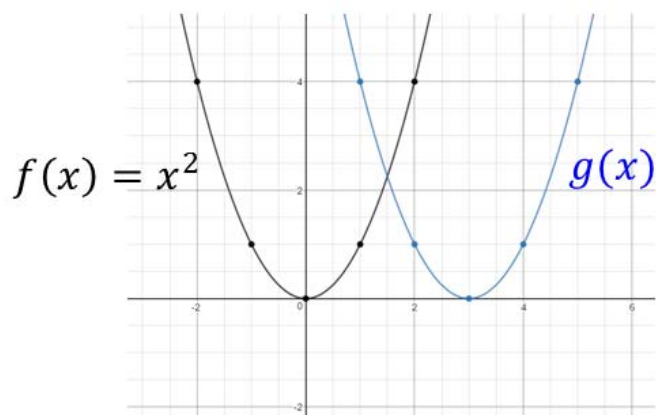Objective: Identify all transformations of a quadratic function using a graph.
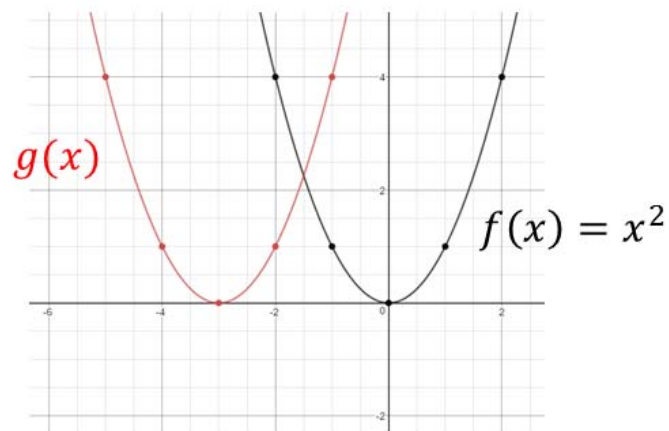
Concept

Understanding Horizontal Translations

A **horizontal translation** of a function is **a shift left or right**, with no change in the shape of the function.

$f(x) = x^2$ $g(x)$

$g(x)$ $f(x) = x^2$

Compared to $f(x)$, $g(x)$ has been translated horizontally 3 units to the right
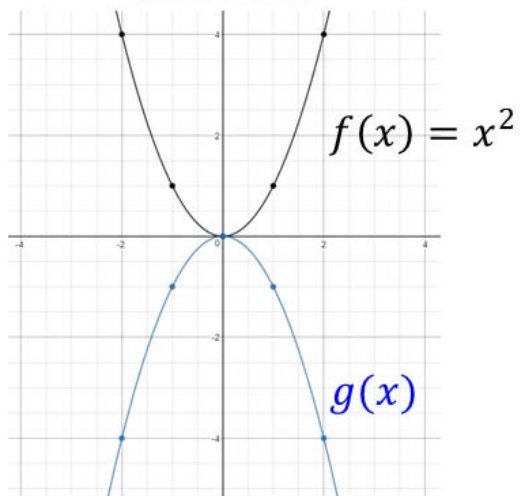
Compared to $f(x)$, $g(x)$ has been translated horizontally 3 units to the left

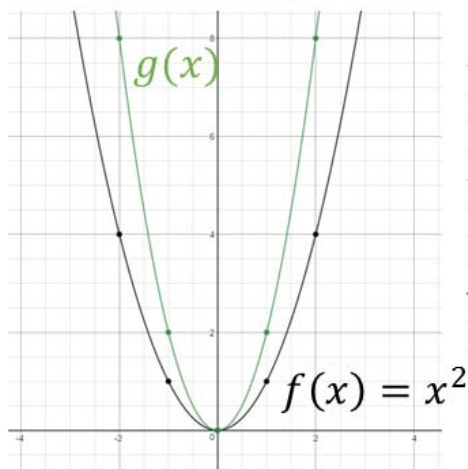Objective: Identify all transformations of a quadratic function using a graph.

