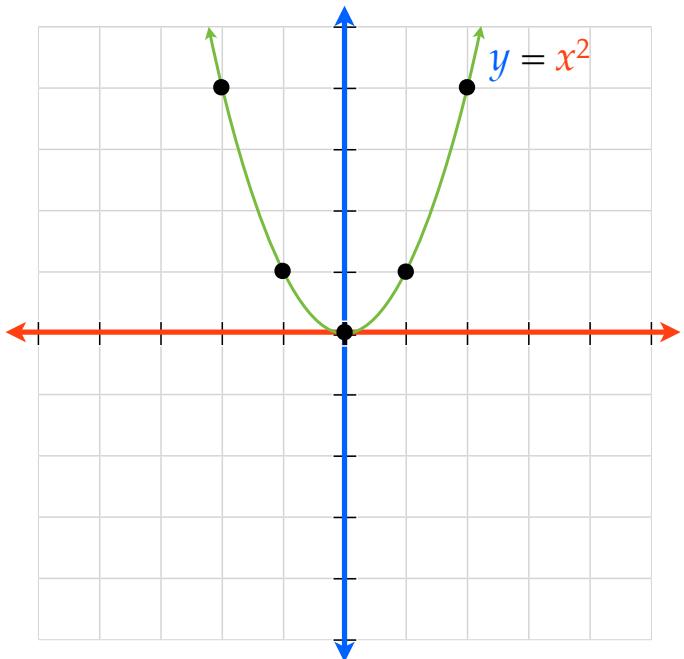


## Graphing Quadratic Functions Using Transformations

The Quadratic Parent Function

$$y = x^2$$

$x$	$y$
-2	4
-1	1
0	0
1	1
2	4

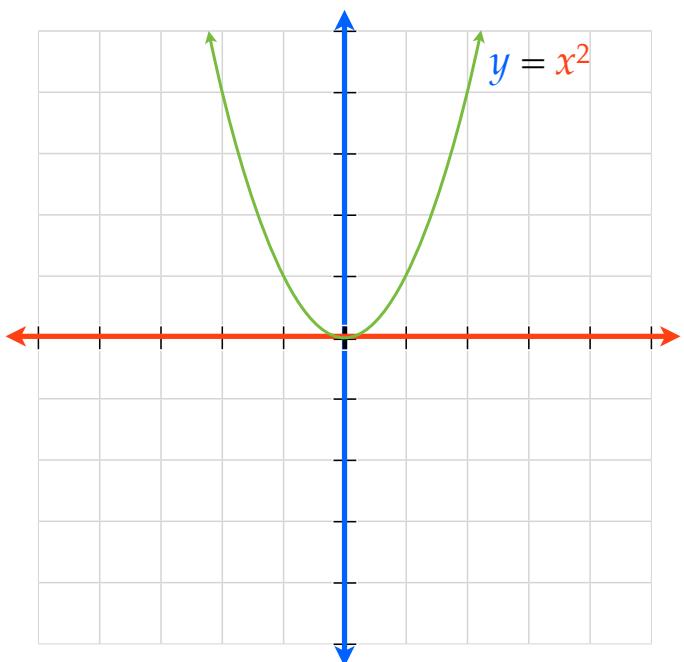


The Quadratic Parent Function

$$y = x^2$$

The graph of  $y = x^2 + k$ ...  
 causes a **vertical** translation of  $y = x^2$   
 if  $k > 0$       if  $k < 0$   
 $k$  units up       $k$  units down

$$y = x^2 + 1$$

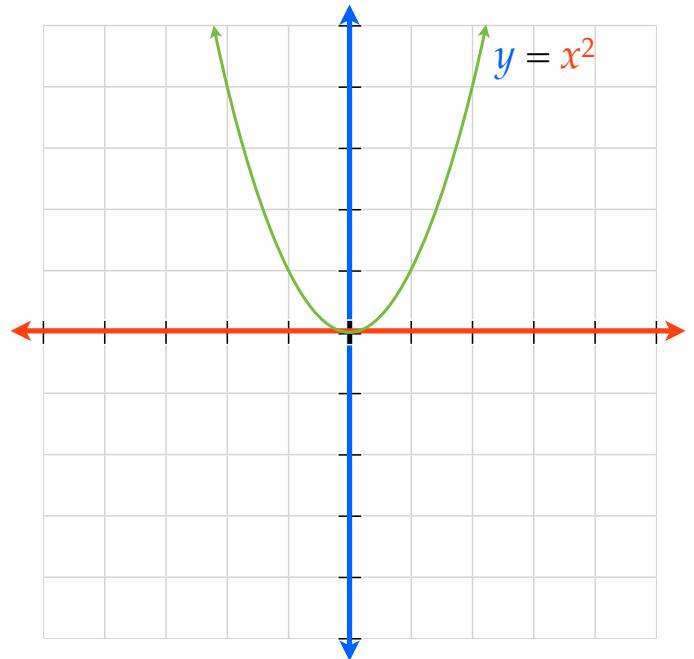


The Quadratic Parent Function

$$y = x^2$$

The graph of  $y = x^2 + k$ ...  
causes a vertical translation of  $y = x^2$   
if  $k > 0$       if  $k < 0$   
 $k$  units up       $k$  units down

