

Polynomials (Pages 382–387)

A **monomial** is a number, a variable, or a product of numbers and variables that have only positive exponents. A **polynomial** is the sum of one or more monomials. A **binomial** is the sum of two monomials, and a **trinomial** is the sum of three monomials. The **degree** of a monomial is the sum of the exponents of its variables. To find the degree of a polynomial, you must find the degree of each term. The greatest degree of any term is the degree of the polynomial. The terms of a polynomial are usually arranged so that the powers of one variable are in ascending or descending order.

EXAMPLES

Consider the expression $3x^2 + 7x + 5$.

A If the expression is a polynomial, identify it as a *monomial*, *binomial*, or *trinomial*.

The expression is a polynomial since it is the sum of 3 monomials. Since there are 3 monomials, it is a trinomial. Note the powers of x are in descending order.

B Find the degree of the polynomial.

The degree of $3x^2$ is 2, the degree of $7x$ is 1, and the degree of 5 is 0. The greatest degree is 2, so the degree of the polynomial is 2.

PRACTICE

Determine whether each expression is a monomial. Explain why or why not.

1. $\frac{1}{80}z^3$

2. $a^8 - \frac{1}{5}a$

3. $\frac{n^2}{17m}$

State whether each expression is a polynomial. If the expression is a polynomial, identify it as a monomial, a binomial, or a trinomial.

4. $2x + 6z - 3y$

5. d^3

6. $4st^3 + 1.2t^2$

Find the degree of each polynomial.

7. $7u^3$

8. $a^8bc^2 - 9ac^2$

9. 18

Arrange the terms of each polynomial so that the powers of x are in descending order.

10. $2 + x^4 + x^2$

11. $6x - 3x^2 + 4 - 2x^8$

12. $a^2bx^6 - bcx^5 + 24 - x^2$

Arrange the terms of each polynomial so that the powers of x are in ascending order.

13. $8x^4 - 2x^8 + 4x^9 + \frac{3}{10}x^5$

14. $3a^2x^8 - 2a^2x^5 + \frac{1}{4}x^2 + \frac{1}{2}x$

15. $17xy^3 + 6x^4y - x^3y^2 + y^5$



16. Standardized Test Practice What is the degree of the polynomial $3x^2y - 4xy^3$?

A 1

B 2

C 3

D 4

Answers: 1. yes; product of a number and a variable 2. no; includes subtraction 3. no; includes division 4. yes; trinomial 5. yes; monomial 6. yes; binomial 7. 3 8. 11 9. 0 10. $x^4 + x^2 + 2$ 11. $-2x^8 - 3x^2 + 6x + 4$ 12. $a^2bx^6 - bcx^5 - x^2 + 24$ 13. $4x^9 - 2x^8 + 8x^4 + \frac{3}{10}x^5$ 14. $\frac{1}{4}x^2 + \frac{1}{2}x + 3a^2x^8 - 2a^2x^5$ 15. $y^5 + 17xy^3 - x^3y^2 + 6x^4y$ 16. D