

# TABLE OF CONTENTS

<b>HOW THIS MANUAL CAN BE USED</b> .....	1
<b>INTRODUCTION</b> .....	4
<b>NEGATIVE NUMBERS</b> .....	7
<b>Introduction</b> .....	7
<b>About Negative Numbers</b> .....	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
<b>Operations with Positive and Negative Numbers</b> .....	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
<b>NON-TERMINATING DECIMALS AND IRRATIONAL NUMBERS</b> .....	44
<b>Introduction</b> .....	44
Activity 1: Calculating Terminating and Non-Terminating Decimal Fractions .....	46
Activity 2: Recognizing Irrational Numbers .....	48
<b>EQUALITIES AND INEQUALITIES</b> .....	50
<b>Introduction</b> .....	50
Background Information .....	51
Activity 1: Using the Symbols for Equalities and Inequalities .....	53

<b>PRE-ALGEBRA</b> .....	56
<b>Introduction</b> .....	56
<b>Equations and Algebraic Equations</b> .....	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
<b>Squares of Numbers and of Polynomial Expressions</b> .....	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
<b>Cubes of Numbers and of Polynomial Expressions</b> .....	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 .....	154
Activity 8: Building the Cube of a Trinomial from the Square of a Trinomial, Layer by Layer .....	157
Activity 9: Building the Cube of a Trinomial from the Square of a Trinomial, Part by Part .....	162
Activity 10: Developing the Algebraic Expression for the Cube of a Trinomial .....	165
Activity 11: Building the Cube of a Trinomial from the Algebraic Expression .....	168
<b>Square Roots of Numbers</b> .....	171
Background Information .....	171
Activity 1: Building Square Roots .....	176
Activity 2: Estimating Square Roots .....	179
Activity 3: Finding the Square Root of a Number with One Period .....	182
Activity 4: Finding the Square Root of a Number with Two Periods .....	185
Activity 5: Finding the Square Root of a Number with Two Periods Abstractly .....	190
Activity 6: Finding the Square Root of a Number with Three Periods .....	196
Activity 7: Finding the Square Root of a Number with Three Periods Abstractly .....	201
Activity 8: Finding Square Roots with Zero as Their Second Digit .....	207
Activity 9: Finding Square Roots with Zero as Their Third Digit .....	211
<b>Cube Roots of Numbers</b> .....	214
Background Information .....	214
Activity 1: Exploring the Concept of Cube Roots .....	218
Activity 2: Estimating Cube Roots .....	221
Activity 3: Finding the Cube Root of a Number with One Period .....	223
Activity 4: Finding the Cube Root of a Number with Two Periods .....	225
Activity 5: Finding the Cube Root of a Number with Two Periods Abstractly .....	228
Activity 6: Finding the Cube Root of a Number with Three Periods .....	233
<b>Exponential and Scientific Notation</b> .....	240
Background Information .....	240
Activity 1: Becoming Familiar with Exponential Notation .....	244
Activity 2: Adding with Exponents .....	248
Activity 3: Subtracting with Exponents .....	250

Activity 4: Multiplying with Exponents .....	252
Activity 5: Dividing with Exponents .....	256
Activity 6: Working with Negative Exponents .....	260
Activity 7: Working with Fractional Exponents with a Numerator of 1 ...	265
Activity 8: Becoming More Familiar with Scientific Notation .....	268
Activity 9: Using Scientific Notation for Numbers Less than 1 .....	271
Activity 10: Adding and Subtracting Numbers in Scientific Notation ...	274
Activity 11: Multiplying and Dividing Numbers in Scientific Notation ...	276
<b>OTHER BASES .....</b>	<b>279</b>
<b>Introduction .....</b>	<b>279</b>
Background Information .....	281
Activity 1: Becoming Familiar with the Base 10 Number System .....	286
Activity 2: Becoming Familiar with Base 5 .....	288
Activity 3: Counting in Base 5, Base 6, and Base 7 .....	291
Activity 4: Counting in Base 4, Base 3, and Base 2 .....	296
<b>RESOURCES FOR TEACHERS AND STUDENTS .....</b>	<b>300</b>
<b>Print .....</b>	<b>300</b>
<b>Web .....</b>	<b>302</b>
<b>GLOSSARY .....</b>	<b>303</b>