Algebra 1 9.3

Apply transformations to quadratic functions

Apply dilations and reflections to quadratic functions

parent graph

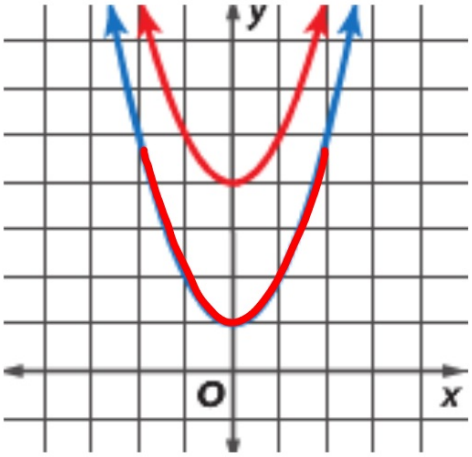
transformation – trans. (slide)
refl. (flip)

translation

reflection

dilation

$y = x^2$ (parent graph)



Are these the same shape?

9.3

p. 569

1-9 all

51-53

$y = x^2$

$v(0,0)$

Parent graph

$f(x) = x^2$

in words:

in symbols:

$y = x^2 + 2$

	x^2
0	0^2
1	1^2
2	2^2
3	3^2

0
1
4
9

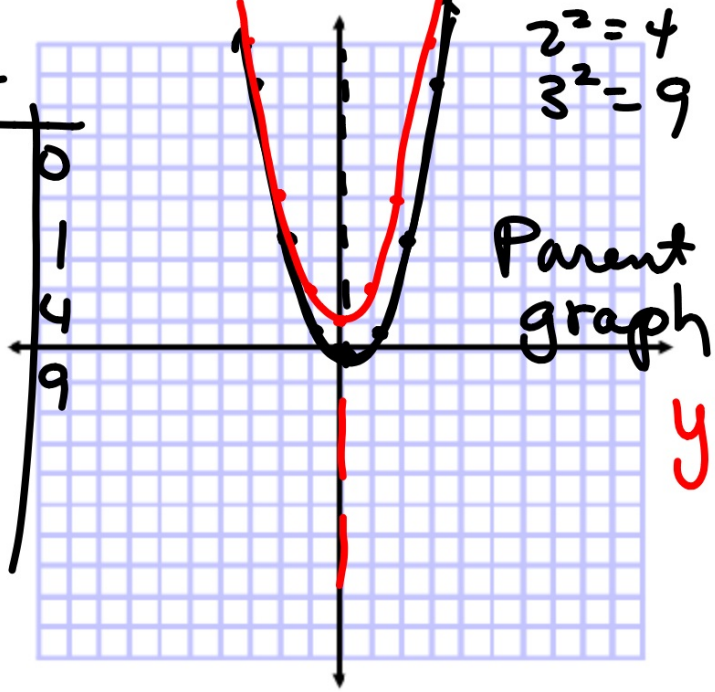
$\frac{-b}{2a} = \frac{-0}{1}$

$v(0,0)$

$1^2 = 1$

$2^2 = 4$

$3^2 = 9$



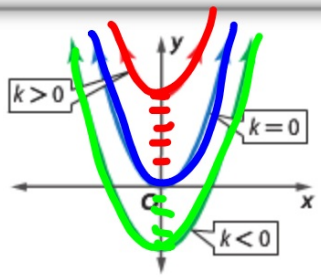
$y = x^2 + 1$

KeyConcept Vertical Translations

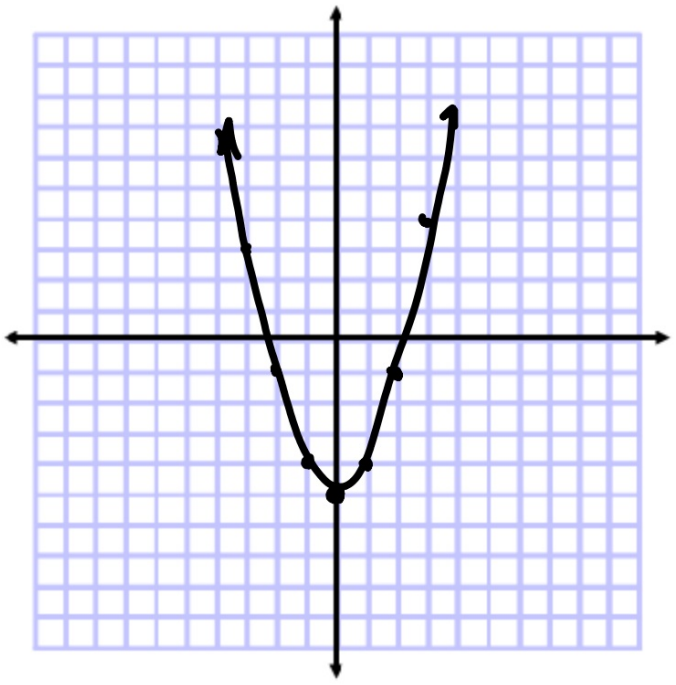
The graph of $f(x) = x^2 + k$ is the graph of $f(x) = x^2$ translated vertically.

