Math Module 5 Overview Plan
Module Title: Number and Operations—Fractions: Understanding Fractions
Grade Band: K–5

Module 5 explores the domain Number and Operations—Fractions, with a focus on understanding fractions. Each of this module's sessions is designed to increase participants' understanding of fractions standards and how these standards should be implemented in the elementary classroom.

In Session 1, participants experience part of an EngageNY lesson and analyze it for evidence of how students engage in the key shifts throughout the lesson.

Session 2 provides participants with an opportunity to study a set of standards from the domain of Number and Operations—Fractions and to explore coherence across the grade levels in the Louisiana Student Standards for Mathematics (LSSM), using a vertical alignment chart.

In Session 3, participants study using unit fractions to reason about numbers by exploring fractions on a number line and the importance of identifying the whole.

Session 4 continues the "5 practices for orchestrating productive mathematics discussions" work. This session focuses on the fifth and final practice of *connecting* student responses. Participants will learn how to strategically make connections between students' responses to tasks and the intended learning to help build students' mathematical understanding.

Session 5 continues work with the Planning Guide that teachers can use to facilitate productive collaborative planning sessions based on the standards and to determine the implications for teaching and learning.

Elementary Mathematics Module 5: Key Understandings

After Module 5, participants will know:

- The key shifts play a critical role in the implementation of the LSSM:
  - *Focus*—by narrowing in on fewer topics in a lesson or unit to ensure teachers have adequate time to push students toward mastery of key mathematical concepts.
  - *Coherence*—by viewing the standards as interconnected across grade levels and across domains within a grade level, rather than as isolated events.
  - *Rigor*—by ensuring that conceptual understanding, procedural skills, and fluency drive the exploration of mathematical content at greater depths, culminating with the ability to apply mathematics to solve real-world problems.
- When instruction using the EngageNY curriculum is executed well, the key shifts are evident and visible in every lesson.
- The numerical reasoning skills that students use when working with whole numbers are also applicable when working with fractions.
- It is important to select student responses that highlight specific strategies or misconceptions and make connections between these responses and the intended learning to deepen students' mathematical understanding.

Module 5: Facilitation Recommendations	
Session Length	Six-hour module including: **Session 0: Introduction** to Module 5 (5 minutes) **Session 1: Key Shifts in Action**—Through an EngageNY Lesson (75 minutes) **Session 2: Exploring Coherence** in the Louisiana Student Standards for Mathematics (LSSM) (60 minutes) **Session 3: Deepening Mathematical Content Knowledge** for Effective Instruction (90 minutes) **Session 4: Instructional Strategies** to Improve Curriculum Implementation (75 minutes) **Session 5: Purposeful Planning** of the EngageNY Curriculum (60 minutes) **Closing Slides and Participant Evaluation Survey** (30 minutes)
Session Pairing Options	Recommended delivery: One full 6-hour day of professional learning, with all 5 sessions facilitated back to back. Facilitators should plan for participants to take the Module 5 evaluation immediately after Session 5, preferably before leaving the session.
Time of Year	Third quarter

Preparing to Facilitate *What materials and supplies are needed to facilitate this session?* *What must the facilitator do to prep for the actual session?*		
Session Materials		
Participant Handouts • **M5_P-00** Elementary Math Content Module 5 presentation slides (printed 2 slides to a page) • **M5_P-01** Looking for Evidence of Student Engagement in the Key Shifts • **M5_P-02** Number Line • **M5_P-03** Vertical Alignment Chart • **M5_P-04** Reasoning Using Benchmarks • **M5_P-05** Processes for Orchestrating Productive Mathematical Discourse • **M5_P-06** Planning Guide	**Facilitator Handouts** • **M5_CL-00** Math Module 5 Overview: Number and Operations—Fractions: Understanding Fractions • **M5_CL-01** Posters and Handouts Guide (this document) • **M5_CL-02** math-g3-m5-topic-e-lesson-22: Lesson 22: Objective: Generate simple equivalent fractions by using visual fraction models and the number line • **M5_CL-03** Fractions Cards • **M5_CL-04** Standards Cards for Vertical Alignment • **M5_CL-05** Comparing Fractions Cards • **M5_CL-06** Connecting Student Learning—Cards	**Additional Supplies** ***Secure the following materials:*** • Participant handouts, 1 per participant • Table supplies (markers, scissors, sticky notes, and glue sticks or tape) • Chart paper

Time & Slide Thumbnail	Facilitator Notes Session 0: Introduction to Module 5	Materials

Slide 1
Time Allotted: 1 minute
	Module 5: Number and Operations—Fractions: Understanding Fractions
	
	Time Allotted for module: 6 hours
	
	Slides 1–4: Time Allotted: 8 minutes
	
	Critical Idea
	• It is important to set a positive tone for learning.
	
	Step-by-Step Instructions
	• Before each session, use handout **M5_CL-01 Posters and Handouts Guide** to organize your preparation.
	• As participants come in for the day, ask them to sit in mixed-grade-level groups of four.
	• Welcome the group. Say, "Throughout the learning sessions you will engage in mathematics tasks and discussions designed to strengthen your understanding of the LSSM, and you will have multiple opportunities to consider ways that you can continue to support students' learning of mathematics content through the high-quality curriculum."
	• Take care of "housekeeping" items prior to starting the session:
	  ○ Scheduled start and stop times
	  ○ Breaks
	  ○ Lunch
	  ○ Location of restrooms
	  ○ Silencing of cell phones
	  ○ Orienting participants to the handouts for the day, including the handout of the slides.
	
	Words of Wisdom
	• If you perceive any resistance, the basic strategy is to
	(1) acknowledge the resistance,
	(2) honor and validate it with a reason or two,
	(3) provide a rationale for engaging, and
	(4) tie it to the work of the session.
		M5_CL-01
		Posters and Handouts Guide

  Slide 2 Time Allotted: 2 minutes	***Critical Idea*** • For participants to buy in to the project, it is important to provide them with the goal and purpose. ***Step-By-Step Instructions*** • Say, ○ "Recall this slide from previous modules. The work in which you are engaged is part of a bigger picture. The overarching goal of the initiative is to improve the quality of instruction in math classrooms by developing deep mathematical content knowledge of teachers and connecting that content knowledge to the practical implementation of a quality curriculum." ***Words of Wisdom*** • This slide provides participants with the goal of this 3-year initiative.	

Time & Slide Thumbnail	Facilitator Notes Session 0: Introduction to Module 5	Materials

Slide 3
Time Allotted:
3 minutes
	Critical Idea
	• Being clear about how a group is expected to collaborate creates an environment that fosters intellectual risk-taking and reflection.
	
	Step-By-Step Instructions
	• Say,
	  ○ "To meet the goals and learning expectations of the initiative, we have group norms that will continue to guide our collaborative work."
	  ○ "Please independently read the slide and choose one of the norms you will pay particular attention to throughout Module 5."
	• As a way to encourage accountability, ask participants to tell their tablemates which norm they selected.
	
	Words of Wisdom
	• Norm-setting is an important step that sets the tone for professional learning. Asking participants to share the norms they will focus on encourages ownership and buy-in to these guidelines.
	
	Citation: These norms have been adapted from recommendations in a variety of sources, including:
	
	National Research Council. (2000). *How people learn: Brain, Mind, Experience, and School*. Washington, DC: The National Academies Press.
	
	The last norm ("Mistakes are expected, respected, and inspected") was shared by Jo Boaler in an early version of her online course. A current version, "How to Learn Math: For Teachers," is available here: http://scpd.stanford.edu/ppc/how-learn-math-teachers	

 Slide 4 Time Allotted: 2 minutes	***Critical Idea*** • The lens for learning is beginning with the end in mind. ***Step-by-Step Instructions*** • Ask participants to quietly read the Module 5 learning expectations. ***Words of Wisdom*** • This slide should be brief and is about clarifying the learning expectations of Module 5.	

Math Module 5, Session 1
Session Title: Key Shifts in Action—Through an EngageNY Lesson

Session Overview *What are the overarching goals of this session?* *Why are those goals important? How do they connect to what's come before and what will come after?*
The overarching goals of Session 1 are for participants to review the key shifts of the Louisiana Student Standards for Mathematics and to experience the key shifts in action by taking part in a portion of an EngageNY lesson. Participants should be able to document evidence of possible student engagement during the lesson, which will refine participants' understanding of the key shifts and how these shifts will manifest in the classroom. These EngageNY lessons focus on standards within the Number and Operations—Fractions domain, and this set of lessons will serve as an ongoing example through many of the other sessions in this module.

Session Key Points *What are the 2 to 4* most *important takeaways from this session?*	**Session Products** *What will participants produce during the session? Immediately following the session?*
Through Session 1, participants will know: • The key shifts play an integral role in the EngageNY curriculum. • Being aware of the coherence of the standards caninfluence how intentional I—as an educator—am in connecting to prior learning.	• During Session 1, participants will produce a document of evidence of student work that participants experience during the EngageNY lesson.

