**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.

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**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.

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### 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).