Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Rational Operations to Fractional Equations | Algebra 1 | 5-Topic Bundle

5-topic bundle | 480 problems | Four activity formats

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01 **Signed Rational Number Operations**

View individual product and its full preview

02 **Mixed Operations with Rational Numbers**

View individual product and its full preview

03 **Order of Operations with Grouping Symbols**

View individual product and its full preview

04 **Two-Step Equations**

View individual product and its full preview

05 **Linear Equations with Fractions and Decimals**

View individual product and its full preview

In every topic

Answer Bank Challenge	24 tasks
Grid Rounds	24 tasks
Match & Move	24 cards
Error Analysis & Strategy	24 tasks
Quick Answer Key and Full Worked Solutions	included
Teacher / Parent Use Guide and Terms of Use	included

Product previews

The following preview pages show the cover, all four activity formats, and worked examples for each included resource, in the listed order.

40 PDFs and 5 READMEs; 281 buyer PDF pages across the 5 products.

Preview pages are not included in the buyer page count. Check the list against resources you already own.

This is a fixed collection of the listed products. Purchase includes the existing individual resource files. To open a product's online preview, follow its title link and select View Preview.

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Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Signed Rational Number Operations

Adding and Subtracting Rational Numbers | A1-U01-COMB-P03-P04

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for addition-of-the-opposite rewrite and exact value, exact sum, exact sum with sign explanation, exact total or unit rate with units, exact value and efficient grouping and exact value with grouping-preserving rewrite.

8 PDFs and a README; 59 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

Signed Rational Number Operations

Name: _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

Rewrite $\frac{23}{4} - (-3)$ as addition of the opposite, then compute its exact value. Bank label: _____	Evaluate $-\frac{5}{3} + \frac{9}{4} + (-\frac{3}{2}) + \frac{5}{3}$. Show an efficient regrouping that uses cancellation or compatible denominators. Bank label: _____
Compute the exact sum $\frac{2}{5} + \frac{3}{5}$. Show how the common sign and magnitudes determine the result. Bank label: _____	Compute the exact sum $0.6 + 0.5$. Show how the common sign and magnitudes determine the result. Bank label: _____
Compute the exact sum $\frac{2}{3} + \frac{7}{9}$. Show how the common sign and magnitudes determine the result. Bank label: _____	Compute $\frac{5}{3} + (-\frac{5}{3})$. Compare the two magnitudes to justify the sign of the sum. Bank label: _____
Compute the exact sum $-4 + (-\frac{5}{7})$. Show how the common sign and magnitudes determine the result. Bank label: _____	Rewrite $\frac{25}{6} - \frac{5}{4}$ as addition of the opposite, then compute its exact value. Bank label: _____

Algebra 1

Signed Rational Number Operations

Name: _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

Evaluate $\frac{7}{5} + (-\frac{7}{5}) + \frac{1}{3} + \frac{2}{3}$. Show an efficient regrouping that uses cancellation or compatible denominators.	Evaluate $\frac{3}{5} + (-\frac{3}{5}) + \frac{7}{2} + (-\frac{7}{2})$. Show an efficient regrouping that uses cancellation or compatible denominators.
Evaluate $\frac{8}{3} + (-\frac{8}{3}) + 1 + \frac{2}{3}$. Show an efficient regrouping that uses cancellation or compatible denominators.	Evaluate $\frac{7}{2} + (-\frac{7}{2}) + 1 + (-1)$. Show an efficient regrouping that uses cancellation or compatible denominators.
Evaluate $-\frac{6}{5} + 1 + (-\frac{3}{2}) + \frac{6}{5}$. Show an efficient regrouping that uses cancellation or compatible denominators.	Evaluate $-1 + \frac{3}{4} + (-\frac{3}{4}) + 1$. Show an efficient regrouping that uses cancellation or compatible denominators.

Algebra 1

Signed Rational Number Operations

Name: _____ **Date:** _____ **Class:** _____

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: $-8-(-4)=-4\,\text{USD}$

Complete the arithmetic blank, or describe all values in the stated domain that work: $\frac{5}{2}\div\underline{\quad}=-\frac{25}{16}$. Enforce the nonzero-divisor restriction. Explain whether the answer is unique.

