

Pair of linear equation in two variables

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Class 10th Maths - Chapter 3

1. On comparing $\frac{a_1}{a_2}, \frac{b_1}{b_2}, \frac{c_1}{c_2}$ Find out whether the following pair of linear equation are consistent, or inconsistent.

$$2x - 3y = 8; \quad (1)$$

$$4x - 6y = 9 \quad (2)$$

Solution:

Equations can be written as:

$$\begin{pmatrix} 2 & -3 \\ 4 & -6 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 8 \\ 9 \end{pmatrix} \quad (3)$$

(4)

The values of x and y are:

$$x = \frac{\begin{vmatrix} \mathbf{b} & \mathbf{a2} \end{vmatrix}}{\begin{vmatrix} \mathbf{a1} & \mathbf{a2} \end{vmatrix}} = \frac{\begin{vmatrix} 8 & 9 \\ -3 & -6 \end{vmatrix}}{\begin{vmatrix} 2 & 4 \\ -3 & -6 \end{vmatrix}} = \frac{|8 \times -6| - |9 \times -3|}{|2 \times -6| - |4 \times -3|} = \frac{-48 + 27}{-12 + 12} = \frac{-21}{0} \quad (5)$$

$$y = \frac{\begin{vmatrix} \mathbf{a1} & \mathbf{b} \end{vmatrix}}{\begin{vmatrix} \mathbf{a1} & \mathbf{a2} \end{vmatrix}} = \frac{\begin{vmatrix} 2 & 4 \\ 8 & 9 \end{vmatrix}}{\begin{vmatrix} 2 & 4 \\ -3 & -6 \end{vmatrix}} = \frac{|2 \times 9| - |4 \times 8|}{|2 \times -6| - |4 \times -3|} = \frac{18 - 32}{-12 + 12} = \frac{-14}{0} \quad (6)$$

The solution derived is inconsistent as the x and y values are undefined so , infinite no of solutions exists.