☺ Chapter 4 Notes ☺

4.4– Translations and the Quadratic Family

Daily Objectives:

1. Define the parent quadratic function, $y = x^2$.
2. Determine the elements of equations that produce translations of the graphs of parent functions (h and k).
3. Introduce the (nonstretched) vertex form of the graph of a parabola, $y = (x-h)^2 + k$.
4. Define *parabola*, *vertex of a parabola*, and *line of symmetry*.
5. Determine the graph from an equation and the equation from a graph.

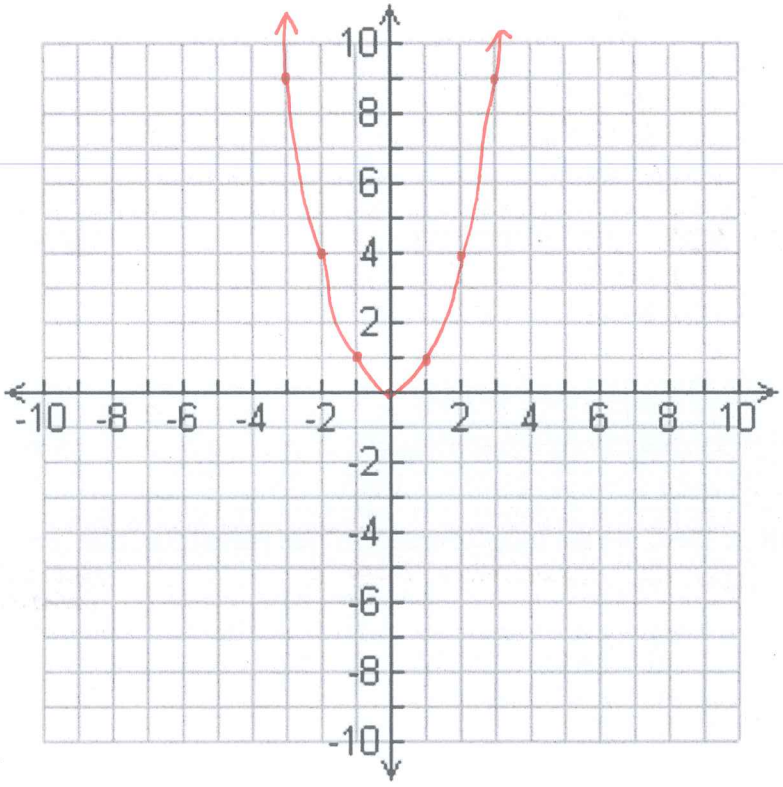
Parent Function: a building block function such as $y=x^2$ $y=|x|$ $y=\sqrt{x}$ that will be transformed

Family of Functions: group of functions created by transforming parent function

Quadratic (Squaring) Function: $y=x^2$ → highest power of x is 2.

Fill out the table of values for $y = x^2$. Then graph the function.

X	Y
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9



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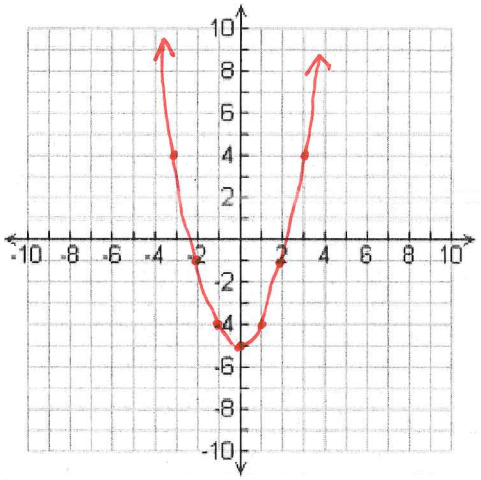
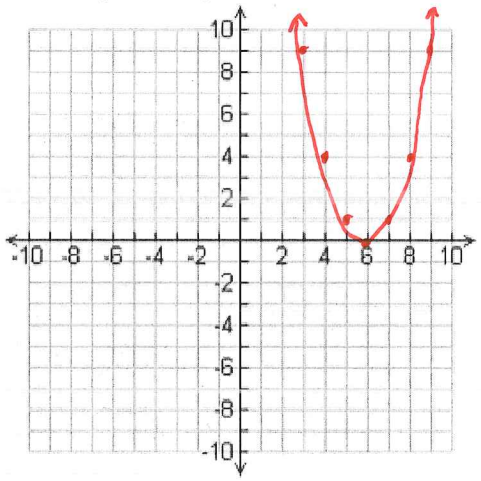
Example 1: Describe the transformation. Then graph the following equations.

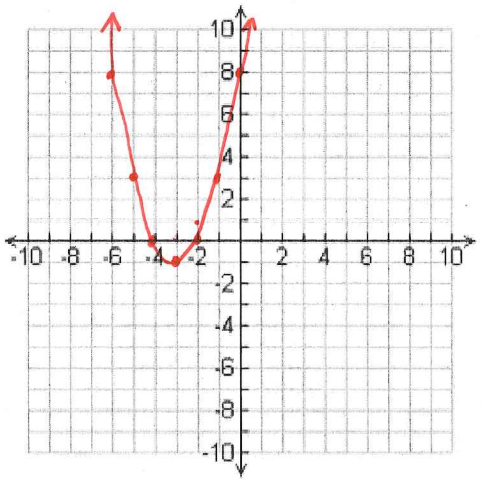
$y = x^2 - 5$ VERTICAL TRANSLATION DOWN 5



