

Adding and Subtracting Polynomials

"Like" terms have the same variable raised to the same power.

Examples: $2x^3$ and $6x^3$

Non Examples: $2x^3$ and $4y^3$

$3x^2$ and $7x$

Adding Polynomials - Let's Look at Two Examples!

Adding polynomials horizontally means...

1. Rewrite each polynomial by removing the parenthesis, "()".
2. Identify the "like" terms.
3. Group "like" terms together, ordering the terms from highest to lowest exponent.
 - ♦ Count your terms. Make sure you don't lose one!
4. Combine "like" terms by adding the coefficients and constants.

$$(11x - x^2 + 13) + (2x^2 - 23 - 5x)$$

$$\underline{11x} \quad \underline{-x^2} \quad \boxed{+13} \quad + \quad \underline{2x^2} \quad \boxed{-23} \quad \underline{-5x}$$

$$\underline{-1x^2} \quad \underline{+2x^2} \quad + \quad \underline{11x} \quad \underline{-5x} \quad \boxed{+13} \quad \boxed{-23}$$

$$\boxed{1x^2 + 6x - 10} \quad \text{or} \quad \boxed{x^2 + 6x - 10}$$

Adding polynomials vertically means...

1. Line up each polynomial vertically.
 - a. Rewrite the 1st polynomial by removing the parenthesis, "()", and ordering the terms from highest to lowest exponent.
 - b. Remove the parenthesis from the 2nd polynomial and line up the "like" terms below the 1st polynomial.
2. Fill in the blank spots (where there are no terms) with zeros. Zero just acts as a placeholder.
3. Combine "like" terms by adding the coefficients and constants.

$$(4x^2 + 6x + 7) + (2x^2 - 9x + 1)$$

$$\begin{array}{r} 4x^2 + 6x + 7 \\ + 2x^2 - 9x + 1 \\ \hline \end{array}$$

$$\boxed{6x^2 - 3x + 8}$$

Subtracting Polynomials - Let's Look at Two Examples!

Subtracting polynomials horizontally means...

1. Rewrite the 1st polynomial by removing the parenthesis, "().
2. Distribute the negative, "-", to each term in the 2nd polynomial, meaning multiply each term in the 2nd polynomial by -1, and remove the parenthesis.
3. Identify the "like" terms.
4. Group "like" terms together, ordering the terms from highest to lowest exponent.
 - ♦ Count your terms. Make sure you don't lose one!
5. Combine "like" terms by adding the coefficients and constants.

$$(4x^2 + 5x) - (7x + 3x^2 + 1)$$

-7x - 3x^2 - 1 opposite signs!

$$\underline{4x^2} + \underline{5x} - \underline{7x} - \underline{3x^2} - 1$$

$$\underline{4x^2} - \underline{3x^2} + \underline{5x} - \underline{7x} - 1$$

$$\boxed{1x^2 - 2x - 1}$$

Subtracting polynomials vertically means...

1. Distribute the negative, "-", to each term in the 2nd polynomial, meaning multiply each term in the 2nd polynomial by -1, and remove the parenthesis.
2. Line up each polynomial vertically.
 - a. Rewrite the 1st polynomial by removing the parenthesis, "()", and ordering the terms from highest to lowest exponent.
 - b. Line up the "like" terms in the 2nd polynomial below the 1st polynomial.
3. Fill in the blank spots (where there are no terms) with zeros. Zero is just a placeholder.
4. Combine "like" terms by adding the coefficients and constants.

$$(2x^3 + 5x^2 - 3x) - (x^3 - 8x^2 + 11)$$

-x^3 + 8x^2 - 11 opposite signs!

$$\begin{array}{r} 2x^3 + 5x^2 - 3x + 0 \\ + -1x^3 + 8x^2 + 0 - 11 \\ \hline \end{array}$$

$$\boxed{1x^3 + 13x^2 - 3x - 11}$$