

Preface

The Putting Essential Understanding into Practice Series explores the teaching of mathematics topics in K–grade 12 that are difficult to learn and to teach. Each volume in this series focuses on specific content from one volume in NCTM’s Essential Understanding Series and links it to ways in which those ideas can be taught successfully in the classroom.

Thus, this series builds on the previous series, which aimed to present the mathematics that teachers need to know and understand well to teach challenging topics successfully to their students. Each of the earlier books identified and examined the big ideas related to the topic, as well as the “essential understandings”—the associated smaller, and often more concrete, concepts that compose each big idea.

Taking the next step, the Putting Essential Understanding into Practice Series shifts the focus to the specialized pedagogical knowledge that teachers need to teach those big ideas and essential understandings effectively in their classrooms. The Introduction to each volume details the nature of the complex, substantive knowledge that is the focus of these books—*pedagogical content knowledge*. For the topics explored in these books, this knowledge is student centered and focuses on teaching mathematics through problem solving.

Each book then puts big ideas and essential understandings related to the topic under a high-powered teaching lens, showing in fine detail how they might be presented, developed, and assessed in the classroom. Specific tasks, classroom vignettes, and samples of student work illustrate possible methods of introducing students to the ideas in ways that will enable students not only to make sense of them now but also to build on them in the future. Items for readers’ reflection appear throughout and offer teachers additional opportunities for professional development.

The final chapter of each book looks at previous and subsequent instruction on the topic. A look back highlights effective teaching that lays the earlier foundations that students are expected to bring to the current grades, where they solidify and build on previous learning. A look ahead reveals how high-quality teaching can expand students’ understanding when they move to more advanced levels.

Each volume in the Putting Essential Understanding into Practice Series also includes three appendixes to extend and enrich readers’ experiences and possibilities for using the book. The appendixes list the big ideas and essential

understandings related to the topic, detail resources for teachers, and present a selection of tasks discussed in the book. These materials are also available to readers online at the More4U website, where Appendix 3 includes additional tasks, and all the tasks are print-ready to facilitate hands-on work with students. Readers can gain online access to each book's More4U materials by going to www.nctm.org/more4u and entering the code that appears on the title page. They can then print out these materials for personal or classroom use.

Because the topics chosen for both the Essential Understanding Series and this successor series represent areas of mathematics that are widely regarded as challenging to teach and to learn, we believe that these books fill a tangible need for teachers. We hope that as you move through the tasks and consider the associated classroom implementations, you will find a variety of ideas to support your teaching and your students' learning.

Acknowledgments from the Authors

We wish to express our thanks for the various contributions to the development of the manuscript of this book from the following: Students at University Laboratory School, Honolulu, Hawaii; Brendan Brennan, University Laboratory School, Honolulu, Hawaii; Stephanie Capen, Honolulu, Hawaii; and Maryam Abhari, Honolulu, Hawaii.