The Main Idea's PD Suggestions for Math Leaders and Math Teams

Some of the ideas below help leaders reflect on their own, some provide suggestions of what to look for in walkthroughs so leaders better understand what's currently happening with math instruction, and some are PD ideas to use with math teachers.

1. Self reflect on where you are in implementing the many roles outlined for the math leader

Throughout the book, the authors refer to "the leader's role" in implementing the CCSS for mathematics. I have compiled a list of some of those different roles below. Take a look at these roles and reflect on your own progress with each one:

- To provide a vision of what math tasks, questions, assessment, and learning should look like in the classroom
- To provide the structures, conditions, and culture necessary to shift from a focus on the individual teacher to the collaborative team
- To provide training and support for leaders of all collaborative math teams
- To ensure that mathematics collaborative teams are focusing on the *right*, high-leverage actions (common lessons, common assessments, common rigorous tasks, etc.)
- To ensure that the CCSS content standards are being implemented effectively (teachers *understand* them, have enough *time* to teach the content, use appropriate *technology*, and implement them as *intended* – with appropriate objectives, tasks, and assessments)
- To help teams change the way assessments are used so that teachers are using them more *formatively*
- To ensure that all math teachers understand the importance of equity in math and provide those students who struggle to reach the standards with a systematic approach to intervention

2. Have math teachers assess how collaborative their teams truly are

In their collaborative math teams, have teachers use the chart below to assess which stage of working together they believe they are in. Then have them discuss what they might need from the leader to support them in moving toward the *collaboration* level.

Level of Team Work	Stage	Questions That Define This Stage
COOPERATION	**Stage one**: Filling the time	What exactly are we supposed to do as a team?
	Stage two: Sharing personal practice	What is everyone doing in his or her classroom for instruction, lesson planning, and assessment?
	Stage three: Planning, planning, planning	What should we be teaching during this unit, and how do we lighten the load for each other?
COORDINATION	**Stage four**: Developing common assessments	How will we know if students learned the standards? What does mastery look like for the standards in this unit?
	Stage five: Analyzing student learning	Are students learning what they are supposed to learning? Do we agree on student evidence of learning?
COLLABORATION	**Stage six**: Adapting instruction to student needs	How can we adjust instruction to help those students struggling and those exceeding expectations?
	Stage seven: Reflecting on instruction	Which lesson-design practices are most effective with our students?

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3. As the leader, do a walkthrough of all mathematics team meetings

How many of the teams are focusing on the high-leverage actions below? Which items are most teams addressing and which are being neglected? Alone or with your teams, choose one or two neglected areas for the teams to focus on in the upcoming months.

- The team agrees on prior knowledge to be assessed and the learning to be taught in the unit.
- The team agrees on lesson-design elements and ensures that CCSS Mathematical Practices are included in each unit.
- The team designs ways for students to demonstrate their learning in each lesson.
- The team designs agreed-on common assessments and implements common scoring and feedback.
- The team designs agreed-on adjustments to teaching and student support based on formative assessments.
- The team agrees on levels of rigor for classroom and homework tasks.
- The teams designs agreed-on methods to teach students to self-assess and set goals.

As the leader, do a walkthrough of math classes to determine if teachers are focusing on ***procedural*** or ***conceptual*** learning

With the CCSS students are expected to do more conceptual learning. Do a walkthrough of math classes to see how many focus on procedural fluency and how many focus instead on deeper understanding, reasoning, and problem solving. Do a simple tally:

# of Classes Focusing on Math Procedures	# of Classes Focusing on Math Concepts

***Note – If you want to do a more thorough walkthrough to see whether math teachers are implementing the Mathematical Practices, use the chart in the next section below to look for the subskills of the Mathematical Practices or use the Look-Fors chart from page 55 in the summary below:

