

Suppose $f(x) = 2x^2 - 3x + 5$

What is $f(\text{can})$?

$$f(\text{can}) = 2(\text{can})^2 - 3(\text{can}) + 5 \quad \text{What did we do?}$$

We Replaced all occurrences of x with can .

Suppose $f(x) = -3x^2 + 5x - 1$

What is $f(2x + 1)$?

$$f(2x + 1) = -3(2x + 1)^2 + 5(2x + 1) - 1 \quad \text{What did we do?}$$

We replaced all occurrences of x with $2x + 1$.

Suppose we have a function $f(x)$.

To Reflect in the x-axis

$$-f(x)$$

To Reflect in the y-axis

$$f(-x)$$

To Vertically Stretch/Shrink by a factor of a

$$af(x)$$

To Horizontally Stretch/Shrink by a factor of a

$$f\left(\frac{1}{a}x\right)$$

To Translate w units Left

$$f(x + w)$$

To Translate w units Right

$$f(x - w)$$

To Translate w units Up

$$f(x) + w$$

To Translate w units Down

$$f(x) - w$$

Given: $f(x) = -2x^2 + 4x - 3$

Horizontally Shrink by $\frac{1}{2}$, Translate 3 Units Right

$$g(x) = f(2x) = -2(2x)^2 + 4(2x) - 3 = -8x^2 + 8x - 3 \quad \text{Horiz Shrink by } \frac{1}{2} \text{ - Replace } x \text{ with } 2x$$

$$g(x - 3) = -8(x - 3)^2 + 8(x - 3) - 3 = -8(x^2 - 6x + 9) + 8x - 24 - 3 = -8x^2 + 48x + 72 + 8x - 27$$

$$= -8x^2 + 56x + 42$$

Translate 3 Right - Replace x with $x - 3$

Given: $f(x) = 3x^2 - x$

Translate 1 Unit Up, Vertically Stretch by a factor of 3

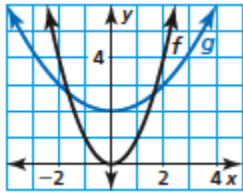
$$g(x) = f(x) + 1 = 3x^2 - x + 1$$

Up 1 Unit - Add 1 to $f(x)$

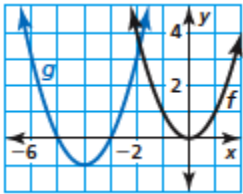
$$h(x) = 3g(x) = 3(3x^2 - x + 1) = 9x^2 - 3x + 3$$

Vertical Stretch by a factor of 3

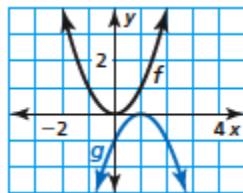
1. Describe the transformation of $f(x) = x^2$ represented by g .



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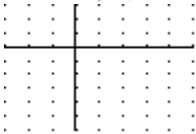


3. Describe the transformation of $f(x) = x^2$ represented by g .



4. Let g be a horizontal shrink by a factor of $\frac{1}{4}$, followed by a translation 1 unit up and 3 units right of the graph of $f(x) = (2x + 1)^2 - 11$. Write the new function and give the Vertex.

5. Graph $f(x) = 2(x - 1)^2 - 5$ on the coordinate plane below. Label the Vertex.



6. Graph $h(x) = 3x^2 + 6x - 2$ on the coordinate plane below. Label the Vertex.



7. Find the x -intercepts of $g(x) = -3(x + 2)(x + 4)$. Then describe where $h(x)$ is increasing and where $h(x)$ is decreasing.