Concept

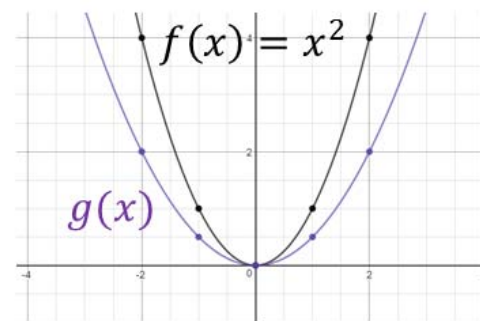## Recognizing Transformations of $f(x) = x^2$

Reflection across the x-axis

$f(x) = x^2$

$g(x)$

Vertical Stretch by a factor of 2

$g(x)$

$f(x) = x^2$

Vertical Compression by a factor of 1/2
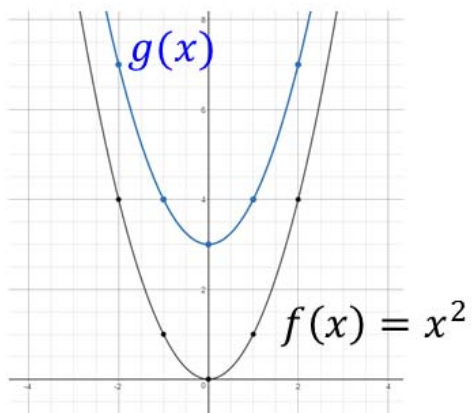
$f(x) = x^2$

$g(x)$

Objective: Identify all transformations of a quadratic function using a graph.
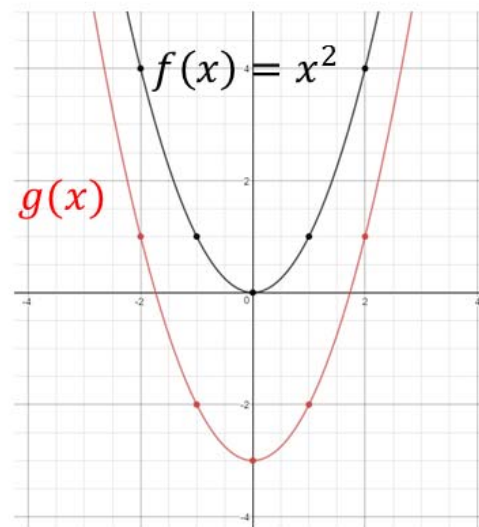
Concept

Recognizing Transformations of $f(x) = x^2$

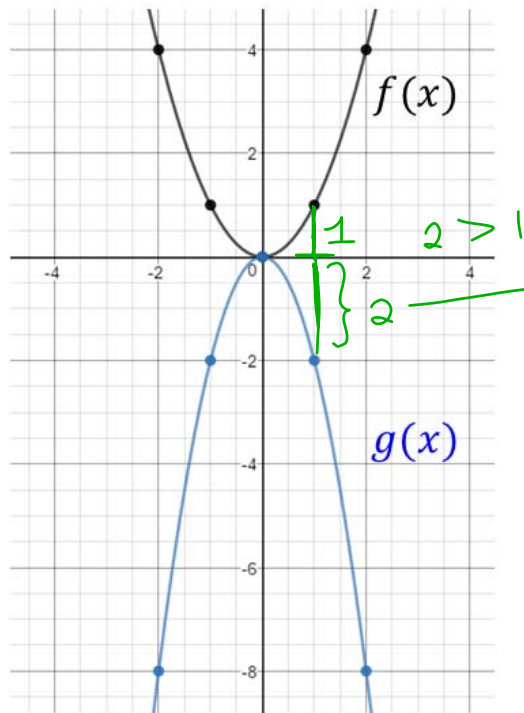Vertical Translation
up 3 units

Vertical Translation
down 3 units

Objective: Identify all transformations of a quadratic function using a graph.

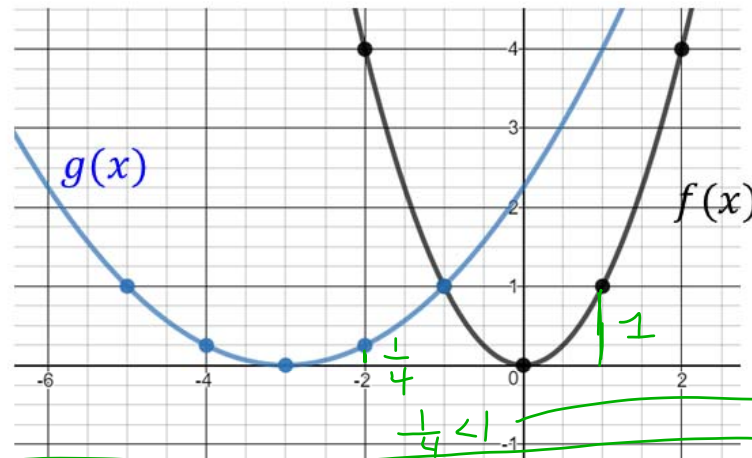Ex) Identify all transformations of the graph of the quadratic function compared to the parent function $f(x) = x^2$.

