Class X Math
Notes for Pair of Linear Equations in Two Variables

Basic Concepts with Examples

- **Linear Equation in Two Variables**

An equation which can be put in the form

$$ax + by + c = 0$$

where a, b and c are real numbers {a, b ≠ 0) is called a **linear equation** in two variables 'x' and 'y'

- **General Form of a Pair of Linear Equations in Two Variables**

General form of a linear pair of equations in two variables is:

$$a_1x + b_1y + c_x - 0 \text{ and}$$

$$a_2x + b_2y + c_2 = 0$$

where a_1 b_1, c_1, a_2, b_2, c_2 are real numbers such that

$$a_1^2 + b_1^2\ 0 \text{ and } a_2^2 + b_2^2\ 0$$

- **Solution of a Pair of Linear Equations in Two Variables**

The solution of a linear equation in two variables 'x' and 'y' is a pair of values (one for 'x' and other for 'y') which makes the two sides of the equation equal. There are two methods to solve a pair of linear equations:

(i) algebraic method

(ii) graphical method.

- **Algebraic Method**

We have already studied (i) Substitution method and (ii) Elimination method. Here, we will study cross-multiplication method also.

If $a_1 x + b_1 y + c_1 = 0$

$a_2 x + b_2 y + c_2 = 0$

form a pair of linear equations, then the following three situations can arise:

(i) If $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$, then the system is **consistent.**

(ii) If $\frac{a_1}{a_2} = \frac{b_1}{b_2}$, then the system is **inconsistent.**

(ii) If $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$, then the system is **dependent and consistent.**

- **Graphical Method of Solution of a Pair of Linear Equations**

(i) If the graphs of two equations of a system intersect at a point, the system is said to have a **unique solution,** i.e., the system is **consistent.**

(ii) If the graphs of two equations of a system are two parallel lines, the system is said to have **no solution,** i.e., the system is **inconsistent.**

(iii) When the graphs of two equations of a system are two coincident lines, the system is said to have **infinitely** many solutions, i.e., the system is **consistent and dependent.**