

# Louisiana Believes

**Common Core State Standards for Mathematics**

*TEACHER SELF-LEARNING SERIES*

**Module 6**

**Standards for Mathematical Practice – Implementation in the Classroom**

# COMMON CORE STATE STANDARDS for Mathematics

## TEACHER LEARNING SERIES

### Module 6: Standards for Mathematical Practice - Implementation in the Classroom

**Time Frame:** Approximately 1.5 hours

**Audience:** Teachers, principals, and additional school faculty of all grade levels and all content areas (having a partner or completing this module in a small group would be beneficial)

**Module Description:** This module assumes that the information presented in previous modules is well known to the learner. Module 6 is the third of three modules (4, 5, and 6) designed to provide an in-depth look at the Standards of Mathematical Practice which are part of the Common Core State Standards for Mathematics. Module 6 focuses on strategies for implementing the practices in the classroom, determining the degree of students' progress towards meeting the practices, and using an observation tool to ensure that practices are evident in a classroom.

**Course Objectives:** By the end of the module, the learner will be able to:

- a. understand how to determine the progress that a student is making in meeting a practice.
- b. state how specific instructional strategies are used to promote the use of practices and increase student achievement.
- c. use an observation tool to identify ways to make math practices visible to observers in the classroom and to assist in understanding the meanings of the practices.

**Materials Needed to Complete Module:** copy of the Common Core State Standards for Mathematics, access to the Internet, Math Practice Progressions (links provided in document), The Standards for Mathematical Practice in bulleted format posted at <http://tinyurl.com/ay9n5du> (optional)

**Pre-Assessment:** Those who can answer the questions below with confidence may want to skip this module. Because there is new material presented in the module, it is anticipated that most learners will not have encountered as much of the content as in past modules.

1. What are the primary purposes of using the instructional strategy of “allowing students to struggle” with regard to attaining the Standards for Mathematical Practice?
2. If a student can use appropriate symbols, vocabulary, and labeling to effectively communicate and exchange ideas, to what Math Practice does this proficiency apply and what degree of proficiency is the student demonstrating?
3. What are “look fors?”
4. Describe at least three resources that are available to help teachers and/or students to better understand the Standards for Mathematical Practice.

**Resources:**

- Hull, Ted H., Ruth H. Miles, and Don S. Balka. *The Common Core State Standards: Transforming Practice through Team Leadership* (Thousand Oaks: Corwin, 2012)

**Introduction**

Modules 4 and 5 provided a detailed look at the Math Practices and connected the Practices to the content of the CCSSM. The role of the teacher is to plan tasks/activities that allow students to develop the behaviors and characteristics of mathematical students. Module 6 consists of two sections. The first provides an overview of instructional strategies designed to target specific practices and to gradually move students from an initial to an advanced level of proficiency. The second section provides a tool which can be used by teachers to ensure that the use of Math Practices is evident in classroom instruction.

**Strategies for Implementing the Math Practices and Evaluating Students’ Proficiencies**

In *The Common Core State Standards: Transforming Practice through Team Leadership* (Corwin, 2012), Ted H. Hull, Ruth Harbin Miles, and Don S. Balka provide two complementary forms that identify degrees of proficiencies for the practices and an instructional strategy sequence to assist teachers in transitioning to meet the expectations of the eight Standards for Mathematical Practice. The first form, *Standards of Student Practice in Mathematics Proficiency Matrix*, can be accessed at <http://tinyurl.com/aaxmabs>. The second form, *Instructional Implementation Sequence: Attaining the CCSS Mathematical Practices Engagement Strategies*, is accessible at <http://tinyurl.com/a7slxwp>. Print a copy of each of these before proceeding as you will need to reference them as you read. For the remainder of this module, these documents will be referred to as the Proficiency Matrix and the Engagement Strategies, respectively.

Read the first two pages of the Proficiency Matrix document which include some clarifying information from the authors.

Next, proceed to page three which is the first page of the actual matrix. The first two rows of the Proficiency Matrix are shown below.