If $k > 0$, the graph of $f(x) = x^2$ is translated $|k|$ units **up**.

If $k < 0$, the graph of $f(x) = x^2$ is translated $|k|$ units **down**.



10. $h(x) = -5 + x^2$ D. $f(x) = x^2 + 1$



$y = x^2 - 5$

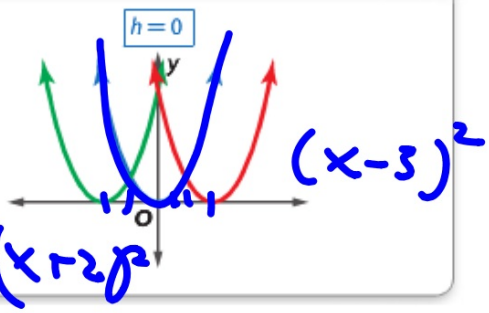
$y = x^2 + -5$

Notice the subtraction in the formula...
(related to the distance formula...trust me)

A quadratic graph can be translated horizontally by subtracting an h term from x.

KeyConcept Horizontal Translations

The graph of $g(x) = (x - h)^2$ is the graph of $f(x) = x^2$ translated horizontally.



$y = (x-2)^2$

$y = (x+2)^2$

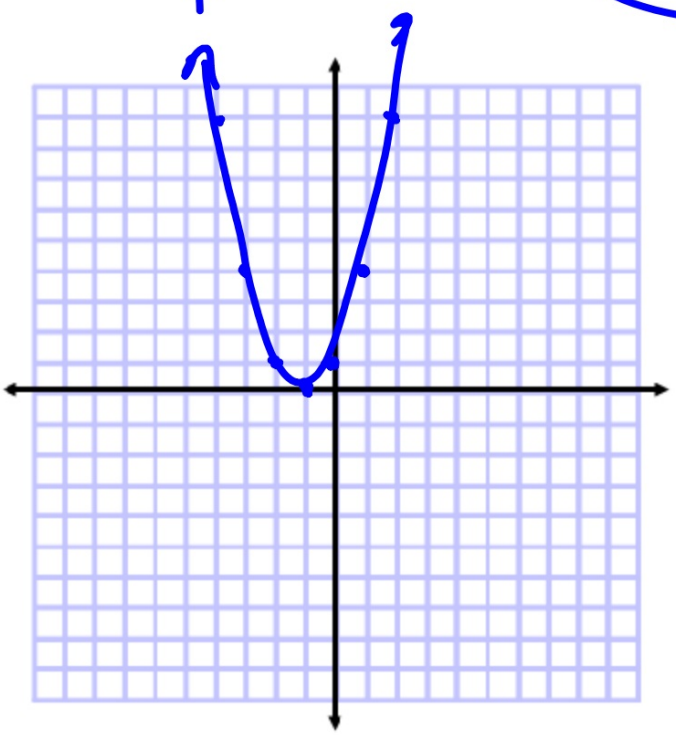
Remember the - in the formula? What did you subtract?
in words:

Example 2 Horizontal Translations

Describe how the graph of each function is related to the graph of $f(x) = x^2$.

