# Understanding polynomial terminology

## Vocabulary Review:

- Term: A single piece of the polynomial, like ( $3x^2$ ) or ( $-5$ ).
- Coefficient: The number in front of a variable in a term (e.g., in ( $4x^3$), the coefficient is 4).
- Variable: The letter representing an unknown value (usually ( $x$ )).
- Exponent: The power to which the variable is raised (e.g., in ( $x^5$), the exponent is 5).
- Degree: The highest exponent in the polynomial (e.g., ( $2x^3 + x - 1$ ) has degree 3).
- Constant Term: A term with no variable (e.g., 7 in ( $x^2 + 7$ )).
- Leading Term: The term with the highest degree (e.g., ( $2x^3$) in ( $2x^3 + x - 1$)).
- Leading Coefficient: The coefficient of the leading term (e.g., 2 in ( $2x^3$)).
- Types of Polynomials (by number of terms):
    - Monomial: One term (e.g., ( $5x^2$)).
    - Binomial: Two terms (e.g., ($x + 3$)).
    - Trinomial: Three terms (e.g., ( $x^2 + 2x + 1$)).
    - Polynomial: Any number of terms (4 or more terms are just called polynomials).

Standard Form: Write polynomials with terms in descending order of degree (e.g., ( $3x^4 - 2x^2 + 5x + 1$)).

Salah Alkmali

# Understanding polynomial terminology

Classifying Polynomials by Degree

- CONSTANT POLYNOMIAL (Degree 0): A polynomial consisting only of a constant term.
    - Examples: $10$ , $-3$ , $\frac{1}{2}$ (because $10 = 10x^0$)
- LINEAR POLYNOMIAL (Degree 1): The highest exponent on the variable is 1. Its graph is a straight line!
    - Examples: $x + 4$ , $2y - 7$ , $5m$
- QUADRATIC POLYNOMIAL (Degree 2): The highest exponent on the variable is 2.

  Its graph is a parabola (U-shape)! This is what we've been solving! (SKILL 23).
    - Examples: $x^2 + 3x - 1, y^2 - 9, -4x^2$
- CUBIC POLYNOMIAL (Degree 3): The highest exponent on the variable is 3.
    - Examples: $x^3 - 2x^2 + x - 5$ , $7y^3 + 1$
- QUARTIC POLYNOMIAL (Degree 4): The highest exponent on the variable is 4.
    - Examples: $x^4 + 3x^2 - 2$ , $-x^4 + 8$
- For degrees higher than 4, we usually just say "a polynomial of degree 5," "degree 6," etc.

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# Understanding polynomial terminology

LEVEL 1: The Basics

1. List the terms in $2x + 5$.

2. What is the coefficient of $x$ in $4x - 7$ ?

3. What is the degree of $6x^3 + 2x^2 + 1$?

4. Identify the constant term in $x^2 + 3x + 8$.

5. How many terms are in $5x^2 - 2x + 4$?

6. Is $7x^2$ a monomial, binomial, or trinomial?

7. What is the variable in $9x - 3$?

8. What is the coefficient of $x^2$ in $3x^2 + 2x + 1$?

9. What is the degree of $10$?

10. List the terms in $x^3 - x + 2$.

11. What is the constant term in $4x^2 - 5x$?

12. Is $2x^2 + 3x + 1$ a trinomial?

13. What is the coefficient of $x$ in$-x + 6$ ?

14. What is the degree of $8x^4 + 2x^2$?

15. How many terms are in $0$?

Salah Alkmali

# Understanding polynomial terminology

LEVEL 2: Dive Deeper

1. Identify the degree and leading coefficient in $5x^3 - 2x^2 + x - 4$.
2. What type of polynomial is $3x^2 + 7$?
3. List the coefficients in $2x^4 - 3x^2 + 5x - 1$.
4. Is $4x^2 + 2x^{-1}$ a polynomial? Why or why not?
5. What is the constant term in $6x^3 + 2x^2$?
6. What is the degree of $7x^5 - 3x^3 + 2$?
7. How many terms are in $x^2 + 2x + 3$?
8. What is the coefficient of $x^3$ in $x^3$?
9. Is $0$ a polynomial? What is its degree?
10. What is the variable in $12y^2 - 5y + 1$?
11. What is the degree of $2x^2 + 3x + 4$?
12. List the terms in $9x^4 - 2x^2 + 5$.
13. What is the coefficient of $x$ in $8x - 3$?
14. Is $5x^2 + 2x + 1$ a trinomial?
15. What is the leading term in $4x^3 + 2x^2 - x + 5$?
16. What is the degree of 3?
17. What is the coefficient of $x^2$ in $-x^2 + 4x$?
18. How many terms are in $7x^2 + 2x$?
19. What is the constant term in $5x^3 - 2x^2 + 1$?
20. Is $2x^2 + 3x^{\frac{1}{2}}$ a polynomial? Why or why not?

Salah Alkmali

# Understanding polynomial terminology

LEVEL 3: Mastering the Concept

1. Zainab wrote $4x^3 - 2x^2 + 7x - 5$. List all terms, coefficients, degree, and constant term.

2. Omar is working with $3y^2 + 2y$. What type of polynomial is this? What is its degree?

3. Yasmine has $6x^4 - 3x^2 + 2$. Identify the leading term, degree, and constant term.

4. Hamza wrote $2x^2 + 5x + 1$. What is the coefficient of $x$? Is this a trinomial?

5. Nour is checking if $7x^2 - 4x + 9$ is a polynomial. Explain why.

6. Write a binomial with degree 3.

7. Write a monomial with degree 5.

8. Write a trinomial with degree 2.

9. Is $4x^2 - 3x^{-1} + 2$ a polynomial? Why or why not?

10. What is the degree and leading coefficient of $9x^6 - 2x^3 + 4$?

11. List all terms and coefficients in $5x^2 + 3x - 8$.

12. What is the constant term in $2x^3 + 7$?

13. Write a polynomial with 4 terms and degree 3.

14. Is $0$ a monomial, binomial, or trinomial?

15. Write a polynomial with degree 1 and three terms.

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# Understanding polynomial terminology

Challenge Problems

1. Write a polynomial with degree 4, four terms, and a constant term of 6.

2. Is $3x^2 + 2x^{1.5} + 1$ a polynomial? Explain.

3. Write a binomial with degree 5 and a negative leading coefficient.

4. List all the terms, coefficients, degree, and constant term in $7x^4 - 3x^2 + x - 9$.

5. Write a trinomial with degree 3, where all coefficients are negative.

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