



# Mathematics for Secondary School Teachers (Maa Textbooks)

By Elizabeth G. Bremigan, Ralph J. Bremigan, John D. Lorch

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**Mathematics for Secondary School Teachers (Maa Textbooks)** By Elizabeth G. Bremigan, Ralph J. Bremigan, John D. Lorch

*Mathematics for Secondary School Teachers* discusses topics of central importance in the secondary school mathematics curriculum, including functions, polynomials, trigonometry, exponential and logarithmic functions, number and operation, and measurement.

Acknowledging diversity in the mathematical backgrounds of pre-service teachers and in the goals of teacher preparation programs, the authors have written a flexible text, through which instructors can emphasize any of the following: Basics: exploration of key pre-college topics from intuitive and rigorous points of view; Connections: exploration of relationships among topics, using tools from college-level mathematics; Extensions: exploration of college-level mathematical topics that have a compelling relationship to pre-college mathematics.

*Mathematics for Secondary School Teachers* provides a balance of discovery learning and direct instruction. Activities and exercises address the range of learning objectives appropriate for future teachers. Beyond the obvious goals of conceptual understanding and computational fluency, readers are invited to devise mathematical explanations and arguments, create examples and visual representations, remediate typical student errors and misconceptions, and analyze student work. Introductory discussion questions encourage prospective teachers to take stock of their knowledge of pre-college topics. A rich collection of exercises of widely varying degrees of difficulty is integrated with the text. Activities and exercises are easily adapted to the settings of individual assignments, group projects, and classroom discussions.

*Mathematics for Secondary School Teachers* is primarily intended as the text for a bridge or capstone course for pre-service secondary school mathematics teachers. It can also be used in alternative licensure programs, as a supplement to a mathematics methods course, as the text for a graduate course for in-service teachers, and as a resource and reference for in-service faculty development.

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## **Editorial Review**

### **Review**

Prospective teachers need mathematics courses that develop a deep understanding of the mathematics they will teach. --2001 CBMS Report

As the authors state early on, this book is intended in part as a response to the 2001 report from the Conference Board of the Mathematical Sciences on the mathematical education of future teachers.

There is a very definite need for books like this one. While courses and textbooks on mathematics for elementary teachers are common across America, few schools offer a course for which this book would be a good fit, and that's probably regrettable. There is a good argument to be made for offering prospective secondary teachers the same kind of course--in which they consider the math they expect to teach from an advanced perspective and with some attention to how to teach it--that we routinely require of prospective elementary teachers.

I have taught such a course, as an independent study, to about ten students over the years. I have used two likely competitors of this book, and the three all take slightly different approaches to the challenge.

*Mathematics Methods and Modeling for Today's Mathematics Classroom*, by Dossey et al., is a COMAP project with a focus, as the title suggests, on mathematical modeling using middle and high school math. by contrast, *Mathematics for High School Teachers: An Advanced Perspective*, by Usiskin et al., follows a path similar to what we see in textbooks for the standard mathematics for elementary teachers course: an examination of topics that the students will someday teach, in somewhat more depth than in a high school textbook.

*Mathematics for Secondary School Teachers* is more traditional in its content than the first of these predecessors and more ambitious than the second. The topics are drawn from high school mathematics, but there's a depth of content that outstrips the Usiskin text. The authors note (p. 143), in introducing a chapter on hyperbolic trigonometry, that "Most of us first encounter the hyperbolic trigonometric functions in a calculus course"--which is surely accurate. They then go on to take students through a development of those functions starting with hyperbolas, and that is an excellent coverage of precalculus topics at an appropriately challenging level.

There is additional thoughtful and deep content in the chapters on the algebraic properties of number systems, which may well give a prospective teacher coming out of an abstract algebra course some important insight into how that material might connect to his or her future career. Due to these and other examples, the suggestion of the CBMS report that "Prospective mathematics teachers need mathematics courses that develop a deep understanding of the mathematics they will teach" will be well-realized by a course based on this textbook. --Mark Bollman, MAA Reviews

### **About the Author**

Elizabeth G. Bremigan received her B.A. in mathematics from Grove City College, her M.S. in mathematics from Carnegie Mellon, and an Ed.D. in mathematics education from the University of Pittsburgh. Bremigan taught middle and high school at The Ellis School in Pittsburgh, PA from 1980-1993. She is currently a professor at Ball State University.

Ralph Bremigan received an A.B. in mathematics from University of Chicago and his Ph.D. in mathematics from Brandeis University. He has worked at Duke University, and Max Planck-Institut fuer Mathematik (Bonn, Germany). He is currently a professor at Ball State University.

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