CONTENTS

1. The Set of Whole Numbers 1

1.1 Preliminary Concepts 1
1.2 Numbers and Numerals 4
1.3 Axioms of Equality and Order; Number Line 7
1.4 Sums 12
1.5 Products 17
1.6 The Distributive Law 21
1.7 Consequences of the Axioms 25
1.8 Inverse Operations 28
1.9 Factoring 31
1.10 Order of Operations; Numerical Evaluation 33
1.11 Equations and Inequalities 36
Chapter Summary 38
Chapter Review 40

2. The Set of Integers 45

2.1 Some Properties of Integers 45
2.2 Sums 50

2.3 Differences 54
2.4 Products and Quotients 57
2.5 Order of Operations; Numerical Evaluation 63
2.6 Equations and Inequalities Involving Integers 65
Chapter Summary 66
Chapter Review 67

3. Polynomials 71

3.1 Forms of Products 71
3.2 Definitions 75
3.3 Sums and Differences 79
3.4 Products of Monomials 84
3.5 Products of Polynomials 86
3.6 Factored Forms 91
3.7 Factoring Trinomials—I 93
3.8 Factoring Trinomials—II 96
3.9 Special Products and Factors 99
Chapter Summary 102
Chapter Review 103

4. Rational Expressions 105

4.1 An Extension of the Set of Integers 105
4.2 Some Properties of Rational Numbers 110
4.3 Reducing Rational Expressions 115
4.4 Quotients of Monomials 119
4.5 Quotients of Polynomials 121
4.6 Building Rational Expressions 125
4.7 Powers with Integral Exponents 127
4.8 Scientific Notation 129
Chapter Summary 133
Chapter Review 134

5. Operations on Rational Expressions 137

5.1 Sums 137
5.2 Differences 144

5.3 Products 149
5.4 Quotients 153
5.5 Complex Fractions 157
Chapter Summary 160
Chapter Review 161

6. First-Degree Equations and Inequalities—One Variable 163

6.1 Equations 163
6.2 Equivalent Equations—I 165
6.3 Equivalent Equations—II 170
6.4 Solution of Inequalities 174
6.5 Mathematical Models for Word Problems 178
6.6 Word Problems Concerning Numbers 182
6.7 Word Problems Concerning Physical Quantities 186
6.8 Ratio and Proportion; Metric Measurement 195
Chapter Summary 199
Chapter Review 200

7. The Set of Real Numbers 203

7.1 Radical Notation 203
7.2 The Set of Irrational Numbers 206
7.3 Some Properties of Real Numbers 209
7.4 Properties of Radicals 214
7.5 Sums and Differences of Radical Expressions 218
7.6 Products and Quotients of Radical Expressions 221
Chapter Summary 224
Chapter Review 225

8. Second-Degree Equations 229

8.1 Solution by Factoring 229
8.2 Solution by Extraction of Roots 233
8.3 Complex Numbers 235
8.4 Solution by Completing the Square 239
8.5 Solution by the Quadratic Formula 243

8.6 Word Problems 247
Chapter Summary 252
Chapter Review 253

9. Relations, Functions, and Their Graphs 255

9.1 Solutions of Equations in Two Variables 255
9.2 Relations 260
9.3 Functions 263
9.4 Function Notation 267
9.5 Graph of a Function; Linear Functions 269
9.6 Graphing Using Intercepts 273
9.7 Special Cases of Linear Equations 276
9.8 Special Property of Linear Functions 280
9.9 Graphs of Inequalities in Two Variables 283
9.10 The Quadratic Function 287
Chapter Summary 291
Chapter Review 293

10. Systems of Linear Equations 297

10.1 Graphical Solutions of Systems of Equations 297
10.2 Independent, Inconsistent, and Dependent Equations 301
10.3 Solving Systems by Substitution 305
10.4 Solving Systems by Linear Combinations 307
10.5 Word Problems Using Two Variables 311
Chapter Summary 320
Chapter Review 321

Cumulative Review 323

Answers 331

Index 383

Conversion Tables 390