

Solution of Linear Equations in Two Variables

Let's consider the following situation :

Ram's age is 3 years more than double the age of his son Abhimanyu.

$$\text{i.e. } y = 2x + 3 \quad \dots\dots(i)$$

Where x = the age of Abhimanyu and y = the age of Ram.

Here, equation (i) represents a linear equation in two variables x and y .

Linear Equation in Two Variables : An equation of the form $ax + by + c = 0$ or $ax + by = c$, where a, b, c are real numbers and $a \neq 0, b \neq 0$, is called a linear equation in two variables x and y .

Examples : Each of the following equations is a linear equation :

$$(i) 2x + 3y = 6$$

$$(ii) x - 3y = 5$$

$$(iii) \sqrt{5}x - \sqrt{2}y = 0$$

The condition $a \neq 0, b \neq 0$, is often denoted by $a^2 + b^2 \neq 0$

Solution of a Linear Equation : Any pair of values of x and y is said to be the solution of a linear equation $ax + by + c = 0$, where a, b, c are real numbers and $a \neq 0, b \neq 0$ if it satisfies the equation.

i.e., $x = \alpha$ (alpha) and $y = \beta$ (beta) is an solution of $ax + by + c = 0$ if $a\alpha + b\beta + c = 0$

Example : Show that $x = 1$ and $y = 2$ is a solution of $3x + y = 5$

Sol. : Substituting $x = 1$ and $y = 2$ in the given equation, we get,

$$\text{LHS} = 3 \times 1 + 2 = 5 = \text{RHS}$$

$$\therefore x = 1 \text{ and } y = 2 \text{ is a solution of } 3x + y = 5.$$

Example : Show that $x = -3$ and $y = 5$ is not a solution of $5x - 2y = 8$

Sol. : Substituting $x = -3$ and $y = 5$ in the equation, we get,

$$\text{LHS} = 5 \times (-3) - 2 \times 5 = -15 - 10 = -25 \neq \text{RHS}$$

$$\therefore x = -3 \text{ and } y = 5 \text{ is not a solution of } 5x - 2y = 8$$

Simultaneous Linear Equations in Two Variables

A pair of linear equations in two variables is said to form a system of simultaneous linear equation.

Thus, a pair of linear equations in x and y , $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ where $a_1, b_1, c_1, a_2, b_2, c_2$ are all real numbers and $a_1^2 + b_1^2 \neq 0, a_2^2 + b_2^2 \neq 0$

Solution of System of Simultaneous Linear Equations in Two Variables

A pair of values of the variables x and y satisfying

each of the equations in a given system of two linear equations in x and y is called a solution of the system.

Example : Show that $x = 2, y = 1$ is a solution of the system of linear equations $3x + 2y = 8$ and $5x - y = 9$

Sol. :

$$3x + 2y = 8 \quad \dots(i)$$

$$5x - y = 9 \quad \dots(ii)$$

Substituting $x = 2, y = 1$ in equation (i), we get,

$$\text{LHS} = 3 \times 2 + 2 \times 1 = 6 + 2 = 8 = \text{RHS}$$

Substituting $x = 2$ and $y = 1$ in equation (ii), we get,

$$\text{LHS} = 5 \times 2 - 1 = 9 = \text{RHS}$$

Hence, $x = 2$ and $y = 1$ is a solution of the given system of linear equations.

Consistency and Inconsistency

- A system of a pair of linear equations in two variables is said to be consistent if it has at least one solution.
- A system of a pair of linear equations in two variables is said to be inconsistent if it has no solution.
- The system of a pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has :

- a unique solution (i.e. consistent) if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

The graph of the linear equations intersect at only one point.

- no solution (i.e. inconsistent) if $\frac{a_1}{b_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

The graph of the two linear equations are parallel to each other i.e.e the lines do not intersect.

- an infinite number of solutions if $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

The graph of the linear equations are coincident.

- Homogeneous equation of the form $ax + by = 0$ is a line passing through the origin. Therefore, this system is always consistent.

Algebraic Method of Solving a Pair of Linear Equations in Two Variables

The most commonly used methods are :

- Substitution Method
- Elimination Method
- Cross-multiplication Method

Algebraic Solution by Substitution Method

Working Rule :

Step I : Write the given equations

$$a_1x + b_1y + c_1 = 0 \quad \dots(i)$$

$$a_2x + b_2y + c_2 = 0 \quad \dots(ii)$$

Step II : Choose one of the two equations and express y in terms of x (or x in terms of y) i.e. express one variable in terms of the other.