$f(x)$

$g(x)$

$\dfrac{1}{2} > 1$

2

Compared to $f(x) = x^2$, $g(x)$ has an x-axis reflection and a vertical stretch by a factor of 2.

Objective: Identify all transformations of a quadratic function using a graph.

Ex) Identify all transformations of the graph of the quadratic function compared to the parent function $f(x) = x^2$.

$g(x)$

$f(x)$

$\frac{1}{4}$

$\frac{1}{4} < 1$

Compared to $f(x) = x^2$, $g(x)$ has a translation left 3 units and a vertical compression by a factor of $\frac{1}{4}$.

Objective: Identify all transformations of a quadratic function using a graph.
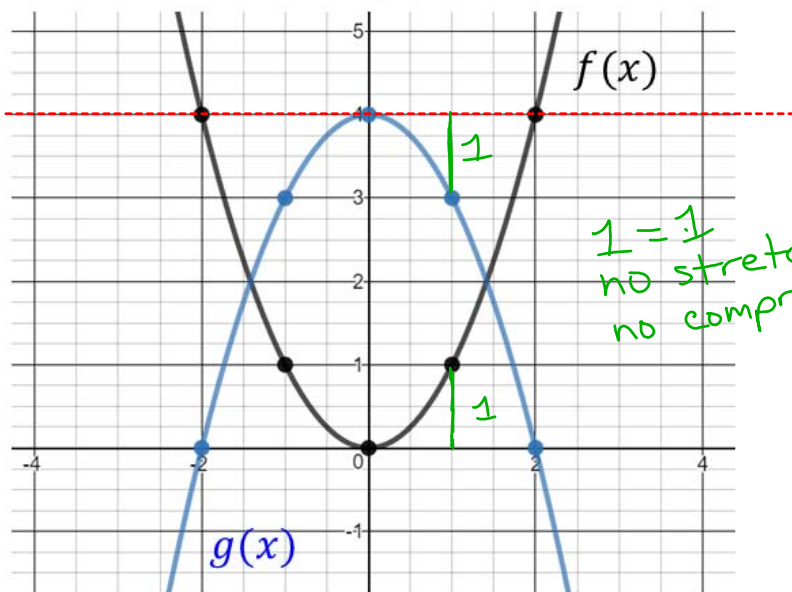
Ex) Identify all transformations of the graph of the quadratic function compared to the parent function $f(x) = x^2$.

$f(x)$

$g(x)$

1
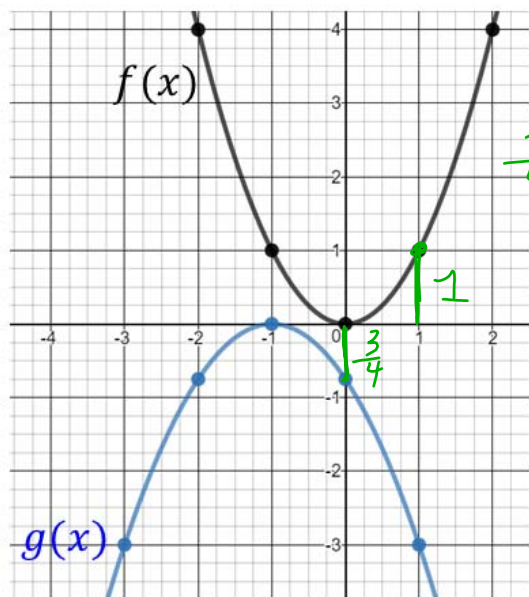
$1 = 1$
no stretch
no compression

1

Compared to $f(x) = x^2$, $g(x)$ has

an x-axis reflection and a translation up 4 units.

Objective: Identify all transformations of a quadratic function using a graph.

Ex) Identify all transformations of the graph of the quadratic function compared to the parent function $f(x) = x^2$.

