

Section 1 – Topic 2

Understanding Polynomial Expressions

A **term** is a constant, variable, or multiplicative combination of the two.

Consider $3x^2 + 2y - 4z + 5$.

How many terms do you see?

4

List each term.

$3x^2$

$2y$

$-4z$

5

This is an example of a ***polynomial expression***. A polynomial can be one term or the sum of several terms. There are many different types of ***polynomials***.

A monarchy has one leader. How many terms do you think a monomial has?

1

A bicycle has two wheels. How many terms do you think a binomial has?

2

A triceratops has three horns. How many terms do you think a trinomial has?

3

Let's recap:

Type of Polynomial	Number of Terms	Example
Monomial	1	$2x^5$
Binomial	2	$3x + 5$
Trinomial	3	$4a^2 + 2b + 3c$
Polynomial	1 or more	$2m + 3n + \frac{1}{2}p + 7$

Some important facts:

- The *degree of a monomial* is the sum of the exponents of the variables.
- The *degree of a polynomial* is the degree of the monomial term with the highest degree.

Sometimes, you will be asked to write polynomials in standard form.

- Write the monomial terms in descending degree order.
- The *leading term* of a polynomial is the term with the highest degree.
- The *leading coefficient* is the coefficient of the leading degree.

Let's Practice!

1. Are the following expressions polynomials? If so, name the type of polynomial and state the degree. If not, justify your reasoning.

a. $8x^2y^3$

**Yes, monomial,
degree 5**

b. $\frac{2a^2}{3b}$

**No, it is the quotient
of variables**

c. $\frac{3}{2}x^4 - 5x^3 + 9x^7$

**Yes, trinomial,
degree 7**

d. $10a^6b^2 + 17ab^3c - 5a^7$

**Yes, trinomial,
degree 8**

e. $2m + 3n^{-1} + 8m^2n$

**No, it has the
quotient of a
constant and
variable.**

Try It!

2. Are the following expressions polynomials?

a. $\frac{1}{2}a + 2b^2$

- polynomial
 not a polynomial

b. 34

- polynomial
 not a polynomial

c. $\frac{xy}{y^2}$

- polynomial
 not a polynomial

d. $2rs + s^4$

- polynomial
 not a polynomial

e. $xy^2 + 3x - 4y^{-1}$

- polynomial
 not a polynomial

3. Consider the polynomial $3x^4 - 5x^3 + 9x^7$.

a. Write the polynomial in standard form.

$$9x^7 + 3x^4 - 5x^3$$

b. What is the degree of the polynomial?

7

c. How many terms are in the polynomial?

3

d. What is the leading term?

$$9x^7$$

e. What is the leading coefficient?

9

BEAT THE TEST!

1. Match the polynomial in the left column with its descriptive feature in the right column.

- | | | |
|-------------------------------|------------|---|
| A. $x^3 + 4x^2 - 5x + 9$ | V | I. Fifth degree polynomial |
| B. $5a^2b^3$ | I | II. Constant term of -2 |
| C. $3x^4 - 9x^3 + 4x^9$ | VII | III. Seventh degree polynomial |
| D. $7a^6b^2 + 18ab^3c - 9a^7$ | VI | IV. Leading coefficient of 3 |
| E. $x^5 - 9x^3 + 2x^7$ | III | V. Four terms |
| F. $3x^3 + 7x^2 - 11$ | IV | VI. Eighth degree polynomial |
| G. $x^2 - 2$ | II | VII. Equivalent to $4x^9 + 3x^4 - 9x^3$ |



Algebra
Wall

Want some help? You can always ask questions on the Algebra Wall and receive help from other students, teachers, and Study Experts. You can also help others on the Algebra Wall and earn Karma Points for doing so. Go to AlgebraNation.com to learn more and get started!