Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Quadratic Functions and Equations

15-topic bundle | 1,440 problems | Four activity formats

Included topics

The following pages list all 15 included resources in the suggested order, with a link to each product. Each resource retains its complete preview.

Suggested learning sequence

1. Features and equivalent forms
2. Compare equation-solving methods
3. Applications and systems

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.

120 PDFs and 15 READMEs; 1,418 buyer PDF pages across the 15 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.

Published by Tusils LLC.

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Algebra 1

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15 included resources | Complete resource previews follow this guide.

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Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Quadratic Function Classification and Range

Quadratic Function Classification and Range | A1-U09-P01

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for decision and justification preserving the original requested quantities.

8 PDFs and a README; 122 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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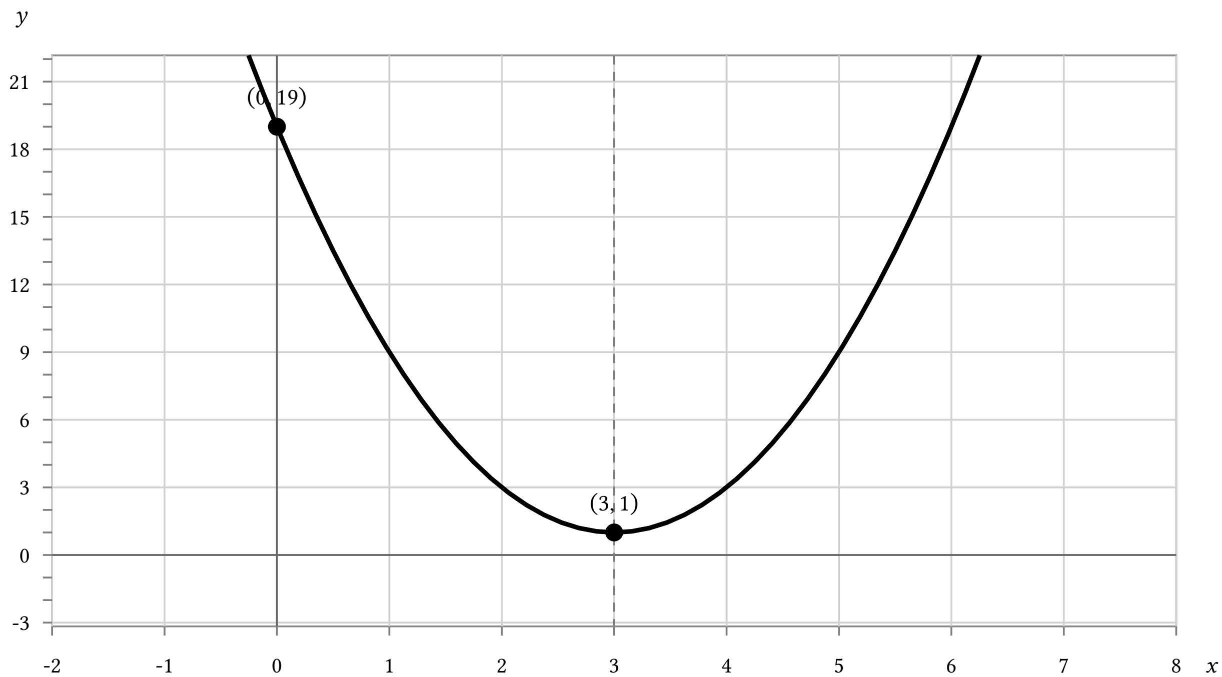
Algebra 1

Quadratic Function Classification and Range

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.

Explain the intercept status using the extremum, and give end behavior. For the answer bank, record the minimum point as (x, y). Complete and justify every part of the original task in your work.



Bank label: ______

Algebra 1

Quadratic Function Classification and Range

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.

Use finite differences to decide whether the table is compatible with a quadratic model.

Model assumption: values come from a polynomial of degree at most 2

Input	Output
-2	7
-1	2
0	1
1	4
2	11

Predict the opening and extremum type without locating the vertex. Rule: $g(x) = 5x^2 - 7x + 1$ Leading coefficient: 5

Compute the second differences and interpret their sign.

Model assumption: polynomial degree at most 2

Input	Output
-1	2
0	5
1	4
2	-1
3	-10

State the opening, extremum type, and end behavior. Rule: $q(x) = -x^2 + 12x + 8$ Leading coefficient: -1

Algebra 1

Quadratic Function Classification and Range

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: $[-5, 16)$

Determine the function family for every real a. Rule: $q\_a(x) = a(x+1)^2$-$ax^2 + 3x^2$ Parameter: a

Your response: ______________

Incoming: constant, not quadratic

Find the missing output so all second differences equal 2, then state the evidence.

Model assumption: quadratic polynomial

Input	Output
-2	8
-1	3
0	0
1	____
2	0

Your response: ______________

Algebra 1

Quadratic Function Classification and Range

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.

Explain why ordinary consecutive second differences are not valid evidence here and what must be addressed.

Declared family: unspecified

Input	Output
0	1
1	4
3	16
6	49

Choose between classifying by the largest displayed exponent and combining like terms first. Use the chosen method to determine the actual degree and justify it. Rule: $s(x) = x(x^2 + 2x - 1) - x^3 + 4$

Quadratic Function Classification and Range

Full Worked Solutions - excerpt

Worked example

Problem. Classify h and identify its leading coefficient. Rule: $h(x) = x(x+1) + (x-2)^2$

Answer. quadratic with leading coefficient 2

Explanation and check.

The rule becomes $x^2 + x + x^2 - 4x + 4 = 2x^2 - 3x + 4$.

Worked example

Problem. Classify h by its actual degree after simplification. Rule: $h(x) = 3(x^2 + 2x) - 3x^2 + 4$ Domain: all real x

Answer. linear, not quadratic

Explanation and check.

The x^2 terms cancel, leaving $h(x) = 6x + 4$, which has degree 1.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Quadratic Vertex, Axis, and Intercepts

Quadratic Vertex, Axis, and Intercepts | A1-U09-P02

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Quadratic Vertex, Axis, and Intercepts.

8 PDFs and a README; 61 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

Quadratic Vertex, Axis, and Intercepts

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.

Find the axis input first, then evaluate the function there. Match the complete originally requested feature set or point. Include the axis, extremum type, or effective coefficient whenever the original question requires it. The rule is $v(x) = 2x^2 - 6x + 1$ Bank label: _______	Derive the fractional maximum point and axis. Match the complete originally requested feature set or point. Include the axis, extremum type, or effective coefficient whenever the original question requires it. The rule is $E(x) = -4x^2 + 7x + 2$ Bank label: _______
Compute the vertex and verify its height by substitution. Match the complete originally requested feature set or point. Include the axis, extremum type, or effective coefficient whenever the original question requires it. The rule is $H(x) = 9x^2 + 6x - 8$ Bank label: _______	Locate the low point and its axis for the fractional leading coefficient. Match the complete originally requested feature set or point. Include the axis, extremum type, or effective coefficient whenever the original question requires it. The rule is $K(x) = (\frac{1}{3})x^2 - 4x + 5$ Bank label: _______
Read the vertex, axis, and extremum type directly from the formula. Match the complete originally requested feature set or point. Include the axis, extremum type, or effective coefficient whenever the original question requires it. The rule is $f(x) = 2(x - 3)^2 + 1$ Bank label: _______	State the lowest point and symmetry line. Match the complete originally requested feature set or point. Include the axis, extremum type, or effective coefficient whenever the original question requires it. The rule is $p(x) = (x - 1)^2 - 8$ Bank label: _______
Name the turning point, axis, and extremum type. Match the complete originally requested feature set or point. Include the axis, extremum type, or effective coefficient whenever the original question requires it. The rule is $q(x) = -3(x + 2)^2 - 5$ Bank label: _______	Extract the vertex and axis from the displayed form. Match the complete originally requested feature set or point. Include the axis, extremum type, or effective coefficient whenever the original question requires it. The rule is $r(x) = 0.5(x - 7)^2$ Bank label: _______

Algebra 1

Quadratic Vertex, Axis, and Intercepts

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.

Find every x-intercept and the y-intercept as ordered pairs. The rule is $f(x) = (x-2)(x+5)$ The domain is all real x	List the coordinates where the graph meets each axis. The rule is $g(x) = -2(x+1)(x-4)$
Find the intercept coordinates, noting any point shared by both axes. The rule is $p(x) = x(x-7)$	Identify the x-axis contact point and the y-intercept. The rule is $q(x) = 3(x+2)^2$
Determine all real intercepts. The rule is $r(x) = (x-3)^2 + 4$	Find the single real x-axis contact and the vertical-axis crossing. The rule is $s(x) = -(x+4)^2$

Algebra 1

Quadratic Vertex, Axis, and Intercepts

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: $(5, \frac{11}{2})$ Derive the vertex in lowest-term fractions. Match the complete originally requested feature set or point. Include the axis, extremum type, or effective coefficient whenever the original question requires it. The rule is $C(x) = 7x^2 - 3x + 2$ Your response: ______________	**Incoming:** $(\frac{5}{12}, -\frac{71}{24})$ Find the vertex while keeping compound fractions exact. Match the complete originally requested feature set or point. Include the axis, extremum type, or effective coefficient whenever the original question requires it. The rule is $E(x) = (\frac{2}{5})x^2 + 3x - 1$ Your response: ______________
Incoming: $(\frac{7}{15}, \frac{41}{90})$ Find the maximum point in the t-coordinate system. Match the complete originally requested feature set or point. Include the axis, extremum type, or effective coefficient whenever the original question requires it. The rule is $H(t) = -(\frac{2}{3})t^2 + 4t + 1$ Your response: ______________	**START** Use the standard-form coefficients to compute the vertex. Match the complete originally requested feature set or point. Include the axis, extremum type, or effective coefficient whenever the original question requires it. The rule is $q(x) = 3x^2 - 12x + 10$ Your response: ______________
Incoming: axis: $y = -\frac{7}{2}$; vertex: $(-\frac{7}{2}, -11)$ Interpret the negated input inside the square and identify the vertex. Match the complete originally requested feature set or point. Include the axis, extremum type, or effective coefficient whenever the original question requires it. The rule is $V(x) = -4(0 - x)^2 + 3$ Your response: ______________	**Incoming:** $(-\frac{1}{5}, \frac{21}{5})$ Compute the maximum point from standard form. Match the complete originally requested feature set or point. Include the axis, extremum type, or effective coefficient whenever the original question requires it. The rule is $s(x) = -2x^2 + 20x - 41$ Your response: ______________

Algebra 1

Quadratic Vertex, Axis, and Intercepts

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.

Calculate the axis of symmetry and vertex. Choose between using the coefficient axis formula and rewriting as a completed square. Explain which is more convenient for these coefficients, then provide all originally requested features exactly and verify the vertex height.

The rule is $f(x) = x^2 - 6x + 5$

Find the vertex and write its vertical axis. Choose between using the coefficient axis formula and rewriting as a completed square. Explain which is more convenient for these coefficients, then provide all originally requested features exactly and verify the vertex height.

The rule is $g(x) = 2x^2 + 8x - 1$

Determine the vertex, axis, and whether the vertex is a maximum or minimum. Choose between using the coefficient axis formula and rewriting as a completed square. Explain which is more convenient for these coefficients, then provide all originally requested features exactly and verify the vertex height.

The rule is $p(x) = -x^2 + 4x + 7$

State the axis equation and the exact vertex. Choose between using the coefficient axis formula and rewriting as a completed square. Explain which is more convenient for these coefficients, then provide all originally requested features exactly and verify the vertex height.

The rule is $r(x) = x^2 + 10x + 21$

Quadratic Vertex, Axis, and Intercepts

Full Worked Solutions - excerpt

Worked example

Problem. Find the intercept coordinates; keep the scale factor in the y-intercept calculation.

The rule is $C(x) = (\frac{1}{2})(x+6)(x-2)$

Answer. x-intercepts: $(-6, 0), (2, 0)$; y-intercept: $(0, -6)$

Explanation and check.

The roots come from the factors. At $x = 0$, one half of $6(-2)$ is -6.

Worked example

Problem. Identify the x-axis contact point and the y-intercept.

The rule is $q(x) = 3(x+2)^2$

Answer. multiplicity: 2; x-intercepts: $(-2, 0)$; y-intercept: $(0, 12)$

Explanation and check.

The squared factor is zero only at $x = -2$ and has multiplicity 2. At $x = 0$ the output is 12.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Quadratic Function Transformations

Quadratic Function Transformations | A1-U09-P03

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Quadratic Function Transformations.

8 PDFs and a README; 66 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

Quadratic Function Transformations

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.

Write the final equation and identify the peak location. Match the complete original rule, ordered point list, or parameter set, with any required justification. Preserve the original input variable and coordinate scale.

Parent	$f(x) = x^2$
Operations	shift left 2, reflect across x-axis, shift up 6

Bank label: ______

Write the rule for the specified order. Match the complete original rule, ordered point list, or parameter set, with any required justification. Preserve the original input variable and coordinate scale.

Parent	$f(x) = x^2$
Operations	multiply outputs by $-\frac{1}{3}$, shift down 3

Bank label: ______

Write the final vertex form. Match the complete original rule, ordered point list, or parameter set, with any required justification. Preserve the original input variable and coordinate scale.

Parent	$f(x) = x^2$
Operations	shift right 4, double outputs, shift up 5

Bank label: ______

Write the exact final equation. Match the complete original rule, ordered point list, or parameter set, with any required justification. Preserve the original input variable and coordinate scale.

Parent	$f(x) = x^2$
Operations	shift left $\frac{1}{2}$, shift down $\frac{3}{2}$, multiply current outputs by 4

Bank label: ______

Algebra 1

Quadratic Function Transformations

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.

