

# Chapter 5

# Polynomials

December 4, 2015

**Term**--Part of an expression or series separated by a + or - sign, or parts of a sequence separated by commas.

Expression	Terms
$5a^3 - 2xy + 3$	$5a^3$ , $-2xy$ , and $3$
$\frac{p - 2q}{a^2 + b}$	$p$ , $-2q$ , $a^2$ , and $b$

$$(p-2q) \div (a^2+b)$$

## *Polynomials*

*A polynomial is one term or the sum of terms whose variables have whole number exponents*

	Polynomial?	# of terms
$2a + 3$	yes	2
$4a - 6$	yes	2
$4a$	yes	1

- constants [like 3, -20, or 1/2]
- Variables [like x , y etc]
- exponents [like the 2 in  $y^2$ ] but only whole number exponents

$$2x^2 + y + 4$$

Handwritten annotations in red:

- An arrow points from the word "exponent" to the 2 in  $x^2$ .
- An arrow points from the word "variables" to the  $x$  and  $y$ .
- An arrow points from the word "constant" to the 4.

Polynomials are combined using:

- addition [+], subtraction[-]

**Term**-a constant [number], variable **or** the product of a number and variable.

Examples 2, y, 2xy,  $2x^2$ , -3x, -2

Polynomial	How many terms	List the terms
a) $-3$	1	$-3$
b) $4a^2$	1	$4a^2$
c) $-3a + 4a^3$	2	$-3a, 4a^3$
d) $-3xy + 2$	2	$-3xy, 2$
e) $2 + 3a - 4x$ $-4x + 3a + 2$	3	$2, 3a, -4x$
f) $2x^2 + 4x - 3y + 2$	4	$2x^2, 4x, -3y, 2$

If an expression has a square root of a variable  $\sqrt{x}$ , or has a variable in the denominator ( $\frac{1}{x}, \frac{2}{x^2}$ ) it IS **NOT A POLYNOMIAL!**

The term with the greatest exponent determines the **DEGREE** of the polynomial.

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

The term  $-2x$  has a degree of 1

The term 5 is constant term. Its value does not change when the value of  $x$  changes. A constant term has a degree of 0.

What is the degree of the polynomial?

	Degree	Terms <sup>#</sup>
a) $-3x^4$	4	1
b) $-2x^2 + 3x - 4$	2	3
c) $2x^2 + 4x^4 - 6$	4	3
d) $-3x^2 + 4x^3 - 2x + 4$	3	4
e) $4$	0	1

## Classifying polynomials [look at the number of terms]...

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

A **monomial** has 1 term, for example:  $4a$ ,  $6$ ,  $-2p^2$

A **binomial** has 2 terms, for example:  $2c - 5$ ,  $2m^2 + 3m$

A **trinomial** has 3 terms, for example:  $2h^2 - 6h + 4$

## Coefficient- the numerical value of a term

*2a<sup>2</sup>* degree variable Monomial [found in front of a variable]

Term	Coefficient [s]	degree	variable[s]	constant
a) $-2x + 4y^2$	$-2, 4$	2	$x, y$	none
b) $-3a^2$	$-3$	2	$a$	none
c) $-2xy + 4a^3 + 2$	$-2, 4$	3	$x, y, a$	2
d) $6$	none	0	none	6



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4.a.  $2+3m$  yes

5.

6. chart