Your response: _____

Incoming: missing divisor $=-\frac{8}{5}$

Compute $2\div\left(-\frac{6}{7}\right)$. Rewrite the quotient by inverting only the nonzero divisor, then simplify.

Your response: _____

Incoming: $-1+5+3=7\,\text{USD}$

For account balance relative to zero, positive values are above the stated reference and negative values are below it. The initial value is -4 USD, followed by changes of -1 USD and -3 USD, giving final value -8 USD. Find the signed difference final minus initial; write a signed expression and interpret the result.

account balance relative to zero USD

state	value
initial	-4
first change	-1
second change	-3
final	-8

Your response: _____

Incoming: $-\frac{22}{5}$

Compute $-4\cdot\frac{9}{5}$. Convert any mixed number or decimal to a fraction, cancel whole factors when possible, and apply the sign.

Your response: _____

Algebra 1

Signed Rational Number Operations

Name: _____ **Date:** _____ **Class:** _____

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.

Evaluate this signed-number method: Temperatures are $-3\ ^\circ\mathrm{C}$ and $5\ ^\circ\mathrm{C}$, so a student says their directed difference $5-(-3)$ is $-8\ ^\circ\mathrm{C}$. Identify the first invalid step if there is one, repair the calculation, and verify the result exactly.

Evaluate this signed-number method: A student computes $0-(-\frac{9}{4})=-\frac{9}{4}$ because the zero contributes no sign. Identify the first invalid step if there is one, repair the calculation, and verify the result exactly.

Evaluate this signed-number method: To check $-4+9=5$, a student subtracts 9 from 5 and obtains -4. Identify the first invalid step if there is one, repair the calculation, and verify the result exactly.

Signed Rational Number Operations

Full Worked Solutions - excerpt

Worked example

Problem. Evaluate this method: A student says $\frac{4}{5} \div 0 = 0$ because zero makes an answer zero. Identify the first invalid step if any and repair the reasoning exactly.

Answer. incorrect

Explanation and check.

Division by zero is undefined; the zero-factor rule applies to multiplication, not a zero divisor.

Worked example

Problem. Evaluate this method: A student says a product of three negative nonzero factors is positive. Identify the first invalid step if any and repair the reasoning exactly.

Answer. incorrect

Explanation and check.

Three is odd, so the product of three negative nonzero factors is negative.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Mixed Operations with Rational Numbers

Mixed Operations with Rational Numbers | A1-U01-P05

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for efficient exact representation and value, exact rational value, first invalid step and repaired exact result, missing stage and forward verification, mixed expression and exact quantity with units and supported or not supported with decisive bound.

8 PDFs and a README; 58 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

Mixed Operations with Rational Numbers

Name: _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

Use the fully labeled operation diagram. *A* 2-arrow operation machine starts with an unknown value, multiplies by $(-\frac{1}{2})$, then adds $\frac{3}{4}$, and ends at $-\frac{23}{28}$. Recover the starting value by undoing the arrows in reverse order, then verify it forward.

_____	Multiply by $-\frac{1}{2}$ →	_____	Add $\frac{3}{4}$ →	$-\frac{23}{28}$

Bank label: _____

Use the fully labeled operation diagram. *A* 2-arrow operation machine starts with an unknown value, multiplies by $(-\frac{3}{4})$, then adds $(-\frac{3}{4})$, and ends at $-\frac{33}{28}$. Recover the starting value by undoing the arrows in reverse order, then verify it forward.

_____	Multiply by $-\frac{3}{4}$ →	_____	Add $-\frac{3}{4}$ →	$-\frac{33}{28}$

Bank label: _____

Evaluate $\frac{6}{5}(-3) - \frac{8}{3}$ exactly. Complete the multiplication or division before the addition or subtraction, and show the common-denominator step if one is needed.

Bank label: _____

Evaluate $\frac{5}{4} - \frac{10}{3} \div \frac{5}{2}$ exactly. Complete the multiplication or division before the addition or subtraction, and show the common-denominator step if one is needed.

