

Contents at a Glance

***Introduction* 1**

***Part I: Arming Yourself with the Basics of Basic Math* ...9**

Chapter 1: Playing the Numbers Game11

Chapter 2: It's All in the Fingers — Numbers and Digits29

Chapter 3: The Big Four: Addition, Subtraction, Multiplication, and Division.....37

***Part II: Getting a Handle on Whole Numbers*55**

Chapter 4: Putting the Big Four Operations to Work57

Chapter 5: A Question of Values: Evaluating Arithmetic Expressions71

Chapter 6: Say What? Turning Words into Numbers83

Chapter 7: Divisibility97

Chapter 8: Fabulous Factors and Marvelous Multiples105

***Part III: Parts of the Whole: Fractions, Decimals, and Percents* 119**

Chapter 9: Fooling with Fractions121

Chapter 10: Parting Ways: Fractions and the Big Four Operations133

Chapter 11: Dallying with Decimals155

Chapter 12: Playing with Percents179

Chapter 13: Word Problems with Fractions, Decimals, and Percents193

***Part IV: Picturing and Measuring — Graphs, Measures, Stats, and Sets*205**

Chapter 14: A Perfect Ten: Condensing Numbers with Scientific Notation207

Chapter 15: How Much Have You Got? Weights and Measures217

Chapter 16: Picture This: Basic Geometry229

Chapter 17: Seeing Is Believing: Graphing as a Visual Tool251

Chapter 18: Turning Geometry and Measurements into Word Problems261

Chapter 19: Figuring Your Chances: Statistics and Probability275

Chapter 20: Setting Things Up with Basic Set Theory287

<i>Part V: The X-Files: Introduction to Algebra</i>	295
Chapter 21: Enter Mr. X: Algebra and Algebraic Expressions	297
Chapter 22: Unmasking Mr. X: Algebraic Equations	315
Chapter 23: Putting Mr. X to Work: Algebra Word Problems	329
<i>Part VI: The Part of Tens</i>	339
Chapter 24: Ten Key Math Concepts You Shouldn't Ignore	341
Chapter 25: Ten Important Number Sets You Should Know	347
<i>Index</i>	355

Table of Contents

***Introduction* 1**

About This Book	1
Conventions Used in This Book	2
What You're Not to Read	2
Foolish Assumptions	3
How This Book Is Organized	3
Part I: Arming Yourself with the Basics of Basic Math	3
Part II: Getting a Handle on Whole Numbers	4
Part III: Parts of the Whole: Fractions, Decimals, and Percents	4
Part IV: Picturing and Measuring — Graphs, Measures, Stats, and Sets	5
Part V: The X-Files: Introduction to Algebra	6
Part VI: The Part of Tens	6
Icons Used in This Book	6
Where to Go from Here	7

Part I: Arming Yourself with the Basics of Basic Math 9

Chapter 1: Playing the Numbers Game 11

Inventing Numbers	12
Understanding Number Sequences	12
Evening the odds	13
Counting by threes, fours, fives, and so on	13
Getting square with square numbers	14
Composing yourself with composite numbers	15
Stepping out of the box with prime numbers	16
Multiplying quickly with exponents	17
Looking at the Number Line	18
Adding and subtracting on the number line	18
Getting a handle on nothing, or zero	19
Taking a negative turn: Negative numbers	21
Multiplying the possibilities	22
Dividing things up	23
Discovering the space in between: Fractions	24
Four Important Sets of Numbers	25
Counting on the counting numbers	26
Introducing integers	26
Staying rational	27
Getting real	27

Chapter 2: It's All in the Fingers — Numbers and Digits 29

Knowing Your Place Value	30
Counting to ten and beyond	30
Telling placeholders from leading zeros	31
Reading long numbers	32
Close Enough for Rock 'n' Roll: Rounding and Estimating	33
Rounding numbers	33
Estimating value to make problems easier	34

Chapter 3: The Big Four: Addition, Subtraction, Multiplication, and Division 37

Adding Things Up.....	37
In line: Adding larger numbers in columns	38
Carry on: Dealing with two-digit answers	38
Take It Away: Subtracting.....	39
Columns and stacks: Subtracting larger numbers	40
Can you spare a ten? Borrowing to subtract	41
Multiplying	44
Signs of the times	44
Memorizing the multiplication table.....	45
Double digits: Multiplying larger numbers	49
Doing Division Lickety-Split.....	51
Making short work of long division	52
Getting leftovers: Division with a remainder.....	54

Part II: Getting a Handle on Whole Numbers55**Chapter 4: Putting the Big Four Operations to Work 57**

Knowing Properties of the Big Four Operations	57
Inverse operations	58
Commutative operations	59
Associative operations	60
Distributing to lighten the load	61
Big Four Operations with Negative Numbers	61
Addition and subtraction with negative numbers	62
Multiplication and division with negative numbers	64
Understanding Units	64
Adding and subtracting units	65
Multiplying and dividing units	65
Understanding Inequalities	66
Doesn't equal (\neq)	66
Less than ($<$) and greater than ($>$)	67
Approximately equals (\approx)	67

