

Algebra I
Notes 11.1, Part 1 Defining a Polynomial

Objective: Identify a polynomial by its name and its degree.

term - a single number (a "constant") OR
a product of a number (a "coefficient") and (a) variable(s)
(always write the coefficient *first*)

polynomial - an expression formed by adding, subtracting, or multiplying terms

degree of a polynomial - the **largest** exponent of a term in a polynomial

$$8y^5 + 17y^3 - y + 6 \quad \text{the degree of this polynomial is 5}$$

Arrange polynomial terms in descending order of exponents (highest to lowest) ending with the constant term.

The above polynomial can be re-written to illustrate a descending order of exponents:

$$8y^5 + 0y^4 + 17y^3 + 0y^2 + -1y^1 + 6y^0$$

Polynomials with 1, 2, and 3 terms have special names.

<u>number of terms</u>	<u>name</u>	<u>example</u>
1	monomial	x^2
2	binomial	$x^2 - 2$
3	trinomial	$x^2 + 3x - 5$

Each of the following is an example of a term called a monomial.

-7 is a constant.

m is a variable.

$4y^3$ is a product of a constant and a variable.

$-3xa^5b$ is a product of a constant and several variables.

**Definition:
Monomial**

A **monomial** is a term that is either a constant, a variable, or a product of a constant and one or more variables.

The **degree of a monomial** is the sum of the exponents of all of its variables.

The **degree of a polynomial** is the highest degree of any of its terms after it has been simplified. For example, the degree of the polynomial $15x^3 - 4x^2 + 7$ is 3, because the highest degree of a term is 3.

Example 1 Find the degree of each monomial.

$$7x^2 \quad | \quad -8a^3b^6 \quad | \quad 6xym^5 \quad | \quad 9$$

The *polynomial* $x^3 + 5x^2 - 2x + 4$ contains several terms, or monomials.

**Definition:
Polynomial**

A **polynomial** is a monomial, or a sum, or difference of monomials.

Polynomials of one, two, or three terms have these special names:

monomial | (The prefix
one term | *mono-* means
| one.)

binomial | (The prefix
two terms | *bi-* means
| two.)

trinomial | (The prefix
three terms | *tri-* means
| three.)

Example 2 Classify each polynomial as either a monomial, binomial, or trinomial.

$$5a^2 + 6a + 8 \quad | \quad 5m^2 - 2 \quad | \quad 14x^2$$