

## Algebra II

### 5.3 Add, Sub, & Mult Polynomials

Obj: to add, sub and mult poly.

Things to keep in mind:

- Like Terms
- When to add exponents
- Distribute
- Simplify when possible

#### Add & Sub Polynomials

When adding or subtracting, add or sub the coefficients of the like terms only!!! Don't change the exponents.  
Distribute a negative outside the ( ).

$$(3x^3 + 8x^2 - x - 5) + (5x^3 - x^2 + 17) \begin{array}{r} 3x^3 + 8x^2 - x - 5 \\ + 5x^3 - x^2 + 17 \\ \hline 8x^3 + 7x^2 - x + 12 \end{array}$$

$$(3x^3 + 8x^2 - x - 5) - (5x^3 - x^2 + 17) \begin{array}{r} \text{Distribute} \\ 3x^3 + 8x^2 - x - 5 \\ - (5x^3 - x^2 + 17) \\ + -5x^3 + x^2 + 17 \\ \hline -2x^3 + 9x^2 - x + 12 \end{array}$$

Distribute First →

$$3(3x^3 + 8x^2 - x - 5) - 2(5x^3 - x^2 + 17) \begin{array}{r} 9x^3 + 24x^2 - 3x - 15 \\ + -10x^3 + 2x^2 \\ \hline -x^3 + 26x^2 - 3x - 49 \end{array}$$

### Multiplying Polynomials

Distribute anything outside the ( ).

Add exponents when multiplying.

Multiply each term in the first polynomial times each term in the second polynomial.

$$\begin{aligned} & \overbrace{-3x^2(5x^3 - x^2 + 17)} \\ & -15x^5 + 3x^4 - 51x^2 \end{aligned}$$

$$(2x-5)(x+7)$$

$$\begin{aligned} & 2x^2 + 14x - 5x - 35 \\ & 2x^2 + 9x - 35 \end{aligned}$$

First  
Outer  
Inner  
Last

Difference  
of  
Squares

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

$$\begin{aligned} & 9x^2 + 15x - 15x - 25 \\ & 9x^2 - 25 \end{aligned}$$

### Multiplying Polynomials

$$\begin{aligned} & \overbrace{(8x^2 - x - 5)(x+3)} \\ & 8x^3 - x^2 - 5x + 24x^2 - 3x - 15 \\ & \boxed{8x^3 + 23x^2 - 8x - 15} \end{aligned}$$

$$\begin{aligned} & \overbrace{(x^3 - 4x - 6)(3x^2 + 4x + 2)} \\ & 3x^5 + 4x^4 + 2x^3 - 12x^3 - 16x^2 - 8x - 18x^2 - 24x - 12 \\ & \boxed{3x^5 + 4x^4 - 10x^3 - 34x^2 - 32x - 12} \end{aligned}$$

$$\begin{aligned} & \overbrace{(4x-5)^2} \\ & \overbrace{(4x-5)(4x-5)} \\ & 16x^2 - 20x - 20x + 25 \\ & \boxed{16x^2 - 40x + 25} \end{aligned}$$

## Multiplying Polynomials

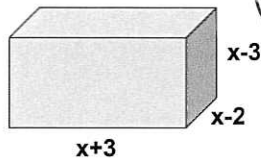
$$(x-5)(x+3)(2x+1)$$

$$(x^2 + 3x - 5x - 15)(2x+1)$$

$$2x^3 + 6x^2 - 10x^2 - 30x + x^2 + 3x - 15$$

$$= 2x^3 + 3x^2 - 32x - 15$$

Write an expression for the volume of the box shown:



$$V = (x+3)(x-2)(x-3)$$

$$x^2 + 3x - 2x - 6$$

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

$$x^3 + x^2 - 6x - 3x^2 - 3x + 18$$

$$x^3 - 2x^2 - 9x + 18$$