Bank label: _____

Algebra 1

Mixed Operations with Rational Numbers

Name: _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

Start at $\frac{6}{5}$ and follow the fixed order: divide by 5, then add one negative rational number. Construct the adjustment that reaches $-\frac{14}{25}$, and verify that the final result is noninteger.

Evaluate $\frac{5}{6} - (-0.5) \cdot 1$ exactly. Choose fraction or terminating-decimal form to reduce the work, state why your choice avoids rounding, and give the exact value.

Use the quantities in the table. A position changes at a constant signed rate of 6 meters per hour for 2 hours, then has an additional signed change of $\frac{5}{2}$ meters. Write the mixed expression and find the net change in meters.

Quantity	Value	Unit
signed rate	6	meters per hour
time	2	hours
later adjustment	$\frac{5}{2}$	meters

Evaluate $1.25 \div (-\frac{7}{10}) - 2$ exactly. Choose fraction or terminating-decimal form to reduce the work, state why your choice avoids rounding, and give the exact value.

Evaluate $0.25 + \frac{4}{9} \cdot 3$ exactly. Choose fraction or terminating-decimal form to reduce the work, state why your choice avoids rounding, and give the exact value.

Evaluate $1.2 + \frac{2}{7} \cdot \frac{1}{2}$ exactly. Choose fraction or terminating-decimal form to reduce the work, state why your choice avoids rounding, and give the exact value.

Algebra 1

Mixed Operations with Rational Numbers

Name: _____ **Date:** _____ **Class:** _____

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: add $(-\frac{1}{3})$: $\frac{8}{3} \to 4 \to \frac{11}{3}$

*A*2-arrow operation machine starts with an unknown value, divides by $\frac{3}{2}$, then subtracts $\frac{2}{3}$, and ends at $-\frac{20}{21}$. Recover the starting value by undoing the arrows in reverse order, then verify it forward.

_____	Divide by $\frac{3}{2} \to$	_____	Subtract $\frac{2}{3} \to$	$-\frac{20}{21}$

Your response: _____

Incoming: $-\frac{3}{7}$

Evaluate $\frac{7}{6} + \frac{1}{5} \cdot 2$ exactly. Complete the multiplication or division before the addition or subtraction, and show the common-denominator step if one is needed.

Your response: _____

Incoming: $\frac{3}{10}$

Start at $\frac{8}{3}$ and follow the fixed order: divide by $\frac{2}{3}$, then add one negative rational number. Construct the adjustment that reaches $\frac{11}{3}$, and verify that the final result is noninteger.

Your response: _____

Incoming: $\frac{9}{2}$

Evaluate $-\frac{7}{5} - \frac{5}{2} \div \frac{5}{2}$ exactly. Complete the multiplication or division before the addition or subtraction, and show the common-denominator step if one is needed.

Your response: _____

Incoming: $-\frac{493}{24}$

*A*2-arrow operation machine starts with an unknown value, adds $(-\frac{2}{3})$, then multiplies by 6, and ends at $\frac{38}{7}$. Recover the starting value by undoing the arrows in reverse order, then verify it forward.

_____	Add $-\frac{2}{3} \to$	_____	Multiply by $6 \to$	$\frac{38}{7}$

Your response: _____

Incoming: $\frac{71}{10}$

Evaluate $\frac{3}{4} - \frac{1}{2} \div 2$ exactly. Complete the multiplication or division before the addition or subtraction, and show the common-denominator step if one is needed.

Your response: _____

Algebra 1

Mixed Operations with Rational Numbers

Name: _____ **Date:** _____ **Class:** _____

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.

Audit this worked calculation for $\frac{3}{4} + (\frac{2}{5})(\frac{5}{2})$. Step 1: Add $\frac{3}{4} + \frac{2}{5}$ first. Step 2: Multiply that result by $\frac{5}{2}$. Identify the first invalid step, preserve every valid prefix, and give the repaired exact result. If no step is invalid, say so.

