Lesson 19: Factoring Day 2

Objectives:

~ Factor by Grouping

~ Factor with leading coefficients of not 1

Lesson 5.4: GCF and Factor by Grouping

Factor out the GCF: Remember, Sometimes the GCF is a Binomial. Factor the Binomial out.

1. $4x(\underline{x-3}) + 5(\underline{x-3})$

$\boxed{(x-3)(4x+5)}$

2. $2x(3x-2) - 3(3x-2)$

$\boxed{(3x-2)(2x-3)}$

Factor by Grouping (4 terms)

Step 1: Group the terms with common factors. Sometimes it will be necessary to rearrange the terms.

Step 2: In each grouping, factor out the common factor.

Step 3: Factor out the common factor that remains (usually a Binomial).

Step 4: Check your answer.

Factor by Grouping

Examples:

3. $\underbrace{x^3 + 3x^2}+\underbrace{2x + 6}$

$x^2(x+3)+2(x+3)$

$\boxed{(x+3)(x^2+2)}$

Factor by Grouping

Examples:

4. $\underbrace{6x^2 + 9x} - \underbrace{10x - 15}$

$= 3x(2x+3) - 5(2x+3)$

$= \boxed{(2x+3)(3x-5)}$

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We can use Factor by Grouping to factor trinomials that have a leading coefficent of something other than 1.

We just need to fill out the chart like normal and then put the two numbers "m" and "n" as the middle term - just split up.

Remember to take out the GCF first!

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ax^2	nx
mx	c

FACTORING BY GROUPING:

Step 1: Find the value of $A(C)$

Step 2: Find the pair of integers whose product equals ac, and whose sum equals b. Call these integers ***m*** and ***n***, where $mn = ac$ and $m + n = b$

Step 3: Rewrite the expression as:

$$ax^2 + bx + c = ax^2 + mx + nx + c$$

Step 4: Factor the new expression by grouping.

Step 5: CHECK YOUR ANSWER!

Examples: by grouping

5. $4x^2 + 7x + 3$

$= 4x^2 + 4x + 3x + 3$

$= 4x(x+1) + 3(x+1)$

$= \boxed{(x+1)(4x+3)}$

$\underline{4} \cdot \underline{3} = 12$ AC

$\underline{4} + \underline{3} = 7$ B

Examples: by "Box" method

5. $4x^2 + 7x + 3$

$\boxed{(4x+3)(x+1)}$

	x	$+1$
$4x$	$4x^2$	$4x$
$+3$	$3x$	3

$\underline{3} \cdot \underline{4} = 12$

$\underline{3} + \underline{4} = 7$

Examples:

6. $2x^2 + 7x + 6$

$\underbrace{2x^2 + 4x} + \underbrace{3x + 6}$

$= 2x(x+2) + 3(x+2)$

$= \boxed{(2x+3)(x+2)}$

or

$(x+2)(2x+3)$

$\underline{3} \cdot \underline{4} = 12$

$\underline{3} + \underline{4} = 7$

Examples: Remember GCF!

7. $4x^2 - 2x - 6$

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

$$= 2[\underbrace{2x^2 + 2x}\underbrace{- 3x - 3}]$$

$$= 2[2x(x+1) - 3(x+1)]$$

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

$\underline{-3} \cdot \underline{2} = -6$

$\underline{-3} + \underline{2} = -1$

Diff. of perfect □'s.

Examples:

8. $2x^6 - 32$

$2(x^6 - 16)$

$$\boxed{2(x^3+4)(x^3-4)}$$

Examples:

9. $8x^4 - 128$

$8(x^4 - 16)$

$8(x^2 + 4)(x^2 - 4)$

$\boxed{8(x^2 + 4)(x + 2)(x - 2)}$

Objectives:

~ Factor by Grouping

~ Factor with leading coefficients of not 1

Can you?

Assignment 19

Due a the beginning of next class