



## MATHS

### BOOKS - NAVBODH MATHS (HINGLISH)

### LINEAR EQUATIONS IN TWO VARIABLES

1 1 1 Mark Each

1. For simultaneous equations in  $x$  and  $y$ , if  $D_x = 25$ ,  $D_y = 50$  and  $D = 5$ , then what is the value of  $x$ ?

A. 5

B.  $-5$

C. 10

D.  $\frac{1}{5}$

**Answer:**



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2. What is the value of  $D$  for solving simultaneous equations  $x + y = 3$  and  $3x - 2y - 4 = 0$  by Cramer's rule ?

A.  $-1$

B.  $1$

C.  $5$

D.  $-5$

**Answer:**



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3. What is the degree of the determinant  $\begin{vmatrix} a & b \\ c & d \end{vmatrix}$ ?

A. 1

B. 3

C. 4

D. 2

**Answer:**



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4. What are the coordinates of the point of intersection of the graph of the equation  $3x + 4y = -6$  with the  $Y$ -axis?

A.  $\left(0, -\frac{2}{3}\right)$

B.  $\left(-\frac{2}{3}, 0\right)$

C.  $\left(0, -\frac{3}{2}\right)$

D.  $\left(-\frac{3}{2}, 0\right)$

**Answer:**



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5. What is the value of the determinant  $\begin{vmatrix} 5 & 3 \\ -3 & -5 \end{vmatrix}$ ?

A. 30

B. -30

C. 16

D. -16

**Answer:**



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6. What is the value of  $k$ , if  $(k, 5)$  is the solution of the simultaneous equations  $4x + 3y = 19$  and  $4x - 3y = -11$ ?

A.  $-\frac{1}{3}$

B. 1

C. 4

D. 5

**Answer:**

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7. For drawing the graph of  $5x + 2y = 16$ , if  $x = 2$ , what is the value of  $y$ ?

A.  $\frac{11}{2}$

B. 8

C. 3

D.  $\frac{14}{5}$

**Answer:**



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8. What is the value of  $D_x$  for solving simultaneous equations

$3x + 2y = -11$  and  $7x - 4y = 9$  by Cramer's rule?

A. 26

B. -26

C. 62

D. -62

**Answer:**



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9. What is the value of  $k$ , for which the simultaneous equations  $2x + 3y = 8$  and  $6x - ky = 24$  have infinitely many solutions ?

A. 9

B.  $-6$

C. 6

D.  $-9$

**Answer:**

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10. What is the value of  $k$ , for which the graphical representation of the simultaneous equations  $5x - 3y = 1$  and  $2x - ky = -4$  are parallel lines ?

A.  $\frac{5}{6}$

B.  $\frac{6}{5}$

C.  $-\frac{5}{6}$

D.  $-\frac{6}{5}$

**Answer:**



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## Assignment 1 1

1. For drawing the graph of  $4x + 5y = 19$ , if  $x = 1$ , what is the value of  $y$ ?

A. 4

B. 3



C. 2

D.  $-3$

**Answer:**



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2. For drawing the graph of  $2x + 5y = 16$ , if  $y = 2$ , what is the value of  $x$ ?

A. 3

B.  $-3$

C. 13

D.  $-13$

**Answer:**



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3. What is the value of  $D_x$ , for solving the simultaneous equations

$3x + 2y = 11$  and  $7x - 4y = 9$  by Cramer's rule ?

A. 26

B. - 26

C. 62

D. - 62

**Answer:**



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4. What is the value of  $D_y$ , for solving the simultaneous equations

$3x + y = 1$  and  $2x - 11y = 3$  by Cramer's rule?

A. 14

B.  $-14$

C.  $7$

D.  $-7$

**Answer:**



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5. For drawing the graph of  $3x - 2y = -1$ , if  $y = 2$ , what is the value of  $x$ ?

A.  $-1$

B.  $1$

C.  $0$

D.  $-2$

**Answer:**



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6. What are the coordinates of the point of intersection of the lines

$$x + 3y = 7 \text{ and } 2x + y = -1?$$

A.  $(2, -3)$

B.  $(-2, 3)$

C.  $(2, 3)$

D.  $(-2, -3)$

**Answer:**



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7. What is the value of  $k$ , for which the graphical representation of the simultaneous equations  $14x + 10y = 33$  and  $kx + 5y = 11$  are

parallel lines ?

A. 7

B. 10

C. 11

D.  $-7$

**Answer:**



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8.  $ax + by = c$  and  $mx + ny = d$ . If  $an \neq bm$ , then these simultaneous equations have

A. Only one solution

B. No solution

C. Infinite number of solutions

D. Only two solutions

**Answer:**

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**1 2 1 Mark Each**

1. For certain simultaneous equations, if

(i)  $D = -5, D_x = 15, D_y = -10$

(ii)  $D = 4, D_x = 2, D_y = 8$ . Find the values of  $x$  and  $y$ .

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2. Find the value of  $y$  in the equation  $2x + y = 7$ , if  $x = 2$ .

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3. Find the value of the determinant  $\begin{vmatrix} 4 & 3 \\ 2 & 7 \end{vmatrix}$ .

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4. If  $3x + 2y = 10$  and  $2x + 3y = 15$ , find the value of  $x + y$ .

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5. Find the value of  $x - y$ , if  $5x + 4y = 14$  and  $4x + 5y = 13$ .