Audit this worked calculation for $\frac{2}{5} + (\frac{1}{3})(\frac{3}{4})$. Step 1: Multiply $\frac{1}{3}$ by $\frac{3}{4}$ to get $\frac{1}{4}$. Step 2: Add $\frac{2}{5} + \frac{1}{4}$ as $\frac{3}{9} = \frac{1}{3}$. Identify the first invalid step, preserve every valid prefix, and give the repaired exact result. If no step is invalid, say so.

Audit this worked calculation for $\frac{3}{4} \div (\frac{5}{6}) - \frac{1}{10}$. Step 1: Rewrite as $\frac{3}{4}$ times $\frac{5}{6}$ minus $\frac{1}{10}$. Step 2: Report $\frac{21}{40}$. Identify the first invalid step, preserve every valid prefix, and give the repaired exact result. If no step is invalid, say so.

Audit this worked calculation for $(\frac{3}{4} + \frac{5}{6})(\frac{2}{3})$. Step 1: Cancel the 3 in $\frac{3}{4}$ with the outside factor $\frac{2}{3}$. Step 2: Multiply the remaining expression. Identify the first invalid step, preserve every valid prefix, and give the repaired exact result. If no step is invalid, say so.

Mixed Operations with Rational Numbers

Full Worked Solutions - excerpt

Worked example

Problem. Start at $\frac{7}{3}$. Use each operation exactly once—add $\frac{8}{3}$ and multiply by $\frac{3}{4}$—in an order that reaches $\frac{15}{4}$. The intermediate value must be positive. Construct and verify the chain.

Answer. $\frac{7}{3} \to$ add $\frac{8}{3} \to 5 \to$ multiply by $\frac{3}{4} \to \frac{15}{4}$

Explanation and check.

Adding first gives the required positive intermediate 5; multiplying it by $\frac{3}{4}$ reaches $\frac{15}{4}$.

Worked example

Problem. Start at $\frac{3}{2}$. Use each operation exactly once—add $\frac{4}{3}$ and multiply by $\frac{3}{2}$—in an order that reaches $\frac{17}{4}$. The intermediate value must be positive. Construct and verify the chain.

Answer. $\frac{3}{2} \to$ add $\frac{4}{3} \to \frac{17}{6} \to$ multiply by $\frac{3}{2} \to \frac{17}{4}$

Explanation and check.

Adding first gives the required positive intermediate $\frac{17}{6}$; multiplying it by $\frac{3}{2}$ reaches $\frac{17}{4}$.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Order of Operations with Grouping Symbols

Order of Operations with Grouping Symbols | A1-U01-P06

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for all valid groupings or impossibility proof, all valid groupings or impossibility proof; justified strategy selection, equivalent expression or tree and exact value, equivalent expression or tree and exact value; justified strategy selection, exact value or undefined verdict and exact value or undefined verdict; justified strategy selection.

8 PDFs and a README; 63 buyer pages.

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Algebra 1

Order of Operations with Grouping Symbols

Name: _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. Give the whole requested response, including any reasoning the question asks for.

Evaluate $5 + 7 \cdot 4 - 1$. At each precedence level, work from left to right; show the decisive first operation. Bank label: _____	Evaluate $3 + 2 \cdot 5 - 1$. At each precedence level, work from left to right; show the decisive first operation. Bank label: _____

Algebra 1

Order of Operations with Grouping Symbols

Name: _____ **Date:** _____ **Class:** _____

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.

Translate $(4 - 3) \div 4$ into an operation tree whose leaves and operation nodes preserve every grouping, and state its exact value.	Insert grouping into $4 + 4 - 4 \div 4$ to obtain 4, without reordering operands or operations. Any full parenthesization preserving the displayed order is allowed. Give every valid grouping, or prove none works by checking the permitted structures.
Insert grouping into $5 - 4 + 5 \cdot 3$ to obtain $\frac{33}{2}$, without reordering operands or operations. Only these grouping templates are allowed: $(5 - (4 + 5)) \cdot 3$; $5 - (4 + (5 \cdot 3))$; $(5 - 4) + (5 \cdot 3)$. Give every valid grouping, or prove none works by checking the permitted structures.	Evaluate $(10 - 6)(2 + 1)$. Record each completed inner group before using it in the enclosing operation.
Insert grouping into $2 - 4 + 6 \cdot 2$ to obtain 8, without reordering operands or operations. Any full parenthesization preserving the displayed order is allowed. Give every valid grouping, or prove none works by checking the permitted structures.	A fraction bar has numerator $[8 + 1 \cdot 5]$ and denominator $[5 - 5]$. Evaluate each whole group, then evaluate the compound fraction or state that it is undefined.

