Algebra I **Name**_____
Module 3: Quadratic Functions
Lessons 4-5 **Period**____
Date_____

Lesson #4: Factoring by Grouping

Day #1

Today we are going to learn about how to factor by grouping. This will require you to use GCFs twice in the same problem. Sound crazy? It really isnt…

When you see an expression that has **FOUR** terms, you IMMEDIATELY want to think about factoring by grouping.

Example #1: Factor $5x^3 + 25x^2 + 2x + 10$

Example #2: Factor $x^3 + 2x^2 + 3x + 6$

STEPS

1. Check for a GCF
2. Split the expression into two groups
3. Factor out the GCF from the first group
4. Factor out the GCF from the second group
5. Do the 'left overs' look the same? Because they should!
6. Write down the binomial they have in common in one set of parentheses
7. Write down the 'left overs' as another binomial in a second set of parentheses
8. Check your answer by multiplying the two binomials

Example #3: Factor $x^3 - 6x^2 + 4x - 24$

Example #4: Factor $x^3 - 4x^2 - 5x + 20$

Example #5: Factor $x^3 - 5x^2 - 2x + 10$

Worktime: Factor the following expressions by grouping

#1 $x^3 + 4x^2 + 5x + 20$

#2 $x^3 + 2x^2 - 3x - 6$

#3 $x^3 - 2x^2 - 5x + 10$

#4 $x^3 - 5x^2 - 6x + 30$

Day #2

Today we are going to continue working on factoring by grouping. We are going to follow the steps as yesterday, but they will get a little trickier…so be careful!

Factor the following expressions by grouping.

#1 $x^3 - x^2 + 3x - 3$

#2 $3x^3 + 4x^2 + 6x + 8$

#3 $6x^3 + 15x^2 + 4x + 10$

#4 $4x^3 - 2x^2 - 18x + 9$

Worktime: Factor the following expressions by grouping

#1 $x^3 - x^2 - 5x + 5$

#2 $2x^3 + 12x^2 + 5x + 30$

#3 $6x^3 + x^2 - 42x - 7$

#4 $15x^3 + 40x^2 - 6x - 16$

Lesson #5: Factoring basic trinomials

Now that wasn't so bad, was it? Good news…we're going to take a break from factoring by grouping and review some other types of factoring you might find easier. How do we factor basic trinomials? The easiest types of trinomials to factor are ones where the leading coefficient is 1.

Huh?

Let's review.

A ***trinomial*** is a polynomial expression with ____ terms.

A ***leading coefficient*** is the_____ that comes first when a polynomial is written in standard form.

Standard form is how you should ALWAYS be writing your polynomial expressions. Standard form is when you write the terms of your expression with the exponents in decreasing order; in other words, from the _____ to the _____

Try this! Find the product of $(x + 7)(x + 3)$ and write your answer in standard form.

Factoring reverses that process and finds what you can multiply together to get an expression.

How could you factor $x^2 + 10x + 21$?

#1 Factor $x^2 + 11x + 24$

STEPS

1. Write down all the pairs of numbers that multiply to the last #
2. Find the pair of #s that add or subtract to give you the middle #
3. Draw two sets of parentheses and fill in the #s
4. Multiply the binomials to check your answer

$x^2 + 11x + 24$ is called a _____expression. That means that the highest power of the variable is 2.

Worktime: *Factor the following expressions*

#2 $x^2 + 9x + 14$ #3 $x^2 + 10x + 16$ #4 $x^2 + 21x + 20$

#5 $x^2 + 5x + 6$ #6 $x^2 + 7x + 6$ #7 $x^2 + 11x + 30$

It is crucial that you are watching the signs when you factor trinomials. Checking your answer is quite easy. Simply multiply the binomials together and see if it matches. You can even check in your calculator if you really want to.

#8 Factor $x^2 - 2x - 24$

Steps

1.) Write down all the pairs of numbers that multiply to _____

2.) Determine which pair of numbers can add/subtract to _____ but multiply to _____

3.) Write out your 2 binomials with the pair of numbers you found

4.) Multiply the two binomials to check your answer

WATCH YOUR SIGNS!

#9. Factor $c^2 + 2c - 24$ #10 Factor $x^2 + 15x + 50$

#11 Factor $b^2 - 10b + 24$ #12 Factor $x^2 - 10x - 24$

Worktime: *Factor the following expressions*

1.) $x^2 - 6x - 27$

2.) $x^2 + 14x + 24$

3.) $w^2 + 13w + 40$

4.) $x^2 - x - 56$

5.) $c^2 + 13c + 36$

6.) $w^2 + 3w - 54$

7.) $x^2 - 7x - 44$

8.) $x^2 + 16x - 36$

9.) $x^2 - x - 90$

10.) $x^2 + 5x - 6$

11.) $x^2 - 19x + 48$

12.) $x^2 + 33x + 260$

Day #2

Today, we are going to continue to look at factoring your basic trinomials. We're going to look at some tips that might help you factor if you ever get stuck.

Look at the ***LAST*** number.

- If it is ***negative***, the signs are_____. one ___ and one ___.
- If it is ***positive***, the signs are the _____.

If the signs are the *SAME*

- Look at the middle term. BOTH signs will be this sign.

EXAMPLES

1.) $x^2 + 8x + 12$

2.) $x^2 + 13x + 42$

3.) $x^2 - 11x + 30$

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

5.) $x^2 + 5x + 4$

6.) $x^2 - 15x + 50$

7.) $x^2 - 9x + 18$

8.) $x^2 - 10x + 9$

If the signs are *DIFFERENT*

- Once you figure out what numbers you need, the BIGGER number gets the sign of whatever is on the middle term.

REMINDER! You can ALWAYS check your answer by multiplying the binomials by using distributive property or box method.

EXAMPLES

1.) $x^2 - 3x - 18$

2.) $x^2 - 8x - 20$

3.) $x^2 + 4x - 12$

4.) $x^2 + 7x + 12$

5.) $x^2 - 3x - 40$

6.) $x^2 - 5x - 14$

7.) $x^2 - 9x - 10$

8.) $x^2 - 14x + 40$

9.) $x^2 + 2x - 24$

10.) $x^2 - 2x + 1$