# 4-1

Reteaching

Quadratic Functions and Transformations

Vertex Form of a Quadratic Function

The vertex form of a quadratic function is $y = a(x - h)^2 + k$. The graph of this function is a transformation of the graph of the parent quadratic function $y = x^2$. The vertex of the graph is (h, k). If $a = 1$, you can graph the function by sliding the graph of the parent function h units along the x-axis and k units along the y-axis.
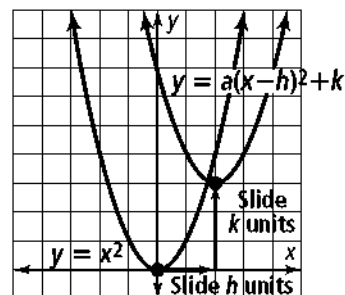
If $a \neq 1$, the graph is a stretch or compression of the parent function by a factor of $|a|$.
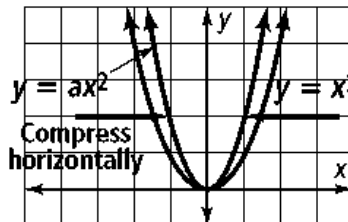
|a|< 1

The graph is a horizontal stretch of the parent function.

$|a| > 1$
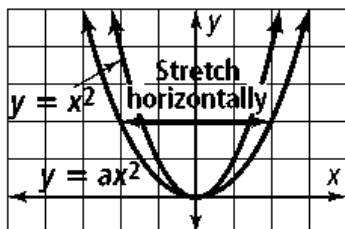
The graph is a horizontal compression of the parent function
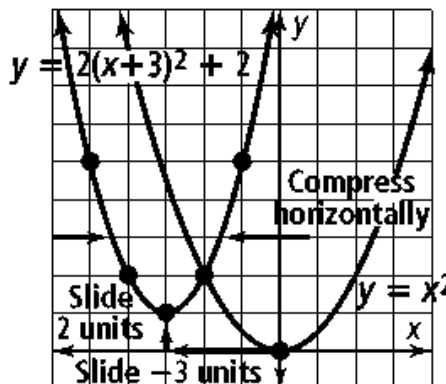

Problem

What is the graph of $y = 2(x + 3)^2 + 2$?

Step 1 Write the function in vertex form: $y = 2[x - (-3)]^2$

Step 2 The vertex is $(-3, 2)$.

Step 3 The axis of symmetry is $x = -3$.

Step 4 Because $a = 2$, the graph of this function is a ho. parent function. In addition to sliding the graph o and 2 units up, you must change the shape of the the vertex to help you sketch the graph.

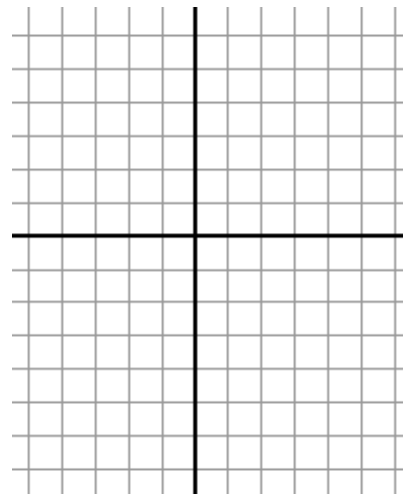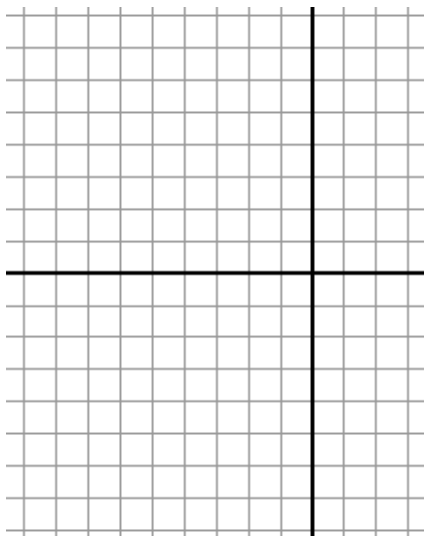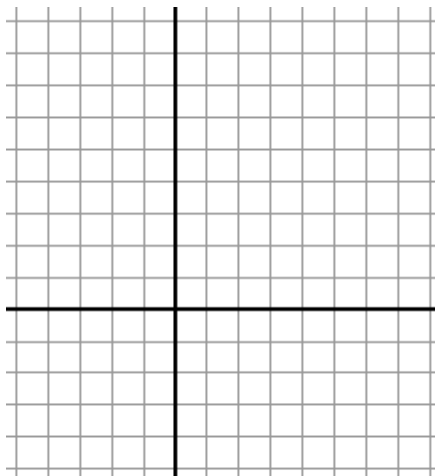| x	−5	−4	−3	−2	−1
y	10	4	2	4	10

Graph each function. Identify the vertex and axis of symmetry.

1. $y = (x - 1)^2 + 3$ **2.** $y = (x + 4)^2 - 2$ **3.** $y = (x + 2)^2 + 1$

4. y = 2(x – 1) 2 + 3   **5.** y = $\frac{1}{2}$ (x + 4) 2 – 2