MISSOURI



ALGEBRA I

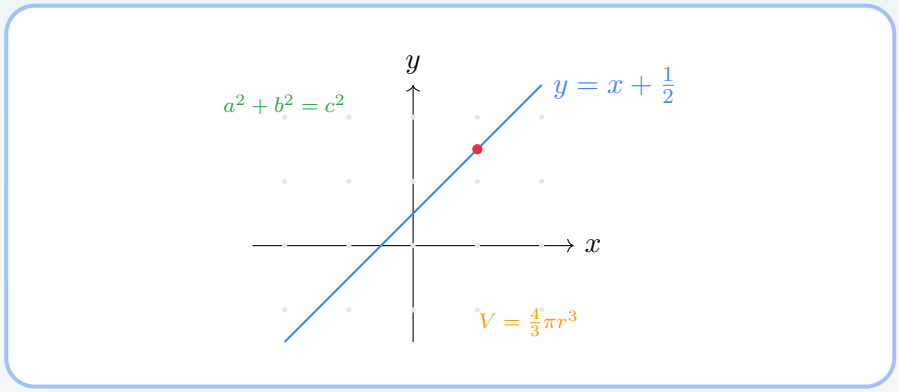
MADE RIDICULOUSLY SIMPLE

THE ULTIMATE STUDY GUIDE TO ACE ALGEBRA I

Missouri Algebra I

Made Ridiculously Simple

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



Reza Nazari

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A1.DS.A.6	Interpret the slope (rate of change) and the y-intercept (constant term) of a linear model in the context of the data.
A1.DS.A.7	Determine and interpret the correlation coefficient for a linear association.
A1.DS.A.8	Distinguish between correlation and causation.
A1.DS.A.4.a	Interpret relative frequencies in the context of the data.
A1.DS.A.4.b	Recognize possible associations and trends in the data.
A1.DS.A.5.a	Construct a linear function to model bivariate data represented on a scatter plot that minimizes residuals.
A1.IF.B	Interpret linear, quadratic and exponential functions in terms of the context.
A1.IF.A.1	Understand that a function from one set (domain) to another set (range) assigns to each element of the domain exactly one element of the range.
A1.IF.A.2	Use function notation to evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
A1.IF.A.1.a	Represent a function using function notation.
A1.IF.B.3	Using tables, graphs and verbal descriptions, interpret key characteristics of a function that models the relationship between two quantities.
A1.IF.B.4	Relate the domain and range of a function to its graph and, where applicable, to the quantitative relationship it describes.
A1.IF.B.5	Determine the average rate of change of a function over a specified interval and interpret the meaning.
A1.IF.B.6	Interpret the parameters of a linear or exponential function in terms of the context.
A1.IF.C.8	Translate between different but equivalent forms of a function to reveal and explain properties of the function and interpret these in terms of a context.
A1.IF.C.9	Compare the properties of two functions given different representations.
A1.LQE.A.2	Describe, using graphs and tables, that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.
A1.LQE.A.3	Construct linear, quadratic and exponential equations given graphs, verbal descriptions or tables.
A1.LQE.A.1.a	Determine that linear functions change by equal differences over equal intervals.

A1.LQE.A.1.b	Recognize exponential situations in which a quantity grows or decays by a constant percent rate per unit interval.
A1.LQE.B.4	Write arithmetic and geometric sequences in recursive and explicit forms, and use them to model situations and translate between the two forms.
A1.LQE.B.5	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the set of integers.
A1.NQ.A.1	Explain how the meaning of rational exponents extends from the properties of integer exponents.
A1.NQ.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents. Limit to rational exponents with a numerator of 1.
A1.NQ.B.4	Define and use appropriate quantities for representing a given context or problem.
A1.NQ.B.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
A1.NQ.B.3.d	Choose and interpret the scale and the origin in graphs and data displays.
A1.REI.A.2.b	Derive the quadratic formula.
A1.REI.B.3	Solve a system of linear equations algebraically and/or graphically.
A1.REI.B.4	Solve a system consisting of a linear equation and a quadratic equation algebraically and/or graphically.
A1.REI.C.6	Explain that the graph of an equation in two variables is the set of all its solutions plotted in the Cartesian coordinate plane.
A1.REI.C.7	Graph the solution to a linear inequality in two variables.
A1.REI.C.8	Solve problems involving a system of linear inequalities.
A1.SSE.A.2	Analyze the structure of polynomials to create equivalent expressions or equations.
A1.SSE.A.3.b	Find the maximum or minimum value of a quadratic function by completing the square.

