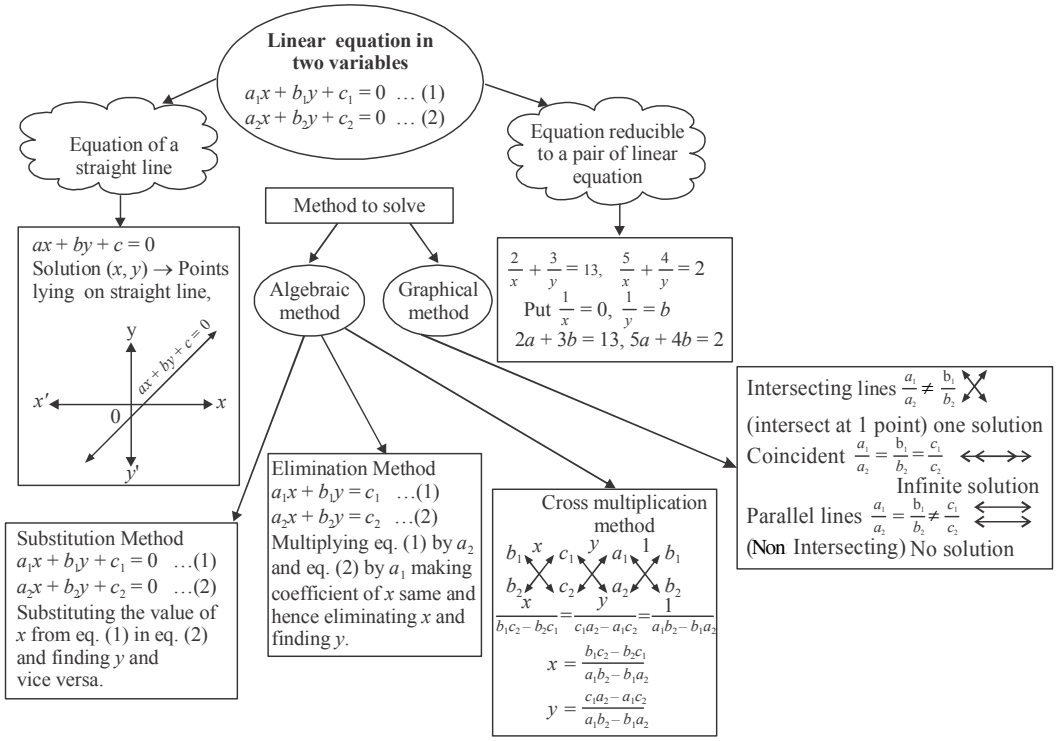
CHAPTER

3 Pair of Linear Equations in Two Variables

KEY POINTS



VERY SHORT ANSWER TYPE QUESTIONS

1. If the lines given by $3x + 2ky = 2$ and $2x + 5y = 1$ are parallel, then the value of k is _____ .

2. If $x = a$ and $y = b$ is the solution of the equation $x - y = 2$ and $x + y = 4$, then the values of a and b are respectively _____ .

3. A pair of linear equations which has a unique solution $x = 2$ and $y = -3$ is

(a) $x + y = 1$ and $2x - 3y = -5$

(b) $2x + 5y = -11$ and $2x - 3y = -22$

(c) $2x + 5y = -11$ and $4x + 10y = -22$

(d) $x - 4y - 14 = 0$ and $5x - y - 13 = 0$

4. The area of the triangle formed by the lines $x = 3$, $y = 4$ and $x = y$ is _____ .

5. The value of k for which the system of equations $3x + 5y = 0$ and $kx + 10y = 0$ has a non-zero solutions is ____ .

6. If a pair of linear equations in two variables is consistent, then the lines represented by two equations are:

(a) Intersecting (b) Parallel

(c) always coincident (d) intersecting or coincident

7. For $2x + 3y = 4$, y can be written in terms of x as _____ .

8. One of the common solution of $ax + by = c$ and y axis is

(a) $\left(0, \frac{c}{b}\right)$ (b) $\left(0, \frac{b}{c}\right)$

(c) $\left(\frac{c}{b}, 0\right)$ (d) $\left(0, -\frac{c}{b}\right)$

9. If $ax + by = c$ and $lx + my = n$ has unique solution then the relation between the coefficient will be:

(a) $am \neq lb$ (b) $am = lb$ (c) $ab = lm$ (d) $ab \neq lm$

10. In ΔABC, $\angle C = 3\angle B$, $\angle C = 2(\angle A + \angle B)$ then, $\angle A$, $\angle B$, $\angle C$ are respectively.