$$y = x^2 - 4$$

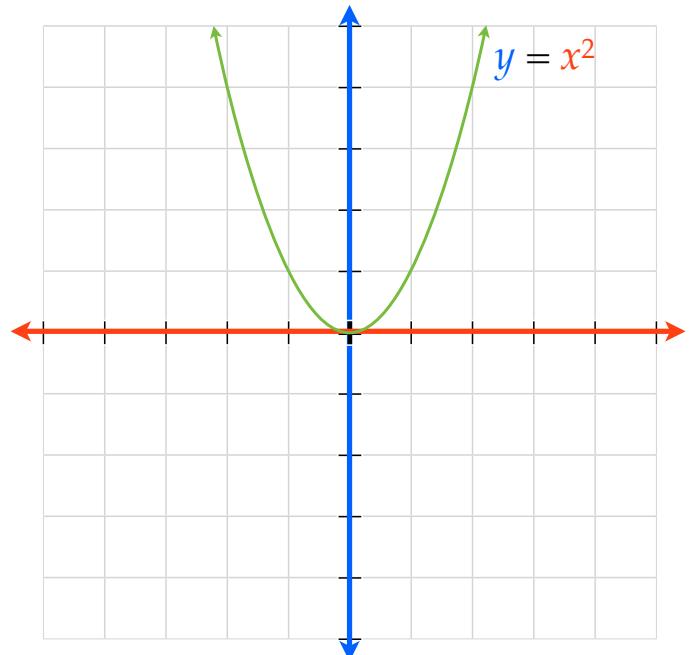


The Quadratic Parent Function

$$y = x^2$$

The graph of  $y = (x - h)^2$ ...  
causes a horizontal translation of  $y = x^2$   
if  $h > 0$       if  $h < 0$   
 $h$  units right       $h$  units left

$$y = (x - 3)^2$$

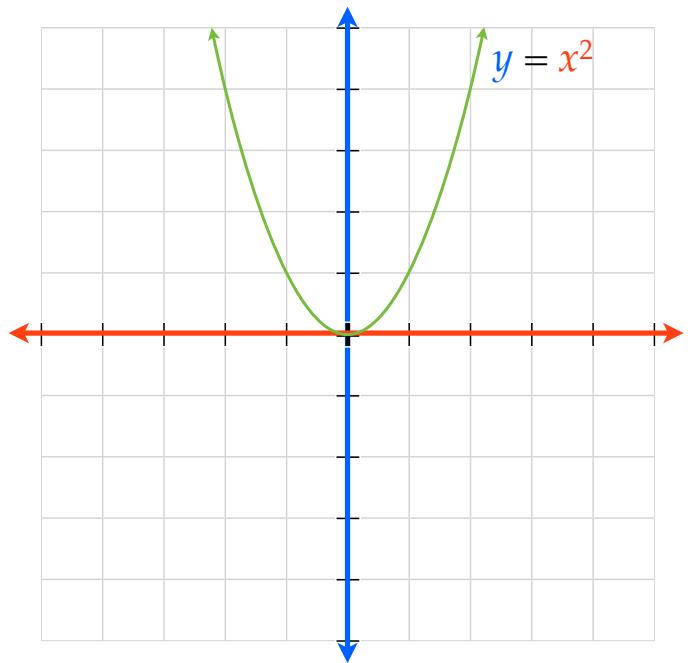


## The Quadratic Parent Function

$$y = x^2$$

The graph of  $y = (x - h)^2$ ...  
causes a horizontal translation of  $y = x^2$   
if  $h > 0$       if  $h < 0$   
 $h$  units right       $h$  units left

