The *Math Expressions* Mastery Learning Loop

Keeping All Students on the Grade-Level Learning Path
by Giving More Time and Support to
In-Class Periodic Interventions and Out-of-Class Tier 2 & Tier 3 Follow Up Interventions

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Math Expressions provides high quality classroom instruction using a Four- Phase Learning Path Teaching-Learning model implementing a Math Talk Community in the classroom (see the overview schematic on the final page). This model allows for considerable differentiation within whole-class instruction as students solve and explain a variety of solutions to problems. Teachers in Phase 1 for a math domain elicit student methods. In Phase 2 *Math Expressions* provides research-based mathematically desirable and accessible methods that enable less-advanced students to advance rapidly. In Phase 3 students practice a general math method to obtain fluency. *Math Expressions* provides research-based mathematically desirable and accessible methods that enable less-advanced students to advance rapidly. The Math Talk Community allows the teacher to do continual formative assessment to modify instruction and address errors or extend good mathematical thinking. Teachers can use the Mastery Learning Loop to provide periodic in-class interventions for students who need this additional support. The Mastery Learning Loop is implemented as a whole class period at specific times within the *Math Expressions* program pacing. Details are given after the summary below.

Step 1: *Math Expressions* Differentiation within the Whole Class Advance all students by using the 4-Phase Learning Path Teaching-Learning and differentiate within whole-class activities by students solving at their own level (see summary on the final page). Students who have trouble on the Remembering pages (the *Math Expressions* cumulative review) can attend the RtI teacher-led meetings or get help from peers on those items.

Step 2: Use the Mastery Learning Loop for all units

Unit 1: Read 5 lessons ahead to help you see the progression of the lessons and concepts.

Big Idea 1 (3 to 6 lessons)

- Teach each lesson.
- Give the Big Idea 1 Quick Quiz on the last lesson for Big Idea 1.
- Analyze the quiz results to plan differentiation.
- Differentiate instruction (flexibly group) for one day:
    - Above-level and on-level students work in groups on various tasks.
    - The teacher works with strugglers in a small group.
    - Students who need more help also attend teacher-led RtI meetings 3 times a week

Big Ideas 2, 3, etc.: Repeat the above steps.
Unit 1 Test

- Give the test that is in the Student Activity Book.
- Differentiate as above for 1 or 2 days (3 if absolutely necessary).
- Give Form A of the test in the Teacher Assessment Guide.
- Students who need more help attend teacher-led RtI meetings 3 times a week. (additional time may need to be scheduled)

Units 2, 3, 4, etc.: Repeat the above steps.

Differentiation Days and Response to Intervention (RtI)
In the Mastery Learning Loop

In the Mastery Learning Loop for a given unit, a differentiation day occurs after each Big Idea and one or more such days occur at the end of the unit. This is Tier 1 instruction in the Response to Intervention (RtI) model. *Math Expressions* units are divided into lesson chunks called Big Ideas; a quiz is given at the end of each Big Idea. This quiz provides data for the teacher to differentiate the class. On level and advanced students will work alone, in pairs, or small groups on appropriate activities in the learning stations as described below. The teacher will work with students who need more support as identified through an item analysis of the quiz, or by ongoing formative assessment in the classroom. *Math Expressions* has summative unit assessments with multiple forms that identify similar content and strategies. The unit test in the Student Activity Book is given at the end of the unit, and the results—as well as all of the teacher's knowledge about individual students for that unit—is used to determine the differentiation levels for another day or two days before the test is given again (this time Form A in the Teacher Assessment Guide is used). This approach is usually sufficient to keep most students on grade level throughout a unit. The use of quizzes and the two forms of the unit test allow the teacher to identify if initial learning has taken place before the intervention and then at the end, to identify if a student is able to retain and/or apply the knowledge.
When students demonstrate a need for sustained and in-depth out-of-class Tier 2 or Tier 3 intervention, then schools need to provide for additional time outside of class for students to receive support and more time with the *Math Expressions* lessons and concepts with which those students are experiencing difficulty. This will usually be most effective when done by the regular classroom teacher, who knows the individual students and their difficulties because of the on-going observational activities (for example, student activity book pages, homework, formative assessment questions) afforded by the *Math Expressions* classroom design. Such out-of-class intervention can be a combination of pre-teaching class lessons to reduce the need for the Mastery Loop intervention, post-teaching concepts to meet the needs remaining after the Mastery Loop intervention, and teaching and practicing concepts from earlier grade levels to support on-level learning. This should be done for at least three 20-minute periods with 3 to 5 students at a time. Tier 3 students may require even more time.