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## Assignment 1 2

1. For certain simultaneous equations, if

(i)  $D_x = 12$  and  $D = 4$ , what is the value of  $x$ ?

(ii)  $D = -3$  and  $D_y = 6$ , what is the value of  $y$ ?

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2. Find the value of the determinant  $\begin{vmatrix} 0 & -5 \\ 0 & 4 \end{vmatrix}$ .

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3. Find the value of  $x + y$ , if  $5x - 2y = 4$  and  $x + 8y = 26$ .

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4. Find the value of  $x - y$ , if  $3x + 4y = 11$  and  $4x + 3y = 12$ .

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5. Write the solution of the equation  $2x - y + 1 = 0$ .

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132 Marks Each

1. Find the value of determinant

$$\begin{vmatrix} 2\sqrt{3} & 9 \\ -2 & 3\sqrt{3} \end{vmatrix}.$$

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2. If  $\begin{vmatrix} 4 & 5 \\ m & 3 \end{vmatrix} = 22$ , then find the value of  $m$ .

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3. Find the value of  $D_x$ , for solving the simultaneous equations

$$3x + 4y = 8, x - 2y = 5 \text{ by Cramer's rule.}$$

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4. Solve :  $3a + 5b = -9, 2a + 5b = -11$ .

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5. Find the value of  $(x + y)$  and  $(x - y)$ , if  $27x + 31y = 85$ ,

$$31x + 27y = 89.$$

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6. Determine whether the point  $(4, -2)$  lies on the graph of the equation  $2x + y = 6$  or not.



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7. Two numbers differ by 3. The sum of the greater number and twice the smaller number is 15. Find the smaller number.



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8. Complete the following activity to solve the simultaneous equations  $3x + 2y = 6$  and  $2x + 4y = 12$  by Cramer's rule method.

$$D = \begin{vmatrix} 3 & 2 \\ 2 & 4 \end{vmatrix} = 8, D_x = \begin{vmatrix} 6 & 2 \\ 12 & 4 \end{vmatrix} = \square, D_y = \begin{vmatrix} 3 & 6 \\ 2 & 12 \end{vmatrix} = \square,$$

$$x = \square, y = \square.$$



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9. Complete the following activity to draw the graph of the equation  $x - y = 1$ .

<b>x</b>	<b>0</b>	<input type="text"/>
<b>y</b>	<input type="text"/>	<b>0</b>
<b>(x, y)</b>	<input type="text"/>	<input type="text"/>

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10. Complete the following activity to solve the simultaneous equations  $3x + 2y = 29$  and  $10x - 2y = 36$ .

Adding the given equations,

$$3x + 2y = 29 \quad \dots(1)$$

$$10x - 2y = 36 \quad \dots(2)$$

$$\hline 13x \quad = \quad \square \quad \therefore = \quad \square$$

Substituting the value of  $x$  in equation (1),

$$15 + 2y = 29 \quad \therefore 2y = \square \quad \therefore y = \square$$

$\therefore (x, y) = ( \quad - \quad - \quad , \quad - \quad - \quad - )$  is the solution.

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## Assignment 13

1. If the value of the determinant  $\begin{vmatrix} 3\sqrt{6} & -4\sqrt{2} \\ 5\sqrt{3} & x \end{vmatrix}$  is  $26\sqrt{6}$ , find the value of  $x$ .

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2. If the value of determinant  $\begin{vmatrix} m & 2 \\ -5 & 7 \end{vmatrix}$  is 31, find the value of  $m$ .

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3. Determine whether the point  $(2, 5)$  lies on the graph of the equation  $3x - y = 1$  or not.

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4. Find the value of  $(x + y)$  and  $(x - y)$ , if

(i)  $15x - 17y = 11$ ,  $17x - 15y = 21$ .

(ii)  $12x + 13y = 29$ ,  $13x + 12y = 21$ .



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5. Write two solutions of the equation  $2x - y = 1$ .



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6. In the equation  $2x + y = 7$ , find the values of (i)  $y$  if  $x = 2$  and

(ii)  $x$  if  $y = -1$ .



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7.  $3x - 4y = 10$ ,  $4x + 3y = 5$ . Find the values of  $D_x$  and  $D_y$  to solve the simultaneous equations by Cramer's rule.



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8. Complete the following activity to draw the graph of  $3x - y = 2$ .

$x$	<input type="text"/>	$-1$
$y$	$1$	<input type="text"/>
$(x, y)$	<input type="text"/>	<input type="text"/>



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9. Complete the following activity to solve the simultaneous equations  $2x + y = 19$  and  $2x - 3y = -3$  by Cramer's rule.

$$D = \begin{vmatrix} 2 & 1 \\ 2 & -3 \end{vmatrix} = \square, D_x = \begin{vmatrix} 19 & 1 \\ -3 & -3 \end{vmatrix} = \square, D_y = \begin{vmatrix} 2 & 19 \\ 2 & -3 \end{vmatrix} = \square,$$
$$x = \square, y = \frac{11}{2}$$

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10. Complete the following activity to solve the simultaneous equations.  $5x - 3y = 13$  and  $2x + 3y = 1$

$$5x - 3y = 13 \quad \dots(1)$$

$$2x + 3y = 1 \quad \dots(2)$$

$$\frac{\square x}{\quad} = 14 \quad \therefore x = \square$$

Substituting  $x = 2$  in equation (2),

$$2 \times 2 + 3y = 1 \quad \therefore 3y = \square \quad \therefore y = \square$$

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1 4 3 Marks Each

1. If  $\begin{vmatrix} 2 & -y \\ 1 & x \end{vmatrix} = 16$  and  $\begin{vmatrix} 3 & 2 \\ y & x \end{vmatrix} = 3$ . From the given determinant form two simultaneous equations and solve them.

