Solve a Linear System and Check Both Equations

Prepare and keep the stages separate

Learning target

Solve a unique-solution pair of linear equations by substitution and verify the ordered pair in both equations.

Intended audience and limits

US Grade 9. Grade placement has not been validated. Check the prerequisites and your local curriculum; this sequence is not a complete course.

Before starting

Interpret ordered pairs, substitute into an expression, use signed-number arithmetic and the distributive property, and solve a one-variable linear equation. This is a bounded first-algebra sequence, not a complete systems course.

Preparation and sequence

Prepare the chosen student files and ordinary paper and pencil. Give readiness first, then model and guided practice. Reserve the independent file until after teaching. Clarify access before selecting a response route. Use the later file after another learning opportunity, without showing its tasks during the teaching or response lesson.

No time estimate is available. Plan the selected activities from the teacher guide and learner responses.

Evidence and access

Look for replacement by the complete equal expression, valid one-variable steps, both coordinates recovered and two original-equation checks for the same pair.

Read the two equations aloud without changing them; allow written, typed or spoken algebra with a scribe who records the learner’s own steps. Provide more spacing or enlarged HTML. Clarify coordinate order, arithmetic and notation separately; do not supply a substitution step during the independent check.

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Choose a response from observed work

Read the selected guided or independent response with the learner. Clarify access, task wording, notation and prerequisite knowledge first. These are conditional teaching options, not learner diagnoses or validated scoring cutoffs.

Verify both equations for the same pair

If observed: The learner accepts an ordered pair after checking just one equation, once ordered-pair notation and substitution access are clear.

Keep the same x and y values in two separate checks. Ask which original statement is true in each check and whether both must hold at once. Do not infer a concept difficulty from a coordinate-reading error.

Use: Response A: Verify the same pair twice. Next evidence: Look for two correct truth checks and a conclusion based on their conjunction.

Reserve for later: Later response 2.

Substitute the whole equal expression

If observed: During Guided practice 3, the learner selects the correct expression to substitute but omits multiplication of one term, after basic one-variable equation access is checked.

Write parentheses around the entire equal expression before simplifying. Expand on a separate line, then check the resulting pair in both original equations. Clarify a signed-number or distribution error separately from the method choice.

Use: Response B: Substitute the whole expression. Next evidence: Look for a complete substitution, correct distribution and verification in the original pair of equations.

Reserve for later: Later response 1.

Solve a Linear System and Check Both Equations

Teacher answers and reasoning evidence

Readiness 1

For the ordered pair (2, 5), find x + y and 2x + y. Explain which coordinate is x and which is y.

Accept: x = 2 and y = 5; x + y = 7 and 2x + y = 9. The first coordinate is x and the second is y.

Look for: Interpret the ordered pair and substitute each value consistently.

Readiness 2

Solve 3x + 2 = 14. Show the equation after subtracting 2 and then give x.

Accept: 3x = 12, so x = 4.

Look for: Use equivalent operations on both sides and divide by 3.

Solve a Linear System and Check Both Equations

Teacher answers and reasoning evidence

Worked teaching example

Solve y = x + 2 and x + y = 8 by substitution. Give the ordered pair and check it in both original equations.

Accept: Substitute x + 2 for y: x + (x + 2) = 8; 2x + 2 = 8; x = 3; y = 5. The solution is (3, 5). Checks: 5 = 3 + 2 and 3 + 5 = 8.

Look for: Replace y by its equal expression, recover both values, and verify both original equations.

Guided practice 1

Solve y = 2x + 1 and x + y = 10. Show the substitution and check the ordered pair in both equations.

Accept: x + (2x + 1) = 10 gives 3x = 9, so x = 3 and y = 7. Checks: 7 = 2(3) + 1 and 3 + 7 = 10.

Look for: Use the complete equal expression for y and verify both equations.

Solve a Linear System and Check Both Equations

Teacher answers and reasoning evidence

Guided practice 2

A learner proposes (4, 3) for x + y = 7 and 2x - y = 2. Check both equations. Does this pair solve the system? Explain without solving for a new pair.

Accept: 4 + 3 = 7 is true, but 2(4) - 3 = 5, not 2. The pair does not solve the system because both equations must be true for the same pair.

Look for: Do not accept a pair based on only one equation.

Guided practice 3

Solve x = y - 1 and 2x + y = 7. Show which expression replaces x and verify both values.

Accept: 2(y - 1) + y = 7 gives 3y - 2 = 7, y = 3 and x = 2. Checks: 2 = 3 - 1 and 2(2) + 3 = 7.

Look for: Distribute 2 to the whole substituted expression and check both original equations.

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Teacher answers and reasoning evidence

Independent response 1

Solve y = 3x - 2 and 2x + y = 18. Show the substitution, give the ordered pair and check both original equations.

Accept: 2x + (3x - 2) = 18; 5x = 20; x = 4 and y = 10. Checks: 10 = 3(4) - 2 and 2(4) + 10 = 18.

Look for: Substitute the complete expression and verify the same ordered pair in both equations.

Independent response 2

A learner says (5, 2) solves x - y = 3 and x + 2y = 12 because the first equation works. Check the claim and explain what counts as a solution to a system.

Accept: 5 - 2 = 3 is true, but 5 + 2(2) = 9, not 12. It is not a solution; the same pair must make every equation in the system true.

Look for: Distinguish a solution of one equation from a solution of their system.

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Teacher answers and reasoning evidence

Response A: Verify the same pair twice

For x + y = 9 and 2x - y = 3, test (4, 5), then test (3, 6). For each, state whether it satisfies each equation and whether it solves the system.

