3.3 Common Factors of a Polynomial

Lesson Focus

Model and record factoring a polynomial

Reminder

- *What is a **GCF?***

- *Ex. What is the GCF between the following numbers:*
  - *12 and 18* = 6
  - $4x$ *and* 8 = 4
  - $3x^2$ *and* $9x$ = 3x

Polynomials

Polynomials

*Now we're going to do the same thing, however we're going to have multiple **terms***

Monomial – polynomial with 1 term

Binomial – polynomial with 2 terms

Polynomial – polynomial with 3 or more terms

*Now we need to find the **GCF** of multiple terms, and factor it out*

This is the first step towards factoring polynomials

Reminder – Multiply Monomials

Determine each product.

a) $(5x)(2x)$

$= 10x^2$

b) $(3x)(2y)$

$= 6xy$

Multiply the coefficients

Add the exponents of the same variables

If variables are different, write in alphabetic order

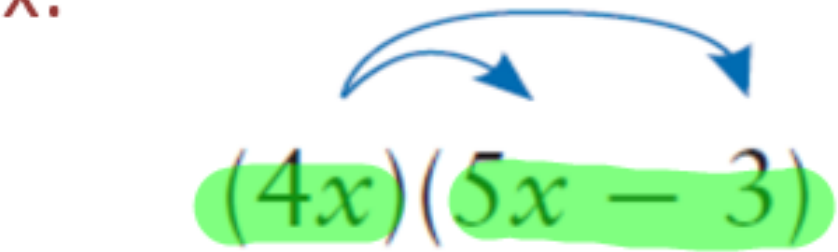
Variables always come AFTER the coefficient

Reminder - Distributive Property

Distributive Property - Multiply the monomial by each **term** in the **polynomial**

Then we're just multiplying monomials

Ex:



$= 20x^2 - 12x$

In Algebra

Expand an expression to form a product.

$$3(2 - 5a) = 6 - 15a$$

Factor a polynomial by writing it as a product of factors.

$$6 - 15a = 3(2 - 5a)$$

Factoring Polynomials

To **multiply** polynomials:

Multiply the coefficients

Add the exponents of the same variables

If variables are different, write in alphabetic order

To **Factor** polynomials:

Divide the coefficient by the factor

Subtract exponents

Leave variables that can not be factored out

Example Binomials

GCF

Factor each binomial.

a) $6n + 9$

$= 3(2n + 3)$

b) $6c + 4c^2$

$= 2c(3 + 2c)$

Example – Your Turn Binomials

Factor each binomial.

a) $3g + 6$ **b)** $8d + 12d^2$

$4d(2+3d)$

Example – Your Turn Trinomials

Factor the trinomial $5 - 10z - 5z^2$.

$= 5(1 - 2z - z^2)$

Factor the trinomial

$6 - 12z + 18z^2$

$= 6(1 - 2z + 3z^2)$

Example – Extend More than one variable

Factor the trinomial. Verify that the factors are correct.

$-12x^3y - 20xy^2 - 16x^2y^2$

$= -4xy(3x^2 + 5y + 4xy)$

Example – Your Turn More than one variable

Factor the trinomial. Verify that the factors are correct.

$-20c^4d - 30c^3d^2 - 25cd$

$$\underbrace{ab + b}_{\text{Grouping}} + \underbrace{2a + 2}_{\text{Grouping}}$$

$$= b(a+1) + 2(a+1)$$

$$= (a+1)(b+2)$$

$$mx + qx + my + qy$$

$$= x(m+q) + y(m+q)$$

$$= (m+q)(x+y)$$

$$2rs + 4s - r - 2$$

$$= 2s(r+2) - 1(r+2)$$

$$= (r+2)(2s-1)$$

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

$$\underbrace{x^2y - 2y} + \underbrace{6x - 3x^3}$$

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

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

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

Homework

P. 154-156

 # 5, 6, 8, 10, 14, 16

Handout "Factoring GCF" and Factoring By Grouping