Quadratics 2c - Factored Form Graph to Symbolic

Standards: **F-IF.4** & **F-IF.7**

GLOs: #3 Complex Thinker

Math Practice: Look for and make use of structure

HW: WS #10 (graph on graph paper!)

Learning Target:
What points do you need to write a quadratic equation and how do you use them to do so?

Aug 26-9:36 PM

In the last lesson we learned how to graph quadratic functions that are represented symbolically in factored form. In this lesson we learn how to reverse that process – to build our own symbolic representations of the form $f(x) = a(x - s)(x - t)$ from the graphs.

Determining the Symbolic Form $f(x) = a(x-s)(x-t)$

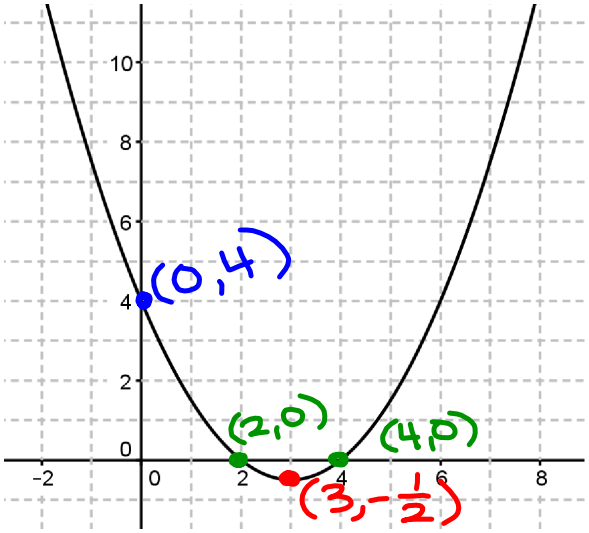
1. Identify the zeros (x-int) of the quadratic function, and use them to find the factors $(x - s)$ and $(x - t)$

2. Locate a third point on the graph. This can be anywhere on the graph, but sometimes it is useful to use the *y* -intercept.

3. Plug in the x- and *y*- values of the third point into the partial symbolic representation. Simplify the resulting equation to solve for *a*.

4. Write the complete solution in symbolic form ($f(x) = a(x-s)(x-t)$).

1. Find the symbolic representation for the following quadratic function and then mark the exact coordinates of the intercepts and vertex.



① Zeros: 2 4

$(x-2)(x-4)$

② y-int: $(0,4)$ (x, y)

$f(x)=a(x-2)(x-4)$

$4=a(0-2)(0-4)$

$4=a(-2)(-4)$

$\frac{4}{8}=\frac{a(8)}{8}$

$a=\frac{1}{2}$

$f(x)=a(x-s)(x-t)$

$f(x)=\frac{1}{2}(x-2)(x-4)$

vertex:

$x: \frac{2+4}{2}=\frac{6}{2}=3$

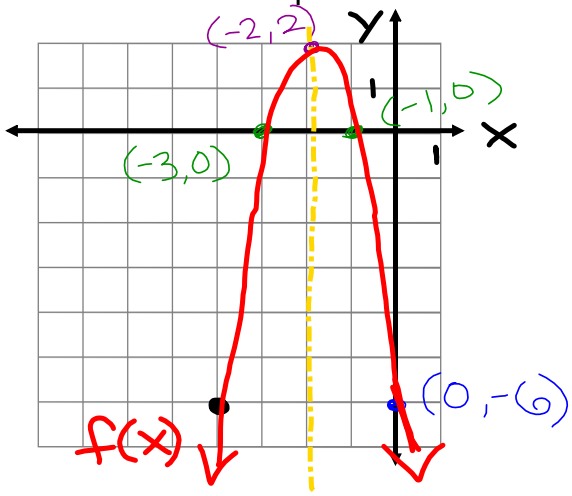
$y: f(3)=\frac{1}{2}(3-2)(3-4)$

$f(3)=\frac{1}{2}(1)(-1)$

$f(3)=\frac{1}{2}(-1)$

$f(3)=-\frac{1}{2}$

2. Find the symbolic representation for the quadratic function *f* with zeros at x = – 1 and x= – 3 and y–intercept at (0, -6). State the coordinates of all intercepts and the vertex Graph *f* below.



① Zeros: -1 & -3

$(x+1)(x+3)$

② $(0,-6)$
x y

$f(x)=a(x+1)(x+3)$

$-6=a(0+1)(0+3)$

$-6=a(1)(3)$

$\frac{-6}{3}=\frac{a(3)}{3}$

$a=-2$

$f(x)=a(x-s)(x-t)$

$f(x)=\underline{-2(x+1)(x+3)}$

x-int: $(-1,0)$ & $(-3,0)$

y-int: $(0,-6)$

vertex: $(-2,2$

Vertex:

$x: \frac{-1+-3}{2}=\frac{-4}{2}=-2$

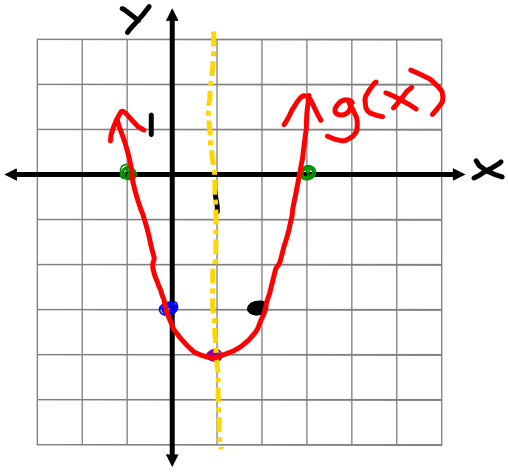
$y: f(-2)=-2(-2+1)(-2+3)$

$f(-2)=-2(-1)(1)$

$f(-2)=-2(-1)$

$f(-2)=2$

3. Find the symbolic representation for the quadratic function *g* with zeros at x = – 1 and x = 3 and vertex at (1, -4). State the coordinates of all intercepts. Graph *g* below.



① Zeros: -1 & 3

$(x+1)(x-3)$

② $(1,-4)$ (x, y)

$g(x) = a(x+1)(x-3)$

$-4 = a(1+1)(1-3)$

$-4 = a(2)(-2)$

$\frac{-4}{-4} = \frac{a(-4)}{-4}$

$a = 1$

y-int:

$g(0) = 1(0+1)(0-3)$

$g(0) = 1(1)(-3)$

$g(0) = -3$

$f(x) = a(x-s)(x-t)$

$g(x) = 1(x+1)(x-3)$

x-int: $(-1,0)$ & $(3,0)$

y-int: $(0,-3)$

vertex: $(1,-4)$