

Linear Equations In Two Variables

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Maths - Chapter 3 This is Problem 1 from Exercise 3.1

1. Aftab tells his daughter, "Seven years ago, I was seven times as old as you were then. Also, three years from now, I shall be three times as old as you will be." Represent this situation both algebraically and graphically.

Solution:

Let us take Aftab's age as x and his daughter's age as y "Seven years ago I was seven times as old as you were.

Therefore,

$$x - 7 = 7(y - 7) \quad (1)$$

so, "Three years from now, I shall be three times as old as you will be."

Therefore,

$$x + 3 = 3(y + 3) \quad (2)$$

$$x - 7y = -42. \quad (3)$$

$$x - 3y = 6 \quad (4)$$

The equations can also be written as:

$$\begin{pmatrix} 1 & -3 \\ 1 & -7 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 6 \\ -42 \end{pmatrix} \quad (5)$$

$$(6)$$

$$x = \frac{\begin{vmatrix} \mathbf{b} & \mathbf{a}_2 \end{vmatrix}}{\begin{vmatrix} \mathbf{a}_1 & \mathbf{a}_2 \end{vmatrix}} = \frac{\begin{vmatrix} 6 & -3 \\ -42 & -7 \end{vmatrix}}{\begin{vmatrix} 1 & -7 \\ 1 & -3 \end{vmatrix}} = \frac{(-6)(-7) - (-3)(-42)}{(1)(-7) - (1)(-3)} = 42 \quad (7)$$

Hence, Aftab's age is 42

$$y = \frac{\begin{vmatrix} \mathbf{a}_1 & \mathbf{b} \end{vmatrix}}{\begin{vmatrix} \mathbf{a}_1 & \mathbf{a}_2 \end{vmatrix}} = \frac{\begin{vmatrix} 1 & 6 \\ 1 & -42 \end{vmatrix}}{\begin{vmatrix} 1 & -7 \\ 1 & -3 \end{vmatrix}} = \frac{(1)(-42) - (1)(6)}{(1)(-7) - (1)(-3)} = 12 \quad (8)$$

Hence, Aftab's daughter's age is 12