Predict the target vertex and axis.

<table>
<tr><td>Reference</td><td><table><tr><td>Rule</td><td>$f(x) = x^2$</td></tr><tr><td>Vertex</td><td>0, 0</td></tr></table></td></tr>
<tr><td>Target relation</td><td>$g(x) = f(x - 3) + 2$</td></tr>
</table>

Map the reference vertex and classify the target extremum.

<table>
<tr><td>Reference vertex</td><td>2, −1</td></tr>
<tr><td>Reference opening</td><td>up</td></tr>
<tr><td>Transformation</td><td><table><tr><td>h</td><td>0</td></tr><tr><td>a</td><td>3</td></tr><tr><td>k</td><td>4</td></tr></table></td></tr>
</table>

Predict the target x-intercepts.

Reference roots	−2, 2
Target relation	$g(x) = f(x - 3)$

Predict the new x-intercepts.

Reference	$f(x) = x^2$
Target relation	$g(x) = f(x) - 4$

Predict the target vertex and extremum type.

Reference vertex	−1, −3
Reference extremum	minimum
Target relation	$g(x) = -f(x) + 2$

Predict the target vertex and x-intercepts using the supplied old level.

<table>
<tr><td>Reference vertex</td><td>0, −5</td></tr>
<tr><td>Reference level points</td><td><table><tr><td>y</td><td>−2</td></tr><tr><td>Points</td><td>−3, −2, 3, −2</td></tr></table></td></tr>
<tr><td>Target relation</td><td>$g(x) = f(x) + 2$</td></tr>
</table>

Algebra 1

Quadratic Function Transformations

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: $g(x) = 2x^2 + 6$

Write the final rule and preserve the operation order. Match the complete original rule, ordered point list, or parameter set, with any required justification. Preserve the original input variable and coordinate scale.

Parent	$f(x) = x^2$
Operations	multiply outputs by 2, shift the resulting graph up 3

Your response: ____________

Incoming: $g(x) = 5x^2 - 2$

Write and simplify the final rule. Match the complete original rule, ordered point list, or parameter set, with any required justification. Preserve the original input variable and coordinate scale.

Parent	$f(x) = x^2$
Operations	shift up 3, multiply all current outputs by 2

Your response: ____________

Incoming: a: 2; h: 2; k: 1

Recover the complete parameter triple. Match the complete original rule, ordered point list, or parameter set, with any required justification. Preserve the original input variable and coordinate scale.

Target vertex	2, −3
Target point	4, 5
Model	g(x)=a(x-h)^2+k

Your response: ____________

Incoming: a: $\frac{1}{2}$; h: 1; k: −1

Find a and write the target rule. Match the complete original rule, ordered point list, or parameter set, with any required justification. Preserve the original input variable and coordinate scale.

Target vertex	−1, −8
Target root	1
Model	$a(x + 1)^2 - 8$

Your response: ____________

Incoming: $g(x) = 3(x - 2)^2 + 1$

Compose the ordered changes into one formula. Match the complete original rule, ordered point list, or parameter set, with any required justification. Preserve the original input variable and coordinate scale.

Parent	$f(x) = x^2$
Operations	shift left 1, shift down 2, multiply current outputs by −2, shift up 3

Your response: ____________

Incoming: $g(x) = -2(x + 1)^2 + 7$

Write the exact final rule. Match the complete original rule, ordered point list, or parameter set, with any required justification. Preserve the original input variable and coordinate scale.

Parent	$f(x) = x^2$
Operations	reflect outputs, shift up 5, multiply all current outputs by $\frac{1}{2}$

Your response: ____________

Algebra 1

Quadratic Function Transformations

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.

Write the transformed quadratic rule. Choose how to organize the work: apply the listed operations to the rule one at a time, or track the horizontal center, vertical scale, and vertical offset through that same sequence. Explain your choice and obtain the original requested rule without changing operation order.

Parent	$f(x) = x^2$
Operations	shift right 3, shift up 2

Write an equation for the final graph. Choose how to organize the work: apply the listed operations to the rule one at a time, or track the horizontal center, vertical scale, and vertical offset through that same sequence. Explain your choice and obtain the original requested rule without changing operation order.

Parent	$f(x) = x^2$
Operations	reflect across the x-axis, shift left 4

Translate the ordered operations into a target formula. Choose how to organize the work: apply the listed operations to the rule one at a time, or track the horizontal center, vertical scale, and vertical offset through that same sequence. Explain your choice and obtain the original requested rule without changing operation order.

Parent	$f(x) = x^2$
Operations	compress vertically by factor $\frac{1}{2}$, shift down 5

Write the target quadratic. Choose how to organize the work: apply the listed operations to the rule one at a time, or track the horizontal center, vertical scale, and vertical offset through that same sequence. Explain your choice and obtain the original requested rule without changing operation order.

Parent	$f(x) = x^2$
Operations	shift left 2, shift up 7

Quadratic Function Transformations

Full Worked Solutions - excerpt

Worked example

Problem. Predict the target vertex and x-axis contact.

Reference vertex	$-1, -4$
Target relation	$g(x) = f(x-3)+4$

Answer. axis: x = 2; multiplicity: 2; vertex: 2, 0; x intercepts: 2 and 0

Explanation and check.

The vertex shifts right 3 and up 4 to the x-axis, so it becomes a double-root tangent point.

Worked example

Problem. Decide whether the target has any real x-intercepts.

Reference range	[2,infinity)
Target relation	$g(x) = f(x-1)+3$

Answer. no real x-intercepts

Explanation and check.

A target zero would require the old output -3, but -3 is outside the reference range [2 ,infinity).

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Converting Quadratics to Vertex Form

Converting Quadratics to Vertex Form | A1-U09-P04

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Converting Quadratics to Vertex Form.

8 PDFs and a README; 56 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

Converting Quadratics to Vertex Form

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.

Complete the inner square and scale its compensation. Match the complete requested vertex form. Preserve the outside coefficient and compensating constant; the expanded standard form alone is not the requested response.

Standard	$3x^2 + 18x + 20$

Bank label: ______

Convert the downward-opening quadratic. Match the complete requested vertex form. Preserve the outside coefficient and compensating constant; the expanded standard form alone is not the requested response.

Standard	$-3x^2 + 24x + 1$

Bank label: ______

Express the scaled perfect square in vertex form. Match the complete requested vertex form. Preserve the outside coefficient and compensating constant; the expanded standard form alone is not the requested response.

Standard	$4x^2 - 24x + 36$

Bank label: ______

Rewrite without a trailing zero constant. Match the complete requested vertex form. Preserve the outside coefficient and compensating constant; the expanded standard form alone is not the requested response.

Standard	$-4x^2 - 16x - 16$

Bank label: ______

Convert and retain the remainder after the scaled square. Match the complete requested vertex form. Preserve the outside coefficient and compensating constant; the expanded standard form alone is not the requested response.

Standard	$6x^2 - 12x + 8$

Bank label: ______

Rewrite to reveal the left-shifted vertex. Match the complete requested vertex form. Preserve the outside coefficient and compensating constant; the expanded standard form alone is not the requested response.

Standard	$-6x^2 - 36x - 50$

Bank label: ______

Convert and compute the scaled correction. Match the complete requested vertex form. Preserve the outside coefficient and compensating constant; the expanded standard form alone is not the requested response.

Standard	$7x^2 + 28x + 19$

Bank label: ______

Write the exact vertex form. Match the complete requested vertex form. Preserve the outside coefficient and compensating constant; the expanded standard form alone is not the requested response.

Standard	$-7x^2 + 28x - 11$

Bank label: ______

Algebra 1

Converting Quadratics to Vertex Form

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.

Fill both equal blanks.

Trace	$x^2 + 4x + 9 = (x^2 + 4x +$ _____ - _____ $) + 9 = (x + 2)^2 + 5$

What number belongs in both blanks?

Trace	$x^2 - 6x + 1 = (x^2 - 6x +$ _____ $)-$ _____ $+1 = (x - 3)^2 - 8$

Algebra 1

Converting Quadratics to Vertex Form

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: $(x + \frac{7}{2})^2 - \frac{69}{4}$

Complete the square for $x^2 + x$. Match the complete requested vertex form. Preserve the outside coefficient and compensating constant; the expanded standard form alone is not the requested response.

Standard	$x^2 + x$

Your response: ______________

Incoming: $(x + 12)^2 - 1$

Extract the completed square from the trinomial. Match the complete requested vertex form. Preserve the outside coefficient and compensating constant; the expanded standard form alone is not the requested response.

Standard	$x^2 - 24x + 160$

Your response: ______________

Incoming: $(x - \frac{9}{2})^2 - \frac{81}{4}$

Rewrite using a single rational vertical offset. Match the complete requested vertex form. Preserve the outside coefficient and compensating constant; the expanded standard form alone is not the requested response.

Standard	$x^2 + 7x - 5$

Your response: ______________

Incoming: $(x + \frac{11}{2})^2 - \frac{41}{4}$

Convert and include an exact form that expands back to 50 as the constant. Match the complete requested vertex form. Preserve the outside coefficient and compensating constant; the expanded standard form alone is not the requested response.

Standard	$x^2 + 15x + 50$

Your response: ______________

Incoming: $(x - 11)^2 + 1$

Write vertex form and show the one-unit deficit. Match the complete requested vertex form. Preserve the outside coefficient and compensating constant; the expanded standard form alone is not the requested response.

Standard	$x^2 + 24x + 143$

Your response: ______________

Incoming: $(x + \frac{1}{2})^2 - \frac{1}{4}$

Rewrite and keep all constants as fractions. Match the complete requested vertex form. Preserve the outside coefficient and compensating constant; the expanded standard form alone is not the requested response.

Standard	x^2-$x + 6$

Your response: ______________

Algebra 1

Converting Quadratics to Vertex Form

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.

Rewrite the quadratic in vertex form. Choose how to organize the conversion: insert and compensate a square-completing term, or compare coefficients with a squared-binomial form. Explain which route suits the coefficients, then give the original requested vertex form and verify it.

Standard	$x^2 + 6x + 5$

Complete the square and state the equivalent vertex form. Choose how to organize the conversion: insert and compensate a square-completing term, or compare coefficients with a squared-binomial form. Explain which route suits the coefficients, then give the original requested vertex form and verify it.

Standard	$x^2 - 8x + 19$

Put $x^2 + 10x$ into vertex form without changing its values. Choose how to organize the conversion: insert and compensate a square-completing term, or compare coefficients with a squared-binomial form. Explain which route suits the coefficients, then give the original requested vertex form and verify it.

Standard	$x^2 + 10x$

Find the vertex form and identify the final constant. Choose how to organize the conversion: insert and compensate a square-completing term, or compare coefficients with a squared-binomial form. Explain which route suits the coefficients, then give the original requested vertex form and verify it.

Standard	$x^2 - 4x - 12$

Converting Quadratics to Vertex Form

Full Worked Solutions - excerpt

Worked example

Problem. Complete the final equality.

Trace	$x^2 + 8x + 3 = (x+4)^2 - 16 + 3 = (x+4)^2 +$ ____

Answer. -13

Explanation and check.

Combine -16 and 3.

Worked example

Problem. Use the last equality to recover the original constant c.

Trace	$4x^2 - 16x + c = 4[(x-2)^2 - 4] + c = 4(x-2)^2 + 9$

Answer. 25

Explanation and check.

The final constant is $c - 16$, so $c - 16 = 9$.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Quadratic Zeros and Factored Form

Quadratic Zeros and Factored Form | A1-U09-P05

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Quadratic Zeros and Factored Form.

8 PDFs and a README; 109 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

Quadratic Zeros and Factored Form

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.

State the zero and its multiplicity. Match the complete original zero set, factored function, contact description, or parameter solution set. Preserve multiplicity and any required orientation or verification.

Function	$g(x) = (x - 4)^2$

Bank label: ______

Express the rule as repeated factors and state the zero data. Match the complete original zero set, factored function, contact description, or parameter solution set. Preserve multiplicity and any required orientation or verification.

Function	$f(x) = 5x^2$

Bank label: ______

Give the zero and multiplicity. Match the complete original zero set, factored function, contact description, or parameter solution set. Preserve multiplicity and any required orientation or verification.

Function	$f(x) = (4x + 1)^2$

Bank label: ______

State all zero information, including multiplicity. Match the complete original zero set, factored function, contact description, or parameter solution set. Preserve multiplicity and any required orientation or verification.

Function	$f(x) = -9(2x - 5)(2x - 5)$

Bank label: ______

Algebra 1

Quadratic Zeros and Factored Form

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.

Identify the zeros and explain the role of 7.

Function	$f(x) = 7(x-1)(x-6)$

Give the x-intercepts from the factored rule.

Function	$f(x) = -2(x+1)(x-8)$

Determine the x-intercepts.

Function	$f(x) = (5-x)(3x+6)$

State where outputs are positive, negative, and zero.

Function	$f(x) = (x+2)(x-5)$

Give the sign pattern across the two zeros.

Function	$f(x) = -3(x-1)(x-4)$

Describe the sign on both sides of the double root.

