

# Study Guide

## Addition of Polynomials

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### Polynomials: Addition

A monomial is the product of a number and an unknown variable or unknown variables.  $6xy$  is a monomial. The sum of two or more monomials is called a polynomial. Here is an example of a polynomial:  $y^2 + 4y + 3$ .

Adding and subtracting polynomials includes simplifying and combining "like" terms. Like terms are monomials that have the same variable or variables for which the variable or variables have the same exponent.

Examples:

To add polynomials, combine similar terms.

**Example 1:**  $(p^2 + 3p + 3) + (p^2 - 2p - 6)$

$$\begin{array}{l} \text{(1)} \quad p^2 + 3p + 3 + p^2 - 2p - 6 \\ \text{(2)} \quad p^2 + p^2 = 2p^2 \\ \quad \quad 3p - 2p = p \\ \quad \quad 3 - 6 = -3 \\ \text{(3)} \quad 2p^2 + p - 3 \end{array}$$

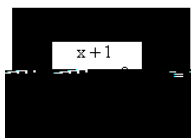
Step 1: Set the two polynomials up as one long polynomial.

Step 2: Combine the like terms.

Step 3: Add the results of combining the like terms to determine the answer.

The sum is  $2p^2 + p - 3$ .

**Example 2:**



$$\begin{array}{l} \text{(1)} \quad 3x^2 + 4x - 2 + (2x^2 + 2x) \\ \text{(2)} \quad (3x^2 + 2x^2) + (4x + 2x) - 2 \\ \text{(3)} \quad 5x^2 + 6x - 2 \end{array}$$

Step 1: The area of the large rectangle would be the area of the shaded region added to the area of the small rectangle. Since we know both areas, we simply add them together.

Step 2: Collect like terms so they can be added.

Step 3: Add together any like terms that were collected to determine the final answer.

The area of the large rectangle is  $5x^2 + 6x - 2$ .

Sometimes it is necessary to use the distributive property before we can combine like terms.

**Example 3:**  $3(8x^2 + 16x - 7) - 4(x^2 + 3x - 5)$

$$\begin{array}{l} \text{(1)} \quad 3(8x^2) + 3(16x) + 3(-7) + (-4)(x^2) + (-4)(3x) + (-4)(-5) \\ \quad \quad 24x^2 + 48x - 21 - 4x^2 - 12x + 20 \\ \quad \quad (2) \quad 20x^2 + 36x - 1 \end{array}$$

Step 1: Multiply each term of the first polynomial by 3. Then multiply each term of the second polynomial by -4.

Step 2: Group like terms together.

Step 3: Combine like terms.

Answer:           

**Example 4**: Solve for a, b, and c.

$$(9x^2 + bx + 4) + (ax^2 - 5x - 3) = 5x^2 - 7x + c$$

$$(1) (9x^2 + ax^2) + (bx - 5x) + (4 - 3) = 5x^2 - 7x + c$$

$$(2) 9x^2 + ax^2 = 5x^2$$

$$bx - 5x = -7x$$

$$4 - 3 = c$$

$$(3) a = -4, b = -2, c = 1$$

Step 1: Group the similar terms on the left side of the equation together.

Step 2: Now, group like terms from both sides of the equal sign together.

Step 3: Solve for a, b, and c.

Answer: a = -4, b = -2, and c = 1