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2. Solve the simultaneous equations  $3x - y = 7$ ,  $x + 4y = 11$  using Cramer's rule.

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3. Solve the simultaneous equations  $x + y = 5$  and  $3x - y = 3$  graphically.

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4. Solve:  $\frac{4}{x} + \frac{5}{y} = 7$ ,  $\frac{3}{x} + \frac{4}{y} = \frac{11}{2}$ .

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5. The coordinates of the point of intersection of lines  $ax + by = 9$  and  $bx + ay = 5$  are  $(3, -1)$ . Find the values of  $a$  and  $b$ .



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6. The sum of the numerator and denominator of a fraction greater by 1 than thrice the numerator. If the numerator decreased by 1, then the fraction reduces to  $\frac{1}{3}$ . Find the fraction



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7. Complete the following activity to solve the simultaneous equations  $3x - 2y = 3$  and  $2x + y = 16$  by Cramer's rule

Find the values of the determinants  
in the given equations

$$D = \begin{vmatrix} \square & \square \\ \square & \square \end{vmatrix} = 7; \quad D_x = \begin{vmatrix} \square & \square \\ \square & \square \end{vmatrix} = 35; \quad D_y = \begin{vmatrix} 3 & 3 \\ 2 & 16 \end{vmatrix} = 48$$

Values according to Cramer's rule

$$x = \frac{\begin{vmatrix} \square & \square \\ \square & \square \end{vmatrix}}{\begin{vmatrix} \square & \square \\ \square & \square \end{vmatrix}} = 5; \quad y = \frac{\begin{vmatrix} \square & \square \\ \square & \square \end{vmatrix}}{\begin{vmatrix} \square & \square \\ \square & \square \end{vmatrix}} = 6.$$

$\therefore (x, y) = (5, 6)$  is the solution.

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8. Complete the following activity to find the selling price of a digital watch.

	Analogue watch	Digital Watch	Amount received
Sale on 1st day	11	6	₹ 4200
Sale on 2nd day	22	5	₹ 7300

Let the selling price of an analogue watch be  $x$  rs and that of digital watch be  $y$  rs.

From the sale on 1st day , \_\_\_ + \_\_\_ = 4330 .....(1)

From the sale on 2nd day , \_\_\_ + \_\_\_ = 7330.....(2)

Multiplying equation (1) by 2,  $22x + \underline{\hspace{2cm}} = 8660$  .....(3)

Subtracting equation (2) from equation (3),

$$22x + 12y = 8660 \quad \dots(3)$$

$$22x + 5y = 7330 \quad \dots(2)$$

$$\begin{array}{r} - \quad - \quad - \\ \hline 7y = \square \end{array}$$

$$\therefore y = 190$$

The selling price of digital watch is 190rs.



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9. Word problem : The length of a rectangular plot of land is  $15m$  more than its breadth. Find the breadth of the plot, if its perimeter is  $70m$ .



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10. To draw a figure as per the given information. (Use a graph paper)

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## Assignment 14

1.  $\begin{vmatrix} 3 & 1 \\ y & x \end{vmatrix} = 7$  and  $\begin{vmatrix} 4 & -x \\ 1 & y \end{vmatrix} = 11$ . From the given determinants form two simultaneous equations and solve them.

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2. Solve the following simultaneous equations using Carmer's rule:

(i)  $3x + y = 7, 2x - 11y = 3.$

(ii)  $x + 2y = -4, 3x + 4y = -6.$

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3. Solve the simultaneous equations graphically :

$$(i) x + y = 0, 2x - y = 9$$

$$(ii) 3x + 4y = -5, y - x = 4.$$



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4. Solve:  $\frac{1}{x} = 12, \frac{3}{x} - \frac{2}{y} = 1.$



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5. Solve the following problems using two variables:

(i) The sum of two numbers is 97. If the greater number is divided by the smaller, the quotient is 7 and the remainder is 1. Find the numbers.

(ii) The sum of the present ages of mother and her daughter is 50

years. After 20 years mother's age will be twice her daughter's age at that time. Find their present ages.

(iii) The sum of a two-digit number and the number obtained by interchanging the digit is 121. The digit at the units place is 7 more than the digit at the tens place. Find the number.

(iv) Vedant can row down stream  $24\text{km}$  in 2 hours and upstream  $8\text{km}$  in 2 hours . Find his speed of rowing in still water and the speed of the water current.



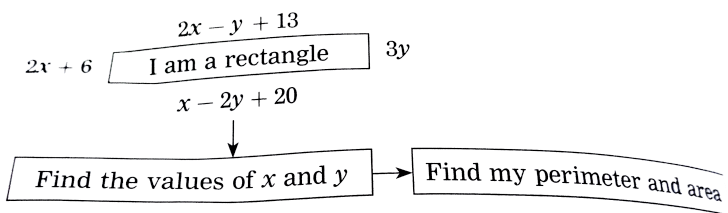
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6. In a school some of the students opted for the NSS and some opted for gardening. Three times the number of students opting for NSS is 10 less than twice the number of students opting for gardening. One-third the number of students opting for NSS is equal to one-fifth the number of students opting for gardening.