Algebra 1

Order of Operations with Grouping Symbols

Name: _____ **Date:** _____ **Class:** _____

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: -4 Evaluate $48 \div 6 \cdot 5 - 2$. At each precedence level, work from left to right; show the decisive first operation. Your response: _____	**Incoming:** 38 Evaluate $(4 - 7)(2 + 5)$. Record each completed inner group before using it in the enclosing operation. Your response: _____
Incoming: undefined Evaluate $-\lvert 5 - 6\rvert \cdot 4$. Complete every expression inside absolute-value bars before taking its magnitude. Your response: _____	**Incoming:** $\frac{5}{3}$ Evaluate $6 - [5 - (4 - 4)]$. Record each completed inner group before using it in the enclosing operation. Your response: _____
Incoming: -2 Evaluate $\lvert 6 - 9\rvert - \lvert 4 - 3\rvert$. Complete every expression inside absolute-value bars before taking its magnitude. Your response: _____	**Incoming:** 32 A fraction bar has numerator $[6 - (2 + 5)]$ and denominator $[5 - 2]$. Evaluate each whole group, then evaluate the compound fraction or state that it is undefined. Your response: _____

Algebra 1

Order of Operations with Grouping Symbols

Name: _____ **Date:** _____ **Class:** _____

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.

Compare $(-9)^{4}$ and -9^{4}. Evaluate both, state whether they are equal, and explain how the parentheses and exponent parity control the sign.

Audit the evaluation of $-|4-9|+2$. Step 1: Compute $4-9=-5$. Step 2: Replace $|-5|$ by -5, so the external negative gives $-(-5)$. Step 3: Add 2 and report 7. Identify the first invalid step, preserve the valid prefix, and give the corrected value. If every step is valid, say so.

Audit the evaluation of $18 \div [7-(5-4)]$. Step 1: Compute $5-4=1$. Step 2: Compute $7-1=6$. Step 3: Replace the bracket by 7 and report $\frac{18}{7}$. Identify the first invalid step, preserve the valid prefix, and give the corrected value. If every step is valid, say so.

Compare $(-5)^{2}$ and -5^{2}. Evaluate both, state whether they are equal, and explain how the parentheses and exponent parity control the sign.

Order of Operations with Grouping Symbols

Full Worked Solutions - excerpt

Worked example

Problem. Evaluate $5 + 7 \cdot 4 - 1$. At each precedence level, work from left to right; show the decisive first operation.

Answer. 32

Explanation and check.

First

$$7 \cdot 4 = 28$$

Then move left to right:

$$5 + 28 - 1 = 32$$

Worked example

Problem. Evaluate $3 + 2 \cdot 5 - 1$. At each precedence level, work from left to right; show the decisive first operation.

Answer. 12

Explanation and check.

First

$$2 \cdot 5 = 10$$

Then move left to right:

$$3 + 10 - 1 = 12$$

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Two-Step Equations

Two-Step Equations | A1-U02-P04

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for exact value and verification, exact value with inverse order, exact value with unit and contextual check, first invalid step, corrected solution, and check, input, reverse path, and forward check and parameter value or feasibility classification.

