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: ..... 166Mary McLeod BethuneWalt 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:
11. Using Inspection ..... 170
12. Zero Slope and No Slope ..... 171
13. 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
14. Slope Intercept Form Equation of a Line ..... 177
15. Graphing a Line When the Slope-Intercept Form of Its Equation Is Given ..... 179
16. Solutions to Equations of Lines ..... 180
17. Writing the Slope-Intercept Form of the Equation of a Line When a Graph Is Given ..... 181
18. Standard Equation of a Line ..... 182
19. Converting Equations to Slope-Intercept Form of an Equation of a Line ..... 183
20. Converting Equations to Standard Form of an Equation of a Line ..... 184
21. What to Do When Information Seems to Be Missing ..... 185
22. A System of Equations ..... 186
Chapter 6 Review ..... 187
Someone to Think About ..... 189Mary Kay AshSevero Esquivel
Index191
PART II Practice Puzzles
Practice Puzzles
Table of Contents for Quizzes, Reviews, and Check Tests ..... 195
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
