

---

## Developing Essential Understanding of Multiplication and Division

Otto, Albert; Caldwell, Janet; Hancock, Sarah Wallus and Zbiek, Rose Mary

2011 ♦ NCTM

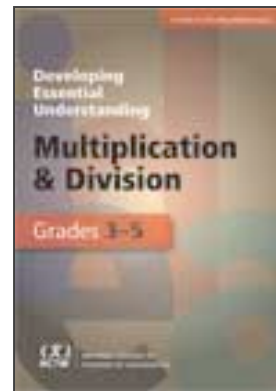
ISBN: 978-087353-667-7

Mathematical and Pedagogical Knowledge: Books

---

### DESCRIPTION

*Developing Essential Understanding of Multiplication and Division*, by Albert Otto, Janet Caldwell, Sarah Wallus Hancock, and Rose Mary Zbiek, presents ideas teachers in grades 3-5 need to understand thoroughly and be able to use flexibly. The importance of understanding how arithmetic operations relate to one another and the challenge of computing fluently make this an essential topic for teachers to understand deeply.



Chapter 1 considers the question, “What is essential to know about multiplication and division to be effective in the classroom?” and it is organized around two big ideas and associated essential understandings:

1. Multiplication is one of two fundamental operations, along with addition, which can be defined so that it is an appropriate choice for representing and solving problems in many different situations.
2. The properties of multiplication and addition provide the mathematical foundation for understanding computational procedures for multiplication and division, including mental computation and estimation strategies, invented algorithms, and standard algorithms.

Chapter 2 emphasizes longitudinal connections between multiplication and division of whole numbers and the corresponding operations with fractions and decimals. Using properties of operations and numbers in estimation and mental mathematics is discussed. Chapter 3 focuses on the selection and development of tasks, techniques, and tools for assessing student understanding.

### STAGE 1 LEADERSHIP DEVELOPMENT

*Developing Essential Understanding of Multiplication and Division*, by Albert Otto, Janet Caldwell, Sarah Wallus Hancock, and Rose Mary Zbiek, supports stage 1 leadership development of specialists working to know and model the Teaching and Learning Principle. This book is a valuable resource for specialists working to enrich their own understanding. Specialists may work alone, with a colleague, or with a group of specialists to read and reflect on the information.

As you read, take time to consider the models and representations provided. Take time to discuss or write about the reflect prompts found in chapter 1. You will find several key concepts woven throughout the big ideas and essential understandings from chapter 1. Reflect on these concepts and take some time to create your own models or representations as you consider how these concepts are integrated in number and numeration.

## STAGE 2 LEADERSHIP DEVELOPMENT

*Developing Essential Understanding of Multiplication and Division*, by Albert Otto, Janet Caldwell, Sarah Wallus Hancock, and Rose Mary Zbiek, supports stage 2 leadership development of specialists/leaders working to collaborate and implement the Teaching and Learning Principle. This article is a great tool for specialists to use with teachers in developing Indicator 3: *Every teacher participates in continuous and meaningful mathematics professional learning in order to improve his or her practice*. Specialists looking for a teacher-friendly resource will find this book useful. Chapters 1 and 2 are useful for helping teachers to deepen their understanding of multiplication and division. Specialists might facilitate groups of teachers as they read and discuss the big ideas and essential understandings in Chapter 1. A useful strategy for groups working through chapter 1 is to discuss or individually consider the reflect prompts found throughout.

Continuing their collaborative work, specialists and teachers might discuss the connections to lower and higher grade-bands discussed in chapter 2. The scenario presented at the beginning of chapter 3 provides an opportunity to open a discussion about teacher beliefs and teaching strategies that lead to understanding. Three specific issues in teaching about multiplication and division are presented and may be discussed as ways to turn these issues into opportunities to deepen student understanding. These issues include:

- The Use of “Tricks” in Computation
- Opportunities for Rich Mathematical Tasks
- The Need for Mathematical Terms and Definitions