Transformations of Quadratic Functions

$q(x) = p(x-2) + 3$ is the transformation of the function $p(x) = (x-5)^2 + 1$. Write the function for $q(x)$.

vertex $p(x) = (5, 1)$

transformation: right 2, up 3

vertex $q(x) = (7, 4)$ $\quad q(x) = (x-7)^2 + 4$

$s(x) = r(x+3) - 5$ is the transformation of the function $r(x) = x^2 - 4$. Write the function for $s(x)$.

$r(x) = (0, -4)$

vertex

transformation left 3 down 5

vertex $s(x)$ $(-3, -9)$

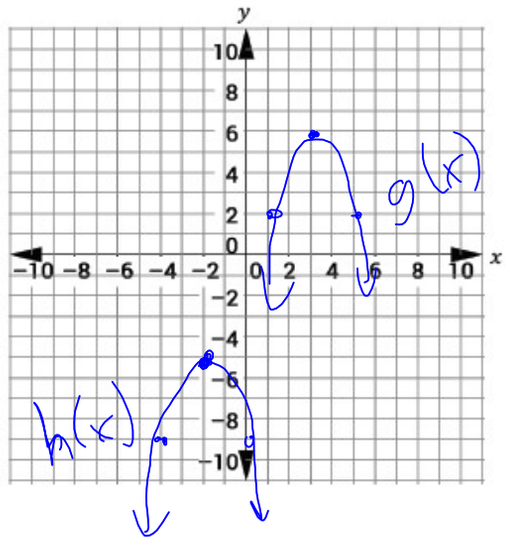
$s(x) = (x+3)^2 - 9$

Let's Practice!

1. Consider the function below.

$$h(x) = -(x+2)^2 - 5$$

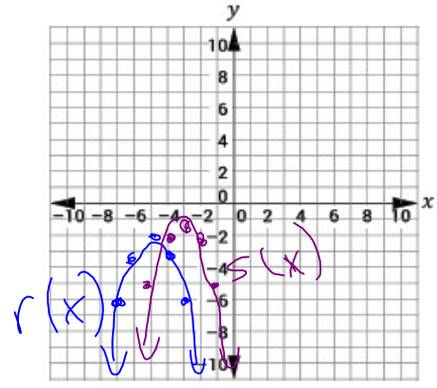
If $g(x) = h(x-5) + 11$, sketch the graph of $g(x)$.



h(x) vertex
(-2, -5)
(0, -9)
(-4, -9)
transformation rights 5 up 11
g(x) vertex
(3, 6)
(5, 2)
(1, 2)

2. The table below models the function $r(x)$, which is a transformation of $s(x)$. Sketch the graph of $s(x)$ on the coordinate plane.

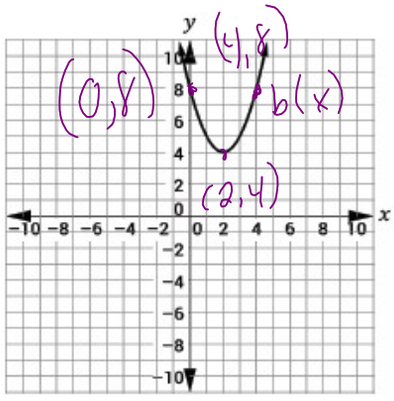
$r(x) = s(x+2) - 1$	
$x' = -7$	$y' = -6$
$x' = -6$	$y' = -3$
$x' = -5$	$y' = -2$
$x' = -4$	$y' = -3$
$x' = -3$	$y' = -6$

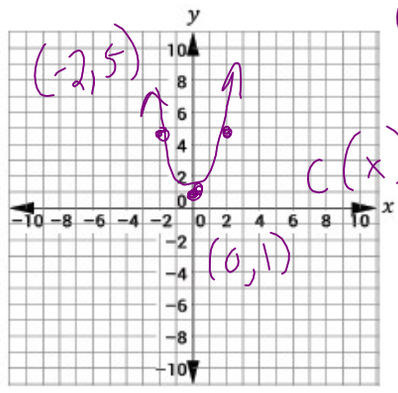


transformation from s(x) to r(x)
left 2 down 1

transformation from r(x) to s(x)
right 2 up 1

3. The graph on the left models $b(x) = c(x - 2) + 3$. Sketch the graph of $c(x)$ on the coordinate plane on the right.





from c(x) to b(x) right 2, up 3

from b(x) to c(x) left 2, down 3

4. The table below models a transformation on $f(x)$.
Complete the missing values of each ordered pair.

left 3, down 1

$x' = x$ prime

$f(x)$		$f(x+3)-1$	
$x = 12$	$y = 145$	$x' =$ 9	$y' =$ 144
$x =$ 5	$y =$ 26	$x' = 2$	$y' = 25$
$x = -4$	$y =$ 17	$x' =$ -7	$y' = 16$

$y(-\frac{1}{2}) = -2$

BEAT THE TEST!

$f(x)$ vertex $(-3, 0)$

$g(x)$ vertex $(-6, 0)$

1. Consider the function below.

left 3

$$f(x) = -\frac{1}{2}(x+3)^2$$

If $g(x) = 4f(x+3)$, which of the following statements are true? Select all that apply.

- ☒ The graphs open in same direction.
- ☐ The graph of $g(x)$ is wider than the graph of $f(x)$.
- ☐ The graphs share the same vertex.
- ☒ $f(x) = g(x)$ when $x = -5$.
- ☐ The graphs share the same y–intercept.

$g(x) = -2(x+6)^2$

$-\frac{1}{2}(0+3)^2 = -\frac{1}{2}(9)$

$-2(0+6)^2 = -2(36)$

$-\frac{1}{2}(-5+3)^2$

$-\frac{1}{2}(-2)^2 = -\frac{1}{2}(4)$

$= -2$

$-2(-5+6)^2$

$-2(1)^2$

$-2(1) = -2$