

# Polynomials

Definiton: an expression constructed of variables and constants using addition, subtraction, and multiplication

- \*Exponents must be whole numbers
- \*No division by a variable



$$\frac{2}{x}$$

$$x^{\frac{1}{2}} \quad x^{-1}$$

1. Which of the following expressions are polynomials? [Circle your choices.]

$6x$	$3x^2 - 4y^3$	$a + \frac{2}{3}$	<del><math>\frac{1}{x}</math></del>	$24x^2 + 48z^3$
<del><math>4x^{-2}</math></del>	<del><math>\sqrt{x}</math></del>	$\frac{x}{3}$	$\sqrt{3}$	$2x^3 - 9xy^2 + 7y^3 + 12$



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$4x^{-2}$	$\sqrt{x}$	$\frac{x}{3}$	$\sqrt{3}$	$2x^3 - 9xy^2 + 7y^3 + 12$

$$\sqrt{x} = x^{\frac{1}{2}}$$

$\sqrt{3}$  is a polynomial because it is a constant.



## Standard Form

the terms are in order from greatest degree to least degree and alphabetical

ex.  $2x^4 + 5x^2 + x - 1$

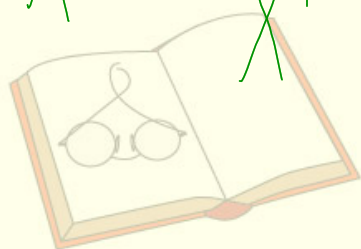


- **Example:**  $2x^3 + 5x^2 - 4x + 7$  \* The highest exponent is called the degree.
- **Classifying Polynomials:** All polynomials are classified by degree and number of terms.

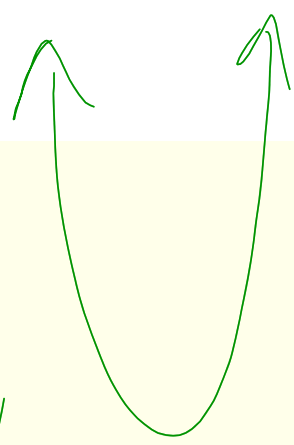
3  
 $2x+1$

DEGREE	
0	Constant
1	Linear
2	Quadratic
3	Cubic
4	Quartic

NUMBER OF TERMS	
1	Monomial
2	Binomial
3	Trinomial
4 or more	Polynomial



$x^2$        $x^4$        $x^3$   
 $x^3 + x^2 + x + 1$



**Classify the following polynomials by degree and number of terms.**

1. 6

1. constant monomial

2.  $-2x^1$

2. linear monomial

3.  $7x^1 + 1$

3. linear binomial

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

4. quadratic trinomial

5.  $4x^3 - 8$

5. cubic binomial

6.  $2x^4 - 7x^2 - 5x + 1$

6. quartic polynomial

**DEGREE:** Based on the exponents of the variables.

- The **degree of a MONOMIAL:** *each term*  
the sum of the exponents of the variables in the monomial
- The **degree of a POLYNOMIAL:**  
the highest degree of any monomial term in the polynomial

**Examples:** Find the degree of each polynomial.

13.  $5mn^2$

*degree  
3*

14.  $5a^2 + 3^0$

*degree  
2*

15.  $3x^2 - 7x^1$

*degree  
of 2*



16.  $9x^3yz^6$

degree  
10

17.  $-4x^2y^2 + 3x^2 + 12$

degree  
4

18.  $8m^3 - 2m^2n^2 - 11$

degree  
4





Write the following polynomials in standard form.

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

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

8.  $x^2 + 64 - x + 7x^3$

8.  $7x^3 + x^2 - x + 64$

9.  $x^3 + 5x^2 + 28 - x$

9.  $x^3 + 5x^2 - x + 28$

10.  $24 - x^3 + x$

10.  $-x^3 + x + 24$

11.  $2ab + a^3 + 5a^2b^2 - 2b^3$

11.  $5a^2b^2 + a^3 - 2b^3 + 2ab$

12.  $13 - x^3 + 5y^3 - 7x^2y^2$

12.  $-7x^2y^2 - x^3 + 5y^3 + 13$

