



Polynomials

Vocabulary

Monomial: A number, a variable or the product of a number and one or more variables.

Polynomial: A monomial or a sum of monomials.

Binomial: A polynomial with exactly two terms.

Trinomial: A polynomial with exactly three terms.

Coefficient: A numerical factor in a term of an algebraic expression.

Vocabulary

Degree of a monomial: The sum of the exponents of all of the variables in the monomial.

Degree of a polynomial in one variable: The largest exponent of that variable.

Standard form: When the terms of a polynomial are arranged from the largest exponent to the smallest exponent in decreasing order.

Degree of a Monomial

What is the degree of the monomial?

$$5x^4b^2$$

- The degree of a monomial is the sum of the exponents of the variables in the monomial.
- The exponents of each variable are 4 and 2. $4+2 = 6$.
 - The degree of the monomial is 6.
 - The monomial can be referred to as a sixth degree monomial.

Polynomials in One Variable

- A polynomial is a monomial or the sum of monomials

$$4x^2$$

$$3x^3 - 8$$

$$5x^2 + 2x - 14$$

- Each monomial in a polynomial is a term of the polynomial.
 - The number factor of a term is called the coefficient.
 - The coefficient of the first term in a polynomial is the ***lead coefficient***.
- A polynomial with two terms is called a ***binomial***.
- A polynomial with three terms is called a ***trinomial***.

Polynomials in One Variable

- The degree of a polynomial in one variable is the largest exponent of that variable.

2 A constant has no variable. It is a 0 degree polynomial.

$4x + 1$ This is a 1st degree polynomial. 1st degree polynomials are ***linear***.

$5x^2 + 2x - 14$ This is a 2nd degree polynomial. 2nd degree polynomials are ***quadratic***.

$3x^3 - 8$ This is a 3rd degree polynomial. 3rd degree polynomials are ***cubic***.

Example

Classify the polynomials by degree and number of terms.

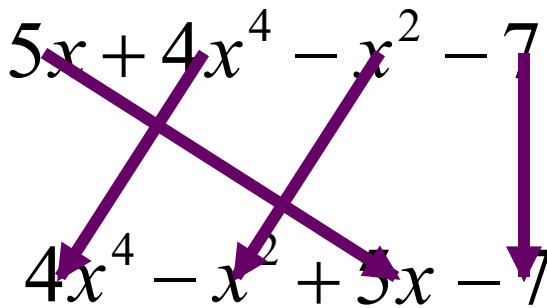
	Polynomial	Degree	Classify by degree	Classify by number of terms
a.	5	Zero	Constant	Monomial
b.	$2x - 4$	First	Linear	Binomial
c.	$3x^2 + x$	Second	Quadratic	Binomial
d.	$x^3 - 4x^2 + 1$	Third	Cubic	Trinomial

Standard Form

- To rewrite a polynomial in standard form, rearrange the terms of the polynomial starting with the largest degree term and ending with the lowest degree term.
- The ***leading coefficient***, the coefficient of the first term in a polynomial written in standard form, should be positive.

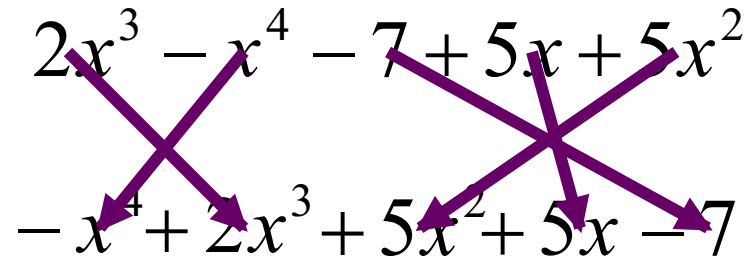
Examples

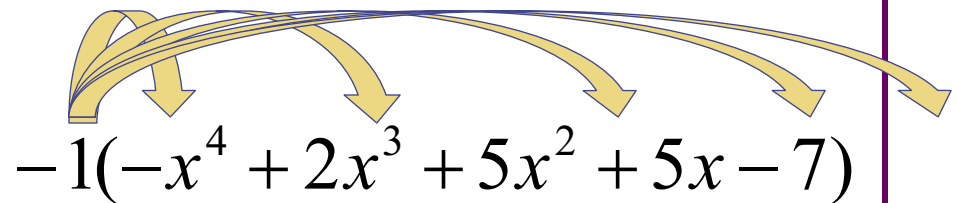
Write the polynomials in standard form.


$$5x + 4x^4 - x^2 - 7$$
$$4x^4 - x^2 + 5x - 7$$

Remember: The lead coefficient should be positive in standard form.

To do this, multiply the polynomial by -1 using the distributive property.


$$2x^3 - x^4 - 7 + 5x + 5x^2$$
$$-x^4 + 2x^3 + 5x^2 + 5x - 7$$


$$-1(-x^4 + 2x^3 + 5x^2 + 5x - 7)$$

$$x^4 - 2x^3 - 5x^2 - 5x + 7$$

Practice

Write the polynomials in standard form and identify the polynomial by degree and number of terms.

1. $7 - 3x^3 - 2x^2$

2. $1 + 3x^2 + 2x$

Problem 1

$$7 - 3x^3 - 2x^2$$

$$7 - 3x^3 - 2x^2$$

$$-3x^3 - 2x^2 + 7$$

$$-1(-3x^3 - 2x^2 + 7)$$

$$3x^3 + 2x^2 - 7$$

This is a 3rd degree, or cubic, trinomial.

Problem 2

$$1 + 3x^2 + 2x$$

$$1 + 3x^2 + 2x$$

$$3x^2 + 2x + 1$$

This is a 2nd degree, or quadratic, trinomial.