

Multiplication of Larger or Three Polynomials and Higher Powers

To multiply two larger polynomials, one might use vertical multiplication. $(2a^2 - 3a + 5)($

$$\begin{array}{r} a^2 - 4a + 2 \\ \times \quad 2a^2 - 3a + 5 \\ \hline 5a^2 - 20a + 10 \\ -8a^3 + 12a^2 - 20a \\ \hline 2a^4 - 3a^3 + 5a^2 \end{array}$$

multiply 2 times $2a^2 - 3a + 5$
multiply $-4a$ times $2a^2 - 3a + 5$
multiply a^2 times $2a^2 - 3a + 5$

Answer: $2a^4 - 11a^3 + 21a^2 - 26a + 10$ add like terms together

One can also approach the problem by using the distributive property. Multiply each term of the 2nd polynomial by each term of the 1st polynomial. Decide which method works best for you.

TRY:

$$(a^2 + a + b)(a^2 - a - b) \qquad (x^2 - 3x + 2)(x - 4)$$

To multiply three polynomials, first multiply two together, then take that product times the third polynomial.

$$\begin{aligned} (x - 2y)(x + 2y)(3x - y) &= (x^2 + 2xy - 2yx - 4y^2)(3x - y) = (x^2 - 4y^2)(3x - y) \\ &= (x^2 - 4y^2)(3x - y) = 3x^3 - x^2y - 12xy^2 + 4y^3 \end{aligned}$$

A similar process would be used for higher powers or for multiplying many polynomials together.

Higher Powers

$$(x + 5)^4 = (x + 5)(x + 5)(x + 5)(x + 5)$$

Multiply the first two binomials together. Then, take that product times the third polynomial. Then take that product times the fourth polynomial.

TRY:

$$(x - 2y)(2x + y)(x - y)$$