

TABLE OF CONTENTS

HOW THIS MANUAL CAN BE USED	1
INTRODUCTION	4
NEGATIVE NUMBERS	7
Introduction	7
About Negative Numbers	11
Background Information	11
Activity 1: Understanding the Concept of Negative Numbers	13
Activity 2: Counting and Ordering Negative Numbers	16
Activity 3: Finding Equivalent Forms of Positive and Negative Numbers	19
Activity 4: Naming Additive Inverses for Positive and Negative Numbers	22
Operations with Positive and Negative Numbers	24
Background Information	24
Activity 1: Adding with Negative Numbers	27
Activity 2: Subtracting with Negative Numbers	30
Activity 3: Multiplying with Negative Numbers	33
Activity 4: Naming Reciprocals for Positive and Negative Numbers	36
Activity 5: Dividing with Negative Numbers	38
Activity 6: Simplifying Expressions with Multiple Operations and Positive and Negative Numbers	41
NON-TERMINATING DECIMALS AND IRRATIONAL NUMBERS	44
Introduction	44
Activity 1: Calculating Terminating and Non-Terminating Decimal Fractions	46
Activity 2: Recognizing Irrational Numbers	48
EQUALITIES AND INEQUALITIES	50
Introduction	50
Background Information	51
Activity 1: Using the Symbols for Equalities and Inequalities	53

PRE-ALGEBRA	.56
Introduction	.56
Equations and Algebraic Equations	.64
Background Information	.64
Activity 1: Creating Simple Equations	.68
Activity 2: Writing Equations and Using Negative Numbers in Equations	.71
Activity 3: Using Variables to Represent Unknown Quantities in Equations	.74
Activity 4: Solving Equations with One Variable	.77
Activity 5: Solving Equations with Two Occurrences of the Same Variable	.80
Activity 6: Solving Word Problems Using Equations with One Variable	.83
Activity 7: Solving Word Problems Using Equations with Two Occurrences of One Variable	.85
Squares of Numbers and of Polynomial Expressions	.88
Background Information	.88
Activity 1: Forming the Squares of the Numbers 1–10	.94
Activity 2: Using the Distributive Property of Multiplication	.98
Activity 3: Building the Square of a Binomial	.102
Activity 4: Calculating the Square of a Binomial	.106
Activity 5: Creating the Algebraic Expression for the Square of a Binomial	.109
Activity 6: Squaring a Binomial Greater than 10	.112
Activity 7: Finding the Algebraic Expression for a Binomial Square Greater than 10	.116
Activity 8: Forming the Square of a Trinomial	.120
Activity 9: Calculating the Square of a Trinomial Abstractly	.124
Activity 10: Deriving the Algebraic Expression for the Square of a Trinomial	.127
Activity 11: Building a Trinomial Square for Values Greater than 100	.129
Cubes of Numbers and of Polynomial Expressions	.133
Background Information	.133
Activity 1: Cubing Small Numbers	.136
Activity 2: Forming the Cubes of Numbers 1–10	.139
Activity 3: Building the Cube of a Binomial from the Square of a Binomial, Layer by Layer	.142
Activity 4: Building the Cube of a Binomial from the Square of a Binomial, Part by Part	.146

Activity 5: Developing the Algebraic Expression for the Cube of a Binomial	148
Activity 6: Building the Cube of a Binomial from the Algebraic Expression	151
Activity 7: Building the Cube of a Hierarchical Binomial from the Algebraic Expression	153
Activity 8: Building the Cube of a Trinomial from the Square of a Trinomial, Layer by Layer	156
Activity 9: Building the Cube of a Trinomial from the Square of a Trinomial, Part by Part	161
Activity 10: Developing the Algebraic Expression for the Cube of a Trinomial	164
Activity 11: Building the Cube of a Trinomial from the Algebraic Expression	167
Square Roots of Numbers	170
Background Information	170
Activity 1: Building Square Roots	175
Activity 2: Estimating Square Roots	178
Activity 3: Finding the Square Root of a Number with One Period	181
Activity 4: Finding the Square Root of a Number with Two Periods	184
Activity 5: Finding the Square Root of a Number with Two Periods Abstractly	189
Activity 6: Finding the Square Root of a Number with Three Periods	195
Activity 7: Finding the Square Root of a Number with Three Periods Abstractly	200
Activity 8: Finding Square Roots with Zero as Their Second Digit	206
Activity 9: Finding Square Roots with Zero as Their Third Digit	210
Cube Roots of Numbers	213
Background Information	213
Activity 1: Exploring the Concept of Cube Roots	217
Activity 2: Estimating Cube Roots	220
Activity 3: Finding the Cube Root of a Number with One Period	222
Activity 4: Finding the Cube Root of a Number with Two Periods	224
Activity 5: Finding the Cube Root of a Number with Two Periods Abstractly	227
Activity 6: Finding the Cube Root of a Number with Three Periods	232
Exponential and Scientific Notation	238
Background Information	238
Activity 1: Becoming Familiar with Exponential Notation	241
Activity 2: Adding with Exponents	245
Activity 3: Subtracting with Exponents	247

Activity 4: Multiplying with Exponents	.249
Activity 5: Dividing with Exponents	.253
Activity 6: Working with Negative Exponents	.257
Activity 7: Working with Fractional Exponents with a Numerator of 1	.262
Activity 8: Becoming More Familiar with Scientific Notation	.265
Activity 9: Using Scientific Notation for Numbers Less than 1	.268
Activity 10: Adding and Subtracting Numbers in Scientific Notation	.271
Activity 11: Multiplying and Dividing Numbers in Scientific Notation	.273
OTHER BASES	.276
Introduction	.276
Background Information	.278
Activity 1: Becoming Familiar with the Base 10 Number System	.282
Activity 2: Becoming Familiar with Base 5	.284
Activity 3: Counting in Base 5, Base 6, and Base 7	.287
Activity 4: Counting in Base 4, Base 3, and Base 2	.292
RESOURCES	.296