Function	$f(x) = 2(x+3)^2$

Algebra 1

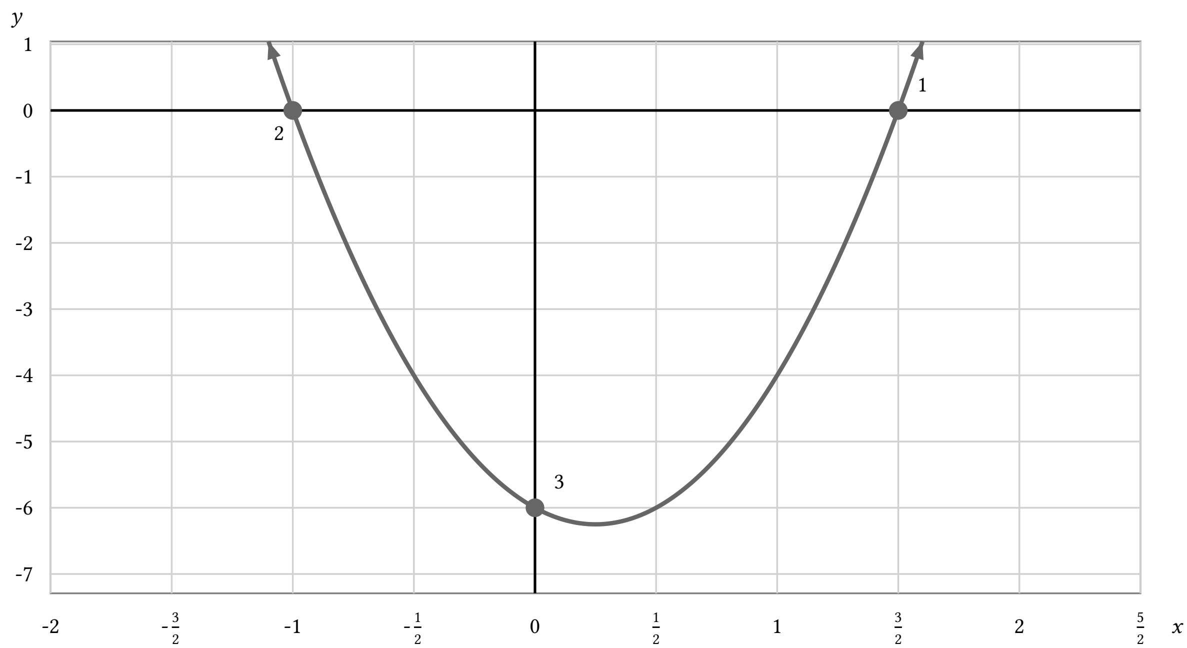
Quadratic Zeros and Factored Form

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: $f(x) = 6(x - \frac{1}{3})(x - 2)$

Give a factored rule using integer-coefficient linear factors. Match the complete original zero set, factored function, contact description, or parameter solution set. Preserve multiplicity and any required orientation or verification.



Marker	Exact coordinate	Boundary status
1	$(\frac{3}{2}, 0)$	included
2	$(-1, 0)$	included
3	$(0, -6)$	included

Graph	X intercepts	$\frac{3}{2}, 0, -1, 0$
	Exact point	$0, -6$
Scales	x	$\frac{1}{2}$
	y	1

Your response: ____________

Algebra 1

Quadratic Zeros and Factored Form

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.

Construct the quadratic in factored form. Choose between using the root factors with one unknown scale or solving for standard-form coefficients from the same data. Explain which setup is more economical, then give the originally requested factored rule and verify the point and roots.

Zeros	-2, 3
Point	0, -6

Use the two zero rows and the remaining row to find the rule. Choose between using the root factors with one unknown scale or solving for standard-form coefficients from the same data. Explain which setup is more economical, then give the originally requested factored rule and verify the point and roots.

Input	**Output**
1	0
5	0
0	10

Quadratic Zeros and Factored Form

Full Worked Solutions - excerpt

Worked example

Problem. Normalize the factors and give the complete sign chart.

Function	$f(x) = (4x + 8)(3x - 9)$

Answer. negative: $(-2, 3)$; positive: $(-\text{infinity}, -2)$ union $(3, \text{infinity})$; zero: -2, 3

Explanation and check.

The factors are $4(x + 2)$ and $3(x - 3)$; their scalar product is positive.

Worked example

Problem. State the sign without treating 4 as two interval boundaries.

Function	$f(x) = (2x - 8)(5x - 20)$

Answer. negative: none; positive: $(-\text{infinity}, 4)$ union $(4, \text{infinity})$; zero: 4

Explanation and check.

Both factors are positive multiples of $x - 4$, so their product is a positive square multiple.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Comparing Forms of Quadratic Functions

Comparing Forms of Quadratic Functions | A1-U09-P06

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Comparing Forms of Quadratic Functions.

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.

Published by Tusils LLC.

Algebra 1

Comparing Forms of Quadratic Functions

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.

Select the equivalent factored form. Match the complete expression, feature values, or parameter values requested below; show the requested verification. The standard form is $x^2 - 5x + 6$. Compare the proposed factored forms $(x-2)(x-3)$; $(x+2)(x+3)$.

Bank label: ______

Choose the equivalent vertex form. Match the complete expression, feature values, or parameter values requested below; show the requested verification. The standard form is $x^2 + 6x + 5$. Compare the proposed vertex forms $(x+3)^2 - 4$; $(x-3)^2 - 4$.

Bank label: ______

Verify whether the three representations agree.

Label	Supplied expression or information
standard	$-2x^2 + 8x - 6$
vertex	$-2(x-2)^2 + 2$
factored	$-2(x-1)(x-3)$

Bank label: ______

Which candidate matches the standard form? Match the complete expression, feature values, or parameter values requested below; show the requested verification. The standard form is $3x^2 - 15x + 18$.

Label	Supplied expression or information
A	$(x-2)(x-3)$
B	$3(x-2)(x-3)$

Bank label: ______

Algebra 1

Comparing Forms of Quadratic Functions

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.

Choose the representation and state the roots.

Label	Supplied expression or information
standard	$6x^2 + x - 2$
factored	$(3x + 2)(2x - 1)$

Which form should be read, and what is the vertex?

Label	Supplied expression or information
standard	$3x^2 + 12x + 8$
vertex	$3(x + 2)^2 - 4$

Choose the representation that preserves the units and answer the question. The context is height $h(t)$ in feet. Determine initial height at $t = 0$.

Label	Supplied expression or information
standard	$-16t^2 + 48t + 6$
vertex	$-16(t - \frac{3}{2})^2 + 42$

Which form decides the claim immediately? Determine whether $x = 5$ is a zero.

Label	Supplied expression or information
standard	$2x^2 - 6x - 20$
factored	$2(x - 5)(x + 2)$

Select the single form that shows both requested features. Determine opening direction and extreme output.

Label	Supplied expression or information
standard	$-2x^2 + 20x - 41$
vertex	$-2(x - 5)^2 + 9$

Which available form best answers the feature question? Determine minimum value.

Label	Supplied expression or information
standard	$x^2 + 4x + 8$
vertex	$(x + 2)^2 + 4$
real factored	does not exist

Algebra 1

Comparing Forms of Quadratic Functions

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: b: -16; c: 9

Find a and k. Match the complete expression, feature values, or parameter values requested below; show the requested verification.

Label	**Supplied expression or information**
standard	$ax^2 + 18x + 20$
vertex	$a(x + 3)^2 + k$

Your response: ______________________

Incoming: factored form: $(x\text{-}m)(x - 2)$; zeros: m, 2

Give the minimum and minimizers in terms of r. Use $f(x) = 2(x\text{-}r)(x + r)$. Restrict x to $[0, \infty)$. Let r be real. Determine minimum on domain.

Your response: ______________________

Incoming: p: 3; q: -12

Choose and perform the useful conversion. Use $h(x) = x^2 - 7x + 12$. Determine zeros.

Your response: ______________________

Incoming: factored form: $(x - 3)(x - 4)$; zeros: 3, 4

State the range and explain why no conversion is needed. Use $f(x) = -4(x + 1)^2 + 9$. Determine range.

Your response: ______________________

Incoming: factored form: $-2(x - 3)(x + 2)$; positive: $(-2, 3)$

Find the range with a minimal vertex calculation. Use $f(x) = 5(x + 2)(x - 4)$. Determine range.

Your response: ______________________

Incoming: factored form: $(3x + 2)(2x - 1)$; zeros: $-\frac{2}{3}$, $\frac{1}{2}$

Factor and answer the sign question. Use $f(x) = -2x^2 + 2x + 12$. Determine positive-output interval.

Your response: ______________________

Algebra 1

Comparing Forms of Quadratic Functions

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.

Which supplied form reveals the requested feature most directly? Justify the form choice from the requested feature and the supplied expressions, then complete the original feature reading. Preserve the supplied alternatives and any restrictions. Determine y-intercept.

Label	Supplied expression or information
standard	$2x^2 - 5x + 7$
vertex	$2(x - \frac{5}{4})^2 + \frac{31}{8}$
factored	not supplied

Choose the form that answers the question immediately. Justify the form choice from the requested feature and the supplied expressions, then complete the original feature reading. Preserve the supplied alternatives and any restrictions. Determine minimum value.

Label	Supplied expression or information
standard	$x^2 - 6x + 11$
vertex	$(x - 3)^2 + 2$

Comparing Forms of Quadratic Functions

Full Worked Solutions - excerpt

Worked example

Problem. Convert directly from vertex to factored form. Use $f(x) = 3(x+1)^2 - 27$. Determine zeros.

Answer. factored form: $3(x-2)(x+4)$; zeros: -4, 2

Explanation and check.

Factor $3[(x+1)^2 - 9] = 3[(x+1)-3][(x+1)+3]$.

Worked example

Problem. Find a purposeful factorization and state the roots. Use $f(x) = x^2 - (m+2)x + 2m$. Determine zeros in terms of m.

Answer. factored form: $(x - m)(x-2)$; zeros: m, 2

Explanation and check.

The required sum is $m+2$ and product $2m$, so the factors separate as $x - m$ and $x-2$.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Solving Quadratics by Factoring

Solving Quadratics by Factoring | A1-U09-P07

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Solving Quadratics by Factoring.

8 PDFs and a README; 49 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

Solving Quadratics by Factoring

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.

Solve the product equation and list both roots. Match the complete solution set while showing the original required normalized equation, factorization and zero-product branches. Equation: $(x-2)(x+5)=0$ Bank label: ______	Find the complete solution set without dividing by x. Match the complete solution set while showing the original required normalized equation, factorization and zero-product branches. Equation: $x(x-7)=0$ Bank label: ______
Solve each linear factor equation. Match the complete solution set while showing the original required normalized equation, factorization and zero-product branches. Equation: $(2x-3)(x+1)=0$ Bank label: ______	Explain whether the outside -3 changes the roots. Match the complete solution set while showing the original required normalized equation, factorization and zero-product branches. Equation: $-3(x+2)(x-6)=0$ Bank label: ______
Solve by separating the two factor equations. Match the complete solution set while showing the original required normalized equation, factorization and zero-product branches. Equation: $(x-9)(x+9)=0$ Bank label: ______	Keep every root of the product. Match the complete solution set while showing the original required normalized equation, factorization and zero-product branches. Equation: $4x(3x+2)=0$ Bank label: ______
Solve the nonmonic factor equations exactly. Match the complete solution set while showing the original required normalized equation, factorization and zero-product branches. Equation: $(3x+4)(2x-5)=0$ Bank label: ______	Account for the reversed second factor. Match the complete solution set while showing the original required normalized equation, factorization and zero-product branches. Equation: $7(x-3)(5\text{-}x)=0$ Bank label: ______

Algebra 1

Solving Quadratics by Factoring

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.

Give the distinct real solution and its multiplicity. Equation: $(x + 4)^2 = 0$	State the distinct root and multiplicity. Equation: $(5x + 1)^2 = 0$
How many distinct solutions are there? Equation: $-(x - 1)(x - 1) = 0$	Find the root represented twice. Equation: $(7 - 2x)^2 = 0$
Recognize duplicate roots from opposite factors. Equation: $(4x + 5)(-4x - 5) = 0$	State the repeated solution exactly. Equation: $(\frac{x}{3} - 5)^2 = 0$

Algebra 1

Solving Quadratics by Factoring

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: factorization: $(-\frac{x}{7})(5-3x)$; solutions: $0, \frac{5}{3}$

Factor the nonmonic trinomial and solve exactly. Match the complete solution set while showing the original required normalized equation, factorization and zero-product branches.

Equation: $2x^2+7x+3=0$

Your response: ____________

Incoming: factorization: $(3x+1)(x-2)$; solutions: $-\frac{1}{3}, 2$

Use nonmonic linear factors to solve. Match the complete solution set while showing the original required normalized equation, factorization and zero-product branches.

Equation: $6x^2+x-2=0$

Your response: ____________

Incoming: cross terms: $-15x+8x=-7x$; factorization: $(3x+4)(2x-5)=0$; solutions: $-\frac{4}{3}, \frac{5}{2}$

Factor with product -120 and solve. Match the complete solution set while showing the original required normalized equation, factorization and zero-product branches.

Equation: $20x^2+7x-6=0$

Your response: ____________

Incoming: factorization: $2(2x-1)(2x+1)$; solutions: $-\frac{1}{2}, \frac{1}{2}$

Factor by coordinating the cross terms. Match the complete solution set while showing the original required normalized equation, factorization and zero-product branches.

Equation: $10x^2-17x+3=0$

Your response: ____________

Incoming: factorization: $(x+8)(x+3)$; solutions: $-8, -3$

Use two factors with leading term $2x$. Match the complete solution set while showing the original required normalized equation, factorization and zero-product branches.

Equation: $4x^2+4x-15=0$

Your response: ____________

Incoming: factorization: $5(x-3)(x+3)$; solutions: $-3, 3$

Factor completely before solving. Match the complete solution set while showing the original required normalized equation, factorization and zero-product branches.

Equation: $3x^2+12x+9=0$

Your response: ____________

Algebra 1

Solving Quadratics by Factoring

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.

Factor the trinomial and solve. Choose a factoring setup: test integer binomial factor pairs directly, or split the middle term using a product-sum pair. Explain which is efficient for this equation, then finish the original factor-and-solve task with every zero-product branch.

