TENNESSEE TCAP



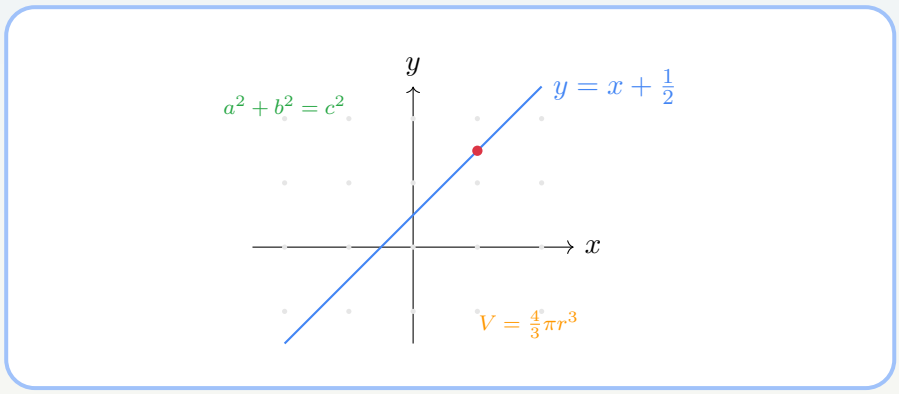
ALGEBRA I
MADE RIDICULOUSLY SIMPLE

THE ULTIMATE STUDY GUIDE TO ACE ALGEBRA I

Tennessee TCAP Algebra I

Made Ridiculously Simple

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



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A1.A.REI.B.2.b	Solve absolute value equations and inequalities in one variable. Represent solutions algebraically and graphically.
A1.A.REI.B.3.a	Solve quadratic equations by inspection (e.g., for x2 = 49), taking square roots, knowing and applying the quadratic formula, and factoring, as appropriate to the initial form of the equation. Recognize when a quadratic equation has solutions that are not real numbers.
A1.A.REI.C.4	Write and solve a system of linear equations in real-world context.
A1.A.REI.D.5	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).
A1.A.REI.D.6	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 approximate solutions by graphing the functions or making a table of values, using technology when appropriate.
A1.A.REI.D.7	Graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
A1.A.SSE.A	Interpret the structure of expressions.
A1.A.SSE.A.1.a	Interpret parts of an expression, such as terms, factors, and coefficients.
A1.A.SSE.A.1.b	Interpret complicated expressions by viewing one or more of their parts as a single entity.
A1.F.BF.A.1.a	Determine steps for calculation, a recursive process, or an explicit expression from a context.
A1.F.BF.B.2	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 graphs.
A1.F.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).
A1.F.IF.A.3	Understand geometric formulas as functions.
A1.F.IF.A.2.a	Use function notation to evaluate functions for inputs in their domains, including functions of two variables.

A1.F.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.
A1.F.IF.B.5	Relate the domain of a function to its graph and, where applicable, to the context of the function it models.
A1.F.IF.B.6	Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate and interpret the rate of change from a graph.
A1.F.IF.C.9	Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions.
A1.F.IF.C.8.a	Rewrite quadratic functions to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a real-world context.
A1.F.IF.C.9.b	Compare properties of the same function on two different intervals or represented in two different ways.
A1.F.LE.A.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a table, a description of a relationship, or input-output pairs.
A1.F.LE.A.1.a	Know that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.
A1.F.LE.A.1.b	Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
A1.F.LE.A.1.c	Recognize situations in which a quantity grows or decays by a constant factor per unit interval relative to another.
A1.F.LE.B.3	Interpret the parameters in a linear or exponential function in terms of a context.
A1.N.Q.A.1.a	Choose and interpret the scale and the origin in graphs and data displays.
A1.N.Q.A.1.c	Define and justify appropriate quantities within a context for the purpose of modeling.
A1.N.Q.A.1.d	Choose an appropriate level of accuracy when reporting quantities.
A1.S.ID.A.2	Use statistics appropriate to the shape of the data distribution to compare center (mean, median, and/or mode) and spread (range, interquartile range) of two or more different data sets.
A1.S.ID.A.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points.

A1.S.ID.C.5	Interpret the rate of change and the constant term of a linear model in the context of data.
A1.S.ID.C.6	Use technology to compute the correlation coefficient of a linear model; interpret the correlation coefficient in the context of the data.
A1.S.ID.C.7	Explain the differences between correlation and causation. Recognize situations where an additional factor may be affecting correlated data.

✎ 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.A.REI.A.1 | A1.A.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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