Find the number of students opting for NSS and gardening respectively.

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7. Complete the following



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8. Draw the graph of  $x + y = 6$  which intersects the X-axis and Y-axis at A and B respectively. Find the length of segment AB. Find the area of  $\triangle AOB$ , where point  $O$  is the origin.

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9. Complete the following activity to solve the simultaneous equations  $5x + 3y = -11$  and  $2x + 4y = -10$  by Cramer's rule.

$$D = \begin{vmatrix} \square & \square \\ \square & \square \end{vmatrix} = 14; \quad D_x = \begin{vmatrix} -11 & 3 \\ -10 & 4 \end{vmatrix} = \square; \quad D_y = \begin{vmatrix} \square & \square \\ \square & \square \end{vmatrix} = \square;$$
$$x = \frac{D_x}{D} = \square; \quad y = \frac{D_y}{D} = \square.$$

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## Practice Set 1 1

1. Complete the following activity to solve the simultaneous equations.

$$5x + 3x = 9, \quad 2x - 3x = 12$$

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2.  $3a + 5b = 26; a + 5b = 22$



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3. Simultaneous equations

$$x + 7y = 10, 3x - 2y = 7$$



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4. Solve the following simultaneous equations :

$$2x - 3y = 9, 2x + y = 13$$



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5.  $5m - 3m = 19, m - 6n = -7$



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## 6. Simultaneous equations

$$5x + 2y = -3, x + 5y = 4$$



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## 7. Simultaneous equations

$$\frac{1}{3}x + y = \frac{10}{3}, 2x + \frac{1}{4}y = \frac{11}{4}$$



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8. Solve the following system of equations:

$$99x + 101y = 499, \quad 101x + 99y = 501$$



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9. Solve the following simultaneous equations :

$$49x - 57y = 172, 57x - 49y = 252$$



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### Practice Set 1 2

1. Complete the following table to draw graph of the equations.

$$x + y = 3, x - y = 4$$

$$x + y = 3$$

$x$	3	<input type="text"/>	<input type="text"/>
$y$	<input type="text"/>	5	3
$(x, y)$	(3, 0)	<input type="text"/>	(0, 3)

$$x - y = 4$$

$x$	<input type="text"/>	-1	0
$y$	0	<input type="text"/>	-4
$(x, y)$	<input type="text"/>	<input type="text"/>	(0, -4)



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2. Solve the following simultaneous equations graphically:

$$x + y = 6; x - y = 4$$

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3. Solve the following simultaneous equations graphically :

$$x + y = 5, x - y = 3$$

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4. Solve the following simultaneous equations graphically:

$$x+y=0, 2x-y=9.$$

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5. Solve the following simultaneous equations graphically :

$$3x - y = 2, 2x - y = 3$$



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6. Solve the following simultaneous equations graphically.

$$3x - 4y = 7, 5x - 2y = 0$$



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7. Solve the following simultaneous equations graphically :

$$2x - 3y = 4, 3y - x = 4$$



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1. Fill in the blanks with correct number.

$$\begin{vmatrix} 3 & 2 \\ 4 & 5 \end{vmatrix} = 3 \times \square - \square \times 4$$

$$= \square - 8$$

$$= \square$$

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2.  $\begin{vmatrix} -1 & 7 \\ 2 & 4 \end{vmatrix}$

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3.  $\begin{vmatrix} 5 & 3 \\ -7 & 0 \end{vmatrix}$

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4. Find the values of following determinants.

$$\begin{vmatrix} \frac{7}{3} & \frac{5}{3} \\ \frac{3}{2} & \frac{1}{2} \end{vmatrix}$$

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5.  $3x - 4y = 10$ ,  $4x + 3y = 5$ . Find the values of  $D_x$  and  $D_y$  to solve the simultaneous equations by Cramer's rule.

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6. Solve the simultaneous equations using Cramer's rule

$$4x + 3y - 4 = 0, 6x = 8 - 5y$$

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7. Solve the following simultaneous equations using Cramer's rule .

$$x + 2y = -1, 2x - 3y = 12$$



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8. Solve the simultaneous equations using Cramer's rule

$$6x - 4y = -12, 8x - 3y = -2$$



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9. Solve the simultaneous equations using Cramer's rule

$$4m + 6n = 54, 3m + 2n = 28$$



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10. Solve the simultaneous equations using Cramer's rule

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



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### Practice Set 14

1. Solve the simultaneous equations.

$$\frac{2}{x} - \frac{3}{y} = 15, \frac{8}{x} + \frac{5}{y} = 77$$



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2. Solve the simultaneous equations.

$$\frac{10}{x+y} = \frac{2}{x-y} = 4, \frac{15}{x+y} - \frac{5}{x-y} = -2$$



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3. Solve the following simultaneous equations:

$$\frac{27}{x-2} + \frac{31}{y+3} = 35, \quad \frac{31}{x-2} + \frac{27}{y+3} = 89$$

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4. Solve the following system of equations:

$$\frac{1}{3x+y} + \frac{1}{3x-y} = \frac{3}{4}, \quad \frac{1}{2(3x+y)} - \frac{1}{2(3x-y)} = -\frac{1}{8}$$