8 PDFs and a README; 50 buyer pages.

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Algebra 1

Two-Step Equations

Name: _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

Isolate x in $-2x + 9 = -3$, preserving the equality at every step. Bank label: _____	Use this operation diagram: input x → multiply by 3 → add 5 → output 17. Traverse the arrows backward to recover x, then run the machine forward as a check. Bank label: _____
Determine the value of x that makes $7x + 2 = -19$ true. Show the two inverse operations. Bank label: _____	Isolate x in $2x + 11 = 25$, preserving the equality at every step. Bank label: _____
Complete $5(-3) + k = -22$ so that the prescribed input $x = -3$ works. Determine k and verify the resulting equality. Bank label: _____	Without skipping the check, solve $5x + 15 = 15$ and explain whether $x = 0$ works. Bank label: _____
Solve $9(x - 5) = -27$ by reversing the outer operation before the inner shift. Bank label: _____	Isolate x in $(-\frac{7}{4})x + \frac{2}{3} = \frac{25}{6}$, preserving the equality at every step. Bank label: _____

Algebra 1

Two-Step Equations

Name: _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

Solve $-3x - 6 = -24$. Keep the result exact and verify it in the original equation.	Solve $8x - 5 = -29$. Keep the result exact and verify it in the original equation.
The complete rule is input $x \to$ multiply by $-4 \to$ add $7 \to$ output 19. What input produced the stated output? Include the intermediate value in your verification.	Use the given equation $64 - 5x = 24$ for this initial-minus-use situation: x measures operating intervals in hours; 64 is the initial amount and 5 is removed per unit of x. Recover x and explain both inverse steps.
The conversion rule has already been modeled as $(\frac{9}{5})x + 32 = 77$; x is the input temperature; the conversion multiplies by $\frac{9}{5}$ and then shifts by 32. Find the source value x in degrees and check by converting forward.	Solve $-5(x - 4) = 35$ by reversing the outer operation before the inner shift.

Algebra 1

Two-Step Equations

Name: _____ **Date:** _____ **Class:** _____

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: -23

A two-stage machine applies 'divide by 4' and then 'add 3'. Its output is 5. Recover the input and list the inverse steps in reverse order.

Your response: _____

Incoming: 8

The complete rule is input $x \to$ multiply by $\frac{1}{2} \to$ add $-3 \to$ output 2. What input produced the stated output? Include the intermediate value in your verification.

Your response: _____

Incoming: $\frac{23}{6}$

What value of x satisfies $\frac{x+2}{7} = -3$? Show how the grouped quantity is isolated first.

Your response: _____

Incoming: $\frac{7}{4}$

Complete $\frac{\frac{11}{6} - \frac{5}{4}}{d} = \frac{7}{3}$ so that the prescribed input $x = \frac{11}{6}$ works. Determine d and verify the resulting equality.

Your response: _____

Incoming: $\frac{8}{3}$

Use this operation diagram: input $x \to$ add 9 $\to$ divide by $-5 \to$ output -2. Traverse the arrows backward to recover x, then run the machine forward as a check.

Your response: _____

Incoming: 4

Determine the value of x that makes $4x - 7 = 13$ true. Show the two inverse operations.

Your response: _____

Algebra 1

Two-Step Equations

Name: _____ **Date:** _____ **Class:** _____

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 $(\frac{3}{2})(x+4)=\frac{15}{2}$, Route A would multiply both sides by the reciprocal $\frac{2}{3}$ to isolate the group. Route B would split the rational scale into numerator and denominator and undo those two factors separately. Carry out both valid routes, compare their intermediate arithmetic, and solve.

Two valid plans for $(\frac{5}{3})(x-2)=\frac{20}{3}$ are: A—multiply both sides by the reciprocal $\frac{3}{5}$ to isolate the group; B—split the rational scale into numerator and denominator and undo those two factors separately. Decide which better exposes the grouped quantity here and verify the common solution.

Inspect $\frac{x+5}{\frac{7}{4}}=-\frac{21}{4}$. Compare the valid full-group route (multiply both sides by the full divisor $\frac{7}{4}$) with the factor-by-factor route (rewrite division by the rational number as reciprocal multiplication, then undo that multiplier); report x and the cleaner route.

For $(-\frac{3}{2})(x+6)=9$, Route A would multiply both sides by the reciprocal $-\frac{2}{3}$ to isolate the group. Route B would split the rational scale into numerator and denominator and undo those two factors separately. Carry out both valid routes, compare their intermediate arithmetic, and solve.

