

# PAM HARRIS

*equipping math teachers with content &  
pedagogy for student success*

## **Bio:**

Pam Harris is a mom, a former high school math teacher, a university lecturer, an author, and she wants to change the way we view and teach mathematics.

While Pam was teaching high school math, her four children grew and mathematized their world in a way she had never imagined. "I had always bought into the myth that math is a disconnected set of facts to memorize, with rules and procedures to mimic. I now call that *fake math*."

Pam's own kids, research, and experiences teaching *real math* have shown her what it means to mathematize and to support learners in their own journeys. *Real math* is thinking mathematically, not just mimicking what a teacher does on the board. You can change your brain structure from using rote memory to mathematizing. Pam helps teachers make this shift for themselves, and helps teachers teach in a way that supports students to learn *real math*.

## **Professional Background:**

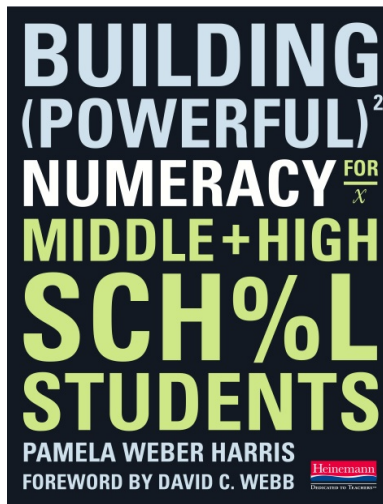
Pamela Weber Harris is the author of several books, including Building Powerful Numeracy, Discovering Advanced Algebra, and a book for professional development leaders. A former secondary mathematics teacher, Pam currently teaches at Texas State University, is a K-12 mathematics education consultant, a T<sup>3</sup> (Teachers Teaching with Technology) Instructor, and an author and coauthor of several professional development workshops. Pam presents frequently at regional and national conferences. Her particular interests include teaching real math, building powerful numeracy, sequencing rich tasks to construct mathematics, using technology appropriately, smart assessment, and vertical connectivity in curricula in schools PK-12.

## Head Shots:



Pamela Weber Harris head shot

Pamela Weber Harris headshot reduced file size



### From the Introduction

"As secondary teachers, we are often frustrated by the lack of number sense in our students. Students seem to either reach for a calculator or just shrug and say "I don't know," when asked simple arithmetic questions... I was and continue to be amazed at the power we can harness in our secondary students by teaching ourselves and our students real numeracy. ...when we help students construct numerical relationships, they begin to believe that mathematics is understandable, that it is not all about memorizing abstract, counter-intuitive rules, but instead an arena in which they can reason and use their intuitive sense. We can develop their numeracy and use this understanding to build higher math."

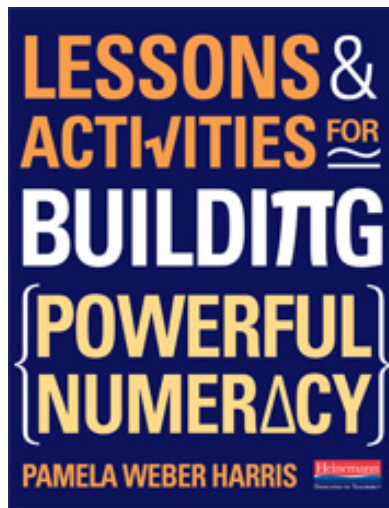
### Review

"This book is an outstanding and welcome contribution to the field of mathematics education. It simultaneously addresses the development of numeracy and the extensions to the mathematical ideas taught on the secondary level and does so in a wonderfully engaging, coherent, and thoughtful way. Any secondary teacher reading this book will come away with a far deeper understanding of how to develop numeracy and fluent computation while integrating the more advanced topics that they are required to teach."

~ Cathy Fosnot, author of the series  
*Young Mathematicians at Work*

### Table of Contents

Chapter 1	Numeracy
Chapter 2	Addition and Subtraction: Models and Strategies
Chapter 3	Addition
Chapter 4	Subtraction
Chapter 5	Multiplication and Division: Models and Strategies
Chapter 6	Multiplication
Chapter 7	Divisions
Chapter 8	Decimals, Fractions, and Percents: Models and Strategies
Chapter 9	Decimals, Fractions, and Percents: Addition and Subtraction
Chapter 10	Decimals, Fractions, and Percents: Multiplication and Division



### From the Introduction

"I wrote [Building Powerful Numeracy for Middle & High School Students](#) to bring the wonderful world of research in numeracy at the elementary level to the secondary world. Lessons & Activities for Building Powerful Numeracy continues that work, providing classroom resources for you to help your students build numeracy."