Session Objectives *What will participants know, believe, and be able to do as a result of this session?*	**Session Agenda at a Glance** *What is the overall flow of this session?*
Participants will … • Look for evidence of the key shifts of focus, coherence, and rigor in the standards. (CP, CK) • Engage in mathematics learning experiences that help clarify math concepts related to using unit fractions to reason about numbers. (CK, CP, CS) CK: Content Knowledge CP: Content Pedagogy CS: Curriculum Skills	• Review the key shifts. • Participate in a math learning experience with an EngageNY lesson. • Analyze the lesson for student evidence of the key shifts.

Facilitation Recommendations	
Session Length	75 minutes

Preparing to Facilitate *What materials and supplies are needed to facilitate this session?* *What must the facilitator do to prep for the actual session?*	
Session Materials • **Participant Handouts** ○ **M5_P-01** Looking for Evidence of Student Engagement in the Key Shifts ○ **M5_P-02** Number Line • **Facilitator Handouts** ○ **M5_CL-02** math-g3-m5-topic-e-lesson-22: Lesson 22: Objective: Generate simple equivalent fractions by using visual fraction models and the number line. ○ **M5_CL-03** Fractions Cards • **Additional Supplies** ○ String (at least 5 feet) ○ Box of paper clips ○ Chart paper ○ Markers ○ Sticky notes	**Facilitator Pre-Work and Prep** • Print participant handouts (1 per participant) • Study EngageNY lesson handout ○ **M5_CL-02** math-g3-m5-topic-e-lesson-22: Lesson 22: Objective: Generate simple equivalent fractions by using visual fraction models and the number line. • Cut one set of **M5_CL-03** Fractions Cards • Attach string to the wall with sufficient tape that it will not sag, so it can act as your number line.

Participant Pre-Work *What should participants bring to this session? What should they do or prepare in advance of this session?*	
Participants must bring: • Not applicable	**Before this session, participants should:** • Not applicable

Time & Slide Thumbnail	Facilitator Notes Session 1: Key Shifts in Action—Through an EngageNY Lesson	Materials
  Slide 5 Time Allotted: < 1 minute	**Session 1: Key Shifts in Action** through an EngageNY lesson **Slides 5–11 Time Allotted: 75 minutes** ***Critical Idea*** • This slide introduces Session 1. ***Step-By-Step Instructions*** • Say, ○ "Let's transition into Session 1, which focuses on understanding mathematics content through task analysis." **Words of Wisdom:** • For Session 1, participants should be sitting in mixed-grade-level groups of four.	
  Slide 6 Time Allotted: 2 minutes	***Critical Idea*** • The key shifts are what make the LSSM different from previous standards. These key shifts should guide decisions about teaching and learning. ***Step-By-Step Instructions*** • Say, ○ "In Module 1, we defined the 3 key shifts of the LSSM and identified evidence of focus, coherence, and rigor in the standards. For this session, it is important to think about how these key shifts surface in the classroom. To ground our thinking, please revisit the definitions of the key shifts on the slide." **Words of Wisdom** • Keep this slide simple and brief.	

Slide 7
Time Allotted:
5 minutes
	Critical Idea
	• The key shifts are what make the LSSM different from previous standards. These key shifts should guide decisions about teaching and learning.
	
	Step-By-Step Instructions
	• Say,
	  ○ "We are going to engage in a portion of a mathematics lesson from EngageNY to give you an opportunity to observe how the key shifts come to life in the classroom while students engage in the mathematics content."
	  ○ "It is important to note, though, that while the task may not be aligned to the grade level you teach, the experience is intended to surface ways in which you can connect the EngageNY lessons to inform your teaching and learning. By the end of the six modules, you will have the opportunity to experience a variety of lessons from grades K–5."
	  ○ "To help you with this experience, we will continue to use the **Looking for Evidence of Student Engagement in the Key Shifts** tool that we have used in previous modules to help you look for and document evidence of the key shifts."
	• Ask participants to locate handout **M5_P-01 Looking for Evidence of Student Engagement in the Key Shifts**.
	• Say,
	  ○ Remember, the left-hand column contains descriptors of how the students may engage in the key shifts. Next to each descriptor is a box you can use to check off any of the student actions that you observe in the lesson."
	  ○ "You can use the right-hand column to document observations of any specific actions that can be used as evidence for the descriptors that you checked off in the
		M5_P-01
		Looking for Evidence of Student Engagement in the Key Shifts

Time & Slide Thumbnail	Facilitator Notes Session 1: Key Shifts in Action—Through an EngageNY Lesson	Materials
	left-hand column." • Give participants time to refamiliarize themselves with the **M5_P-01** handout and to ask questions if they need further clarification. ***Words of Wisdom*** • Make sure all participants have an opportunity to read through the document to familiarize themselves with the descriptors of the key shifts. Participants will use these descriptors to make observations while they engage in the math lesson. • During this lesson, participants may make connections and have "ah-ha" moments related to the content. It is important for them to understand that these connections may not happen as quickly in the classroom with their students. The EngageNY curriculum is designed for students to make these connections across multiple lessons.	

Slides 8–9
Time Allotted: 48 minutes
	Critical Idea
	• The key shifts are what make the LSSM different from previous standards. These key shifts should guide decisions about teaching and learning.
	
	Step-By-Step Instructions
	• Before beginning this lesson you should hang at least 5 feet of string somewhere in the room to represent a number line.
	• Display the question on the slide.
	• Say,
	  ○ "To observe how students would engage in the key shifts in the classroom, we will now experience part of an EngageNY lesson."
	  ○ "As you engage in the lesson, use **M5_P-01 Looking for Evidence of Student Engagement in the Key Shifts** to document evidence of the key shifts."
	  ○ "Remember, the purpose of experiencing this lesson is to get a clearer understanding of how students should engage in the mathematics as described in the key shifts."
	  ○ "In addition, you should engage in the math lesson as if you were the students, and you should also look for and document evidence of engagement in the mathematics through the key shifts."
	  ○ "Take a minute and read the question on the slide."
	• **<u>Animate the slide</u>** to display directions.
	• Say,
	  ○ "Work with your elbow partner and solve the problem by drawing a picture of the final scarf, labeling what he has finished and what he still has to make, and drawing a number bond with 2 parts to show the fraction he has made and the fraction he has not made."
	• Allow no more than 3 minutes for participants to complete the problem.
	• While they are working, walk around and choose strategies that you want to highlight.
	• Call on the groups with the strategies you want to show and document their thinking on chart paper as they describe their strategy.
	• Possible strategy:
	
	• After you have a similar drawing on your chart, make a connection between the drawing of the scarf and a number line.
		M5_P-01
		Looking for Evidence of Student Engagement in the Key Shifts
		
		M5_P-02
		Number line
		
		Chart paper
		
		Markers
		
		String (at least 5 ft.)
		
		Box of paper clips
		
		M5_CL-03
		Fraction Cards

Time & Slide Thumbnail	Facilitator Notes Session 1: Key Shifts in Action—Through an EngageNY Lesson	Materials

	• Direct participants' attention to the string. (You hung up this string in the room prior to starting the lesson.)
	• Say,
	  ○ "Using this string, we are going to create another number line."
	• Using a paper clip, hang the card labeled with the number 1 on the far right of the string.
	  ○ "If this represents the whole number one on my number line, what would I label the other end of the string?" (*zero*)
	• Hang the card labeled with the number 0 on the far left of the string.
	• Hand out the remaining fraction cards to the participants, **M5_CL-03 Fraction Cards** (one card per participant if possible).
	• Say,
	  ○ "I have just handed out several fraction cards"
	  ○ "Someone here has the card labeled one-half. Who has that card?"
	• Invite the participant with the ½ card to use a paper clip to post it on the number line.
	• Say,
	  ○ "How did you know to place your card there?" (*I knew one half would split the string into two equal pieces.*)
	  ○ "Does everyone agree with the placement of the ½ card?"
	  ○ "Good, let's talk really quick about what this means on a number line."
	  ○ "You were correct that ½ means that the number line should be split into two equal pieces, but what does this spot on the number line represent?" (*it is labeling the halfway point between zero and one.*)
	  ○ "So, this labeled mark on a number line indicates that if I was traveling on my number line from zero to one, this is the spot that I would have traveled halfway."
	  ○ "It is important to remember that the marks on a number line indicate the value of the distance from zero to that mark."
	  ○ "This mark indicates that I have traveled one of two equally long sections from zero to one."
	• Have participants locate handout **M5_P-02 Number line.**
	• Have participants label ½ on their number lines.
	• Ask,
	  ○ "Who has the one-fourth card?"
	• Invite the participant with the ¼ card use a paper clip to post it on the number line. (*halfway between 0 and ½)*
	• Say,
	  ○ "How did you know to place your card there?" (*I knew ¼ would divide the number line into 4 equal pieces, and this card marks the spot for the first of those 4 pieces.*)
	  ○ "How did you know where the first of four equal pieces would stop without marking off all four pieces?" (*I knew the ½ card was dividing the number line into 2 equal pieces, so if I divided each half in half I would have 4 equal pieces.*)
	• Have participants label ¼ on their **M5_P-02 Number line** handouts.
	  ○ "So, if the card you placed indicates the first of four equal pieces, where would we mark the second of the four equal pieces? Let's have the person with the 2/4 card come show us where it should be." (*Use paper clips to hang the card from the ½ card.)*
	  ○ "Why did you put the card there?" (*I knew the distance from one fourth to two fourths should be equal to the distance from zero to one fourth.*)
	  ○ "Are you saying that two fourths are equal to one half? Does everyone agree that two fourths are equal to one half?" (*yes*)
	• Have participants mark 2/4 on their number line handout.	

