

Warm-Up

Page 1 of the Notes Handout!



# 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  $f(x) = a(x - p)(x - q)$  are  $x = p$  and  $x = q$ .

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

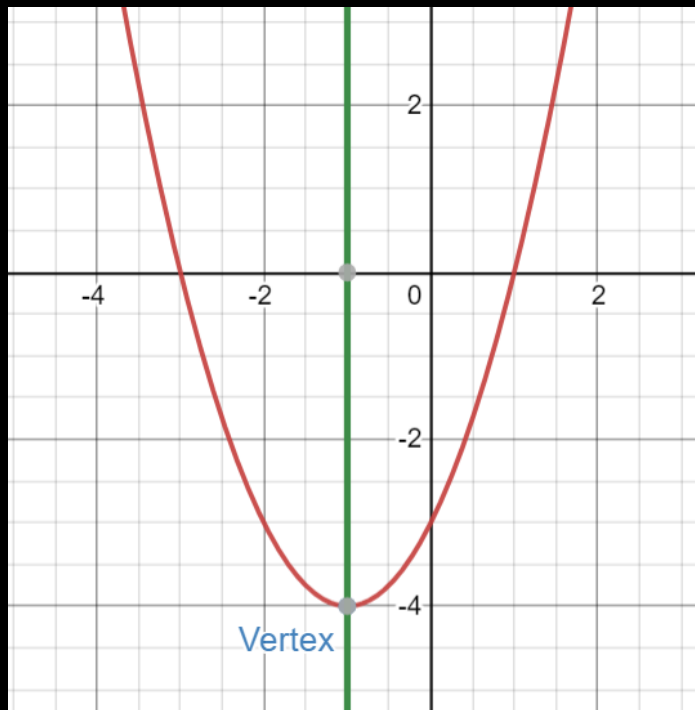
(D4.2) Students will be able to calculate the factor form of a quadratic given its standard form using the split-the-middle method.

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

# Standard Form

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

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



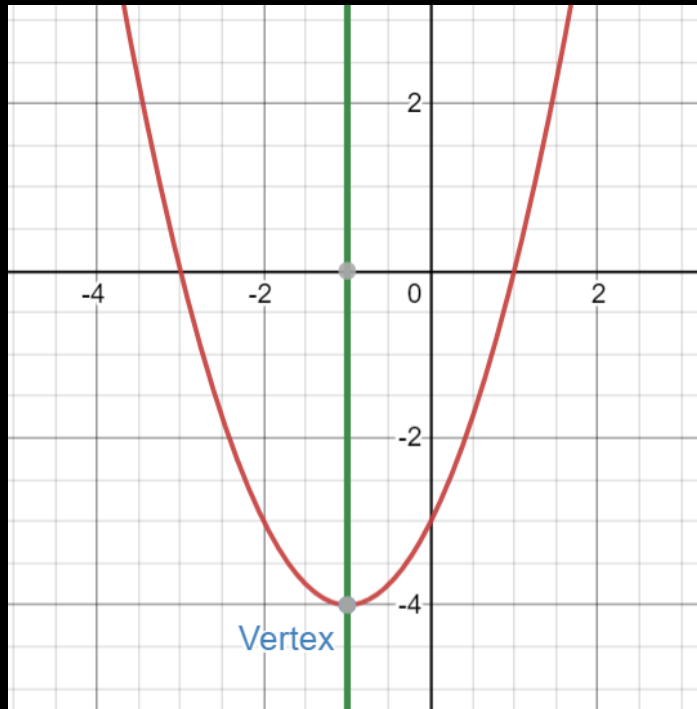
The y-intercept is  $(0, c)$ .

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  $f$ ?

$$x = p \text{ and } x = q$$

# Factor Form to Standard Form

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

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# 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  $-b$

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

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A man with dark hair, wearing a light-colored button-down shirt, is sitting at a desk. He has a thoughtful expression, with his hand resting on his chin. A green desk lamp is positioned to his left, casting a soft glow. The background is dark, and the entire scene is framed by a teal-colored border with several white circular bokeh lights scattered throughout. The text 'A Different Way to Solve' is overlaid on the bottom left of the image.

A Different Way to Solve

# QUADRATIC EQUATIONS

exp-ii

1. Log into [student.desmos.com](https://student.desmos.com).
2. Solve the activity *Quadratics, Lesson 4, Factorizations*

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