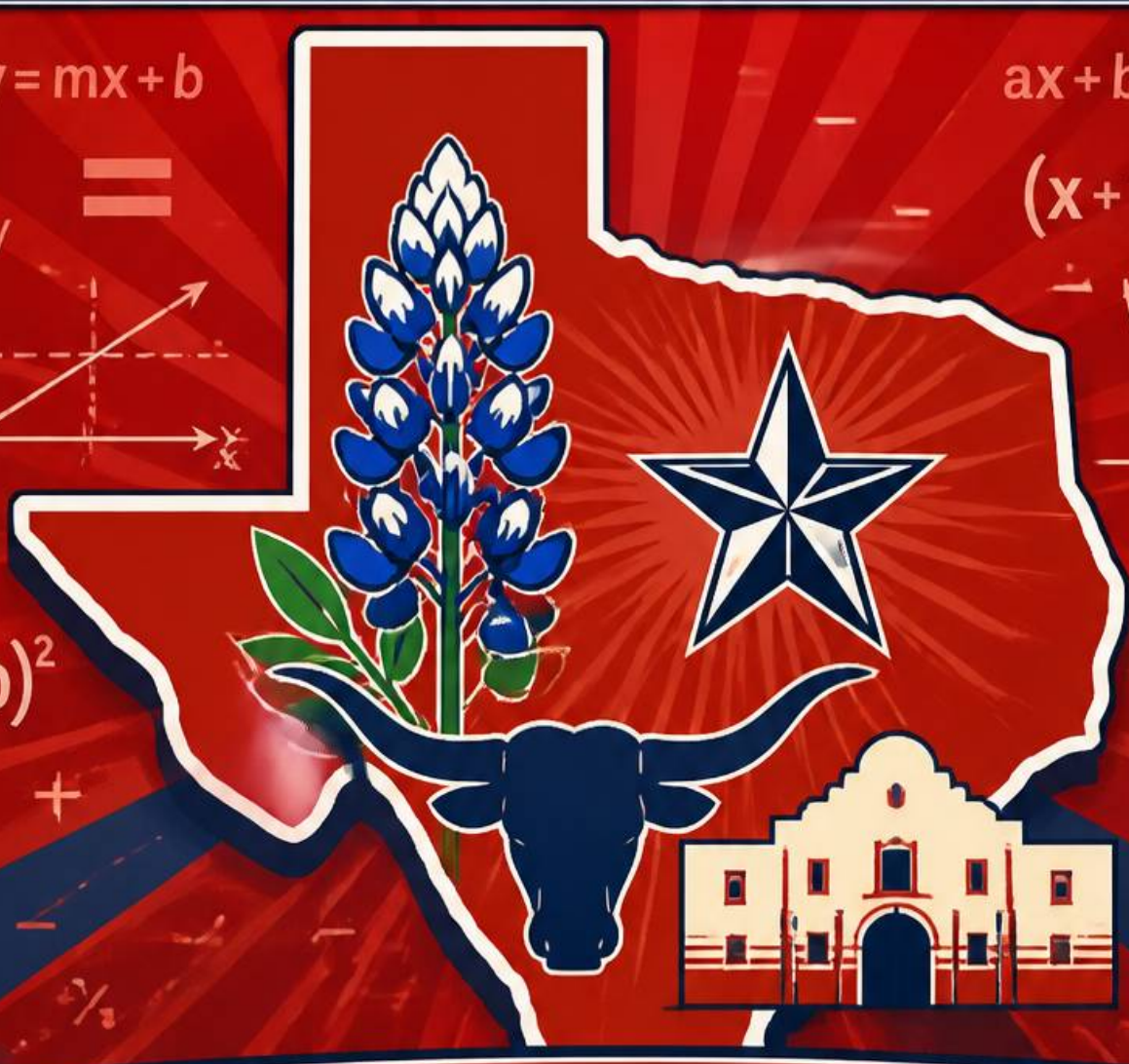
★ TEXAS STAAR ★



ALGEBRA I

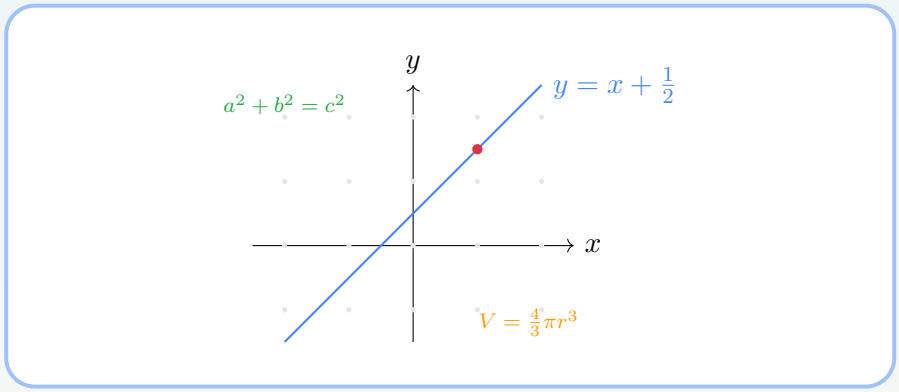
MADE RIDICULOUSLY SIMPLE

★ THE ULTIMATE STUDY GUIDE TO ACE ALGEBRA I ★

Texas STAAR Algebra I

Made Ridiculously Simple

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



Reza Nazari

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A1.2(D)	write and solve equations involving direct variation;
A1.2(E)	write the equation of a line that contains a given point and is parallel to a given line;
A1.2(F)	write the equation of a line that contains a given point and is perpendicular to a given line;
A1.2(G)	write an equation of a line that is parallel or perpendicular to the X or Y axis and determine whether the slope of the line is zero or undefined;
A1.2(I)	write systems of two linear equations given a table of values, a graph, and a verbal description.
A1.3(C)	graph linear functions on the coordinate plane and identify key features, including x-intercept, y-intercept, zeros, and slope, in mathematical and real-world problems;
A1.3(E)	determine the effects on the graph of the parent function $f(x) = x$ when $f(x)$ is replaced by $af(x)$, $f(x) + d$, $f(x - c)$, $f(bx)$ for specific values of a, b, c, and d;
A1.3(F)	graph systems of two linear equations in two variables on the coordinate plane and determine the solutions if they exist;
A1.3(H)	graph the solution set of systems of two linear inequalities in two variables on the coordinate plane.
A1.4(A)	calculate, using technology, the correlation coefficient between two quantitative variables and interpret this quantity as a measure of the strength of the linear association;
A1.4(B)	compare and contrast association and causation in real-world problems; and
A1.4(C)	write, with and without technology, linear functions that provide a reasonable fit to data to estimate solutions and make predictions for real-world problems.
A1.5(A)	solve linear equations in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides;
A1.5(B)	solve linear inequalities in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides; and
A1.5(C)	solve systems of two linear equations with two variables for mathematical and real-world problems.
A1.6(A)	determine the domain and range of quadratic functions and represent the domain and range using inequalities;

A1.6(B)	write equations of quadratic functions given the vertex and another point on the graph, write the equation in vertex form ($f(x) = a(x - h)^2 + k$), and rewrite the equation from vertex form to standard form ($f(x) = ax^2 + bx + c$); and
A1.7(A)	graph quadratic functions on the coordinate plane and use the graph to identify key attributes, if possible, including x-intercept, y-intercept, zeros, maximum value, minimum values, vertex, and the equation of the axis of symmetry;