Time & Slide Thumbnail	Facilitator Notes Session 1: Key Shifts in Action—Through an EngageNY Lesson	Materials
	○ "Who has the three fourths card?" • Invite the participant with the ¾ card to come and place it in the number line. (*Halfway between the ½ and 1*) ○ "Does everyone agree with where they placed the ¾ card?" (*yes*) • Have participants label ¾ on their number line handout. • Ask, ○ "Are there any more cards with a denominator of four that we should add to the number line?" (*the participant with 4/4 card should respond*) • Invite the participant with the 4/4 card to come and place it in the number line. (*Hang it from the 1 whole card.)* ○ "Does everyone agree with where they placed the 4/4 card? Who can explain why we placed it there?" (*4/4 indicates that we have traveled 4 pieces out of 4 total pieces from zero to one, which means we have traveled the entire distance from zero to one. This makes 4/4 equal to one whole*.) • Have participants label 4/4 on their number line handout. ○ "Who has the 1/8 card?" • Invite the participant with the 1/8 card to come place it in the number line. ○ "Why did you place the 1/8 card there?" (*I know that 1/8 means the number line is divided into eight equal pieces, and this indicates the distance from zero to the first piece*.) ○ "How did the other fractions help you decide where to place your card?" (*We decided that ½ was half of one whole, and ¼ was half of ½, so 1/8 should be half of ¼*.) ○ "Does anyone notice a pattern emerging with our unit fractions of ½, ¼, and 1/8 and their placement on the number line? Talk with your elbow partner about what patterns you see." • Give participants a minute to discuss and have a few participants share out. • Possible responses: ○ *As the denominators get bigger the fractions get smaller.* ○ *The smaller the unit fractions the closer they are to zero.* ○ *¼ is half of ½, and the denominator 4 is twice as much as 2. This indicates that there are twice as many pieces; therefore, the pieces are half the size.* • Have participants label 1/8 on their number line handout. • Ask, ○ "Who has the 2/8 card?" • Invite the participant with the 2/8 card to place it in the number line. *(Hang it from the ¼ card)* • Ask, ○ "Does everyone agree that 2/8 should be equivalent to ¼? How do you know this is true? Discuss with your partner." • Allow a minute for participants to discuss, and then ask a few to share out. • Have participants label 2/4 on their number line handouts. • Say, ○ "We have established that some fractions can be equivalent because they have the same value, and therefore they will fall on the same spot on a number line." ○ "If anyone has a fraction card that is equivalent to one of the fractions we have already placed on the number line, I would like for you to come up and place it in the number line now." • Allow a couple minutes for the several participants to come add their cards to the number line. • When they finish, your number line should look similar to the one below:	

Time & Slide Thumbnail	Facilitator Notes Session 1: Key Shifts in Action—Through an EngageNY Lesson	Materials
	  ○ "Does everyone agree with the placement of all these equivalent fractions?" • Give participants to discuss any issues or cards they feel are in the wrong place. ○ "What patterns do you notice are emerging with the equivalent fractions? Take a minute to discuss at your table groups." • Allow no more than 3 minutes for participants to discuss patterns, and then have a few share out. • Possible responses: ○ *If you take any fraction and multiply the denominator and numerator by the same number, you will get an equivalent fraction.* ○ *For all the fractions that are equivalent to one half, the numerator is always half of the denominator.* ○ *For any fractions that are equivalent to one whole, the numerator is always the same as the denominator.* • Have participants add these fractions to their number line handout. ○ "I noticed only 3/6 and 6/6 were placed on the number line. Where should 1/6 and 2/6 be?" • Invite the participants with the 1/6 and 2/6 cards to come up and place their cards in the number line. • This may be difficult. If so, allow the other participants to help them, or, if they are still struggling, have them use what they know about the other fractions to help them. ○ *1/6 is larger than 1/8 but smaller than ¼, so it should be placed between these two cards. You can then use the distance from zero to 1/6 to determine about where 2/6 should fall.* • Have participants add these fractions to their number line handout. ○ "What about 1/3? Who has that card? Where should it be placed?" • Invite the participant with the 1/3 card to come and place it in the number line and explain why they placed it there. (*1/3 is equivalent to 2/6 because 3 is half of 6 and 1 is half of 2*) • Have participants add this fraction to their number line handout. • Invite any remaining participants still holding fraction cards to place their cards on the number line. • The final number line should look similar to the one below:	

Time & Slide Thumbnail	Facilitator Notes Session 1: Key Shifts in Action—Through an EngageNY Lesson	Materials
	  ○ "Does everyone agree with the placement of the cards in the number line?" • Allow a minute for participants to discuss possible errors and make corrections. • Have participants add these fractions to their number line. • Direct their attention back to the slides and **transition to the next slide**. • Say, ○ "Let's look at a different model. These 3 wholes are the same. Can you name the shaded fraction in each model? Discuss with your elbow partner." • Allow a minute for partners to discuss and name the fractions. Have a few participants share out. (*1/3, 2/6, 3/9*) ○ "Are these fractions equivalent? Work with your partner to use the number line to prove your answer. Be ready to share your thinking." • Allow a couple minutes for participants to discuss and then have a few share out. • Transition to the next slide. ***Words of Wisdom*** • If participants do not answer questions in the way that is indicated, use probing questions to get them to draw the intended conclusions as indicated in the notes.	
 Slide 10 Time Allotted: 10 minutes	***Critical Idea*** • Intentional teacher moves support focus, coherence, and rigor around the mathematics content. ***Step-By-Step Instructions*** • Say, ○ "During the lessons, you were asked to use handout **M5_P-01 Looking for Evidence of Student Engagement in the Key Shifts** to check off student behaviors/actions observed in the lesson. Please take 3 minutes of independent think time to record specific evidence of the descriptors in the right-hand column of the page." • Allow 5 minutes for participants to work with their groups to complete their handouts. • Once participants are done, ask a few participants to share out specific evidence they documented from the lesson. • Ask, ○ "What component of rigor did the students engage in the most throughout this lesson?" • Be prepared for participants to say any of the three components of rigor. If necessary, remind them that they were documenting evidence as learners. Students may make use of all three components of rigor at any time during a lesson. What is important is that the teacher approaches the delivery of the lesson from the lens of the intended component of rigor as identified in the Louisiana Rigor Document. • Transition to the next slide.	**M5_P-01** Looking for Evidence of Student Engagement in the Key Shifts

Time & Slide Thumbnail	Facilitator Notes Session 1: Key Shifts in Action—Through an EngageNY Lesson	Materials
	Words of Wisdom • Not applicable	
  Slide 11 Time Allotted: 10 minutes	***Critical Idea*** • Adults do not learn from experience but rather from reflecting on experience. ***Step-By-Step Instructions*** • Say, ○ "It is essential that we take a deliberate pause in our work to reflect on this experience." • Display the reflection questions and ask participants to turn over handout **M5_P-01 Looking for Evidence of Student Engagement in the Key Shifts**, and individually reflect on these questions for a few minutes. • Ask participants to make eye contact with someone in the room who they haven't worked with thus far, then share their reflection with that person. • Solicit comments from the group for each reflection question. ***Words of Wisdom*** • Don't rush this conversation. Participants need time to think about, reflect on, and share their observations of what they experienced in the lesson. • Remember to focus conversations on how the key shifts enable students to engage in mathematics in meaningful ways, which can lead to a deeper understanding of math as students develop mathematical thinking and perseverance.	**M5_P-01** Looking for Evidence of Student Engagement in the Key Shifts

Math Module 5, Session 2
Session Title: Exploring Coherence in the LSSM

Session Overview *What are the overarching goals of this session? Why are those goals important?* *How do they connect to what's come before and what will come after?*
The overarching goal of Session 2 is for participants to understand their specific grade level's place in the larger picture of *A Story of Units*. Teachers will explore coherence across the K–5 continuum, focusing on the big idea of Using Unit Fractions to Reason About Numbers by analyzing each grade level's standards and identifying when concepts are introduced, developed, changed, or become more complex as they progress through the grades. This conversation is pivotal in building teachers' understanding of the importance of the foundational skills and understanding in the grade levels they teach—and how these skills affect subsequent grade levels.

Session Key Points *What are the 2 to 4* most *important takeaways from this session?*	**Session Products** *What will participants produce during the session? Immediately following the session?*
Through Session 2, participants will know: • Each grade builds on the prior work of the grades before and is the foundation of work to come in future grades, illustrating the coherence of the standards. • Studying the standards in a vertical team is necessary to understand how specific grade-level expectations fit into the development of a big idea across grades, which has implications for grade-level teaching.	During Session 2, participants will produce a vertical alignment chart for the big idea of Using Unit Fractions to Reason About Numbers. Participants will discuss how the standards change from grade to grade, and they will identify the implications for instruction as a result of their study of the standards.