Two-Step Equations

Full Worked Solutions - excerpt

Worked example

Problem. Isolate x in $-2x + 9 = -3$, preserving the equality at every step.

Answer. 6

Explanation and check.

First undo the full offset: the variable term equals -12. Its effective coefficient is -2, so division gives $x = 6$. Substitution in $-2x + 9 = -3$ reproduces -3.

Worked example

Problem. Use this operation diagram: input $x \to$ multiply by $3 \to$ add $5 \to$ output 17. Traverse the arrows backward to recover x, then run the machine forward as a check.

Answer. 4

Explanation and check.

Starting at 17, subtract 5 gives the prior stage value 12; then divide by 3 gives $x = 4$. Forward verification applies multiply by 3 and add 5 and returns 17.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Linear Equations with Fractions and Decimals

Solving Linear Equations with Fractional Coefficients | A1-U02-P09

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for both routes, compared intermediate equations, and justification of equal solution sets, common multiplier, fully scaled equation, exact solution, and check, common multiplier, preserved numerator groups, exact solution, and verification, exact root, rounded result, and changed-equation verdict, first error, fully corrected scaled equation, and solution and method choice, structural justification, exact solution, and check.

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Algebra 1

Linear Equations with Fractions and Decimals

Name: _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. Give the whole requested response, including any reasoning the question asks for.

Find a common multiplier for the unrelated denominators in $(\frac{3}{4})x + \frac{2}{5} = (\frac{1}{6})x + \frac{41}{15}$, apply it to every term on both sides, and solve. Bank label: _____	Clear the constant denominators in $-(\frac{5}{6})x + \frac{7}{8} = (\frac{1}{4})x + \frac{33}{8}$ while preserving all negative signs. State the exact solution. Bank label: _____
Use the shared factors among the denominators of $(\frac{7}{10})x - \frac{3}{5} = -(\frac{2}{15})x + \frac{22}{5}$ to choose an efficient clearing multiplier. Solve exactly. Bank label: _____	Find a common multiplier for the unrelated denominators in $(\frac{2}{9})x + \frac{5}{6} = (\frac{7}{12})x + \frac{41}{18}$, apply it to every term on both sides, and solve. Bank label: _____
Clear denominators in $(\frac{5}{14})x + 3 = (\frac{1}{7})x + \frac{33}{7}$; remember that the visible integer term must receive the same multiplier. Find x. Bank label: _____	Use the shared factors among the denominators of $(\frac{9}{16})x - \frac{5}{12} = (\frac{3}{8})x + \frac{43}{48}$ to choose an efficient clearing multiplier. Solve exactly. Bank label: _____
Find a common multiplier for the unrelated denominators in $(\frac{11}{18})x + \frac{7}{20} = -(\frac{5}{12})x - \frac{431}{90}$, apply it to every term on both sides, and solve. Bank label: _____	Find a common multiplier for the unrelated denominators in $(\frac{7}{24})x + \frac{11}{14} = (\frac{5}{16})x + \frac{67}{112}$, apply it to every term on both sides, and solve. Bank label: _____

Algebra 1

Linear Equations with Fractions and Decimals

Name: _____ **Date:** _____ **Class:** _____

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.

Compare $(\frac{1}{2})x + \frac{3}{4} = (\frac{1}{3})x + \frac{5}{6}$ with $6x + 9 = 4x + 10$. Recover the least positive multiplier that clears every denominator and verify all four terms.	Construct a rational equation that becomes $3x + 5 = x + 13$ when every term is multiplied by 12. Use the resulting denominator set and verify equivalence.
Compare $-(\frac{2}{5})x + \frac{7}{10} = (\frac{3}{4})x - \frac{1}{2}$ with $-8x + 14 = 15x - 10$. Recover the least positive multiplier that clears every denominator and verify all four terms.	A coefficient in $-(\frac{2}{3})x + \frac{1}{2} = (\frac{1}{4})x + \frac{13}{4}$ is replaced by its displayed decimal approximation. Quantify the resulting root change rather than assuming equivalence.
Reverse the nonzero scale -6 on $-2x + 7 = 4x - 8$ to design a rational equation. Preserve signs term by term and prove the solution set is unchanged.	The equation $(\frac{3}{8})x - \frac{5}{6} = (\frac{1}{4})x + \frac{7}{12}$ was scaled to $18x - 40 = 12x + 28$. Recover the common multiplier and decide whether it is least or merely valid.

