

# Algebra II: Sketching Parabolas

**Standard Form** Before you sketch a parabolic curve, you ought to put the source quadratic equation in standard form if it is not already:

$$ax^2 + bx + c = y$$

For example:

$$y = 3x(2 + 7x) \rightarrow y = 21x^2 + 6x$$

(note that in this example,  $c = 0$ )

## The Main Steps

1. Find the **axis of symmetry** ( $x = -\frac{b}{2a}$ )
2. Find the **vertex** ( $x, y$ ) coordinates: Take the  $x$  value from the axis of symmetry and plug it into the original equation to get your  $y$  value.
3. Find the **roots**. If they are real numbers, use them as additional points. Remember that the  $y$  values of these points will always be 0, or they wouldn't be roots.
4. Make a **t-chart** to find more points. You should pick  $x$  values to the left and right of the vertex. You need only calculate the  $y$  values for one direction from the vertex, as the  $y$  values in the opposite direction will mirror those. For example:

$x$	$x^2 + 5$
1	6
2	9
3	14
-1	6
-2	9
-3	14

**Direction** Remember that if the leading coefficient ( $a$ ) is positive, the parabola will open upwards. If it is negative, the parabola will open downwards.

**Inequalities**  $\dots > y$  means you should shade the area **above** the curve.  $\dots < y$  means you should shade the area **below** the curve.

$>$  and  $<$  regions should be bordered by a dotted-line curve.

$\geq$  and  $\leq$  regions should be bordered by a solid-line curve.