

Math Solutions Professional Learning Aligned with *GO Math!*

Agenda

Making Sense of Fraction Computation (Grades 3-5)

Two Day Series

OVERVIEW

During this two-day course, educators gain insight into the progression of standards in grades 3-5 focused on fraction computation. Participants explore specific strategies for teaching fraction computation in ways that develop conceptual understanding. They learn to build on students' understanding of whole-number operations to make sense of operations with fractions. Through the course experiences, participants develop a deeper understanding of fraction standards and ways to teach them effectively in *GO Math!* lessons.

OUTCOMES

- Articulate the progression of current state standards related to fraction operations.
- Apply properties of operations in fraction computation.
- Implement effective instructional strategies in *GO Math!* lessons such as the use of classroom discourse, real-world application, and multiple representations to develop students' understanding of fraction computation.
- Challenge students with rigorous tasks that build fraction sense and engage students in the habits of mathematical thinkers.

Day One

Opening

This introduction includes the course goals, an introduction to the course experiences, and pertinent logistical information. Participants review a set of questions they will use throughout the day to help consider how to transfer their learning to the decisions they make in their *GO Math!* classrooms.

Making Sense of Fraction Addition and Subtraction

Computation with fractions is built on an understanding of the operations and on fraction sense, and includes the ability to make accurate estimates. In this session, participants examine how students develop strategies for the fraction operations of addition and subtraction that are flexible and responsive to the numbers and contexts involved. Participants learn strategies they can use to help students understand that fractions are numbers that can be added or subtracted using decomposition, and share ideas for incorporating the strategies in their *GO Math!* lessons.

Specific Tasks

- Tell Me All You Can, Addition and Subtraction (BIM, pages 58–59 and 74–75)
- Draw a Picture (inspired by Informal Exploration, page 162, *Teaching Student-Centered Mathematics, Grades 3–5* by John A. Van de Walle)

BREAK**Examining the Role of Problem Solving**

This session models a structure for lessons that maximizes students' opportunities to struggle constructively to make sense of fraction addition. In this session, participants engage in a problem-solving task that highlights fraction equivalencies and their importance in fraction addition. Participants correlate the problem-solving lesson structure to the 5E lesson structure in *GO Math!* and consider the purpose and teacher's role in each component.

Specific Tasks

- Garden Plots

Generalizing Strategies for Adding and Subtracting Fractions

In this session, participants engage in a series of learning experiences that build fluency by adding and subtracting fractions using strategies based on decomposition and properties of operations. Throughout the session, participants experience firsthand how classroom discussions and models support student learning. As a summary, participants compare their experiences with an example from *GO Math!*. They discuss how instructional shifts, such as including games and increasing opportunities to make sense of models, will benefit students.

Specific Tasks

- Addition and Subtraction with Cuisenaire Rods, Versions 1 & 2 (BIM, pages 43–47 and 67–70)
- Get to the Whole, Versions 1 & 2 (BIM, pages 51–57)
- What's the Difference? (BIM, pages 71–73)
- Score the Difference (TAEF, pages 144–151)
- Smaller Answer Wins (TAEF, pages 152–162)

LUNCH**How Students Learn**

Learning with understanding occurs when people create, or construct, their own comprehension of mathematical concepts and relationships through interactions between their minds and concrete experiences in the real world. This session is designed to give participants the opportunity to reflect on what it means to do fraction computation with understanding. Participants use pattern blocks and previous knowledge about computing with whole numbers as tools to make sense of computation strategies for fractions.

Specific Tasks

- Aspects of Learning
- Modeling Fraction Operations

Closing

Participants take time to reflect on the experiences of the day and ways that these experiences will positively impact their classroom instruction. Reflections include an opportunity to consider ways that these experiences will positively impact their planning *GO Math!* lessons and classroom instruction.

Day Two

Opening

This introduction includes the course goals and working agreements. It provides an opportunity to review the learning and experiences from the first day of the course and answer questions. Participants review focus questions to consider how to transfer their learning to the decisions they make in their *GO Math!* classrooms.

Investigating Multiplication of Fractions

While continuing the focus of helping students to make sense of the mathematics they are asked to learn, this part of the day uses ideas about multiplying whole numbers and properties of operations as a foundation for developing students' understanding about multiplication with fractions. Participants then discuss ideas for increasing the use of tools in their *GO Math!* lessons.

Specific Tasks

- Introducing Multiplication of Fractions—The Building Block (TAMDF, pages 1–22)

BREAK

Looking at Fraction Operations through an Algebra Lens

Participants use mathematical equations as a context for conversation about important mathematical ideas such as equivalence, number sense, unit fractions, and properties. Following their experiences, participants reflect on how teaching arithmetic in ways that support understanding of algebra can enhance students' understanding of computation. Participants examine *GO Math!* assessment items and reflect on how the lessons they experienced foster students' readiness.

Specific Tasks

- Sorting True-or-False Number Sentences
- Solving Open Sentences
- Sorting True, False, and Open Sentences

LUNCH

Exploring Division of Fractions

To understand the complexity of division of fractions, it is essential that students understand the operation with whole numbers and the relationship between division and multiplication. This session provides experiences that revisit ideas about dividing whole numbers and properties of operations and the relationship between multiplication and division as a foundation for developing students' understanding about division with fractions. Participants identify patterns, estimate quotients, defend their answers, and explore the relationship between multiplication and division. As participants discuss the value of students' making sense of computation, they consider instructional shifts that will increase understanding in their *GO Math!* classrooms.

Specific Tasks

- Introducing Division of Fractions—The Building Block (TAMDF, pages 67–83)
- Division Patterns (TAMDF, pages 84–96; and BIM, page 126)
- Divide (or Multiply) and Conquer (BIM, pages 136–137)

Closing

This session connects back to the course outcomes so that participants are prepared to move forward as they go back into classrooms and implement both the instructional strategies and content lessons modeled throughout the course. Reflections include an opportunity to consider ways that these experiences will positively impact their planning *GO Math!* lessons and classroom instruction.

Math Solutions Guiding Principles

Drawing upon academic work and our own classroom-grounded research and experience, Math Solutions has identified the following four instructional needs as absolutely essential to improving instruction and student outcomes:

- Robust Content Knowledge
- Understanding of How Students Learn
- Insight into Individual Learners through Formative Assessment
- Effective Instructional Strategies

These four instructional needs drive the design of all Math Solutions courses, consulting, and coaching. We consider them our guiding principles and strive to ensure that all educators:

- Know the math they need to teach—know it deeply and flexibly enough to understand various solution paths and students' reasoning.
- Understand the conditions necessary for learning, what they need to provide, and what students must make sense of for themselves.
- Recognize each student's strengths and weaknesses, content knowledge, reasoning strategies, and misconceptions.
- Have the expertise to make math accessible for all students, to ask questions that reveal and build understanding, and help students make sense of and solve problems.