

**AGENDA****High School Algebra & Functions****Grades 9-12****OVERVIEW**

This two-day course focuses on mathematical content involving algebra and functions for students in high school. The emphasis of this course is on strategies and tools to help leverage students' ways of thinking so they can approach any type of function, work with it, and understand how it behaves.

**OUTCOMES**

- Apply a fundamental understanding of standards addressing algebra and functions to implement effective tasks.
- Integrate effective instructional strategies such as the use of classroom discourse, real-world applications, and multiple representations to facilitate the learning of all students.
- Challenge students with rigorous math problems that require the habits of mind called for in current state standards.
- Identify purposeful ways to organize the classroom—whole-class, small-group, and individual learning—to maximize the learning of all students.

**Day One****Opening**

This introduction includes the course goals, pertinent logistical information, and introductory information about the course.

**Learning Through Classroom Discourse**

In this session, participants experience a lesson intended to help students learn to translate between words and symbols and to use properties of operations to identify equivalent expressions. Elements of classroom discussion are highlighted to demonstrate the impact of mathematical discourse on student learning.

***BREAK*****Examining the Problem-Solving Lesson**

This activity provides participants with a powerful glimpse of how the structure of a problem-solving lesson can support algebraic thinking to describe and predict phenomena in the real world. Participants actively collect distance data in relation to time and graph it. Through

questioning and rich discussion, participants make connections among and between the actions observed during the activity, the relationships shown in the graph, and concepts such as rate of change, slope, and  $y$ -intercept.

## **LUNCH**

### **Exploring Multiple Representations**

In this session, participants explore multiple representations of a mathematics problem and discuss how different representations highlight different aspects of the concept. Participants consider the connections between various representations as forms of an idea that allow the learner to interpret, communicate, and discuss the idea with others.

### **Closing**

Participants take time to reflect on the experiences of the day and ways that these experiences will positively impact their classroom instruction. Participants receive an application task.

## **Day Two**

### **Opening**

This introduction includes a review of the course goals, the application task, and pertinent logistical information.

### **Investigating Algebraic Expressions**

Participants continue the in-depth analysis of state standards addressing algebra and functions as they engage in a task that supports students' understanding of algebraic expressions and their multiple representations. During this investigation, participants consider the role collaboration plays in student learning and in formative assessment.

## **BREAK**

### **Using Mathematical Tools**

Using mathematical tools for investigating patterns provides students with a tactile and visual experience in describing and extending patterns. This experience highlights the ways in which teachers can help students understand the mathematics of patterns through the use of mathematical tools.

## **LUNCH**

### **Understanding Aspects of Learning**

Participants engage in a learning experience and then use the experience to consider a view of learning in which people create/construct their own understanding of mathematical concepts and relationships through interactions between their minds and concrete experiences.

Teachers also identify social conventions that are necessary to communicate and record their understandings.

## **Break**

### **Exploring Exponential Functions**

This investigation focuses participants on nonlinear relationships that model exponential growth and decay. Participants make and study tables and graphs for exponential situations, describe the patterns they see, and write equations for the patterns, all while looking for the general form of an exponential function.

### **Closing**

Participants take time to reflect on the experiences of the two-day course and 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.