A1.7(B)	describe the relationship between the linear factors of quadratic expressions and the zeros of their associated quadratic functions; and
A1.7(C)	determine the effects on the graph of the parent function $f(x) = x^2$ when $f(x)$ is replaced by $af(x)$, $f(x) + d$, $f(x - c)$, $f(bx)$ for specific values of a, b, c, and d.
A1.8(A)	solve quadratic equations having real solutions by factoring, taking square roots, completing the square, and applying the quadratic formula; and
A1.8(B)	write, using technology, quadratic functions that provide a reasonable fit to data to estimate solutions and make predictions for real-world problems.
A1.9(A)	determine the domain and range of exponential functions of the form $f(x) = ab$ to the x power and represent the domain and range using inequalities;
A1.9(B)	interpret the meaning of the values of a and b in exponential functions of the form $f(x) = ab$ to the x power in real-world problems;
A1.9(C)	write exponential functions in the form $f(x) = ab$ to the x power (where b is a rational number) to describe problems arising from mathematical and real-world situations, including growth and decay;
A1.9(D)	graph exponential functions that model growth and decay and identify key features, including y-intercept and asymptote, in mathematical and real-world problems; and
A1.10(A)	add and subtract polynomials of degree one and degree two;
A1.10(B)	multiply polynomials of degree one and degree two;
A1.10(D)	rewrite polynomial expressions of degree one and degree two in equivalent forms using the distributive property;
A1.10(E)	factor, if possible, trinomials with real factors in the form $ax^2 + bx + c$, including perfect square trinomials of degree two; and
A1.10(F)	decide if a binomial can be written as the difference of two squares and, if possible, use the structure of a difference of two squares to rewrite the binomial.
A1.11(B)	simplify numeric and algebraic expressions using the laws of exponents, including integral and rational exponents.

A1.12(A) decide whether relations represented verbally, tabularly, graphically, and symbolically define a function;

A1.12(B) evaluate functions, expressed in function notation, given one or more elements in their domains;

A1.12(E) solve mathematic and scientific formulas, and other literal equations, for a specified variable.

✎ 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. _____

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1.4 Introduction to Equations and Solutions

A1.5(A) A1.5(B)

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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