



MATHLIBROS

2026

CALIFORNIA MATH

CALIFORNIA ALGEBRA I

ALGEBRA I

review + guided practice

Comprehensive Review, Guided Practice,
and Test Preparation

209 **PAGES**
OF PRACTICE
review • examples • exercises



REVIEW



GUIDED
PRACTICE



TEST PREP



CONFIDENCE



SKILL-BUILDING REVIEW

clear examples and guided practice
made for independent study



**ANSWER
SUPPORT**

practice with confidence

MATH SUCCESS SYSTEM

Practice • Review • Confidence
Test Prep • Skills • Mastery

Dr. Kam Berenji

www.mathlibros.com

California Algebra I

Comprehensive Review, Guided Practice, and Test Preparation

Dr. Kam Berenji

Copyright © 2025

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning, or otherwise, except as permitted under applicable copyright law, without the prior written permission of the author.

This book provides unofficial test prep products for a variety of tests and exams. It is not affiliated with or endorsed by any official organizations.

All inquiries should be addressed to: mathlibros@gmail.com

Dr. Kam Berenji

www.mathlibros.com



Contents

1	Fundamentals of Algebra	8
1.1	Algebraic Expressions	8
1.1.1	Understanding Variables and Constants	8
1.1.2	Simplifying Algebraic Expressions	9
1.1.3	Types of Algebraic Expressions	9
1.2	Basic Operations with Algebraic Expressions	11
1.2.1	Addition and Subtraction of Algebraic Expressions	11
1.2.2	Multiplication of Algebraic Expressions	12
1.2.3	Division of Algebraic Expressions	13
1.3	Evaluating Expressions	16
1.3.1	Substitution Method	17
1.3.2	Order of Operations	17
1.3.3	Common Mistakes	18
1.4	Real-life Applications	21
1.4.1	Using Algebra in Everyday Situations	21
1.4.2	How Algebra Solves Problems	22
1.4.3	Introduction to Algebra in Business	22
2	Equations and Inequalities	24
2.1	Understanding Equations	24
2.1.1	Definition and Types of Equations	24
2.1.2	Linear Equations in One Variable	24
2.1.3	Solving Linear Equations	25
2.2	Solving Inequalities	29
2.2.1	Basics of Inequalities	29
2.2.2	Graphical Representation	30
2.2.3	Compound Inequalities	30

2.3	Quadratic Equations	35
2.3.1	Introduction to Quadratic Equations	36
2.3.2	Methods of Solving Quadratic Equations	36
2.3.3	Applications in Real Life	38
2.4	Systems of Equations	40
2.4.1	Graphical Method	40
2.4.2	Substitution Method	41
2.4.3	Elimination Method	41
2.4.4	Applications in Real-world Problems	42
3	Functions and Graphs	47
3.1	Understanding Functions	47
3.1.1	Definition of a Function	47
3.1.2	Domain and Range	47
3.1.3	Types of Functions	48
3.2	Graphing Linear Functions	52
3.2.1	Introduction to Coordinate Plane	52
3.2.2	Slope and Intercept	52
3.2.3	Graphical Representation	53
3.3	Transformations of Functions	59
3.3.1	Translation, Scaling, and Reflection	59
3.3.2	Reflection	60
3.3.3	Combining Functions	60
3.3.4	Inverse Functions	61
4	Polynomials	66
4.1	Introduction to Polynomials	66
4.1.1	Definition and Terminology	66
4.1.2	Degree of Polynomials	66
4.1.3	Zeros of a Polynomial	67
4.2	Operations on Polynomials	69
4.2.1	Addition and Subtraction of Polynomials	69
4.2.2	Multiplication of Polynomials	70
4.2.3	Division of Polynomials	70
4.3	Graphing Polynomial Functions	75
4.3.1	Long Division and Synthetic Division	75
4.3.2	Zeros and Factors	76
4.3.3	Graphs and End Behavior	76
4.4	Applications of Polynomials	79
4.4.1	Modeling Real-world Situations	79
4.4.2	Polynomial Functions in Industry	80
4.4.3	Predictive Modeling with Polynomials	80

5	Rational Expressions and Functions	84
5.1	Introduction to Rational Expressions	84
5.1.1	Defining Rational Expressions	84
5.1.2	Simplifying Rational Expressions	84
5.1.3	Arithmetic with Rational Expressions	85
5.2	Complex Rational Expressions	90
5.2.1	Combining Rational Expressions	90
5.2.2	Complex Fractions	91
5.2.3	Applications in Problem Solving	92
6	Radicals and Rational Exponents	96
6.1	Understanding Radicals	96
6.1.1	Square Roots and Higher Roots	96
6.1.2	Simplifying Radicals	97
6.1.3	Operations with Radical Expressions	98
6.2	Rational Exponents	100
6.2.1	Converting Between Radicals and Exponents	100
6.2.2	Properties of Rational Exponents	100
6.2.3	Solving Equations with Rational Exponents	101
6.3	Radical Equations and Functions	101
6.3.1	Solving Radical Equations	102
6.3.2	Graphing Radical Functions	103
6.3.3	Applications of Radical Functions	103
6.4	Applications of Radicals	106
6.4.1	Pythagorean Theorem	106
6.4.2	Engineering and Science Problems	106
6.4.3	Data Modeling with Radicals	107
7	Sequences and Series	111
7.1	Introduction to Sequences	111
7.1.1	Arithmetic Sequences	111
7.1.2	Geometric Sequences	112
7.1.3	Properties and Applications	113
7.2	Series and Summations	115
7.2.1	Sum of Arithmetic Series	115
7.2.2	Sum of Geometric Series	116
7.2.3	Infinite Series	117
7.2.4	Concluding Remarks	117
7.3	Introduction to Mathematical Induction	121
7.3.1	Principles of Induction	121
7.3.2	Proving Formulas	121
7.3.3	Applications of Inductive Reasoning	122
7.4	Applications in Real Life	122
7.4.1	Sequences in Nature	122
7.4.2	Financial Calculations	123
7.4.3	Predictive Models Using Sequences	124

