7.1 Add & Subtract Polynomials

Essential Question:

How can you add and subtract polynomials?

Core Vocabulary

monomial, *p. 358*
degree of a monomial, *p. 358*
polynomial, *p. 359*
binomial, *p. 359*
trinomial, *p. 359*
degree of a polynomial, *p. 359*
standard form, *p. 359*
leading coefficient, *p. 359*
closed, *p. 360*

What You Will Learn

- Find the degrees of monomials.
- Classify polynomials.
- Add and subtract polynomials.
- Solve real-life problems.

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Finding the Degrees of Monomials

A monomial is a number, a variable, or the product of a number and one or more variables with whole number exponents.

The degree of a monomial is the sum of the exponents of the variables in the monomial. The degree of a nonzero constant term is 0. The constant 0 does not have a degree.

Monomial	Degree
10	0
$3x$	1
$\frac{1}{2}ab^2$	$1 + 2 = 3$
$-1.8m^5$	5

Not a monomial	Reason
$5 + x$	A sum is not a monomial.
$\frac{2}{n}$	A monomial cannot have a variable in the denominator.
x^n	A monomial cannot have a variable exponent.
x^{-1}	The variable must have a whole number exponent.

Binomial

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Examples:

Find the degree of each monomial.

a. $5x^2$ 2

b. $-\frac{1}{2}xy^3$ 4

c. $8x^3y^3$ 6

d. -3 0

Practice:

Find the degree of each monomial.

1) $\frac{3}{4}a^2b^3c^1$ 6

2) $=(4m^2n)^0$ $=1$ 0

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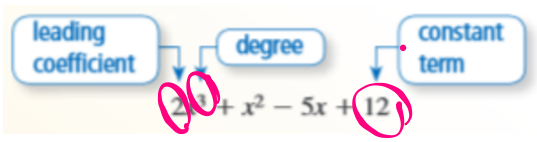
Classifying Polynomials

Core Concept: Polynomials

A polynomial is a monomial or a sum of monomials. Each monomial is called *term* of the polynomial. A polynomial with two terms is a binomial. A polynomial with three terms is a trinomial.

Binomial $5x + 2$ Trinomial $x^2 + 5x + 2$

The degree of a polynomial is the greatest degree of its terms. A polynomial in one variable is in standard form when the exponents of the terms decrease from left to right. When you write a polynomial in standard form, the coefficient of the first term is the leading coefficient.



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Monomial	Binomial	Trinomial
$4g$	$2x - 7$	$2x - 4 + 3x^2$
-7	$y + 2$	$2s^2 - 4 + 3s$
$23x^4$		
$8m^2n^4$		

	$2x - 4 + 3x^2$	$-7 + 2x$	$23x^4$
# of terms	3	2	1
Standard Form	$3x^2 + 2x - 4$	$2x - 7$	$23x^4$
LC	3	2	23
Degree	2	1	4

Standard Form of a Polynomial means the terms are listed in descending order based on degree.

Example:

Write $15x - x^3 + 3$ in standard form. Identify the degree and leading coefficient of the polynomial.

$-x^3 + 15x + 3$

D: 3

LC: -1

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Your Turn:

Write each polynomial in standard form. Identify the degree and classify each polynomial by the number of terms.

a. $-3z^4$

D: 4

LC: -3

monomial

b. $4 + 5x^2 - x$

$5x^2 - x + 4$

D: 2 LC: 5

trinomial

c. $8q + q^5$

$1q^5 + 8q$

D: 5 LC: 1

binomial

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Perform the indicated operation:

"a" is together and "b" is alone, then we will check.

Find the sum.

a. $(2x^3 - 5x^2 + x) + (2x^2 + x^3 - 1)$

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

b. $(3x^2 + x - 6) + (x^2 + 4x + 10)$

$4x^2 + 5x + 4$

Find the difference.

a. $(4n^2 + 5) - (-2n^2 + 2n - 4)$

$4n^2 + 5 + 2n^2 - 2n + 4$

$6n^2 - 2n + 9$

b. $(4x^2 - 3x + 5) - (3x^2 - x - 8)$

$4x^2 - 3x + 5 - 3x^2 + x + 8$

$x^2 - 2x + 13$

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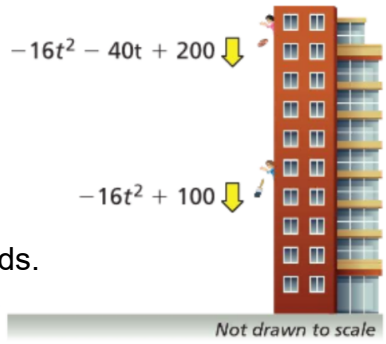
Real-Life Problems

A penny is thrown straight down from a height of 200 feet. At the same time, a paintbrush is dropped from a height of 100 feet. The polynomials represent the heights (in feet) of the objects after t seconds.

x y



a) Write a polynomial that represents the distance between the penny and the paintbrush after t seconds.

$(-16t^2 - 40t + 200) + (16t^2 + 100)$

$-40t + 100$

b) Interpret the coefficients of the polynomial in part (a).

-40 is the speed at which the objects are dropping.

100 is the initial distance between them.

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SOLUTION

a. To find the distance between the objects after t seconds, subtract the polynomials.

Penny	$-16t^2 - 40t + 200$		$-16t^2 - 40t + 200$
Paintbrush	$-(-16t^2 + 100)$	➡	$+\ 16t^2 - 100$
			$-40t + 100$

▶ The polynomial $-40t + 100$ represents the distance between the objects after t seconds.

b. When $t = 0$, the distance between the objects is $-40(0) + 100 = 100$ feet. So, the constant term 100 represents the distance between the penny and the paintbrush when both objects begin to fall.

As the value of t increases by 1, the value of $-40t + 100$ decreases by 40. This means that the objects become 40 feet closer to each other each second. So, -40 represents the amount that the distance between the objects changes each second.

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7.1 Add & Subtract Polynomials

Assign

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A: 12, 18, 20, 22, 30, 36, 40, 42, 46, 48, 50, 52, 54, 60, 64

B: 4, 6, 8, 14, 16, 22, 24, 26, 32, 34, 40, 42, 44, 46, 60, 62, 64

C: 2, 4, 5 - 35 odds, 47 - 52, 62 - 64

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