Beyond the Big Four: Exponents, Square Roots, and Absolute Value ...68
 Understanding exponents68
 Discovering your roots69
 Figuring out absolute value70

Chapter 5: A Question of Values: Evaluating Arithmetic Expressions71

The Three E's of Math: Equations, Expressions, and Evaluations71
 Equality for All: Equations72
 Hey, it's just an expression73
 Evaluating the situation73
 Putting the Three E's together74
 Introducing Order of Operations74
 Applying order of operationsto Big Four expressions75
 Using order of operations in expressions with exponents78
 Understanding order of precedence in expressions with parentheses79

Chapter 6: Say What? Turning Words into Numbers83

Dispelling Two Myths about Word Problems84
 Word problems aren't always hard84
 Word problems are useful84
 Solving Basic Word Problems85
 Turning word problems into word equations85
 Plugging in numbers for words88
 Solving More-Complex Word Problems90
 When numbers get serious90
 Too much information92
 Putting it all together93

Chapter 7: Divisibility97

Knowing the Divisibility Tricks97
 Counting everyone in: Numbers you can divide everything by97
 In the end: Looking at the final digits98
 Add it up: Checking divisibility by adding up digits99
 Identifying Prime and Composite Numbers102

Chapter 8: Fabulous Factors and Marvelous Multiples105

Knowing Six Ways to Say the Same Thing105
 Connecting Factors and Multiples106
 Fabulous Factors107
 Deciding when one number is a factor of another107
 Generating a number's factors108
 Prime factors109
 Finding the greatest common factor (GCF)114



Marvelous Multiples	116
Generating multiples	116
Finding the least common multiple (LCM)	116

***Part III: Parts of the Whole: Fractions, Decimals, and Percents*** **119**

Chapter 9: Fooling with Fractions **121**

Slicing a Cake into Fractions	122
Knowing the Fraction Facts of Life	123
Telling the numerator from the denominator	123
Flipping for reciprocals	124
Using ones and zeros	124
Mixing things up	125
Knowing proper from improper	125
Increasing and Reducing Terms of Fractions	126
Increasing the terms of fractions	126
Reducing fractions to lowest terms	127
Converting Between Improper Fractions and Mixed Numbers	129
Knowing the parts of a mixed number	130
Converting a mixed number to an improper fraction	130
Converting an improper fraction to a mixed number	131
Understanding Cross-multiplication	131

Chapter 10: Parting Ways: Fractions and the Big Four Operations **133**

Multiplying and Dividing Fractions	133
Multiplying numerators and denominators straight across	134
Doing a flip to divide fractions	136
All Together Now: Adding Fractions	136
Finding the sum of fractions with the same denominator	137
Adding fractions with different denominators	138
Take It Away: Subtracting Fractions	143
Subtracting fractions with the same denominator	144
Subtracting fractions with different denominators	144
Working Properly with Mixed Numbers	147
Multiplying and dividing mixed numbers	147
Adding and subtracting mixed numbers	148

Chapter 11: Dallying with Decimals **155**

Basic Decimal Stuff	156
Counting dollars and decimals	156
Place value of decimals	158
Knowing the decimal facts of life	159

Performing the Big Four with Decimals	164
Adding decimals	164
Subtracting decimals	166
Multiplying decimals	166
Dividing decimals	168
Converting between Decimals and Fractions	171
Making simple conversions	172
Changing decimals to fractions	172
Changing fractions to decimals	174

Chapter 12: Playing with Percents179

Making Sense of Percents	179
Dealing with Percents Greater than 100%	180
Converting to and from Percents, Decimals, and Fractions	181
Going from percents to decimals	181
Changing decimals into percents	181
Switching from percents to fractions	182
Turning fractions into percents	182
Solving Percent Problems	183
Figuring out simple percent problems	184
Turning the problem around	185
Deciphering more-difficult percent problems	186
Putting All the Percent Problems Together	187
Identifying the three types of percent problems	187
Introducing the percent circle	188

**Chapter 13: Word Problems with Fractions, Decimals,
and Percents193**

Adding and Subtracting Parts of the Whole in Word Problems	193
Sharing a pizza: Fractions	194
Buying by the pound: Decimals	194
Splitting the vote: Percents	195
Problems about Multiplying Fractions	196
Renegade grocery shopping: Buying less than they tell you to	196
Easy as pie: Working out what's left on your plate	197
Multiplying Decimals and Percents in Word Problems	198
To the end: Figuring out how much money is left	198
Finding out how much you started with	199
Handling Percent Increases and Decreases in Word Problems	201
Raking in the dough: Finding salary increases	202
Earning interest on top of interest	203
Getting a deal: Calculating discounts	204

***Part IV: Picturing and Measuring —
Graphs, Measures, Stats, and Sets*205**

**Chapter 14: A Perfect Ten: Condensing Numbers with
Scientific Notation207**

First Things First: Powers of Ten as Exponents	208
Counting up zeros and writing exponents	208
Adding exponents to multiply	210
Working with Scientific Notation	210
Writing in scientific notation	211
Why scientific notation works	212
Understanding order of magnitude	213
Multiplying with scientific notation	214

