

AGENDA

Connecting High School Content Using an Integrated Approach

OVERVIEW

This course focuses on integrated math experiences that formalize high school students' learning. Critical areas include linear relationships contrasted with exponential relationships, properties and theorems about congruent shapes, and the connection between geometry and algebra as experienced through the lens of Analytic Geometry.

OUTCOMES

- Apply a fundamental understanding of standards in the conceptual categories of Algebra, Geometry, Statistics, and Probability to implement effective tasks.
- Articulate key aspects of an Integrated Mathematics course and consider the instructional shifts needed for this approach.
- Integrate effective instructional strategies such as the use of classroom discourse, real-world applications, and appropriate tools to facilitate the learning of all students.
- Challenge students with rigorous math problems that require the habits of mind called for in the Standards for Mathematical Practice.

Day One

Opening

This introduction includes the course goals, an overview of the Standards for Mathematical Practices, and pertinent logistical information. Working norms are established during this part of the day.

Understanding Integrated Math

The Common Core State Standards have at their foundation the expectation that students make sense of what they are learning. To acquire a deep understanding of mathematical ideas, students need to have many experiences translating between words, symbols, and mathematical models. Student learning is meaningful and lasting when opportunities are provided for students to see and experience the connections between algebraic and geometric representations.

BREAK

Developing and Justifying Conjectures

To acquire a deep understanding of geometric relationships, students need many experiences in making and proving conjectures. In this task, participants investigate relationships involving the centroid of a triangle that challenge the learner to organize his knowledge about both medians and centroids. The instructor emphasizes making conjectures and then developing a mathematical justification or proof of the conjecture.

LUNCH**Exploring Analytic Geometry**

Analytic geometry connects algebra and geometry, resulting in powerful methods of analysis and tools for problem solving. Geometric shapes can be described by equations, turning algebraic manipulation into a tool for geometric understanding, modeling, and proof. Geometric transformations of the graphs of equations correspond to algebraic changes in their equations.

Closing

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

Day Two**Opening**

This introduction includes a review of the course goals and pertinent logistical information. Participants share their processing and reflections from Day One and use that expertise as the foundation for Day Two.

Using Transformational Geometry

In this session, participants use verbal and graphical representations of transformations in the coordinate plane. The concepts of congruence, similarity, and symmetry can be understood from the perspective of geometric transformation. Fundamental transformations are the rigid motions: translations, rotations, reflections, and combinations of these, all of which are here assumed to generally preserve distance and angles, and therefore shapes.

BREAK**Investigating Linear and Exponential Models**

Rather than study two functions in complete isolation, it is helpful for students to look at various functions together to note the similarities and differences. Doing so enables students to identify critical attributes of each kind of function. In this session, participants will examine two scenarios that represent linear and exponential relationships to identify characteristics of each type of function. The instructor emphasizes the use of appropriate tools throughout the experience. Participants reflect on the use of tools in their classrooms as well as the impact of using tools on student learning.

LUNCH**Investigating Linear and Exponential Models *continued*****BREAK****Examining Correlation and Causation**

In high school, students build on previous learning about measures of center to determine correlation coefficients. Analyzing statistics in efforts to determine the relatedness of two variables deepens students' ability to interpret the data that is presented. This session provides participants a scenario which requires mathematical explanation for the relationship between two variables. Participants analyze how to design learning experiences in a problem solving format to maximize student learning.

Closing

This session connects back to the course goals 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.

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.