Session Objectives *What will participants know, believe, and be able to do as a result of this session?*	**Session Agenda at a Glance** *What is the overall flow of this session?*
Participants will… • Engage in a study of standards across grades K–5 related to using unit fractions to reason about numbers to see how this idea develops across the grades. (CK) • Revise and refine their thinking on what the big idea means. (CK) • Reflect on their study of the standards and how their instruction may be affected by their new knowledge. (CP) CK: Content Knowledge CP: Content Pedagogy CS: Curriculum Skills	• Explore the big idea of "Using Unit Fractions to Reason About Numbers." • Align standards based on what students should know and be able to do. • Identify changes in skills, expectations, and understandings in the standards from one grade to the next. • Reflect on how a study of vertical alignment helps with understanding the key shifts.

Facilitation Recommendations	
Session Length	60 minutes

Preparing to Facilitate *What materials and supplies are needed to facilitate this session?* *What must the facilitator do to prep for the actual session?*	

Session Materials
 	
• **Participant Handout**
  ○ **M5_P-03 Vertical Alignment Chart**
 	
• **Facilitator Handout**
  ○ **M5_CL-04 Standards Cards for Vertical Alignment** (cut out prior to session, 1 set per group of 4)
 	
• **Additional Supplies**
  ○ Chart paper (1 sheet for every 4 participants)
  ○ Markers
  ○ Tape
  ○ Sticky notes
	Facilitator Pre-Work and Prep
	
	• Print and cut out handout **M5_CL-04 Standards Cards for Vertical Alignment** (1 set per group of 4)
	• Print participant handouts (1 per participant)

Participant Pre-Work *What should participants bring to this session? What should they do or prepare in advance of this session?*	
Participants must bring: • Not applicable	**Before this session, participants should:** • Not applicable

Time & Slide Thumbnail	Facilitator Notes Session 2: Exploring Coherence in the LSSM	Materials
  Slide 12 Time Allotted: < 1 minute	**Session 2: Exploring Coherence in the LSSM** **Slides 12–17 Time Allotted: 60 minutes** ***Critical Idea*** • This slide introduces Session 2. ***Step-By-Step Instructions*** • Tell participants that we will transition into Session 2. ***Words of Wisdom*** • For Session 2, participants should be sitting in mixed-grade-level groups of four.	

Slide 13
Time Allotted:
10 minutes
	Critical Idea
	• The power of the vertical alignment process and tool is the collaborative conversation. It is not about filling out the chart. The purpose of the chart is to capture common understandings that result from the collaborative conversations.
	
	Step-By-Step Instructions
	• Say,
	  ○ "We are going to investigate vertical alignment in the LSSM."
	  ○ "This vertical alignment process is designed to be used a few times a year, preferably with a group of K–5, K–8, or K–12 educators, in order to study standards that relate to a big idea."
	  ○ "This process is NOT designed to be a 'divide and conquer' activity. The power of this process is in the collaborative conversations that lead to a common understanding of how a big idea develops over time across a number of grade levels."
	• **<u>Animate Step 1 and Step 2</u>.**
	  ○ "With that in mind, let's revisit the first two steps of this process on the slide." *(**Note:** Participants should complete Step 1 and Step 2 before getting the materials they will need to complete the vertical alignment.)*
	• **<u>Step 1</u>:**
	• Say,
	  ○ "The big idea we will study in this session is ***using unit fractions to reason about numbers.***"
	  ○ "The instructions say to select a big idea, but today we have preselected the big idea so we can work on this module's focus domain—Numbers and Fractions."
	  ○ "A *big idea* is a concept that takes time to develop across grade levels, yet is narrow enough to support a focused conversation involving just a few standards at each grade level."
	
	• **<u>Step 2</u>**:
	• Say,
	  ○ "Work with your small groups to determine the meaning of the big idea."
	  ○ "To do that, discuss what *conceptual understanding of fractions* entails, how conceptual understanding is developed, and what foundational math concepts support the development of fraction understanding. That is, what do students need to know to truly understand fractions at a conceptual level?"
	  ○ "Think in terms of what students need to know and be able to do to demonstrate understanding and proficiency."
	• Allow a few minutes for participants to discuss the meaning of the big idea with their groups. Then ask a few groups to share their thinking.
		Sets of **M5_CL-04** Standards Cards for Vertical Alignment, cut out and placed into bags or envelopes. One set per table.

Time & Slide Thumbnail	Facilitator Notes Session 2: Exploring Coherence in the LSSM	Materials
	• As they work, distribute the standards strips from **M5_CL-04 Standards Cards for Vertical Alignment**—one set per group. ***Words of Wisdom*** • ***Do not let groups divide and conquer***. Groups need to work together through each step for the standard(s) for each grade level.	

Slide 14
Time Allotted:
15 minutes
	Critical Idea
	• The power of this activity is the collaborative conversation about carefully selected standards connected to a big idea.
	
	Step-By-Step Instructions
	• Explain the vertical alignment process.
	• Say,
	  ○ "When discussing the vertical alignment of an idea across grade levels, you need to study the standards from each grade level that are related to the big idea, and discuss how the idea develops and changes. You do not necessarily need to study every standard at each grade level that relates to the big idea."
	  ○ "For our work today, the standards have been chosen for the you and cut into strips. Each group is receiving a set of the selected standards. Each standards strip has the actual language of one or more of the standards from kindergarten through Grade 6."
	  ○ "When you look at your strips, you will notice that the grade-level standard coding is not printed with the standard. For the first part of this activity, you will read each of the standard strips with your table group and determine the order of the standards, from kindergarten through Grade 6, based on your experiences and how your group thinks the big idea develops."
	• As participants read and discuss the standards statements, ask them to think about how the standards' language describes skills in increasing complexity and how the language of the standards affects their group's sequencing of the standards strips.
	• Give groups 10 minutes to work together to sequence their standards strips and think about the question "How did the language of the standards affect our ordering of the strips?"
	• As groups are working, walk around and give each group one sheet of chart paper, chart markers, and a long strip of tape, 1 to 1.5 feet long.
	• When it looks like groups have completed the task, call them back to the whole group.
	• Ask,
	  ○ "How did the language of the standards help you to place them into a progression?"
	• Have participants share a few specific examples of language from the standards that helped them to determine their progression.
	• Transition to the next slide to reveal the actual order of the standards, from kindergarten through Grade 6.
	
	Words of Wisdom
	• Move around groups, monitoring conversations and answering questions, and prompt discussions around the mathematics in the standards.
		Sets of **M5_CL-04** Standards Cards for Vertical Alignment, cut out and placed into bags or envelopes. One set per table.
		
		Chart paper
		
		Tape
		
		Markers

Time & Slide Thumbnail	Facilitator Notes Session 2: Exploring Coherence in the LSSM	Materials

Slides 15
Time Allotted:
5 minutes
	Critical Idea
	• The power of this activity is the collaborative conversation about carefully selected standards connected to a big idea.
	
	Step-By-Step Instructions
	• Have participants locate handout **M5_P-03 Vertical Alignment Chart** and compare their ordering of the standards to the actual order of the standards.
	• Give groups 2 to 3 minutes to check their order and re-sequence their strips, if necessary.
	• Debrief questions to ask:
	  ○ "Were there any standards that you thought were intended for one grade level but then had to move?"
	  ○ "What language in that standard do you think makes it fit with its intended grade level?"
	
	Words of Wisdom
	• Not applicable
		M5_P-03
		Vertical Alignment Chart

Slide 16
Time Allotted:
20 minutes
	Critical Idea
	• The power of the vertical alignment process is the collaborative conversation. It is not about placing the standards in order or filling out the chart. The process is intended to capture the conversations and common understandings.
	
	Step-By-Step Instructions
	• At this point, explain the remainder of the vertical alignment process.
	• Say,
	  ○ "You will tape your strips to your chart paper in order—beginning with kindergarten at the bottom. Write the title of the big idea at the top of the chart paper, and to the left of each standard strip, write the coding for the standard."
	  ○ "When you discuss the changes from grade to grade, please chart your conversation on the right-hand side of the chart paper."
	• Participants use the guiding questions on this slide to
	  ○ discuss the changes that occur from one grade to the next,
	  ○ determine where concepts are introduced, developed, and finalized, and
	  ○ describe where and how ideas get more complex.
	• Give 15 minutes for groups to finish out their charts and document the changes from grade to grade, using the questions on the slide as a guide.
	  ○ If you find that groups are struggling, you may choose to model the changes from kindergarten to Grade 1 with the whole group.
	• Circulate around the room as groups are working, encouraging them to use the guiding questions to focus their conversations.
	• When groups finish their work, have each group hang their poster.
	• If there is time, ask table groups to share a few of their findings with the whole group. Some prompts may include:
	  ○ "What are some of the important findings your group made?"
	  ○ "Was there anything that surprised you about the standards?"
	  ○ "Was there anything that was an ah-ha for you or your group?"
	
	Words of Wisdom
	• The purpose of the vertical alignment process is to capture conversations and ideas around focus and coherence. It is not about completing the chart.
		M5_P-03
		Vertical Alignment Chart

Time & Slide Thumbnail	Facilitator Notes Session 2: Exploring Coherence in the LSSM	Materials

Slide 17
Time Allotted:
10 minutes
	Critical Idea
	• Adults do not learn from experience but rather from reflecting on experience.
	
