Warm-Up

Page 1 of the Notes Handout!

6
5
4
3
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Factor Form of Quadratic Functions

Today's Plan

1. Lesson: Connect equations and graphs of functions.
2. Practice: exercises in Desmos or on paper.

(K4.1) Students will know that the factor form of an equation is $f(x) = a(x - p)(x - q)$.

(K4.2) Students will know that the zeros of a quadratic in factor form $f\left(x\right) = a(x - p)(x - q)$ are $x = p$ and $x = q$.

(D4.1) Students will be able to calculate the factor form of a quadratic given its graph.

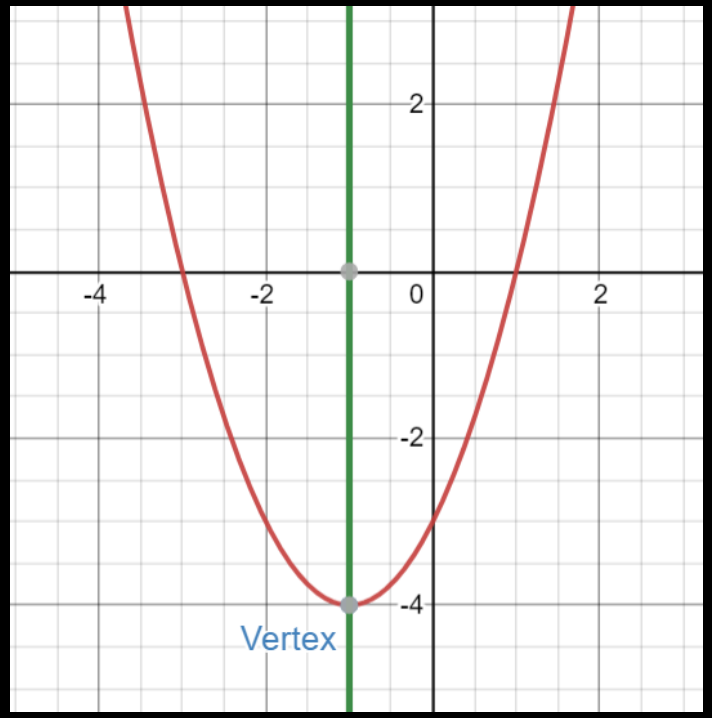
(D4.2) Students will be able to calculate the factor form of a quadratic given its standard form using the split-the-middle method.

(D4.3) Students will be able to calculate the standard form of a quadratic given its factor form.

Standard Form

$$f(x) = ax^2 + bx + c, a \neq 0$$

$$f(x) = x^2 + x - 3$$



The y-intercept is $(0, c)$.

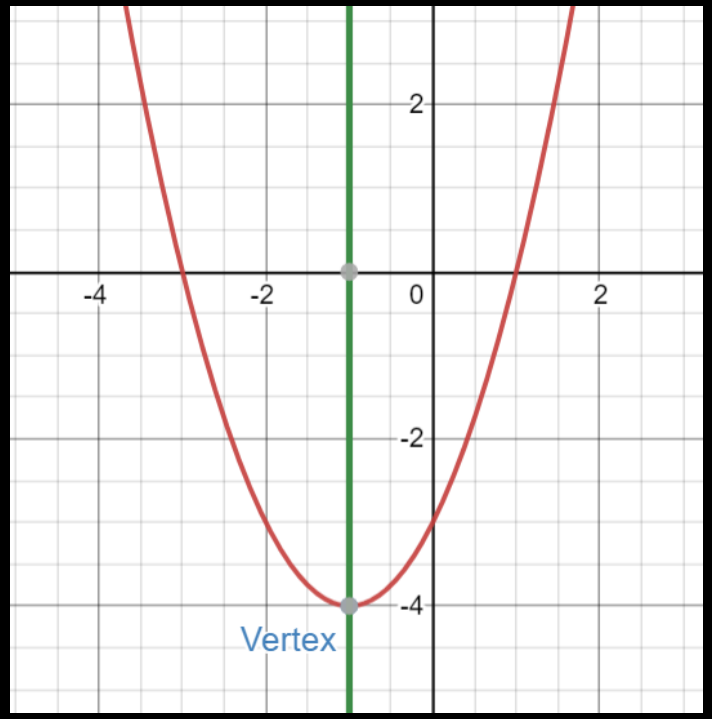
The vertex of f is the point

$$\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$$

Vertex Form

$$f(x) = a(x-h)^2 + k, a \neq 0$$

$$f(x) = (x-1)^2 - 3$$



The vertex has coordinates (h, k).

Other Properties of Quadratics?

Zeros

x-intercepts

Factor Form

$$f(x) = a(x - p)(x - q), a \neq 0$$

What are the zeros of f?

$x = p$ and $x = q$

Factor Form to Standard Form

$$f(x) = 3(x-1)(x-2)$$

Page 2 of the Notes Handout!

Standard Form to Factor Form

To factor a quadratic function means to write it in factor form.

$f(x) = ax^2 + bx + c, a \neq 0$ → $f(x) = a(x - p)(x - q), a \neq 0$

I know a, b, and c.

I calculate p and q.

Split the Middle Method

$$f(x) = x^2 + bx + c$$

$$f(x) = (x - p)(x - q)$$

	x	$-q$
x		
$-p$		

Find two numbers p and q with

1) $pq = c$
2) $p + q = -b$

Strategy:

1) List pairs of numbers that multiply to c
2) Check which ones add to $-b$

$$f(x) = x^2 - 8x + 12$$

Page 3 of the Notes Handout!

A Different Way to Solve
QUADRATIC EQUATIONS
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1. Log into student.desmos.com.
2. Solve the activity *Quadratics, Lesson 4, Factorizations*

Or solve the same problems on paper, in the packet called *Practice.*