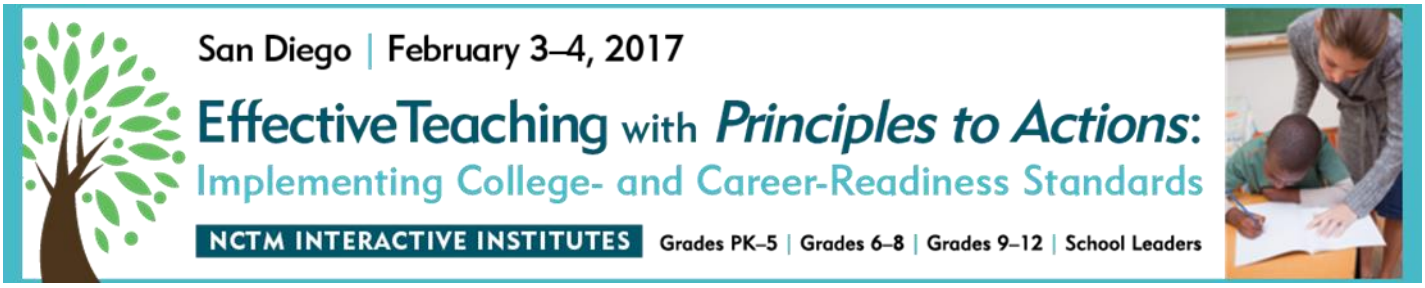

Beginning Algebra

Session 1

Building a Conceptual Understanding of Functions
This session will focus on a series of mathematical tasks that provide a hands-on way to help students develop a conceptual understanding of functions—linear, quadratic, exponential, trigonometric, and so on—so that students can apply this understanding to current and future coursework.

Session 2

Algebra Tasks That Promote Reasoning and Problem Solving
Not all tasks are good tasks. Adapting tasks so that they engage students in reasoning and sense making, allow multiple entry points, and can be solved by using varied solution strategies is a key part of the work that teachers do. This session will offer participants opportunities to experience three approaches for adapting tasks, to adapt concrete tasks for their classrooms, and to give feedback on tasks that have been adapted.

Session 3

Patterns and Trains: Mathematics Teaching Practices in Your Classroom
Engaging students in meaningful mathematics takes planning. Participants will learn about deliberate strategies for raising the level of "math talk" and examining norms for student discussions and strategies for structuring student-to-student interactions. This session will focus on observing and generalizing, in recursive and closed form, patterns generated by creating trains of different-colored blocks.

Session 4

Building Functions through Given Points
How many different functions pass through three points? Attendees will collaborate on writing equations of functions that pass through the given points, and they will explore new ways of writing such functions. They will also discuss strategies for implementing this task through the mathematics teaching practices from *Principles to Actions* in ways that advance students' content knowledge and support them in reasoning and sense making about functions.

Session 5

Promoting Reasoning and Problem Solving While Teaching Algebra
This session will focus on strategies to improve student mathematical explanations and how to use those explanations to help teach algebra content and to promote reasoning and problem solving. Participants will explore these strategies while working through a task that connects some of the big mathematical ideas in beginning algebra.

Advanced Algebra

Session 1

From Similar Triangles to Graphing Sinusoids

The leap from trigonometry as a relationship between sides of a right triangle to a function that is graphed on an *xy*-axis can be challenging for some students. Participants will experience tasks that use dilation to connect similar triangles to the trigonometric ratios. They will then use those triangles to extend the ideas of right triangle ratios to a unit circle. The last set of tasks will link these triangles and circles to the graphs of trigonometric functions.

Session 2

Advanced Algebra Tasks That Promote Reasoning and Problem Solving

Not all tasks are good tasks. Adapting tasks so that they engage students in reasoning and sense making, allow multiple entry points, and can be solved by using varied solution strategies is a key part of the work that teachers do. This session will offer participants opportunities to experience three approaches for adapting tasks, to adapt concrete tasks for their classrooms, and to give feedback on tasks that have been adapted.

Session 3

Building Functions through Given Points

How many different functions pass through three points? Attendees will collaborate on writing equations of functions that pass through the given points, and they will explore new ways of writing such functions. They will also discuss strategies for implementing this task through the mathematics teaching practices from *Principles to Actions* in ways that advance students' content knowledge and support them in reasoning and sense making about functions.

Session 4

Patterns and Trains: Mathematics Teaching Practices in Your Classroom

Engaging students in meaningful mathematics takes planning. Participants will learn about deliberate strategies for raising the level of "math talk" and examining norms for student discussions and strategies for structuring student-to-student interactions. This session will focus on observing and generalizing, in recursive and closed form, patterns generated by creating trains of different-colored blocks.

Session 5

The Beautiful Connection between Polynomials and Probability

By engaging in a series of tasks, participants will explore how polynomials can be used to represent probability models, and vice versa. They will work classroom-tested problems relating to the binomial theorem, polynomial multiplication, and combinations. Through this work, they will discover probability rules all over again, in ways that finally make sense!