Ch 9.1 Adding and Subtracting Polynomials

The **degree of a monomial** is the sum of the exponents of its variables. For a nonzero constant, the degree is 0. Zero has no degree.

1 EXAMPLE **Degree of a Monomial**

Find the degree of each monomial.

a. $\frac{2}{3}x$ Degree: 1 $\frac{2}{3}x = \frac{2}{3}x^1$. The exponent is 1.

b. $7x^2y^3$ Degree: 5 The exponents are 2 and 3. Their sum is 5.

c. -4 Degree: 0 The degree of a nonzero constant is 0.

1 Critical Thinking What is the degree of $9x^0$? Explain.

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A **polynomial** is a monomial or the sum or difference of two or more monomials.

The fraction $\frac{c}{3}$ is a monomial, but the expression $\frac{c}{x}$ is *not* a monomial because there is a variable in the denominator.

The **degree of a monomial** is the sum of the exponents of its variables. For a

The polynomial shown above is in standard form. **Standard form of a polynomial** means that the degrees of its monomial terms decrease from left to right. The **degree of a polynomial** in one variable is the same as the degree of the monomial with the greatest exponent. The degree of $3x^4 + 5x^2 - 7x + 1$ is 4.

Polynomial	Degree	Name Using Degree	Number of Terms	Name Using Number of Terms
$7x + 4$	1	linear	2	binomial
$3x^2 + 2x + 1$	2	quadratic	3	trinomial
$4x^3$	3	cubic	1	monomial
$9x^4 + 11x$	4	fourth degree	2	binomial
5	0	constant	1	monomial

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2 EXAMPLE **Classifying Polynomials**

Write each polynomial in standard form. Then name each polynomial based on its degree and the number of its terms.

a. $5 - 2x$ [redacted] Place terms in order. [redacted]

b. $3x^4 - 4 + 2x^2 + 5x^4$ [redacted] Place terms in order. Combine like terms. [redacted]

2 Write each polynomial in standard form. Then name each polynomial based on its degree and the number of its terms.

a. $6x^2 + 7 - 9x^4$ **b.** $3y - 4 - y^3$ **c.** $8 + 7v - 11v$

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3 EXAMPLE **Adding Polynomials**

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

Method 1 Add vertically.

Line up like terms. Then add the coefficients.

$4x^2 + 6x + 7$
$+ 2x^2 - 9x + 1$
[redacted]

Method 2 Add horizontally.

Group like terms. Then add the coefficients.

$(4x^2 + 6x + 7) + (2x^2 - 9x + 1) = (4x^2 + 2x^2) + (6x - 9x) + (7 + 1)$
$=$ [redacted]

3 Simplify each sum.

a. $(12m^2 + 4) + (8m^2 + 5)$ **b.** $(t^2 - 6) + (3t^2 + 11)$

c. $(9w^3 + 8w^2) + (7w^3 + 4)$ **d.** $(2p^3 + 6p^2 + 10p) + (9p^3 + 11p^2 + 3p)$

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4 EXAMPLE **Subtracting Polynomials**

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

Method 1 Subtract vertically.

[redacted] Line up like terms.

[redacted] Then add the opposite of each term in the polynomial being subtracted.

[redacted]

Method 2 Subtract horizontally.

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

[redacted] Write the opposite of each term in the polynomial being subtracted.

[redacted] Group like terms.

[redacted] Simplify.

4 Simplify each difference.

a. $(v^3 + 6v^2 - v) - (9v^3 - 7v^2 + 3v)$ **b.** $(30d^3 - 29d^2 - 3d) - (2d^3 + d^2)$

c. $(4x^2 + 5x + 1) - (6x^2 + x + 8)$

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