Chapter 15: How Much Have You Got? Weights and Measures217

Examining Differences between the English and Metric Systems	217
Looking at the English system	218
Looking at the metric system	220
Estimating and Converting between the English and Metric Systems	222
Estimating in the metric system	223
Converting units of measurement	225

Chapter 16: Picture This: Basic Geometry229

Getting on the Plane: Points, Lines, Angles, and Shapes	230
Making some points	230
Knowing your lines	230
Figuring the angles	231
Shaping things up	232
Closed Encounters: Shaping Up Your Understanding of 2-D Shapes	233
Circles	233
Polygons	234
Taking a Trip to Another Dimension: Solid Geometry	236
The many faces of polyhedrons	237
3-D shapes with curves	238
Measuring Shapes: Perimeter, Area, Surface Area, and Volume	239
2-D: Measuring on the flat	239
Spacing out: Measuring in three dimensions	246

Chapter 17: Seeing Is Believing: Graphing as a Visual Tool	251
Looking at Three Important Graph Styles	252
Bar graph	252
Pie chart	253
Line graph	254
Cartesian Coordinates	255
Plotting points on a Cartesian graph	256
Drawing lines on a Cartesian graph	257
Solving problems with a Cartesian graph	259
Chapter 18: Solving Geometry and Measurement	
Word Problems	261
The Chain Gang: Solving Measurement Problems with	
Conversion Chains	261
Setting up a short chain	262
Working with more links	263
Pulling equations out of the text	264
Rounding off: Going for the short answer	265
Solving Geometry Word Problems	267
Working from words and images	267
Breaking out those sketching skills	269
Together at Last: Putting Geometry and Measurements	
in One Problem	272
Chapter 19: Figuring Your Chances: Statistics and Probability . . .	275
Gathering Data Mathematically: Basic Statistics	275
Understanding differences between	
qualitative and quantitative data	276
Working with qualitative data	277
Working with quantitative data	279
Looking at Likelihoods: Basic Probability	282
Figuring the probability	283
Oh, the possibilities! Counting outcomes with multiple	
coins and dice	284
Chapter 20: Setting Things Up with Basic Set Theory	287
Understanding Sets	287
Elementary, my dear: Considering what's inside sets	288
Sets of numbers	291
Operations on Sets	291
Union: Combined elements	292
Intersection: Elements in common	292
Relative complement: Subtraction (sorta)	293
Complement: Feeling left out	293

Part V: The X-Files: Introduction to Algebra295**Chapter 21: Enter Mr. X: Algebra and Algebraic Expressions297**

X Marks the Spot	298
Expressing Yourself with Algebraic Expressions	298
Evaluating algebraic expressions	299
Coming to algebraic terms	301
Making the commute: Rearranging your terms	302
Identifying the coefficient and variable	304
Identifying similar terms	304
Considering algebraic terms and the Big Four	305
Simplifying Algebraic Expressions	309
Combining similar terms	309
Removing parentheses from an algebraic expression	310

Chapter 22: Unmasking Mr. X: Algebraic Equations315

Understanding Algebraic Equations	316
Using x in equations	316
Four ways to solve algebraic equations	317
The Balancing Act: Solving for X	318
Striking a balance	319
Using the balance scale to isolate x	320
Rearranging Equations and Isolating X	321
Rearranging terms on one side of an equation	321
Moving terms to the other side of the equal sign	322
Removing parentheses from equations	323
Cross-multiplication	326

Chapter 23: Putting Mr. X to Work: Algebra Word Problems329

Solving Algebra Word Problems in Five Steps	330
Declaring a variable	330
Setting up the equation	331
Solving the equation	332
Answering the question	332
Checking your work	333
Choosing Your Variable Wisely	333
Solving More-Complex Algebraic Problems	334
Charting four people	335
Crossing the finish line with five people	336

<i>Part VI: The Part of Tens</i>	339
Chapter 24: Ten Key Math Concepts You Shouldn't Ignore	341
Getting Set with Sets	341
Playing with Prime Numbers	342
Zero: Much Ado about Nothing	342
Going Greek: Pi (π)	343
On the Level: Equal Signs and Equations	343
On the Grid: The Cartesian Graph	344
In and Out: Relying on Functions	344
Exploring the Infinite	345
The Real Number Line	346
The Imaginary Number i	346
Chapter 25: Ten Important Number Sets You Should Know	347
Counting on Counting (Or Natural) Numbers	348
Identifying Integers	348
Knowing the Rationale behind Rational Numbers	349
Making Sense of Irrational Numbers	349
Absorbing Algebraic Numbers	350
Moving through Transcendental Numbers	351
Getting Grounded in Real Numbers	351
Trying to Imagine Imaginary Numbers	351
Grasping the Complexity of Complex Numbers	352
Going beyond the Infinite with Transfinite Numbers	353
<i>Index</i>	355