Step III : Substitute this value of y obtained in step II, in the other equation to get a linear equation in x .

Step IV : Solve the linear equation obtained in step III and find the value of x .

Step V : Substitute this value of x in the relation obtained in step II and find the value of y .

Example : Solve $2x + 3y = 11$ and $2x - 4y = -24$ and hence find the value of ' m ' for which $y = mx + 3$.

Sol. :

$$2x + 3y = 11 \quad \dots(i)$$

$$2x - 4y = -24 \quad \dots(ii)$$

$$\text{From equation (i), } y = \frac{11 - 2x}{3} \quad \dots (iii)$$

Substituting $y = \frac{11 - 2x}{3}$ in equation (ii),

$$\text{we get, } 2x - 4\left(\frac{11 - 2x}{3}\right) = -24$$

$$\Rightarrow \frac{6x - 44 + 8x}{3} = -24$$

$$\Rightarrow 14x - 44 = -72$$

$$\Rightarrow 14x = -28 \Rightarrow x = -2$$

Substituting $x = -2$ in equation (iii)

$$\text{We get, } y = \frac{11 - 2 \times (-2)}{3} = 5$$

Now substituting $x = -2$ and $y = 5$ in $y = mx + 3$ we get,

$$5 = m \times (-2) + 3$$

$$\Rightarrow 5 = -2m + 3$$

$$\Rightarrow m = -1$$

Algebraic Solution by Elimination Method

Working Rule :

Step I : Write the given equation as $a_1x + b_1y = c_1$ and $a_2x + b_2y = c_2$

Step II : Multiply the given equations by suitable numbers so that the coefficient of one of variables is numerically equal.

Step III : If the numerically equal coefficient are opposite in sign, then add the new equations otherwise subtract.

Step IV : Solve the linear equations in one variable obtained in step III and get the value of one variable.

Step V : Substitute the value of the variable so obtained in step IV in any of the two equations and find the value of the other variable.

Example : $4x + \frac{y}{3} = \frac{8}{3}$

$$\text{and } \frac{x}{2} + \frac{3y}{4} = -\frac{5}{2}$$

Sol. : We have, $4x + \frac{y}{3} = \frac{8}{3}$

$$\Rightarrow 12x + y = 8 \quad \dots(i)$$

$$\text{and, } \frac{x}{2} + \frac{3y}{4} = -\frac{5}{2}$$

$$\Rightarrow 2x + 3y = -10 \quad \dots(ii)$$

Multiplying equation (ii) by 6 and subtracting from equation (i)

$$12x + y = 8$$

$$12x + 18y = -60$$

$$- \quad - \quad +$$

$$-17y = 68$$

$$\Rightarrow y = -4$$

Putting $y = -4$ in equation (ii),

$$2x + 3 \times (-4) = -10$$

$$\Rightarrow 2x - 12 = -10$$

$$\Rightarrow 2x = 2$$

$$\Rightarrow x = 1$$

Algebraic Solution by Cross-multiplication

System of two linear equations $a_1x + b_1y + G = 0$

and $a_2x + b_2y + G = 0$ where $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ has a unique solution given by

$$x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1}$$

$$\text{and } y = \frac{a_2c_1 - a_1c_2}{a_1b_2 - a_2b_1}$$

Remarks

(i) The above solution can also be written as

$$\frac{x}{b_1c_2 - b_2c_1} = \frac{y}{a_2c_1 - a_1c_2} = \frac{1}{a_1b_2 - a_2b_1}$$

(ii) The following diagram helps in remembering the above solution :

$$\begin{array}{ccc} \frac{x}{b_1} \swarrow \searrow c_1 & \frac{y}{c_1} \swarrow \searrow a_1 & \frac{1}{a_1} \swarrow \searrow b_1 \\ b_2 & c_2 & a_2 \end{array}$$