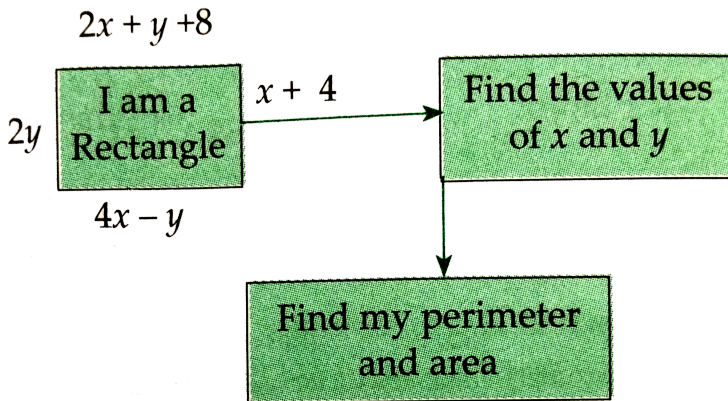
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## Practice Set 15

1. Two numbers differ by 3 . The sum of twice the smaller number and thrice the greater number is 19 . Find the numbers .

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2. Complete the following activity .



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3. The sum of father's age and twice the age of his son is 70 . If we double the age of the father and add it to the age of his son, the sum is 95 find their present ages.

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4. The denominator of a fraction is 4 more than twice the numerator. Denominator becomes 12 times the numerator, if both the numerator and denominator are reduced by 6. Find the fraction.

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5. Two types of boxes A, B are to be placed in a truck having capacity of 10 tone. When 150 boxes of type A and 100 boxes of type B are loaded in the truck, it weighs 10 tone. But truck, it can still accommodate 40 boxes of type B, so that it is fully loaded. Find the weight of each type of box.

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6. Out of 1900 km, Vishal travelled some distance by bus and some by aeroplane . Bus travels with average speed 60 km/hr and the average speed of aeroplane is 700 km/hr . It takes 5 hours to complete the journey . Find the distance, Vishal travelled by bus .

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### Problem Set 1

1. For drawing the graph of  $4x + 5y = 19$ , if  $x = 1$ , what is the value of  $y$ ?

A. 4

B. 3

C. 2

D.  $-3$

**Answer: B**

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2. For simultaneous equations in  $x$  and  $y$ , if  $D_x = 49D_y = -63$  and  $D = 7$ , then what is the value of  $x$ ?

A. 7

B.  $-7$

C.  $\frac{1}{7}$

D.  $\frac{-1}{7}$

**Answer: A**

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3. Find the value of  $\begin{vmatrix} 5 & 3 \\ -7 & -4 \end{vmatrix}$

A.  $-1$

B.  $-41$

C.  $41$

D.  $1$

**Answer: D**



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4. What is the value of D for solving simultaneous equations  $x + y = 3$ ,  $3x - 2y = 4$  by determinant method ?

A.  $5$

B.  $1$



C.  $-5$

D.  $-1$

**Answer: C**



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5.  $ax + by = c$  and  $mx + ny = d$ . If  $an \neq bm$ , then these simultaneous equations have

A. only one solutions

B. infinite number of solutions

C. only two solutions

D. only two solutions

**Answer: A**



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6. Complete the following table to draw the graph of  $2x - 6y = 3$

$x$	$-5$	<input type="text"/>
$y$	<input type="text"/>	$0$
$(x, y)$	<input type="text"/>	<input type="text"/>



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7. Solve the following simultaneous equations graphically :

$$2x + 3y = 12, x - y = 1$$



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8. Solve the simultaneous equations graphically.

$$x - 3y = 1, 3x - 2y + 4 = 0$$

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9. Solve the simultaneous equations graphically.

$$5x - 6y + 30 = 0, 5x + 4y - 20 = 0$$

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10. Solve the following simultaneous equations graphically :

$$3x - y - 2 = 0, 2x + y = 8$$

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11. Solve the following simultaneous equations graphically :

$$3x + y = 10, x - y = 2$$



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12. Find the value of the determinant  $\begin{vmatrix} 4 & 3 \\ 2 & 7 \end{vmatrix}$ .



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13. Find the values of each of the following determinants :

$$\begin{vmatrix} 5 & -2 \\ -3 & 1 \end{vmatrix}$$



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14. Find the values of each of the following determinants.

$$\begin{vmatrix} 3 & -1 \\ 1 & 4 \end{vmatrix}$$



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15. Solve the following equations by Cramer's method.

$$6x - 3y = -10, 3x + 5y - 8 = 0$$



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16. Solve the following simultaneous equations using Cramer's method :

$$4m - 2n = -4, 4m + 3n = 16$$



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17. Solve the following equations by Cramer's method.

$$3x - 2y = \frac{5}{2}, \frac{1}{3}x + 3y = -\frac{4}{3}$$



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18. Solve the following equations by Cramer's method.

$$7x + 3y = 15, 12y - 5x = 39$$



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19. Solve the following equations by Cramer's method.

$$\frac{x + y - 8}{2} = \frac{x + 2y - 14}{3} = \frac{3x - 4}{4}$$



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20. Solve the following simultaneous equations

$$\frac{2}{x} + \frac{2}{3y} = \frac{1}{6}, \quad \frac{3}{x} + \frac{2}{y} = 0$$

