Terms

Terms are the **individual building blocks** of expressions. They add up to form expressions.
A term is a **product** of its **factors**.
For example, the expression $5xy - 3$, is made up of two terms, $5xy$ and (-3).

Factors

Factors are those **variables** or **constants**, whose **product** form a **term** of an expression.
For example, 8, p and q are the factors of the term $8pq$.
Factors are such that they can not be factorised further.

The product of factors forms a term and the summation of the terms forms an expression.

Coefficients

The **numerical factor** of a term is called the **coefficient** of that **term**.
For the terms, $6y$ and $2xy$, the coefficient of $6y$ is 6 and the coefficient of $2xy$ is 2.

Like Terms

Like terms are those terms which have **same variables** raised to the **same power**. Like terms have same **algebraic factors**. The **numerical coefficient** of like terms can be **different**.
For example, $3x^2y$ and $5x^2y$ are like terms.

Monomial

An **expression** with only **one term** is called a **monomial**.
Examples of monomials: $6x$, $7pq$, x^2y, $9xyz$, $4bc$ etc.

Binomial

An **expression** which contains two **unlike terms** is called a **binomial**.
Examples of binomials: $4y-3z$, x^6-2, $pq+1$, etc.

Polynomial

Expressions that have more than **two terms** with **non-zero coefficients** and variables having **non-negative integral exponents** are called polynomials.
Examples: $a+b+c+2$, $7xy-8x+2+3y$, $5t^3-7t+k+3$.

Algebraic Expressions

Algebraic expressions are expressions made up of **variables** and **constants** along with mathematical operators. Algebraic expressions have no sides or equal to sign like algebraic equations.
Examples of algebraic expressions are : $2x+4$, $7y-3+6x$, $3t^2+4t-1$.

Terms

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For example, the expression 5*xy* – 3, is made up of two terms, 5*xy* and (-3).

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Algebraic Identities

- $(a+b)^2=a^2+2ab+b^2$
- $(a-b)^2=a^2-2ab+b^2$
- $(a+b)(a-b)=a^2-b^2$

Addition and Subtraction of Algebraic Expressions

When we are **adding** or **subtracting** two **algebraic expressions**, we can only add or subtract **like terms**. The sum of two or more like terms is a like term, with a **numerical coefficient** equal to the **sum of the numerical coefficient** of all the like terms.

Similarly, the difference between two like terms is a like term with a **numerical coefficient** equal to the **difference between the numerical coefficients** of the two like terms. Suppose if we have to add $3x^2y+y+z$ and $4x^2y+7a+5z$, we will combine all the like terms and then add their numerical coefficients.
$(3x^2y + 4x^2y) + (y) + (7a) + (z + 5z) = 7x^2y + y + 7a + 6z$

Multiplication of Algebraic Expressions

Multiplication of Monomials

When we multiply two monomials:

- the numerical coefficient of the terms is equal to the product of the numerical coefficient of both the terms.
- the exponent or power of each algebraic factor is equal to the sum of the exponents of that algebraic factor in both the monomials.

Multiplying two monomials:

- $x\times3y = x\times3\times y = 3\times x\times y = 3xy$
- $3x\times2y = 3\times x\times2\times y = 3\times2\times x\times y = 6xy$
- $5x\times(-2z) = 5\times(-2)\times x\times z = -10xz$

Multiplying three or more monomials:

- $2x \times 3y \times 5z = (2x\times3y) \times 5z = 6xy \times 5z = 30xyz$
- $4xy \times 5x^2y^2 \times 6x^3y^3 = (4xy\times5x^2y^2) \times 6x^3y^3 = 20x^3y^3 \times 6x^3y^3 = 120x^6y^6$

Zeroes of Polynomial

- A polynomial can have terms which have Constants like 3, -20, etc., Variables like x and y and Exponents like 2 in y^2.
- These can be combined using addition, subtraction and multiplication but NOT DIVISION.
- The zeroes of a polynomial p(x) are precisely the x-coordinates of the points, where the graph of y = p(x) intersects the x-axis.

If α and β are the zeroes of the quadratic polynomial $ax^2 + bx + c$, then
sumofzeros,$\alpha+\beta=-\frac{b}{a}$= -coefficient of x / coefficient of x^2

productofzeros,$\alpha\beta$=ca= = coefficient of constant term / coefficient of x^2

If α, β, γ are the zeroes of the cubic polynomial $ax^3 + bx^2 + cx + d = 0$, then

$\alpha+\beta+\gamma$=–ba= = coefficient of x^2 / coefficient of x^3

$\alpha\beta+\beta\gamma+\gamma\alpha$=ca= = coefficient of x / coefficient of x^3

$\alpha\beta\gamma$=–da=–= coefficient of constant term / coefficient of x^2