(a) 30°, 60°, 90° (b) 20°, 40°, 120°

(c) 45°, 45°, 90° (d) 110°, 40°, 50°

11. If $x = 3m - 1$ and $y = 4$ is a solution of the equation $x + y = 6$, then find the value of m.

12. What is the point of intersection of the line represented by $3x - 2y = 6$ and the y-axis?

13. For what value of p, system of equations $2x + py = 8$ and $x + y = 6$ have no solution.

14. A motor cyclist is moving along the line $x - y = 2$ and another motor cyclist is moving along the line $x - y = 4$ find out their moving direction.

15. Find the value of k for which pair of linear equations $3x + 2y = -5$ and $x - ky = 2$ has a unique solution.

16. Write the solution of $y = x$ and $y = -x$.

17. If $2x + 5y = 4$, write another linear equation, so that lines represented by the pair are coincident.

18. Check whether the graph of the pair of linear equations $x + 2y - 4 = 0$ and $2x + 4y - 12 = 0$ is intersecting lines or parallel lines.

19. What is the value of p, for which the pair of linear equations $x + y = 3$ and $3x + py = 9$ is inconsistent.

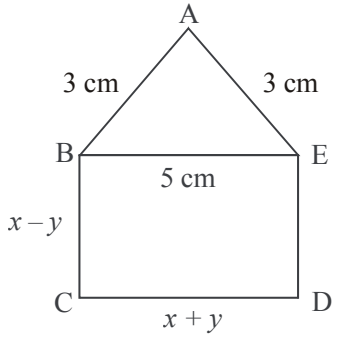
20. If we draw lines of $x = 2$ and $y = 3$ what kind of lines do we get?

SHORT ANSWER TYPE (I) QUESTIONS (2 MARKS QUESTIONS)

21. Form a pair of linear equations for: The sum of the numerator and denominator of the fraction is 3 less than twice the denominator. If the numerator and denominator both are decreased by 1, the numerator becomes half the denominator.

22. For what value of p the pair of linear equations $(p + 2)x - (2p + 1)y = 3(2p - 1)$ and $2x - 3y = 7$ has a unique solution.

23. ABCDE is a pentagon with BE || CD and BC || DE, BC is perpendicular to CD If the perimeter of ABCDE is 21 cm, find x and y.



24. Solve for x and y

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

25. Solve for x and y

$3x + 2y = 11$ and $2x + 3y = 4$

Also find p if $p = 8x + 5y$

26. Solve the pair of linear equations by substitution method $x - 7y + 42 = 0$ and $x - 3y - 6 = 0$

27. Ram is walking along the line joining (1, 4) and (0, 6)
Rahim is walking along the line Joining (3, 4) and (1, 0)
Represent on graph and find the point where both of them cross each other

28. Given the linear equation $2x + 3y - 12 = 0$, write another linear equation in these variables, such that. geometrical representation of the pair so formed is (*i*) Parallel Lines (*ii*) Coincident Lines

29. The difference of two numbers is 66. If one number is four times the other, find the numbers.

30. For what value of k, the following system of equations will be inconsistent
$kx + 3y = k - 3$
$12x + ky = k$

SHORT ANSWERS TYPE (II) QUESTIONS

31. Solve graphically the pair of linear equations $5x - y = 5$ and $3x - 2y = -4$
Also find the co-ordinates of the points where these lines intersect y-axis

32. Solve for x and y

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

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

33. Solve by Cross – multiplication method (CBSE)

$$\frac{x}{a} + \frac{y}{b} = a + b$$

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

34. For what values of a and b the following pair of linear equations have infinite number of solutions? (CBSE)

$$2x + 3y = 7$$
$$a(x + y) - b(x - y) = 3a + b - 2$$

35. Find the value of k for no. solutions

$$(3k + 1)x + 3y - 2 = 0$$
$$(k^2 + 1)x + (k - 2)y - 5 = 0$$

36. Solve the pair of linear equations

$$152x - 378y = -74$$
$$-378x + 152y = -604$$

37. Pinky scored 40 marks in a test getting 3 marks for each right answer and losing 1 mark for each wrong answer. Had 4 marks been awarded for each correct answer and 2 marks were deducted for each wrong answer, then pinky again would have scored 40 marks. How many questions were there in the test?

38. Father's age is three times the sum of ages of his two children. After 5 years his age will be twice the sum of ages of two children. Find the age of the father.

39. On selling a T.V. at 5% gain and a fridge at 10% gain, a shopkeeper gain ₹ 2000. But if he sells the T.V. at 10% gain and fridge at 5% loss, he gains ₹ 1500 on the transaction. Find the actual price of the T.V. and the fridge

40. Sunita has some ₹ 50 and ₹ 100 notes amounting to a total of ₹ 15,500. If the total number of notes is 200, then find how many notes of ₹ 50 and ₹ 100 each, she has.