SOLVED OBJECTIVE QUESTIONS

1. If $13x - 15 = -2x + 105$ then $x = ?$
 (1) 8 (2) 6
 (3) 3 (4) 4
2. If $\frac{3}{x-1} + \frac{1}{x-3} = \frac{4}{x-2}$ then $x = ?$
 (1) -4 (2) 4
 (3) 2 (4) -2
3. If $\frac{x+1}{x} + \frac{x}{x+1} = 2\frac{1}{6}$, then the value of x is :
 (1) 2 (2) -3
 (3) 2 or -3 (4) 2 or 4
4. If $\frac{x+1}{x-1} + \frac{x+2}{x-2} = \frac{22x+30}{11x-18}$ then the value of x is :
 (1) -16 (2) -6
 (3) 6 (4) 8
5. If $\frac{x-7}{x-3} + \frac{x-2}{x-9} = 2$, then the value of $x = ?$
 (1) -5 (2) 5
 (3) 4 (4) -4
6. If $\frac{(x+1)(x+2)}{(x+3)(x+4)} = \frac{x+3}{x+7}$, then $x = ?$
 (1) $-2\frac{1}{5}$ (2) $2\frac{1}{5}$
 (3) $3\frac{1}{5}$ (4) $-3\frac{1}{5}$

7. Solve the following system of equations :

$$\begin{aligned} (i) 7x - 2y &= 3 & (ii) 11x - \frac{3}{2}y &= 8 \\ (1) x &= 1, y = 2 & (2) x &= 2, y = 1 \\ (3) x &= 2, y = 3 & (4) x &= 3, y = -2 \end{aligned}$$

8. Solve the following system of equations :

$$\begin{aligned} 4x - 3y &= 8 & 6x - y &= \frac{29}{3} \\ (1) x &= \frac{3}{2}, y = \frac{2}{3} & (2) x &= \frac{3}{2}, y = \frac{-2}{3} \\ (3) x &= 2, y = 3 & (4) x &= 3, y = -2 \end{aligned}$$

9. Solve the following system of equations :

$$\begin{aligned} x + y &= a + b \\ ax - by &= a^2 - b^2 \\ (1) x &= 2a, y = 2b & (2) x &= 2a, y = b \\ (3) x &= a, y = b & (4) x &= -a, y = -b \end{aligned}$$

10. Solve the following system of equations :

$$\begin{aligned} a(x+y) + b(x-y) &= a^2 - ab + b^2 \\ a(x+y) - b(x-y) &= a^2 + ab + b^2 \end{aligned}$$

$$(1) x = \frac{b^2}{2a}, y = \frac{2a^2 + b^2}{2a}$$

$$(2) x = \frac{a^2}{2a}, y = \frac{b^2}{2a}$$

$$(3) x = a, y = b$$

$$(4) x = 2a, y = 2b$$

11. The value of k for which the system of equations $x + 2y = 5$, $3x + ky + 15 = 0$ has no solution, is

- (1) 6 (2) -6
(3) 2 (4) -2

[SSC CPO SI & Assistant Intelligence Officer Exam, 2012]

12. The area bounded by the lines $x = 0$, $y = 0$, $x + y = 1$, $2x + 3y = 6$ (in square units) is

- (1) 2 (2) $2\frac{1}{3}$
(3) $2\frac{1}{2}$ (4) 3

[SSC FCI Asstt. Grade-III Exam, 11.11.2012 (1st Sitting)]

ANSWERS

1. (1)	2. (2)	3. (3)	4. (2)	5. (1)
6. (1)	7. (1)	8. (2)	9. (3)	10. (1)
11. (1)	12. (3)			

EXPLANATIONS

1. (1) $13x - 15 = -2x + 105$

$$\Rightarrow 13x + 2x = 105 + 15$$

$$\Rightarrow 15x = 120$$

$$\therefore x = \frac{120}{15} = 8$$

2. (2) $\frac{3}{x-1} + \frac{1}{x-3} = \frac{4}{x-2}$

$$\Rightarrow \frac{3}{x-1} + \frac{1}{x-3} = \frac{3}{x-2} + \frac{1}{x-2}$$

$$\Rightarrow \frac{3}{x-1} - \frac{3}{x-2} = \frac{1}{x-2} + \frac{1}{x-3}$$

$$\Rightarrow \frac{3(x-2) - 3(x-1)}{(x-1)(x-2)} = \frac{(x-3) - (x-2)}{(x-2)(x-3)}$$

