Section 5 – Topic 11
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 $q(x)$.

moving $p(x)$ right 2, up 3

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

vertex $q(x) = (7, 4)$

$q(x) = (x-7)^2 + 4$

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

moving $r(x)$ left 3, down 5

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

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

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

Let's Practice!

$-(0+2)^2-5$

$-(2)^2-5$

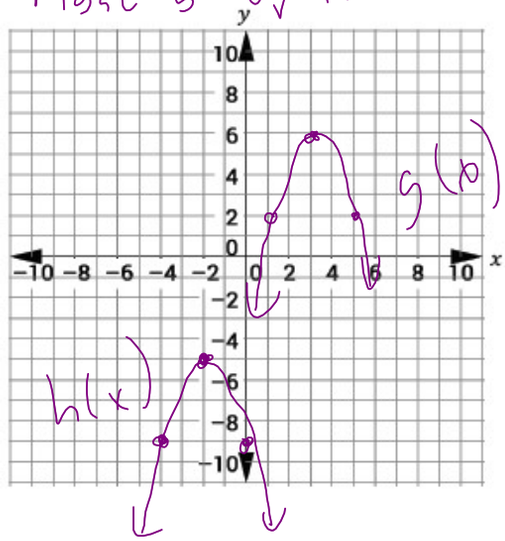
$-4-5=-9$

1. Consider the function below.

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

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

right 5 up 11



1. graph $h(x)$

vertex $(-2, -5)$

y-int $(0, -9)$

point $(-4, -9)$

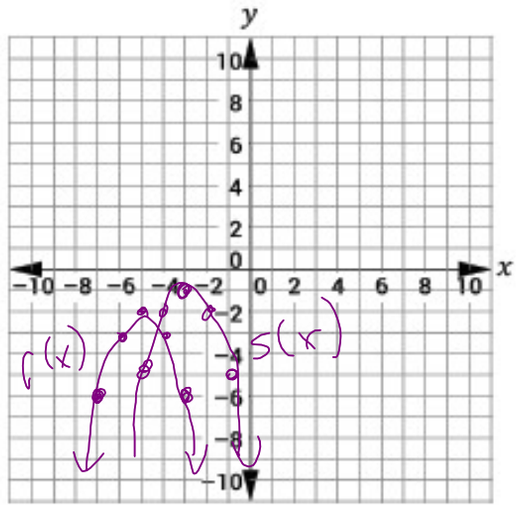
vertex $(3, 6)$

$(5, 2)$

$(1, 2)$

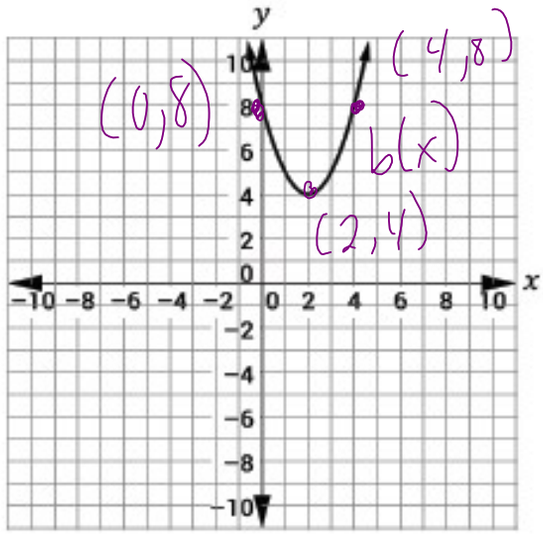
2. The table below models the function $r(x)$, which is a transformation of $s(x)$. Sketch the graph of $s(x)$ on the coordinate plane.

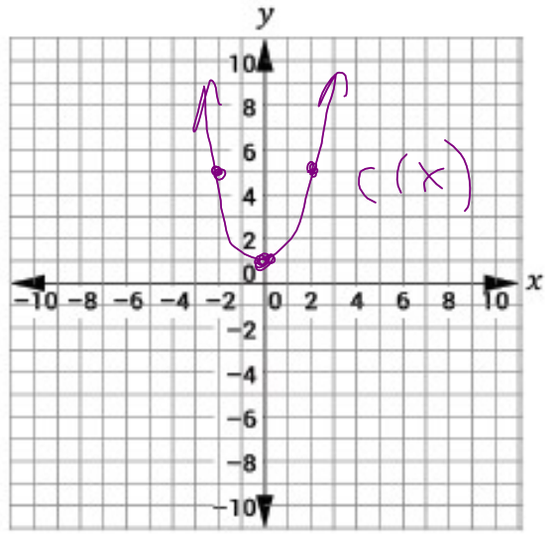
$r(x) = s(x+2) - 1$	
$x' = -7$	$y' = -6$
$x' = -6$	$y' = -3$
$x' = -5$	$y' = -2$
$x' = -4$	$y' = -3$
$x' = -3$	$y' = -6$



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

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

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

right 3
up 1

BEAT THE TEST!

vertex

1. Consider the function below.

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

(-3, 0)

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.

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

vertex (-6, 0)

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

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

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

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

$-2(1)^2$

$-2(1) = -2$

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

$-\frac{1}{2}(9)$

$-2(6)^2$