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Polynomials

You should be able to:

- Define "term" and "polynomial"
- Identify the types of polynomials
- Identify the degree of the polynomial
- Identify the coefficient

Definition of Term

In Algebra a term is either a single number or a variable, or numbers and variables multiplied together.

↳ A LETTER
USED TO REPRESENT
A VALUE OR VALUES.

Examples of terms

- $6x$
- $5x^2$
- $-7x^2y^3$
- 8 (CONSTANT)
- x^4 (TERM)

-Polynomial-Definition

A polynomial is an expression made with constants, variables and exponents (terms), which are combined **using addition, subtraction and multiplication**, ... but not division.

The **exponents can only be 0,1,2,3,...** etc

It cannot have an infinite number of terms.

$$\sqrt{4x}$$

$$6x$$

$$-3x^2$$

$$\frac{1}{2}x^3$$

$$\frac{8}{3x}$$

$$5x^{-3}$$

POLYNOMIAL

$$6x - 3x^2$$

$$\frac{1}{2}x^3$$

NOT A POLYNOMIAL

$$\left\{ \frac{8}{3x} \quad \sqrt{4x} \right\}$$

$$(4x)^{\frac{1}{2}} = \sqrt{4x}$$

Types of polynomials

Monomial: a polynomial with only one term.

Binomial: a polynomial with only two terms.

Trinomial: a polynomial with only three terms.

Identify the following:

State whether the following are polynomials, and if so, what type of polynomial.

$$\frac{5x^2}{\text{TERM}} + \frac{2x}{\text{TERM}} - \frac{14}{\text{TERM}}$$

TRINOMIAL

$$\frac{4x^2}{\text{TERM}}$$

$$\frac{2}{\text{TERM}}$$

MONOMIAL
CONSTANT

$$\frac{3x^3}{\text{TERM}} - \frac{8}{\text{TERM}}$$

BINOMIAL

$$\frac{5x^4b^2}{\text{TERM}}$$

Coefficients

A "coefficient" is the number in front of the variables. In $2x$, the "2" is the coefficient. In $-4x^2$, "-4" is the coefficient. Can you think of a term that does not have a coefficient?

Constants

Constants are terms without variables...just a plain old number. "6" is a constant, "-7" is a constant. They are not coefficients because there are no variables. But they are polynomials!

Practice

State the type of polynomials and the coefficients.

- $-5x^2 + 6x - 7$
- $7x$
- $x^2 + 3x$

Degrees of monomials

The degree of a monomial is the sum of the exponents of the variables in that term.

Find the degrees of the monomials:

$6x^2$, $-5x^3y^2$, $8x$, 9

Degrees of a polynomial

The degree of a polynomial is the value of the greatest degree of each monomial. To find, calculate the degree of each monomial in the polynomial. The highest degree becomes the degree of the polynomial.

Example

$$8x^2 + 7x - 2$$

($8x^2$ has a degree of 2, $7x$ has a degree of 1, and -2 has a degree of 0. Why?)

So the degree of the polynomial is 2...the highest of the degrees of each monomial.

Your turn...

Find the degree of each term, and find the degree of the polynomial.

$$-8x^3y^2 - 6x^2 + 8x$$

Classifying polynomials by degree

A polynomial with a degree of 1 is "linear"—when graphed forms a straight line!

A degree of 2: quadratic

A degree of 3: cubic

And don't worry about the rest.

Special Names

A polynomial with a degree of one: Monic or Linear

A polynomial with a degree of two: Quadratic

A polynomial with a degree of three: Cubic

A polynomial with a degree of four: Quartic

A polynomial with a degree of five: Quintic

A polynomial with a degree of six: Hexic or Sextic

A polynomial with a degree of seven: Septic or Heptic

A polynomial with a degree of eight: Octic

A polynomial with a degree of nine: Nonic

A polynomial with a degree of ten: Decic

A polynomial with a degree of one-hundred: Augghic

Example

Classify the polynomials by degree and number of terms.

	Polynomial	Degree	Classify by degree	Classify by number of terms
a.	5	<input type="text"/>	<input type="text"/>	Monomial
b.	$2x - 4$	<input type="text"/>	<input type="text"/>	<input type="text"/>
c.	$3x^2 + x$	<input type="text"/>	<input type="text"/>	<input type="text"/>
d.	$x^3 - 4x^2 + 1$	<input type="text"/>	<input type="text"/>	<input type="text"/>