Equation: $x^2 + 5x + 6 = 0$

Use a factor pair with product -12. Choose a factoring setup: test integer binomial factor pairs directly, or split the middle term using a product-sum pair. Explain which is efficient for this equation, then finish the original factor-and-solve task with every zero-product branch.

Equation: $x^2 - x - 12 = 0$

Recognize the difference of squares and solve. Choose a factoring setup: test integer binomial factor pairs directly, or split the middle term using a product-sum pair. Explain which is efficient for this equation, then finish the original factor-and-solve task with every zero-product branch.

Equation: $x^2 - 9 = 0$

Factor and report distinct roots. Choose a factoring setup: test integer binomial factor pairs directly, or split the middle term using a product-sum pair. Explain which is efficient for this equation, then finish the original factor-and-solve task with every zero-product branch.

Equation: $x^2 + 8x + 16 = 0$

Solving Quadratics by Factoring

Full Worked Solutions - excerpt

Worked example

Problem. A student factors correctly as $(2x+1)(x+3)$ but solves only $2x+1=0$. Complete the reasoning.

Answer. factorization: $(2x+1)(x+3)=0$; first error: the factor $x+3$ was never set to zero; solutions: -3, $-\frac{1}{2}$

Explanation and check.

Zero-product reasoning is a union of both factor equations, so -3 must be added to $-\frac{1}{2}$.

Worked example

Problem. A student claims $(x+4)(x+3)=0$. Find the first mismatch and repair the solution.

Equation: $x^2+x-12=0$ Student Factorization: $(x+4)(x+3)=0$

Answer. correct factorization: $(x+4)(x-3)=0$; first error: the claimed factors expand to $x^2+7x+12$; solutions: -4, 3

Explanation and check.

The constant must be -12 and the linear coefficient $+1$; constants 4 and -3 meet both conditions.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Solving Quadratics by Square Roots

Solving Quadratics by Square Roots | A1-U09-P08

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Solving Quadratics by Square Roots.

8 PDFs and a README; 51 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

Solving Quadratics by Square Roots

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.

Solve over the real numbers and show both branches. Match the complete exact real solution set. Show the steps that isolate the square and include every real branch. Keep radicals exact. Solve $x^2 = 16$ over the real numbers. Bank label: ______	How many distinct real solutions are there? Match the complete exact real solution set. Show the steps that isolate the square and include every real branch. Keep radicals exact. Solve $x^2 = 0$ over the real numbers. Bank label: ______
Classify the real solution set before attempting a square root. Match the complete exact real solution set. Show the steps that isolate the square and include every real branch. Keep radicals exact. Solve $x^2 = -9$ over the real numbers. Bank label: ______	Distinguish the principal square root from the equation solutions. Match the complete exact real solution set. Show the steps that isolate the square and include every real branch. Keep radicals exact. Solve $x^2 = 1$ over the real numbers. Bank label: ______
List the complete real solution set. Match the complete exact real solution set. Show the steps that isolate the square and include every real branch. Keep radicals exact. Solve $x^2 = 49$ over the real numbers. Bank label: ______	Use square-root branches to solve. Match the complete exact real solution set. Show the steps that isolate the square and include every real branch. Keep radicals exact. Solve $x^2 = 25$ over the real numbers. Bank label: ______
Find and verify both roots. Match the complete exact real solution set. Show the steps that isolate the square and include every real branch. Keep radicals exact. Solve $x^2 = 100$ over the real numbers. Bank label: ______	State both real roots rather than only the radical value. Match the complete exact real solution set. Show the steps that isolate the square and include every real branch. Keep radicals exact. Solve $x^2 = 4$ over the real numbers. Bank label: ______

Algebra 1

Solving Quadratics by Square Roots

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.

Determine the number of real roots. Solve $x^2 = -36$ over the real numbers.	Classify the equation in the real domain. Solve $x^2 = -\frac{4}{9}$ over the real numbers.
Decide whether any real branch exists. Solve $x^2 = -0.49$ over the real numbers.	Use sign evidence to classify real solvability. Solve $x^2 = -\frac{121}{9}$ over the real numbers.
Determine the real solution count. Solve $x^2 = -0.0001$ over the real numbers.	Separate perfect-square magnitude from the sign classification. Solve $x^2 = -\frac{289}{64}$ over the real numbers.

Algebra 1

Solving Quadratics by Square Roots

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: x = -2 or $x = 4$

Separate the outer operations from the final translation. Match the complete exact real solution set. Show the steps that isolate the square and include every real branch. Keep radicals exact.

Solve $3(x + 4)^2 + 2 = 29$ over the real numbers.

Your response: ____________

Incoming: x = -1 or $x = 7$

Interpret the plus sign inside the square correctly. Match the complete exact real solution set. Show the steps that isolate the square and include every real branch. Keep radicals exact.

Solve $(x + 5)^2 = 9$ over the real numbers.

Your response: ____________

Incoming: x = -8 or $x = -2$

Determine whether the branch notation creates distinct roots. Match the complete exact real solution set. Show the steps that isolate the square and include every real branch. Keep radicals exact.

Solve $(x - 4)^2 = 0$ over the real numbers.

Your response: ____________

Incoming: x = $-\frac{17}{10}$ or $x = \frac{17}{10}$

Control the subtraction and the negative decimal divisor. Match the complete exact real solution set. Show the steps that isolate the square and include every real branch. Keep radicals exact.

Solve $-0.8x^2 + 1.25 = -2.982$ over the real numbers.

Your response: ____________

Incoming: x = $-\frac{20}{9}$ or $x = \frac{20}{9}$

Find the common-denominator isolation and all real roots. Match the complete exact real solution set. Show the steps that isolate the square and include every real branch. Keep radicals exact.

Solve $(\frac{7}{3})x^2 + \frac{5}{6} = \frac{599}{84}$ over the real numbers.

Your response: ____________

Incoming: x = $-\frac{19}{10}$ or $x = \frac{19}{10}$

Invert the fractional scale, then take square roots. Match the complete exact real solution set. Show the steps that isolate the square and include every real branch. Keep radicals exact.

Solve $(\frac{81}{4})x^2 + 6 = 106$ over the real numbers.

Your response: ____________

Algebra 1

Solving Quadratics by Square Roots

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.

Isolate x squared before taking both square-root branches. Choose whether to remove the additive term before dividing by the square coefficient, or divide the whole equation by that nonzero coefficient first. Justify the cleaner arithmetic, then isolate the square and finish both branches as originally requested.

Solve $8x^2 + 3 = 53$ over the real numbers.

Preserve equality through both inverse operations and solve. Choose whether to remove the additive term before dividing by the square coefficient, or divide the whole equation by that nonzero coefficient first. Justify the cleaner arithmetic, then isolate the square and finish both branches as originally requested.

Solve $18x^2 - 7 = 91$ over the real numbers.

Determine whether the two sign branches remain distinct. Choose whether to remove the additive term before dividing by the square coefficient, or divide the whole equation by that nonzero coefficient first. Justify the cleaner arithmetic, then isolate the square and finish both branches as originally requested.

Solve $4x^2 + 13 = 13$ over the real numbers.

Track the negative coefficient while isolating the square. Choose whether to remove the additive term before dividing by the square coefficient, or divide the whole equation by that nonzero coefficient first. Justify the cleaner arithmetic, then isolate the square and finish both branches as originally requested.

Solve $-25x^2 + 8 = -56$ over the real numbers.

Solving Quadratics by Square Roots

Full Worked Solutions - excerpt

Worked example

Problem. Isolate the middle squared term, then branch.

Solve $7 - 2(x-4)^2 = 5$ over the real numbers.

Answer. branches: $x - 4 = \pm 1$; center: 4; radius squared: 1; real solution count: 2; solutions: 3, 5

Explanation and check.

Subtract 7 and divide by -2 to find $(x-4)^2 = 1$. Therefore x is 3 or 5.

Worked example

Problem. Determine the number of real roots.

Solve $x^2 = -36$ over the real numbers.

Answer. isolated square value: -36; real solution count: 0; No real solutions

Explanation and check.

Because x squared is at least zero for every real x, there are no real roots.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Solving Quadratics by Completing the Square

Solving Quadratics by Completing the Square | A1-U09-P09

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Solving Quadratics by Completing the Square.

8 PDFs and a README; 62 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

Solving Quadratics by Completing the Square

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.

Complete the square and solve the symmetric integer branches. Match the complete exact real solution set and show every originally requested square isolation, equality-preserving step, and branch. Do not replace exact radicals with decimals. Work over the real numbers with $x^2 + 16x + 60 = 0$. Bank label: ______	Find the center and both roots using equality-preserving additions. Match the complete exact real solution set and show every originally requested square isolation, equality-preserving step, and branch. Do not replace exact radicals with decimals. Work over the real numbers with $x^2 - 14x + 40 = 0$. Bank label: ______
Preserve the exact nonsquare distance from the completed center. Match the complete exact real solution set and show every originally requested square isolation, equality-preserving step, and branch. Do not replace exact radicals with decimals. Work over the real numbers with $x^2 + 18x + 70 = 0$. Bank label: ______	Complete the square with a negative linear term. Match the complete exact real solution set and show every originally requested square isolation, equality-preserving step, and branch. Do not replace exact radicals with decimals. Work over the real numbers with $x^2 - 2x - 10 = 0$. Bank label: ______
Build the square and simplify the exact solution statement. Match the complete exact real solution set and show every originally requested square isolation, equality-preserving step, and branch. Do not replace exact radicals with decimals. Work over the real numbers with $x^2 + 12x + 29 = 0$. Bank label: ______	Use the fractional half-coefficient and give exact roots. Match the complete exact real solution set and show every originally requested square isolation, equality-preserving step, and branch. Do not replace exact radicals with decimals. Work over the real numbers with $x^2 + 3x - 1 = 0$. Bank label: ______
Complete the square without rounding the half-integer center. Match the complete exact real solution set and show every originally requested square isolation, equality-preserving step, and branch. Do not replace exact radicals with decimals. Work over the real numbers with $x^2 - 5x + 2 = 0$. Bank label: ______	Track the quarter fractions created by the odd coefficient. Match the complete exact real solution set and show every originally requested square isolation, equality-preserving step, and branch. Do not replace exact radicals with decimals. Work over the real numbers with $x^2 + 7x + 3 = 0$. Bank label: ______

Algebra 1

Solving Quadratics by Completing the Square

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.

Supply the omitted line and finish the partial solution. Work over the real numbers with $x^2 + 6x = 7$. $x^2 + 6x = 7$ ____________ $(x+3)^2 = 16$	Fill the equality-preserving completion step. Work over the real numbers with $x^2 - 8x = -7$. $x^2 - 8x = -7$ ____________ $(x-4)^2 = 9$
Supply the normalization line that must precede square completion. Work over the real numbers with $2x^2 + 12x = 10$. $2x^2 + 12x = 10$ ____________ $x^2 + 6x + 9 = 5 + 9$	Repair the trace by supplying the omitted signed branch. Work over the real numbers with $x^2 + 4x - 5 = 0$. $(x+2)^2 = 9$ $x + 2 = 3$ $x = 1$
Determine the fractional amount missing from both sides. Work over the real numbers with $x^2 + 5x = 2$. $x^2 + 5x = 2$ $x^2 + 5x +$ ______ $= 2 +$ ______	Replace the trinomial with its equivalent squared-binomial form. Work over the real numbers with $x^2 - 6x + 9 = 14$. $x^2 - 6x + 9 = 14$ ____________ $x - 3 = \pm\sqrt{14}$

Algebra 1

Solving Quadratics by Completing the Square

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: amount added to each side: $\frac{25}{16}$; completed square equation: $(x - \frac{5}{4})^2 = \frac{31}{16}$; real solution count: 2; solutions: $\frac{5-\sqrt{31}}{4}$, $\frac{5+\sqrt{31}}{4}$; square root radicand: $\frac{31}{16}$

Recognize the repeated root created by a rational completion amount. Match the complete exact real solution set and show every originally requested square isolation, equality-preserving step, and branch. Do not replace exact radicals with decimals.

Work over the real numbers with $x^2 + (\frac{7}{5})x + \frac{49}{100} = 0$.

Your response: ______________________

Incoming: amount added to each side: $\frac{9}{16}$; completed square equation: $(x + \frac{3}{4})^2 = \frac{33}{16}$; real solution count: 2; solutions: $\frac{-3-\sqrt{33}}{4}$, $\frac{-3+\sqrt{33}}{4}$; square root radicand: $\frac{33}{16}$

Normalize the leading coefficient before completing the square. Match the complete exact real solution set and show every originally requested square isolation, equality-preserving step, and branch. Do not replace exact radicals with decimals.

Work over the real numbers with $2x^2 + 8x + 1 = 0$.

Your response: ______________________

Incoming: amount added after normalizing: 1; completed square equation: $(x - 1)^2 = \frac{8}{5}$; leading coefficient divisor: 5; normalized equation: $x^2 - 2x - \frac{3}{5} = 0$; real solution count: 2; solutions: $1 - 2 \cdot \frac{\sqrt{10}}{5}$, $1 + 2 \cdot \frac{\sqrt{10}}{5}$; square root radicand: $\frac{8}{5}$

Use normalization to expose the repeated root. Match the complete exact real solution set and show every originally requested square isolation, equality-preserving step, and branch. Do not replace exact radicals with decimals.

Work over the real numbers with $2x^2 - 4x + 2 = 0$.

