Contents

INTRODUCTION 1

CHAPTER 1: NUMBER AND OPERATIONS 5

Ordering, Comparing, and Equivalence 5

Problem 1: Customers Cut the Cake 6

Problem 2: Identifying Fractions Near 0, 1/2, and 1 8

Problem 3: Exploring Numerators and Denominators 10

Problem 4: Here's Looking at Percents 12

Operations on Rational Numbers 15

Problem 5: Multiplication by Decimals Near 0, 1/2, and 1 15

Problem 6: Operations on a Fraction Number Line 18

Problem 7: Patterns with Fractions 20

Proportions 23

Problem 8: Exploring the Size of a Million Dollars 23

Problem 9: Capture Recapture 24

Exponents 26

Problem 10: Patterns in the Powers Chart 26

CHAPTER 2: MEASUREMENT AND GEOMETRY 31

Part 1: Measurement 31

Introducing Measurement 32

Problem 1: Creating Metric ID Cards 32

Problem 2: How Big Is Your Foot? 34

Measuring Circles 36

Problem 3: Circumference of a Circle 36

Problem 4: Area of Circles 38

Problem 5: Grazing Cows 41

Measuring Polygons 43

Problem 6: Areas of Polygons 43

Problem 7: Area of Squares and Square Roots 45

Problem 8: Finding Lengths of Line Segments 48

Problem 9: Squares and the Pythagorean Theorem 51

Problem 10: Proving the Pythagorean Theorem 54

Problem 11: Using the Pythagorean Theorem 56
Measuring Surface Area and Volume 57
Problem 12: Surface Area 57
Problem 13: Volume 60
Similar Figures 63
Problem 14: Similar Shapes 63
Problem 15: Building Staircases 66
Part 2: Visualizing and Representing Shapes 68
Problem 16: Exploring Cubes 68
Problem 17: Representing Buildings Made from Cubes 72
Problem 18: Parallelogram and Triangular Grids 75
Problem 19: Slides, Flips, and Turns 77
CHAPTER 3: DATA AND CHANCE 83
Problem 1: Is This Game Fair? 84
Problem 2: Monte Carlo Simulation 87
Problem 3: A Look at Average Wage 90
Problem 4: Light-Bulb Life 93
Problem 5: Family Combinations of Boys and Girls 96
Problem 6: Montana Red Dog 98
CHAPTER 4: PATTERNS AND FUNCTIONS 103
Problem 1: The Race—Linear Functions 103
Problem 2: Rumors—Exponential Functions 107
Problem 3: Folding Paper—Exponential Functions 110
Problem 4: Miracle Mike—Linear and Exponential Functions 114
Problem 5: Cube Coloring—Linear, Quadratic, and Cubic Functions 117
Problem 6: Maximum Area—Quadratic Functions 120
Problem 7: Reading Graphs 126
Problem 8: Bottle Functions—an Experiment 130
Problem 9: The Function Machine 134
APPENDIX A: Chapter 2 Blackline Masters 139
Blackline Master 2.1: Square-Dot Paper 140
Blackline Master 2.2: Five-by-Five Dot Grids 141
Blackline Master 2.3: Centimeter Grid Paper 142

Blackline Master 2.4: Isometric Dot Paper 143
Blackline Master 2.5: Grazing Cows 144
Blackline Master 2.6: The Area of Polygons 145
Blackline Master 2.7: Proving the Pythagorean Theorem 146
Blackline Master 2.8: Similar Shapes 147
Blackline Master 2.9: Building Staircases 149
Blackline Master 2.10: Representing Buildings Made from Cubes 151
Blackline Master 2.11: Parallelogram and Triangular Grids 153
Blackline Master 2.12: Slides, Flips, and Turns 154

APPENDIX B: Chapter 3 Blackline Masters 157

Blackline Master 3.1: Sum of Seven: A Two-Person Game 158
Blackline Master 3.2: Sum of Seven Recording Sheet 159
Blackline Master 3.3: A Look at Average Wage 160
Blackline Master 3.4: Light-Bulb Life 162
Blackline Master 3.5: Montana Red Dog Recording Sheet 163