

Ch-3 Pair of Linear Equations in 2 Variables

1. **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 ($a, b \neq 0$) is called a **linear equation** in two variables ‘ x ’ and ‘ y ’.
2. **General Form of a Pair of Linear Equations in Two Variables** – General form of a linear pair of equations in two variables is –
 $a_1x + b_1y + c_1 = 0$, 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, $a_1^2 + b_1^2 \neq 0$ and $a_2^2 + b_2^2 \neq 0$.
3. **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 –
 - a. algebraic method
 - b. graphical method.
4. **Algebraic Method** – We have already studied (i) Substitution method and (ii) Elimination method. Here, we will study cross-multiplication method also.
If, $a_1x + b_1y + c_1 = 0$, and $a_2x + b_2y + c_2 = 0$ form a pair of linear equations, then the following three situations can arise –
 - a. If $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$, then the system is **consistent**.
 - b. If $\frac{a_1}{a_2} = \frac{b_1}{b_2}$, then the system is **inconsistent**.
 - c. If $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$, then the system is **dependent and consistent**.
5. **Graphical Method of Solution of a Pair of Linear Equations** –
 - a. 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**.
 - b. 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**.
 - c. 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**.