a. $g(x) = (x - 2)^2$

b. $g(x) = (x + 1)^2$

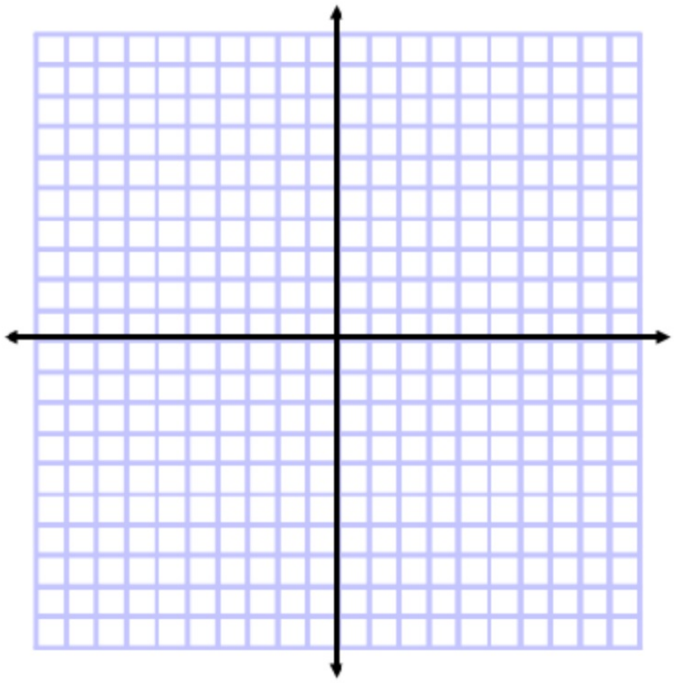


in words:

GuidedPractice

2A. $g(x) = (x - 3)^2$

2B. $g(x) = (x + 2)^2$



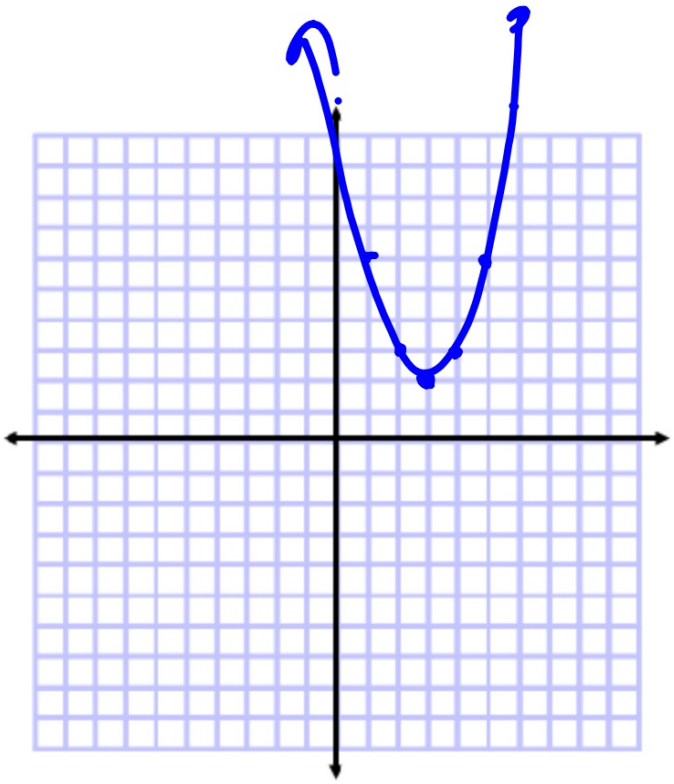
in words:

