

PRERANA PU COLLEGE

BELAGAVI

Class : 10th mathematics
Chapter- 3: Pair of Linear Equations in Two Variables

Substitution

Solve: $7x-15y = 2$ -(i)
 $x+2y = 3$ -(ii)

Solution: From equation (ii), $x = 3-2y$
substitute value of x in eq. (i)
 $7(3-2y)-15y = 2$
 $-29y = -19 \Rightarrow y = \frac{19}{29}$
Now, from $x = 3-2y$
 $x = 3-2\left(\frac{19}{29}\right) = \left(\frac{49}{29}\right)$

By Elimination

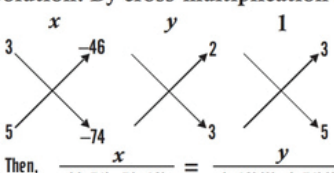
Solve: $x+3y = 6$ -(i)
 $2x+3y = 12$ -(ii)

Now, Adding equation (i) and (ii)
 $3x = 18$ or $x = 6$
Again, from (i) $\times 2$ -(ii)
 $3y = 0$ or, $y = 0$
Hence, $x = 6, y = 0$

By Cross Multiplication

Solve: $2x+3y-46 = 0$ -(i)
 $3x+5y-74 = 0$ -(ii)

Solution: By cross-multiplication method



Then, $\frac{x}{3(-74)-5(-46)} = \frac{y}{(-46)(3)-(-74)(2)} = \frac{1}{2(5)-3(3)}$
 $\frac{x}{-222+230} = \frac{y}{-138+148} = \frac{1}{10-9}$
 $\frac{x}{8} = \frac{y}{1} = \frac{1}{1} \Rightarrow \frac{x}{8} = \frac{1}{1}$ and $\frac{y}{1} = \frac{1}{1}$
i.e. $x = 8$ and $y = 10$

Algebraic Methods

General Form

Pair of Linear Equations in Two Variables

Solution Graphically

Graphically Presentation

$$a_1x+b_1y+c_1 = 0$$

$$a_2x+b_2y+c_2 = 0$$

$a_1, b_1, c_1, a_2, b_2, c_2, -$ Real numbers

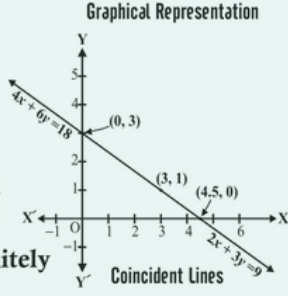
Each solution (x, y) , corresponds to a point on the line representing the equation and vice-versa

Pair of Lines = $2x+3y-9 = 0$
 $4x+6y-18 = 0$

$\frac{a_1}{a_2} = \frac{2}{4}, \frac{b_1}{b_2} = \frac{3}{6}, \frac{c_1}{c_2} = \frac{-9}{-18}$

Compare the Ratios = $\frac{a}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

Algebraic Interpretation = Infinitely many solutions - Dependent



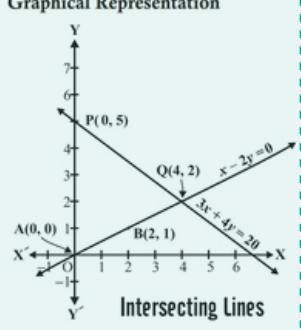
Graphical Representation
Coincident Lines

Pair of Lines = $x-2y = 0$
 $3x+4y-20 = 0$

$\frac{a_1}{a_2} = \frac{1}{3}, \frac{b_1}{b_2} = \frac{-2}{4}, \frac{c_1}{c_2} = \frac{0}{-20}$

Compare the Ratios = $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

Algebraic Interpretation : Exactly one solution - consistent (unique)



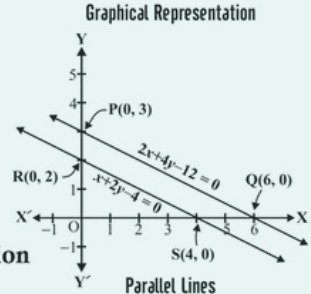
Graphical Representation
Intersecting Lines

Pair of Lines = $x+2y-4 = 0$
 $2x+4y-12 = 0$

$\frac{a_1}{a_2} = \frac{1}{2}, \frac{b_1}{b_2} = \frac{2}{4}, \frac{c_1}{c_2} = \frac{-4}{-12}$

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

Algebraic Interpretation : No solution - Inconsistent



Graphical Representation
Parallel Lines

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