Your response: ______________________

Incoming: amount added after normalizing: $\frac{25}{4}$; completed square equation: $(x - \frac{5}{2})^2 = \frac{13}{12}$; leading coefficient divisor: 6; normalized equation: $x^2 - 5x + \frac{31}{6} = 0$; real solution count: 2; solutions: $\frac{5}{2}$-$\frac{\sqrt{39}}{6}$, $\frac{5}{2} + \frac{\sqrt{39}}{6}$; square root radicand: $\frac{13}{12}$

Normalize the odd linear coefficient and solve exactly. Match the complete exact real solution set and show every originally requested square isolation, equality-preserving step, and branch. Do not replace exact radicals with decimals.

Work over the real numbers with $4x^2 + 20x + 11 = 0$.

Your response: ______________________

Incoming: amount added after normalizing: $\frac{9}{4}$; completed square equation: $(x + \frac{3}{2})^2 = \frac{1}{4}$; leading coefficient divisor: 10; normalized equation: $x^2 + 3x + 2 = 0$; real solution count: 2; solutions: -2, -1; square root radicand: $\frac{1}{4}$

Normalize and simplify the small exact radius. Match the complete exact real solution set and show every originally requested square isolation, equality-preserving step, and branch. Do not replace exact radicals with decimals.

Work over the real numbers with $12x^2 - 24x + 11 = 0$.

Your response: ______________________

START

Rearrange the constants and use the completed-square sign to classify roots. Match the complete exact real solution set and show every originally requested square isolation, equality-preserving step, and branch. Do not replace exact radicals with decimals.

Work over the real numbers with $x^2 - 5x + 9 = 2$.

Your response: ______________________

Algebra 1

Solving Quadratics by Completing the Square

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.

Complete the square and keep both exact radical branches. Choose between adding the completing quantity to both sides and inserting a compensating pair on the left before isolating the square. Justify the clearer equality-preserving route, then solve by the requested square completion.

Work over the real numbers with $x^2 + 6x + 1 = 0$.

Use half the linear coefficient to build the square. Choose between adding the completing quantity to both sides and inserting a compensating pair on the left before isolating the square. Justify the clearer equality-preserving route, then solve by the requested square completion.

Work over the real numbers with $x^2 - 4x - 3 = 0$.

Show the equal addition that creates a perfect-square trinomial. Choose between adding the completing quantity to both sides and inserting a compensating pair on the left before isolating the square. Justify the clearer equality-preserving route, then solve by the requested square completion.

Work over the real numbers with $x^2 + 8x + 5 = 0$.

Complete the square and simplify the resulting radical. Choose between adding the completing quantity to both sides and inserting a compensating pair on the left before isolating the square. Justify the clearer equality-preserving route, then solve by the requested square completion.

Work over the real numbers with $x^2 - 10x + 7 = 0$.

Solving Quadratics by Completing the Square

Full Worked Solutions - excerpt

Worked example

Problem. Use normalization to expose the repeated root. Match the complete exact real solution set and show every originally requested square isolation, equality-preserving step, and branch. Do not replace exact radicals with decimals.

Work over the real numbers with $2x^2 - 4x + 2 = 0$.

Answer. amount added after normalizing: 1; completed square equation: $(x-1)^2 = 0$; leading coefficient divisor: 2; normalized equation: $x^2 - 2x + 1 = 0$; real solution count: 1; solutions: 1; square root radicand: 0

Explanation and check.

Dividing by 2 already displays the perfect square $x^2 - 2x + 1$. Its only root is $x = 1$.

Worked example

Problem. Show how negative normalization reveals a zero radius. Match the complete exact real solution set and show every originally requested square isolation, equality-preserving step, and branch. Do not replace exact radicals with decimals.

Work over the real numbers with $-5x^2 + 20x - 20 = 0$.

Answer. amount added after normalizing: 4; completed square equation: $(x-2)^2 = 0$; leading coefficient divisor: -5; normalized equation: $x^2 - 4x + 4 = 0$; real solution count: 1; solutions: 2; square root radicand: 0

Explanation and check.

Every term divided by -5 gives the perfect square $x^2 - 4x + 4$. Hence $x = 2$ is repeated.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Quadratic Formula

Quadratic Formula | A1-U09-P10

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Quadratic Formula.

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

Quadratic Formula

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.

Consider $4x^2 + 9 = 12x$ over the real numbers. Rewrite with zero on one side and identify the coefficient used for -*b*. Use the quadratic formula, show your substitution and simplification, and match the complete exact real solution set. Bank label: ______	Consider $x(x - 3) = 10$ over the real numbers. Expand the product and normalize before filling the formula slots. Use the quadratic formula, show your substitution and simplification, and match the complete exact real solution set. Bank label: ______
Consider $2x(x + 4) = 3$ over the real numbers. Distribute the outside factors and determine the signed constant after normalization. Use the quadratic formula, show your substitution and simplification, and match the complete exact real solution set. Bank label: ______	Consider $(x - 2)(x + 5) = 7$ over the real numbers. Expand, combine the product constant with the right-side value, and then identify coefficients. Use the quadratic formula, show your substitution and simplification, and match the complete exact real solution set. Bank label: ______
Consider $3(x^2 - 2) = x + 1$ over the real numbers. Remove grouping and collect both right-side terms before entering a, b, and c. Use the quadratic formula, show your substitution and simplification, and match the complete exact real solution set. Bank label: ______	Consider $(x + 1)^2 = 8$ over the real numbers. Convert the square to standard zero form for a formula substitution. Use the quadratic formula, show your substitution and simplification, and match the complete exact real solution set. Bank label: ______
Consider $5x^2 = 2(x + 3)$ over the real numbers. Distribute the right side and move its two terms with the correct signs. Use the quadratic formula, show your substitution and simplification, and match the complete exact real solution set. Bank label: ______	Consider $0.5x^2 - 1.5x = 2$ over the real numbers. Keep the fractional coefficients rather than clearing them, and normalize c correctly. Use the quadratic formula, show your substitution and simplification, and match the complete exact real solution set. Bank label: ______

Algebra 1

Quadratic Formula

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.

Consider $6x - 5 = 2x^2$ over the real numbers. Place the quadratic term first without losing the signs of the other terms.

Consider 4-$x(x + 2) = 0$ over the real numbers. Use an equivalent positive-leading normalization and state the coefficient triple it creates.

Consider -$(x - 4)^2 = 3x - 20$ over the real numbers. Expand the leading negative square, collect, and choose a positive-leading zero form.

Consider $x^2 + x - 1 = 0$ over the real numbers. Round the final approximations to 2 decimal places. Report the exact pair first and then fill a hundredths-and-residual table.

branch	**exact root**	**rounded to 2 places**	**absolute residual**
Smaller root	______	______	______
Larger root	______	______	______

Consider $2x^2$-$x - 2 = 0$ over the real numbers. Round the final approximations to 2 decimal places. Approximate each branch to the nearest hundredth and substitute the rounded results.

branch	**exact root**	**rounded to 2 places**	**absolute residual**
Smaller root	______	______	______
Larger root	______	______	______

Consider $3x^2 - 2x - 2 = 0$ over the real numbers. Round the final approximations to 2 decimal places. Simplify the exact radical before giving hundredth approximations.

Algebra 1

Quadratic Formula

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.

START Consider $8x^2 + 2x - 3 = 0$ over the real numbers. Evaluate the radical 10 and reduce the two sixteenth-denominator branches. Use the quadratic formula, show your substitution and simplification, and match the complete exact real solution set. Your response: ____________	**Incoming:** $\{1, \frac{7}{2}\}$ Consider $3x^2 - 5x = 2x^2 + 6$ over the real numbers. Collect the quadratic terms first and apply the formula to the net leading coefficient. Use the quadratic formula, show your substitution and simplification, and match the complete exact real solution set. Your response: ____________
Incoming: $\{1\}$ Consider $16x^2 + 24x + 9 = 0$ over the real numbers. Evaluate the formula at a zero discriminant with an even denominator reduction. Use the quadratic formula, show your substitution and simplification, and match the complete exact real solution set. Your response: ____________	**Incoming:** $\{-1, \frac{7}{2}\}$ Consider $(3x - 2)^2 = 25$ over the real numbers. Expand the affine square and solve the resulting quadratic by the complete formula. Use the quadratic formula, show your substitution and simplification, and match the complete exact real solution set. Your response: ____________
Incoming: $\{-2 - \sqrt{3}, -2 + \sqrt{3}\}$ Consider $2x^2 - 3x - 1 = 0$ over the real numbers. State the exact formula roots when the positive discriminant has no square factor. Use the quadratic formula, show your substitution and simplification, and match the complete exact real solution set. Your response: ____________	**Incoming:** $\{-2, 3\}$ Consider $3x^2 - 12 = 0$ over the real numbers. Use $a = 3$ and $b = 0$ directly rather than simplifying the equation first. Use the quadratic formula, show your substitution and simplification, and match the complete exact real solution set. Your response: ____________

Algebra 1

Quadratic Formula

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.

Consider $2x^2 + 3x - 5 = 0$ over the real numbers. Read a, b, and c with their signs, then write the full quadratic-formula substitution. Choose how to organize the arithmetic: calculate the discriminant first and then insert it, or write the complete signed formula substitution before simplifying any component. Justify your choice for these coefficients, then show the coefficients and the full formula substitution.

Consider $4x^2 - 9 = 0$ over the real numbers. Insert the absent term explicitly before setting up the formula. Choose how to organize the arithmetic: calculate the discriminant first and then insert it, or write the complete signed formula substitution before simplifying any component. Justify your choice for these coefficients, then show the coefficients and the full formula substitution.

Consider $-x^2 + 6x + 7 = 0$ over the real numbers. Keep the displayed leading sign and form the denominator $2a$. Choose how to organize the arithmetic: calculate the discriminant first and then insert it, or write the complete signed formula substitution before simplifying any component. Justify your choice for these coefficients, then show the coefficients and the full formula substitution.

Consider $3x^2 - 8x + 2 = 0$ over the real numbers. Record the coefficient triple and the unsimplified radical expression. Choose how to organize the arithmetic: calculate the discriminant first and then insert it, or write the complete signed formula substitution before simplifying any component. Justify your choice for these coefficients, then show the coefficients and the full formula substitution.

Quadratic Formula

Full Worked Solutions - excerpt

Worked example

Problem. Consider $6x - 5 = 2x^2$ over the real numbers. Place the quadratic term first without losing the signs of the other terms.

Answer. coefficients: a: 2; b: -6; c: 5; discriminant: -4; formula substitution: x = $\frac{-(-6)\pm\sqrt{(-6)^2-4(2)(5)}}{2(2)}$; normalized equation: $2x^2 - 6x + 5 = 0$; solutions:

Explanation and check.

Subtracting the left side from both sides gives $2x^2 - 6x + 5 = 0$, so $a = 2, b = -6, c = 5$.

Worked example

Problem. Consider $(x + 1)^2 = 8$ over the real numbers. Convert the square to standard zero form for a formula substitution. Use the quadratic formula, show your substitution and simplification, and match the complete exact real solution set.

Answer. $\{-1 + 2 \cdot \sqrt{2}, \ -2 \cdot \sqrt{2} - 1\}$

Explanation and check.

The signed coefficients are $a = 1, b = 2, c = -7$. In standard form, $x^2 + 2x - 7 = 0$. The discriminant is 32. Substitution in the quadratic formula gives $x = \frac{-(2)\pm\sqrt{(2)^2-4(1)(-7)}}{2(1)}$. Expanding gives $x^2 + 2x + 1 = 8$; moving 8 left gives $c = -7$ while $b = 2$.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Discriminant and Real Roots

Discriminant and Real Roots | A1-U09-P11

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Discriminant and Real Roots.

8 PDFs and a README; 89 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

Discriminant and Real Roots

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.

Consider $x^2 - 5x + 6 = 0$. The coefficients are real. Compute only the discriminant and state the number of distinct real roots. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots. Bank label: ______	Consider $x^2 + 4x + 4 = 0$. The coefficients are real. Classify the real roots from b squared minus $4ac$, without finding the root. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots. Bank label: ______
Consider $x^2 + 2x + 5 = 0$. The coefficients are real. Use the sign of the formula radicand to classify this equation. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots. Bank label: ______	Consider $2x^2 - 3x - 2 = 0$. The coefficients are real. Determine the distinct real-root count from the discriminant alone. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots. Bank label: ______
Consider $2x^2 + x + 2 = 0$. The coefficients are real. Calculate the discriminant sign and interpret it over the reals. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots. Bank label: ______	Consider $x^2 - 9 = 0$. The coefficients are real. Insert the absent linear coefficient and classify by discriminant sign. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots. Bank label: ______
Consider $x^2 + 9 = 0$. The coefficients are real. Make $b = 0$ explicit before determining the real-root count. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots. Bank label: ______	Consider $-2x^2 - 3x - 5 = 0$. The coefficients are real. Track all three signs and classify the roots without multiplying by -1. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots. Bank label: ______

Algebra 1

Discriminant and Real Roots

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.

Consider $0x^2 + 5x - 1 = 0$. The coefficients are real. Explain why the quadratic discriminant classification is unavailable here.	Consider $-x^2 + 4x - 4 = 0$. The coefficients are real. Retain the negative leading coefficient and evaluate the discriminant.
Consider $4x^2 - 12x + 9 = 0$. The coefficients are real. Check whether the two discriminant terms cancel for this scaled equation.	Consider $(\frac{1}{3})x^2 + (\frac{2}{3})x + \frac{1}{3} = 0$. The coefficients are real. Compute the rational discriminant exactly and classify distinct roots.
Consider $7x^2 = 0$. The coefficients are real. Account for both missing terms and count distinct real roots.	Consider $3(x - 2)^2 = 6x - 15$. The coefficients are real. Expand the square, collect the external linear expression, and classify the resulting contact.

Algebra 1

Discriminant and Real Roots

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: D = 41; two distinct irrational roots.

