Grades 3 -5

Algebraic Reasoning: It Starts in Elementary School
Carolee Koehn Hurtado

Participants will engage in a hands-on examination of tasks and activities designed to engage students in algebraic concepts and relational thinking. This session will include interactive participant dialogue in response to research data, video clips, and student work samples.

Routines to Support Number Sense and Algebraic Reasoning
Carolee Koehn Hurtado

The Common Core Standards for Mathematical Practice (SMP) require students to communicate mathematically, provide justifications, and consider alternative solutions. Performing these activities can be difficult for students. Come to this session to learn games, warm-ups, and routines to foster number sense and reasoning. We can support students to engage in SMP and have fun while doing it.

Using Mathematical Discourse to Teach Number and Operations, including Fractions
Tina Setser

How do you teach students to construct viable arguments and critique the reasoning of others? You facilitate meaningful mathematical discourse by posing purposeful questions. Much easier said then done. This session will delve into using these two effective teaching practices from Principles to Actions with the 3–5 Number and Operations content, specifically fractions on the number line. We will answer two central questions: “What does a meaningful mathematical discourse sound like?” and “How do you develop purposeful questions?”

Dive Deeper into Building a Culture for Constructing Viable Arguments
Tina Setser

Build on the knowledge that you gained in session 1, which focused on two effective teaching practices from Principles to Actions, to answer a new question: “How do you teach students to construct viable arguments and critique the reasoning of others?” Discover the dos and don’ts for developing a classroom culture that establishes productive discourse as a means to learn and establish truths. You will also learn techniques to engage non-English speakers and beginning English learners in the discussions to ensure that they are building their language fluency along with their mathematical knowledge.

How to Turn Angles from Blah into Fantastic
Mike Chamberlain

Learn the art of choosing motivating problems and ways to present them so that even the most uninterested student can’t keep from joining in! Participants will discover how the development of fourth-grade students’ understanding of angle can be both thought-provoking and lots of fun. The focus will be on Mathematical Practice 2, “Reason abstractly and quantitatively,” as students contextualize and decontextualize problems involving angles, and on Mathematical Practice 5, “Use appropriate tools strategically,” as they work with readily available, mostly free tools to further their motivation and understanding.
What Donald Trump Can Teach You about Area and Volume
Mike Chamberlain

Donald Trump has made lots of money by placing large amount of volume in relatively small areas. Learn how to get students to design buildings. See how the process of generating a floor plan can turn an area into volumes of real estate. See how to lower the affective filter while ratcheting up the rigor in grades 3–5 by designing learning experiences that support productive struggle. Explore the attributes of plane and solid figures—and by doing so, get at the heart of area and volume.

Fraction Ghostbusters
Jason Chamberlain

Students of all ages are haunted by the specter of FRACTIONS. How unfortunate! Participants in this workshop will complete activities for grades 3–5 that will keep the fraction affective filter low and the comfort level high. To ensure students’ future mathematical success, helping them making sense of what fractions are and being able to create and/or use appropriate tools for solving problems starts now!

How Much Do You Think?
Jason Chamberlain

"Did I get it right?" "Is this correct?" "Is this the right answer?" Questions like these are a sure sign that our students are too interested in being "answer getters" and lack mathematical confidence. In this workshop, participants will complete activities for grades 3–5 designed to refocus students’ thinking on the hows and whys of problem solving. With activities like these, students will develop self-check skills that will bring confidence and, ultimately, self-motivation.

Fractions: It’s All about Equivalence!
Annemarie Newhouse

In this engaging workshop, we will create and explore models that allow students to represent their mathematical understanding of fractions as numbers, fraction equivalence, and comparisons of fractions. We will also use modeling to explore the connections between whole numbers and fractions under the operations of addition and subtraction. Participants will examine the fraction learning progression outlined for grades 3–5 in the Common Core through the lens of Mathematical Practice 4, “Model with mathematics,” as well as the NCTM Process Standards of Problem Solving, Communication, Representation, and Connections. Increase your students’ mathematical thinking through activities that involve real-world scenarios and challenge them to create multiple representations of those scenarios.

