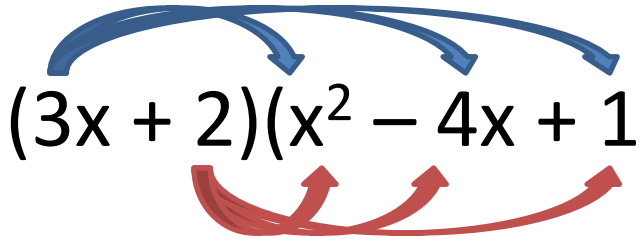
Multiplying Polynomials

Multiply $(3x + 2)(x^2 - 4x + 1)$



Distribute

$3x^3 - 12x^2 + 3x + 2x^2 - 8x + 2$ Combine like terms

$3x^3 - 10x^2 - 5x + 2$

This is called the horizontal method.

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

	$4x^2$	$-2y$	$3x$
$2x$	$8x^3$	$-4xy$	$6x^2$
$4y$	$16x^2y$	$-8y^2$	$12xy$
-12	$-48x^2$	$24y$	$-36x$

$$8x^3 + 16x^2y - 42x^2 + 8xy - 8y^2 - 36x + 24y$$

This is the box method.

Multiply $(x^3 + 3x^2 + 3x + 1)(3 - x)$

$$x^3 + 3x^2 + 3x + 1$$
$$-x + 3$$

$3x^3 + 9x^2 + 9x + 3$ Multiply by 3

$-x^4 - 3x^3 - 3x - x$ Multiply by -x

$-x^4 + 0x^3 + 6x + 8x + 3$ Combine like terms

$$-x^4 + 6x + 8x + 3$$

This is the vertical method.

It works best if there is only 1 variable.

Given $P(x) = 3x^2 + 2x - 1$, evaluate $P(x + 2)$

$P(x+2) = 3(x+2)^2 + 2(x+2) - 1$ Substitute (x+2) in for x.

$P(x+2) = 3(x^2 + 4x + 4) + 2(x+2) - 1$ FOIL

$P(x+2) = 3x^2 + 12x + 12 + 2x + 4 - 1$ Distribute

$P(x+2) = 3x^2 + 14x + 15$ Combine like terms

Simplify: $(5 - x^2)^3$

$(5 - x^2)(5 - x^2)(5 - x^2)$ Re-write as $(5 - x^2)$ 3 times

$(5 - x^2)(25 - 10x^2 + x^4)$ FOIL two of the parenthesis

$125 - 50x^2 + 5x^4 - 25x^2 + 10x^3 - x^6$ Multiply $5 - x^2$ with the trinomial

$-x^6 + 5x^4 + 10x^3 - 75x^2 + 125$ Combine like terms