The Mastery Learning Loop in-class intervention days will contain a mixture of high needs students who often need extra learning time and support and students who missed class or had special difficulties with the given Big Idea concepts on the quiz. Some students will be able to move fairly quickly during the intervention hour to independent practice while others will need more problems and support directed at particular aspects of difficulty (and later additional out-of-class support). The teacher plans systematic and explicit instruction focusing on the contextual representation and math talk during the intervention period. This facilitates diagnosing individual student problems and aspects of needed support. The instruction can follow earlier lessons and problems quite closely because many intervention students just need to consider and solve more problems when help is available.

Math Expressions provides a wide range of resources to support teachers to arrange differentiation for on-level and advanced students in flexible groups using learning stations. During the first Mastery Learning Loop intervention day, the teacher focuses on supporting all students to engage in purposeful practice and/or enrichment activities. On subsequent intervention days, on-level and advanced students manage themselves with minimal teacher support while the teacher works with struggling students. Having a whole class period for the interventions allows students to understand how the learning stations function and experience more than one such station during the class period.

If math class is more than 60 minutes, such differentiating can be done more frequently to enable the teacher to work with students who need it between quizzes. This approach should not slow up the rate at which lessons are done by extending lessons over to a second day.

Teachers who have followed the pacing guide for *Math Expressions* and used the Mastery Learning Loop rather than reteaching or differentiating more frequently have time to finish all needed units before spring testing dates. Teachers then can use post-testing the rest of the year to catch up students who need additional work and extend and deepen learning for students already on grade level using learning stations.

Year 1 of Differentiated Instruction Small Group and Learning Station Implementation

Math learning stations can occur anywhere in the classroom: small clusters of desks, tables, and even on the floor. Students can work independently, with a partner, or a small group of 3 to 4 collaboratively to use materials that will expand their mathematical thinking. The purpose of each station is to provide activities that reinforce concepts, extend prior instruction, and/or allow students to deepen mathematical understandings.

The number of stations set up varies with class size and student needs. In the first unit there may be two or three stations with the same activity in order to establish routines, management, and teach students how to function independently in work stations. The station time is short, 10 to 20 minutes, with perhaps only two switches for the first few times. With time, students will become familiar with the station structure, and the amount of independent time and number of rotations can be increased. Students can and should be involved in setting up the stations by finding the resources they need to

complete the activities. Additional ideas for using stations or centers in the classroom can be found in the Center Planning Guide in the *Math Expressions* Math Activity Center Tri-fold and in the online version of the Math Activity Center that is in your *Math Expressions* Think Central account.

On the first day of use of the learning stations, the teacher introduces the work stations. He/she will use the entire class period to allow for explanation of the stations, establish the expectations for self-management, and teach students the routine of what to do if they have a question while the teacher is working with other children. This first lesson should be used to:

- model how to use and find materials for using the leveled Activity Cards from the Math Activity Center.
- model how to write a good response to one of the writing prompts found on the back of the leveled Activity Cards from the Math Activity Center.
- where to find materials for completing station work
- what to do if they finish before it is time to switch to a new station

After students can function well in the model, it can be used as part of a class period for 10 to 20 minutes to catch up or help struggling students. Fewer learning stations might be used in this case. New kinds of work stations used later on in the year may take some extra time to introduce, but the initial expectation is that students will figure out and manage themselves in stations. They may even propose new stations for future days.