Quick and Meaningful Tasks to Engage and Assess Mathematical Thinking
Annemarie Newhouse

Come experience ten-minute tasks that will engage your students in both the content and the Mathematical Practices of the Common Core. Explore quick and motivating visual and spatial tasks, number talks, vocabulary activities and formative assessment probes to diagnose your students’ needs by examining their mathematical thinking. Rich, worthwhile mathematical activities encourage students to reason about mathematics and allow them opportunities to communicate mathematically. This fun and hands on workshop will focus on SMP 2, reason abstractly and quantitatively, and SMP 6, attend to precision.
Join us for some fun with Play-Doh and fraction operations! Participants will move from the concrete to the pictorial to the abstract by (1) building a physical area model with Play-Doh, (2) drawing visual models, and (3) deriving the algorithm for multiplication of fractions. Participants will establish conceptual understanding first by using the area model and number line in context. They will then draw on two Common Core mathematical practices. First, they will use Mathematical Practice 7, “Look for and make use of structure,” to identify a pattern or structure, and then they will use Mathematical Practice 8, “Look for and express regularity in repeated reasoning,” to observe calculations that repeat and generalize an algorithm. Mathematical Practice 3, “Construct viable arguments and critique the reasoning of others,” will be embedded in participants’ work throughout and will be used to justify conclusions. The goals of this session include having participants leave with a greater understanding of (a) Mathematical Practices 3, 7, and 8; (b) multiplication of fractions as outlined in the Common Core; and (c) methods to engage students in content and in classroom discourse.

**Speaker:** Janna Canzone
Reasoning Quantitatively: A Mathematical Thinking Avenue into and through Nonroutine Problems
Grace Kelemanik

This session unpacks Mathematical Practice 2 (MP2) identified in the Common Core: “Reason abstractly and quantitatively.” Together, we will do math that prompts the use of this practice. In focusing on this practice, participants will learn both what it looks like when math doers are reasoning abstractly and quantitatively, and how to develop this type of reasoning in their students. Participants will learn a how to leverage the Three-Reads instructional routine to prompt students’ use of MP2.

Diagramming: An Instructional Routine to Foster Mathematical Practice 2
Grace Kelemanik

“Reason abstractly and quantitatively,” Mathematical Practice 2 (MP2), is one of three math practices in the Common Core that define a type of mathematical reasoning that students can learn and apply. But how do we help them develop this reasoning? Through math practice instructional routines! These routines consist of a set of repeatable steps and behaviors that can help students focus on the mathematical reasoning required by a particular math practice. In this workshop, participants will learn about two foundational ideas and several key instructional questions that support MP2. Participants will then learn an instructional routine that builds student capacity to reason quantitatively and abstractly (MP2). They will also learn how the Diagramming routine leverages best practices, including effective teaching practices detailed in Principles to Actions, to support struggling learners.

Are You Convinced? Viable Arguments: A Critical Component of Geometric Thinking
YeukSze Leong

Who would have guessed that a piece of letter-sized paper could be a versatile tool to help middle school students visualize the evidence they need to justify their geometric reasoning? This session will provide opportunities for you to experience how the process of exploring rich nonroutine geometry tasks helps students foster their mathematical thinking. It will also highlight instructional strategies that promote the development of two of the Common Core mathematical practices: “Make sense of problems and persevere in solving them” (1) and “Construct viable arguments and critique the reasoning of others” (3).

Mathematical Practices and the Development of Algebraic Reasoning and Generalization
YeukSze Leong

This session will take a closer look at two of the Common Core mathematical practices: “Look for and make Use of Structure” (7) and “Look for and express regularity in repeated reasoning” (8). The goal is to see how we can use purposeful selections of math tasks to guide our students—in particular, our struggling learners—to develop (1) a habit of looking for regularity in patterns and structures and (2) strategies that can help them generalize and explain their algebraic thinking.
Strategies for Building Mathematical Practice 8 through Multi-Modal Learning Experiences
Susan Creighton

Mathematical Practice 8 (MP8), “Look for and express regularity in repeated reasoning,” is one of three key Common Core math practices that specify a type of mathematical reasoning that students can use to make sense of and explore nonroutine problems. But how do you help students develop and use this math practice? Through multi-modal learning experiences! In this workshop, participants will learn about two foundational ideas and several key instructional questions that support MP8. They will learn to identify evidence of MP8 in their own reasoning in several mathematics problems and then learn about a selection of strategies that draw on different learning modes to focus students on MP8 reasoning.