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21. Solve the following simultaneous equations:

$$\frac{7}{2x+1} + \frac{13}{y+2} = 27, \quad \frac{13}{2x+1} + \frac{7}{y+2} = 33$$

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22. 
$$\frac{148}{x} + \frac{231}{y} = \frac{527}{xy}, \quad \frac{231}{x} + \frac{148}{y} = \frac{610}{xy}$$

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23. Solve the following system of equations:

$$\frac{7x - 2y}{xy} = 5, \quad \frac{8x + 7y}{xy} = 15$$



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24. Solve the following simultaneous equations

$$\frac{1}{2(3s + 4y)} + \frac{1}{5(2x - 3y)} = \frac{1}{4}, \quad \frac{5}{3x + 4y} - \frac{2}{2x - 3y} = -\frac{3}{2}$$



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## Problem Set 2

1. A two digit number and up to 143. In the given number the digit in unit's place is 3 more than the digit in the ten's place. Find the original number.



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## Problem Set 3



1. Kantabai bought  $1\frac{1}{2}$  kg tea and 5 kg sugar from a shop. She paid ₹ 700. Then she realised that by ordering online the goods can be bought with free home delivery at the same price. So, next month she placed the order online for 2 kg tea and 7 kg sugar. She paid ₹ 880 for that. Find the rate of sugar and tea per kg.

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#### Problem Set 4

1. If  $\frac{a - 8}{3} = \frac{a - 3}{2}$ , then  $a = ?$

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#### Problem Set 5

1. Sum of the present ages of Manish and Savita is 31 . Manish's age 3 years ago wa 4 times the age of Savita . Find their present ages .

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## Problem Set 6

1. Solve the following Word Problems :

In a factory the ratio of salary of skilled and unskilled workers is 5 : 3 Total salary of one day of them is Rs 720 . Find daily wages of skilled and unskilled workers .

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## Problem Set 7

### 1. Solve the following Word Problems :

Places A and B are 300 km apart and they are on a straight road .

Hamid travels from A to B on bike . At same time joseph starts from B on bike, travels towards A . They meet each other after 20 minutes

. If Joseph would have started from B at same time but in the opposite direction ( instead of towards A ) . Hamid would have caught him after 3 hours . Find the speed of Hamid and Joseph .



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### Challenging Questions

1. Draw the graph of  $x + y = 6$  which intersects the X-axis and Y-axis at A and B respectively. Find the length of segment AB. Find the area of  $\triangle AOB$ , where point O is the origin.



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2. Find the values of  $a$  and  $b$  for which the simultaneous equations  $x + 2y = 1$  and  $(a - b)x + (a + b)6 = a + h - 2$  have infinitely many solutions.



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## Multiple Choice Questions

1. For drawing the graph of  $5x + 2y = 16$ , if  $x = 2$ , what is the value of  $y$ ?

A.  $\frac{11}{8}$

B. 8

C. 3

D.  $\frac{14}{5}$

**Answer: C**

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2. For drawing the graph of  $3x + 7y = 27$ , if  $y = 3$  what is the value of  $x$  ?

A. 2

B.  $\frac{20}{3}$

C. 9

D.  $\frac{13}{3}$

**Answer: A**

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3. What is the value of  $k$ , if  $(k, 5)$  is the solution of the simultaneous equations  $4x + 3y = 19$  and  $4x - 3y = -11$ ?

A. 4

B.  $-\frac{1}{3}$

C. 5

D. 1

**Answer: D**



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4. What is the degree of the determinant  $\begin{vmatrix} a & b \\ c & d \end{vmatrix}$ ?

A. 3

B.  $\frac{1}{3}$

C. 2

D.  $\frac{1}{2}$

**Answer: D**



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5. What is the value of  $D_x$  for the simultaneous equations

$$3x + 2y + 11 = 0 \text{ and } 7x - 4y = 9?$$

A. 26

B.  $-26$

C. 62

D.  $-62$

**Answer: A**



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6. What is the value of  $D_y$ , for solving the simultaneous equations

$3x + y = 1$  and  $2x - 11y = 3$  by Cramer's rule?

A.  $-14$

B.  $14$

C.  $-7$

D.  $7$

**Answer: D**



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7. For simultaneous equations in  $x$  and  $y$ , if  $D_x = 39$ ,  $D_y = 26$  and

$D = 13$ , Then what is the value of  $x$  ?

A.  $3$



B.  $\frac{1}{3}$

C. 2

D.  $\frac{1}{2}$

**Answer: A**



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8. For simultaneous equations in  $x$  and  $y$ , if  $D = 30$ ,

$D_x = -18$ ,  $D_y = -12$ , then what is the value of  $y$ ?

A.  $-\frac{3}{5}$

B.  $\frac{3}{5}$

C.  $-\frac{2}{5}$

D.  $\frac{2}{5}$

**Answer: C**



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9. What is the value of  $k$ , for which the simultaneous equations  $2x + 3y = 8$  and  $6x - ky = 24$  have infinitely many solutions ?

A. 6

B.  $-6$

C. 9

D.  $-9$

Answer: D



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10. Except which value of  $k$  does the simultaneous equations  $5 - kx = 10y$  and  $x + 15y = -1$  have a unique solution ?

