Algebraic Expressions

- **Algebra:** It is a branch of mathematics in which we use literal numbers and statements symbolically. Literal numbers can be positive or negative. They are variables.

- **Variable:** A symbol which takes various values is known as a variable. Normally it is denoted by x, y, z etc.

- **Constant:** A symbol having a fixed numerical value is called a constant. Sometimes, 'c', 'k', etc., are used as symbols to denote a constant.

- **Coefficient:** In a term of an algebraic expression any of the factors with the sign of the term is called the coefficient of the product of the other factors in that term. Sometimes, symbols like a, b, l, m etc., are used to denote the coefficients. Coefficients that are numbers are called numerical coefficients.

- **Algebraic expression:** A combination of constants and variables connected by some or all of the four fundamental operations +, -, x and - is called an algebraic expression.
  e.g., - 5p + 12 is an algebraic expression.
  Here -5 is the coefficient of the variable 'p' and 12 is the constant.

- **Terms of an algebraic expression:** The different parts of the algebraic expression separated by the sign + or -, are called the terms of the expression.

  e.g., 3x - 5 + 4xy is an algebraic expression containing 3 terms -3x, -5 and 4xy.

- **Like and unlike terms:** In a given algebraic expression, the terms having the same literal factors are called like or similar terms, otherwise they are called unlike terms.
  e.g., 3xy and -4xy are like terms while 6xy and -4x are unlike terms.

- **Factors:** Each term of an algebraic expression consists of a product of constants and variables.
  A constant factor is called a numerical factor, while a variable factor is known as a literal factor.

- **Various types of algebraic expressions:**
  (i) Monomial: An algebraic expression which contains only one term, is called a monomial,
  Thus, $5x$, $2xy$, $-3a^2$ b, -7, etc., are all monomials.
  (ii) Binomial: An algebraic expression containing two terms is called a binomial.
  Thus, $(2a + 3b), (8 - 3x), (x^2 - 4xy^2)$, etc., are all binomials.
  (iii) Trinomial: An algebraic expression containing three terms is called a trinomial.
- Thus, $(a + 2b + 5c), (x + 2y - 3z), (x^3 - y^3 - z^3)$, etc., are all trinomials.
  (iv) Polynomial: An expression containing two or more terms is called a polynomial.

- **Addition of Algebraic Expressions:** While adding algebraic expressions, we collect the like terms and add them. The sum of several like

terms is another like term whose coefficient is the sum of the coefficients of those like terms. The like terms are added and the unlike terms are left as they are.

- **Subtraction of Algebraic Expressions;** the difference of two like terms is a like term whose coefficient is the difference of the numerical coefficients of the two like terms.

  e.g., $4x^2 - 6x^2 = (4-6)x^2 = -x^2$

  Rule for subtraction: Change the sign of each term of the expression to be subtracted and then add.

- **Value of an expression:** The value of an algebraic expression depends on the values of the variables forming the expression.

- **Using algebraic expressions" Formulae and Rules:**

  Rules and formulae in mathematics are written in a concise and general form using algebraic expressions.

  Thus, the area of a rectangle $= lb$, where I is the length and b is the breadth of the rectangle.

  The general $\left(n^{th}\right)$ term of a number pattern (or a sequence) is an expression in 'n'.

  Thus, the n$^\wedge$ term of the number pattern 11, 21, 31, 41,.... is (10n + 1).