

Learning Target(s): I am able to add, subtract, and multiply polynomials.

Notes: 5.3 Add, Subtract, and Multiply Polynomials

Ex 1: Add polynomials vertically and horizontally. *Combine like terms*

a.
$$\begin{array}{r} 3x^3 - 2x^2 + 4x - 6 \\ + 1x^3 - 5x^2 + 3 \\ \hline 4x^3 - 7x^2 + 4x - 3 \end{array}$$

b.
$$\begin{array}{r} 2y^3 + 7y^2 - 6y + (-4y^2 + 3y - 9) \\ \hline 2y^3 + 3y^2 - 3y - 9 \end{array}$$

Watch your signs

Ex 2: Subtract polynomials vertically and horizontally.

a.
$$\begin{array}{r} 7x^3 - 6x^2 + 3x - 7 \\ + (-6x^3 + 3x^2 + 7x + 5) \\ \hline 1x^3 - 9x^2 + 10x + 2 \end{array}$$

b.
$$\begin{array}{r} (8x^2 - 5x + 11) + (-12x^2 + 9x + 3) \\ \hline -4x^2 + 4x + 14 \end{array}$$

Ex 3: Multiply polynomials vertically and horizontally.

a.
$$\begin{array}{r} 3x^2 - x + 4 \\ \times x^2 - 2 \\ \hline 6x^4 - 2x^3 + 8x^2 \\ + 3x^3 - x^2 + 4x + 0 \\ \hline 3x^4 + 5x^3 + 2x^2 + 4x + 8 \end{array}$$

b. Multiply three binomials:

FOIL $(x-3)(x+7)(x+1)$

$x^2 + 7x - 3x - 21$

$(x^2 + 4x - 21)(x+1)$ distribute

$x^3 + x^2 + 4x^2 + 4x - 21x - 21$

$x^3 + 5x^2 - 17x - 21$

sum and difference: $(a+b)(a-b) = a^2 - b^2$

square of a binomial: $(a+b)^2 = a^2 + 2ab + b^2$

$(a-b)^2 = a^2 - 2ab + b^2$

cube of a binomial: $(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

don't have to memorize, but nice shortcuts

Ex 4: Use special product patterns.

a. $a: 7m$ $b: 3$
 $(7m-3)(7m+3)$

$(7m)^2 - (3)^2$
 $49m^2 - 9$

b. $(4t^3+6)^2$ $a: 4t^3$ $b: 6$ $(4t^3+6)(4t^3+6)$

$(4t^3)^2 + 2(4t^3)(6) + (6)^2$
 $16t^6 + 48t^3 + 36$

c. $(xy-4)^3$ $(xy-4)(xy-4)(xy-4)$

$a: xy$
 $b: 4$

$(xy)^3 - 3(xy)^2(4) + 3(xy)(4)^2 - (4)^3$
 $x^3y^3 - 12x^2y^2 + 48xy - 64$

Try it!

1. $(8t + 6 - 5t^2) - (2t^3 - 3t^2 + 7)$

2. $(x-2)(6x^2 + 3x - 5)$

3. $(x+3)(x-6)(x+5)$

4. $(2m+5)^3$