Learning Station Ideas

Station activities should allow students to practice problem solving, communicating, and making connections between big mathematical ideas as well as represent mathematics in many ways while offering students opportunities for choice in how they engage in the mathematics. Many of the resources listed below are included in the Math Expressions Math Activity Center Tri-fold and in the online version of the Math Activity center that is in your Math Expressions Think Central account.

Station	Suggested Materials/Activities
Literature Station	• The Math Readers from the Math Activity Center or the *Math Expressions Literature Library* books can help students broaden their understanding of the mathematical idea or even develop a stronger conceptual understanding of the big idea. Teachers can either use whole group time to read aloud the book (depends on the difficulty of the book) or have the students read or listen to the book in the station. • The Math Readers include questions and activities at the end of each book. The Teacher Guides that come with the Literature Libraries offer suggestions or activities that students can do to engage with the text or content of the book.

Station	Suggested Materials/Activities
Enrichment Station	• Challenge Activity cards and • Challenge Copymasters from the Math Activity Center.
Fluency Station	**(choose some and vary as needed):** • Strategy Cards • Check ups • Quick Practice activities • Fact fluency triangle cards (math mountain cards) • Board games from the Math Activity Center • Interactive Games and Fluency Builders from the online Math Activity Center
Vocabulary Station	• Record vocabulary words in a math dictionary, use graphic organizers (for example, the Frayer Model) to define, draw, similarities and differences, etc. • Play matching/concentration games with vocabulary and definitions. • A Vocabulary Game can be found in the Math Activity Center and additional activities are in the back of the Student Activity Book. • Vocabulary Cards are at the beginning of every unit in the Student Activity Book. • The free downloadable *Study Pop* App can also be used to practice vocabulary. • Use suggestions in the lessons for English Learners.
Writing and Problem Solving Station	• Use the Math Writing Prompts found on the backs of the leveled Activity Cards in the Math Activity Center. • Create your own word problem and make a drawing and explain the solution on the back. • Solve or write multi-step problems. • Anytime problem (Gr. 3-6): Students solve and then write 2 more related Problems of the Day. • Solve problems written by classmates. • Use questions from the PARCC, Smarter Balanced or High Stakes test prep books in your online Think Central account (Grades 3 to 6).
Catch up or Helping Station	• Student Activity book page • Homework or Remembering page (past or present) • Solve and Explain activities with word problems • Reteach and Practice Copymasters in the Math Activity Center. • Interactive RtI Tier 1 or 2 in the online Math Activity Center