A.  $\frac{3}{2}$

B.  $-\frac{3}{2}$

C.  $-\frac{2}{3}$

D.  $\frac{2}{3}$

**Answer: D**



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11. The simultaneous equations  $-3x + 4y = 7$ ,  $\frac{9}{2}x - 6y = -\frac{21}{6}$  have .....

A. infinite solutions

B. no solutions

C. a unique solution

D. two solutions

**Answer: A**

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12. For simultaneous equations in  $x$  and  $y$ , if  $D_x = 25$ ,  $D_y = 50$  and  $D = 5$ , then what is the value of  $x$ ?

A.  $-5$

B.  $\frac{1}{5}$

C.  $10$

D.  $5$

**Answer: D**

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1. Find the values of the following determinants :  $\begin{vmatrix} -3 & 8 \\ 6 & 0 \end{vmatrix}$

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2. For certain simultaneous equations, if

(i)  $D_x = 12$  and  $D = 4$ , what is the value of  $x$ ?

(ii)  $D = -3$  and  $D_y = 6$ , what is the value of  $y$ ?

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3. Express the following information in mathematical form using variables  $x$  and  $y$

(i) The perimeter of a rectangle is 40 cm

(ii) The ratio of two numbers is 5 : 3

(iii) The sum of the ages of a father and son is 73 years .

(iv) The cost of 2 tables and 3 chairs is Rs 5400

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4. Write the solution of the equation  $2x - y + 1 = 0$ .

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5. In the equation  $2x + y = 7$ , find the values of (i)  $y$  if  $x = 2$  and (ii)  $x$  if  $y = -1$ .

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6. Solve the simultaneous equations  $x + y = 7$ ,  $2x - 3y = 9$  by Cramer's method

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7. Find the values of  $(x+y)$  , if

(i)  $3x + 4y = 11$  ,  $4x + 3y = 10$  (ii)  $5x - 2y = 4$  ,  $x + 8y = 26$  `

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8. Find the values of  $(x - y)$  , if

(i)  $3x + 4y = 11$ ,  $4x + 3y = 10$  (ii)  $3x + 2y = 8$ ,  $2x + 3y = 7$

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9. If the value of determinant  $\begin{vmatrix} m & 2 \\ -5 & 7 \end{vmatrix}$  is 31, find the value of  $m$ .

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10.  $3x - 4y = 10$ ,  $4x + 3y = 5$ . Find the values of  $D_x$  and  $D_y$  to solve the simultaneous equations by Cramer's rule.



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11. Find the value of  $k$  , if  $kx + 3y = k - 3$  and  $12x + ky = k$  represent coincident lines .



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12. Solve the following system of equations:  
 $99x + 101y = 499$ ,  $101x + 99y = 501$



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13. Complete the following activity to solve the simultaneous equations  $3x + 2y = 6$  and  $2x + 4y = 12$  by Cramer's rule method.



$$D = \begin{vmatrix} 3 & 2 \\ 2 & 4 \end{vmatrix} = 8, D_x = \begin{vmatrix} 6 & 2 \\ 12 & 4 \end{vmatrix} = \square, D_y = \begin{vmatrix} 3 & 6 \\ 2 & 12 \end{vmatrix} = \square,$$

$$x = \square, y = \square.$$



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14. Complete the following activity to draw the graph of  $3x - y = 2$ .

$x$	<input type="text"/>	$-1$
$y$	$1$	<input type="text"/>
$(x, y)$	<input type="text"/>	<input type="text"/>



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15. Complete the following activity to solve simultaneous equations

:

$$4x + 3y = 18 \quad \dots(1) \quad 5x - 3y = 9 \quad \dots(2)$$

$$4x + 3y = 18 \quad \dots(1)$$

$$\text{Adding equations (1) and (2), } + 5x - 3y = 9 \quad \dots(2)$$

$$\hline \square x = \square$$

$$\therefore X = \frac{\square}{\square} \quad \therefore X = \square$$

Substituting  $x = 3$  in equation (1),

$$4 \times \square + 3y = 18 \quad \therefore 3y = 18 - \square \quad \therefore 3y = \square$$

$$\therefore y = 2$$

$(x, y) = (\square, \square)$  is the solution



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16. Complete the following table to draw the graph of the equation

$$x - y = 1:$$

$x$	0	<input type="text"/>
$y$	<input type="text"/>	0
$(x, y)$	<input type="text"/>	<input type="text"/>



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### 3 Marks Questions

1. Solve the following simultaneous equations using graphical me

$$x - y = -2 \quad x + y = 6$$

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2. Solve the following simultaneous equations using graphical method :

$$x + y = 7, \quad x - y = 3$$

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3. Solve the following simultaneous equations using substitution method :

$$x + y = 7; x - y = -1$$

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4. Solve the simultaneous equations  $3x - y = 7$ ,  $x + 4y = 11$  using Cramer's rule.

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5. Solve the following simultaneous equations :

$$4x + 3y = 4, 6x + 5y = 8$$

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6. Solve the following simultaneous equations using Cramer's rule :

$$3x - 4y = 7, 5x + 2y = 3$$

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7. The monthly incomes of Amit and Atul are in the ratio 6 : 5. The ratio of their expenditure is 5 : 4. If each of them saves Rs 2500 per month, find their monthly incomes.

(i) Use the variable  $x$  to write their monthly incomes.