LONG ANSWER TYPE QUESTIONS

41. Solve graphically the pair of linear equations $3x - 4y + 3 = 0$ and $3x + 4y - 21 = 0$

Find the co-ordinates of vertices of triangular region formed by these lines and x-axis. Also calculate the area of this triangle.

42. Solve for x and y

$$\frac{1}{2(2x+3y)} + \frac{12}{7(3x-2y)} = \frac{1}{2}$$

$$\frac{7}{(2x+3y)} + \frac{4}{(3x-2y} = 2$$

For $2x + 3y \neq 0$

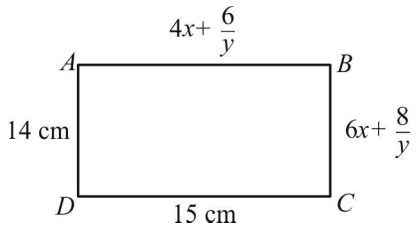
$3x - 2y \neq 0$.

43. Solve the pair of equations by reducing them to a pair of linear equations

$$2^x = 8^{y-1}$$

and $$9^y = 3^{x-6}$$

44. ABCD is a rectangle. Find the perimeter of the rectangle.



45. A man travels 600 km to his home partly, by train and partly by bus. He takes 8 hours, if he travels 120 km by train and rest by bus. Further, it takes 20 minute longer, if he travels 200 km by train and rest by bus. Find the speeds of the train and the bus.

46. A and B are two points 150 km apart on a highway. Two cars start with different speeds from A and B at same time. If they move in same direction, they meet in 15 hours. If they move in opposite direction, they meet in one hour. Find their speeds

47. A boat covers 32 km upstream and 36 km downstream, in 7 hours. Also it Covers 40 km upstream and 48 km downstream in 9 hours. Find the speed of boat in still water and that of the stream. **(CBSE)**

48. 8 Women and 12 men can complete a work in 10 days while 6 women and 8 men can complete the same work in 14 days. Find the time taken by one woman alone and that one man alone to finish the work.

49. The ratio of incomes of two persons A and B is 3 : 4 and the ratio of their expenditures is 5 : 7. If their savings are ₹ 15,000 annually find their annual incomes.

50. Vijay had some bananas and he divided them into two lots A and B. He sold the first lot at the rate of ₹ 2 for 3 bananas and the second lot at the rate of ₹ 1 per banana and got a total of ₹ 400. If he had sold the first lot at the rate of ₹ 1 per banana and the second lot at the rate of ₹ 4 for 5 bananas, his total collection would have been ₹ 460. Find the total number of bananas he had.

(HOTS, Exampler)

51. A railway half ticket cost half the full fare but the reservation charges are the same on a half ticket as on a full ticket. One reserved first class ticket costs ₹ 2530. One reserved first class ticket and one reserved first class half ticket from stations A to B costs ₹ 3810. Find the full first class fare from stations A to B and also the reservation charges for a ticket. (Exemplar)

52. Determine graphically, the vertices of the triangle formed by the times $y = x$, $3y = x$ and $x + y = 8$. **(NCERT Exemplar)**

53. Draw the graphs of the equations x = 3, x = 5 and $2x - y - 4 = 0$. Also find the area of the quadrilateral formed by the lines and the x-axis.

(NCERT Exemplar, HOTS)

54. A nirudh takes 3 hours more than Nishi to walk 30 km. But if Anirudh doubles his speed, he is ahead of Nishi by 1½ hours. Find their speed fo walking.

55. In a two digit number, the ten's place digit is 3 times the unit's place digit. When the number is decreased by 54, digits get reversed. Find the original number.

56. A two-digit number is 3 more than 4 times the sum of the digits. If 18 is added to the number, digits reversed. Find the number.

57. A boat can travel 30 km upstream and 28 km downs stream in 7 hours. It can travel 21 km upstream and return in 5 hours. Find the speed of the boat in still water and the speed of the stream.