"There are two main types of activities in this workbook: Student workouts and teacher-directed activities (strings, as close as it gets, and relational thinking). The Workouts (new in this book) are to be distributed to students to work on independently or in pairs. The teacher then leads a class discussion of the problems and the relationships and the strategies they reveal. These are often used as warmups. The teacher-directed activities, on the other hand, involve you, the teacher, actively throughout the activity. Both types help build a solid numeracy base."

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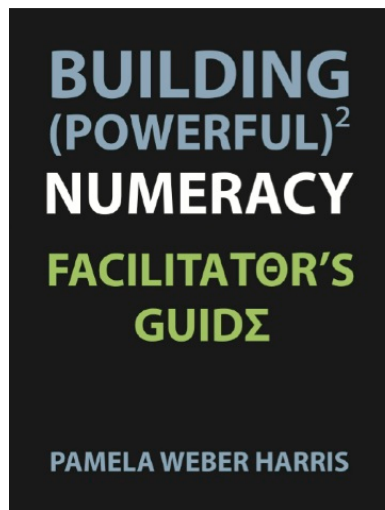
#### Workouts

- Chapter 1 Student Workouts for Addition
- Chapter 2 Student Workouts for Subtraction
- Chapter 3 Student Workouts for Multiplication and Division
- Chapter 4 Student Workouts for Proportions and Percents

#### Teacher-Directed Activities

- Chapter 5 Problem Strings
- Chapter 6 As Close As It Gets
- Chapter 7 Relational Thinking

Great for middle and high school teachers who want to help students improve their numeracy!



### From the Introduction

"This facilitator's guide is a companion to [\*Building Powerful Numeracy for Middle & High School Students\*](#). The intended audience is workshop presenters, teacher leaders, coaches, pre-service instructors, and anyone else who delivers numeracy professional development. This guide represents a compilation of workshops I have given to hundreds of teachers for over 10 years on developing powerful numeracy in themselves and in their students."

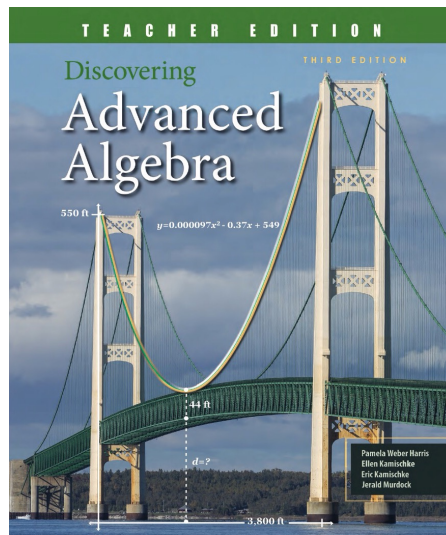
"Each chapter describes activities, problem strings, and assignments for teachers and participants. The detailed lesson plans include presenter helps, such as discussion questions, sample dialogs, and detailed models. The beginning of each chapter has a handy "at a glance" section that displays the major big ideas, models, strategies, materials needed, and preparation for presenters. I personally use the detailed plans to prepare for each workshop and then use the two-page overview at a glance as my crib notes while delivering the material."

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Chapter 1 Addition
Chapter 2 Subtraction
Chapter 3 Multiplication
Chapter 4 Division
Chapter 5 Fraction: Addition & Subtraction
Chapter 6 Fraction: Multiplication & Division
Chapter 7 Decimals: Addition & Subtraction
Chapter 8 Decimals: Multiplication & Division
Chapter 9 Percents
Appendices

A must have for facilitators of numeracy professional development!



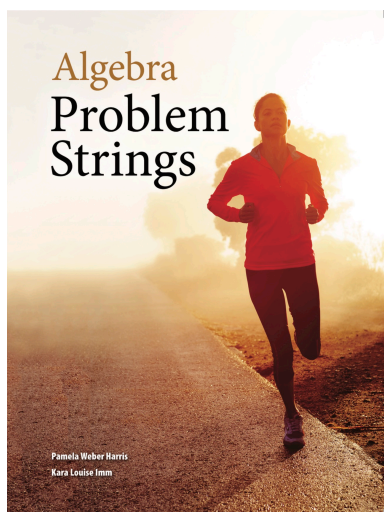


### Discovering Advanced Algebra, Third Edition

"*Discovering Advanced Algebra* uses technology, along with applications, to foster a deeper understanding of algebraic ideas. The investigations emphasize symbol sense, algebraic manipulations, and conceptual understandings. The investigative process encourages the use of multiple representations—numerical, graphical, symbolic, and verbal—to deepen understanding for all students and to serve a variety of learning styles. Explorations from multiple perspectives help students simplify and understand what formerly were difficult algebraic abstractions..."

