Table of Contents

Note: 1. PART I contains explanations and examples of the “puzzle” exercises which are found in Part II.

2. PART II contains practice puzzles, check quizzes, and check tests. These are referenced to the appropriate text pages.

Foreword: What Students Have to Say about This Book v
Preface: Why This Book Was Written vi
Introduction: The Bridge Between Arithmetic and Algebra vii
Table of Contents viii
Acknowledgments xii
Five Principles That Maximize Learning, Retention, and Transfer xiv
Pre-Algebra Readiness Check Quiz xvi
Review of Arithmetic Concepts xix
Using Prime Factorization for Finding the LCD xix
Common Fraction Operations xx
Decimal Fraction Operations xxiv
Using Proportions to Solve % Puzzles xxvii
About the Author xxviii
Never, Never, Never, Give Up! xxix
Why Topics Were Selected for This Book xxx
Dear Students xxxi

PART I Explanations and Examples

Chapter 1 Signed Numbers and Equations

Something to Think About: The Human Brain 1
What Is Algebra? 2
Basic Vocabulary 3
The Number Line 4
The Horizontal Number Line and Signed Numbers 5
Symbols Used for Multiplication 8
Using the Order of Operations 11
Making Addition and Subtraction of Integers Easier 12
## Chapter 1 Signed Numbers and Equations (continued)

- Additive Inverses 13
- Using the Multiplicative Identity of “1” 14
- Identifying Clusters of Multiplication 15
- Nested (or Embedded) Grouping Symbols 17
- Substitution 20
- Getting Ready to Solve Equations 21
- Punctuation Symbols in Mathematics 22
- Misunderstandings in Mathematics 23
- Using Inverses to Solve Equations 25
- Phrases, Sentences, and Verbs in Algebra 27
- Solving Algebraic Equations That Contain Fractions 28
- Chapter 1 Review 32

## Chapter 2 Multiple Step Equations and Inequalities

- Someone to Think About: Maxcy Filer 35
- Solving Multiple Step Equations 36
- Exponents and Combining Like Terms 42
- Solving Equations That Contain Like Terms 44
- The Distributive Property of Multiplication 47
- Identity and No Solution Puzzles 49
- Embedded Grouping Symbols 50
- Graphing Equalities and Inequalities 51
- Solving and Graphing Inequalities 53
- Chapter 2 Review 58
- Someone to Think About: Tom Monaghan 60

## Chapter 3 Translations, Pictures, and Charts

- Someone to Think About: Helen Keller 61
- An Introduction to Word Puzzles 62
- From Arithmetic to Algebra 63
- Steps to Use When Translating 65
- The Syntax of Mathematics 66
- Translating and Solving Multiple Operation Word Puzzles 67
- Translating Multiple Operation Word Puzzles 68
- Consecutive Integers 73
- Pythagorus and Right Triangles 80
- Puzzles with One Known and One Unknown 83
- Using One Variable to Find Multiple Unknowns 84
- Formulas, Multiple Unknowns, and One Variable 89
Chapter 3  Translations, Pictures, and Charts (continued)

Working with Conditional Statements  90
Chapter 3 Review  93

Chapter 4  Charts and Rates

Someone to Think About: Jaime Escalante  97
Using a Chart to Organize Information  98
Using a Chart to Organize a Coin Mixture Puzzle  99
Solution Puzzles  104
Understanding and Solving Proportions  109
Using a Chart to Solve a Distance Puzzle  111
Chapter 4: Review of Charts and Rates  119
Someone to Think About: Jackie Nink Pflug  122

Chapter 5  Polynomials, Lists, Factoring, and Quadratic Equations

Someone to Think About: Thomas Edison  123
Squares and Square Roots  124
Exponents and Powers  125
Polynomials  127
Vertical Method of Multiplying Polynomials  128
Horizontal Method of Multiplying Two Binomials  129
Factoring and the Distributive Property  131
Factoring Concepts and Methods:
  1. Extracting the Greatest Common Factor  132
  2. The Sum and Difference of Two Squares  134
  3. Perfect Square Trinomials  135
  4. Making Organized Lists to Sort Information  137
  5. Factoring Trinomials That Have “1” as the Leading Coefficient  139
  6. “Creating” Common Factors  141
  7. Factoring by Grouping  144
  8. Master Product  146
  9. Using More Than One Factoring Method  147
  10. Summary of Basic Factoring Methods  148
Introduction to Algebraic Fractions  150
Zero Factor Property  154
Types of Polynomial Equations  155
Missing Integers in Quadratic Equations  156
The Quadratic Formula  159
When a Solution CanNOT Be Determined  161
Chapter 5 Review  162
Someone to Think About:
  Mary McLeod Bethune  166
  Walt Disney
Chapter 6  Using Formulas and Graphing Lines

Someone to Think About: Albert Einstein  167
The Cartesian Coordinate System  168
The Graph  169
Determining Slope:
  1. Using Inspection  170
  2. Zero Slope and No Slope  171
  3. The Slope Formula  172
X and Y Intercepts  174
The Uniqueness of a Line  175
Different Ways of Writing the Same Slope  176
Equations of Lines
  1. Slope Intercept Form Equation of a Line  177
  2. Graphing a Line When the Slope-Intercept Form of Its Equation Is Given  179
  3. Solutions to Equations of Lines  180
  4. Writing the Slope-Intercept Form of the Equation of a Line When a Graph Is Given  181
  5. Standard Equation of a Line  182
  6. Converting Equations to Slope-Intercept Form of an Equation of a Line  183
  7. Converting Equations to Standard Form of an Equation of a Line  184
  8. What to Do When Information Seems to Be Missing  185
  9. A System of Equations  186
Chapter 6 Review  187
Someone to Think About  189
  Mary Kay Ash
  Severo Esquivel
Index  191

PART II  Practice Puzzles

Practice Puzzles  195
Table of Contents for Quizzes, Reviews, and Check Tests  197
Chapter 1: Signed Numbers and Equations  197
Chapter 2: Solving and Graphing Equations and Inequalities  237
Chapter 3: Translations, Pictures, and Charts  270
Chapter 4: Charts and Rates  310
Chapter 5: Polynomials, Lists, Factoring, and Quadratic Equations  340
Chapter 6: Using Formulas and Graphing Lines  389

PART III  Answers to Puzzles

Many People, Many Obstacles, Many Successes  431
Message  432
Someone to Think About: Joseph Horswill  464