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1.4 Introduction to Equations and Solutions

A1.CED.A.1

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."

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"Twice a number" is $2n$; "six more than" means $+6$; "is" means $=$. Equation: $2n + 6 = 14$. Substitute $n = 4$: $2(4) + 6 = 8 + 6 = 14$. ✓Since $14 = 14$, the value $n = 4$ is a solution.

Answer: *$2n + 6 = 14$; Yes, $n = 4$ is a solution*

Practice Problems

Determine whether the given value is a solution (Yes/No), or translate the sentence into an equation. Write your answer on the line.

1. $x + 9 = 14;\ x = 5$? _____

2. $2x - 3 = 7;\ x = 5$? _____

3. $4a + 1 = 17;\ a = 3$? _____

4. $5n - 10 = 0;\ n = 2$? _____

5. $\frac{x}{3} = 6;\ x = 18$? _____

6. $3(y - 2) = 12;\ y = 6$? _____

7. "A number plus 8 is 15" → _____

8. "Three times a number is 21" → _____

9. "A number minus 4 equals 10" → _____

10. $7 - x = 3;\ x = 4$? _____

11. $2(x + 3) = 14;\ x = 4$? _____

12. "Half a number is 9" → _____

Study Tips

- To check a solution, always **substitute** the value back into the original equation and simplify both sides.
- When translating words, underline the key phrase that tells you the operation, and circle the word that means "=."
- An equation can have one solution, no solution, or many solutions. At this stage, focus on deciding whether a specific value works.

Word Problems

13. A gym membership costs a one-time sign-up fee of \$25 plus \$10 per month. After m months, the total cost is $10m + 25$. Carlos has paid \$75 so far. Write an equation and determine the number of months. _____

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14. Priya says that $x = 3$ is a solution of $2x + 4 = 12$. Check whether $x = 3$ makes the equation true.

1.5 Personal Financial Literacy

A1.NQ.B.3.d | A1.NQ.B.4 | A1.NQ.B.5

Algebra is not just for the classroom — it helps you make smart money decisions in real life. In this section you will learn how to calculate simple and compound interest, compare savings and loan options, and solve problems involving tax, commission, markup, and discount. You will also see how compounding works over time and why even small interest rates can make a big difference.

Key Concepts & Quick Review

Simple Interest: $I = Prt$, where P is the principal (starting amount), r is the annual interest rate (as a decimal), and t is the time in years. Total amount after t years: $A = P + Prt = P(1 + rt)$.

Compound Interest: $A = P\left(1 + \frac{r}{n}\right)^{nt}$, where n is the number of times interest is compounded per year. When compounded annually, $n = 1$.

Percent Applications: Discount: Sale Price = Original − Original × discount rate. Tax: Total = Price + Price × tax rate. Commission: Earnings = sales × commission rate.

Examples

① You deposit \$500 in an account that earns 4% simple interest per year. How much interest do you earn in 3 years? What is the total amount?

Use $I = Prt$: $I = 500 \times 0.04 \times 3 = 60$. Total amount $A = 500 + 60 = 560$.

Answer: *Interest* = \$60; *Total* = \$560

② You invest \$1,000 at 5% interest compounded annually. What is the balance after 2 years?

Use $A = P(1 + r)^t$ with $P = 1000$, $r = 0.05$, $t = 2$: $A = 1000(1.05)^2 = 1000(1.1025) = 1102.50$.

Answer: \$1,102.50

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