Consider $4x^2 + 3x - 1 = x^2 - 2x + 1$. The coefficients are rational. Collect both polynomials and classify the two exact roots arithmetically. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots.

Your response: ______________________________

Algebra 1

Discriminant and Real Roots

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.

Consider $x^2 + 4x + k = 0$. Let k be real. Partition all real k by the number of distinct real roots. Choose a classification route: analyze the discriminant inequality, or normalize to a square and analyze its right-hand side. Explain which gives simpler parameter conditions here; first separate any value that makes the equation nonquadratic.

Consider $2x^2 + 3x + k = 0$. Let k be real. Find the exact constant threshold for zero, one, and two real roots. Choose a classification route: analyze the discriminant inequality, or normalize to a square and analyze its right-hand side. Explain which gives simpler parameter conditions here; first separate any value that makes the equation nonquadratic.

Consider $3x^2 - 6x + k = 0$. Let k be real. Use the discriminant to classify every real k without solving any quadratic. Choose a classification route: analyze the discriminant inequality, or normalize to a square and analyze its right-hand side. Explain which gives simpler parameter conditions here; first separate any value that makes the equation nonquadratic.

Consider $-x^2 + 2x + k = 0$. Let k be real. Track the inequality direction for a parameter with negative leading coefficient. Choose a classification route: analyze the discriminant inequality, or normalize to a square and analyze its right-hand side. Explain which gives simpler parameter conditions here; first separate any value that makes the equation nonquadratic.

Discriminant and Real Roots

Full Worked Solutions - excerpt

Worked example

Problem. Consider $-3x^2 + x + 1 = 0$. The coefficients are rational. Use the positive nonsquare discriminant to classify exact root type. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots.

Answer. D = 13; two distinct irrational roots.

Explanation and check.

The discriminant calculation is $(1)^2 - 4(-3)(1) = 13$. Its square root is $\sqrt{13}$. The coefficients are rational, but $\sqrt{13}$ is not, so both real roots are irrational. The discriminant is 13; its square root is $\sqrt{13}$, so the equation has two distinct irrational roots.

Worked example

Problem. Consider $2x^2 - 8 = 0$. The coefficients are rational. Insert $b = 0$ and determine whether the symmetric roots are rational. Match the discriminant and the requested root classification or graph contact. Classify without solving for the roots.

Answer. D = 64; two distinct rational roots.

Explanation and check.

The discriminant calculation is $(0)^2 - 4(2)(-8) = 64$. Its square root is 8. The discriminant 64 has rational radical 8. The discriminant is 64; its square root is 8, so the equation has two distinct rational roots.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Quadratic Word Problems

Quadratic Word Problems | A1-U09-P12

96 problems · Four activity formats

Topic focus

This topic is a focused set of 96 practice tasks on Quadratic Word Problems.

8 PDFs and a README; 126 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

Quadratic Word Problems

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.

A rectangular herb plot has 46 meters of edging. Let w be its width. Build the area function, state its square-meter unit, and give the open domain that keeps both dimensions positive. Match the complete original model with its requested units, meaningful domain and interpretation or verification. The coefficient polynomial alone is not the complete contextual response.

Context	A rectangular herb plot uses all 46 meters of edging on four sides.
Variable definition	w is the width in meters
Length unit	meters
Area unit	square meters

Bank label: ______

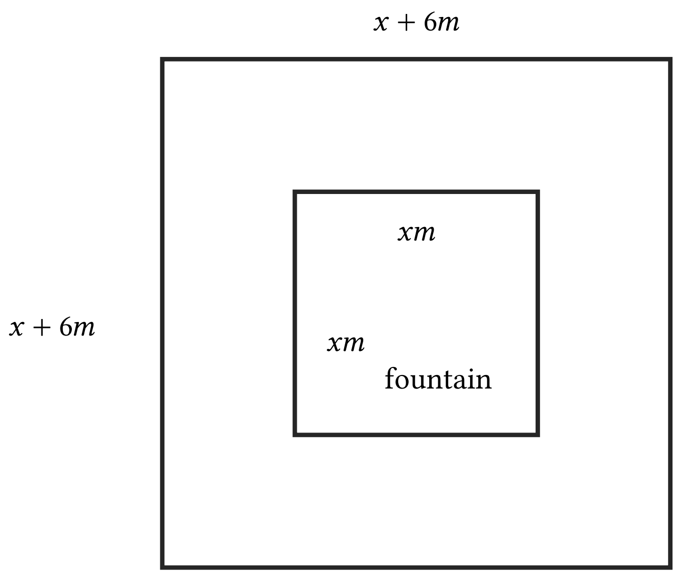
Algebra 1

Quadratic Word Problems

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.

A centered square fountain has side x, and the surrounding square plaza has side $x + 6$ meters. Build the walkable ring-area model by distinguishing the two dependent squares.



Context	A square plaza of side $x + 6$ meters surrounds a centered square fountain of side x meters.
Variable definition	x is the fountain side length in meters
Length unit	meters
Area unit	square meters

Algebra 1

Quadratic Word Problems

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: feasible domain: $0 \le x \le 20$; x is an integer; model: $R(x) = (12 + x)(180 - 9x)$; output unit: dollars

A concert forecast pairs each 2-dollar discount with 16 additional ticket sales, starting from 30 dollars and 240 sales. Model revenue by discount count d and prevent a negative ticket price. Match the complete original model with its requested units, meaningful domain and interpretation or verification. The coefficient polynomial alone is not the complete contextual response.

Context	A fictional concert sells 240 tickets at 30 dollars; every 2-dollar discount adds 16 predicted sales.
Variable definition	d is the number of 2-dollar discounts
Factor relations	price=$30 - 2d$ dollars, tickets=$240 + 16d$
Output unit	dollars

Your response: ____________________________________

Incoming: feasible domain: $0 \le d \le 15$; d is an integer; model: $R(d) = (30 - 2d)(240 + 16d)$; output unit: dollars

A table is organized by blocks of five extra tour visitors. Starting from 20 visitors at 28 dollars each, every added block lowers everyone's rate by 1 dollar. Write total income in b and preserve the block-count domain. Match the complete original model with its requested units, meaningful domain and interpretation or verification. The coefficient polynomial alone is not the complete contextual response.

additional blocks	visitors	rate (dollars/visitor)	income (dollars)
0	20	28	560
4	40	24	960
12	80	16	1280

Context	A fictional museum tour charges 28 dollars per visitor for 20 visitors and lowers the per-person rate by 1 dollar for each additional block of 5 visitors.
Variable definition	b is the number of additional 5-visitor blocks
Factor relations	visitors=$20 + 5b$, rate=28-b dollars per visitor
Output unit	dollars

Your response: ____________________________________

Algebra 1

Quadratic Word Problems

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.

The exact table has $R(0) = 2, R(1) = 6$, and $R(2) = 14$. Given $R(x) = ax^2 + bx + 2$, recover a and b and verify the row at $x = 2$. Choose a calibration setup: use the known initial value to reduce the coefficient unknowns first, or write the full observation equations and eliminate systematically. Explain which setup is more economical for these data, then complete the original model and verification requirements.

input	**output (response units)**
0	2
1	6
2	14

Context	A sensor response follows $R(x) = ax^2 + bx + 2$.
Variable definition	x is the input setting
Known initial value	$R(0) = 2$
Measurement unit	response units

For $Q(x) = ax^2 + bx + 5$, the table gives $Q(-1) = 4$ and $Q(1) = 8$. Add and subtract the equations to recover the even and odd contributions. Choose a calibration setup: use the known initial value to reduce the coefficient unknowns first, or write the full observation equations and eliminate systematically. Explain which setup is more economical for these data, then complete the original model and verification requirements.

input	**output (calibration units)**
-1	4
0	5
1	8

Context	A calibration curve is $Q(x) = ax^2 + bx + 5$.
Variable definition	x is signed control offset
Known initial value	$Q(0) = 5$
Measurement unit	calibration units

Quadratic Word Problems

Full Worked Solutions - excerpt

Worked example

Problem. A model multiplies 2 meters by x centimeters and labels $2x$ as square meters. Repair the unit conversion and area rule.

Context	A panel is 2 meters wide and x centimeters tall.
Supplied rule	area equals width times height
Proposed argument	$A(x) = 2x$ square meters.

Answer. correction: convert x centimeters to $\frac{x}{100}$ meters, so $A(x) = \frac{x}{50}$ square meters; defect: the factors use incompatible length units; evidence: x centimeters = $\frac{x}{100}$ meters, $2(\frac{x}{100}) = \frac{x}{50}$

Explanation and check.

Convert the height before multiplying: x centimeters is $\frac{x}{100}$ meters. The area is $2(\frac{x}{100}) = \frac{x}{50}$ square meters.

Worked example

Problem. A student treats $A(15) = -45$ as a possible rectangular area for $A = x(12 - x)$. Identify the first contextual failure and repair the domain.

Context	A rectangle has width x meters and length 12-x meters.
Supplied rule	$A(x) = x(12 - x)$
Proposed argument	Use $x = 15$ because the algebra returns $A(15) = -45$.

Answer. correction: restrict the geometry to $0 < x < 12$; negative area is not a physical rectangle; defect: x = 15 makes the dependent length -3 meters; evidence: $12 - 15 = -3$ meters, valid dimensions must be positive

Explanation and check.

At $x = 15$ the other side is -3 meters, so no rectangle exists. The correct model domain is $0 < x < 12$; the negative algebraic output is outside that domain.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Linear-Quadratic Systems

Linear-Quadratic Systems | A1-U09-P13

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for feasible equal-output events with units, complete set of real ordered pairs, diagnosis and complete corrected ordered-pair set and complete parameter partition by 0, 1, or 2 intersections.

8 PDFs and a README; 79 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

Linear-Quadratic Systems

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.

$f(x) = -2x^2 - 3x + 10$ and $g(x) = -3x + 2$. Determine the complete real solution set of this line-quadratic system, then check each coordinate in both rules. Match the complete ordered-pair set, or the constructed line with all requested contact points. Keep every original substitution check.

Quadratic rule	$f(x) = -2x^2 - 3x + 10$
Line rule	$g(x) = -3x + 2$
Required check	each ordered pair must satisfy both displayed rules

Bank label: ____

$f(x) = x^2 - 9x + 3$ and $g(x) = -4x + 3$. Solve for the common inputs and recover the matching output for each one. Give points, not roots alone. Match the complete ordered-pair set, or the constructed line with all requested contact points. Keep every original substitution check.

Quadratic rule	$f(x) = x^2 - 9x + 3$
Line rule	$g(x) = -4x + 3$
Required check	each ordered pair must satisfy both displayed rules

Bank label: ____

$f(x) = x^2 + 4x - 7$ and $g(x) = 2x + 1$. Locate all real intersections algebraically and verify that every reported point lies on both relations. Match the complete ordered-pair set, or the constructed line with all requested contact points. Keep every original substitution check.

Quadratic rule	$f(x) = x^2 + 4x - 7$
Line rule	$g(x) = 2x + 1$
Required check	each ordered pair must satisfy both displayed rules

Bank label: ____

$f(x) = -x^2 + 13$ and $g(x) = 4$. First decide whether there are zero, one, or two real intersections; then report all ordered pairs. Match the complete ordered-pair set, or the constructed line with all requested contact points. Keep every original substitution check.

Quadratic rule	$f(x) = -x^2 + 13$
Line rule	$g(x) = 4$
Required check	each ordered pair must satisfy both displayed rules

Bank label: ____

Algebra 1

Linear-Quadratic Systems

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.

$f(x) = 3x^2 + \frac{7}{2}x + \frac{19}{4}$ and $g(x) = \frac{1}{2}x + 2$. Locate all real intersections algebraically and verify that every reported point lies on both relations.

Quadratic rule	$f(x) = 3x^2 + \frac{7}{2}x + \frac{19}{4}$
Line rule	$g(x) = \frac{1}{2}x + 2$
Required check	each ordered pair must satisfy both displayed rules

$f(x) = -x^2 + 9x - 15$ and $g(x) = 3x - 4$. Find every ordered pair shared by the line and the parabola. Show the equation obtained by equating their outputs.

Quadratic rule	$f(x) = -x^2 + 9x - 15$
Line rule	$g(x) = 3x - 4$
Required check	each ordered pair must satisfy both displayed rules

$f(x) = \frac{3}{2}x^2 - \frac{1}{3}x - \frac{1}{4}$ and $g(x) = \frac{5}{3}x - \frac{7}{4}$. Use the most revealing exact method for the difference equation and state the full intersection set.

Quadratic rule	$f(x) = \frac{3}{2}x^2 - \frac{1}{3}x - \frac{1}{4}$
Line rule	$g(x) = \frac{5}{3}x - \frac{7}{4}$
Required check	each ordered pair must satisfy both displayed rules

Where does $x = 0$ meet $y = -x^2 + 2x + 5$? Treat the line as a fixed input rather than trying to write it as $y = mx + b$.

Quadratic rule	$y = -x^2 + 2x + 5$
Line relation	$x = 0$

Algebra 1

Linear-Quadratic Systems

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: points: (x: -3; y: $\frac{19}{2}$); real intersection count: 1

Find all points where $y = x^2$ reaches the horizontal line $y = 9$. Match the complete ordered-pair set, or the constructed line with all requested contact points. Keep every original substitution check.

Quadratic rule	$y = x^2$
Line relation	$y = 9$

Your response: ______________________

Incoming: points: (x: -2; y: 5); real intersection count: 1

The line $x = \frac{1}{2}$ cannot be isolated as a y-function. Substitute its exact input into $y = 2x^2 - 3x + 1$ and report the point. Match the complete ordered-pair set, or the constructed line with all requested contact points. Keep every original substitution check.

