Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Quadratic Graphs & Equivalent Forms | Algebra 1 | 6-Topic Bundle

6-topic bundle | 576 problems | Four activity formats

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01 **Quadratic Function Classification and Range**

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05 **Quadratic Zeros and Factored Form**

View individual product and its full preview

06 **Comparing Forms of Quadratic Functions**

View individual product and its full preview

In every topic

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

Product previews

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

48 PDFs and 6 READMEs; 473 buyer PDF pages across the 6 products.

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

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

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Sets & Steps
Math Practice & Worked Solutions

Algebra 1

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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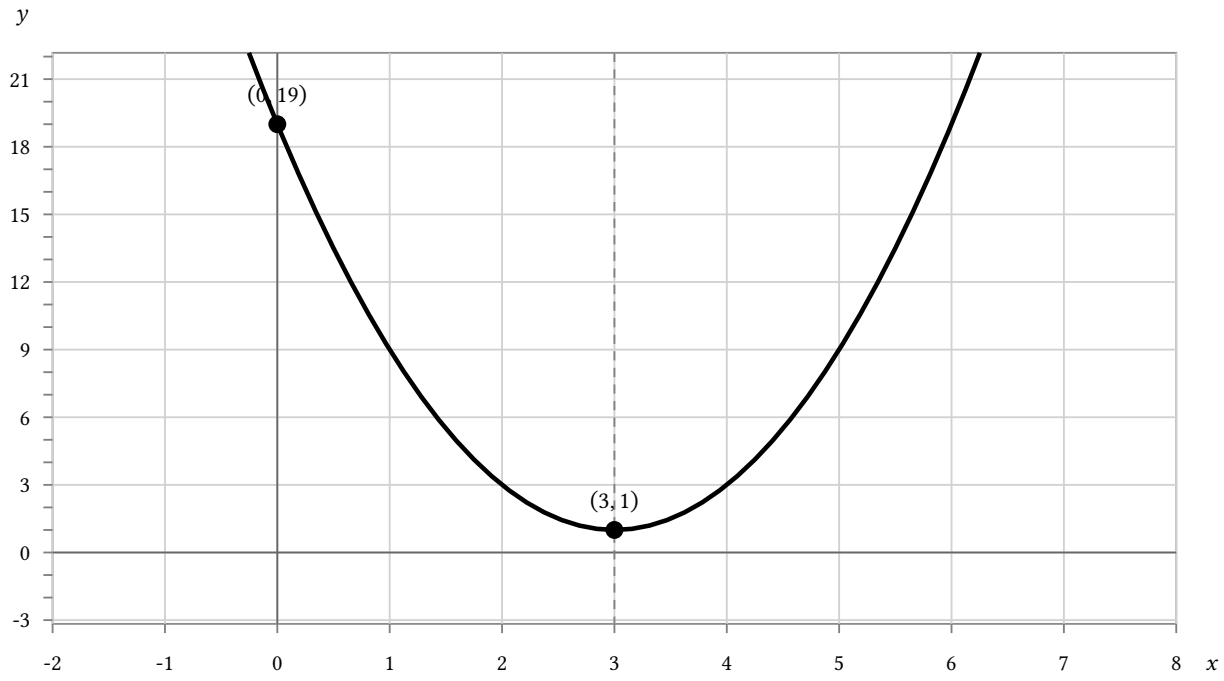
Algebra 1

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: $q\_a(x) = a(x + 1)^2\text{-}ax^2 + 3x^2$ 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.

Reference	Rule: $f(x) = x^2$; Vertex: 0, 0
Target relation	$g(x) = f(x - 3) + 2$

Map the reference vertex and classify the target extremum.

Reference vertex	2, −1
Reference opening	up
Transformation	h: 0; a: 3; k: 4

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.

Reference vertex	0, −5
Reference level points	y: −2; Points: −3, −2, 3, −2
Target relation	$g(x) = f(x) + 2$

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.

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Published by Tusils LLC.

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

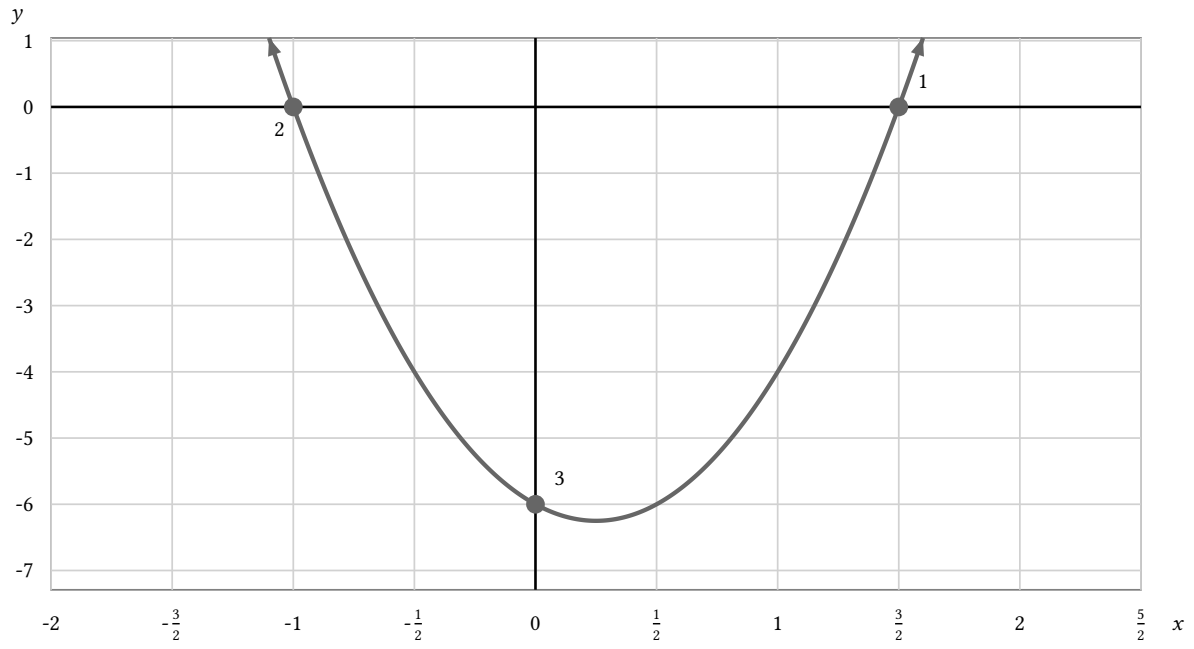
Quadratic Zeros and Factored Form

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 $x-2$.