An Instructional Routine to Help All Learners to Use Mathematical Practice 8
Susan Creighton

Mathematical Practice 8 (MP8), “Look for and express regularity in repeated reasoning,” is one of three Common Core math practices that specify a type of mathematical reasoning that students can learn to apply. But how can we help them develop this type of reasoning? Through math practice instructional routines! These routines consist of a set of repeatable steps and behaviors that can help students focus on the mathematical reasoning required by a math practice. In this workshop, participants will learn about two foundational ideas and several key instructional questions that support MP8. They will then learn an instructional routine that helps focus students on this kind of mathematical reasoning and will see how the routine incorporates some best practices for struggling learners.

Finding the Common Core Standards for Mathematical Practice in Geometry
Johannah Nikula

Incorporating the Standards for Mathematical Practice (SMP) into classroom instruction requires careful attention to how student thinking develops in the context of particular mathematical content. What do the mathematical practices look like in geometry? This session will (1) explore examples of Mathematical Practice 7, “Look for and make use of structure,” along with other practices identified in SMP, in tasks that elicit geometric thinking; and (2) offer ideas and a protocol for planning instruction focused on these practices in geometry. Participants will have an opportunity to use the planning protocol themselves and discuss how to integrate and recognize SMP in geometric thinking. Considerations for planning for students who are English learners will be included.

Diagrams Used for Mathematical Thinking – Supporting English Learners
Johannah Nikula

Mathematical diagrams are an important support for problem solving and communication aligned with the Common Core Standards for Mathematical Practice (SMP) for all students—and for students who are English learners (ELs) in particular. Experience the variety of roles that diagrams play in mathematical work—in this case, diagrams embedded in number and pre-algebra problem-solving contexts. Debrief and discuss ways to support ELs’ engagement in the practices identified in SMP by weaving support for language access and production into instructional routines related to diagramming.
So You’re Gonna Skip Stats? Consider Approaching Ratio and Proportion via Stats
Bryan Sheldon

Skipping statistics is a frequent choice at all levels from sixth grade through twelfth. Even so, time is still tight to cover all the standards, and remediation isn’t helping or going away. But statistics doesn’t need to be sacrificed. In fact, expecting our students to handle real-world scenarios and mathematical modeling is a big challenge unless our instruction brings in the richness of statistical techniques and data. Two mathematical practices identified in the Common Core—“Reason abstractly and quantitatively” (2) and “Model with mathematics” (4)—fit beautifully with instruction that uses real-world data and statistics. Numerous topics in statistics, including data collection, plots, units, and sampling, can support content standards focusing on ratios and proportion in grades 6 and 7—without requiring extra time.

Contemplate, Then Calculate: An Instructional Routine to Foster Students’ Structural Thinking
Amy Lucenta

The Common Core Standards for Mathematical Practice, along with the NCTM Process Standards, raise expectations for student learning and for classroom practices. In particular, the Common Core emphasizes mathematical structure in both content and practice standards. Although the articulation of such thinking is relatively new, teachers do not need a new curriculum to develop structural thinking in their students. Participants in this session will learn Contemplate then Calculate, a robust instructional routine designed to deepen students’ and teachers’ understanding of Mathematical Practice 7, “Look for and make use of structure.” Contemplate then Calculate provides access to structural thinking for diverse learners, by integrating high-leverage, research-based pedagogies.

Connecting Representations: An Instructional Routine to Foster Students’ Structural Thinking
Amy Lucenta

The Common Core Standards for Mathematical Practice, along with the NCTM Process Standards, raise expectations for student learning and for classroom practices. In particular, the Common Core emphasizes mathematical structure in both content and practice standards. Although the articulation of such thinking is relatively new, teachers do not need a new curriculum to develop structural thinking in their students. Participants in this session will learn Connecting Representations, a robust instructional designed to deepen students’ and teachers’ understanding of Mathematical Practice 7, “Look for and make use of structure.” Connecting Representations provides a wide range of learners access to structural thinking by integrating high-leverage, research-based pedagogies.