Quadratic rule	$y = 2x^2 - 3x + 1$
Line relation	$x = \frac{1}{2}$

Your response: ______________________

Incoming: points: (x: $-\frac{3}{2}$; y: $-\frac{17}{4}$); real intersection count: 1

Evaluate the system $y = -2x^2 + 7x - 5$ with $x = -1$. Pay attention to the signs produced by the negative fixed input. Match the complete ordered-pair set, or the constructed line with all requested contact points. Keep every original substitution check.

Quadratic rule	$y = -2x^2 + 7x - 5$
Line relation	$x = -1$

Your response: ______________________

Incoming: points: (x: $-\frac{1}{2}$; y: $\frac{3}{2}$), (x: $\frac{1}{2}$; y: $\frac{3}{2}$); real intersection count: 2

Solve the fixed-output system formed by $y = -2x^2 + 4$ and $y = \frac{7}{2}$, giving ordered pairs exactly. Match the complete ordered-pair set, or the constructed line with all requested contact points. Keep every original substitution check.

Quadratic rule	$y = -2x^2 + 4$
Line relation	$y = \frac{7}{2}$

Your response: ______________________

Incoming: points: (x: $\frac{1}{2}$; y: 3), (x: 2; y: 6); real intersection count: 2

Reduce or isolate the line $4x + 2y = 6$, then coordinate its outputs with $y = 2x^2 + 2x - 3$. Match the complete ordered-pair set, or the constructed line with all requested contact points. Keep every original substitution check.

Quadratic rule	$y = 2x^2 + 2x - 3$
Line relation	$4x + 2y = 6$

Your response: ______________________

Incoming: points: ; real intersection count: 0

Report the ordered pair common to $y = -2x^2$-$x + 4$ and the non-isolated line relation $x = 1$. Match the complete ordered-pair set, or the constructed line with all requested contact points. Keep every original substitution check.

Quadratic rule	$y = -2x^2$-$x + 4$
Line relation	$x = 1$

Your response: ______________________

Algebra 1

Linear-Quadratic Systems

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.

$f(x) = x^2 + 2x - 4$ and $g(x) = x + 2$. Find every ordered pair shared by the line and the parabola. Show the equation obtained by equating their outputs. After equating the outputs as requested, choose factoring or the quadratic formula for the resulting equation. Justify the choice from its coefficients, then recover every shared ordered pair and verify both original rules.

Quadratic rule	$f(x) = x^2 + 2x - 4$
Line rule	$g(x) = x + 2$
Required check	each ordered pair must satisfy both displayed rules

---

$f(x) = -x^2 + 3x + 5$ and $g(x) = 2x - 1$. Solve for the common inputs and recover the matching output for each one. Give points, not roots alone. After equating the outputs as requested, choose factoring or the quadratic formula for the resulting equation. Justify the choice from its coefficients, then recover every shared ordered pair and verify both original rules.

Quadratic rule	$f(x) = -x^2 + 3x + 5$
Line rule	$g(x) = 2x - 1$
Required check	each ordered pair must satisfy both displayed rules

Linear-Quadratic Systems

Full Worked Solutions - excerpt

Worked example

Problem. Does the horizontal line $y = 3$ meet $y = x^2 - 2x + 5$ over the reals? Justify the complete intersection set.

Quadratic rule	$y = x^2 - 2x + 5$
Line relation	$y = 3$

Answer. points: ; real intersection count: 0

Explanation and check.

The horizontal condition makes $x^2 - 2x + 5 = 3$. Solving gives the listed input value(s); each has output 3.

Worked example

Problem. Where does $x = 0$ meet $y = -x^2 + 2x + 5$? Treat the line as a fixed input rather than trying to write it as $y = mx + b$.

Quadratic rule	$y = -x^2 + 2x + 5$
Line relation	$x = 0$

Answer. points: (x: 0; y: 5); real intersection count: 1

Explanation and check.

A vertical line fixes $x = 0$. Direct evaluation of the quadratic gives $y = 5$, so the unique shared point is $(0, 5)$.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Solving Quadratics Using Graphs

Solving Quadratics Using Graphs | A1-U09-P14

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for correct difference-function graph and its zeros, justified root bracket or exact endpoint root, diagnosis and corrected graphical root statement, root conclusion and decisive exact evidence, complete set of distinct real roots and better window choice with justified precision.

8 PDFs and a README; 361 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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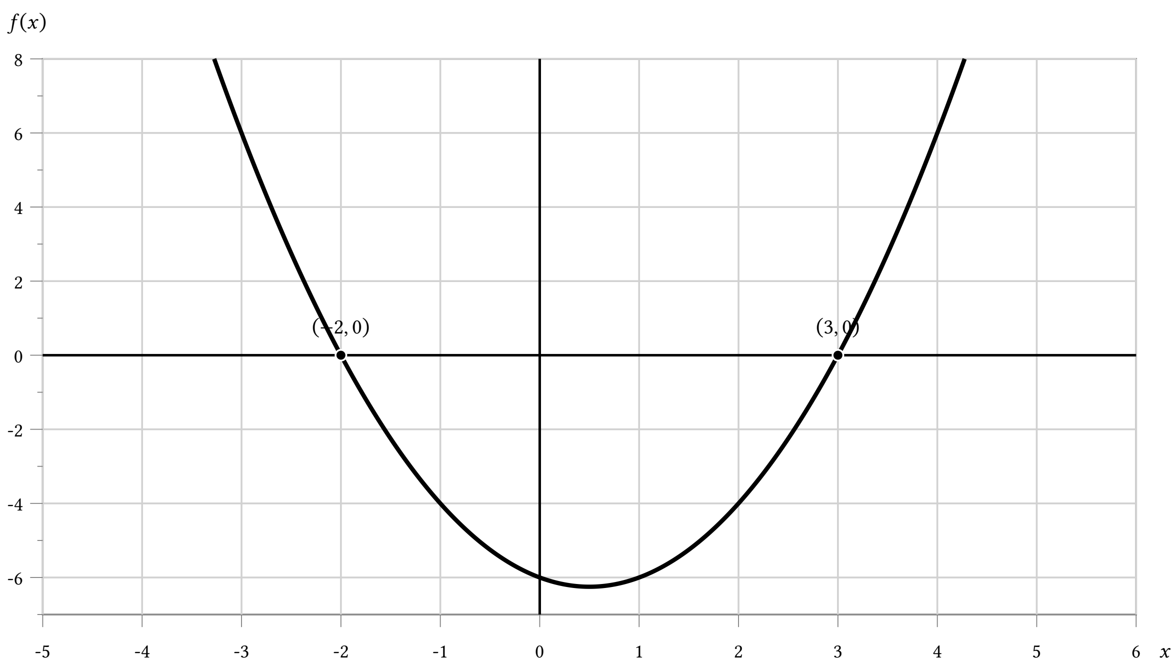
Algebra 1

Solving Quadratics Using Graphs

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.

The exact unit-grid graph of $f(x) = x^2\text{-}x - 6$ marks both x-intercepts. State the roots. Match the complete original graphical response, including the chosen zero-function graph or level and any excluded inputs where requested. Read the preserved graph at its stated precision.



Graph data	Value
Rule	$f(x) = x^2\text{-}x - 6$
Window	$x \in [-5, 6]$; $y \in [-7, 8]$
Minor tick intervals	x: 1; y: 1
Coordinate labels	exact
Axes / units	x/ units; $f(x)$/ units
Axes	Shared coordinate axes
Supplied visible labels	$(-2, 0)$; $(3, 0)$

Bank label: ______

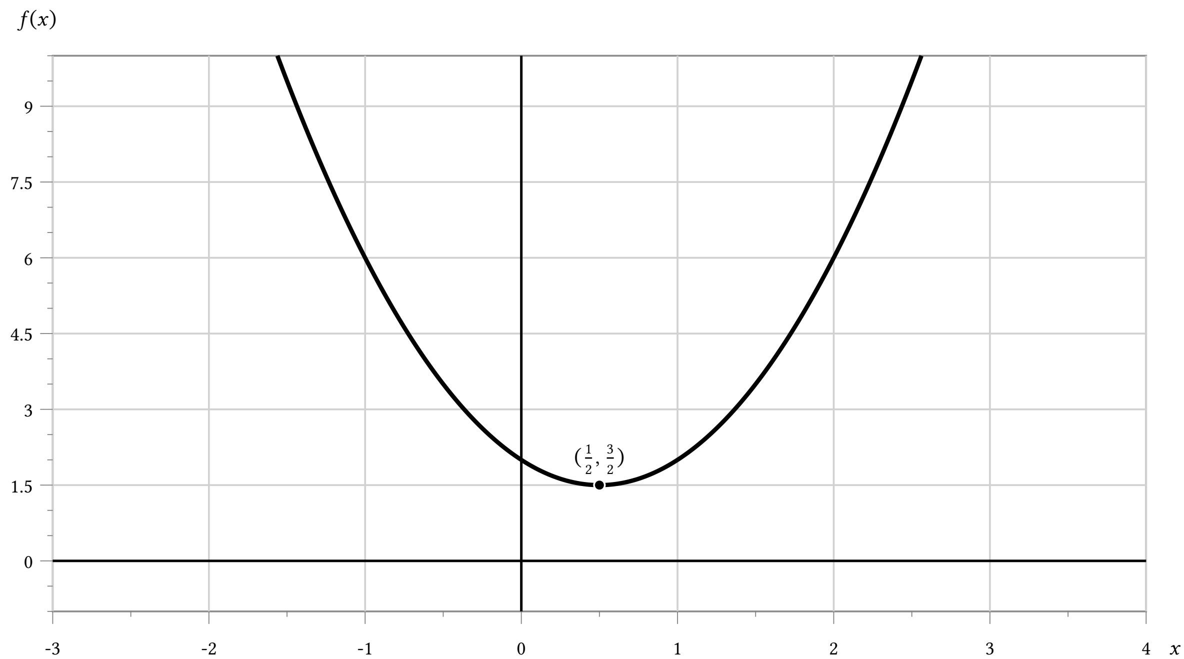
Algebra 1

Solving Quadratics Using Graphs

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.

The vertex of $f(x) = 2x^2 - 2x + 2$ is exactly labeled above $y = 0$. Use the opening to determine the root set.



Graph data	Value
Rule	$f(x) = 2x^2 - 2x + 2$
Window	$x \in [-3, 4]$; $y \in [-1, 10]$
Minor tick intervals	x: $\frac{1}{2}$; y: $\frac{1}{2}$
Coordinate labels	exact
Axes / units	x/ units; $f(x)$/ units
Axes	Shared coordinate axes
Opening	up
Certified Extremum Relative To Axis	above
Supplied visible labels	$(\frac{1}{2}, \frac{3}{2})$

Algebra 1

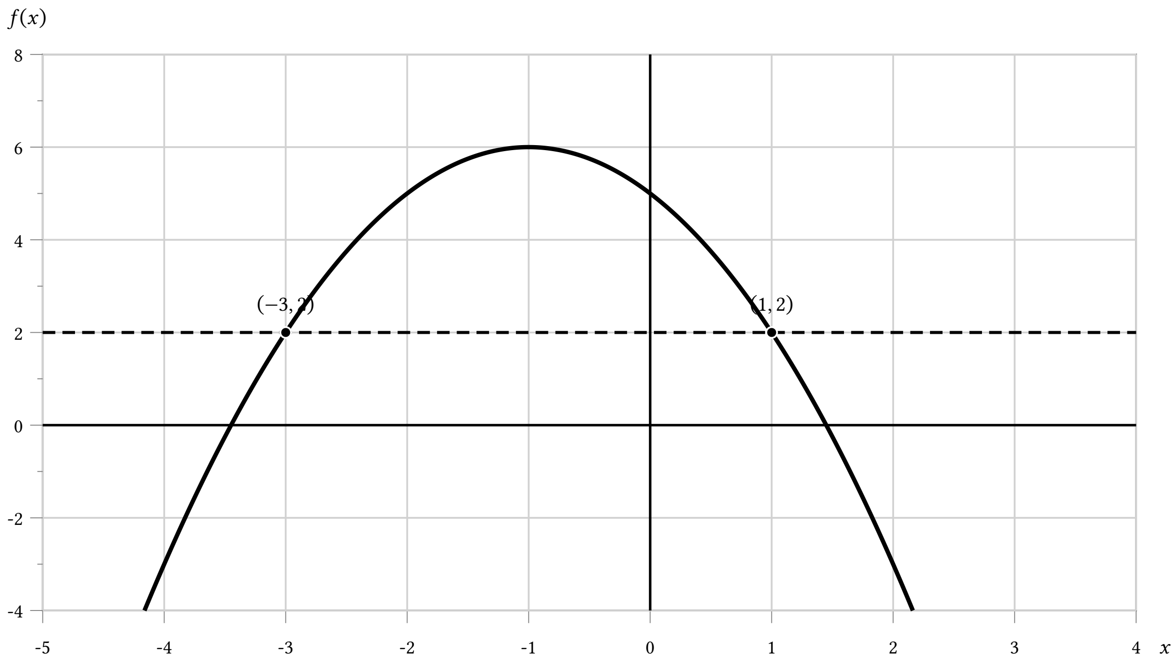
Solving Quadratics Using Graphs

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: excluded or clipped inputs: ; inputs: -1, 5; level: 10

For $f(x) = -x^2 - 2x + 5$, solve $f(x) = 2$ graphically on $-5 \le x \le 4$. The requested level lies below the maximum. Match the complete original graphical response, including the chosen zero-function graph or level and any excluded inputs where requested. Read the preserved graph at its stated precision.



