Math Solutions
FOUNDED BY MARILYN BURNS

AGENDA
Supporting Students Who Struggle with Mathematics, Grades K–8

OVERVIEW

This three-day course offers guidance to classroom teachers, special educators and math specialists in understanding and supporting children who struggle with mathematics. The struggles that children encounter may be the result of cognitive learning challenges, background and experience, or previous instruction. This is not a "recipe" course, but rather a course on improving instructional practices and helping teachers to be more thoughtful about struggling learners in their classes. In this course, educators examine and choose instructional strategies to help struggling students be successful in regular mathematics classrooms and learn to use a framework of assessments to understand student thinking.

OUTCOMES

This course will help you:

- Broaden your perspective about the reasons students have difficulties with mathematics
- Incorporate strategies into your instruction that close the achievement gap by promoting student understanding and confidence in mathematics
- Plan effective interventions and differentiated lessons that address your students' specific learning needs
- Provide a sequential system of assessments to identify students who struggle and to understanding their difficulties.

DAY 1

WELCOME, INTRODUCTION, AND OVERVIEW (20 minutes)

This introduction includes the course goals, an overview of the course and pertinent logistical and background information.

Introduction to Struggling Learners (75 minutes)

In this course, participants are presented with both a perspective for viewing struggling learners and tools for working successfully with students from that point of view. This framework asks participants to consider how background, learning challenges, and past instruction may have contributed to learner struggles. This session creates the foundation for understanding why learners struggle and gives them insight into student thinking.

BREAK **(15 minutes)**

A SIMULATED FIRST EXPERIENCE WITH NUMBER (90 minutes)

In this session, participants engage in a simulation that allows them to explore the difficulties children encounter when learning early number concepts. Participants are in the role of a struggling learner exploring some fundamental math concepts, including an in-depth look at place value. During the simulation, participants also experience ways that using models support learning with understanding.

MEMORY AND MODELS OF INSTRUCTION (90 minutes)
Participants engage in shared learning about three kinds of memory: short-term, working, and long-term. They internalize the information they processed about memory and connect it to effective models of instruction in the context of a geometry exploration.

***BREAK* (15 minutes)**

MODELS, STRATEGIES, AND ALGORITHMS (45 minutes)
In this session participants see the development of mathematical ideas as beginning with a model (*something to think with*), expanding through the application of that model to solve problems, and ending in an efficient strategy or algorithm. As participants consider the work of struggling learners, they focus on where in the trajectory students might be stalled.

CLOSING AND HOMEWORK (10 minutes)
Participants reflect on the pedagogy, mathematics, and experiences of the day and the implications for their classroom instruction. Before dismissal, the instructor will assign a reading from the course resource.

DAY 2
Opening (50 minutes)
This introduction recaps content from day one, provides an opportunity to review and discuss homework, and extends ideas to lead into the progression of content in day two.

Improving Understanding Through Student Communication (75 minutes)
Via video, participants watch skillful teachers facilitate student conversations and mental computation. They consider the use of student-to-student dialog for developing understanding of math concepts, particularly for students who may struggle. Participants engage in problem-solving experiences in which misconceptions are often present. They have first-hand experience in the role communication plays in student learning and the resolving of misconceptions.

***BREAK* (15 minutes)**

USING CRA INSTRUCTION TO BUILD UNDERSTANDING (75 MINUTES)
The most common cause of math struggles is the application of a procedure without understanding its underlying concept and usually points to an underdeveloped or missing conceptual model. When students are supported to first develop a concrete level of understanding, they can use this foundation to later link to abstract mathematics learning activities. Having students represent their concrete understandings (representational) by drawing simple pictures that replicate or mimic their use of concrete materials provide students a supported process for transferring their concrete understandings to the abstract level. In this session, participants will contrast a student's experience learning about addition of fractions at a symbolic level and learning about it by connecting concrete experiences to representations to abstract symbols. Through their experience, participants will comprehend the critical role of the progression from concrete to representation to abstract when planning instruction.

LUNCH (60 minutes)

MAIN LESSON/MENU STRUCTURE (135 minutes; 15 minute break included)

Participants learn about and experience the elements of the Main Lesson/Menu Lesson structure. This structure is a tool for supporting the needs of struggling learners in the regular classroom. This approach addresses both Tier 1 and Tier 2 of RTI intervention. This session demonstrates techniques for gathering information on student thinking (on a daily basis) and for meeting the needs of a wide range of learners.

CLOSING AND HOMEWORK (10 MINUTES)
Participants reflect on the pedagogy, mathematics, and experiences of the day and the implications for their classroom instruction. Before dismissal, the instructor will assign a reading from the course resource.

Day 3

OPENING (20 MINUTES)
This introduction recaps content from day one, provides an opportunity to review and discuss homework, and extends ideas to lead into the progression of content in day two.

LEARNING ABOUT CONCRETE—REPRESENTATIONAL—ABSTRACT (CRA) ASSESSMENTS (90 MINUTES)
In this session participants learn the structure and purpose of a CRA assessment—a classroom tool to solve for why students struggle. They view and analyze examples of how a first grade teacher structured her CRA around regrouping with addition to 30.

***BREAK* (15 minutes)**

CONSTRUCTING A CRA ASSESSMENT (60 MINUTES)
Participants construct their own CRA assessment with guidance and resources from *Solving for Why*. CRA assessments are the first assessment in the suite of assessments used to understand student thinking. The classroom assessments that participants create will allow them to apply the theory from Day 1 to understanding the thinking of their students.

***LUNCH* (60 minutes)**

CONSTRUCTING A CRA ASSESSMENT (60 MINUTES)
Participants continue to construct their own CRA assessment with guidance and resources from *Solving for Why*.

***BREAK* (15 minutes)**

ERROR ANALYSIS AND FLEXIBLE INTERVIEWS (75 MINUTES)
Participants work in groups and individually to practice finding patterns in samples of student computation. Identifying these patterns leads to the development of theories about the underlying struggles these students might have.

REFLECTION AND COURSE CLOSING (25 MINUTES)
Participants take time to reflect on their overall experiences during the course. Reflections include an opportunity to consider ways that these experiences will positively impact their 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

