ALGEBRAIC EXPRESSIONS

MODULE 1

We combine variables and constants to make algebraic expressions. For this, we use the operations of addition, subtraction, multiplication and division.

- We use letters x, y, l, m, … etc. to denote variables. A **variable** can take various values. Its value is not fixed.
- On the other hand, a **constant** has a fixed value. Examples of constants are: 4, 100, –17, etc.

We have already come across expressions like $4x + 5$, $10y - 20$. The expression $4x + 5$ is obtained from the variable x, first by multiplying x by the constant 4 and then adding the constant 5 to the product. Similarly, $10y - 20$ is obtained by first multiplying y by 10 and then subtracting 20 from the product.

TERMS OF AN EXPRESSION

- **Terms are added to form expressions.** Just as the terms $4x$ and 5 are added to form the expression $(4x + 5)$, the terms $4x$ and $(-3xy)$ are added to give the expression $(4x - 3xy)$. This is because $4x + (-3xy) = 4x - 3xy$.

Factors of a term

- We saw above that the expression ($4x2 - 3xy$) consists of two terms $4x2$ and $-3xy$. The term $4x2$ is a product of 4, x and x; we say that 4, x and x are the factors of the term $4x2$. A term is a product of its factors. The term $-3xy$ is a product of the factors -3, x and y.

Coefficients of a term

- We have learnt how to write a term as a product of factors. One of these factors may be numerical and the others algebraic (i.e., they contain variables). The numerical factor is said to be the numerical coefficient or simply the **coefficient** of the term. Thus in $5xy$, 5 is the coefficient of the term. It is also the coefficient of xy. In the term $10xyz$, 10 is the coefficient of xyz, in the term $-7x^2y^2$, -7 is the coefficient of x^2y^2.

Sometimes, the word ‘coefficient’ is used in a more general way. Thus we say that in the term $5xy$, 5 is the coefficient of xy, x is the coefficient of $5y$ and y is the coefficient of $5x$. In $10xy^2$, 10 is the coefficient of xy^2, x is the coefficient of $10y^2$ and y^2 is the coefficient of $10x$. Thus, in this more general way, a coefficient may be either a numerical factor or an algebraic factor or a product of two or more factors. It is said to be the coefficient of the product of the remaining factors.

LIKE AND UNLIKE TERMS

- When terms have the same algebraic factors, they are **like** terms. When terms have different algebraic factors, they are **unlike** terms. For example, in the expression $2xy - 3x + 5xy - 4$, look at the terms $2xy$ and $5xy$. The factors of $2xy$ are 2, x and y. The factors of $5xy$ are 5, x and y. Thus their algebraic (i.e., those which contain variables) factors are the same and hence they are **like** terms. On the other hand the terms $2xy$ and $-3x$, have different algebraic factors. They are **unlike** terms.

MONOMIALS, BINOMIALS, TRINOMIALS AND POLYNOMIALS

- An expression with only one term is called a **monomial**; for example, $7xy$, $-5m$, $3x^5$ etc.
- An expression which contains two unlike terms is called a **binomial**; for example, $x + y$, $m - 5$, $mn + 4m$, $a2 - b2$ are binomials.
- An expression which contains three terms is called a **trinomial**; for example, the expressions $x + y + 7$, $ab + a + b$, $3x2 - 5x + 2$, $m + n + 10$ are trinomials.
- In general, an expression with one or more terms is called a **polynomial**. Thus a monomial, a binomial and a trinomial are all polynomials.

ADDITION AND SUBTRACTION OF ALGEBRAIC EXPRESSIONS:

- *The sum of two or more like terms is a like term with a numerical coefficient equal to the sum of the numerical coefficients 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.*
- *Note that unlike terms cannot be added or subtracted the way like terms are added or subtracted.* We have already seen examples of this, when 5 is added to x, we write the result as $(x + 5)$. Observe that in $(x + 5)$ both the terms 5 and x are retained.

When we **add** two algebraic expressions, the like terms are added as given above; the **unlike** terms are **left as they are**. Thus, the sum of $4x^2 + 5x$ and $2x + 3$ is $4x^2 + 7x + 3$; the like terms $5x$ and $2x$ add to $7x$; the unlike terms $4x^2$ and 3 are left as they are.

Thank you