Multiplying Polynomials

Multiplying Monomials

When multiplying two monomial terms, such as $(8x^3)(3x^4)$,

mentally reorder the factors to get $(8 \cdot 3)(x^3 \cdot x^4)$.

Then multiply using the rules for exponents: $24x^7$.

The Distributive Property: $a(b + c) = ab + ac$

When multiplying a monomial by another polynomial, use the distributive property, as in this example:

$$(8x^3)(3x^4 + 2x - 7) =$$
$$(8x^3)(3x^4) + (8x^3)(2x) + (8x^3)(-7) =$$
$$24x^7 + 16x^4 - 56x^3 =$$

Multiplying Two Binomials: $(a + b)(c + d) = ac + ad + bc + bd$

As shown in the heading above, the process of multiplying two binomials involves multiplying each term from the first binomial by each term from the second. After that, any like terms may be combined. This is often referred to as the FOIL method, for First + Outer + Inner + Last.

- In multiplying $(y + 9)(2y + 4)$
  - The first product is: $(y)(2y) = 2y^2$
  - The outer product is: $(y)(4) = 4y$
  - The inner product is: $(9)(2y) = 18y$
  - The last product is: $(9)(4) = 36$
  - The sum of all these products is: $2y^2 + 4y + 18y + 36$
  - Finally, combine like terms to get: $2y^2 + 22y + 36$

Multiplying Any Two Polynomials

In an expansion of the distributive property and FOIL method, each term of the first polynomial must be multiplied by each term of the second. Then all like terms are combined.

$(3z^2 - 5z + 7)(z^2 + 2z - 6)$

$(3z^2)(z^2 + 2z - 6) = \quad 3z^4 + 6z^3 - 18z^2$

$(-5z)(z^2 + 2z - 6) = \quad\quad -5z^3 - 10z^2 + 30z$

$(7)(z^2 + 2z - 6) = \quad\quad\quad 7z^2 + 14z - 42$

Combine like terms from the above products: $3z^4 + z^3 - 21z^2 + 44z - 42$

For more practice, go to Multiplying Polynomials.*

Then complete the following problems.

$5t(8t^2 + 3t - 1) =$

$(4x - 7)(3x - 2) =$

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