PAIR OFLINEAR EQUATION IN TWO VARIABLES INTRODUCTION

SUBJECT: MATHEMATICS

CHAPTER NO:3

CHAPTER NAME:LINEAR EQUATION IN TWO VARIABLES

- LEARNING OUTCOME

  1.Students will be able to define linear equations in two variables ,
  2.Students will be able to **express** linear equations in two variables **in general form.**
  3.Students will be able to represent graphically linear equations in two variables.

General form of a Linear Equation in Two Variables

The general form of a linear equation in two variables is ax + by + c = 0, where a and b cannot be zero simultaneously. The graph of a linear equation is a straight line.

Two linear equations in the same two variables are called a pair of linear equations in two variables. The most general form of a pair of linear equations is: $a_1x + b_1y + c_1 = 0$; $a_2x + b_2y + c_2 = 0$

where a_1, a_2, b_1, b_2, c_1 and c_2 are real numbers, such that $a_1^2 + b_1^2 \neq 0$, $a_2^2 + b_2^2 \neq 0$.

- A pair of values of variables 'x' and 'y' which satisfy both the equations in the given system of equations is said to be a solution of the simultaneous pair of linear equations.
- A pair of linear equations in two variables can be represented and solved, by
(i) Graphical method
(ii) Algebraic method

•A pair of linear equations in two variables can be represented and solved, by
(i) Graphical method
(ii) Algebraic method

Types of algebraic method;

1.Substitution method

2.Elimination method

3.Cross-multiplication method.

Introduction to linear equation in two variables

https://youtu.be/NJU6gClTinI

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.” (Isn’t this interesting?) Represent this situation algebraically and graphically

https://youtu.be/TDe64q-xuY4 (10.2)

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 algebraically and graphically." [NCERT]

Solution. Let the present age of the daughter $= x$ years

7 years ago daughter's age $= (x-7)$ years

3 years from now, daughter's age $= (x+3)$ years

Let the present age of father $= y$ years

7 years ago father's age $= (y-7)$ years

3 years from now father's age $= (y+3)$ years

Seven years ago, Aftab's age $= 7\times$ daughter's age $\Rightarrow y-7=7(x-7)$

Three years later, Aftab's age $= 3\times$ daughter's age $\Rightarrow y+3=3(x+3)$

or $y=7x-42$ ...(*i*)

and $y=3x+6$ ...(*ii*)

Equations (*i*) and (*ii*) are the algebraic representations of the given situations.

For graphical representations, we find atleast two solutions of each equation.

Table : Solutions of $y=7x-42$

x	12	18
$y=7x-42$	$7\times12-42=42$	$7\times18-42=84$

We plot the points $A(12, 42)$ and $B(18, 84)$ on a graph paper.

The line AB is a graphical representation of $y = 7x - 42$.

Table : Solutions of $y = 3x + 6$

x	6	12
$y = 3x + 6$	$3 \times 6 + 6 = 24$	$3 \times 12 + 6 = 42$

We plot the point $C(6, 24)$ on the same graph paper. Point $A(12, 42)$ is already plotted.

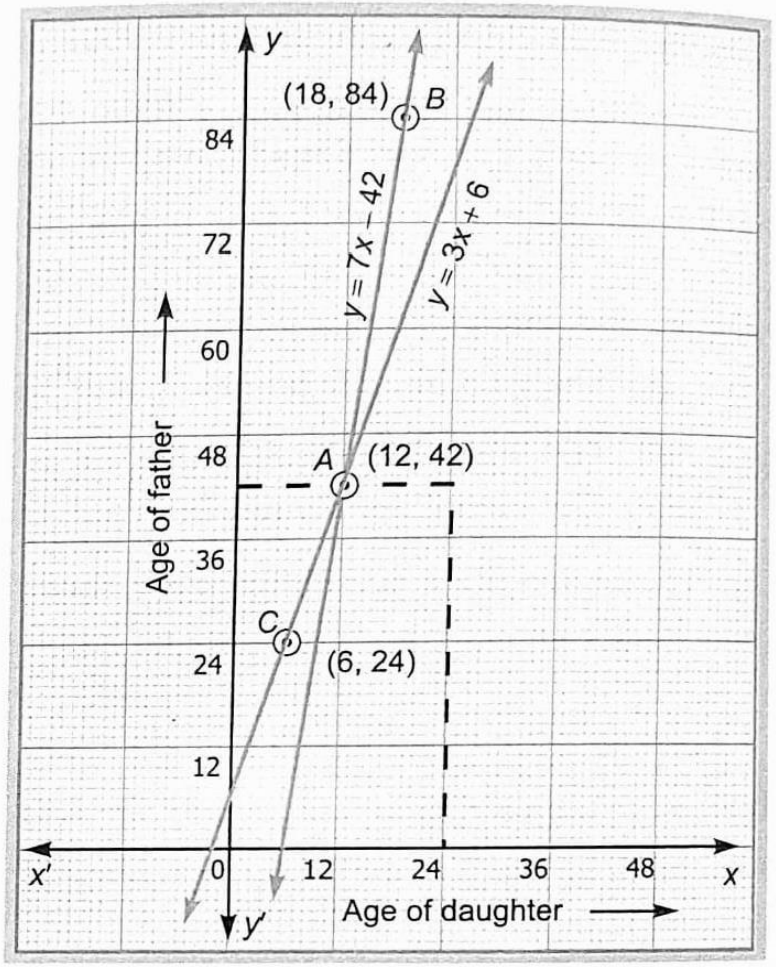
The line BC is a graphical representation of $y = 3x + 6$.