$$y = (x + 2)^2$$

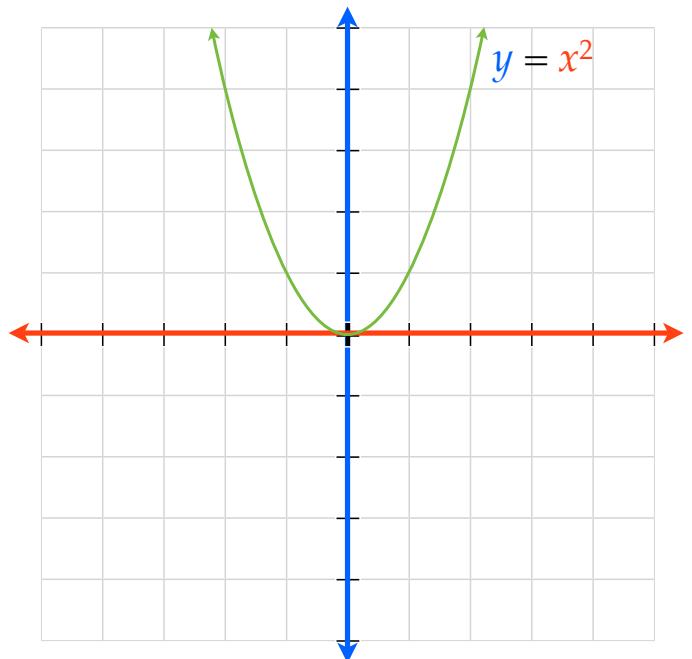


## The Quadratic Parent Function

$$y = x^2$$

The graph of  $y = (x - h)^2 + k$ ...  
causes a horizontal and vertical translation  
of  $y = x^2$

$$y = (x + 2)^2 - 4$$

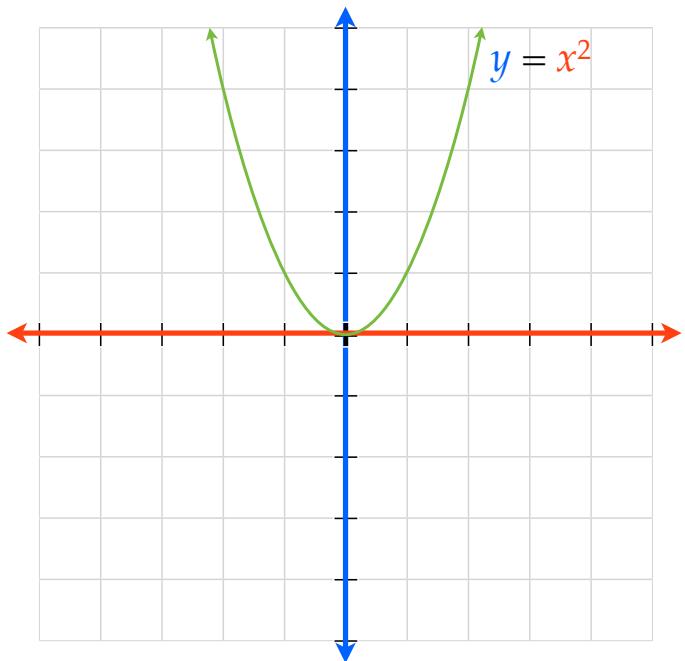


## The Quadratic Parent Function

$$y = x^2$$

The graph of  $y = (x - h)^2 + k$ ...  
 causes a horizontal and vertical translation  
 of  $y = x^2$

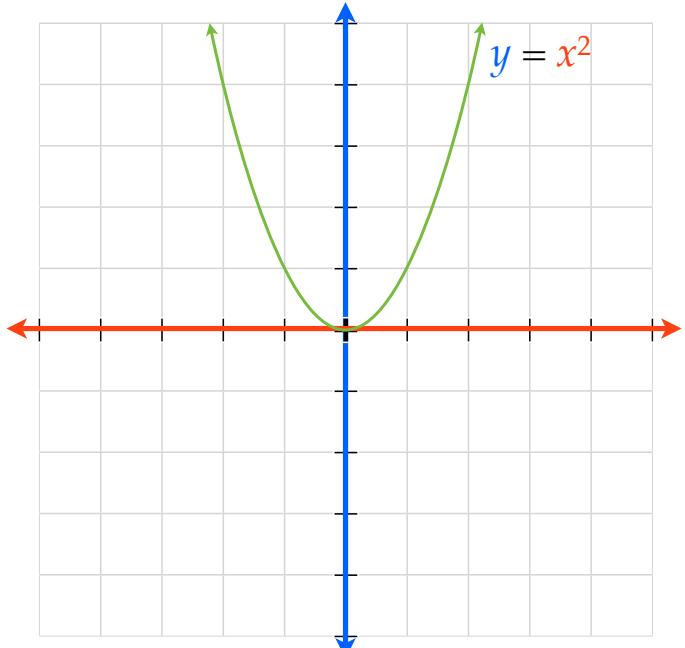
$$y = (x - 3)^2 + 1$$



$$y = (x - h)^2 + k$$

### Horizontal Translation

if $h > 0$	if $h < 0$
$h$ units right	$h$ units left



### Vertical Translation

if $k > 0$	if $k < 0$
$k$ units up	$k$ units down