

## 7-6 Polynomials

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## 7-6 Polynomials

### Warm Up

Evaluate each expression for the given value of  $x$ .

1.  $2x + 3$ ;  $x = 2$     7    2.  $x^2 + 4$ ;  $x = -3$     13  
 3.  $-4x - 2$ ;  $x = -1$     2    4.  $7x^2 + 2x$ ;  $x = 3$     69

Identify the coefficient in each term.

5.  $4x^3$     4    6.  $y^3$     1  
 7.  $2n^7$     2    8.  $-s^4$     -1

### Practice B

- |              |              |
|--------------|--------------|
| 1. 3         | 2. 11        |
| 3. 0         | 4. 11        |
| 5. 4         | 6. 8         |
| 7. 8         | 8. 125       |
| 9. 8         | 10. 8        |
| 11. 1        | 12. 1331     |
| 13. $y$      | 14. $x^2y^6$ |
| 15. $a^2b$   | 16. $x^5$    |
| 17. $x^2y^4$ | 18. $x$      |
| 19. $20m$    |              |

## 7-6 Polynomials

### Objectives

Classify polynomials and write polynomials in standard form.  
 Evaluate polynomial expressions.

## 7-6 Polynomials

A **monomial** is a number, a variable, or a product of numbers and variables with whole-number exponents. There will be not + or - signs.

Monomials	Not Monomials
5 $x$ $-7xy$ $0.5x^4$	$-0.3x^{-2}$ $4x - y$ $\frac{2}{x^3}$

The **degree of a monomial** is the **sum** of the exponents of the variables. A constant has degree 0.

## 7-6 Polynomials

### Example 1: Finding the Degree of a Monomial

Find the degree of each monomial.

**A.  $4p^4q^3$**

The degree is 7.     *Add the exponents of the variables:  $4 + 3 = 7$ .*

**B.  $7ed$**

The degree is 2.     *Add the exponents of the variables:  $1 + 1 = 2$ .*

**C. 3**

The degree is 0.     *Add the exponents of the variables:  $0 = 0$ .*

## 7-6 Polynomials

### Check It Out! Example 1

Find the degree of each monomial.

**a.  $1.5k^2m$**

The degree is 3.     *Add the exponents of the variables:  $2 + 1 = 3$ .*

**b.  $4x$**

The degree is 1.     *Add the exponents of the variables:  $1 = 1$ .*

**c.  $2c^3$**

The degree is 3.     *Add the exponents of the variables:  $3 = 3$ .*

## 7-6 Polynomials

Poly means many. A **polynomial** is a monomial or a sum or difference of monomials. If you see any + or - signs it is a polynomial.

The **degree of a polynomial** is the degree of the term with the **greatest degree**.

## 7-6 Polynomials

### Example 2: Finding the Degree of a Polynomial

Find the degree of each polynomial.

A.  $11x^7 + 3x^3$

$11x^7$ : degree 7

The degree of the polynomial is the greatest degree, 7.

*Find the degree of each term.*

B.  $\frac{1}{3}w^2z + \frac{1}{2}z^4 - 5$

~~$\frac{1}{3}w^2z$~~ : degree 3

$\frac{1}{2}z^4$ : degree 4

~~$-5$~~ : degree 0

*Find the degree of each term.*

The degree of the polynomial is the greatest degree, 4.

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## 7-6 Polynomials

The terms of a polynomial may be written in any order. However, polynomials that contain only one variable are usually written in *standard form*.

The **standard form of a polynomial** that contains one variable is written with the terms in order from greatest degree to least degree. When written in standard form, the coefficient of the first term is called the **leading coefficient**.

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## 7-6 Polynomials

### Example 3A: Writing Polynomials in Standard Form

Write the polynomial in standard form. Then give the leading coefficient.

$6x - 7x^5 + 4x^2 + 9$

*Find the degree of each term. Then arrange them in descending order:*

~~$6x - 7x^5 + 4x^2 + 9$~~   
 $-7x^5 + 4x^2 + 6x + 9$

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## 7-6 Polynomials

### Check It Out! Example 3b

Write the polynomial in standard form. Then give the leading coefficient.

~~$18y^5 - 3y^8 + 14y$~~   
 $-3y^8 + 18y^5 + 14y$

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## 7-6 Polynomials

Some polynomials have special names based on their degree and the number of terms they have.

Degree	Name	Terms	Name
0	Constant	1	Monomial
1	Linear	2	Binomial
2	Quadratic	3	Trinomial
3	Cubic	4 or more	Polynomial
4	Quartic		
5	Quintic		
6 or more	6 <sup>th</sup> , 7 <sup>th</sup> , degree and so on		

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## 7-6 Polynomials

### Example 4: Classifying Polynomials

Classify each polynomial according to its degree and number of terms.

A.  $5n^3 + 4n$

Degree 3 Terms 2

$5n^3 + 4n$  is a cubic binomial.

B.  $4y^6 - 5y^3 + 2y - 9$

Degree 6 Terms 4

$4y^6 - 5y^3 + 2y - 9$  is a 6<sup>th</sup>-degree polynomial.

C.  $-2x$

Degree 1 Terms 1

$-2x$  is a linear monomial.

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## 7-6 Polynomials

### Check It Out! Example 4

Classify each polynomial according to its degree and number of terms.

a.  $x^3 + x^2 - x + 2$

Cubic Polynomial

b. 6

Constant Monomial

c.  $-3y^8 + 18y^5 + 14y$

8<sup>th</sup> Degree Trinomial

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## 7-6 Polynomials

### Example 5: Application

~~A tourist accidentally drops her lip balm off the Golden Gate Bridge.~~ The bridge is 220 feet from the water of the bay. The height of the lip balm is given by the polynomial  $-16t^2 + 220$ , where  $t$  is time in seconds. How far above the water will the lip balm be after 3 seconds?

Substitute the time for  $t$  to find the lip balm's height.

$$-16t^2 + 220$$

$$-16(3)^2 + 220 \quad \text{The time is 3 seconds.}$$

$$-16(9) + 220$$

$$-144 + 220$$

$$76$$

Evaluate the polynomial by using the order of operations.

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**7-6 Polynomials****Check It Out! Example 5**

**What if...?** Another firework with a 5-second fuse is launched from the same platform at a speed of 400 feet per second. Its height is given by  $-16t^2 + 400t + 6$ . How high will this firework be when it explodes?

**7-6 Polynomials****Lesson Quiz: Part I**

Find the degree of each polynomial.

1.  $7a^3b^2 - 2a^4 + 4b - 15$     5

2.  $25x^2 - 3x^4$     4

Write each polynomial in standard form. Then give the leading coefficient.

3.  $24g^3 + 10 + 7g^5 - g^2$      $7g^5 + 24g^3 - g^2 + 10$ ; 7

4.  $14 - x^4 + 3x^2$      $-x^4 + 3x^2 + 14$ ; -1

**7-6 Polynomials****Lesson Quiz: Part II**

Classify each polynomial according to its degree and number of terms.

5.  $18x^2 - 12x + 5$     quadratic trinomial

6.  $2x^4 - 1$     quartic binomial

7. The polynomial  $3.675v + 0.096v^2$  is used to estimate the stopping distance in feet for a car whose speed is  $v$  miles per hour on flat dry pavement. What is the stopping distance for a car traveling at 70 miles per hour?

727.65 ft