1.1.2 Simplifying Algebraic Expressions

The process of simplifying algebraic expressions involves combining like terms and using the distributive property where necessary.

Definition 1.3 **Like terms** are terms whose variables (and their exponents) are the same. Only the coefficients of these terms can differ.

For instance, in the expression $3x + 4x^2 + 5x$, the terms $3x$ and $5x$ are like terms.

- **Example 1.2** Simplify the expression $5x + 3 + 4x - 2$.

Solution: Combine the like terms:

$$(5x + 4x) + (3 - 2) = 9x + 1$$

The simplified expression is $9x + 1$.

Another important tool in simplifying expressions is the distributive property.

Definition 1.4 The **distributive property** states that $a(b + c) = ab + ac$.

- **Example 1.3** Simplify the expression $2(x + 3) + 4(x - 1)$.

Solution: Apply the distributive property:

$$2(x + 3) = 2x + 6$$

$$4(x - 1) = 4x - 4$$

Combine all the terms:

$$2x + 6 + 4x - 4 = (2x + 4x) + (6 - 4) = 6x + 2$$

The simplified expression is $6x + 2$.

1.1.3 Types of Algebraic Expressions

Algebraic expressions can be classified based on the number of terms they contain:

- **Monomial:** An expression with a single term, for example, $7x$.
- **Binomial:** An expression with two terms, for example, $3x + 2$.
- **Trinomial:** An expression with three terms, for example, $x^2 + 3x + 4$.
- **Polynomial:** An expression with more than one term, which may include monomials, binomials, and trinomials.

Exercise 1.6

1. Calculate the product and simplify:

$$(x+5)(x-5)$$

Explain why this produces a difference of squares.

2. Simplify the division of the following expressions:

$$\frac{x^3 + 3x^2 - x + 2}{x - 1}$$

Using synthetic division.

3. Understand and apply the distributive property by expanding:

$$(2x+3)(x^2-x+6)$$

4. Writing an algebraic expression: A number is tripled and then decreased by 7. Translate this into an algebraic expression.

Answers with Explanations**Solution:**

1. For the expression $3x^2 - 2x + 4 + (2x^2 + x - 5)$, combine like terms:

$$\begin{aligned}(3x^2 + 2x^2) + (-2x + x) + (4 - 5) \\ = 5x^2 - x - 1.\end{aligned}$$

2. For $(4x - 3) + (2x^2 + x)$:

$$2x^2 + 4x + x - 3 = 2x^2 + 5x - 3.$$

3. For multistep operation:

- a. Addition:

$$\begin{aligned}(5a^2 + 3a - 1) + (3a^2 - a + 4) \\ = (5a^2 + 3a^2) + (3a - a) + (-1 + 4) \\ = 8a^2 + 2a + 3.\end{aligned}$$

- b. Subtraction:

$$\begin{aligned}(2a^2 + 3) - (a^2 - 4a + 5) \\ = 2a^2 - a^2 + 4a + 3 - 5 \\ = a^2 + 4a - 2.\end{aligned}$$

- c. Combining (i) and (ii):

$$8a^2 + 2a + 3 + a^2 + 4a - 2 = 9a^2 + 6a + 1.$$

■ **Example 2.1** Solve the equation $5x - 7 = 3$.

Solution:

To solve $5x - 7 = 3$, we begin by isolating x on one side of the equation.

$$\begin{aligned}5x - 7 &= 3 \\5x &= 3 + 7 \\5x &= 10 \\x &= \frac{10}{5} \\x &= 2\end{aligned}$$

Thus, the solution is $x = 2$.

2.1.3 Solving Linear Equations

To solve linear equations, one can use various algebraic techniques to simplify the equation and isolate the variable. Key steps involve:

1. **Simplifying Both Sides:** Use operations such as addition, subtraction, multiplication, or division to simplify each side.
2. **Isolating the Variable:** Rearrange the equation such that the variable appears on one side.
3. **Elimination of Fractions:** Multiply all terms by the least common denominator if the equation involves fractions.
4. **Verification:** Substitute the solution back into the original equation to verify correctness.

■ **Example 2.2** Solve the equation $\frac{2x}{3} + 4 = 10$.

Solution:

First, clear the fraction by multiplying every term by 3.

$$\begin{aligned}3\left(\frac{2x}{3} + 4\right) &= 3 \times 10 \\2x + 12 &= 30\end{aligned}$$

Next, isolate x .

$$\begin{aligned}2x &= 30 - 12 \\2x &= 18 \\x &= \frac{18}{2} \\x &= 9\end{aligned}$$