

Introduction

IN MARCH 1989, the National Council of Teachers of Mathematics officially released *Curriculum and Evaluation Standards for School Mathematics* (NCTM 1989). The document provided a vision and a framework for strengthening the mathematics curriculum in kindergarten through grade 12 in North American schools. During NCTM’s development of the document, it became apparent that the document would need a plethora of examples to illustrate how to implement the vision in the grades K–12 classroom. This, in turn, led to NCTM inviting leaders in the mathematics education community to write a series of supplementary books for teachers. The purpose of those books, referred to as the Addenda series, was to support the implementation of the 1989 *Standards* document. Although NCTM has produced a number of documents since then (e.g., *Principles and Standards for School Mathematics* [2000]; *Curriculum Focal Points for Pre-kindergarten through Grade 8 Mathematics: A Quest for Coherence* [2006]), each one builds on and refines the original vision set forth in *Curriculum and Evaluation Standards*. Therefore, much of the content in the Addenda series applies as extensively today as it did the 1990s. In this spirit, NCTM’s Educational Materials Committee invited us, Elizabeth Phillips and Judith Zawojewski, in 2006 to coordinate developing this book as a collection of the best of the Addenda series, grades 5–8.

The problems selected for this book represent important content for today’s middle school mathematics curriculum. We chose them because they emphasize the roles of representation, generalization, problem solving, and connections in mathematics learning and teaching. These four practices first put forth by NCTM (2000) also appear in the set of Mathematical Practices that the Common Core State Standards for Mathematics (CCSSM) described in 2010. The eight Mathematical Practices are as follows:

1. Make sense of problems and persevere in solving them;
2. Reason abstractly and quantitatively;
3. Construct viable arguments and critique the reasoning of others;
4. Model with mathematics;
5. Use appropriate tools strategically;
6. Attend to precision;
7. Look for and make sense of structure; and
8. Look for and express regularity in repeated reasoning.

We do not intend the resulting set of problems to be comprehensive, because complete coverage is not possible in a book of this size. Therefore, we left many worthy problems and activities behind, as opportunities for the reader to revisit some of the experiences from the original series. Further, the introduction to each of the series' original books is a rich source of information on that book's mathematics content. We believe that all the original books would be well worth a reread.

We have organized this book into four chapters: Number and Operations, Measurement and Geometry, Data and Chance, and Algebra. The chapters draw on a variety of problems that the Addenda series, Grades 5–8—*Developing Number Sense in the Middle Grades; Understanding Rational Numbers and Proportions; Measurement in the Middle Grades; Geometry in the Middle Grades; Dealing with Data and Chance; and Patterns and Functions*—originally published. We have placed some of the problems that occurred in a given chapter in the Addenda in different chapters. For example, problem 10 in chapter 1, Number and Operations, originally occurred in the *Patterns and Functions* book. To present all the various problems and activities in one publication, we adapted the original work to fit a common format and provide consistent support for implementing the activities. Therefore, although we have noted each problem's origin, we adapted, added to, and subtracted from the original work to create a cohesive set of experiences for this book. We composed each problem with a goal statement, a list of the needed materials, possible solutions, teacher's notes, and ideas for extensions. The teacher's notes include the problem's mathematical goals, essential information for implementing the problem, elaboration on students' possible strategies, sample questions for use in class discussion, and commentary on and answers to the questions. Throughout the book we have identified some situations that represent the CCSSM Mathematical Practices. Since all the problems and activities in this book reflect the Mathematical Practice, "Make sense of problems and persevere in solving them," we have not always listed this practice. We invite the reader to look for more instances of the Mathematical Practices and to add more questions, explanation, organization, and pedagogy to adapt the experiences to each unique classroom setting.

We hope that you find this rich collection of activities a valuable resource as it supplements your curriculum, and that it helps you, together with your students, develop deeper understandings of, and appreciation for, the important ideas in middle school mathematics.

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