

Chapter 10 - Polynomials

Adding and Subtracting Polynomials

The addends of an algebraic expression are called the terms.

$x + 3$
↑ ↑ _____ 2 terms

$3y^2 + (-4y) + 2$
↑ ↑ ↑ _____ 3 terms

Terms that are exactly the same, except that they may have different numerical coefficients are called like terms.

Like Terms	Unlike Terms
$3x, 2x$	$5x, x^2$
$-6y, 2y, y$	$7x, 7y$
$2ab^2, -5b^2a$	$6a, ab$

The order of the variables does not have to be the same.

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Like terms can be added or subtracted by using the distributive property.

$$7x + 5x = (7 + 5)x = 12x$$

Monomials

A monomial is a term that contains only whole-number exponents and no variable in the denominator.

Monomial	Not Monomials
$5x^2$	variable in denominator $\frac{3}{x}$
$-\frac{1}{3}a^2b^3c$	negative exponent $-2y^{-3}$
$\frac{1}{6}$	

Polynomials

A polynomial is a monomial or a sum or difference of monomials

$$3x^4 - 2x^3 + 7x - 5 \quad -3.8y^3 + 7y$$
$$y \quad \frac{1}{4}z - \frac{2}{5} \quad 6$$

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Adding and Subtracting Polynomials

To add polynomials, combine like terms.

To subtract polynomials, change the signs of the terms of the polynomial being subtracted, then add.

Multiplication Properties of Exponents

Product Rule for Exponents

If m and n are positive integers and a is a real number, then

$$a^m \cdot a^n = a^{m+n}$$

In other words, to multiply two exponential expressions with the same base, keep the base and add the exponents.

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Helpful Hint

These examples will remind you of the difference between adding and multiplying terms.

Addition

$$7x^2 + 5x^2 = 12x^2$$

$$4x + 5x^3 = 4x + 5x^3$$

Multiplication

$$7x^2 \cdot 5x^2 = 35x^4$$

$$4x \cdot 5x^3 = 20x^4$$

Multiplying Polynomials

Multiplying a Monomial and a Polynomial

A polynomial that consists of one term is called a monomial. To multiply a monomial and any polynomial, we use the distributive property


$$a(b + c) = a \cdot b + a \cdot c$$


and properties of exponents.

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Multiply

Apply the distributive property.


$$3x(5x^2 + 4) = 3x \cdot 5x^2 + 3x \cdot 4 = 15x^3 + 12x$$


$$\begin{aligned} 4z(2z^2 + 5z - 6) &= 4z \cdot 2z^2 + 4z \cdot 5z + 4z \cdot (-6) \\ &= 8z^3 + 20z^2 - 24z \end{aligned}$$
