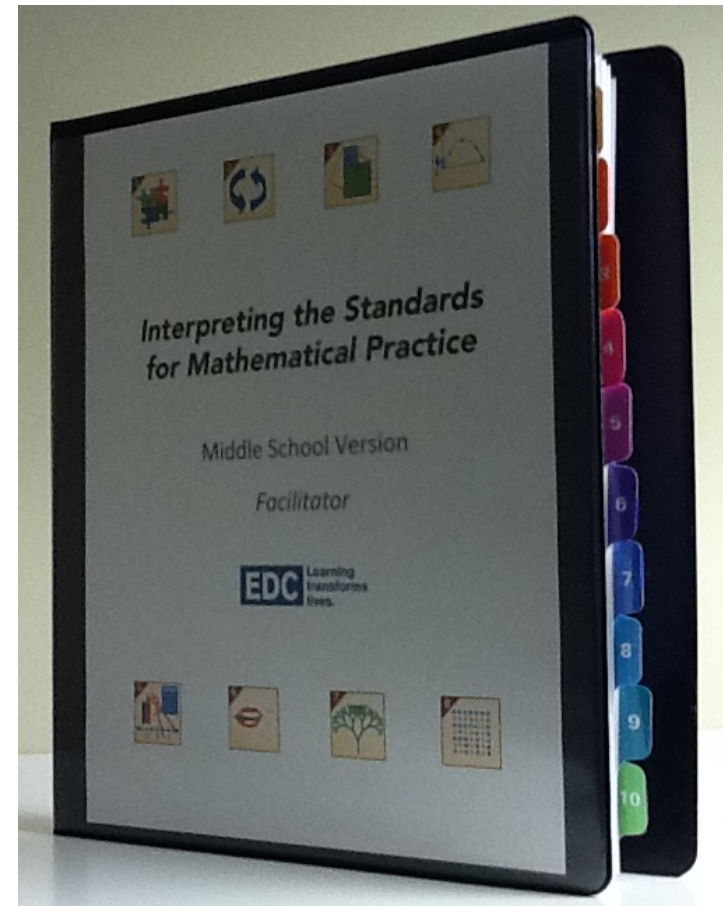
Professional Development

Materials for 20 Hour Professional Development Course (MS & HS Versions)

Three Main Activity Types:

- Doing and Discussing Mathematics
- Analyzing Artifacts of Student Thinking
- Connecting to Classroom Practice

Field tested in 7 states with over 400 teachers



Structure of the PD Course



- Ten two-hour sessions
 - Sessions 1 and 2: Introduction
 - Sessions 3-6: SMP in Algebra and Functions Contexts
 - Sessions 7-9: SMP in Geometry Contexts
 - Session 10: SMP in Statistics Context and Conclusion
- All eight Standards for Mathematical Practice highlighted over time – not every SMP in every session.

Rectangle with the Same Numerical Area and Perimeter: Math Task

Find the dimensions of all rectangles whose area and perimeter have the same numerical value.

Work individually for 5 min (quietly), then in pairs (loudly 😊).
Keep track of thinking, questions, wrong turns, etc.

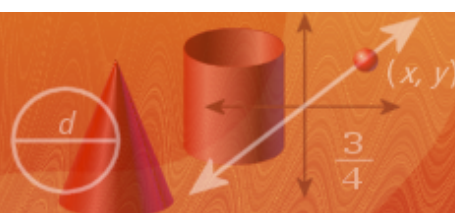
Rectangle with the Same Numerical Area and Perimeter: Discussing Mathematics

- How did you start out thinking about the task?
- How did your thinking change, and what prompted that change?
- What conjectures, conclusions, and questions have you generated?

Rectangle with the Same Numerical Area and Perimeter: Reflecting on the SMP

What evidence of the SMP did you see in...

- 1) Your own work on the task?
- 2) Colleagues' work on the task?



Rectangles with the Same Numerical Area and Perimeter

Mathematics Task and Student Dialogue

Targeted Standards »

Teacher Reflection Questions »

Mathematical Overview »

Student Materials »

The mathematics task is intended to be a problem or question that encourages the use of mathematical practices. The dialogue is meant to show how students might engage in the mathematical practices as they work on the task. Before reading the dialogue, work on the mathematics task. Next reflect on the mathematical practices you engaged in while working on the task. Finally read the student dialogue.

Mathematics Task

Find the dimensions of all rectangles whose area and perimeter have the same numerical value.

Student Dialogue

The students in this dialogue know how to determine the area and perimeter of rectangles, and have experience with manipulating equations. This dialogue comes at a time of year when students are studying rational expressions.

[Open Student Dialogue \(in its own window\)](#)
[Jump to Comment section](#)



- (1) *Lee* Let's start by finding at least one that works.
- (2) *Chris* OK, so let's start with squares. All the sides are the same in squares.
- (3) *Lee* We don't care that all the sides are the same! We want the numerical value of the **area** and the **perimeter** to be the same.
- (4) *Matei* We can still start with squares and see if they work.

Planning with the SMP in Mind



Some guiding principles...

Planning with the SMP in Mind



1. Focus on student thinking
 - SMP are exhibited in student thinking
 - What do we expect students will think?
 - What do we want students to be thinking?
2. Plan at task-level
 - Encourages anticipation of student thinking
 - Site of interaction between student and mathematics
3. Set both content and **practice** goals
 - Deliberate instruction in both is needed

Planning Protocol



- Incorporates the three guiding principles
- Does not represent “the only way”
- Adaptable (e.g., IEP goals)
- Potential use: individuals, CPT, coaching, PD

Planning Protocol



- (1) Where does the task fit in a curricular sequence?
- (2) Identify goals related to SMP and mathematical content; what evidence shows that goals will be met
- (3) Consider modifications to engage students in SMP
- (4) Anticipate student thinking and strategies to support students to engage in the SMP
- (5) & (6) Launching and debriefing the task

Try the Planning Protocol

- In pairs:
 - Think back to your experience solving the task
 - Use the protocol to plan use of task with students
 - Focus on questions:
 - 2 (goals)
 - 4 (anticipation/strategies)
 - 5/6 (launch and debrief)
- Whole group:
 - Share plans and get feedback

Discuss Plans and Get Feedback

- Share one content and one SMP goal and how students demonstrate mastery of those goals (#2)
 - Group discussion: What other goals are appropriate? What else might students do, say, or write in relation to these goals?
- Share an anticipated challenge or struggle (#4)
 - Group discussion: Ideas for how to address? What question might you ask?
- Share a way you plan to launch or debrief (#5-6)
 - Group discussion: How does this launch or debrief support the SMP? What suggestions do you have?

Debrief about Supporting Teachers



What do you want to keep in mind as you plan instruction that engages students in the SMP?

A Look at What Students Did



- Take a look at both pieces of student work.
- How are the approaches similar/different?
- What SMP (or seeds of SMP) do you see?
- What might you ask each student to push their thinking or use of an SMP forward?

Implementing the Mathematical Practice Standards



Email: vmateas@edc.org

mathpractices.edc.org (QR code on bookmark)

Questions?

Thank you!