

LESSON 4.2a

Adding and Subtracting Polynomials

Today you will:

- Add and subtract polynomials
- Practice using English to describe math processes and equations

Core Vocabulary:

- polynomial, p. 158
- polynomial function, p. 158

Describe the process/steps to follow in order to add $(-2x + 3)$ and $(x - 4)$

1. Write out the expression.
2. Remove the parenthesis.
3. Combine like terms.

$(-2x + 3) + (x - 4)$	Write out the expression
$= -2x + 3 + x - 4$	Remove the parenthesis
$= -2x + 3 + x - 4$	Combine like terms
$= -x - 1$	

Or arrange the expressions vertically (like a system of equations) and combine:
(when you do this make sure to put the expressions in standard form (descending order by exponent))

$$\begin{array}{r} + \quad -2x + 3 \\ \quad \quad x - 4 \\ \hline \quad \quad -x - 1 \end{array}$$

a. Add $3x^3 + 2x^2 - x - 7$ and $x^3 - 10x^2 + 8$ in a vertical format.

b. Add $9y^3 + 3y^2 - 2y + 1$ and $-5y^2 + y - 4$ in a horizontal format.

SOLUTION

$$\begin{array}{r} \text{a.} \quad 3x^3 + 2x^2 - x - 7 \\ + \quad x^3 - 10x^2 + 8 \\ \hline 4x^3 - 8x^2 - x + 1 \end{array}$$

$$\begin{aligned} \text{b.} \quad (9y^3 + 3y^2 - 2y + 1) + (-5y^2 + y - 4) &= 9y^3 + 3y^2 - 5y^2 - 2y + y + 1 - 4 \\ &= 9y^3 - 2y^2 - y - 3 \end{aligned}$$

Describe the process/steps to follow in order to subtract $(x - 4)$ from $(-2x + 3)$

1. Write out the expression.
2. Remove the parenthesis changing the sign of **EACH** term in the subtracted expression.
3. Combine like terms.

$$\begin{aligned} & (-2x + 3) - (x - 4) \\ &= -2x + 3 - x + 4 \\ &= -2x + 3 - x + 4 \\ &= -3x + 7 \end{aligned}$$

Write out the expression

Remove the parenthesis **AND** change sign every term of subtracted

Combine like terms

Or arrange the expressions vertically (like a system of equations), change the sign of each term of the subtracted expression and combine:

$$\begin{array}{r} - \quad -2x + 3 \\ \quad \quad \quad x - 4 \\ \hline \end{array} \quad \Rightarrow \quad \begin{array}{r} + \quad -2x + 3 \\ \quad \quad \quad -x + 4 \\ \hline -3x + 7 \end{array}$$

COMMON ERROR

A common mistake is to forget to change signs correctly when subtracting one polynomial from another. Be sure to add the opposite of *every* term of the subtracted polynomial.



a. Subtract $2x^3 + 6x^2 - x + 1$ from $8x^3 - 3x^2 - 2x + 9$ in a vertical format.

b. Subtract $3z^2 + z - 4$ from $2z^2 + 3z$ in a horizontal format.

SOLUTION

a. Align like terms, then add the opposite of the subtracted polynomial.

$$\begin{array}{r} 8x^3 - 3x^2 - 2x + 9 \\ - (2x^3 + 6x^2 - x + 1) \\ \hline \end{array} \quad \rightarrow \quad \begin{array}{r} 8x^3 - 3x^2 - 2x + 9 \\ + \quad -2x^3 - 6x^2 + x - 1 \\ \hline 6x^3 - 9x^2 - x + 8 \end{array}$$

b. Write the opposite of the subtracted polynomial, then add like terms.

$$\begin{aligned} (2z^2 + 3z) - (3z^2 + z - 4) &= 2z^2 + 3z - 3z^2 - z + 4 \\ &= -z^2 + 2z + 4 \end{aligned}$$

Homework

Pg 170, #1-16