Math 10C – Factors and Products Date: KEY

Expanding Polynomials Notes

Monomial – an algebraic expression consisting of **one term**. Eg. $3x$, $4x^2$, $8xy^2$, 2

Binomial – an algebraic expression consisting of **two terms**.Eg $4x + 3$, $3x + 5y$, $3x^2 + 1$

Trinomial – an algebraic expression consisting of **three terms**.Eg. $4x^2 + 3x + 1$

Polynomial – an algebraic expression consisting of **more than three terms**.

Expanding Polynomials

Rule: To multiply a **polynomial** by a monomial, **use** the **distributive property**: multiply each term of the **polynomial** by the monomial. This involves **multiplying** coefficients and adding exponents of the appropriate variables.

Practice:

a) $3(x+5)$ $3x+15$

b) $2x(x+7)$ $2x^2+14x$

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

d) $4y(x-9y+2)$ $4xy-36y^2+8y$

Review

Multiplication Law

* Keep the base add the exponents

$2x^1 \cdot 3x^1 = 6x^{1+1} = 6x^2$

$5x^1y^1 \cdot 7x^2y^1 = 35x^3y^2$

Multiplication of Binomials

To multiply a binomial by a binomial-- $(a + b)(c + d)$, where a , b , c , and d are terms-- use the distributive property twice. First, treat the second binomial as a single term and distribute over the first binomial:

$$(a + b)(c + d) = a(c + d) + b(c + d)$$

Example: $(x - 4)(x + 2) = x(x + 2) - 4(x + 2)$

Next, use the distributive property over the second binomial:

$$a(c + d) + b(c + d) = ac + ad + bc + bd$$

Example: $x(x + 2) - 4(x + 2) = x^2 + 2x - 4x - 8$

At this point, there should be 4 terms in the answer -- every combination of a term of the first binomial and a term of the second binomial. **Simplify the answer by combining like terms.**

Example: $x^2 + \mathbf{2x} - \mathbf{4x} - 8$ Combine like terms $+\mathbf{2x} - \mathbf{4x}$

Answer: $x^2 - 2x - 8$ Final answer is a trinomial

Practice:

a) $(x + 3)(x - 7)$

$x(x-7) + 3(x-7)$

$x^2 - 7x + 3x - 21$

$x^2 - 4x - 24$

b) $(2x - 5)(3x - 2)$

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

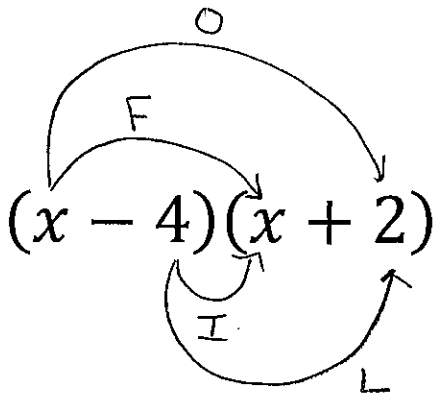
$6x^2 - 4x - 15x + 10$

$6x^2 - 19x + 10$

We can use the word **FOIL** to remember how to multiply two binomials $(a + b)(c + d)$:

- Multiply their **F**irst terms. (ac)
- Multiply their **O**utside terms. (ad)
- Multiply their **I**nside terms. (bc)
- Multiply their **L**ast terms. (bd)
- Finally, add the results together: $ac + ad + bc + bd$. Combine like terms.

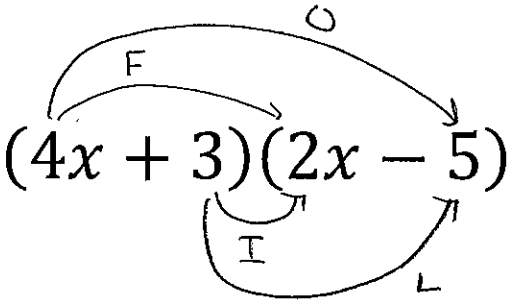
Example:



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

like terms

$x^2 - 2x - 8$



$8x^2 - 20x + 6x - 15$

$8x^2 - 14x - 15$

Practice:

a) $(x+6)(x+7)$

$x^2+7x+6x+42$

$x^2+13x+42$

b) $(2x-5)(x-3)$

$2x^2-6x-5x+15$

$2x^2-11x+15$

c) $(3x+2)(5x-4)$

$15x^2-12x+10x-8$

$15x^2-2x-8$