	Step-By-Step Instructions
	• Remind the group that it is essential that we take a deliberate pause in our work to reflect on this experience.
	• Display the reflection questions, and ask participants to take a minute and individually reflect on these questions, making notes on a piece of scrap paper or a sticky note.
	• After their individual reflection, have participants discuss their answers at their table groups.
	• Call on participants to share something they heard a colleague say for each of the questions.
	• Close out this session by asking participants:
	  ○ "What happens if a teacher decides not to teach the standards?"
	• Popcorn some responses.
	• Possible response:
	  ○ *The power of understanding the coherence of the standards is that teachers can remediate gaps in student learning that may directly influence the current content being taught as opposed to spending more time on the new learning than is necessary.*
	
	Words of Wisdom
	• Not applicable
		Sticky notes

Math Module 5, Session 3
Session Title: Deepening Mathematical Content Knowledge for Effective Instruction

Session Overview *What are the overarching goals of this session? Why are those goals important?* *How do they connect to what's come before and what will come after?*
The overarching goal of Session 3 is for participants to do a deep study of fraction concepts. Participants will explore the importance of *identifying the whole* when talking about fractions. They will explore relative magnitude of fractions on a number line, and they will discuss strategies such as benchmark fractions for making comparisons with fractions.

Session Key Points *What are the 2 to 4* most *important takeaways from this session?*	**Session Products** *What will participants produce during the session? Immediately following the session?*
Through Session 3, participants will know: • The use of contexts, models, and mental imagery can help students build a strong understanding of the relative size of fractions. • The relationship between the number of parts and the size of parts cannot be "told" but must be developed in each student through many experiences. • The goal is for students to select efficient strategies for determining the larger fraction, not to memorize an algorithmic method of choosing the correct answer.	• In Session 3, participants will complete several activities related to making sense of fractions.

Session Objectives *What will participants know, believe, and be able to do as a result of this session?*	**Session Agenda at a Glance** *What is the overall flow of this session?*
Participants will … • Develop and use a common understanding of grade-level standards to align teaching and learning. (CK, CS) • Engage in a study and collegial conversation about how fractions are numbers, and we can use different models (including a number line) when comparing fractions. (CK, CS) CK: Content Knowledge CP: Content Pedagogy CS: Curriculum Skills	• Engage in a variety of models to compare fractions. • Explore relative magnitude of fractions on a number line, beginning with unit fractions. • Explore equivalent fractions.

Facilitation Recommendations	
Session Length	90 minutes

Preparing to Facilitate *What materials and supplies are needed to facilitate this session?* *What must the facilitator do to prep for the actual session?*	

Session Materials
 	
• **Participant Handout**
  ○ **M5_P-04** Reasoning Using Benchmarks
 	
• **Facilitator Handout**
  ○ **M5_CL-05** Comparing Fractions Cards (cut out prior to session, 1 set per group of 4)
 	
• **Additional Supplies**
  ○ Sticky notes
	Facilitator Pre-Work and Prep
	
	• Print participant handouts (1 per participant)
	• Print (preferably on card stock) and cut out **M5_CL-05** Comparing Fractions Cards (1 set per group of 4)

Participant Pre-Work *What should participants bring to this session? What should they do or prepare in advance of this session?*	
Participants must bring: • Not applicable	**Before this session, participants should:** • Not applicable

Time & Slide Thumbnail	Facilitator Notes Session 3: Deepening Mathematical Content Knowledge for Effective Instruction	Materials
  Slide 18 Time Allotted: < 1 minute	**Session Three: Deepening Mathematical Content Knowledge** for effective instruction **Slides 18–26 Time Allotted: 90 minutes** ***Critical Idea*** • This slide introduces Session 3. ***Step-by-Step Instructions*** • Say, ○ "We will now transition into Session 3. This session is designed to deepen your mathematical knowledge for effective instruction." ○ "The activities in this session are not necessarily designed for student use." ○ "The EngageNY curriculum has similar math learning activities built into its lessons, though the activities may be spread across several lessons and not necessarily be presented in the same way we are about to experience." ○ "It is important to keep in mind that you may experience some ah-ha moments in this section that will not come as quickly and as easily to your students—so it is essential to abide by the pacing of the EngageNY curriculum, which is designed to be more developmentally appropriate for the students." ***Words of Wisdom*** • For Session 3, participants should be sitting in mixed-grade-level groups of four.	
  Slide 19 Time Allotted: 10 minutes	***Critical Idea*** • Instruction involving fractions should always begin with identifying the whole. If the whole is not identified, any reasonable answer needs to be accepted. ***Step-By-Step Instructions*** • Say, ○ "We will engage in some math learning experiences in the domain of Number and Operations—Fractions." ○ "Individually, look at the slide and think about what this diagram represents. Be prepared to justify your thinking." • After a minute or two, ask a few participants to share their number-**without** sharing their reasoning. As you record the numbers on chart paper, ask participants to show thumbs up or thumbs down if they agree with the response. Record 4 or 5 responses. Be sure to include ¼, 1/8, ¾, and 7/8. • Ask the table groups to take a few minutes to discuss their reasoning of why these responses are correct or not. • Ask for a volunteer to share their reasoning for each of the numbers, one at a time, recorded on the chart paper. • If answers 1 and 7 have not surfaced by this point, add them to the chart and ask, ○ "What would the whole be if the answer is 1? If the answer is 7?" ***Words of Wisdom*** • Time does not allow for all participants to share their numbers. Sharing just a few examples will surface the need to always identify the whole.	Chart paper Markers

Time & Slide Thumbnail	Facilitator Notes Session 3: Deepening Mathematical Content Knowledge for Effective Instruction	Materials
  Slide 20 Time Allotted: 10 minutes	***Critical Idea*** • Denominators indicate how many same-size pieces are needed to form a whole. ***Step-By-Step Instructions*** • Distribute medium-sized (about 3”x 3” square) sticky notes to participants. • Ask participants to use a sticky note to answer the questions on the slide, then share their thinking with an elbow partner. • As participants discuss their thinking, monitor their discussions, and ask a pair to share their discussion with the whole group. • **Animate the slide (there are two animations)**. The first animates the dark blue rectangle; the second moves the dark blue rectangle on top of the light blue rectangle. • Repeat participants’ responses, modeling their thinking using the animation on the slide. (For example, participants might say, “If this is one half, I need two pieces of this size to make a whole. So, the whole would be one sticky note. Since the fraction is ½ the denominator tells me I need two equal pieces to make a whole.”) ***Words of Wisdom*** • Keep this discussion brief. This slide sets up the next activity.	Sticky notes (ideally about 3” x 3”)

Slide 21
Time Allotted:
15 minutes
	Critical Idea
	• Denominators indicate how many same-size pieces are needed to form a whole.
	
	Step-By-Step Instructions
	• Ask to participants to individually select one of the numbers on the slide, then work with a partner and use sticky notes to determine the whole (4 minutes).
	• Ask partners to share their thinking with their table group. (If a group finishes early, encourage them to continue the process by selecting other numbers and determining the whole.) (4 minutes)
	• After small groups share, ask each table group to share with the whole group their reasoning for one of the numbers. Then continue a whole-group discussion using the following questions to guide the discussion:
	  ○ “Which numbers did you find to be the most challenging?”
	  ○ “What ideas surfaced during your conversation with your partner?”
	  ○ “Did you have an ‘ah-ha’ moment? If so, describe what you learned or noticed.”
	  ○ “What similarities or differences did you notice about how you and your partner reasoned through this task?”
	
	Words of Wisdom
	• It is critical that you monitor and listen as participants are working through this task. Provide support using questions such as:
	  ○ “In what way have you tried to determine the whole?”
	  ○ “How can you determine the number of equal pieces that make a whole?”
	  ○ “If half of the sticky note is 2/3 (for example), then how much of the sticky note is equal to 1/3?”
	• If pairs are struggling, encourage them to work with another pair of participants.	

Time & Slide Thumbnail	Facilitator Notes Session 3: Deepening Mathematical Content Knowledge for Effective Instruction	Materials

Slide 22
Time Allotted:
15 minutes
	Critical Idea
	• The numerical reasoning skills that students use when working with whole numbers are applicable when working with fractions.
	
	Step-By-Step Instructions
	• Say,
	  ○ "In this activity, you are making connections with whole numbers and fractions."
	  ○ "Work independently to read and complete the activity described on the slide (2 minutes), then share your number lines with your table groups" (4 minutes).
	• As the groups discuss, draw a number line on chart paper.
	• Select a volunteer to share their numbers and reasoning.
	• Record each number on a sticky note.
	• Ask the volunteer to place their first number (sticky note) on the number line and then to explain their reasoning.
	• Ask the volunteer to repeat the process by placing sticky notes for the other points on the number line and then explaining their reasoning.
	• Remove these sticky notes from the chart and then, using the same process, ask 2 or 3 additional participants share their numbers and reasoning.
	• Ask the whole group, "What did you have to think about to complete this task?"
	• Popcorn out a few responses.
	
