

# Notes: Classifying, Adding/Subtraction/Multiplication of Polynomials Degree

Standard Form: Largest Exponent  $\rightarrow$  Smallest Exponent

$$3x^5 + 4x^4 + 5x^2 + 6$$

Leading Coefficient
Degree
4 Terms

Classifying Polynomials by Degree		
Name	Degree	Example
Constant	0	$-9x^0$
Linear	1	$x^1 - 4$
Quadratic	2	$x^2 + 3x - 1$
Cubic	3	$x^3 + 2x^2 + x + 1$
Quartic	4	$2x^4 + x^3 + 3x^2 + 4x - 1$
Quintic	5	$7x^5 + x^4 - x^3 + 3x^2 + 2x - 1$

Polynomial	Number of Terms	Name of Function
$2x^4$	1	monomial
$7x - 4$	2	binomial
$x^4 + 3x^3 - 2$	3	trinomial
$3x^5 - 5x^3 + 2x^2 - x + 7$	5	polynomial or multinomial

<p>a) <math>2x^2 - 5x^4 + 3 - 6x</math></p> <p>Standard Form: <math>-5x^4 + 2x^2 - 6x + 3</math></p> <p>Leading Coefficient: <math>-5</math> Degree: <math>4</math> Terms: <math>4</math></p> <p>Name: <u>Quartic Polynomial</u></p>	<p>b) <math>3x - 8x^4 - x^5 + 3x^2 - 1</math></p> <p>Standard Form: <math>-x^5 - 8x^4 + 3x^2 + 3x - 1</math></p> <p>Leading Coefficient: <math>-1</math> Degree: <math>5</math> Terms: <math>5</math></p> <p>Name: <u>Quintic Polynomial</u></p>
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## Identifying Like Terms:

$\rightarrow$  same variable raised to the same power

Examples:  $4y$  and  $7y$        $8x^2$  and  $-4x^2$        $7m^5y$  and  $m^5y$

Non Examples:  $3x^2$  and  $3x$        $8m$  and  $6n$

Like Terms?

$3x^2y$ and $-3yx^2$ <span style="color: blue; font-size: 2em;">✓</span>	$15xy^2$ and $12x^2y$ <span style="color: blue; font-size: 2em;">X</span>	$13$ and $-4$ <span style="color: blue; font-size: 2em;">✓</span>
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## Adding Polynomials:

$$3x^2 + 4x + 5x^2 + 6x$$

Identify Like Terms

$$3x^2 + 5x^2 + 4x + 6x$$

Rearrange terms so that like terms are together

$$8x^2 + 10x$$

Combine Like terms

EX:  $(5y^2 + 7y + 2) + (4y^2 + y + 8)$

$$9y^2 + 8y + 10$$

EX:  $(6x^2y - 4xy + 8y^2x) + (4x^2y - 12y^2x)$

$$10x^2y - 4xy - 4y^2x$$

Subtracting Polynomials:

$$(6y^4 + 3y^2 - 7) - (2y^4 - y^2 + 5)$$

$$\underline{6y^4 + 3y^2 - 7} - \underline{2y^4 + y^2 - 5}$$

$$4y^4 + 4y^2 - 12$$

★ Distribute the negative

Identify Like Terms

Rearrange terms so that like terms are together

Combine like terms.

EX:  $(4x^3 - x^2 + 10) - (2x^3 - x^2 - 15)$

$$4x^3 - x^2 + 10 - 2x^3 + x^2 + 15$$

$$2x^3 + 25$$

EX:  $(10a^7 + 3a^2b - ab) - (8a^7 - a^2b + 2)$

$$10a^7 + 3a^2b - ab - 8a^7 + a^2b - 2$$

$$2a^7 + 4a^2b - ab - 2$$

Multiplying Monomials:

$$(5x^2)(4x^3)$$

$$(5 \cdot 4)(x^2 \cdot x^3)$$

$$20x^5$$

$$(12x^3y^6)(-4xy^2)$$

$$(12 \cdot -4)(x^3 \cdot x^1)(y^6 \cdot y^2)$$

$$-48x^4y^8$$

Multiplying Monomials by Polynomials:

$$5(2x^2 + x + 4)$$

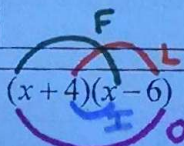
$$2x^2(5) + x(5) + 4(5)$$

$$10x^2 + 5x + 20$$

$$\frac{1}{3}x^2(9x^2 - 6x + 12)$$

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

Multiplying Binomial by Binomial:

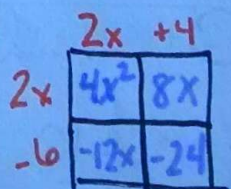


$$(x+4)(x-6)$$

$\frac{x \cdot x}{x^2}$	$\frac{x \cdot -6}{-6x}$	$\frac{4 \cdot x}{4x}$	$\frac{4 \cdot -6}{-24}$
First	Outer	Inner	Last

$$x^2 - 2x - 24$$

$$(2x+4)(2x-6)$$



$$4x^2 + 8x - 12x - 24$$

$$4x^2 - 4x - 24$$

$$(2x+1)(x-5)$$

$$2x^2 - 10x + x - 5$$

$$2x^2 - 9x - 5$$

1)  $2y^2 + 3y + 7y - y^2$

2)  $12x^5 + 10x^4 - 8x^5$

3)  $(6x^2 + 3x) + (2x^2 + 6x)$

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

5)  $(2y^5 - 6y^3 + 1) + (y^5 + 8y^4 - 2y^3 - 1)$

6)  $(t^3 - 2t) - (t^2 + 2t + 6)$   
 $t^3 - 2t - t^2 - 2t - 6$   
 $t^3 - t^2 - 4t - 6$

7)  $(m^2 - 10m + 5) + (8m + 2)$

8)  $(6x^3 + 5x) + (4x^3 + x^2 - 2x + 9)$   
 $10x^3 + x^2 + 3x + 9$

9)  $(4c^5 + 8c^2 - 2c - 2) - (c^3 - 2c + 5)$

10)  $(4x + 3)(x - 6)$   
 $4x^2 - 24x + 3x - 18$   
 $4x^2 - 21x - 18$

11)  $4a(3a^2 - a + 2) - (a^3 + 2a^2 + 4)$

12)  $8a - 2(3a + 4)$   
 $8a - 6a - 8$   
 $2a - 8$

13)  $(4xy + 3x - 7x^3y) - 3x(y - 2 + x^2y)$

$4xy + 3x - 7x^3y - 3xy + 6x - 3x^3y$   
 $-10x^3y + xy + 9x$

14)  $(x^2 + 1)(2x + 3)$

$x^2 + 1$   

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

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