Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Linear Equations: One, None, or All Real Solutions

Multi-Step Equations: One, No, or Infinitely Many Solutions | A1-U02-P08

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for constructed equation and coefficient-constant verification, first error, corrected class, and solution-set meaning, local forms, solution class, complete set, and justification, parameter conditions and all corresponding solution classes, permitted edit or impossibility proof and resulting class and real classification, domain intersection, and actual set.

8 PDFs and a README; 50 buyer pages.

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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Algebra 1

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Name: ______________ **Date:** ______________ **Class:** ______________

Solve each question and match the whole requested response. If two bank entries express the same result, either label is accepted; labels may be reused. Give exact values and any requested reasoning.

Classify $-2(4x-3)+5=4(-2x+1)+7$ after carrying every outer factor through its group. Give the full solution set. Bank label: ______	The equation $2x+7=2x+11$ is considered only for x in $\{-3,1,5\}$. Find the actual set after both algebra and domain restriction. Bank label: ______
Break the current degeneracy in $-2x+9=-2x+9$ using only the left x-coefficient so the result has one real solution. Verify the new class. Bank label: ______	Find when $(k+\frac{9}{4})x+\frac{11}{8}=(-\frac{3}{5})x+\frac{11}{8}$ becomes an identity. Also state the solution class for every remaining k. Bank label: ______
Analyze the cancellation in $-6x-5+3x+8=-x+4-2x-8$. Explain what remains and classify every possible value of x. Bank label: ______	For $6x+1=2x+13$, the allowed domain is $[0,4]$. Determine the actual solution set and show whether the algebraic root is admitted. Bank label: ______
Partition all real values of k by the number of solutions of $(k-\frac{7}{8})x+\frac{13}{10}=(\frac{5}{6})x-\frac{4}{7}$. Identify the exceptional coefficient condition first. Bank label: ______	Reduce $2(-5x+6)+3=5(-x-1)+35$ to $\mathrm{A}x+B=\mathrm{C}x+D$, compare both totals, and report the entire solution set. Bank label: ______

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Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

Classify the reduced equation $3x = 0$. Explain why a zero value for x is different from having no solutions.	Partition all real values of k by the number of solutions of $(k+1)x + 4 = 5x + 4$. Identify the exceptional coefficient condition first.
In $3(2x-1) + 5 = 2(3x+1) + 4$, expose the final coefficient and constant comparison. Use the residual statement to decide one, none, or all.	The equation $3x + 5 = x + 13$ currently has one real solution; solution set $\{4\}$. Change only the right x-coefficient to obtain no solution, or prove it cannot be done.
For $(k-2)x + 7 = 3x + 9$, determine which k, if any, causes coefficient cancellation and classify both that case and its complement.	Read $-4x = -8$ as a final reduced form. State the complete real solution set and justify the division used.

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Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

Incoming: one real solution; solution set $\{-\frac{4}{9}\}$

For $(-\frac{5}{3})x + \frac{7}{6} = (\frac{1}{3})x - \frac{5}{6}$, the allowed domain is $\{-2, 1, \frac{5}{3}\}$. Determine the actual solution set and show whether the algebraic root is admitted.

Your response: ______________

Incoming: $\{1\}$

Construct a two-sided linear equation whose only solution is $x = 4$. You must use unequal nonzero x-coefficients and constants on both sides. Verify it.

Your response: ______________

Incoming: one real solution; solution set $\{\frac{5}{3}\}$

Read $(\frac{15}{7})x = -\frac{20}{21}$ as a final reduced form. State the complete real solution set and justify the division used.

Your response: ______________

Incoming: $(-4, 2)$

Construct a two-sided equation with no solution. Begin with left side $5x + 4$ and use outer factor 1 on the grouped right side. Match the final x-coefficients but force unequal constants.

Your response: ______________

Incoming: $(\frac{7}{4})x - \frac{5}{6} = (\frac{7}{8})(2x + \frac{3}{5}) - \frac{163}{120}$

Solve $(\frac{3}{2})x + \frac{5}{4} = (\frac{3}{2})x + \frac{5}{4}$ only over the declared finite domain $\{-\frac{1}{2}, \frac{2}{3}, \frac{7}{4}\}$. Intersect the real solution class with the allowed values.

Your response: ______________

Incoming: $-2x + 7 = 4x + 25$

Solve $3x + 5 = 3x + 5$ only over the declared finite domain $\{-2, 0, 4\}$. Intersect the real solution class with the allowed values.

Your response: ______________

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Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

For the explicitly linear equation $3x + 5 = 3x + 5$, the table shows equality at distinct inputs $x = -2$ and $x = 4$. Evaluate the claim that the equation holds for all real x, using only justified implications.

Audit this work for $3x + 5 = x + 5$: 'The constants cancel, so $x = 0$. Therefore there are no solutions.' Identify the first conceptual error and give the correct complete solution set.

For $2x + 1 = 2x + 4$, the table reports $x = 0$, left= 1, and right= 4. Does this evidence support the claim that the equation is an identity? Give the strongest warranted conclusion.

A student classifies $4x + 7 = 4x + 7$ using: 'Everything cancels to $0 = 0$, so the only solution is $x = 0$.' Diagnose the meaning of $0 = 0$ and correct the conclusion.

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Full Worked Solutions - excerpt

Worked example

Problem. Classify $5x - 3 = 2x + 9$ over the restricted domain $\{-4, 0, 3\}$; an algebraic root outside that set must be excluded.

Answer. empty solution set

Explanation and check.

Over the reals the equation has one real solution; solution set $\{4\}$. Intersecting that set with $\{-4, 0, 3\}$ gives empty solution set.

Worked example

Problem. Intersect the real solution set of $7x - 2 = 7x - 2$ with the interval $[-3, 5]$. Report the resulting set exactly.

Answer. $[-3, 5]$

Explanation and check.

Over the reals the equation has all real numbers. Intersecting that set with $[-3, 5]$ gives $[-3, 5]$.