Lesson 15: Factoring Quadratics

Objectives	Terms
• To identify standard and factored form of quadratic functions. • To multiply quadratics. • To factor quadratics. • To translate functions between standard and factored form.	• Quadratics • Standard Form • Factored Form • Distribution • Factoring • Factoring by Grouping • Common Binomial Factor

Think about this: What is the expression of a quadratic function?

Definitions:

- **Quadratic Characteristics:**
  - **Graph**: _____
  - **Standard Form:** _____
    - _____ are numbers
    - _____ $\neq 0$
  - **Factored Form:** _____
    - _____ $\neq 0$
    - _____ are zeros of the function

Practice: Identify each quadratic as either Standard Form, Factored Form, or neither. **(circle** one)

1. $x^2 + 2x - 15$ Standard Form   Factored Form   Neither

2. $3(x - 9)^2 + 1$ Standard Form   Factored Form   Neither

3. $2(x - 1)(x + 1)$ Standard Form   Factored Form   Neither

Discuss: How can you take intercept form and change it to standard form?

Multiply: _____

Distribution: multiply each term in one set of parentheses to each term in the other set of parentheses.	FOIL: Guided Distribution	Table: Guided Distribution

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Practice: Rewrite the given quadratics in standard form.

$(4x - 1)(x + 2)$	$(3x + 2)(5x + 1)$	$\frac{1}{2}(x - 8)(x + 12)$

Discuss: How can you take standard form and change it to factored form?

Examples: Rewrite the given quadratics in factored form.

1. $2x^2 + 4x - 30$

a. Are there any factors common to each term? Factor that value.

b. What is the new value of b and c?

c. What two numbers multiply to c and add to b?

d. Write the fully factored form.

2. $x^2 - 17x + 70$

a. Are there any factors common to each term? Factor that value.

b. What is the new value of b and c?

c. What two numbers multiply to c and add to b?

d. Write the fully factored form.

Definition

- **Factoring:** This is "undoing" distribution. You identify:
  - Common _____ to each term
  - The values of _____ and _____
  - The factors of c that add to _____ (the factors can be _____ and/or _____
    - These factors are _____ and _____ when writing factored form. (when a = 1)

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Consider this: How would you factor the following quadratics?

Example: Factor: $5x^2 + 11x + 2$

Mathematical Steps	Description
$5x^2 + 11x + 2$	Identify and factor any common factors (this example does not have any common factors).
	Identify the values of: _____
	Multiply _____ and _____ together
	Find the factors of the product of _____ that add to ___.
	Rewrite the original quadratic: _____
	Create groups with 2 terms each.
	Find the Greatest Common Factor (GCF) of each pair of terms.
	Identify the terms they have in common (the common binomial factor)
	Rewrite the quadratic in factored form. The GCF of each term goes into one set of parentheses and the common binomial factor in another.
	Check your answer by distributing and rewriting in standard form.

Definitions:

- **Factor by Grouping:** A way of factoring quadratics when _____.
  - Can only be used when there are _____ terms.
  - You can create a _____ term in a quadratic by rewriting the _____ to be a sum of the factors of _____.
  - Group the terms into pairs and factor out the GCF of each pair.
  - **Common Binomial Factor:** the two-term expression in common after the GCF is factored out of each pair.
  - The final expression is written in factored form.
    - One factor is the Common Binomial Factor.
    - The other factor is the sum of the two GCFs.

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Practice: Factor each of the given quadratics. Write your answer in factored form. Check your work by using distribution to return your answer to standard form.

1. $6x^2 - 5x + 1$	Answer: Check Step:
2. $2x^2 - 8x + 6$	Answer: Check Step:
3. $x^2 + 13x + 40$	Answer: Check Step:
Where will you see this in upcoming material?	What are the calculator skills you needed?