"The accessibility of the mathematics in *Discovering Advanced Algebra* is central to the instructional design. Varied forms of pedagogy are required to engage and challenge all learners. *Discovering Advanced Algebra* combines these instructional strategies seamlessly to motivate struggling students, ELLs, and advanced learners alike."

— from *Discovering Advanced Algebra*,  
Teacher Edition, pages xxvi-xxvii



### From the Introduction

"A problem string is a purposeful sequence of related problems, designed to help students mentally construct mathematical relationships. It is a powerful lesson structure during which teachers and students interact to construct important mathematical strategies, models, and concepts. The power of a problem string lies in the carefully crafted conversation as students solve problems, one at a time, and the teacher models student thinking and draws out important connections and relationships."

"Facilitating a problem string requires careful attention to the mathematics as well as the ability to really listen to students and model their thinking for all to see. Thinking is often in development— not fully polished or formed and sometimes idiosyncratic or just tricky to understand. Because we believe in a mathematical community that includes all learners, our role is to bring before the class what is helpful for development— whether it is clear, clean, and polished, or messy, incomplete, and developing, or even incorrect. The goal is always to give students the chance to articulate their ideas and to see each others' thinking— to give the class the chance to respond to, challenge, and make sense of someone else's strategy or idea."

"Our belief in problem strings stems partially from the idea that telling or showing students mathematics does not produce learning— and in fact, it never has. Disrupting this pattern of 'delivering' or 'showing' students mathematics is a bold undertaking that will require planning, restraint, and real trust in students' ability to think for themselves. We must believe that our students are full of interesting mathematical ideas, insights, and questions— and that what they offer is enough to begin the work of formal algebra together. Allowing students to solve problems any way they want, asking students to share their thinking, and pushing students to justify can be foreign, new, and unsettling. And, downright fun."

## Algebra Problem Strings, cont'd

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**Each problem string has the following sections:**

- At a Glance
- Objectives
- Placement
- Guiding the Problem String
- About the Mathematics
- Sample Final Display
- Facilitation Notes

Additionally, each problem string has either full or partial Sample Interactions, or Important Question sections.

### Table of Contents

Introduction

Chapter 1 Data Exploration

Chapter 2 Proportional Reasoning

Chapter 3 Linear Equations

Chapter 4 Functions and Linear Modeling

Chapter 5 Systems of Equations and

Chapter 5 Inequalities

Chapter 6 Exponents and Exponential Models

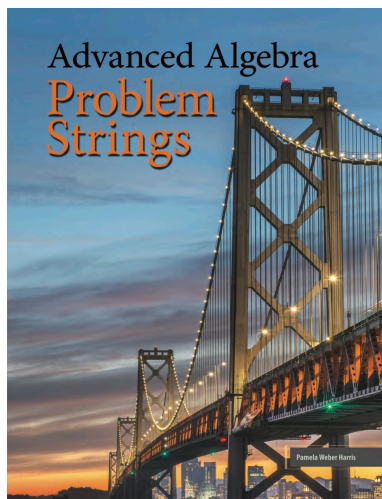
Chapter 7 Functions and Transformations

Chapter 8 Quadratic Functions

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Use Algebra Problem Strings with the [Discovering Advanced Algebra](#) textbook to support the investigations, or with a different text to provide students with opportunities to construct mathematical concepts.





### From the Introduction

"We believe that the regular use of the powerful routine called *problem strings* helps both students and teachers before and after investigations. Increasingly, problem strings are being used by teachers to:

- preview big ideas that will arise in an investigation,
- solidify the ideas and skills that came up in the investigation,
- create puzzlement, disequilibrium, and curiosity,
- invite students to prove or justify their ideas,
- describe and solidify strategies, and move towards efficient strategies,
- build students' efficacy at choosing strategies, and
- generalize an idea beyond the task at hand.

"Problem strings allow students to struggle in a contained, guided, purposeful set of tasks. They compliment and support the work of investigations and math discussions, working together to foster conversations and form conclusions about relationships, structures, and repeated reasoning. This is the work worthy of teachers, to help students develop and grow into mathematicians."

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Introduction

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Chapter 2 Systems of Equations and Inequalities

Chapter 3 Functions and Relations

Chapter 4 Exponential, Power, and Logarithmic Functions

Chapter 5 Quadratic Functions and Relations

Chapter 6 Polynomial and Rational Functions

Chapter 7 Trigonometry and Trigonometric Functions

Chapter 8 Probability

Chapter 9 Applications of Statistics

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