$\frac{3}{4} < 1$

$f(x)$

$g(x)$

$\frac{3}{4}$

1

Compared to $f(x) = x^2$, $g(x)$ has an x-axis reflection, a vertical compression by a factor of $\frac{3}{4}$, and a translation left 1 unit.

Objective: Identify all transformations of a quadratic function using a graph.
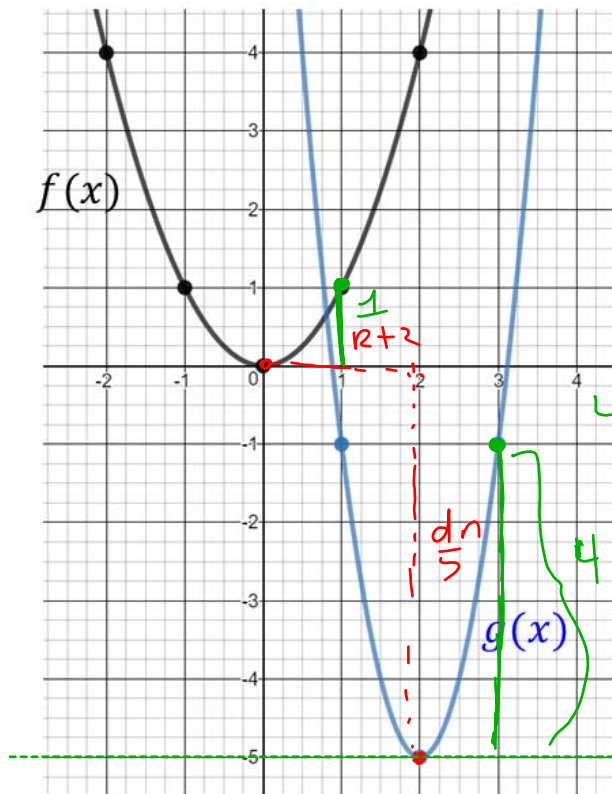
Ex) Identify all transformations of the graph of the quadratic function compared to the parent function $f(x) = x^2$.

$f(x)$

$\frac{1}{R+2}$

$4 > 1$

$\frac{dn}{5}$

4

$g(x)$

Compared to $f(x) = x^2$, $g(x)$ has

a vertical stretch by a factor of 4

and a translation right 2 units and down 5 units.

Objective: Identify all transformations of a quadratic function using a graph.

Closure

Stephanie identified the transformations of $g(x)$ compared to the parent function $f(x) = x^2$. Her response is shown. What errors did Stephanie make and how would you correct her response?
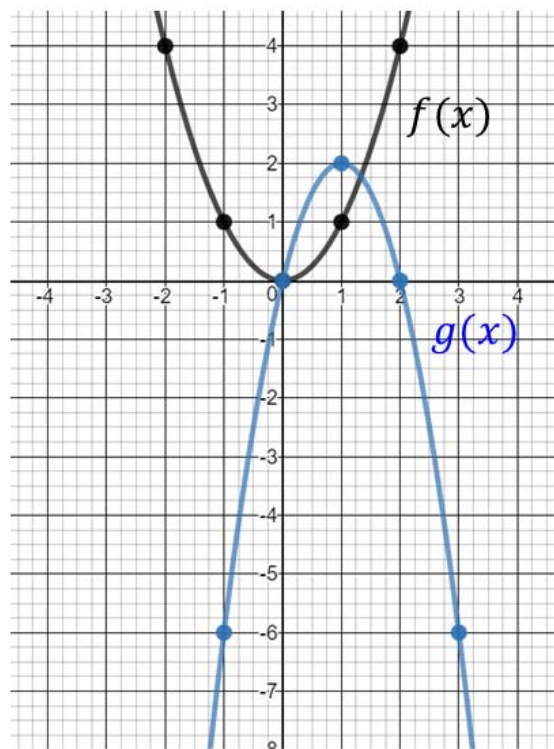
Compared to the parent function $f(x) = x^2$ the graph of $g(x)$ has a

reflection across the x-axis,

a vertical compression by a factor of 2,

a horizontal translation left 1 unit

and a vertical translation up 2 units.

Stephanie made two errors. Her first error was that she said $g(x)$ has a vertical compression instead of a vertical stretch. Her second error was that she said the horizontal translation was left instead of right. I would correct her response by changing compression to stretch and left to right.