Formula
PAIR OF LINEAR EQUATIONS IN TWO VARIABLES
Chapter: - 3

1) **Linear Equation**: - ax + by +c = 0
2) **Pair of lines: -**
   $ax_1 + by_1 + c_1 = 0$, $ax_2 + by_2 + c_2 = 0$

Sr. no.	Pair of lines	$\frac{a_1}{a_2}$	$\frac{b_1}{b_2}$	$\frac{c_1}{c_2}$	**Compare the ratios**	**Graphical representation**	**Algebraic interpretation**
(i)	**2x+3y+10=0** **3x-2y+15=0**	$\frac{2}{3}$	$-\frac{3}{2}$	$\frac{10}{15}=\frac{2}{3}$	$\frac{a_1}{a_2}\neq\frac{b_1}{b_2}$	**Intersecting lines**	**Exactly one solution (unique)**
(ii)	**2x+4y+7=0** **4x+8y+14=0**	$\frac{2}{4}=\frac{1}{2}$	$\frac{4}{8}=\frac{1}{2}$	$\frac{7}{14}=\frac{1}{2}$	$\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$	**Coincident lines**	**Infinitely many solutions**
(iii)	**3x+2y+5=0** **9x+6y+2=0**	$\frac{3}{9}=\frac{1}{3}$	$\frac{2}{6}=\frac{1}{3}$	$\frac{5}{2}$	$\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$	**Parallel lines**	**No solution**

3) If the lines intersect at a point, then that point gives the unique solution of the two equations. In this case, the pair of equations is consistent.

$$\frac{a_1}{a_2}\neq\frac{b_1}{b_2}$$

4) If the lines coincide, then there are infinitely many solutions — each point on the line being a solution. In this case, the pair of equations is **dependent (consistent).**

$$\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$$

5) If the lines are parallel, then the pair of equations has no solution. In this case, the pair of equations is inconsistent.

$$\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$$