Horizontally Translating a Quadratic Relation

We can horizontally translate the base graph of a quadratic relation by subtracting a constant from all of the x-values before we square them. The equation would be $y = (x - h)^2$.

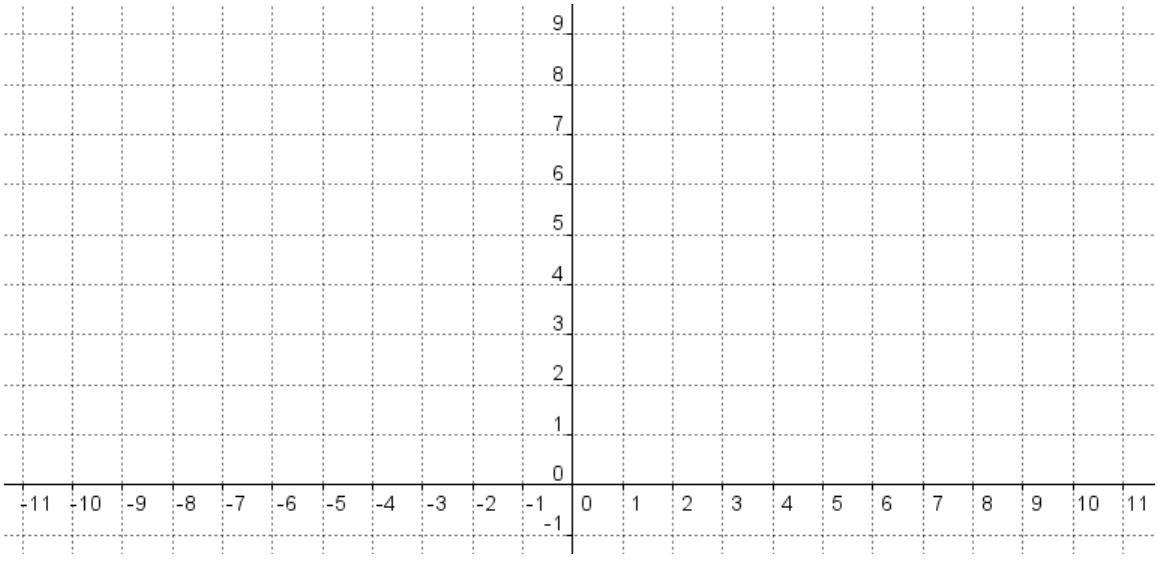
Now that we are changing the x-value rather than changing the y-value, we will need to focus more on a very important question:

"Where will the maximum or minimum value of the parabola occur?"

Example – Consider each quadratic relation below. Determine the x-values that are required to make y = 0, y = 1, y = 4 and y = 9. Represent this information in each table of values and on the grid provided.

x	$y = (x + 8)^2$

x	$y = x^2$



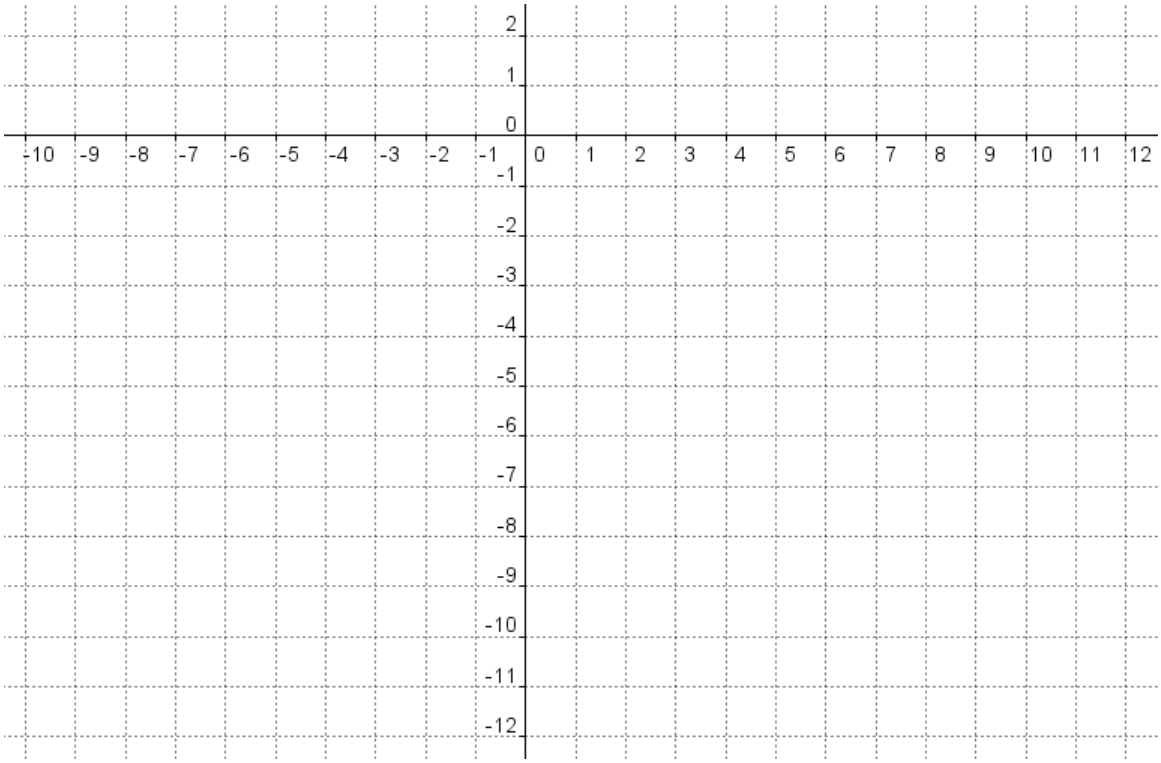
Horizontal translations can be applied to the base graph of a quadratic relation together with vertical stretches and vertical reflections. The equation would be $y = a(x-h)^2$.

