MAINE



ALGEBRA I

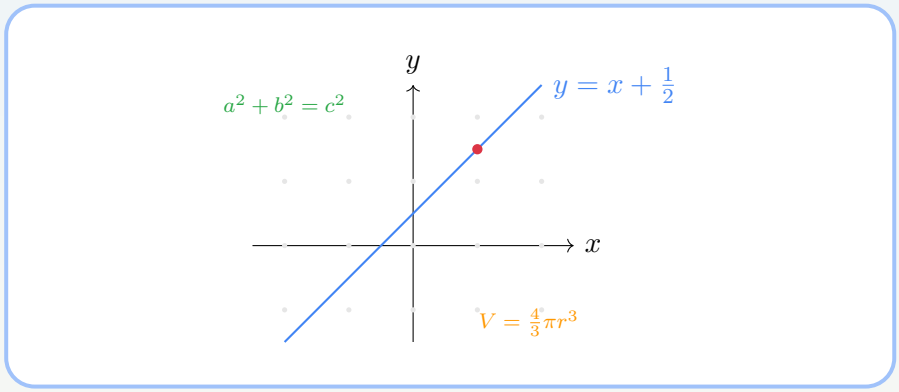
MADE RIDICULOUSLY SIMPLE

★ THE ULTIMATE STUDY GUIDE TO ACE ALGEBRA I ★

Maine Algebra I

Made Ridiculously Simple

Comprehensive Practice, Challenging Exercises, and Strategic Guidance for Complete Test-Day Confidence



Reza Nazari

Copyrighted Material



Effortless Math Education Inc

Published by Effortless Math Education
www.effortlessmath.com

All rights reserved. No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the author, except in the case of brief quotations embodied in critical reviews and certain other noncommercial uses permitted by copyright law, including Section 107 or 108 of the 1976 United States Copyright Act.

This publication is independently produced and has no official connection to any state, district, or national testing program.

Test names and organizational names used herein are the property of their respective trademark holders.



Copyright © 2026

Copyrighted Material

HSA.REI.A.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify or refute a solution method.
HSA.REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
HSA.REI.B.4a	Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.
HSA.REI.C.5	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
HSA.REI.C.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
HSA.REI.C.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the point(s) of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.
HSA.REI.D.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). Show that any point on the graph of an equation in two variables is a solution to the equation.
HSA.REI.D.11	Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
HSA.REI.D.12	Graph the solutions of a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set of a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
HSA.SSE.B.3a	Rewrite a quadratic expression (such as by factoring) to reveal the zeros of the function it defines.
HSA.SSE.B.3b	Rewrite a quadratic expression (such as by completing the square) to reveal the maximum or minimum value of the function it defines.
HSF.BF.A.1	Write a function that describes a relationship between two quantities.

HSF.BF.A.2	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
HSF.BF.A.1a	Determine an explicit expression, a recursive process, or steps for calculation from a context.
HSF.BF.B.3	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate 20 an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
HSF.BF.B.4a	Solve an equation of the form f(x) = c (where c represents the output value of the function) for a simple function f that has an inverse and write an expression for the inverse. For example, if f(x) =2 x^3, then solving f(x) = c leads to x = (c/2)1/3, which is the general formula for finding an input from a specific output, c, for this function.
HSF.IF.A.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).
HSF.IF.A.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
HSF.IF.A.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.
HSF.IF.B.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features may include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative and absolute maximums and minimums; symmetries; end behavior; and periodicity.
HSF.IF.B.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.
HSF.IF.B.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

HSF.IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.
HSF.IF.C.7a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
HSF.IF.C.8a	Use the process of factoring and completing the square in a quadratic function to show zeros, maximum and minimum values, and symmetry of the graph, and interpret these in terms of a context.
HSF.LE.A.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table.
HSF.LE.A.3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.
HSF.LE.A.1a	Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
HSF.LE.A.1b	Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
HSF.LE.A.1c	Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
HSF.LE.B.5	Interpret the parameters in a linear or exponential function in terms of a context.
HSN.Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data 5 displays. Example: Marlena made a scale drawing of the sand volleyball court at her summer camp. The drawing of the volleyball court is 6 cm long by 3 cm wide. The actual volleyball court is 18 meters long. What scale did Marlena use for the drawing?
HSN.RN.A.1	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define $51/3$ to be the cube root of 5 because we want $(51/3)^3 = 5(1/3)3$ to hold, so $(51/3)^3$ must equal 5.
HSN.RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.

Scan Me

14. Marcus earns d dollars per hour and works h hours per week. His weekly pay after a \$15 deduction for parking is $dh - 15$. Calculate his weekly pay when $d = 12$ and $h = 20$.

