

Study Guide and Intervention

Polynomials

Degree of a Polynomial A **polynomial** is a monomial or a sum of monomials. A **binomial** is the sum of two monomials, and a **trinomial** is the sum of three monomials. Polynomials with more than three terms have no special name. The **degree** of a monomial is the sum of the exponents of all its variables. The **degree of the polynomial** is the same as the degree of the monomial term with the highest degree.

Example

State whether each expression is a polynomial. If the expression is a polynomial, identify it as a *monomial*, *binomial*, or *trinomial*. Then give the degree of the polynomial.

Expression	Polynomial?	Monomial, Binomial, or Trinomial?	Degree of the Polynomial
$3x - 7xyz$	Yes. $3x - 7xyz = 3x + (-7xyz)$, which is the sum of two monomials	binomial	3
-25	Yes. -25 is a real number.	monomial	0
$7n^3 + 3n^{-4}$	No. $3n^{-4} = \frac{3}{n^4}$, which is not a monomial	none of these	—
$9x^3 + 4x + x + 4 + 2x$	Yes. The expression simplifies to $9x^3 + 7x + 4$, which is the sum of three monomials	trinomial	3

Exercises

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

1. 36

2. $\frac{3}{q^2} + 5$

3. $7x - x + 5$

4. $8g^2h - 7gh + 2$

5. $\frac{1}{4y^2} + 5y - 8$

6. $6x + x^2$

Find the degree of each polynomial.

7. $4x^2y^3z$

8. $-2abc$

9. $15m$

10. $s + 5t$

11. 22

12. $18x^2 + 4yz - 10y$

13. $x^4 - 6x^2 - 2x^3 - 10$

14. $2x^3y^2 - 4xy^3$

15. $-2r^8s^4 + 7r^2s - 4r^7s^6$

16. $9x^2 + yz^8$

17. $8b + bc^5$

18. $4x^4y - 8zx^2 + 2x^5$

19. $4x^2 - 1$

20. $9abc + bc - d^5$

21. $h^3m + 6h^4m^2 - 7$

Study Guide and Intervention *(continued)*

Polynomials

Write Polynomials in Order The terms of a polynomial are usually arranged so that the powers of one variable are in **ascending** (increasing) order or **descending** (decreasing) order.

Example 1 Arrange the terms of each polynomial so that the powers of x are in ascending order.

a. $x^4 - x^2 + 5x^3$
 $-x^2 + 5x^3 + x^4$

b. $8x^3y - y^2 + 6x^2y + xy^2$
 $-y^2 + xy^2 + 6x^2y + 8x^3y$

Example 2 Arrange the terms of each polynomial so that the powers of x are in descending order.

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

b. $-6xy + y^3 - x^2y^2 + x^4y^2$
 $x^4y^2 - x^2y^2 - 6xy + y^3$

Exercises

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

1. $5x + x^2 + 6$

2. $6x + 9 - 4x^2$

3. $4xy + 2y + 6x^2$

4. $6y^2x - 6x^2y + 2$

5. $x^4 + x^3 + x^2$

6. $2x^3 - x + 3x^7$

7. $-5cx + 10c^2x^3 + 15cx^2$

8. $-4nx - 5n^3x^3 + 5$

9. $4xy + 2y + 5x^2$

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

10. $2x + x^2 - 5$

11. $20x - 10x^2 + 5x^3$

12. $x^2 + 4yx - 10x^5$

13. $9bx + 3bx^2 - 6x^3$

14. $x^3 + x^5 - x^2$

15. $ax^2 + 8a^2x^5 - 4$

16. $3x^3y - 4xy^2 - x^4y^2 + y^5$

17. $x^4 + 4x^3 - 7x^5 + 1$

18. $-3x^6 - x^5 + 2x^8$

19. $-15cx^2 + 8c^2x^5 + cx$

20. $24x^2y - 12x^3y^2 + 6x^4$

21. $-15x^3 + 10x^4y^2 + 7xy^2$