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8. The monthly incomes of Amit and Atul are in the ratio 6 : 5. The ratio of their expenditure is 5 : 4. If each of them saves Rs 2500 per month, find their monthly incomes.

(ii) Use the variable  $y$  to write their monthly expenditure.

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9. The monthly incomes of Amit and Atul are in the ratio 6 : 5. The ratio of their expenditure is 5 : 4. If each of them saves Rs 2500 per month, find their monthly incomes.

Form simultaneous equations and solve.



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10. The sum of a two-digit number and the number obtained by reversing its digits is 121. Find the number, if the units place digit is greater than the tens place digit by 7.



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11. In a tiger National Park the number of the heads and number of the legs of tiger and human visitors were counted it was found there were 100 heads and 376 legs. Form simultaneous linear

equations and find the number of tigers and human visitors in the park

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**12.** Construct a word problem on simultaneous linear equations in two variables (  $x$  and  $y$  ) so that the value of one of the variables will be 10 ( persons, rupees , metres , years , etc ) and solve it .

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## 4 Marks Questions

**1.** Solve the following simultaneous equations using elimination method :

$$3x + 4y + 5 = 0, y = x + 4$$

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2. Solve the following simultaneous equations using graphical method :

$$4x + 3y = 17, 3x + 4y = 18$$

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3. Solve the following simultaneous equations using Cramer's rule :

$$3x + \frac{2y}{5} = 20, \frac{x}{3} + y = 7$$

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4. Solve the following simultaneous equations :

$$\frac{x}{3} + \frac{y}{4} = 2, 3x + 4y = 25$$

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5. Solve the following simultaneous equations :

$$\frac{1}{x} + \frac{1}{y} = 8, \frac{4}{x} - \frac{2}{y} = 2$$



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6. Solve the following simultaneous equations:

$$\frac{27}{x-2} + \frac{31}{y+3} = 35, \frac{31}{x-2} + \frac{27}{y+3} = 89$$



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7. Solve the following simultaneous equations :

$$\frac{1}{x} + \frac{1}{y} = 12, \frac{3}{x} - \frac{2}{y} = 1$$



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8. Solve the following system of equations:

$$\frac{1}{3x + y} + \frac{1}{3x - y} = \frac{3}{4}, \quad \frac{1}{2(3x + y)} - \frac{1}{2(3x - y)} = -\frac{1}{8}$$

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9. Solve the following simultaneous equation:

$$\frac{30}{x - y} + \frac{44}{x + y} = 10, \quad \frac{40}{x - y} + \frac{55}{x + y} = 13.$$

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10. Solve the following simultaneous equations :

$$\frac{8}{3x - 2} + \frac{45}{4y + 3} = 5, \quad \frac{12}{3x - 2} - \frac{30}{4y + 3} = 1$$

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**11.** Solve the following problems using two variables :

If the numerator of a fraction is increased by 1 , its value becomes  $\frac{3}{4}$  . If its denominator is increased by 2 , its value becomes  $\frac{1}{2}$  . Find the fraction .



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**12.** A boat take 6 hours to travel 36 km downstream and 24 km upstream. It take 9 hours to travel 48 km downstream and 40 km upstream. Find the speed of the stream and that of boat in still water.



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**13.** Solve the following problems using two variables :

Two taps A and B can together fill a swimming pool in 15 days . Taps

A and B are kept open for 12 days and then tap B is closed . It takes another 8 days for the pool to be filled . How many days does each tap require to fill the pool ?



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**14.** Solve the following problems using two variables :

The sum of the digits of a number consisting of three digits is 12 .

The middle digit is equal to half the sum of the other two . If the order of the digits is reversed , The number is diminished by 198 .

Find the number .



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**15.** Solve the following problems using two variables :

Some part of a journey of 780 km was made by car with a speed of 60 km/h and the remaining journey was made by train with a speed

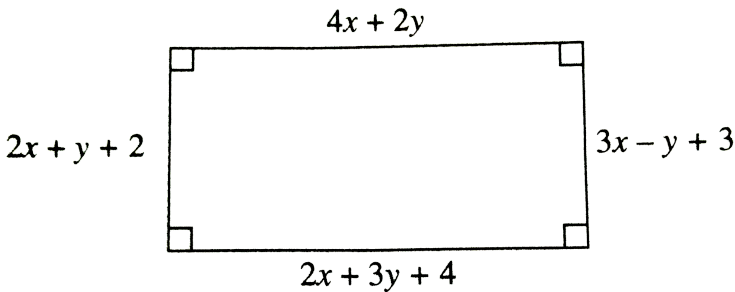
of 100 km/h . If total required was 9 hours . Find the time taken by train and distance covered by train .



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**16.** Solve the following problems using two variables :

In the figure , the sides of a rectangle are given . The lengths are in cm . Find the length and breadth of the rectangle .



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**17.** Solve the following problems using two variables :

The fore wheel of a tractor makes 120 revolutions more than the

rear wheel in going 720 m . If the diameter of the rear wheel is increased by  $1\frac{1}{2}$  times the present diameter , then the fore wheel makes 20 revolutions more than the rear wheel in going the same distance . Find the circumference of each wheel .

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**18.** Last year the total number of students in a school was 5000 .This year,the number of boys increased by 5% and that of girls by 3% and the total number of students increased by 202 .How many boys and girls were there

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