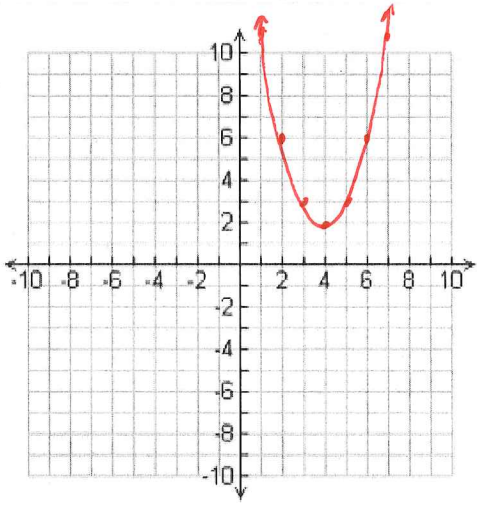
$y = (x-6)^2$ HORIZONTAL TRANSLATION RIGHT 6



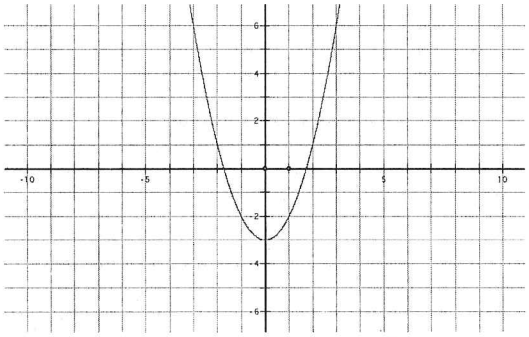
$y = (x+3)^2 - 1$ HORIZONTAL TRANSLATION LEFT 3, VERTICAL TRANSLATION DOWN 1



$y = (x-4)^2 + 2$ HORIZONTAL TRANSLATION RIGHT 4, VERTICAL TRANSLATION UP 2

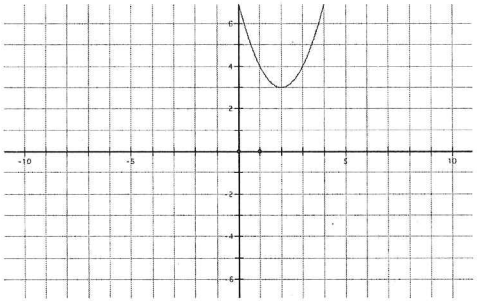


Example 2: Describe the transformation of the parent function $y = x^2$. Then write the equation of the graph. VERTICAL TRANSLATION DOWN 3



$y = x^2 - 3$

HORIZONTAL TRANSLATION RIGHT 2
VERTICAL TRANSLATION UP 3



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

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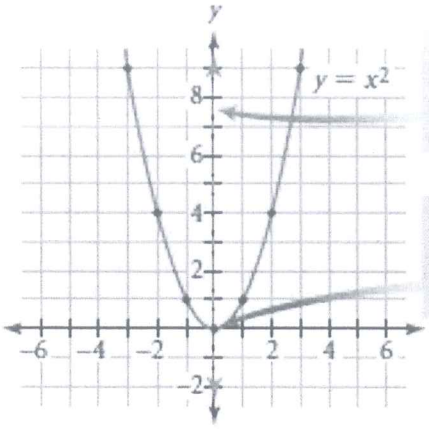
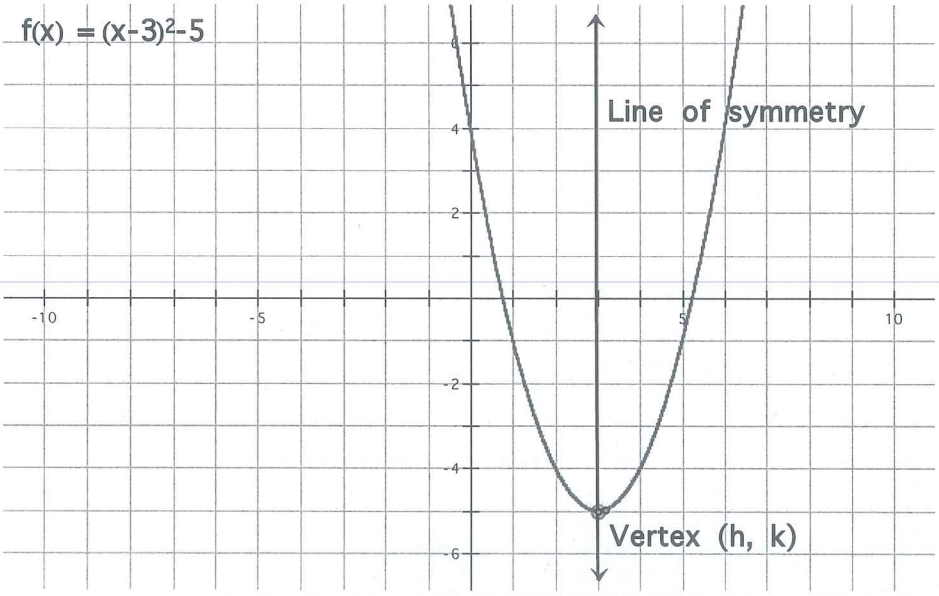


The line of symmetry divides the graph into mirror-image halves. The line of symmetry of $y = x^2$ is $x = 0$.

The vertex is the point where the graph changes direction. The vertex of $y = x^2$ is $(0, 0)$.

Find the vertex and equation of the line of symmetry for the parabola below.



(3, -5)

x = 3