Graph data	Value
Rule	$f(x) = -x^2 - 2x + 5$
Window	$x \in [-5, 4]$; $y \in [-4, 8]$
Minor tick intervals	x: 1; y: 1
Coordinate labels	exact
Axes / units	x/ units; $f(x)$/ units
Axes	Shared coordinate axes
Requested line	$y = 2$
Supplied visible labels	$(-3, 2)$; $(1, 2)$

Your response: ________________

Algebra 1

Solving Quadratics Using Graphs

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.

Near-axis data for $f(x) = x^2 - 4x + 4$ have the same sign at $x = 1$ and $x = 3$. Decide whether a tangent root is possible and cite decisive evidence. Compare what the endpoint sign test establishes with what the original exact resolving evidence establishes. Explain why equal endpoint signs alone cannot rule out a tangent root or two crossings, then answer the original root question.

Display precision: exact. Exact values and rounded displays have distinct roles.

x	**f(x)**
1	1
3	1

Near-axis data for $f(x) = -2x^2 - 4x - 2$ have the same sign at $x = -2$ and $x = 0$. Do not conclude no root from the missing sign change. Compare what the endpoint sign test establishes with what the original exact resolving evidence establishes. Explain why equal endpoint signs alone cannot rule out a tangent root or two crossings, then answer the original root question.

Display precision: exact. Exact values and rounded displays have distinct roles.

x	**f(x)**
-2	-2
0	-2

Solving Quadratics Using Graphs

Full Worked Solutions - excerpt

Worked example

Problem. Near-axis data for $f(x) = x^2 - 4x + 4$ have the same sign at $x = 1$ and $x = 3$. Decide whether a tangent root is possible and cite decisive evidence. Compare what the endpoint sign test establishes with what the original exact resolving evidence establishes. Explain why equal endpoint signs alone cannot rule out a tangent root or two crossings, then answer the original root question.

Display precision: exact. Exact values and rounded displays have distinct roles.

x	f(x)
1	1
3	1

Answer. decisive evidence: exact vertex: x: 2; y: 0; opening: up; has real root: True; roots: 2

Explanation and check.

Same-sign samples do not exclude a root. Exact vertex data show $f(2) = 0$, so $x = 2$ is a repeated root with no sign change. A sign change certifies a crossing on a continuous interval. Equal signs alone are inconclusive; use the original exact vertex, rule, or resolving evidence without inventing precision.

Worked example

Problem. Near-axis data for $f(x) = -2x^2 - 4x - 2$ have the same sign at $x = -2$ and $x = 0$. Do not conclude no root from the missing sign change. Compare what the endpoint sign test establishes with what the original exact resolving evidence establishes. Explain why equal endpoint signs alone cannot rule out a tangent root or two crossings, then answer the original root question.

Display precision: exact. Exact values and rounded displays have distinct roles.

x	f(x)
-2	-2
0	-2

Answer. decisive evidence: exact vertex: x: -1; y: 0; opening: down; has real root: True; roots: -1

Explanation and check.

Same-sign samples do not exclude a root. Exact vertex data show $f(-1) = 0$, so $x = -1$ is a repeated root with no sign change. A sign change certifies a crossing on a continuous interval. Equal signs alone are inconclusive; use the original exact vertex, rule, or resolving evidence without inventing precision.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Choosing a Quadratic Solving Method

Choosing a Quadratic Solving Method | A1-U09-P16

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for equivalence verdict, solution effect, witness, and corrected step, validity verdict, completeness verdict, corrected set, and certificate, recommended method, structural reason, and first step, chosen independent tool, independence reason, outcome, and limitation, validity, shared solution set, efficiency reason, and preferred route and constructed equation, method-sensitive justification, root set, and independent verification.

8 PDFs and a README; 70 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

Choosing a Quadratic Solving Method

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.

For $(x-4)(x+3)=0$, choose the most efficient solution method for the requirement "find all exact real roots." State the structural reason and a valid first step. Both factors must be checked. Match the complete requested strategy with its actual first-step equality or branches, constructed equation, or full set-verification response. A method label alone is insufficient. Do not carry out routine solving where the original asks only for strategy and first step. Bank label: ______	For $(x+2)^2=25$, choose the most efficient solution method for the requirement "give exact real roots." State the structural reason and a valid first step. The plus-minus symbol preserves both branches. Match the complete requested strategy with its actual first-step equality or branches, constructed equation, or full set-verification response. A method label alone is insufficient. Do not carry out routine solving where the original asks only for strategy and first step. Bank label: ______
Decide whether factoring, the square-root method, completing the square, the quadratic formula, or graphing is best for $x^2+7x+12=0$ under this answer requirement: solve exactly with minimal arithmetic. The factorization is visible without formula arithmetic. Match the complete requested strategy with its actual first-step equality or branches, constructed equation, or full set-verification response. A method label alone is insufficient. Do not carry out routine solving where the original asks only for strategy and first step. Bank label: ______	Select a solution route for $x^2-2x-7=0$ that respects this precision demand: estimate roots to the nearest tenth from a displayed curve. Explain why a different representation would be less suitable. An exact radical is not the requested answer form. Match the complete requested strategy with its actual first-step equality or branches, constructed equation, or full set-verification response. A method label alone is insufficient. Do not carry out routine solving where the original asks only for strategy and first step. Bank label: ______

Algebra 1

Choosing a Quadratic Solving Method

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.

Audit these two correct approaches to $9x^2 - 12x + 4 = 0$ under the requirement “identify the distinct root and verify multiplicity two.” A: factor $(3x - 2)^2 = 0$. B: compute discriminant 0 and use $x = \frac{12}{18} = \frac{2}{3}$. Which better preserves the requested answer form, and why? The zero discriminant independently confirms the double root.	Audit these two correct approaches to $x^2 - 6x + 12 = 0$ under the requirement “prove there are no real roots.” A: complete $(x - 3)^2 = -3$. B: compute discriminant $36 - 48 = -12$. Which better preserves the requested answer form, and why? The negative discriminant is an equally valid certificate.
Two valid routes solve $(\frac{1}{3})x^2 - (\frac{4}{3})x + 1 = 0$. Route A: multiply by 3 and factor $x^2 - 4x + 3$. Route B: apply the formula to fractional coefficients. Compare their efficiency without treating the longer route as incorrect. Route B is valid but less convenient.	For $2x^2 + x - 4 = 0$, compare the algebraic route “use $x = \frac{-1\pm\sqrt{33}}{4}$, then approximate.” with the representation-based route “graph and read approximate intercepts near -1.69 and 1.19..” State what each can certify and which fits exact roots and a decimal reasonableness check. Approximate graph values do not replace exact answers.
Audit these two correct approaches to $x^2 - 8x + 10 = 0$ under the requirement “exact roots and their midpoint.” A: complete $(x - 4)^2 = 6$, giving $4 \pm \sqrt{6}$. B: use $\frac{8\pm\sqrt{24}}{2}$ and simplify. Which better preserves the requested answer form, and why? Formula results are equivalent after simplification.	Two valid routes solve $4x^2 - 4x - 15 = 0$. Route A: split $-4x$ as $6x - 10x$ and factor by grouping. Route B: recognize directly $(2x - 5)(2x + 3) = 0$. Compare their efficiency without treating the longer route as incorrect. Both factorizations encode the same zero-product branches.

Algebra 1

Choosing a Quadratic Solving Method

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: constraint audit: the midpoint is 3 and each root is distance 4 from it.; equation: $(x-3)^2 = 16$; favored method: the square-root method; roots: $\{-1, 7\}$; verification: expansion gives $x^2 - 6x - 7 = 0 = (x+1)(x-7)$.

Construct a quadratic equation satisfying these independent requirements: use midpoint -2 and irrational offsets $\sqrt{5}$. The visible form must genuinely favor completing the square, and the roots must be $-2 \pm \sqrt{5}$. Give the equation and verify it by a different route. The equation starts in standard form so completion is a meaningful choice. Match the complete requested strategy with its actual first-step equality or branches, constructed equation, or full set-verification response. A method label alone is insufficient. Do not carry out routine solving where the original asks only for strategy and first step.

Your response: ______________

Incoming: constraint audit: dividing by x would violate the completeness requirement.; equation: $x(2x+3) = 0$; favored method: factoring; roots: $\{-\frac{3}{2}, 0\}$; verification: expansion gives $2x^2 + 3x = 0$, and direct substitution confirms both values.

Construct a quadratic equation satisfying these independent requirements: use symmetric rational roots $\pm\frac{5}{2}$ and a leading coefficient 4. The visible form must genuinely favor factoring as a difference of squares, and the roots must be $-\frac{5}{2}$ and $\frac{5}{2}$. Give the equation and verify it by a different route. The leading coefficient requirement is satisfied independently. Match the complete requested strategy with its actual first-step equality or branches, constructed equation, or full set-verification response. A method label alone is insufficient. Do not carry out routine solving where the original asks only for strategy and first step.

Your response: ______________

Incoming: constraint audit: the root sum is zero, consistent with the missing linear term.; equation: $4x^2 - 25 = 0$; favored method: factoring as a difference of squares; roots: $\{-\frac{5}{2}, \frac{5}{2}\}$; verification: isolating $x^2 = \frac{25}{4}$ and taking both square roots confirms the pair.

Construct a quadratic equation satisfying these independent requirements: use axis $x = \frac{3}{2}$ and offsets $\frac{\sqrt{7}}{2}$ while keeping integer standard coefficients. The visible form must genuinely favor completing the square, and the roots must be $\frac{3 \pm \sqrt{7}}{2}$. Give the equation and verify it by a different route. The method requirement determines the chosen linear coefficient. Match the complete requested strategy with its actual first-step equality or branches, constructed equation, or full set-verification response. A method label alone is insufficient. Do not carry out routine solving where the original asks only for strategy and first step.

Your response: ______________

Incoming: certificate: $(x+2)(x-3) = 0$ gives exactly -2 and 3.; complete: no; correct solution set: $\{-2, 3\}$; listed values valid: no

For $6x^2 + x - 2 = 0$, a proposed real solution set is $\{-\frac{2}{3}, \frac{1}{2}\}$. Decide separately whether every listed value is valid and whether the set is complete. Exact fractions are retained. Match the complete requested strategy with its actual first-step equality or branches, constructed equation, or full set-verification response. A method label alone is insufficient. Do not carry out routine solving where the original asks only for strategy and first step.

Your response: ______________

Algebra 1

Choosing a Quadratic Solving Method

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.

Two valid routes solve $x^2 - 5x + 6 = 0$. Route A: factor to $(x-2)(x-3) = 0$, giving $x = 2$ or 3. Route B: use the quadratic formula to obtain $\frac{5 \pm 1}{2}$, giving $x = 2$ or 3. Compare their efficiency without treating the longer route as incorrect. Formula use is not an error. Compare the two original routes for validity and efficiency under the stated answer requirement. Do not label a longer correct route as an error; justify any preference from the visible equation structure.

Both traces for $(x-4)^2 = 9$ claim the same solution set. Route A: take $x - 4 = \pm 3$, so $x = 1$ or 7. Route B: expand to $x^2 - 8x + 7 = 0$ and apply the formula, obtaining $x = 1$ or 7. Compare how each route preserves all branches and identify the more direct one. Both routes retain plus and minus. Compare the two original routes for validity and efficiency under the stated answer requirement. Do not label a longer correct route as an error; justify any preference from the visible equation structure.

Two valid routes solve $x^2 + 4x - 5 = 0$. Route A: complete $(x+2)^2 = 9$, then get $x = 1$ or -5. Route B: use $\frac{-4 \pm 6}{2}$, then get $x = 1$ or -5. Compare their efficiency without treating the longer route as incorrect. The formula is still exact. Compare the two original routes for validity and efficiency under the stated answer requirement. Do not label a longer correct route as an error; justify any preference from the visible equation structure.

For $x^2 - 2 = 0$, compare the algebraic route “solve exactly as $x = \pm\sqrt{2}$ and round to ± 1.41.” with the representation-based route “read graph intercepts near -1.41 and 1.41 from a sufficiently scaled graph..” State what each can certify and which fits roots to the nearest hundredth. The graph is valid at the requested precision if its scale supports hundredths. Compare the two original routes for validity and efficiency under the stated answer requirement. Do not label a longer correct route as an error; justify any preference from the visible equation structure.

Choosing a Quadratic Solving Method

Full Worked Solutions - excerpt

Worked example

Problem. What should be the strategic first step for $9x^2 - 16 = 0$ if the goal is find exact roots? Name the method that this step prepares. This avoids unnecessary formula substitution. Match the complete requested strategy with its actual first-step equality or branches, constructed equation, or full set-verification response. A method label alone is insufficient. Do not carry out routine solving where the original asks only for strategy and first step.

Answer. decisive structure: the left side is a difference of squares; first step: factor as $(3x - 4)(3x + 4) = 0$; method: factoring

Explanation and check.

The decisive feature is the left side is a difference of squares. Therefore use factoring. A valid strategic first step is factor as $(3x - 4)(3x + 4) = 0$. This avoids unnecessary formula substitution.

Worked example

Problem. Two valid routes solve $(\frac{1}{3})x^2 - (\frac{4}{3})x + 1 = 0$. Route A: multiply by 3 and factor $x^2 - 4x + 3$. Route B: apply the formula to fractional coefficients. Compare their efficiency without treating the longer route as incorrect. Route B is valid but less convenient.

Answer. both valid: True; common solution set: $\{1\,,\ 3\}$; preferred route: Route A; reason: nonzero scaling preserves roots and removes fraction arithmetic.

Explanation and check.

Both routes are reversible and give $\{1, 3\}$. Route A is more efficient here because nonzero scaling preserves roots and removes fraction arithmetic. The other route remains mathematically valid. Route B is valid but less convenient.