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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.

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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

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•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

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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.

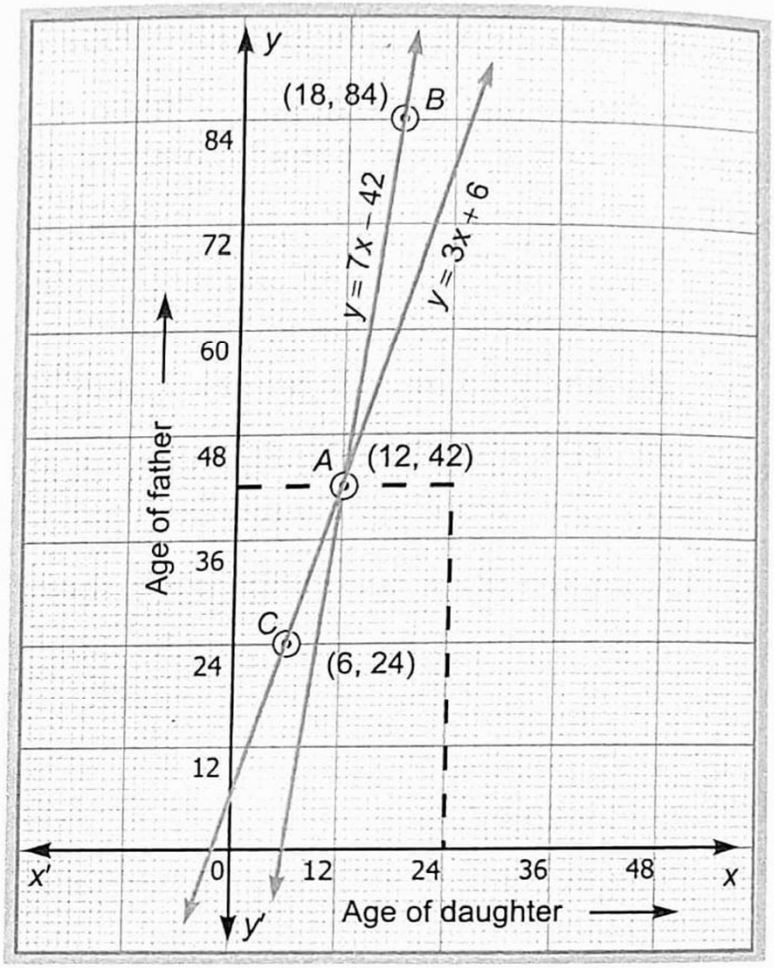
The line BC is a graphical representation of $y = 3x + 6$.

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 $x+3y=1500$.

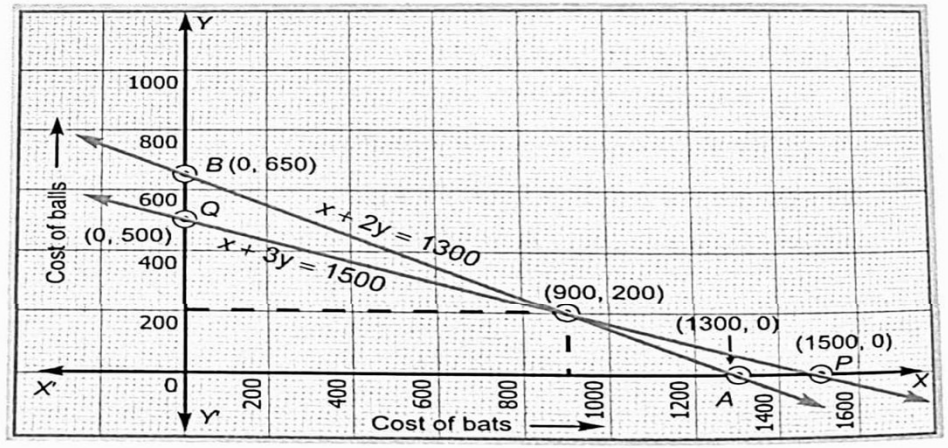


FIGURE 3.4

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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