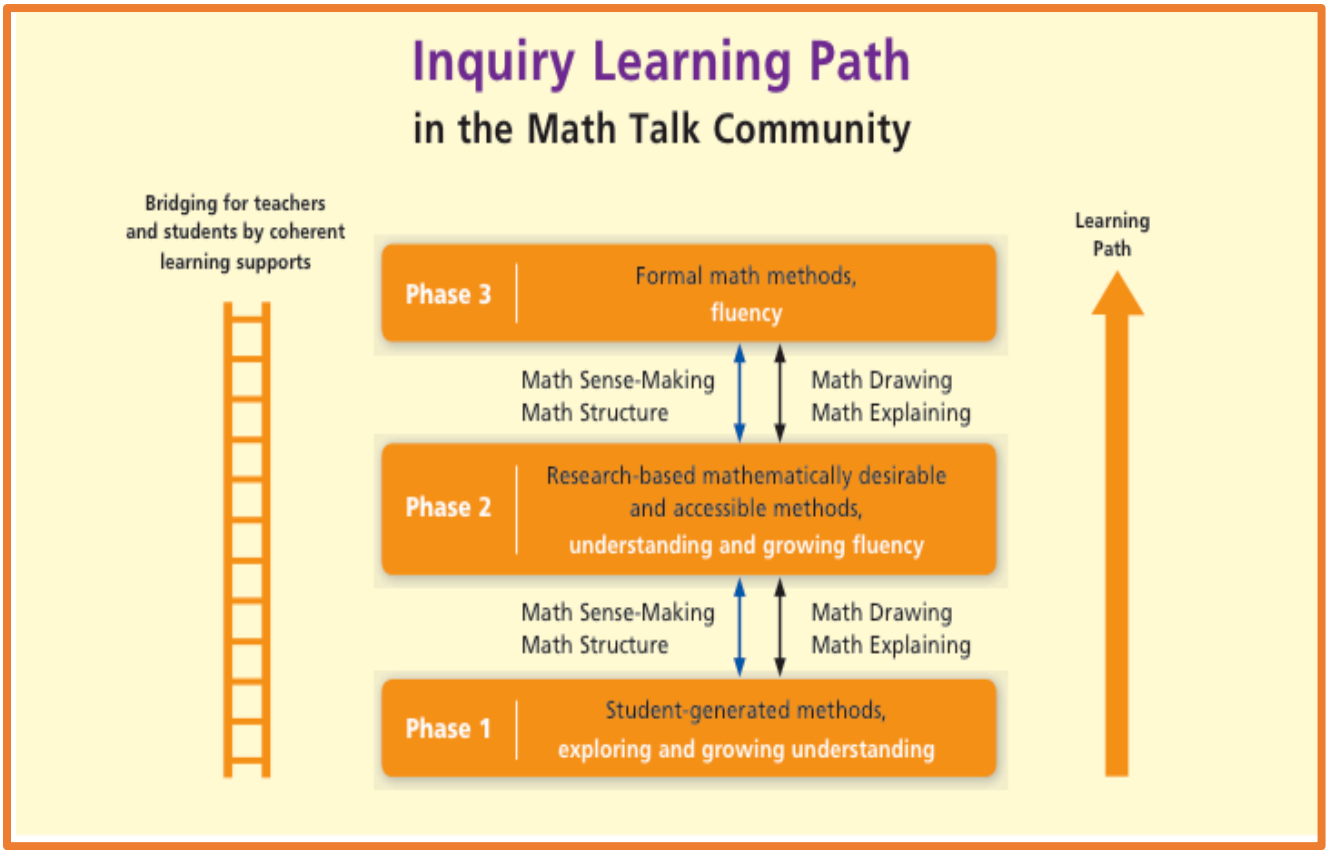
Station	Suggested Materials/Activities
Place Value Station	• Hundreds board activities- patterns, hundred chart puzzles • Math Board drawings representing various numbers • Secret Code Card activities • Daily Routines for K, 1, 2

The In-Class Interventions

Working with intervention students at the board where each can solve is one good approach because teachers can see student work easily, everyone can group around a given problem as it is explained, and the teacher can offer corrective feedback as students solve the problems. On-level or advanced students can help individuals or ELL students during this activity, differentiating for them as they do the challenging thinking of helping someone else with their own ways of thinking.

Tier 2 and Tier 3 students may need to solve more problems than the on-level and faster learners, and they often need help at different individual critical points where they do not understand some specific concept or idea. Some children just need the extra practice with the teacher available to help (even if the teacher is not needed for most problems), and then the problem solving begins to come together and flow more smoothly and confidently. The intervention can reuse the same problems used in class. This gives student's confidence. Teachers can also make up similar problems or have students begin doing the homework with the teacher available to help.

Resources for Tier 2 and 3 intervention can also be found in the online Math Activity Center.



Phase 4 focuses throughout the year on maintaining and integrating fluency as students use the Remembering pages and relate old topics to new topics.

Mathematical Practices

Math Sense-Making	Math Structure	Math Drawings	Math Explaining
Make sense and use of appropriate precision.	**See structure and generalize.**	**Model and use tools.**	**Reason, explain, and question.**
MP1 Make sense of problems and persevere in solving them. **MP6** Attend to precision.	**MP7** Look for and make use of structure. **MP8** Look for and express regularity in repeated reasoning.	**MP4** Model with mathematics. **MP5** Use appropriate tools strategically.	**MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others.

Teachers continually assist students to do math sense-making about math structure using math drawings to support math explaining.