

Multiplication of Polynomials (Monomials, Binomials, FOIL)

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

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

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

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

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

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

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

TRY:

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

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

$$-3mn(2mn^2 - 4mn - 9)$$

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

To multiply two polynomials, 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			Do you see Mr. Foil?
F – First terms	$3x \cdot 4x$	$12x^2$	
O – Outer terms	$3x \cdot -y$	$-3xy$	
I – Inner terms	$y \cdot 4x$	$+4xy$	
L – Last terms	$y \cdot -y$	$-y^2$	
		$12x^2 - 3xy + 4xy - y^2$ $= 12x^2 + xy - y^2$	

Some like to use a table:

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

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?

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

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

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