58. Find the values of a and b for infinite solutions

(i) $2x - (a - 4)y = 2b + 1$

$4x - (a - 1)y = 5b - 1$

(ii) $2x + 3y = 7$

$2ax + ay = 28 - by$

ANSWERS AND HINTS

1. $k = \frac{15}{4}$ **2.** $a = 3$ and $b = 1$

3. (c) $2x + 5y = -11$ and $4x + 10y = -22$

4. $\frac{1}{2}$ sq. unit **5.** 6

6. (d) intersecting or coincident **7.** $y = \frac{4 - 2x}{3}$

8. (a) $\left(0, \frac{c}{b}\right)$ **9.** (a) $am \neq lb$

10. (b) 20°, 40°, 120° **11.** $m = 1$

12. (0, –3) **13.** $p = 2$

14. move parallel **15.** $k \neq \frac{-2}{3}$

16. (0, 0)

17. $4x + 10y = 8$

18. Parallel lines

19. $p = 3$

20. Intersecting lines

21. $x - y = -3$, $2x - y = 1$

22. $p \neq 4$

23. $x = 5$, $y = 0$

24. 4, 2

25. $x = 5$, $y = -2$, $p = 30$

26. 42, 12

27. (2, 2)

28. (*i*) $4x + 6y + 10 = 0$

(*ii*) $4x + 6y - 24 = 0$

29. 88, 22

30. $k = -6$

31. (2, 5) (0, – 5) and (0, 2)

32. (3, 2)

33. $x = a^2$, $y = b^2$

34. $a = 5$, $b = 1$

35. $k = -1$

36. 2, 1

37. 40 questions

38. 45 years

39. T.V. = ₹ 20,000 Fridge = ₹ 10,000

40. ₹ 50 notes = 90, ₹ 100 notes = 110

41. Solution (3, 3), Vertices (– 1, 0) (7, 0) and (3, 3), Area = 12 square units

42. (2, 1)

43. $x = 24$, $y = 9$

44. $x = 3$ and $y = 2$

45. 60 km/hr, 80 km/hr

46. 80 km/hr , 70 km/hr

47. 10 km/hr, 2 km/hr

48. 1 woman in 140 days, 1 man in 280 days

49. ₹ 90,000, ₹ 1,20,000

50. Let the no. of bananas in lots A be x and in lots B be y

Case I : $\frac{2}{3}x + y = 400 \quad \Rightarrow \quad 2x + 3y = 1200$

Case 2 : $x + \frac{4}{5}y = 460 \quad \Rightarrow \quad 5x + 4y = 2300$

$x = 300$, $y = 200$, Total bananas = 500.

51. Let the cost of full and half ticket be ₹ x & ₹ $\frac{x}{2}$ and reservation charge by ₹ y per ticket.

Case I : $x + y = 2530$

Case 2 : $x + y + \frac{x}{2} + y = 3810$

$x = 2500, y = 3810$

Full first class fare is ₹ 2500 and reservation charge is ₹ 30.

52. Vertices of the triangle are (0, 0) (4, 4) (6, 2).

53. Area of quadrilateral ABCD where,

$A(3, 0), B(5, 0)$

C(5, 6), $D(3, 2)$

$$= \frac{1}{2} \times AB \times (AD + BC)$$

$$= \frac{1}{2} \times 2 \times (6 + 2) = 8 \text{ sq. units.}$$

54. $\frac{10}{3}$ km/hr, 5 km/hr

55. 93

56. 35

57. 10 km/hr, 4 km/hr

58. (i) 7, 3

(ii) 4, 8

PRACTICE-TEST

Pair of Linear Equations In Two Variables

Time : 1 Hr. ***M.M. : 20***

SECTION-A

1. For what value of k system of equations
$x + 2y = 3$ and $5x + ky + 7 = 0$ has a unique solution. **1**

2. Does the point (2, 3) lie on line represented by the graph of $3x - 2y = 5$. **1**

3. The pair of equations $x = a$ and $y = b$ graphically representes lines which are: **1**

(a) Parallel (b) Intersecting at (b, a)

(c) Coincident (d) Intersecting at (a, b)

4. For what value of K, the equations $3x - y + 8 = 0$ and $6x - Ky = -16$ represent coincident lines? **1**

(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) 2 (d) –2

SECTION-B

5. For what value of a and b the pair of linear equations have infinite number of solutions

$$2x - 3y = 7$$
$$ax + 3y = b$$ **2**

6. Solve for x and y

$$0.4x + 0.3y = 1.7$$
$$0.7x - 0.2y = 0.8$$ 2

7. If the system of equations $6x + 2y = 3$ and $kx + y = 2$ has a unique solution, find the value of k. **2**

SECTION-C

8. Solve for x and y by cross multiplication method

$$x + y = a + b$$
$$ax - by = a^2 - b^2$$ **3**

9. Sum of the ages of a father and the son is 40 years. If father's age is three times that of his son, then find their ages. **3**

SECTION-D

10. Solve the following pair of equations graphically.
$3x + 5y = 12$ and $3x - 5y = -18$. **4**

Also shade the region enclosed by these two lines and x-axis.