Multiplying Polynomials

Multiplying a Polynomial by a Monomial

To multiply a polynomial by a monomial we use a Distributive Property as well as the rule for multiplying exponential expressions.

EXAMPLE: $4x^2(x + 8)$

We will first multiply $4x^2$ and x. Then we will multiply $4x^2$ and 8.

$$4x^2(x) + 4x^2(8)$$

$$4x^3 + 32x^2$$

REMEMBER to add the exponents if the bases are the same.

$$4x^2(x) = 4x^{2+1} = 4x^3$$

Also, REMEMBER that the sign we get when we multiply gives us the sign between the terms.

EXAMPLE: $-y(-3y^2 - 2y + 6)$

Use the Distributive Property to multiply each term inside the parentheses by $-y$. REMEMBER that the sign in front of the term goes with the term.

$$-y(-3y^2 - 2y + 6)$$

$$-y(-3y^2) - y(-2y) - y(6)$$

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

REMEMBER that we cannot combine terms unless the variable parts are identical. This problem is simplified as far as possible.

Don't forget the rules for exponents!

Multiplying a Polynomial by a Polynomial

You can do direct distribution to multiply 2 polynomials together.

$$(3x^2 + 4x - 2)(2x + 3)$$

Break it up into parts

$$2x(3x^2 + 4x - 2) + 3(3x^2 + 4x - 2)$$

Distribute

$$(6x^3 + 8x^2 - 4x) + (9x^2 + 12x - 6)$$

Combine like terms

$$6x^3 + (8x^2 + 9x^2) + (-4x + 12x) - 6$$

Solve

$$6x^3 + 17x^2 + 8x - 6$$