

Mathematics 9

Unit 3: Introduction to Polynomials

Sec. 5.1: The Language of Mathematics

Learning Targets:

1. Use mathematical terminology to describe polynomials with respect to:
 - Their number of terms
 - Their variables
 - Their constant
 - Their degree
2. Create a polynomial expression to match a given description.

Key Terms:

Algebra: a branch of math that uses _____ to represent unknown numbers. These symbols are called _____.

Variable: a _____ or _____ that represents an *unknown* number.

Constant: an expression that is simply a _____ - it is a *known* value in an expression or equation.

Coefficient: a number that multiplies a _____.

Algebraic Expressions

Mathematical expressions using a combination of numbers, variables and mathematical operations.

Describe the following expressions in terms of their variable(s), coefficient(s), and constant:

$$x + 5$$

$$x - y - 6$$

$$a^2 + 15$$

$$4x$$

$$7 - 2y$$

$$a^2 + 2b$$

You Try: $-5x - 10$

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Term: an expression formed by the **product** of a coefficient and a variable or multiple variables.

In algebraic expressions, terms are _____ by addition and subtraction.

An algebraic expression could have _____ term, or _____ terms.

Single terms (examples)

5 (every constant is one term)

n (a variable by itself is one term)

7x (a variable with a coefficient is one term)

This expression means "7 times x"

-3ab (a coefficient with multiple variables is one term)

This expression means "-3 times a times b"

4m² (a variable power with a coefficient is one term)

This expression means "4 times m²"

Two terms:

5 + x (two terms linked together with addition)

3x² - 2 (two terms linked together with subtraction)

7xy + z² (two terms linked together with addition)

Three Terms:

1 - x + y (three terms linked together with subtraction and addition)

2x² + 3x - 5 (three terms linked together with addition and subtraction)

a + b + c (three terms linked together with addition)

Example:

How many terms are in each of these four algebraic expressions?

$$4xy + 3$$

$$7a^2 - 2ab + b^2$$

$$5x^2 + y^2 + z^2 - x - 6$$

$$13$$

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The algebraic expression we have been describing have another name:

A polynomial is an algebraic expression made up of _____ that are connected by the operations of addition and/or subtraction.

Polynomials

Polynomials are classified in a number of different ways. One way is by how many terms they have:

1 term = _____

2 terms = _____

3 terms = _____

Polynomials with more than 3 terms don't have particular names. We simply call them "polynomials" and refer to the number of terms they have.

Ex. $3x^2 - 4y + 2x - 7$ is a _____

Example:

Classify the polynomials by their number of terms:

$7x - 2$

$-3xy$

$5x^2 + 8x - 2y + 6$

$8m^2 + 4m - 9$

Degree:

Polynomials can also be classified according to their "**degree**".

In order to determine the degree of a polynomial, we first need to know how to find the degree of a single term.

Degree of a term:

Every term of a polynomial has its own degree:

- Add up all of the _____ on all of the variables in the term

Constant terms: degree = _____

5, -3, 9, 0.25, etc.

Single variable terms: degree = _____

x, 3y, -a, 4n, etc.

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Power terms: degree = _____

m^2 degree = _____

$3x^2$ degree = _____

$-y^3$ degree = _____

Terms containing multiple variables: degree = _____

$5ab$ degree = _____

$-2x^2y$ degree = _____

abc degree = _____

Degree of a polynomial:

The degree of a polynomial is equal to the _____ of its terms.

Find the degree of each term – pick the highest value. That is the degree of the polynomial.

Ex. What is the degree of $3x - 4xy + 7$?

Example:

Classify each polynomial according to their number of terms and state the degree of the polynomial..

$$4x^2 + 3$$

$$7a^2 - 8ab + b^2$$

$$-10$$

$$5z - 3 + 2w$$

Writing polynomials:

Just like there are proper ways to write things in English, there are proper ways to write things in mathematical notation.

When working with polynomials, focus on:

- (1) Always put coefficients in front of variables, not behind. **(3a not a3)**
- (2) Terms with multiple variables should have the variables listed alphabetically. **(5ab not 5ba)**
- (3) Polynomials with multiple terms should be written so that the terms are written in order of descending degree. If multiple terms have the same degree, it doesn't matter which order they are written as long as lower degree terms are written later.

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Example:

Write a polynomial to match the description:

- (1) binomial of degree 1 with two different variables

- (2) degree 2 monomial with a negative coefficient

- (3) degree 0

**Check your understanding: pg. 178 – 182, #5 – 10,
#15 (model with an expression, not a diagram)
#19, 28, 30**