	Words of Wisdom
	• Participants may struggle with this. Working in cooperative groups provides support. In addition, monitor participants' work and discussions, and provide clarification and guidance as needed.
		Chart paper
		
		Markers
		
		Sticky notes

Slide 23
Time Allotted:
15 minutes
	Critical Idea
	• Using benchmarks to make sense of magnitude and location of whole numbers is extended to reasoning about fractions. That is, understanding that the meaning of denominators as "how many pieces are required to make a whole."
	• E.g., in 2/3, you need 3 "pieces" to make a whole of 3/3. The fraction 2/3 indicates that you have 2 of these pieces.
	• Then the numerator indicates "how many of pieces that you have of 1/3 size each." These ideas are critical to developing conceptual understanding of fractions as numbers.
	
	Step-By-Step Instructions
	• Have participants locate handout **M5_P-04 Reasoning Using Benchmarks**.
	• Ask participants to work with a partner to complete the worksheet.
	• Give pairs 5 minutes to complete the worksheet.
	• As they finish, have each pair of participants join another pair—that is not seated at their table—and discuss the worksheet.
	• Ask participants to return to their table groups.
	• Ask a few pairs to share their thinking, important parts of their discussion, and/or any struggles or ah-ha moments they experienced during this activity.
	• Say,
	  ○ "It is important that we teach students how to reason with fractions—and their values when comparing fractions—rather than relying on tricks."
	  ○ "For example, cross multiplication/the butterfly method is a handy trick when learning to compare fractions, but unless there is a deep conceptual understanding for why this works, teaching this trick without the understanding behind it is actually robbing our students of important knowledge that they need for later grades."
		M5_P-04
		Reasoning Using Benchmarks

Time & Slide Thumbnail	Facilitator Notes Session 3: Deepening Mathematical Content Knowledge for Effective Instruction	Materials
	○ "Knowing how to use benchmark fractions, common denominators, and common numerators are valuable skills that will help students develop conceptual understanding and reasoning when comparing fractions. • Transition to the next slide. ***Words of Wisdom*** • Though complex fractions are not introduced until grade 7, often it is beneficial to think about half of a unit fraction to think about size and relationship of fraction pairs. For example, the relationship of thirds and a half is "it would take 1 and a half thirds to equal one half."	
 Slide 24 Time Allotted: 5 minutes	***Critical Idea*** • Understanding a fraction as a *number*, and unit fractions as the *base unit*, supports the three components of rigor—conceptual understanding, procedural skills and fluency, and application. ***Step-By-Step Instructions*** • Say, ○ "Read and respond to the questions on the slide. Jot your ideas on a sticky note." • Ask participants to share their thinking at their tables. • **<u>Animate the bullets one at a time</u>**, providing clarification as needed. (All points, except the first, apply to all fractions, not just unit fractions.) • Ask, ○ "Did your group have similar ideas to those listed?" ○ "What additional ideas surfaced in your discussion?" ***Words of Wisdom*** • This slide leads to reflection on participants' learning.	
 Slide 25 Time Allotted: 15 minutes	***Critical Idea*** • Understanding a fraction as a *number*, and unit fractions as the *base unit*, supports the three components of rigor—conceptual understanding, procedural skills and fluency, and application. ***Step-By-Step Instructions*** • Say, ○ "We will close out this session with one more math learning experience and a final reflection." ○ "For this learning experience, you will work in groups of 3 to 5." • Give participants a minute to move to another table, if necessary. ○ "Take a moment to read the slide." • Distribute to each group one set of **M5_CL-05 Comparing Fractions Cards**. • Explain, ○ "Place the three strategy cards (see slide) face up on the table and place all the fraction cards face down, either in a pile or scattered." • Have participants follow the directions on the slide. • Participants will each draw a card. • Then they take turns placing the card under one of the strategy category cards, stating their reasoning for the placement. It can be argued that some fraction cards could fit under more than one strategy. Tell participants to select the best fit. • As groups finish the task, ask two or three participants to share one of their fraction cards and their reasoning for selecting/using the strategy.	**M5_CL-05** Comparing Fractions Cards

Time & Slide Thumbnail	Facilitator Notes Session 3: Deepening Mathematical Content Knowledge for Effective Instruction	Materials
	Words of Wisdom • Circulate around the table groups, encouraging participants to use the concept of unit fractions to justify their conclusions.	

Slide 26
Time Allotted:
5 minutes
	Critical Idea
	• Adults do not learn from experience but rather from reflecting on experience.
	
	Step-By-Step Instructions
	• Say,
	  ○ "Let's take some time to pause and reflect on our experience."
	  ○ "Take a moment to read the questions on the slide."
	• Give participants individual time to think about the questions on the slide. Encourage them to jot down their thinking on a sticky note.
	• After a few minutes, ask participants to make eye contact with someone they haven't worked with today and move to meet them in the room to share their reflections.
	• Allow a few minutes for participants to share.
	
	Words of Wisdom
	• Participants will reflect on and make connections in their learning by jotting down their thinking.	

Math Module 5, Session 4
Session Title: Instructional Strategies to Improve Curriculum Implementation

Session Overview *What are the overarching goals of this session? Why are those goals important?* *How do they connect to what has come before and what will come after?*
The overarching goal of Session 4 is for participants to continue to explore the research and processes for orchestrating productive mathematical discourse. In this session, the participants will review the "5 practices for orchestrating productive mathematics discussions" model. This session's focus will mainly be on the final practice of *connecting* student responses. In this session, participants will analyze student work to identify strategies and misconceptions. They will discuss ways to make connections among the various strategies and to the intended learning, in order to deepen their students' mathematical understanding. Participants will then chart their proposed sequence for these selected responses in a logical order to help students make connections between strategies and explain their connections.

Session Key Points *What are the 2 to 4* most *important takeaways from this session?*	**Session Products** *What will participants produce during the session? Immediately following the session?*
Through Session 4, participants will know: • That it is important to encourage students to make mathematical connections between different students' responses. • The importance of cultivating a classroom culture with explicit supports for student discourse. • That it is important, during anticipation of work, to consider how possible student responses are mathematically related.	• During Session 4, participants will chart a proposed sequence of student responses to a lesson in order to highlight connections that will help students deepen their mathematical understanding.

Session Objectives *What will participants know, believe, and be able to do as a result of this session?*	**Session Agenda at a Glance** *What is the overall flow of this session?*
Participants will … • Select and sequence student responses to build a mathematically coherent story line from prior knowledge to current grade-level standards. (CP, CS) CK: Content Knowledge CP: Content Pedagogy CS: Curriculum Skills	• Review the "5 Practices for Orchestrating Productive Mathematics Discussions" model. • Connect student responses. • Practice connecting student responses by analyzing student responses to a task.

Facilitation Recommendations	
Session Length	75 minutes

Preparing to Facilitate *What materials and supplies are needed to facilitate this session?* *What must the facilitator do to prep for the actual session?*	

Session Materials
 	
• **Participant Handout**
  ○ **M5_P-05** Processes for Orchestrating Productive Mathematical Discourse
 	
• **Facilitator Handout**
  ○ **M5_CL-06** Connecting Student Learning—Cards
 	
• **Additional Supplies**
  ○ Sticky notes
	Facilitator Pre-Work and Prep
	
	• Print participant handouts (1 per participant)
	• Print and cut out **M5_CL-06** Connecting Student Learning—Cards (1 set per group of 4)

Participant Pre-Work *What should participants bring to this session? What should they do or prepare in advance of this session?*	
Participants must bring • Not applicable	**Before this session, participants should** • Not applicable

Time & Slide Thumbnail	Facilitator Notes Session 4: Instructional Strategies to Improve Curriculum Implementation	Materials
  Slide 27 Time Allotted: < 1 minute	**Session 4: Instructional Strategies** to improve curriculum implementation **Slides 27–34 Time Allotted: 75 minutes** ***Critical Idea*** • This slide introduces Session 4. ***Step-By-Step Instructions*** • Tell participants that we will transition into Session 4. ***Words of Wisdom*** • For Session 4, participants should be sitting in mixed-grade-level groups of four.	

Slide 28
Time Allotted:
5 minutes
	Critical Idea
	• Emphasize that the purpose of this section is to give participants an overview of the model for facilitating mathematics discourse described in the resource *5 Practices for Orchestrating Productive Mathematics Discussions,* and to take a deeper look at the final practice: **connecting**. In previous modules, we explored in depth the other four practices described in this book.
	
	Step-By-Step Instructions
	• Say,
	  ○ "To promote productive student discourse in the mathematics classroom, we will continue to examine the "5 practices" model as originated by Margaret Smith and Mary Kay Stein. Smith and Stein's research laid out the framework as a process for using student thinking and student work as the launch pad for rich discussions that get at the heart of important learning."
	  ○ "The first iteration of this model was done with mathematics; later, the model was expanded to also address science discourse. We will use the mathematics resource as the foundation of our learning today."
	  ○ "The purpose of this section of learning today will be to review the "5 practices" model, and to explore the final practice in the model, **connecting.**
	• Transition to the next slide.
	
