

Algebra 1
Rational Arithmetic & Order of Operations | Algebra 1 | 3-Topic Bundle

3-topic bundle | 288 problems | Four activity formats

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](#)

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.

24 PDFs and 3 READMEs; 180 buyer PDF pages across the 3 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.

Algebra 1
Signed Rational Number Operations

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

96 problems · Four activity formats

01	Answer Bank Challenge	24 tasks
02	Grid Rounds	24 tasks
03	Match & Move	24 cards
04	Error Analysis & Strategy	24 tasks
05	Quick Answer Key	96 answers
06	Full Worked Solutions	96 solutions
07	Teacher / Parent Use Guide	included
08	Terms of Use & License	included

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.

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: _____

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°C and 5°C , so a student says their directed difference $5 - (-3)$ is -8°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.

Algebra 1
Mixed Operations with Rational Numbers

Mixed Operations with Rational Numbers | A1-U01-P05
96 problems · Four activity formats

01	Answer Bank Challenge	24 tasks
02	Grid Rounds	24 tasks
03	Match & Move	24 cards
04	Error Analysis & Strategy	24 tasks
05	Quick Answer Key	96 answers
06	Full Worked Solutions	96 solutions
07	Teacher / Parent Use Guide	included
08	Terms of Use & License	included

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.

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. A2-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 $-\frac{1}{2} \rightarrow$	_____	Add $\frac{3}{4} \rightarrow$	$-\frac{23}{28}$
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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: _____

Use the fully labeled operation diagram. A2-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 $-\frac{3}{4} \rightarrow$	_____	Add $-\frac{3}{4} \rightarrow$	$-\frac{33}{28}$
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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. <table border="1" data-bbox="151 1045 795 1176"> <thead> <tr> <th>Quantity</th> <th>Value</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>signed rate</td> <td>6</td> <td>meters per hour</td> </tr> <tr> <td>time</td> <td>2</td> <td>hours</td> </tr> <tr> <td>later adjustment</td> <td>$\frac{5}{2}$</td> <td>meters</td> </tr> </tbody> </table> 	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.
Quantity	Value	Unit											
signed rate	6	meters per hour											
time	2	hours											
later adjustment	$\frac{5}{2}$	meters											
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 $(-\frac{1}{3})$: $\frac{8}{3} \rightarrow 4 \rightarrow \frac{11}{3}$ A2-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. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%; height: 30px; vertical-align: bottom;">_____</td> <td style="width: 20%; text-align: center; vertical-align: bottom;">Divide by $\frac{3}{2} \rightarrow$</td> <td style="width: 20%; height: 30px; vertical-align: bottom;">_____</td> <td style="width: 20%; text-align: center; vertical-align: bottom;">Subtract $\frac{2}{3} \rightarrow$</td> <td style="width: 20%; text-align: center; vertical-align: bottom;">$-\frac{20}{21}$</td> </tr> </table> Your response: _____	_____	Divide by $\frac{3}{2} \rightarrow$	_____	Subtract $\frac{2}{3} \rightarrow$	$-\frac{20}{21}$	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: _____
_____	Divide by $\frac{3}{2} \rightarrow$	_____	Subtract $\frac{2}{3} \rightarrow$	$-\frac{20}{21}$		
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: $-\frac{493}{24}$ A2-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. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%; height: 30px; vertical-align: bottom;">_____</td> <td style="width: 20%; text-align: center; vertical-align: bottom;">Add $-\frac{2}{3} \rightarrow$</td> <td style="width: 20%; height: 30px; vertical-align: bottom;">_____</td> <td style="width: 20%; text-align: center; vertical-align: bottom;">Multiply by $6 \rightarrow$</td> <td style="width: 20%; text-align: center; vertical-align: bottom;">$\frac{38}{7}$</td> </tr> </table> Your response: _____	_____	Add $-\frac{2}{3} \rightarrow$	_____	Multiply by $6 \rightarrow$	$\frac{38}{7}$	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: _____
_____	Add $-\frac{2}{3} \rightarrow$	_____	Multiply by $6 \rightarrow$	$\frac{38}{7}$		

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

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

Explanation and check.

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

Algebra 1
Order of Operations with Grouping Symbols

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

96 problems · Four activity formats

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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.

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: _____

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:

$$3 + 10 - 1 = 12$$