

10.1 Graph $y = ax^2 + c$

TEKS A.2.A, A.9.A,
A.9.B, A.9.C



Before

You graphed linear and exponential functions.

Now

You will graph simple quadratic functions.

Why?

So you can solve a problem involving an antenna, as in Ex. 40.

Key Vocabulary

- quadratic function
- parabola
- parent quadratic function
- vertex
- axis of symmetry

A **quadratic function** is a nonlinear function that can be written in the **standard form** $y = ax^2 + bx + c$ where $a \neq 0$. Every quadratic function has a U-shaped graph called a **parabola**. In this lesson, you will graph quadratic functions where $b = 0$.

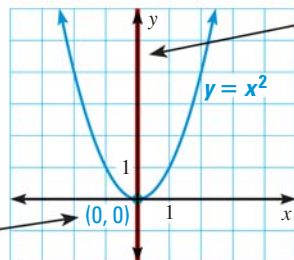
KEY CONCEPT

For Your Notebook

Parent Quadratic Function

The most basic quadratic function in the family of quadratic functions, called the **parent quadratic function**, is $y = x^2$. The graph of $y = x^2$ is shown below.

The lowest or highest point on a parabola is the **vertex**. The vertex of the graph of $y = x^2$ is $(0, 0)$.



The line that passes through the vertex and divides the parabola into two symmetric parts is called the **axis of symmetry**. The axis of symmetry for the graph of $y = x^2$ is the y -axis, $x = 0$.

EXAMPLE 1 Graph $y = ax^2$ where $|a| > 1$

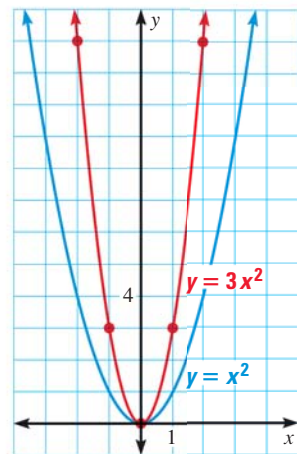
STEP 1 Make a table of values for $y = 3x^2$.

x	-2	-1	0	1	2
y	12	3	0	3	12

STEP 2 Plot the points from the table.

STEP 3 Draw a smooth curve through the points.

STEP 4 Compare the graphs of $y = 3x^2$ and $y = x^2$. Both graphs open up and have the same vertex, $(0, 0)$, and axis of symmetry, $x = 0$. The graph of $y = 3x^2$ is narrower than the graph of $y = x^2$ because the graph of $y = 3x^2$ is a vertical stretch (by a factor of 3) of the graph of $y = x^2$.



PLOT ADDITIONAL POINTS

If you are having difficulty seeing the shape of the parabola, plot additional points.