	Words of Wisdom
	• The "5 practices model" is very rich; participants can become overwhelmed, so strive to keep the overview of the 5 practices brief.
		Citation:
		Smith, M. S., & Stein, M. K. (2011). *5 practices for orchestrating productive mathematics discussions.* Reston, VA: National Council of Teachers of Mathematics. Available at http://www.nctm.org/Store/Products/5--Practices-for-Orchestrating-Productive-Mathematics-Discussions

Slide 29
Time Allotted:
5 minutes
	Critical Idea
	• Emphasize that the purpose of this section is to give participants an overview of the model for facilitating mathematics discourse described in the resource *5 Practices for Orchestrating Productive Mathematics Discussions,* and to take a deeper look at the final practice: **connecting**. In previous modules, we explored in depth the other four practices described in this book.
	
	Step-By-Step Instructions
	• Say,
	  ○ "Remember that this visual is an overview of the '5 practices model' for orchestrating productive mathematics discussions."
	  ○ "The '5 practices model' is a process of planning and instruction that teachers can implement for promoting productive discussions in classrooms."
	  ○ "The EngageNY curriculum resource makes use of these 5 practices in many lessons."	

Time & Slide Thumbnail	Facilitator Notes Session 4: Instructional Strategies to Improve Curriculum Implementation	Materials
	○ "By taking the time to understand the model fully, you should be able to better implement the EngageNY curriculum to its fullest intent." • **<u>Animate the slide for each step</u>.** • Briefly review the description for each step: ○ "This process depends on the foundation of establishing a clear learning goal for discussions, which often EngageNY does for you." ○ "The first practice, ***Anticipating*** **student responses** to a challenging task, is part of the planning that occurs BEFORE students engage in the mathematics task." ○ "The second practice, ***Monitoring*** **student work** during engagement with the task, happens while students are working on the task individually, in pairs, or in small groups." ○ "The third practice, ***Selecting*** **particular student work** samples (or students, or groups of students, to present their mathematical work), happens after students have completed the task." ○ "The fourth practice, ***Sequencing*** **student work** in a specific order for discussion, also happens after students have completed the task." ○ "The fifth and final practice, ***Connecting*** **student work samples** to each other and to the key learning goal (connecting different students' responses, and connecting the responses to key mathematical ideas), happens after a sequence is determined." • **<u>Animate the slide.</u>** • Say, ○ "In the previous modules, we explored the practices of anticipating student responses and monitoring, selecting, and sequencing student work." • **<u>Animate the slide</u>**. ○ "The focus of our session today will be on **Connecting different student responses and connecting responses to key mathematical ideas**." ***Words of Wisdom*** • While EngageNY does make use of many of these practices, it does not call them out specifically. Therefore, it is important that teachers using the EngageNY curriculum understand how to recognize each of these practices so they can best meet the intent of the lesson.	
  Slide 30 Time Allotted: 10 minutes	***Critical Idea*** • Emphasize that the purpose of this section is to give participants an overview of the model for facilitating mathematics discourse described in the resource *5 Practices for Orchestrating Productive Mathematics Discussions,* and to take a deeper look at the final practice: **connecting**. In previous modules, we explored in depth the other four practices described in this book. ***Step-By-Step Instructions*** • Ask participants to locate handout **M5_P-05 Processes for Orchestrating Productive Mathematical Discourse**. • Say, ○ "Before we dive deeper into the fifth and final practice, I would like to take some time to review the previous practices that we covered in other modules." ○ "This document highlights all '5 practices for orchestrating productive mathematical discourse.' Take a minute to read through the 5 practices and think about how this process will affect teaching and learning in your classroom." • **<u>Animate the slide</u>**.	**M5_P-05** Processes for Orchestrating Productive Mathematical Discourse

Time & Slide Thumbnail	Facilitator Notes Session 4: Instructional Strategies to Improve Curriculum Implementation	Materials
	○ "When you have finished reading, have a quick table discussion about how this process may affect teaching and learning in your classroom." • Allow a few minutes for participants to read and to discuss the process. • Ask a few participants to share out their thinking. • Move to the next slide. ***Words of Wisdom*** • Not applicable	
 Slide 31 Time Allotted: 5 minutes	***Critical Idea*** • *Connecting* students' responses requires the teacher to craft questions that will make the mathematics visible and understandable. Teacher questions must go beyond clarifying and probing, and must focus on mathematical meaning and relationships and make connections between mathematical ideas and representations. ***Step-By-Step Instructions*** • Say, ○ "Take a minute or two to review the slide and share your understanding of the process of ***Connecting*** with those at your table." • After giving participants a couple of minutes to talk with those in their groups, share the following with them: ○ "The fifth and final practice, ***connecting*** different students' responses, and connecting the responses to key mathematical ideas, happens after you determine a sequence of student responses." ○ "*Connecting* is supported by the other four practices — *anticipating*, *monitoring*, *selecting*, and *sequencing* — because the way you choose to connect students' ideas to one another and to key mathematical ideas will depend upon the observations and decisions you make when implementing the other four practices." ○ "Like other practices in this framework, the practice of *connecting* also involves reflection and planning on the part of the teacher." ○ "When working on *connecting*, the teachers must think about how to keep the key mathematical ideas as the focus of the lesson, as well as how to use questions to help students make mathematical connections between the different responses presented. Teachers should also consider possible extensions that may surface during the discussion." • Move to the next slide. ***Words of Wisdom*** • Not applicable	

Time & Slide Thumbnail	Facilitator Notes Session 4: Instructional Strategies to Improve Curriculum Implementation	Materials

Slide 32
Time Allotted:
10 minutes
	Critical Idea
	• *Connecting* students' responses requires the teacher to craft questions that will make the mathematics visible and understandable.
	
	Teacher questions must go beyond clarifying and probing, and must focus on mathematical meaning and relationships and make connections between mathematical ideas and representations.
	
	Step-By-Step Instructions
	• Say,
	  ○ "To rehearse the *connecting* practice, we are going to analyze some student work from a task and look for possible connections we can make."
	  ○ "Since the *connecting* practice involves not only making connections between student responses, but also connecting those responses to the intended mathematical learning, it is important that we are familiar with the task that these students completed."
	  ○ "Take a minute to read the question in the slide."
	  ○ "Have a quick discussion at your group about how you anticipate students in this grade 3 class may respond to this task."
	• Give participants a few minutes to discuss possible anticipated student responses to the task. Ask a few participants to share out.
	• **Animate the slide**.
	  ○ "The teacher's learning goal for this task was for students to see how the structure of multiplication is evident in different representations."
	  ○ "It is important to know this before looking for connections, because we need to ensure that we are connecting the student responses back to this intended goal."
	• Move to the next slide.
	
	Words of Wisdom
	• Not applicable	

Slide 33
Time Allotted:
30 minutes
	Critical Idea
	• *Connecting* students' responses requires the teacher to craft questions that will make the mathematics visible and understandable.
	
	Teacher questions must go beyond clarifying and probing, and must focus on mathematical meaning and relationships and make connections between mathematical ideas and representations.
	
	Step-By-Step Instructions
	• Hand out a set of **M5_CL-06 Connecting Student Learning—Cards** and a sheet of chart paper and markers to each group.
	• Say,
	  ○ "Each card has a different student's response to the task."
	  ○ "As a group, you are going to analyze the student work and look for strategies, misconceptions, and different levels of understanding."
	  ○ "You will tape the student work cards onto the chart paper in an order that you think would support student understanding."
	  ○ "Then, you will write on the chart paper a description of how you would make connections between the students' strategies and how you would connect them to the learning goal."
	  ○ "You will have about 20 minutes to work on this. Please post your chart when
		M5_CL-06
		Connecting Student Learning—Cards
		(cards should have been printed and cut out prior to session)
		
		Chart paper
		
		Markers

Time & Slide Thumbnail	Facilitator Notes Session 4: Instructional Strategies to Improve Curriculum Implementation	Materials
	your group is finished." • Give the groups 20 minutes to complete their charts. • Debrief the activity either by highlighting some unique connections you noticed on the various charts or by asking participants to share out any "ah-has" they had while completing the activity. ***Words of Wisdom*** • Walk around while groups are completing their charts and look for groups that may be making some unique connections that others may not have thought of.	

Slide 34
Time Allotted:
10 minutes
	Critical Idea
	• Determining action steps based on learning is a fundamental component to long-term success.
	
	Step-By-Step Instructions
	• Say,
	  ○ "Let's take some time to pause and reflect on our experience in planning for mathematical discourse."
	  ○ "Take a moment to read the questions on the slide."
	• Give participants individual time to think about the questions on the slide. Encourage them to jot down their thinking on a piece of scrap paper or a sticky note.
	• After a few minutes, ask a few participants to make eye contact with someone they haven't worked with yet today and move to meet them in the room to share their reflections.
	• Allow a couple minutes for participants to share.
	• Ask a few participants to share out what they discussed with the whole group.
	
	Words of Wisdom
	• This is an important conversation about the role of the classroom environment in ensuring all students openly engage in meaningful discourse.
	• Participants need time to think about and discuss questions like these, and they need the support that they can find from one another as they think and talk about ways to support students as they engage in meaningful mathematics discourse.	

