Introduction to Polynomials

OBJECTIVES: At the end of the lesson, I will be able to…

1. Write polynomials in standard form with 100% accuracy.
2. Classify polynomials by degree and number of terms with at least 80% accuracy as measured by a lesson quiz.

VOCABULARY

- **Polynomial** - is a monomial or sum or difference of monomials

  Examples: $4x^3$ $5x + 2$ $4x^2 - 2x - 3$

- **Standard form of a Polynomial** - means that the degrees of the monomial terms of the polynomial decrease from left to right.

  Example: $3x^4 - 2x^3 + 5x^2 - 7x + 1$

- **Degree** - refers to the exponents of the terms of the polynomial
- **Degree of a polynomial** - highest exponent of a monomial term (if the term has more than 1 variable, then add all exponents of that term)
- **Coefficient** – is the number in front of a variable
- **Leading term** - term of highest degree. Its coefficient is called the leading coefficient
- **Constant term** - the term without a variable

Example 1: Identify the degree of the polynomial, leading term, leading coefficient and constant term of the polynomial $3x^4 - 4x^2 + x - 1$

Degree of this polynomial is *4*

Leading term is $3x^4$

Leading coefficient is *3*

Constant term is *-1*

Example 2: Identify the degree of the polynomial, leading term, leading coefficient and constant term of the polynomial $8x^6 y^4 + x^7 y + 3xy^5 - 4$

Degree of this polynomial is _____

Leading term is _____

Leading coefficient is _____

Constant term is _____

Types of Polynomials Based on Number of Terms

Monomial – is a polynomial with one term. It could be a real number, a variable, or a product of a real number and one or more variables with a whole number exponent.

Examples: 18, x, 3x, $4xy^2z$

Binomial – is a polynomial with 2 terms

Examples: $3x - 5$ $4xy^2 + 3xy$

Trinomial – is a polynomial of 3 terms

Examples: $4x^2 + 7x + 3$ $8x^4 - 2x^3 + 3x$

Types of Polynomials Based on its Degree or Number of terms

- You can name a polynomial based on its degree or the number of monomials it contains.

Polynomial	Degree	Name Using Degree	Number of Terms	Name Using Number of Terms
6	0	Constant	1	Monomial
$5x + 9$	1	Linear	2	Binomial
$4x^2 + 7x + 3$	2	Quadratic	3	Trinomial
$2x^3$	3	Cubic	1	Monomial
$8x^4 - 2x^3 + 3x$	4	Fourth degree	3	Trinomial

Classifying Polynomials

Write each polynomial in standard form. What is the name of the polynomial based on its degree and number of terms?

A $3x + 4x^2$

$4x^2 + 3x$ Place terms in order.

This is a quadratic binomial.

B $4x - 1 + 5x^3 + 7x$

$5x^3 + 4x + 7x - 1$ Place terms in order.

$5x^3 + 11x - 1$ Combine like terms.

This is a cubic trinomial.

Name each polynomial by degree and number of terms.

1) $2p^4 + p^3$

2) $-10a$

3) $2x^2$

4) $-10k^2 + 7$

5) $-5n^4 + 10n - 10$

6) $-6a^4 + 10a^3$

7) $6n$

8) 1

9) $-9n + 10$

10) $5a^2 - 6a$

11) $8p^5 - 5p^3 + 2p^2 - 7$

12) $-7n^7 + 7n^4$

13) $-8n^4 + 5n^3 - 2n^2 - 8n$

14) $9v^7 + 7v^6 + 4v^3 - 1$

15) $9x^2 + 3x$

16) -6

17) $-10k^4 + k^2 - k$

18) $8a + 1$

ANSWERS

1) $2p^4 + p^3$

quartic binomial

2) $-10a$

linear monomial

3) $2x^2$

quadratic monomial

4) $-10k^2 + 7$

quadratic binomial

5) $-5n^4 + 10n - 10$

quartic trinomial

6) $-6a^4 + 10a^3$

quartic binomial

7) $6n$

linear monomial

8) 1

constant monomial

9) $-9n + 10$

linear binomial

10) $5a^2 - 6a$

quadratic binomial

11) $8p^5 - 5p^3 + 2p^2 - 7$

quintic polynomial with four terms

12) $-7n^7 + 7n^4$

seventh degree binomial

13) $-8n^4 + 5n^3 - 2n^2 - 8n$

quartic polynomial with four terms

14) $9v^7 + 7v^6 + 4v^3 - 1$

seventh degree polynomial with four terms

15) $9x^2 + 3x$

quadratic binomial

16) -6

constant monomial

17) $-10k^4 + k^2 - k$

quartic trinomial

18) $8a + 1$

linear binomial