$$\Rightarrow \frac{3x-6-3x+3}{x-1} = \frac{x-3-x+2}{x-2}$$

$$\Rightarrow \frac{-3}{x-1} = \frac{-1}{x-3}$$

$$\Rightarrow \frac{3}{x-1} = \frac{1}{x-3}$$

$$\Rightarrow 3x-9=x-1 \Rightarrow 2x=8 \Rightarrow x=4$$

$$3. (3) \frac{x+1}{x} + \frac{x}{x+1} = 2\frac{1}{6}$$

Subtracting 2 from the both sides,

$$\Rightarrow \left(\frac{x+1}{x} - 1\right) + \left(\frac{x}{x+1} - 1\right) = 2\frac{1}{6} - 2$$

$$\Rightarrow \frac{x+1-x}{x} + \frac{x-x-1}{x+1} = \frac{1}{6}$$

$$\Rightarrow \frac{1}{x} - \frac{1}{x+1} = \frac{1}{6}$$

$$\Rightarrow \frac{x+1-x}{x(x+1)} = \frac{1}{6}$$

$$\Rightarrow \frac{1}{x^2+x} = \frac{1}{6}$$

$$\Rightarrow x^2+x=6 \quad \text{[By cross multiplication]}$$

$$\Rightarrow x^2+x-6=0$$

$$\Rightarrow x^2+3x-2x-6=0$$

$$\Rightarrow x(x+3)-2(x+3)=0$$

$$\Rightarrow (x+3)(x-2)=0$$

$$\text{If } \begin{cases} x+3=0 \text{ then, } x=-3 \\ x-2=0 \text{ then, } x=2 \end{cases}$$

$$4. (2) \frac{x+1}{x-1} + \frac{x+2}{x-2} = \frac{22x+30}{11x-18}$$

$$\Rightarrow \frac{x+1}{x-1} - 1 + \frac{x+2}{x-2} - 1 = \frac{22x+30}{11x-18} - 2$$

$$\Rightarrow \frac{x+1-x+1}{x-1} + \frac{x+2-x+2}{x-2}$$

$$= \frac{2x+30-22x+36}{11x-18}$$

$$\Rightarrow \frac{2}{x-1} + \frac{4}{x-2} = \frac{66}{11x-18}$$

$$\Rightarrow \frac{2(x-2)+4(x-1)}{(x-1)(x-2)} = \frac{66}{11x-18}$$

$$\Rightarrow \frac{2x-4+4x-4}{x^2-3x+2} = \frac{66}{11x-18}$$

$$\Rightarrow \frac{6x-8}{x^2-3x+2} = \frac{66}{11x-18}$$

$$\Rightarrow (6x-8)(11x-18) = 66(x^2-3x+2)$$

$$\Rightarrow 66x^2-196x+144 = 66x^2-198x+132$$

$$\Rightarrow 198x-196x = 132-144$$

$$\Rightarrow 2x = -12$$

$$\therefore x = -6$$

$$5. (1) \frac{x-7}{x-3} + \frac{x-2}{x-9} - 2 = 0$$

$$\Rightarrow \frac{x-7}{x-3} - 1 + \frac{x-2}{x-9} - 1 = 0$$

$$\Rightarrow \frac{x-7-x+3}{x-3} + \frac{x-2-x+9}{x-9} = 0$$

$$\Rightarrow \frac{-4}{x-3} + \frac{7}{x-9} = 0$$

$$\Rightarrow \frac{7}{x-9} = \frac{4}{x-3}$$

$$\Rightarrow 7x-21 = 4x-36 \quad \text{(By cross-multiplication)}$$

$$\Rightarrow 7x-4x = 21-36$$

$$\Rightarrow 3x = -15$$

$$\Rightarrow x = -5$$

$$6. (1) \frac{(x+1)(x+2)}{(x+3)(x+4)} = \frac{x+3}{x+7}$$

$$\Rightarrow \frac{x^2+3x+2}{x^2+7x+12} = \frac{x+3}{x+7}$$

$$\Rightarrow \frac{x^2+3x+2}{x+3} = \frac{x^2+7x+12}{x+7}$$

$$\Rightarrow \frac{x(x+3)+2}{x+3} = \frac{x(x+7)+12}{x+7}$$

$$\Rightarrow x + \frac{2}{x+3} = x + \frac{12}{x+7} \quad \left[\because \frac{a+b}{c} = \frac{a}{c} + \frac{b}{c} \right]$$

