8-4 Polynomials *(Pages 432–436)*

Recall that a *monomial* is a number, a variable, or a product of numbers and variables. A **polynomial** is a monomial or a sum of monomials. The exponents of the variables of a polynomial must be positive. 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 $3x^2 + 5 + 7x$.

a. Is the expression a polynomial and if so is it a monomial, binomial, or trinomial?

The expression is the sum of three monomials, therefore it is a polynomial. Since there are three monomials, the polynomial is a trinomial.

b. What is the degree of the polynomial?

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

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

$3x^2 + 7x + 5$

Practice

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

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

2. $a^8 - \frac{1}{5}a + \frac{b}{574a}$

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

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

5. $\frac{5}{d} + d^3$

6. $4st^3 + 1.2t^2 - 0.8st$

Find the degree of each polynomial.

7. $7u^3$

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

9. 18

10. $k^8 + h^9$

11. $2f - 9y + z - 8q$

12. $2x^3y^2z^4 - 6xy^4z^2$

Arrange the terms of each polynomial so that the powers of x are in ascending order. Then arrange them in descending order.

13. $2 + x^4 + x^2$

14. $6x - 3x^2y + 4 - 2x^8$

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

16. $8x^4 - 2x^8y + 4x^9 + \frac{3}{10}x^5$

17. $3a^2x^8 - 2a^2x^5 + \frac{1}{4}x^2 + \frac{1}{2}x$

18. $17xy^3 + 6x^4y - x^3y^2 + y^5$

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

A 1   **B** 2   **C** 3   **D** 4