	Students:	(I) = Initial	(IN) = Intermediate	(A) = Advanced
1a	Make sense of problems	Explain their thought processes in solving a problem one way. PS	Explain their thought processes in solving a problem and representing it in several ways. QW	Discuss, explain, and demonstrate solving a problem with multiple representations and in multiple ways. GE
1b	Persevere in solving them	Stay with a challenging problem for more than one attempt. QW	Try several approaches in finding a solution, and only seek hints if stuck. GE	Struggle with various attempts over time, and learn from previous solution attempts. SS

The matrix designates degrees of student proficiency as (I)initial, (IN)intermediate, (A)dvanced and provides indicators of proficiency for each Math Practice. Note that because Math Practice Standards 1 and 3 have two components, each component has been listed separately in the first column. The web version of the chart uses codes to correlate each degree for each practice to one of the Engagement Strategies. The following is a listing of the abbreviations used and their meanings in the order in which they appear in the Engagement Strategies chart:

- PS – Initiating Think Pair-Share (or pair share)
- ST – Show thinking in classrooms
- QW – Questioning and Wait Time
- GE – Grouping and engaging problems
- QP – Using questions and prompts with groups
- SS – Allowing students to struggle
- ER – Encouraging reasoning

The Proficiency Matrix works in parallel with the Engagement Strategies. “The sequence of instructional strategies...provides teachers with a progressive, developmental approach toward incorporating new instructional strategies. As strategies are incorporated and mastered, the Standards for Mathematical Practice are attained, student achievement increases, and student learning is greatly enhanced.” (p 60)

Notice that the pair-share strategy appears in only 1a and 3b in the Proficiency matrix and at the (I)ntial level. This indicates that when implemented, the think pair-share engagement strategy is useful in having students explain their thought processes in solving a problem one way, or in having students understand and discuss other ideas and approaches. Students who demonstrate that they can solve a problem one way or understand and discuss other ideas and approaches for solving a problem are at the first level of proficiency for these two practices.

Now switch to the Engagement Strategies document. Think pair-share is listed in the first row of the Engagement Strategies chart as shown below. The authors advise that the strategies be implemented in the classroom in the order presented in this chart.

### Engagement Strategies

Strategy	Description	Practice	Degree	Matrix Code
<b>Think pair-share</b>	<p>Pair-Share, or Think-Pair-Share, is a strategy easy to implement in any classroom at any grade level or subject. This strategy does not require any other change in pedagogy or materials. For pair – share, teachers merely ask a question or assign a problem and allow students to think and work with a partner for one to three minutes before requesting an answer to the question or problem. In think – pair – share students are given a brief period of time to think independently before working with a partner. While effective in results, this strategy is a significant first step in engaging all students in classroom instructional activities.</p>	<ul style="list-style-type: none"> <li>• Make sense of problems.</li> <li>• Critique the reasoning of others.</li> </ul>	<ul style="list-style-type: none"> <li>• Explain their thought processes in solving a problem one way.</li> <li>• Understand and discuss other ideas and approaches.</li> </ul>	<p><b>1a I</b></p> <p><b>3b I</b></p>

A description of the think pair-share strategy is found in column 2. The Math Practice(s) to which the strategy can be applied are in column 3. The description of what the student is expected to do is listed in column 4. Column 5 lists the code which indicates where the think pair-share strategy appears in the Proficiency Matrix. As was indicated in the Proficiency matrix, the Engagement Strategies chart show that think pair-share promotes (I)ntial understandings for practices 1a and 3b.

Teachers should work to incorporate each successive strategy with the understanding that strategies are cumulative and that each strategy supports the next one and each other. After students have had the opportunity to adjust to think pair-share, teachers should introduce the second strategy listed, show thinking in classrooms. This strategy works to bring students to the (I)ntial level in MP3a (construct viable arguments) and in MP6 (attend to the communication portion of precision) and to the (A)dvanced level in MP4 (modeling).

It is important to know how to cross reference the two charts to plan effective lessons that encourage participation, learning, and a variety of strategy usage and that target specific Standards for Mathematical

Practices. Additionally, it is understood that teachers will add strategies at different rates, strategies may have variations, and other strategies are possible. It was the goal of the writers to provide a reasonable number of strategies that could be easily managed and taught in a sequential way. Another goal is to assist teachers in planning, presenting, analyzing, and reflecting in a manageable sequence.

