Quadratics in Vertex Form:

Vertex and Axis of Symmetry

A quadratic can be written in many forms:

- Vertex Form: $y = a(x-h)^2 + k$
- Transformation Form: $y = a(bx-c) + d$
- Factor Form: $y = a(x-b)(x-c)$
- Standard Form: $y = ax^2 + bx + c$

This station will focus on the vertex and the axis of symmetry of a quadratic function. The vertex is a key characteristic of a quadratic function. Let's explore using the parent function $f(x) = x^2$ below.

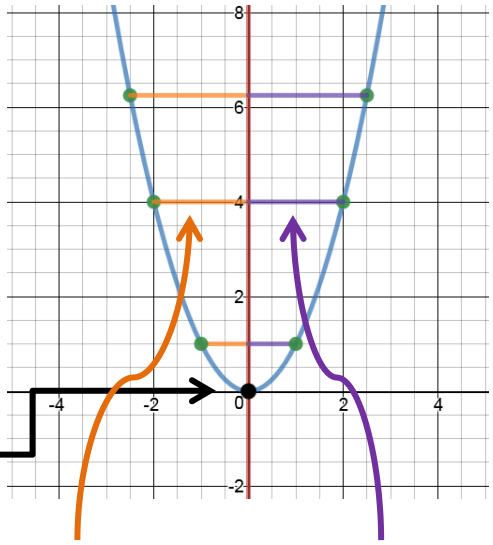
Vertex Form: $y = a(x-h)^2 + k$

Parent Function can be written two ways:

$y = 1x^2 = x^2$ ← this is what you are familiar with

Or by substituting the values $(0,0)\ as\ (h\ ,k)$

$$y = 1(x-0)^2+0$$



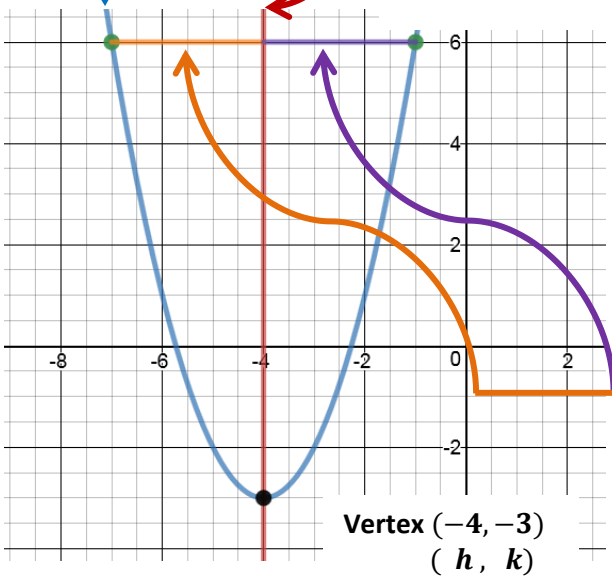
Vertex $(0,0)$
(h,k)

Equation for Quadratic

$y = 1(x-(-4)) - 3$

$y = 1(x+4) - 3$

Axis of Symmetry
$x = -4$



Vertex $(-4,-3)$
$(\ h\ ,\ k)$

Symmetric Distance between points

Notice how the red line (axis of symmetry) breaks the function into two identical halves. For example, there is a distance of 2 units from the axis of symmetry and the points $(-2,4)\ and\ (2,4)$. The equal distance from point to axis of symmetry is maintained through the quadratic to point symmetric on other side of axis of symmetry.

Axis of Symmetry is represented as $x = h$ so in this example $x = 0$