NOTE From the graph, the two lines intersect at the point (12, 42).

$\therefore$ $x = 12$ and $y = 42$ is the solution of equations (*i*) and (*ii*).

Present age of daughter $= x = 12$ years

Present age of father $= y = 42$ years



Example 2 The coach of cricket team buys 3 bats and 6 balls for ₹3900. Later, she buys another bat and 3 more balls of same kind for ₹1500. Represent this situation algebraically and geometrically.

Solution. Let the cost of one bat be ₹x

and the cost of one ball be ₹y

Then according to given condition, we have

$$3x+6y=3900 \Rightarrow x+2y=1300 \quad \ldots(i)$$

also $$x+3y=1500 \Rightarrow x+3y=1500 \quad \ldots(ii)$$

Equations (i) and (ii) are the algebraic representations of the given situation.

For graphical representations, we find two solutions of each equation.

Table : Solutions of $x+2y=1300$

x	1300	0
$y=\frac{1300-x}{2}$	$\frac{1300-1300}{2}=0$	$\frac{1300-0}{2}=650$

We plot points $A(1300, 0)$ and $B(0, 650)$ on a graph paper.

The line AB is the graph of $x+2y=1300$

Table : Solutions of $x+3y=1500$

x	1500	0
$y=\frac{1500-x}{3}$	$\frac{1500-1500}{3}=0$	$\frac{1500-0}{3}=500$

We plot the points $P(1500, 0)$ and $Q(0, 500)$ on a graph paper.

The line PQ is the graph of $x+3y=1500$.

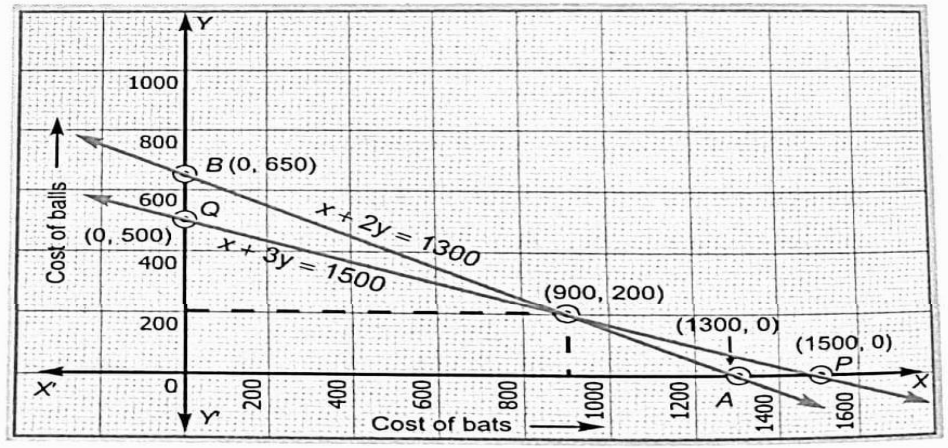


FIGURE 3.4

NOTE From the graph, the two lines intersect at the point (900, 200).

$\therefore x=900$ and $y=200$ is a solution of the equations (i) and (ii).

Cost of a bat $= x =$ ₹ 900 and cost of a ball $= y =$ ₹ 200

HOME ASSIGNMENT; Ex. 3.1 & AHA

1 Solve the system of equation 2x + y = -4 and 5x – 3y = 1 by the method of elimination

2. . Solve the system of equation 2x + 3y = 11, x + 2y = 7 by the method of elimination

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