



BRIEF CONTENTS

1	Introduction to Problem Solving	2
2	Sets, Whole Numbers, and Numeration	42
3	Whole Numbers: Operations and Properties	84
4	Whole Number Computation—Mental, Electronic, and Written	128
5	Number Theory	174
6	Fractions	206
7	Decimals, Ratio, Proportion, and Percent	250
8	Integers	302
9	Rational Numbers, Real Numbers, and Algebra	338
10	Statistics	412
11	Probability	484
12	Geometric Shapes	546
13	Measurement	644
14	Geometry Using Triangle Congruence and Similarity	716
15	Geometry Using Coordinates	780
16	Geometry Using Transformations	820
Epilogue: An Eclectic Approach to Geometry		877
Topic 1 Elementary Logic		881
Topic 2 Clock Arithmetic: A Mathematical System		891
Answers to Exercise/Problem Sets A and B, Chapter Reviews, Chapter Tests, and Topics Section A1		
Index		11
Contents of Book Companion Web Site		
Resources for Technology Problems		
Technology Tutorials		
Webmodules		
Additional Resources		
Videos		

1	3	7	9	10
15	23	25	31	32
36	45	51	69	76
72	75	80	81	87
90	92	93	95	98

CONTENTS

Preface xi

1 Introduction to Problem Solving 2

- 1.1 The Problem-Solving Process and Strategies 5
- 1.2 Three Additional Strategies 21

2 Sets, Whole Numbers, and Numeration 42

- 2.1 Sets as a Basis for Whole Numbers 45
- 2.2 Whole Numbers and Numeration 57
- 2.3 The Hindu–Arabic System 67

3 Whole Numbers: Operations and Properties 84

- 3.1 Addition and Subtraction 87
- 3.2 Multiplication and Division 101
- 3.3 Ordering and Exponents 116

4 Whole Number Computation—Mental, Electronic, and Written 128

- 4.1 Mental Math, Estimation, and Calculators 131
- 4.2 Written Algorithms for Whole-Number Operations 145
- 4.3 Algorithms in Other Bases 162

5 Number Theory 174

- 5.1 Primes, Composites, and Tests for Divisibility 177
- 5.2 Counting Factors, Greatest Common Factor, and Least Common Multiple 190

6 Fractions 206

- 6.1 The Set of Fractions 209
- 6.2 Fractions: Addition and Subtraction 223
- 6.3 Fractions: Multiplication and Division 233

7 Decimals, Ratio, Proportion, and Percent 250

- 7.1 Decimals 253
- 7.2 Operations with Decimals 262
- 7.3 Ratio and Proportion 274
- 7.4 Percent 283

8 Integers 302

- 8.1 Addition and Subtraction 305
- 8.2 Multiplication, Division, and Order 318

9 Rational Numbers, Real Numbers, and Algebra 338

- 9.1 The Rational Numbers 341
- 9.2 The Real Numbers 358
- 9.3 Relations and Functions 375
- 9.4 Functions and Their Graphs 391

10 Statistics 412

- 10.1 Statistical Problem Solving 415
- 10.2 Analyze and Interpret Data 440
- 10.3 Misleading Graphs and Statistics 460

11 Probability 484

- 11.1 Probability and Simple Experiments 487
- 11.2 Probability and Complex Experiments 502
- 11.3 Additional Counting Techniques 518
- 11.4 Simulation, Expected Value, Odds, and Conditional Probability 528

12 Geometric Shapes 546

- 12.1 Recognizing Geometric Shapes—Level 0 549
- 12.2 Analyzing Geometric Shapes—Level 1 564
- 12.3 Relationships Between Geometric Shapes—Level 2 579
- 12.4 An Introduction to a Formal Approach to Geometry 589
- 12.5 Regular Polygons, Tessellations, and Circles 605
- 12.6 Describing Three-Dimensional Shapes 620

13 Measurement 644

- 13.1 Measurement with Nonstandard and Standard Units 647
- 13.2 Length and Area 665
- 13.3 Surface Area 686
- 13.4 Volume 696

14 Geometry Using Triangle Congruence and Similarity 716

- 14.1 Congruence of Triangles 719
- 14.2 Similarity of Triangles 729
- 14.3 Basic Euclidean Constructions 742
- 14.4 Additional Euclidean Constructions 755
- 14.5 Geometric Problem Solving Using Triangle Congruence and Similarity 765

15 Geometry Using Coordinates 780

- 15.1 Distance and Slope in the Coordinate Plane 783
- 15.2 Equations and Coordinates 795
- 15.3 Geometric Problem Solving Using Coordinates 807

16 Geometry Using Transformations 820

16.1 Transformations 823

16.2 Congruence and Similarity Using Transformations 846

16.3 Geometric Problem Solving Using Transformations 863

Epilogue: An Eclectic Approach to Geometry 877

Topic 1. Elementary Logic 881

Topic 2. Clock Arithmetic: A Mathematical System 891

Answers to Exercise/Problem Sets A and B, Chapter Reviews, Chapter Tests, and Topics Section A1

Index 11

Contents of Book Companion Web Site

Resources for Technology Problems

eManipulatives

Spreadsheet Activities

Geometer's Sketchpad Activities

Technology Tutorials

Spreadsheets

Geometer's Sketchpad

Programming in Logo

Graphing Calculators

Webmodules

Algebraic Reasoning

Children's Literature

Introduction to Graph Theory

Additional Resources

Guide to Problem Solving

Problems for Writing/Discussion

Research Articles

Web Links

Videos

Book Overview

Author Walk-Through Videos

Children's Videos