Example – Consider each quadratic relation below. Determine the location of each vertex, over 1 point, over 2 point and over 3 point. Complete each table of values, plot each relation and state each horizontal transformation.

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

x	$y = 0.5(x-4)^2$

x	$y = -3(x-10)^2$



Summary of Transformations for $y = a(x - h)^2$

Recall that **a** can tell us if the graph opens up and has a minimum or opens down and has a maximum. It also tells us if there is a vertical stretch applied to the relation.

If h > 0

If h < 0

Example – Graph each relation by plotting its vertex and following its step pattern. Include all points that appear in the domain provided.

$y = -(x + 7)^2$

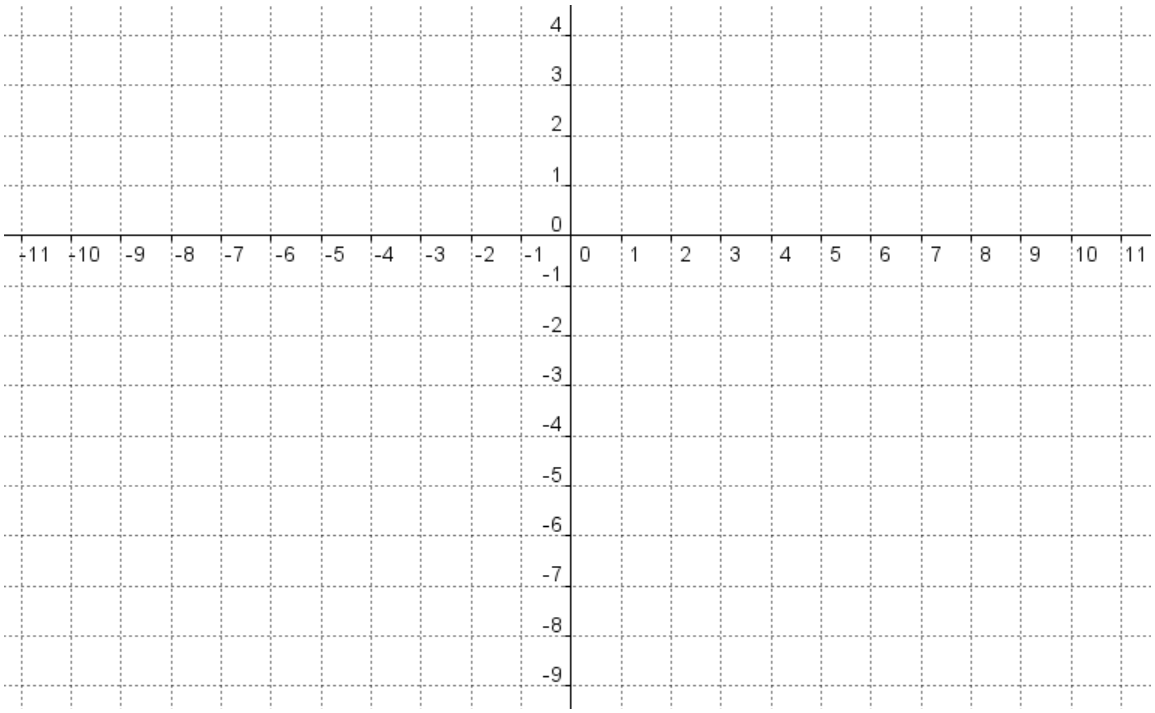
x *over*	y *up/down*
1	
2	
3	

$y = 4(x + 3)^2$

x *over*	y *up/down*
1	
2	
3	

$y = -\frac{1}{2}(x - 5)^2$

x *over*	y *up/down*
1	
2	
3	



Homework – Complete Part C on "The Quadratic Relation Homework Handout"

– Determine the equation for each parabola below in the form $y = a(x - h)^2$.