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Mathematical Practice	Look-Fors: Classroom Indicators
MP1: Make sense of problems, and persevere in solving them.	**Students:** Are engaged in problem solving and high-cognitive-demand tasks **Teacher**: Provides enough time and formative feedback for students to discuss problem solutions with peers
MP2: Reason abstractly and quantitatively.	**Students**: Are able to contextualize or decontextualize problems **Teacher**: Provides access to representations (manipulatives, drawings, etc.) of problems and asks questions to elicit reasoning
MP3: Construct viable arguments, and critique the reasoning of others.	**Students**: Use prior learning in constructing arguments **Teacher**: Provides opportunities for students to listen/read/hear the arguments of others and encourages them to question and provide their own arguments
MP4: Model with mathematics.	**Students**: Analyze and model relationships mathematically (eg., an expression or equation) **Teacher**: Provides contexts for students to apply math
MP5: Use appropriate tools strategically.	**Students**: Use instructional tools to deepen understanding (technology, manipulatives) **Teacher**: Provides and demonstrates appropriate tools
MP6: Attend to precision.	**Students**: Recognize need for precision and use appropriate math vocabulary **Teacher**: Emphasizes the importance of precise communication
MP7: Look for and make use of structure.	**Students**: Look for patterns and structure within mathematics **Teacher**: Provides time for students to discuss patterns and structure
MP8: Look for and express regularity in repeated reasoning.	**Students**: Reason about strategies and check for reasonableness of results **Teacher**: Encourages students to look for and discuss regularity in their reasoning

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4. Structure conversations among math teachers about the 8 Mathematical Practices

Based on your walkthroughs, if you see a need for teachers to improve their implementation of the Mathematical Practices, then ask teams to discuss each of the eight Practices during team meetings using the two questions provided in the book:

1. What is the intent of this CCSS Mathematical Practice?
2. How can the collaborative team address this CCSS Mathematical Practice?

To help teachers address the issue of implementation in the second question, provide them with a list of the subskills to include in their classes in order to address all of the Mathematical Practices. How can they design lessons to incorporate these?

Subskills Needed for the 8 Mathematical Practices
• Students make conjectures about the meaning of a solution and plan an approach to the solution. (MP1)
• Students monitor and evaluate their progress and discuss this with peers. (MP1)
• Students understand multiple approaches and ask the question, "Does this solution make sense?" (MP1)
• Students communicate precisely using clear definitions when discussing their reasoning. (MP6)
• Students calculate accurately and efficiently using the appropriate units of measure. (MP6)
• Students can decontextualize a problem by representing a problem symbolically to solve it. (MP2)
• Students can contextualize a problem by attending to the meaning of the quantities involved in the problem. (MP2)
• Students make conjectures, explore the truth of those conjectures and justify and communicate their conclusions. (MP3)
• Students listen, read, and respond to the arguments of others for sense making and clarity. (MP3)
• Students represent mathematical concepts by using tools such as diagrams, tables, charts, graphs, calculators, and volume models. (MP4)
• Students use symbols and tools to represent real-world situations. (MP4)
• Students choose the appropriate tool for the task at hand. (MP5)
• Students know the limits of the tools they use for providing accurate solutions and can estimate reasonable solutions without the tool. (MP5)
• Students consistently search for the structure of mathematics. (MP7)
• Students engage in exploring numerical and visual patterns that reveal the structure. (MP7)
• Students notice and can articulate patterns that can become generalized properties or formulas. (MP8)

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5. Help math teachers examine their own work – how well are they addressing the Standards for Mathematical Practice?

a) Ask teachers from each math team to bring a math problem they have used in class to a team meeting. Then have the team use the criteria from p. 3 of the summary to determine if each of these problems adequately addresses the Mathematical Practices. A sample problem might be: "Determine the distance between home plate and second base on a Major League Baseball field. Show all of your work and provide an explanation" (page 34).

- Is the problem *interesting* and *challenging* to students?
- Does the problem involve *meaningful* mathematics?
- Does the problem provide an opportunity for students to *apply* and *extend* mathematics?
- Does the problem allow for *multiple strategies* or multiple solutions?

b) Does each team have a bank of real-world problems they can draw from? If not, have each team use a meeting to look through newspapers, magazines kids like, popular blogs, etc. and use these real-world materials to begin to brainstorm real-world problems.

c) The Mathematical Practices require teachers use tools strategically. Have teachers think back to their last use of technology and judge how many of the following criteria it met? If it didn't meet any, or only one, have the team brainstorm ways to meet more criteria:

- To increase student *interactivity* with content.
- To increase *collaboration* and *discussion.*
- To *differentiate* content.
- To provide more *feedback* for students and teachers.

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