Example 3 Horizontal and Vertical Translations

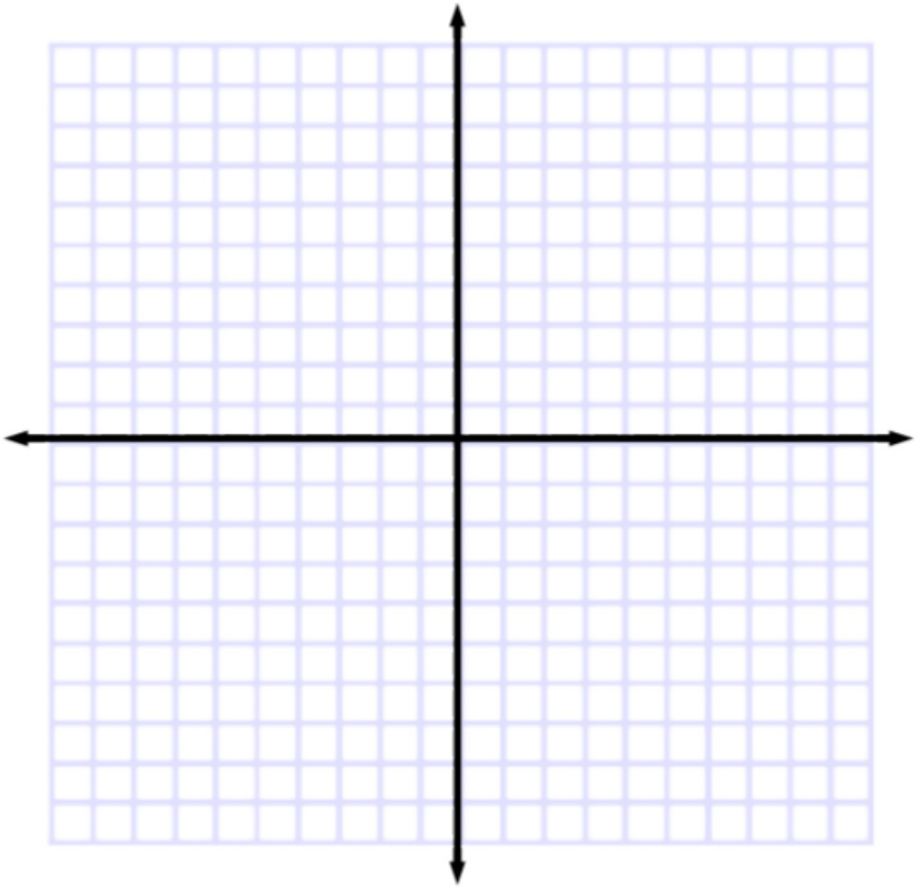
Describe how the graph of each function is related to the graph of $f(x) = x^2$.

a. $g(x) = (x - 3)^2 + 2$

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



Parent graph
(TOV)

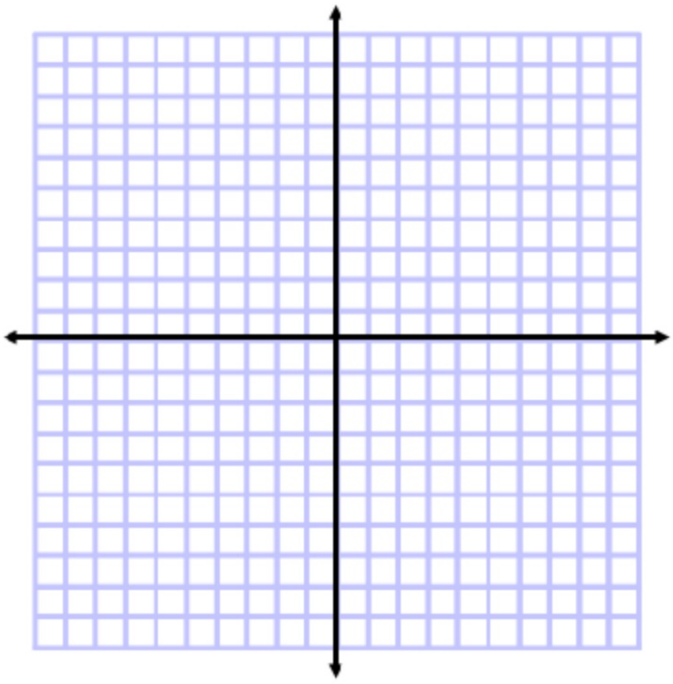


Graph from parent graph:

GuidedPractice

3A. $g(x) = (x + 2)^2 + 3$

3B. $g(x) = (x - 4)^2 - 4$



$y = -x^2 + 3$

reflection (down)