Adding, Subtracting, and Multiplying Polynomials

A number or a number multiplied by variables is called a _____ (also called a _____).

Ex 1.

Which of the following are monomials?

$-4x^2$ $5x^2+3x$ $2x^4y^5$ $\frac{4}{x}$ 17

The sum of the exponents of the variables is called the _____ of a monomial.

The numerical factor in a monomial is called the _____.

Ex 2.

What are the degrees and coefficients of the following monomials?

Monomial	Degree	Coefficient
$-4x^2$		
$5x^2y^4z^7$		
$2x^3y$		
$\frac{x}{4}$		
ab		
$-z$		
17		

One or more monomials added together is called a _____.
ex: $-3x^2y^3+2x^4-3xy+24$

The highest degree of all terms in a polynomial is called the _____ of the polynomial.
ex: What is degree of above polynomial?

A polynomial with 2 terms is called a _____.

A polynomial with 3 terms is called a _____.

Adding and Subtracting Polynomials

Ex 3.

Add: $6x^3 - 4x^2 + 3$ and $-2x^3 + 7x^2 - 5$

Ex 4.

Add: $(-3x^2y^3 + 2x^4 - 3x^3y^2 + 24) + (2x^2y^3 - 2x^4 + 5x^3y^2 + 6x - 4)$

Ex 5.

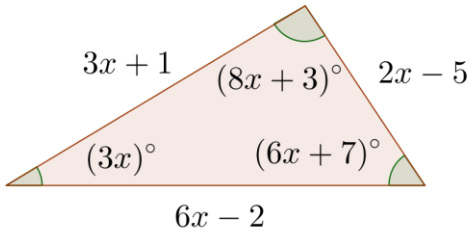
Subtract: $(6x^2y^5 - 2xy^3 - 8) - (-7x^2y^5 - 4xy^3 + 2)$

Ex 6.

Simplify: $[(6t^2 - 3t + 1) - (12t^2 + 2t - 6)] - [(4t^2 - 3t - 8) + (-6t^2 + 10t - 12)]$

Ex 7.

Find a polynomial that represents the perimeter of the triangle. Also, find the angles of the triangle.



Multiplying Polynomials

To multiply polynomials, take each term of the first polynomial times every term of the second polynomial.

Ex 8.

Multiply: $4x^2(3x-5)$

Ex 9.

Multiply: $-3x^3y^2(4x^2y+2y^2-8)$

Ex 10.
Multiply: $(2x+5)(x^2+3x+4)$

Note:
When multiplying two binomials, the mnemonic **FOIL** is sometimes helpful.
FOIL stands for **F**irst **O**uter **I**nner **L**ast.

For example, $(3x-1)(2x+4) = \underbrace{3x \cdot 2x}_{\text{First}} + \underbrace{3x \cdot 4}_{\text{Outer}} - \underbrace{1 \cdot 2x}_{\text{Inner}} - \underbrace{1 \cdot 4}_{\text{Last}}$

Some Shortcuts

$$(A+B)^2 =$$

$$(A-B)^2 =$$

$$(A+B)(A-B) =$$

We can use these shortcuts to multiply certain polynomials.

Ex 11.
Multiply: $(2x+3y)^2$

Ex 12.
Multiply: $\left(\frac{1}{2}x - 3y^4\right)^2$

Ex 13.
Multiply: $(3xy^2+5y)(3xy^2-5y)$

Practice

1. Determine the coefficient of each term, the degree of each term, and the degree of the polynomial.

$12x^4y - 5x^3y^7 - x^2 + 4$

Term	Coefficient	Degree

Degree of the polynomial: _____

2. Add: $(6x^2 - 3x + 7) + (-2x^2 + 3x - 11)$
3. Subtract: $(5x^4y^2 + 6x^3y - 7y) - (3x^4y^2 - 5x^3y - 6y + 8x)$
4. Simplify: $(3x^3 + 7x^2 - 2x) + (5x^3 - 2x^2 + 8x) - (-2x^3 + 6x^2 + 1)$
5. Multiply.

a) $-5xy(8x + 3y - 2x^2y^3)$ b) $(3x - y)(2x + 5y)$ c) $(x^2 - 2x + 3)(x^2 + x + 1)$

d) $(3x + 4y)^2$ e) $(5xy^2 - xy)^2$ f) $(3x + 2)(3x - 2)$ g) $(x + 5)^3$

h) $-2x(x + 3)(5x - 1)$

Q: What has many keys but can't open any doors?