Math Module 5, Session 5
Session Title: Purposeful Planning of the EngageNY Curriculum

Session Overview *What are the overarching goals of this session? Why are those goals important?* *How do they connect to what's come before and what will come after?*
The overarching goal of Session 5 is for participants to learn a process for collaborative planning conversations that will enable them to make connections between the standards and their resource materials. In this session participants, will again use the Planning Guide, which is a tool for focusing conversations around the standards and making instructional decisions around their resource materials.

Session Key Points *What are the 2 to 4* most *important takeaways from this session?*	**Session Products** *What will participants produce during the session? Immediately following the session?*

Through Session 5, participants will know:
• Collaborative planning is:
  ○ Working and learning together to plan instruction (including lessons, units, assessments, and activities) focused on building the intended learning described by the standards.
  ○ Discussing, interpreting, and refining curriculum resource materials together in order to use these resources to best meet students' learning needs.
• Focusing planning conversations around the standards in order to make informed instructional decisions will:
  ○ Build a shared understanding of the math content described in the standards and what that content looks like in teaching and learning.
  ○ Help educators consider and use instructional strategies and resources that will best build on students' current understanding and connect to the intended learning.
	• After Session 5, participants should be able to produce well informed conversations and planning notes around their standards using the Planning Guide.

Session Objectives *What will participants know, believe, and be able to do as a result of this session?*	**Session Agenda at a Glance** *What is the overall flow of this session?*
Participants will … • Investigate select standards from the domain of Numbers and Operations—Fractions to determine how fraction concepts progress across K–5. (CK, CS) • Develop and use a common understanding of grade-level standards to align teaching and learning. (CK, CS) CK: Content Knowledge CP: Content Pedagogy CS: Curriculum Skills	• Review the Planning Guide. • Practice conducting collaborative conversations around the standards.

Facilitation Recommendations	
Session Length	60 minutes

Preparing to Facilitate *What materials and supplies are needed to facilitate this session?* *What must the facilitator do to prep for the actual session?*	

Session Materials
• **Participant Handout**
  ○ **M5_P-06** Planning Guide
• **Additional Supplies**
  ○ Sticky notes
	Facilitator Pre-Work and Prep
	• Print participant handouts (1 per participant)

Participant Pre-Work *What should participants bring to this session? What should they do or prepare in advance of this session?*	
Participants must bring • Computer	**Before this session, participants should** • Not applicable

Time & Slide Thumbnail	Facilitator Notes Session 5: Purposeful Planning of the EngageNY Curriculum	Materials
  Slide 35 Time Allotted: 1 minute	**Session 5: Purposeful Planning** of the EngageNY curriculum **Slides 35-41 Time Allotted: 60 minutes** ***Critical Idea*** • This slide introduces Session 5. • In Session 5, we are working toward implementing structured collaboration for planning instruction. ***Step-By-Step Instructions*** • Tell participants that we will transition into Session 5. ***Words of Wisdom*** • For Session 5, participants should be sitting in grade-level groups.	

Slide 36
Time Allotted:
3 minutes
	Critical Idea
	• This tool helps grade-level teams stay focused when studying standards and planning aligned instruction together.
	
	Step-By-Step Instructions
	• Say,
	  ○ "In the previous modules, we introduced you to the Planning Guide, a tool to support regular, ongoing collaborative planning of instruction in our grade level teams that is aligned to the standards."
	• Give each participant a copy of **M5_P-06 Planning Guide**.
	• Say,
	  ○ "Remember that this tool is designed to be completed within a 45-minute collaborative planning period. This tool guides the discussion, keeping the team focused on understanding the content and what it looks like in instruction, and then considering the best use of strategies and resources for instruction."
	• Give participants two minutes with a partner to re-familiarize themselves with the Planning Guide.
	• Transition to the next slide.
	
	Words of Wisdom
	• This is a quick re-introduction to the Planning Guide. Do not take too much time here.
		M5_P-06
		Planning Guide

Slide 37
Time Allotted:
2 minutes
	Critical Idea
	• This tool helps grade-level teams stay focused when studying standards and planning aligned instruction together.
	
	Step-By-Step Instructions
	• Say,
	  ○ "Recall that the first step in the process is to choose focus standards to study. When you are using the tool with your team, you might choose standards that are coming up in the next lesson or unit, standards that the team typically sees students struggle with, and so on. Whatever way you decide, make sure the team agrees to about 1 to 3 standards to study."
	  ○ "Since our focus has been on the big idea 'Using unit fractions to reason about numbers' we will use the standards from that big idea for today's discussion."
	• Ask each group to note on the first page of their Planning Guide the standards they will study today.
		M5_P-06
		Planning Guide

Time & Slide Thumbnail	Facilitator Notes Session 5: Purposeful Planning of the EngageNY Curriculum	Materials
	Words of Wisdom • Walk around the groups throughout this process to monitor progress and to ask questions/prompt groups to maintain progress.	

Slide 38
Time Allotted:
2 minutes
	Critical Idea
	• This tool helps grade-level teams stay focused when studying standards and planning aligned instruction together.
	
	Step-By-Step Instructions
	• Say,
	  ○ "Since we guided you through this process step by step earlier, this time I am going to quickly review the process and then release you to do it on your own in your grade-level groups."
	  ○ "If you look at the next page of the Planning Guide, you will see the section called Foundational Study of the Standards."
	  ○ "Remember that the purpose of this section is to collaboratively deepen your understanding of what students should know and be able to do based on the standards—and that this section should take only about 15 minutes to complete once you get used to the process."
	  ○ "There is a set of specific "look-fors" listed on your page to help guide you in this conversation."
	• Transition to the next slide.
	
	Words of Wisdom
	• These slides serve as a quick review of the Planning Guide.
		Computer
		
		M5_P-06
		Planning Guide

Slide 39
Time Allotted:
3 minutes
	Critical Idea
	• This tool helps grade-level teams stay focused when studying standards and planning aligned instruction together.
	
	Step-By-Step Instructions
	• Say,
	  ○ "Locate the third page of the Planning Guide. This section is called the Bridge to Lesson Planning. We did a deep dive into this section in the previous module."
	  ○ "Remember that the purpose of this section is to connect your understanding of the standards to the EngageNY resource materials."
	  ○ "You will recall that this part of the collaborative planning conversation takes the most time—about 20 to 30 minutes."
	• Transition to next slide.
	
	Words of Wisdom
	• These slides serve as a quick review of the Planning Guide.
		M5_P-06
		Planning Guide

Time & Slide Thumbnail	Facilitator Notes Session 5: Purposeful Planning of the EngageNY Curriculum	Materials

Slide 40
Time Allotted:
45 minutes
	Critical Idea
	• It is important to apply our deep study of the standards to the implications for instruction to help us make informed decisions about the resource materials that we use in our classrooms.
	
	Step-By-Step Instructions
	• Say,
	  ○ "You are now going to work in your grade-level groups to go through the entire planning process laid out in the Planning Guide."
	  ○ "You will have 45 minutes to complete the whole process: 15 minutes for the study of the standards and 30 minutes for the bridge to lesson planning."
	  ○ "Remember to use all the resources available to you on the Louisiana Believes website to help you with your discussion and to help you in choosing a lesson from EngageNY."
	  ○ "I will be walking around the entire time to make myself available if you need any help or have any questions."
	
	Words of Wisdom
	• Walk around and assist groups as needed.
		Laptops
		
		M5_P-06 Planning Guide

   Slide 41 Time Allotted: 5 minutes	***Critical Idea*** • It is important to apply our deep study of the standards to the implications for instruction to help us make informed decisions about the resource materials that we use in our classrooms. ***Step-By-Step Instructions*** • Say, ○ "Take a few moments to read the questions on the slide and to jot you're your individual reflections on a sticky note." • Give participants a minute to individually reflect and write down their notes. • Give participants a few minutes to discuss the questions with those in their group. • After 3 minutes, ask participants to share out a few of their conversation points. • Summarize by reminding participants that it is our job as teachers to provide students with rich learning experiences that give students opportunities to engage in meaningful mathematics that helps prepare them for college and career. • Ask participants to return to their original seats. ***Words of Wisdom*** • Don't rush this conversation—it is pivotal.	Sticky notes

Module 5	Facilitator Notes Closing Slides and Participant Evaluation Survey	Materials
 Slide 42 Time Allotted: < 1 minute	**Module 5 Closing and Participant Evaluation Survey** **Slides 42–44 Time Allotted: 30 minutes** ***Critical Idea*** • Slides 42–44 are the closing slides for Module 5. ***Step-By-Step Instructions*** • Not applicable ***Words of Wisdom*** • Not applicable	
 Slide 43 Time Allotted: < 1 minute	***Critical Idea*** • This slide provides references for Module 5. ***Step-By-Step Instructions*** • Say, ○ "These are the references for Module 5." • Transition to the next slide. ***Words of Wisdom*** • This slide should be brief.	
 Slide 44 Time Allotted: 10 minutes	***Critical Idea*** • Participant feedback is highly valued and is critical to informing future learning sessions. ***Step-By-Step Instructions*** • Say, "In order to gather feedback of your learning experience, you will take a module evaluation survey. Your responses are very important, so we are providing the next 10 minutes for you to complete the survey." ***Words of Wisdom*** • Participants should complete the evaluation survey during the session.	http://www.utdanacenter.org/ldoe/surveys