Multiplication of Polynomials (Monomials, Binomials, FOIL)

Extended Distributive Property a $(b_1+b_2+...+b_n) = ab_1+ab_2+...+ab_n$

To multiply a polynomial by a monomial, multiply each term of the polynomial by the monomial.

$$-a^{3}b(3a^{2}b^{5} - ab^{4} - 7a^{2}b) = -3a^{5}b^{6} + a^{4}b^{5} + 7a^{5}b^{2}$$

$$[x^{3} - 4x(x^{2} - 3x + 2) - 5x] + [x^{2} - 5(4 - x^{2}) + 3] =$$

$$[x^{3} - 4x^{3} + 12x^{2} - 8x - 5x] + [x^{2} - 20 + 5x^{2} + 3] =$$

$$[-3x^{3} + 12x^{2} - 13x] + [6x^{2} - 17] =$$

$$-3x^{3} + 18x^{2} - 13x - 17$$

TRY:

$$-1(-x^2-3x-9)$$

$$-3x(x-2)-5[2x-4(x+6)]$$

$$-3mn(2mn^2 - 4mn - 9)$$
 $(-4xy)(3x^2y - 5xy)$

© Dr. Susan Harrison

<u>To multiply two polynomials</u>, multiply each term of the first polynomial by each term of the second polynomial and then combine like terms.

$$(3x + y)(4x - y) = 3x(4x) + 3x(-y) + y(4x) + y(-y) = 12x^2 - 3xy + 4xy - y^2 = 12x^2 + xy - y^2$$

Mr. Foil

F – First terms

$$3x \cdot 4x \qquad 12x^2$$

O – Outer terms

$$3x \cdot -y \qquad -3xy$$

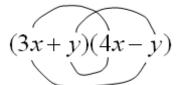
I – Inner terms

$$+4xy$$

L – Last terms

$$12x^2 - 3xy + 4xy - y^2$$
=
$$12x^2 + xy - y^2$$

Do you see Mr. Foil?



Some like to use a table:

*	3x	+y
4x	$12x^{2}$	+4 <i>xy</i>
-у	-3xy	$-y^2$

Multiply each term in the row by a term in the column. Add the resulting 4 terms, combining like terms. $12x^2 - 3xy + 4xy - y^2 = 12x^2 + xy - y^2$

TRY:

$$(x+7)(x-8)$$

$$(4a-7b)(3a-5b)$$

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

What happens when you multiply these?

$$(x-6)(x+6)$$

$$(3a+2b)(3a-2b)$$

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