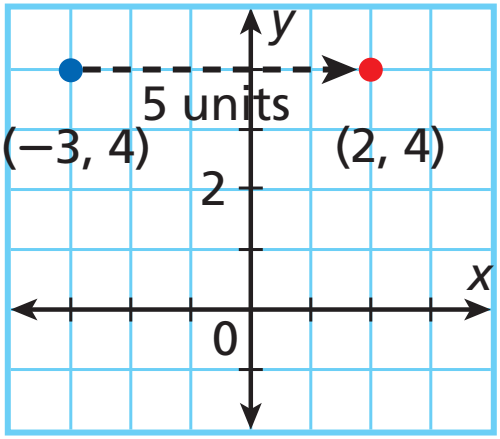
1-8 Exploring Transformations

Example 1 Translating Points

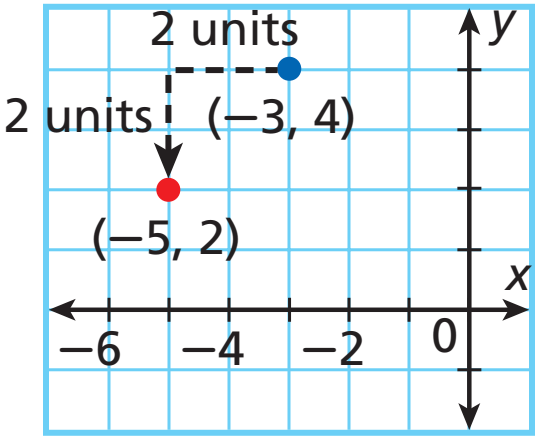
Perform the given translation on the point $(-3, 4)$. Give the coordinates of the translated point.

A. 5 units right



Translating $(-3, 4)$ right 5 units results in the point $(2, 4)$

B. 2 units left and 2 units down



Translating $(-3, 4)$ left 2 units and down 2 units results in the point $(-5, 2)$

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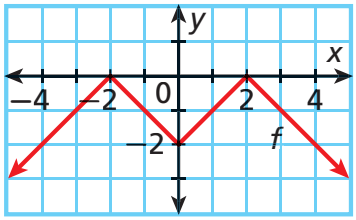
Example 2 Translating and Reflecting Functions

Use a table to perform each transformation of $y = f(x)$. Use the same coordinate plane as the original function.



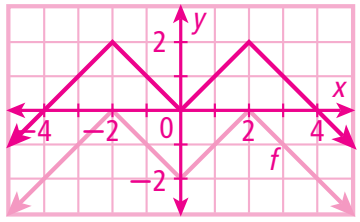
A. translation 2 units up

Identify important points from the graph and make a table.

x	y	$y + 2$
−4	−2	$-2 + 2 = 0$
−2	0	$0 + 2 = 2$
0	−2	$-2 + 2 = 0$
2	0	$0 + 2 = 2$
4	−2	$-2 + 2 = 0$

The entire graph shifts up 2 units.

Add 2 from each y-coordinate.



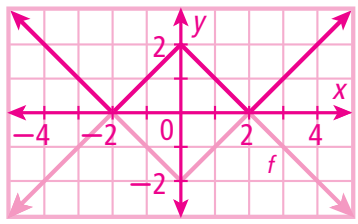
B. reflection across *x*-axis

Identify important points from the graph and make a table.

x	y	$-y$
−4	−2	$-1(-2) = 2$
−2	0	$-1(0) = 0$
0	–2	$-1(-2) = 2$
2	0	$-1(0) = 0$
4	−2	$-1(-2) = 2$

Multiply each y-coordinate by −1.

The entire graph flips across the x-axis.



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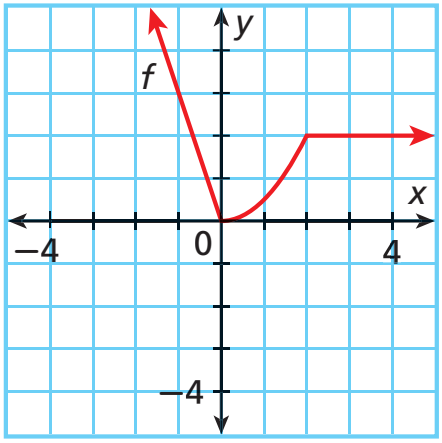
Example 3 Stretching and Compressing Functions

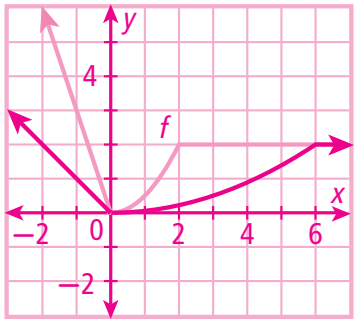
Use a table to perform a horizontal stretch of the function $y = f(x)$ (graphed on p. 61) by a factor of 3. Graph the function and the transformation on the same coordinate plane.



Identify important points from the graph and make a table.

3x	x	y
−6	−2	−2
0	0	0
6	2	−2
12	4	0

Multiply each x-coordinate by 3.



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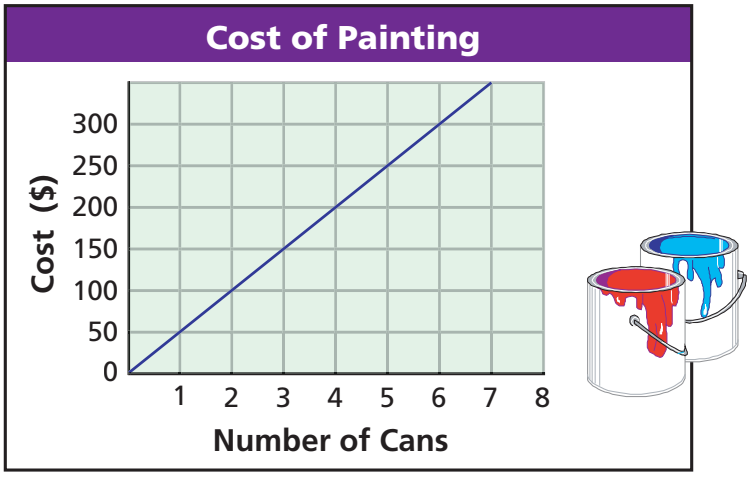
Example 4 Business Application

The graph shows the cost of painting based on the number of cans of paint used. Sketch a graph to represent the cost of a can of paint doubling, and identify the transformation of the original graph that it represents.



If the cost of painting is based on the number of cans of paint used and the cost of a can of paint doubles, the cost of painting also doubles. This represents a vertical stretch by a factor of 2.