$$\Rightarrow \frac{2}{x+3} = \frac{12}{x+7}$$

$$\Rightarrow 12(x+3) = 2(x+7)$$

$$\Rightarrow 12x+36 = 2x+14$$

$$\Rightarrow 12x-2x = -36+14$$

$$\Rightarrow 10x = -22$$

$$\therefore x = \frac{-22}{10} = \frac{-11}{5} = -2\frac{1}{5}$$

$$7. (1) 7x-2y=3$$

$$11x-\frac{3}{2}y=8$$

Here, $a_1 = 7, b_1 = -2, c_1 = 3$

$a_2 = 11, b_2 = -\frac{3}{2}, c_2 = 8$

$$\therefore \frac{a_1}{a_2} = \frac{7}{11}, \frac{b_1}{b_2} = \frac{-2}{-\frac{3}{2}} = \frac{4}{3} \therefore \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$

\therefore The given system of equations has a unique solution.

We write the co-efficients in the following way for an easy solution.

$$\begin{array}{ccc} x & y & -1 \\ -2 & 3 & 7 \\ 3 & 8 & 11 \\ -\frac{3}{2} & -\frac{3}{2} & -2 \end{array}$$

$$\frac{x}{(-2)(8) - (3)(-\frac{3}{2})} = \frac{y}{(3)(11) - (7)(8)} = \frac{-1}{(7)(-\frac{3}{2}) - (11)(-2)}$$

$$\Rightarrow \frac{x}{-16 + \frac{9}{2}} = \frac{y}{33 - 56} = \frac{-1}{-\frac{21}{2} + 22}$$

$$\Rightarrow \frac{x}{-\frac{23}{2}} = \frac{y}{-23} = \frac{-2}{23} \Rightarrow x = \frac{-2}{23} \times \frac{-23}{2} = 1$$

$$\text{and } y = \frac{-2}{23} \times -23 = 2$$

Hence, $x = 1, y = 2$

8. (2) $4x - 3y = 8 \quad \dots(i)$

$6x - y = \frac{29}{3} \quad \dots(ii)$

By equation (i) $\times 3$ - equation (ii) $\times 2$, we have,

$$12x - 9y = 24$$

$$12x - 2y = \frac{58}{3}$$

$$\begin{array}{r} 12x - 9y = 24 \\ - \quad + \quad - \\ \hline \end{array}$$

$$-7y = 24 - \frac{58}{3}$$

$$\Rightarrow -7y = \frac{14}{3} \Rightarrow y = \frac{14}{3} \times -\frac{1}{7} = -\frac{2}{3}$$

Substituting the value of y in equation (i),

$$4x - 3\left(-\frac{2}{3}\right) = 8$$

$$\Rightarrow 4x + 2 = 8 \Rightarrow 4x = 8 - 2 = 6$$

$$\therefore x = \frac{6}{4} = \frac{3}{2}$$

$$\text{Hence, } x = \frac{3}{2}, y = -\frac{2}{3}$$

9. (3) Here, $a_1 = 1, b_1 = 1, c_1 = a + b$
 $a_2 = a, b_2 = -b, c_2 = a^2 - b^2$

$$\text{Here, } \frac{a_1}{a_2} = \frac{1}{a}, \frac{b_1}{b_2} = \frac{1}{-b}$$

$$\Rightarrow \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$

The system of equations has a unique solution.

$$\begin{array}{ccc} x & y & -1 \\ 1 & a+b & 1 \\ -b & b^2 - b^2 & a \\ & a & -a \end{array}$$

$$\frac{x}{(a^2 - b^2) + b(a+b)} = \frac{y}{a(a+b) - 1(a^2 - b^2)} = \frac{-1}{(1)(-b) - (a)(1)}$$

$$\Rightarrow \frac{x}{a^2 - b^2 + ab + b^2} = \frac{y}{a^2 + ab - a^2 + b^2} = \frac{-1}{-b - a}$$

$$\Rightarrow \frac{x}{a^2 + ab} = \frac{y}{b^2 + ab} = \frac{1}{a+b}$$

$$\Rightarrow x = \frac{a^2 + ab}{a+b} = \frac{a(a+b)}{a+b} = a$$

$$y = \frac{b^2 + ab}{a+b} = \frac{b(b+a)}{a+b} = b$$

Hence the solution is : $x = a, y = b$

10. (1) $(a+b)x + (a-b)y = a^2 - ab + b^2$
 $(a-b)x + (a+b)y = a^2 + ab + b^2$

$$\text{Here, } \frac{a_1}{a_2} = \frac{a+b}{a-b}$$

$$\text{and } \frac{b_1}{b_2} = \frac{a-b}{a+b}$$

$$\therefore \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$

\therefore The system of equations has a unique solution.

