# MATHS

## BOOKS - BAL BHARTI

## LINEAR EQUATIONS IN TWO VARIABLES

### Examples

**1.** Solve the following simultaneous equations.

5x - 3y = 8, 3x + y = 2

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**2.** Solve : 15x + 17y = 21, 17x + 15y = 11

**3.** Draw graph of 2x - y = 4.

**4.** Let's draw graphs of x + y = 4, 2x - y = 2 and observe them.

**5.** Find the values of the following determinants.

$$A = \begin{vmatrix} 5 & 3 \\ 7 & 9 \end{vmatrix}$$

**6.** Find the values of the following determinants.

$$N = \begin{vmatrix} -8 & -3 \\ 2 & 4 \end{vmatrix}$$

**7.** Find the values of the following determinants.

$$B = \begin{vmatrix} 2\sqrt{3} & 9 \\ 2 & 3\sqrt{3} \end{vmatrix}$$

**8.** Solve the following simultaneous equations using Cramer's Rule.

5x + 3y = -11 , 2x + 4y = -10

**9.** $\dfrac{4}{x} + \dfrac{5}{y} = 7, \quad \dfrac{3}{x} + \dfrac{4}{y} = 5$

**10.** $\dfrac{4}{x - y} + \dfrac{1}{x + y} = 3, \quad \dfrac{2}{x - y} - \dfrac{3}{x + y} = 5$

**11.** The perimeter of rectangle is 40 cm. The length of rectangle is 2 cm more than twice its breadth. Find the length and the breadth of the rectangle.

**12.** A certain amount is equally distributed among certain number of students. Each would get Rs. 2 less if 10 students were more and each would get Rs. 6 more if 15 students were less. Find the number of students and the amount distributed.

**13.** A three digit number is equal to 17 times the sum of its digits, If the digits are reversed, the new number is 198 more than the old number , also the sum of extreme digits is less than the middle digit by unity. Find the original number.

**Practice Set 11**

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

**2.** Solve the following simultaneous equations.

$3a + 5b = 26, a + 5b = 22$

**3.** Solve the following simultaneous equations.

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

**4.** Solve the following simultaneous equations.

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

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**5.** Solve the following simultaneous equations.

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

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**6.** Solve the following simultaneous equations.

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

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**7.** Solve the following simultaneous equations.

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

**8.** Solve the following simultaneous equations.

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

**9.** Solve the following simultaneous equations.

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

**1.** Solve the following simultaneous equations graphically.

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

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**2.** Solve the following simultaneous equations graphically.

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

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**3.** Solve the following simultaneous equations graphically.

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

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**4.** Solve the following simultaneous equations graphically.

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

**5.** Solve the following simultaneous equations graphically.

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

**6.** Solve the following simultaneous equations graphically.

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

**1.** Find the values of following determinants.

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

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**2.** Find the values of following determinants.

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

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**3.** 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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**4.** Solve the following simultaneous equations using Cramer's rule. $3x - 4y = 10, 4x + 3y = 5.$

**5.** Solve the following simultaneous equations using Cramer's rule.

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

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

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

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

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

**8.** Solve the following simultaneous equations using Cramer's rule $4m + 6n = 54, 3m + 2n = 28.$

**9.** Solve the following simultaneous equations using Cramer's rule $2x + 3y = 2, x - \dfrac{y}{2} = \dfrac{1}{2}.$

**Practice Set 1 4**

**1.** Solve the following simultaneous equations.

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

**2.** Solve the following simultaneous equations.

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

**3.** Solve the following simultaneous equations.

$$\frac{27}{x-2} + \frac{31}{y+3} = 85, \quad \frac{31}{x-2} + \frac{27}{y+3} = 89$$

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**4.** Solve the following simultaneous 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 1 5**

**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.** 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.

**3.** 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.

**4.** Two types of boxes A and B are to be placed in a truck having capacity of 10 tons. When 150 boxes of type A and 100 boxes of type B are loaded in the truck, it weighs 10 tons. But when 260 boxes of type A are loaded in the truck, it can still accommodate 40 boxes of B so that it is fully loaded. Find the weight of each type of box.

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

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**1.** Choose the correct alternative for each of the following questions:

To draw the graph of $4x + 5y = 19$, find y when x=1.

A. 4

B. 3

C. 2

D. -3

**Answer: B**

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**2.** For simultaneous equations in variables x and y, $D_x = 49$, $D_y = -63$, D=7 then what is x? a) 7 b) -7 c) 1/7 d) -1/7

A. 7

B. -7

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

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

**Answer: A**

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**3.** Choose correct alternative for each of the following questions

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.** Choose the correct alternative for each of the following questions:

To solve $x + y = 3, 3x - 2y - 4 = 0$ by determinant method, find D.

A. 5

B. 1

C. -5

D. -1

Answer: C

**5.** Choose correct alternative for each of the following questions

ax + by = c and mx + ny = d and an $^{1}$ bm then these simultaneous equations have

    A. Only one common solution.

    B. No solution.

    C. Infinite number of solutions.

    D. Only two solutions.

**Answer: A**

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**6.** Solve the following simultaneous equations graphically.

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

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**7.** Solve the following simultaneous equations graphically.

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

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**8.** Solve the following simultaneous equations graphically. $5x - 6y + 30 = 0$ , $5x + 4y - 20 = 0$

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**9.** Solve the following simultaneous equations graphically.

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

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**10.** Solve the following simultaneous equations graphically.

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

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**11.** Find the values of each of the following determinants.

$$\begin{vmatrix} 4 & 3 \\ 2 & 7 \end{vmatrix}$$

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**12.** Find the values of each of the following determinants.

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

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

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

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**14.** Solve the following equations by Cramer's method.

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

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

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

**16.** Solve the following equations by Cramer's method.

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

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

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

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

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

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**19.** Solve the following simultaneous equations.

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

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**20.** Solve the following simultaneous equations.

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

**21.** Solve the following simultaneous equations.

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

**22.** Solve the following simultaneous equations.

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

**23.** Solve the following simultaneous equations.

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

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**24.** A two digit number and the number with digits interchanged add 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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**25.** Kantabai bought 1.5kg tea and 5kg sugar from a shop. She paid ₹50 as fare for rickshaw. Total expense was ₹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 7kg sugar and paid ₹880 .Find the rate of sugar and tea per kg.

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

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

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**28.** Places A and B are 30 km apart and they are on a straight road. Hamid travels from A to B on bike. At the 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 the 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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