

# Focus in High School Mathematics: Reasoning and Sense Making in Algebra

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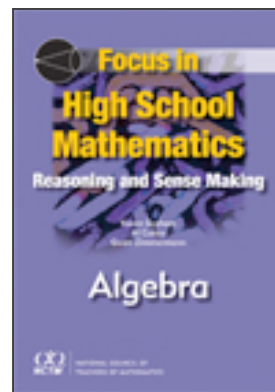
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Mathematical and Pedagogical Knowledge: Books

## DESCRIPTION

*Focus in High School Mathematics: Reasoning and Sense Making in Algebra*, by Karen Graham, Albert Cuoco, and Gwendolyn Zimmermann, believes that reasoning and sense making is essential to students' success in algebra and transforms algebra into a study that calls for creative and original thinking. Habits of mind in reasoning and sense making are identified including:

1. Analyzing a Problem
2. Implementing a Strategy
3. Reflecting on a Solution to a Problem



Three chapters in the book provide examples of how teachers can build on students' concrete experiences, help them to make connections between these experiences and the more formal aspects of algebra, and how these examples play out in the high school algebra curriculum. Chapter 1 looks at the connections between algebra and geometry. Chapter 2 looks at building equations and functions. Chapter 3 presents the ideas of formal algebra. Each chapter also deals with one or more of the key elements of algebraic reasoning including:

- Meaningful Use of Symbols
- Mindful Manipulation
- Reasoned Solving
- Connecting Algebra with Geometry
- Linking Expressions and Functions
- Using Multiple Representations of Functions
- Modeling by Using Families of Functions
- Analyzing the Effects of Parameters

## STAGE 1 LEADERSHIP DEVELOPMENT

*Focus in High School Mathematics: Reasoning and Sense Making in Algebra*, by Karen Graham, Albert Cuoco and Gwendolyn Zimmermann, supports stage 1 development of specialists wishing to develop, model, and apply knowledge and strategies that reflect the importance of relevant,

meaningful mathematics for all students will find this a valuable resource. While this book is not written to be an algebra curriculum, it does contain key elements that a specialist will find helpful in developing reasoning and sense making for algebra. Reading, working through the tasks, and reflecting on the classroom vignettes and examples of student reasoning contained in this book will be helpful as specialists reflect on reasoning and sense making in their own classroom, school, or district. Working with a colleague, colleagues or even individually, specialists may find the questions in the epilogue helpful prompts for reflecting on the school mathematics curriculum in the context of reasoning and sense making in algebra, including:

- How can the curriculum integrate technology to help students experience reasoning and sense making?
- What are possible ways to modify textbook problems or exercises to elicit and support students' reasoning?
- What kinds of algebraic tasks can stimulate students' reasoning and sense making?
- What are possible ways to structure a classroom environment to maximize the opportunities for evaluating and sharing students' ideas?
- What are possible ways to model the types of thinking that students need to do?
- What types of questions can foster the development of algebraic reasoning in students?