SOLUTION OF LINEAR EQUATIONS IN TWO VARIABLES

$$\begin{array}{ccccc}
 & x & & y & \\
 a-b & \nearrow & a^2-ab+b^2 & \nearrow & -1 \\
 & & & & a+b \\
 a+b & \searrow & a^2+ab+b^2 & \searrow & a-b \\
 & & & & a+b
 \end{array}$$

$$\Rightarrow \frac{x}{(a-b)(a^2+ab+b^2) - (a+b)(a^2-ab+b^2)}$$

$$= \frac{y}{(a-b)(a^2-ab+b^2) - (a+b)(a^2+ab+b^2)}$$

$$= \frac{-1}{(a+b)(a+b) - (a-b)(a-b)}$$

$$\Rightarrow \frac{x}{a^3-b^3+a^3-b^3} = \frac{y}{-2b(2a^2+b^2)} = \frac{-1}{4ab}$$

$$\Rightarrow \frac{x}{-2b^3} = \frac{y}{-2b(2a^2+b^2)} = -\frac{1}{4ab}$$

$$\Rightarrow x = -\frac{1}{4ab} \times -2b^3 = \frac{b^2}{2a}$$

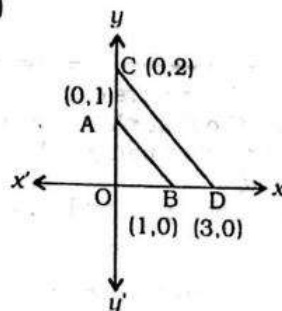
$$y = -\frac{1}{4ab} \times -2b(2a^2+b^2) = \frac{2a^2+b^2}{2a}$$

$$\text{The solution is : } x = \frac{b^2}{2a}, y = \frac{2a^2+b^2}{2a}$$

11. (1) $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ will have no solution if

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2} \Rightarrow \frac{1}{3} = \frac{2}{k} \Rightarrow k = 6$$

12. (3)



$x = 0$ is the equation of y -axis.

$y = 0$ is the equation of x -axis.

Putting $x = 0$ in $x + y = 1$, $y = 1$

Putting $y = 0$ in $x + y = 1$, $x = 1$

Putting $x = 0$ in $2x + 3y = 6$

$$3y = 6 \Rightarrow y = 2$$

Putting $y = 0$ in $2x + 3y = 6$

$$2x = 6 \Rightarrow x = 3$$

$$\therefore OB = 1; OA = 1$$

$$OD = 3; OC = 2$$

$$\therefore \text{Required area} = \Delta OCD - \Delta OAB$$

$$= \frac{1}{2} \times 3 \times 2 - \frac{1}{2} \times 1 \times 1$$

$$= 3 - \frac{1}{2} = 2\frac{1}{2} \text{ sq. units}$$

This book covers almost all the topics from which questions are asked or from which questions may be asked in competitive examinations. Each chapter has been discussed in detail. For instance, nowadays Algebra, Geometry and Trigonometry are accorded more weightage in the various examinations conducted by Staff Selection Commission. A sincere analysis of the questions asked in various competitive examinations reveals that mere knowledge of mathematical formulae will not serve the purpose. One should have clarity of concept and ability to perceive their applicability. Each chapter has been strategically dealt in order to make it easier for you to grasp the subject. The beginning of each chapter defines the chapter and explains the fundamental concepts of the subject.

The emphasis in the book is on fundamental concepts which is the most important part in Mathematics. Nevertheless, direct formulae, short-cut methods and important relations have also been given full coverage in the book. Not only that these short-cut methods and formulae have been mentioned but they have been explained and derived too.

The fifth revised and enlarged edition of the **KIRAN'S TEXT BOOK OF QUICKEST MATHEMATICS** is a thoroughly revised and enlarged edition in true sense. In the earlier editions, there were 41 Chapters in all but this edition has 46 Chapters. In addition to these Chapters, you will find an Appendix of about 100 pages which predominately covers such Chapters and Solved Questions which were incorporated recently in the various competitive examinations. The Appendix acquaints you with the nature of such questions which appeared in the latest examinations.

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