Algebra 1

Linear Equations with Fractions and Decimals

Name: _____ **Date:** _____ **Class:** _____

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: $\frac{23}{12}$ Find a common multiplier for the unrelated denominators in $(\frac{23}{45})x + \frac{31}{56} = -(\frac{17}{30})x + \frac{8767}{2520}$, apply it to every term on both sides, and solve. Your response: _____	**Incoming:** $\frac{19}{7}$ For $-(\frac{29}{48})x - \frac{35}{54} = (\frac{11}{20})x + \frac{46139}{17280}$, justify a nonzero common multiplier, write the full integer-coefficient equation it creates, and solve exactly. Your response: _____
Incoming: $-\frac{17}{6}$ Choose a common denominator for all grouped fractions in $\frac{19x+7}{32} + \frac{-9x-13}{21} = \frac{6x-\frac{85357}{1344}}{26} + \frac{23}{12}$. Show the intact groups after scaling, then solve. Your response: _____	**Incoming:** $-\frac{29}{9}$ Choose a common denominator for all grouped fractions in $\frac{9x+25}{40} + \frac{-11x+16}{33} = \frac{5x-\frac{82789}{1760}}{36} + \frac{31}{16}$. Show the intact groups after scaling, then solve. Your response: _____
Incoming: $-\frac{17}{9}$ For $(\frac{17}{36})x - \frac{25}{42} = -(\frac{11}{27})x + \frac{1279}{756}$, justify a nonzero common multiplier, write the full integer-coefficient equation it creates, and solve exactly. Your response: _____	**Incoming:** 3 Clear the constant denominators in $-(\frac{2}{3})x + 1 = (\frac{1}{3})x + 3$ while preserving all negative signs. State the exact solution. Your response: _____

Algebra 1

Linear Equations with Fractions and Decimals

Name: _____ **Date:** _____ **Class:** _____

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 $\frac{3x+5}{4} = 7$, choose between immediate inverse operations and clearing every denominator. Select the more efficient valid route and solve.

Compare the exact equation $(\frac{1}{3})x + 2 = (\frac{1}{5})x + \frac{38}{15}$ with the version using a rounded coefficient. Solve both exactly as written and decide whether their roots agree.

Audit the claimed clearing step $(\frac{1}{2})x + 3 = (\frac{1}{4})x + 5 \to 6x + 3 = 3x + 60$. Find the first term that failed to receive the common multiplier and repair the equation.

Which method avoids unnecessary expansion in $\frac{-2x+7}{5} = -3$: direct rational isolation or a common scale? Justify and find x.

Linear Equations with Fractions and Decimals

Full Worked Solutions - excerpt

Worked example

Problem. Find a common multiplier for the unrelated denominators in $(\frac{3}{4})x + \frac{2}{5} = (\frac{1}{6})x + \frac{41}{15}$, apply it to every term on both sides, and solve.

Answer. 4

Explanation and check.

Multiplying every term of $(\frac{3}{4})x + \frac{2}{5} = (\frac{1}{6})x + \frac{41}{15}$ by 60 gives $45x + 24 = 10x + 164$. Its coefficient difference is 35, so $x = 4$; substitution verifies the original rational equation.

Worked example

Problem. Clear the constant denominators in $-(\frac{5}{6})x + \frac{7}{8} = (\frac{1}{4})x + \frac{33}{8}$ while preserving all negative signs. State the exact solution.

Answer. -3

Explanation and check.

Multiplying every term of $-(\frac{5}{6})x + \frac{7}{8} = (\frac{1}{4})x + \frac{33}{8}$ by 24 gives $-20x + 21 = 6x + 99$. Its coefficient difference is -26, so $x = -3$; substitution verifies the original rational equation.