**Self Check:** Watch Dr. Deborah Ball, professor and mathematics education researcher at the University of Michigan, as she uses strategies for engaging students in a video posted at <http://tinyurl.com/a6zdle9>.

- Identify at least three Engagement Strategies that Dr. Ball uses with her class.
- Name the practice to which each strategy applies and identify the degree of proficiency targeted by the strategy.

It is important to closely study the two forms to understand how and when to use each strategy and the impact that each strategy has on developing mathematically proficient students. Additional information on working with the Proficiency Matrix and Engagement Strategies can be found in chapter 5 of the referenced book. There are samples of preparing and presenting lessons using the Proficiency Matrix and Engagement Strategies in chapter 6 and nine sample problems in the Appendix of the book that are intended to initiate conversations about instructional change.

### Using an Observation Tool to Ensure that Practices are Visible in the Classroom

Module 4 began by studying the Standards for Mathematical Practice to identify the roles that teachers and students have when the practices are implemented in the classroom. So how would you and others who visit your classroom know that the Math Practices are being effectively implemented? Melissa Hancock, a MSP mathematics consultant in Kansas, created the [Standards for Mathematical Practices Observation Tool](#). This tool is sometimes called the “look fors” tool as it provides listings of things that the teacher and students should be doing for each of the Math Practices to ensure that students are appropriately working towards becoming mathematically proficient students. Additionally, Ms. Hancock has created [Implementing Standards for Mathematical Practices](#). This document is a teacher planning document which provides a short bulleted summary, questions to develop mathematical thinking, and information regarding tasks and planning actions for implementing each practice. Both are these tools are valuable to teachers as they provide some suggestions with regard to the question, “Am I providing the types of opportunities and the support that reflect the shifts in the CCSSM?”

### Summary

Modules 4, 5, and 6 were designed to provide insight into the Standards for Mathematical Practices and strategies for the implementation. Those who have actively engaged in the modules should now have a good understanding of the meanings of the Math Practices for their grade and what their implementation looks like in the classroom. The Proficiency Matrix and the Engagement strategies are a starting point for creating lessons, tasks, and assessments that will provide opportunities to engage students in the Math Practices.

### Assignment

Return to the PreAssessment. You should now be able to answer questions with ease.

## Self-Check Answers

Engagement Strategies found in the Ball video include:

- think pair-share – 1a, 3b, both Initial
- encouraging reasoning – 2, 6, 7, 8, all at Advanced level
- grouping and engaging problems – 1a, Advanced; 1b, Independent, 2 Initial
- using questions and prompts with groups – 4, Independent; 7, initial
- questioning and wait time – 1a, 3a, 3b, Independent; 1b, Initial

## Summary of Resources for Math Practices

- Videos (the last two were not used in the Math Practice Modules):
  - Inside Mathematics – [www.insidemathematics.org](http://www.insidemathematics.org)
  - National Council of Supervisors of Mathematics - [www.mathedleadership.org/ccss/index.html](http://www.mathedleadership.org/ccss/index.html)
  - Hunt Institute Video Series - <http://www.youtube.com/user/TheHuntInstitute#g/u>
  - EngageNY - <http://tinyurl.com/a4py3qm>
  - The Teaching Channel - [https://www.teachingchannel.org/videos?categories=topics\\_common-core](https://www.teachingchannel.org/videos?categories=topics_common-core)
- Tasks
  - National Council of Supervisors of Mathematics - [www.mathedleadership.org/ccss/index.html](http://www.mathedleadership.org/ccss/index.html)
  - The Illustrative Mathematics Project - <http://illustrativemathematics.org/>
  - The Mathematics Assessment Project - <http://map.mathshell.org/materials/index.php>
  - K-5 Math Teaching Resources - <http://www.k-5mathteachingresources.com/>
  - NYC Department of Education - <http://tinyurl.com/72xyl78>
- Book
  - Hull, Ted H., Ruth H. Miles, and Don S. Balka. *The Common Core State Standards: Transforming Practice through Team Leadership* (Thousand Oaks: Corwin, 2012)
- General
  - Tools for the Common Core Blog - <http://commoncoretools.me/>
- Math Practice Progression Documents, Posters, Observation Tool  
<http://www.louisianabelieves.com/resources/library/common-core-state-standards-resources>