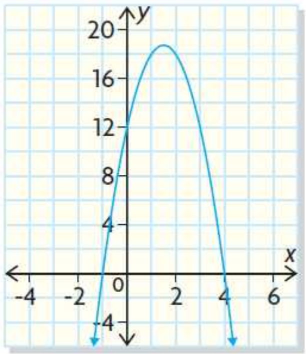
Finding a Quadratic Equation from a Graph

Determine the function that defines this parabola. Write the function in standard form.

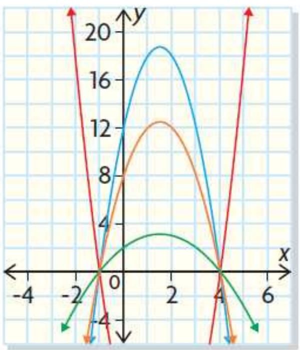


The x-intercepts are $x = -1$ and $x = 4$. The zeros of the function occur when x has values of -1 and 4.

$y = a(x - r)(x - s)$
$y = a[x - (-1)][x - (4)]$
$y = a(x + 1)(x - 4)$

The graph is a parabola, so it is defined by a quadratic function.

I located the x-intercepts and used them to determine the zeros of the function. I wrote the factored form of the quadratic function, substituting -1 and 4 for r and s.



I knew that there are infinitely many quadratic functions that have these two zeros, depending on the value of a. I had to determine the value of a for the function that defines the blue graph.

The y-intercept is 12.

$y = a(x + 1)(x - 4)$
$(12) = a[(0) + 1][(0) - 4]$
$12 = a(1)(-4)$
$12 = -4a$
$-3 = a$

From the graph, I determined the coordinates of the y-intercept.

Because these coordinates are integers, I decided to use the y-intercept to solve for a.

In factored form, the quadratic function is $y = -3(x + 1)(x - 4)$

I substituted the value of a into my equation.

In standard form, the quadratic function is

$y = -3(x^2 - 3x - 4)$
$y = -3x^2 + 9x + 12$

My equation seems reasonable, because it defines a graph with a y-intercept of 12 and a parabola that opens downward.

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