



Rethinking Algebra Institute

Overview: Much of the information contained in this institute comes as an exploration of key algebraic concepts from a mathematical point of view addressing the content demand for a coherent set of mathematics topics that are important for all students to study algebra as well as other important mathematics. In addition, the institute fosters the transition of algebraic concept development within and across the secondary grades. Based on the Van de Walle professional development series, the institute provides targeted professional development that helps educators translate the following pedagogical content knowledge of into practical classroom application:

- o *Exploring What it Means to Know and Do Algebra*
- o *Teaching Algebra Through Problem Solving*
- o *Algebraic Thinking: Generalizations, Patterns, and Functions*

Participant Outcomes: By the end of the institute, participants will be able to:

- o Support simultaneous development of conceptual understanding of algebraic concepts and problem solving skills
- o Identify and address common misconceptions in learning algebra
- o Make mathematical tasks worthwhile and engaging for all students
- o Identify instructional skills and strategies that support purposeful struggle and making explicit the mathematic relationships between ideas, facts, and procedures

Rethinking Algebra Institute
2.5 Day Agenda - Day 1

Objectives: Participants will:

- o Develop a rich understanding of key concepts (composition, decomposition, relationships, and representations) as a framework for how learning in one domain supports learning in another
- o Explore teaching *through* problem solving as a means for student learning through real contexts, problems, situations, and models

Time	Day 1 Activities
8:30 AM 9:00 AM	Continental Breakfast Session Start Time
	Introduction and Overview
	Algebra <ul style="list-style-type: none"> o What does it mean to <i>do</i> algebra? o What does it mean to <i>learn</i> algebra? o What does it mean to <i>understand</i> algebra?
	Morning Break
	Understanding Algebra - Part 1 <ul style="list-style-type: none"> o Benefits of Relational Understanding
	Lunch
	Understanding Algebra - Part 2 <ul style="list-style-type: none"> o Support with Multiple Representations
	Afternoon Break
	Implications for Teaching and Learning <ul style="list-style-type: none"> o Video Case Study
	Reflections/Closing
4:00 PM	Session End Time

Rethinking Algebra Institute
2.5 Day Agenda - Day 2

Objectives: Participants will:

- o Incorporate the approach of teaching *through* problem solving as a means for student learning through real contexts, problems, situations, and models.
- o Develop a rich understanding of algebra as a tool for generalizing and representing patterns
- o Identify critical concepts related to symbolism - variables and equality - as necessary components for student success in algebra
- o Recognize understanding is strengthened when functions are explored across representation, as each one provides a different view of the same relationship

Time	Day 2 Activities
8:30 AM 9:00 AM	Continental Breakfast Session Start Time
	Regroup and Review
	Teaching the Content <ul style="list-style-type: none"> o Benefits of Learning within Context Teaching Algebra through Problem Solving - Part 1 <ul style="list-style-type: none"> o Characteristics of Problem-based Learning
	Morning Break
	Algebra and the Meaningful Use of Symbols <ul style="list-style-type: none"> o The Meaning of Equality o The Meaning of Variables o Expressing Relationships Symbolically
	Lunch
	Algebra & the Study of Patterns and Functions <ul style="list-style-type: none"> o Growing Patterns o Linear and Quadratic Functions o Translating between Representations
	Afternoon Break
	Implications for Teaching and Learning
	Reflections/Closing
4:00 PM	Session End Time

Rethinking Algebra Institute
2.5 Day Agenda - Day 3

Objectives: Participants will:

- o Make mathematical tasks worthwhile and engaging for all students
- o Support purposeful student struggle and identify common misconceptions in mathematics as opportunities for learning

Time	Day 3 Activities
8:30 AM 9:00 AM	Continental Breakfast Session Start Time
	Regroup and Review
	Teaching Algebra through Problem Solving - Part 2 <ul style="list-style-type: none"> o Mathematical Tasks and Cognitive Demand
	Morning Break
	Implications for Teaching and Learning <ul style="list-style-type: none"> o What is it, <i>exactly</i>, about teaching that influences student learning?
	Reflections/Closing
Noon	Session End Time