Accept: (4, 5): 4 + 5 = 9 and 2(4) - 5 = 3, so it solves both. (3, 6): 3 + 6 = 9 but 2(3) - 6 = 0, not 3, so it does not solve the system.

Look for: Check the same coordinates in both equations and preserve the truth conditions.

Response B: Substitute the whole expression

Solve x = y + 2 and 3x - y = 10. A learner writes 3y + 2 - y = 10 after substituting. Explain the needed correction, then solve and check.

Accept: The 3 multiplies all of y + 2: 3(y + 2) - y = 10, so 2y + 6 = 10, y = 2 and x = 4. Checks: 4 = 2 + 2 and 3(4) - 2 = 10.

Look for: Distinguish choosing the right substitution from correctly distributing its coefficient.

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Teacher answers and reasoning evidence

Later response 1

Solve x = y + 1 and 3x + y = 7. Use the first equation to replace x in the second equation. Show the complete expression and how you simplify it, give the ordered pair and verify both original equations.

Accept: 3(y + 1) + y = 7 gives 4y + 3 = 7, y = 1 and x = 2. Checks: 2 = 1 + 1 and 3(2) + 1 = 7.

Look for: Substitute the complete expression, distribute 3 to both terms, recover both values and verify both original equations.

Later response 2

For x + y = 1 and 2x - y = -7, a learner proposes (-2, 3). Verify both equations and state whether this pair solves the system. Explain why a negative coordinate is not by itself a reason to reject a solution.

Accept: -2 + 3 = 1 and 2(-2) - 3 = -7, so (-2, 3) solves both equations. These equations allow real-number coordinates; a negative value is allowed when it satisfies the equations.

Look for: Verify signed arithmetic and judge a pair from the given domain and equations, not a positivity assumption.

Solve a Linear System and Check Both Equations

Sources, scope and responsible use

All coordinates are real numbers. The teaching and assessed systems here have unique integer solutions. This resource does not teach systems with no or infinitely many solutions, elimination, graphing or approximate solutions.

AI-authored materials. Classroom effectiveness, calibrated assessment properties and physical classroom use have not been established. A single response is limited evidence, not a diagnosis. Later tasks are different instructional checks, not equivalent test forms.

Tasks and diagrams authored for Mentor Teaching; no third-party classroom lesson or figure is reproduced. Use under the existing Mentor Teaching Terms of Use.

Newly authored mathematical tasks and diagrams. Original Mentor Teaching materials.

Common Core State Standards Initiative: High School Algebra, solve systems of equations. https://thecorestandards.org/Math/Content/HSA/REI/C/6/ (accessed 2026-10-23). Concept reference for solving pairs of linear equations; this sequence covers selected exact substitution cases only, not full standards alignment or graphing.

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Fictional teaching response — sound for the named task

Named task: Independent response 1: $y = 3x - 2$ and $2x + y = 18$

Fictional response — sound for the named task: “Substitute the whole expression: $2x + (3x - 2) = 18$, so $5x = 20$ and $x = 4$. Then $y = 10$. The pair is $(4, 10)$. Checks: $10 = 3 \times 4 - 2$ and $2 \times 4 + 10 = 18$.”

Visible evidence: Valid substitution, recovery of both coordinates and checks in both original equations for this system.

Not established: All solution methods or reliable performance on other systems.

Clarify: Ask why the same pair must work in both original equations.

Next teaching/evidence: If the explanation is clear, reserve Later response 1 in the later-check file for another occasion to seek new substitution and solving evidence. Do not reuse this answered task as fresh evidence.

This response is invented for teacher interpretation. Accept defensible alternatives. Record access, prior exposure and the actual response; do not assign an ability label or claim mastery from this example.

Later reassessment — save for later

Fictional teaching response — partially developed

Named task: Independent response 1: y = 3x − 2 and 2x + y = 18

Fictional response — partially developed: “x = 4, y = 10; 10 = 3 × 4 − 2.”

Visible evidence: The correct pair and verification of the first equation.

Not established: The substitution process or a check of the second equation.

Clarify: Ask the learner to explain their own substitution and identify which original equation remains unchecked. They may explain orally if writing is the barrier.

Next teaching/evidence: If substitution remains unclear, use Response B: Substitute the whole expression. If checking one equation is treated as sufficient, use Response A: Verify the same pair twice. Reserve Later response 1 for new solving evidence and Later response 2 for checking a supplied pair.

This response is invented for teacher interpretation. Accept defensible alternatives. Record access, prior exposure and the actual response; do not assign an ability label or claim mastery from this example.

Response pack — choose one of the two response lessons

Reserve: Later reassessment — save for later

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Fictional teaching response — plausible error

Named task: Independent response 1: y = 3x − 2 and 2x + y = 18

Fictional response — plausible error: “Choose x = 5. Then y = 13 from the first equation, so (5, 13) solves the system.”

Visible evidence: The pair satisfies y = 3x − 2.

Not established: A common solution: 2 × 5 + 13 = 23, which is not 18.

Clarify: Ask the learner to test that exact pair in both equations, keeping the original equality signs visible.

Next teaching/evidence: Use Response A: Verify the same pair twice: (4, 5) satisfies both x + y = 9 and 2x − y = 3, while (3, 6) satisfies only the first. Require both checks, and reserve Later response 2.

This response is invented for teacher interpretation. Accept defensible alternatives. Record access, prior exposure and the actual response; do not assign an ability label or claim mastery from this example.

Response pack — choose one of the two response lessons

Reserve: Later reassessment — save for later