_____

1.3 Simplifying Algebraic Expressions

9-12.AR.A.1

Simplifying is all about making expressions shorter and easier to work with. In this section you will use the distributive property to remove parentheses, then combine like terms — terms that have the same variable raised to the same power — to write a simpler, equivalent expression. These skills are the foundation for nearly every algebra problem you will see from here on.

Key Concepts & Quick Review

Like Terms: Terms that have the *same* variable(s) raised to the *same* power. For example, $5x$ and $-3x$ are like terms; $5x$ and $5x^2$ are **not**. To combine like terms, add or subtract their coefficients: $5x + (-3x) = 2x$.

Distributive Property: $a(b + c) = ab + ac$. Use it to remove parentheses, then combine any like terms.

Simplification Strategy: **Step 1** — Distribute to clear all parentheses. **Step 2** — Group like terms together. **Step 3** — Combine the coefficients.

Examples

① Simplify $3(2x + 4) - 5x + 7$.

Distribute the 3: $6x + 12 - 5x + 7$. Combine the x-terms: $6x - 5x = x$. Combine the constants: $12 + 7 = 19$. The simplified expression is $x + 19$.

Answer: $x + 19$

② Simplify $-2(3a - 1) + 4(a + 5)$.

Distribute -2: $-6a + 2$. Distribute 4: $4a + 20$. Put them together: $-6a + 2 + 4a + 20$. Combine a-terms: $-6a + 4a = -2a$. Combine constants: $2 + 20 = 22$. Result: $-2a + 22$.

Answer: $-2a + 22$

Scan Me

Practice Problems

Simplify each expression. Write your answer on the line.

1. $5x + 3x =$ _____

2. $7a - 2a + 4 =$ _____

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

4. $-3(2y - 5) =$ _____

5. $4m + 3 - 2m + 1 =$ _____

6. $6(n + 2) - 4n =$ _____

7. $3(x - 4) + 2(x + 1) =$ _____

8. $-5(2p + 3) + 8p =$ _____

9. $7 - 3(k - 2) =$ _____

10. $2(a + b) + 3(a - b) =$ _____

11. $\frac{1}{2}(4x + 8) =$ _____

12. $-4(x - 3) + 4x =$ _____

Study Tips

- Always distribute **before** you combine like terms. Skipping the distributive step is the most common mistake.
- Watch the sign in front of each term carefully. $-2(3a - 1)$ gives $-6a+2$, not $-6a - 2$.
- After simplifying, check your work by plugging in a simple number (like $x = 1$) into both the original and simplified expressions—they should give the same result.

Word Problems

13. A rectangular garden has a length of $(3x + 2)$ feet and a width of $(x + 4)$ feet. Write and simplify an expression for the perimeter. _____

14. Mia buys 3 notebooks at $(n + 1)$ dollars each and 2 pens at $(n - 2)$ dollars each. Write and simplify an expression for her total cost. _____

1.4 Introduction to Equations and Solutions

HSA.REI.A.1 HSA.REI.B.3

An equation is a mathematical sentence that says two expressions are equal, and your job is to find the value that makes it true. In this section you will learn what it means for a number to be a solution of an equation, how to check a solution by plugging it back in, and how to translate everyday word problems into algebraic equations. This is where algebra starts to feel like detective work — you are finding the unknown!

Key Concepts & Quick Review

What Is an Equation? An **equation** is a mathematical sentence that uses an equals sign (=) to show that two expressions have the same value. For example, $2x + 3 = 11$ says "two times some number plus three equals eleven."

Solution of an Equation: A value that makes the equation **true** when substituted for the variable. To check, replace the variable with the value and simplify both sides. If both sides are equal, the value is a solution.

Equivalent Equations: Two equations are **equivalent** when they have exactly the same solution(s). You can produce an equivalent equation by adding or subtracting the same number on both sides, or by multiplying or dividing both sides by the same nonzero number. For example, $x + 3 = 10$ and $x = 7$ are equivalent — both are true only when $x = 7$.

Translating Words to Equations: Key phrases signal operations: "sum" or "more than" $\rightarrow +$, "difference" or "less than" $\rightarrow -$, "product" or "times" $\rightarrow \times$, "quotient" or "divided by" $\rightarrow \div$, "is" or "equals" $\rightarrow =$.

Examples

① Is $x = 5$ a solution of $3x - 7 = 8$?

Substitute 5 for x: $3(5) - 7 = 15 - 7 = 8$. The left side equals the right side ($8 = 8$), so $x = 5$ **is** a solution.

Answer: *Yes*

② Translate into an equation and check if $n = 4$: "Six more than twice a number is 14."

Scan Me