Contents

Preface vii

PART I: INTRODUCTION

1 Analogies, Metaphors, and Images: Vehicles for Mathematical Reasoning 3
Lyn D. English

PART II: COGNITIVE FOUNDATIONS FOR A MIND-BASED MATHEMATICS

2 The Metaphorical Structure of Mathematics: Sketching Out Cognitive Foundations for a Mind-Based Mathematics 21
George Lakoff and Rafael E. Núñez

PART III: MATHEMATICAL REASONING: ANALOGIES

3 How Students Think: The Role of Representations 93
Robert B. Davis and Carolyn A. Maher

4 Analogical Reasoning and Early Mathematics Learning 117
Patricia A. Alexander, C. Stephen White, and Martha Daugherty
5 Children’s Development of Analogical Problem-Solving Skill
   Barry Gholson, Dereece Smith, Audrey Buhrman, Melissa K. Duncan, and Karen A. Pierce

6 Children’s Reasoning Processes in Classifying and Solving Computational Word Problems
   Lyn D. English

7 Two Types of Reliance on Correlations Between Content and Structure in Reasoning About Word Problems
   Miriam Bassok

8 Commentary: Mathematical Reasoning and Analogy
   Mary Jo Rattermann

PART IV: MATHEMATICAL REASONING: METAPHORS, METONYMIES, AND IMAGES

9 Reasoning With Metaphors and Metonymies in Mathematics Learning
   Norma C. Presmeg

10 Reasoning With Images in Mathematical Activity
    Grayson H. Wheatley

11 Generalization Using Imagery in Mathematics
    Norma C. Presmeg

12 Children’s Mathematical Reasoning With the Turtle Programming Metaphor
    Douglas H. Clements and Julie Sarama

13 Commentary: On Metaphorical Roots of Conceptual Growth
    Anna Sfard

Author Index

Subject Index