

PRELUDE TO ALGEBRA

making algebra make sense

Annotated Table of Contents

Chapter 1 – Sums and Differences

- Lesson 1.1 Symbols and Sums
- Lesson 1.2 Inequalities
- Lesson 1.3 Differences
- Lesson 1.4 Differences and the Order of Operations
- Lesson 1.5 Properties of Sums
- Lesson 1.6 Invariant Principles for Sums and Differences
- Chapter 1 Review

Subtraction is defined in terms of addition.

This gives a helpful new tool for simplifying expressions and solving equations.

Chapter 2 – Increases and Decreases

- Lesson 2.1 Addition and Subtraction Operators
- Lesson 2.2 Composition of Two Increases or Two Decreases
- Lesson 2.3 Composition of an Increase and a Decrease
- Lesson 2.4 Inserting Parentheses
- Lesson 2.5 Removing Parentheses
- Lesson 2.6 Simplifying Increases and Decreases
- Chapter 2 Review

Operators and their interactions are introduced here.

Using operators clarifies these important skills.

Chapter 3 – Products and Quotients

- Lesson 3.1 Multiplication
- Lesson 3.2 Division
- Lesson 3.3 Rules of Divisibility
- Lesson 3.4 Order of Operations
- Lesson 3.5 Properties of Products and Quotients
- Lesson 3.6 Invariant Principles for Products and Quotients
- Chapter 3 Review

Division is defined in terms of multiplication.

This gives a helpful new tool for solving proportions and equations.

Chapter 4 – Expansions and Contractions

- Lesson 4.1 Composition of Two Expansions or Two Contractions
- Lesson 4.2 Composition of an Expansion and a Contraction
- Lesson 4.3 Building Compound Expressions
- Lesson 4.4 Canceling Operators
- Lesson 4.5 Simplifying Expressions
- Lesson 4.6 Operators Applied to Operators
- Lesson 4.7 Double Operators
- Chapter 4 Review

Understanding this is critical in solving equations (and completely omitted in the traditional curriculum).

Canceling is explained simply and correctly.

This clarifies operations with signed numbers.

Chapter 5 – Powers

- Lesson 5.1 Exponents
- Lesson 5.2 Exponents and the Order of Operations
- Lesson 5.3 Products and Quotients of Powers
- Lesson 5.4 Powers of Products and Quotients
- Lesson 5.5 Prime Factored Form
- Lesson 5.6 Factoring Composite Expressions
- Lesson 5.7 Common Factors and Common Multiples
- Lesson 5.8 Factoring with the GCF
- Chapter 5 Review

Our definition of exponents is simple and correct (unlike other books).

Factoring as used here begins to develop an important skill for algebra.

A chart is used to aid computation and clarify relationships.

Chapter 6 – Solving Equations

- Lesson 6.1 Equivalent Equations: Sums and Differences
- Lesson 6.2 Sums and Differences with Variables
- Lesson 6.3 Equivalent Equations: Products and Quotients
- Lesson 6.4 Mixed Equations
- Lesson 6.5 Using the Distributive Property
- Mid-Chapter 6 Review
- Lesson 6.6 Removing Increases and Decreases
- Lesson 6.7 Removing Expansions and Contractions
- Lesson 6.8 Reading Algebra
- Lesson 6.9 Writing Algebra
- Lesson 6.10 Modeling with Equations
- Chapter 6 Review

This explains an entirely new way of solving equations that is simple and powerful.

Using the operator point of view shortens the traditional way of solving equations.

The correct way of reading and writing algebraic expressions is explained.

Chapter 7 – Rational Numbers

- Lesson 7.1 Quotients and Fractions
- Lesson 7.2 Multiplying Fractions
- Lesson 7.3 Dividing Fractions
- Lesson 7.4 Ratios
- Lesson 7.5 Adding and Subtracting Fractions
- Lesson 7.6 Ordering Fractions and Solving Equations
- Lesson 7.7 Decimal Fractions
- Lesson 7.8 The Distance Formula and Dimensional Analysis
- Chapter 7 Review

Fractions are defined in a way that clarifies the computational procedures that follow.

We show why the computational rules work the way they do.

This gives a common-sense definition of decimals as fractions.

Chapter 8 – Proportion and Percent

- Lesson 8.1 Proportions
- Lesson 8.2 Modeling Proportions with Linear Scales
- Lesson 8.3 Fractions, Decimals and Percents
- Lesson 8.4 Percent Comparisons
- Lesson 8.5 Estimating with Percents
- Lesson 8.6 Percent Changes
- Lesson 8.7 A Linear Model for Percent Changes
- Lesson 8.8 Simple Interest
- Chapter 8 Review

Linear models are used to give a visual representation of proportions, percents, and percent changes.

Chapter 9 – Signed Numbers

- Lesson 9.1 Adding Signed Numbers
- Lesson 9.2 Subtracting Signed Numbers
- Lesson 9.3 Absolute Value
- Lesson 9.4 Multiplying and Dividing Signed Numbers
- Lesson 9.5 Negative Exponents
- Lesson 9.6 Scientific Notation
- Lesson 9.7 Arithmetic and Geometric Sequences
- Chapter 9 Review

Our earlier work with increases and decreases pays big dividends here.

Lessons 4.6 and 4.7 make this topic straightforward.

Our earlier definition of positive exponents has a natural extension to negative exponents in this lesson.

Chapter 10 – Real Numbers

- Lesson 10.1 Square roots
- Lesson 10.2 The Real Number system
- Lesson 10.3 Inequalities and Their Graphs
- Lesson 10.4 Solving Inequalities
- Lesson 10.5 The Pythagorean Theorem
- Lesson 10.6 Distance and Midpoint in the Plane
- Chapter 10 Review

We show why the “3-number” method of solving equations should not be used when solving inequalities.