CBSE Class 10 Maths Notes Chapter 3 Pair of Linear equations in Two Variables

- For any linear equation, each solution (x, y) corresponds to a point on the line. General form is given by ax + by + c = 0.
- The graph of a linear equation is a straight line.
- Two linear equations in the same two variables are called a pair of linear equations in two variables. The most general form of a pair of linear equations is: $a_1x + b_1y + c_1 = 0$; $a_2x + b_2y + c_2 = 0$ where a_1, a_2, b_1, b_2, c_1 and c_2 are real numbers, such that $a_1^2 + b_1^2 \neq 0$, $a_2^2 + b_2^2 \neq 0$.
- A pair of values of variables 'x' and 'y' which satisfy both the equations in the given system of equations is said to be a solution of the simultaneous pair of linear equations.
- A pair of linear equations in two variables can be represented and solved, by
  (i) Graphical method
  (ii) Algebraic method

(i) Graphical method. The graph of a pair of linear equations in two variables is presented by two lines.
(ii) Algebraic methods. Following are the methods for finding the solutions(s) of a pair of linear equations:

1. Substitution method
2. Elimination method
3. Cross-multiplication method.

- There are several situations which can be mathematically represented by two equations that are not linear to start with. But we allow them so that they are reduced to a pair of linear equations.
- **Consistent system.** A system of linear equations is said to be consistent if it has at least one solution.
- **Inconsistent system.** A system of linear equations is said to be inconsistent if it has no solution.

CONDITIONS FOR CONSISTENCY

Let the two equations be:

$a_1x + b_1y + c_1 = 0$

$a_2x + b_2y + c_2 = 0$

Then,

Relationship between coeff. or the pair of equations	Graph	Number of Solutions	Consistency of System
$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$	Intersecting lines	Unique solution	Consistent
$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$	Parallel lines	No solution	Inconsistent
$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$	Co-incident lines	Infinite solutions	Consistent