

7-7 Adding and Subtracting Polynomials

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7-7 Adding and Subtracting Polynomials

Warm Up
Simplify each expression by combining like terms.

- $4x + 2x$ $6x$
- $3y + 7y$ $10y$
- $8p - 5p$ $3p$
- $5n + 6n^2$ not like terms

Simplify each expression.

- $3(x + 4)$ $3x + 12$
- $-2(t + 3)$ $-2t - 6$
- $-1(x^2 - 4x - 6)$ $-x^2 + 4x + 6$

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Practice B

- 3; 3
- 2; 2
- 4; 4
- $4x^8 + 3x^2 - x - 2$; 4
- $3j^3 - 4j^2 - 50j + 7$; 3
- $5k^4 - 4k^3 + 3k^2 + 6k$; 5
- quadratic binomial
- quartic trinomial
- quartic polynomial
- 7
- 9
- 10
- a. 187.5 m
b. 135.6 m

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Objective

Add and subtract polynomials.

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$$2x \quad 4x^2 \quad 1x^5$$

Just as you can perform operations on numbers, you can perform operations on polynomials. To add or subtract polynomials, combine like terms. They must be identical in order to combine.

$$y \quad y^2$$

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Example 1: Adding and Subtracting Monomials

Add or subtract.

A. $\cancel{12p^3} + 11p^2 + \cancel{8p^3}$

$$20p^3 + 11p^2$$

B. $\cancel{5x^2} - 6 - \cancel{3x} + 8$

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

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Example 1: Adding and Subtracting Monomials

Add or subtract.

C. $\cancel{t^2} + \cancel{2s^2} - \cancel{4t^2} - \cancel{s^2}$

$$s^2 - 3t^2$$

D. $10m^2n + 4m^2n - 8m^2n$

$$6m^2n$$

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Check It Out! Example 1

Add or subtract.

a. $\cancel{2s^2} + \cancel{3s^2} + s$

$$5s^2 + s$$

b. $\cancel{4z^4} - 8 + \cancel{16z^4} + 2$

$$20z^4 - 6$$

c. $\cancel{2x^8} + 7y^8 - \cancel{x^8} - y^8$

$$x^8 + 6y^8$$

d. $\boxed{9b^3c^2} + \boxed{5b^3c^2} - \boxed{13b^3c^2}$

$$b^3c^2$$

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Polynomials can be added in either vertical or horizontal form.

In vertical form, align the like terms and add:

$$\begin{array}{r} 5x^2 + 4x + 1 \\ + 2x^2 + 5x + 2 \\ \hline 7x^2 + 9x + 3 \end{array}$$

In horizontal form, use the Associative and Commutative Properties to regroup and combine like terms.

$$\begin{aligned} & (5x^2 + 4x + 1) + (2x^2 + 5x + 2) \\ = & (5x^2 + 2x^2) + (4x + 5x) + (1 + 2) \\ = & 7x^2 + 9x + 3 \end{aligned}$$

7-7 Adding and Subtracting Polynomials**Example 2: Adding Polynomials**

Add.

A. $(4m^2 + 5) + (m^2 - m + 6)$

$$4m^2 + 5 + m^2 - m + 6$$

B. $(10xy + x) + (-3xy + y)$

7-7 Adding and Subtracting Polynomials**Check It Out! Example 2**

Add $(5a^3 + 3a^2 - 6a + 12a^2) + (7a^3 - 10a)$.

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To subtract polynomials, remember that subtracting is the same as adding the opposite. To find the opposite of a polynomial, you must write the opposite of each term in the polynomial. Like distributing a negative one:

$$-(2x^3 - 3x + 7) = -2x^3 + 3x - 7$$

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Example 3B: Subtracting Polynomials

Subtract.

$$(7m^4 - 2m^2) - (5m^4 - 5m^2 + 8)$$

$$\begin{array}{r} 7m^4 - 2m^2 - 5m^4 + 5m^2 - 8 \\ \hline 2m^4 + 3m^2 - 8 \end{array}$$

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Example 3C: Subtracting Polynomials

Subtract.

$$(-10x^2 - 3x + 7) - (x^2 - 9)$$

$$(-10x^2 - 3x + 7) + (-x^2 + 9)$$

$$(-10x^2 - 3x + 7) + (-x^2 + 9)$$

Rewrite subtraction as addition of the opposite. Identify like terms.

Use the vertical method. Write 0x as a placeholder. Combine like terms.

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Example 3D: Subtracting Polynomials

Subtract.

$$(9q^2 - 3q) - (q^2 - 5)$$

You can subtract vertically as well

$$\begin{array}{r} 9q^2 - 3q + 0 \\ - q^2 + 0q - 5 \\ \hline \end{array}$$

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Check It Out! Example 3

Subtract.

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

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

$$\begin{array}{r} -2x^2 - x \\ \hline \end{array}$$

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Example 4: Application

A farmer must add the areas of two plots of land to determine the amount of seed to plant. The area of plot A can be represented by $3x^2 + 7x - 5$ and the area of plot B can be represented by $5x^2 - 4x + 11$. Write a polynomial that represents the total area of both plots of land.

$$(3x^2 + 7x - 5) + (5x^2 - 4x + 11)$$

$$8x^2 + 3x + 6$$

8, 3, 6

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Lesson Quiz: Part I

Add or subtract.

- $7m^2 + 3m + 4m^2$
- $(r^2 + s^2) - (5r^2 + 4s^2)$
- $(10pq + 3p) + (2pq - 5p + 6pq)$
- $(14d^2 - 8) + (6d^2 - 2d + 1)$
- $(2.5ab + 14b) - (-1.5ab + 4b)$

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Lesson Quiz: Part II

- A painter must add the areas of two walls to determine the amount of paint needed. The area of the first wall is modeled by $4x^2 + 12x + 9$, and the area of the second wall is modeled by $36x^2 - 12x + 1$. Write a polynomial that represents the total area of the two walls.