By the end of the lesson, we will be able to:

- ~ Factor out the Greatest Common Factor
- ~ Factor by Grouping



Snowflake Brushet

Remember the Distributive Property?

$$a(x + y) = ax + ay$$

Well, today, we are going to "UN-distribute".

It's called **FACTORING**.

$$ax + ay = a(x + y)$$

Factors: Factors are numbers/polynomials that are multiplied together to get the whole.

Example:

$$3(2) = 6$$
 ~ 3 and 2 are factors of 6 ~ $6(1) = 6$ $(3x + 1)(x - 5) = 3x^2 - 14x - 5$

~ (3x + 1) and (x-5) are factors of the right side polynomial. ~

We are going to look for the Greatest Common Factor (GCF) of polynomials.

Let's start off with numbers.

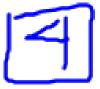
~What is the GCF of 6 and 15? 3

~What is the GCF of 48 and 72? 24

* NOTE: we can break numbers up into Prime Facorization to help us find the GCF.

Find the GCF:

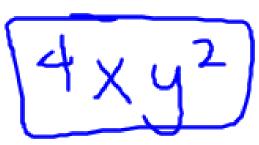
1. 4x, 12



2. $6x^3$, $12x^2$, 15x

3×

3. $4x^3y^4$, $8x^2y^3$, $12xy^2$



<u>Factoring</u>

Factor out the GCF:

1.
$$7x^{2} - 14x$$
 (2. $6y^{3} - 14y^{2} + 10y^{2}$)
 $7 \times (\frac{7x^{2}}{7x} - \frac{14x}{7x})$ = $2y(\frac{6y^{3}}{2y} - \frac{14y^{2}}{2y} + \frac{10y}{2y})$
 $= 2y(3y^{2} - 7y + 5)$
3. $2m^{4}n^{2} + 8m^{3}n^{4} - 6m^{2}n^{5}$
 $2m^{2}n^{2}(m^{2} + 4mn^{2} - 3n^{3})$

Factor out the GCF: (If the coefficient of the highest degree term is negative, we often want to factor out the negative as part of the GCF.)

5.
$$-8z + 16$$
6. $-2b^3 + 10b^2 + 8b$

$$-8(2-2)$$

$$-2b(b^2 - 5b - 4)$$

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

7.
$$4x(x-3) + 5(x-3)$$

(x-3) (4x+5)

8.
$$(c+4)(c-1) + (5c-2)(c-1)$$

 $((-1))((c+4)+(5c-2))$
 $=(c-1)((6c+2)) = [2(c-1)(3c-1)]$

Factor by Grouping see pg. 393 7 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:

1.
$$x^3 + 3x_1^2 + 2x + 6$$

= $\chi^2(x+3) + 2(x+3)$
= $(x+3)(x^2+2)$

Factor by Grouping Examples:

2.
$$6x^2 + 9x - 10x - 15$$

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

By the end of the lesson, we will be able to:

- ~ Factor out the Greatest Common Factor
- ~ Factor by Grouping

CAN YOU?



Homework:

Page 394: #19, 23 - 33 odds, 39,

41, 45, 49, 51, 55, 59

(14 problems)

