

Linear Equations In Two Variables

P.Kishan (pusarlakishan@sriprakashschools.com)

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Class 10th Maths - Chapter 3

This is Problem-2.1 from Exercise 3.2

1. On comparing the ratios $\frac{a_1}{a_2}, \frac{b_1}{b_2}$ and $\frac{c_1}{c_2}$, find out whether the lines representing the following pair of linear equations intersect at a point, parallel and coincident.

$$5x - 4y + 8 = 0 \quad (1)$$

$$7x + 6y - 9 = 0 \quad (2)$$

solution

this can be written as

$$\begin{pmatrix} 5 & -4 \\ 7 & 6 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -8 \\ 9 \end{pmatrix} \quad (3)$$

$$x = \frac{\begin{vmatrix} \mathbf{b} & \mathbf{a}_2 \end{vmatrix}}{\begin{vmatrix} \mathbf{a}_1 & \mathbf{a}_2 \end{vmatrix}} = \frac{\begin{vmatrix} -8 & -4 \\ 9 & 6 \end{vmatrix}}{\begin{vmatrix} 5 & -4 \\ 7 & 6 \end{vmatrix}} = \frac{(-8)(6) - (9)(-4)}{(5)(6) - (7)(-4)} = \frac{-48 + 36}{30 + 28} = \frac{-12}{58} \quad (4)$$

$$y = \frac{\begin{vmatrix} \mathbf{a}_1 & \mathbf{b} \end{vmatrix}}{\begin{vmatrix} \mathbf{a}_1 & \mathbf{a}_2 \end{vmatrix}} = \frac{\begin{vmatrix} 5 & -8 \\ 7 & 9 \end{vmatrix}}{\begin{vmatrix} 5 & -4 \\ 7 & 6 \end{vmatrix}} = \frac{(5)(9) - (7)(-8)}{(5)(6) - (7)(-4)} = \frac{45 + 56}{30 + 28} = \frac{101}{58} \quad (5)$$