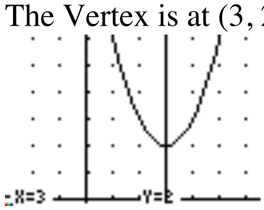
General Form of the Quadratic Function:
$f(x) = ax^2 + bx + c$, Where a cannot be zero

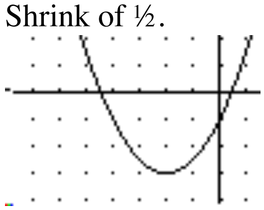
The value of a gives some of the information about the graph:
1. The Value of a gives vertical Stretch or Shrink.
2. If a is Negative then there is a Reflection about the x-axis.
3. For parent Quadratic Function, a = 1, b = 0, c = 0

Vertex Form of the Quadratic Function:
$f(x) = a(x-h)^2 + k$, where a cannot be zero. The position of the vertex is (h, k), and the Axis of Symmetry is at x = h.

Examples:
1. $f(x) = (x-3)^2 + 2$
The Vertex is at (3, 2). The Axis of Symmetry is x = 3 (A vertical Line)



2. $y = \frac{1}{2}(x+2)^2 - 3$
The Vertex is at (-2, -3). The Axis of Symmetry is x = -2 (A Vertical Line). Also, there is a Vertical Shrink of ½.



3. Convert $f(x) = ax^2 + bx + c$ From General Form into Vertex Form by Completing the Square.
$f(x) = a\left(x^2 + \frac{b}{a}x + \quad\right) + c$ The missing value if found by taking half the coefficient of the 2nd Term, then squaring the result. However, since this is inside the parentheses, it is automatically multiplied by a.
$f(x) = a\left(x^2 + \frac{b}{a}x + \frac{b^2}{4a^2}\right) + c - \frac{b^2}{4a}$ But This has a Perfect Square Trinomial and Can be Factored. We will also find the common denominator of the outside terms, then Subtract Them.
$f(x) = \left(x + \frac{b}{2a}\right)^2 - \frac{b^2 - 4ac}{4a}$ The Vertex is at $\left(-\frac{b}{2a}, -\frac{b^2-4ac}{4a}\right)$ The axis of Symmetry is $x = -\frac{b}{2a}$.

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