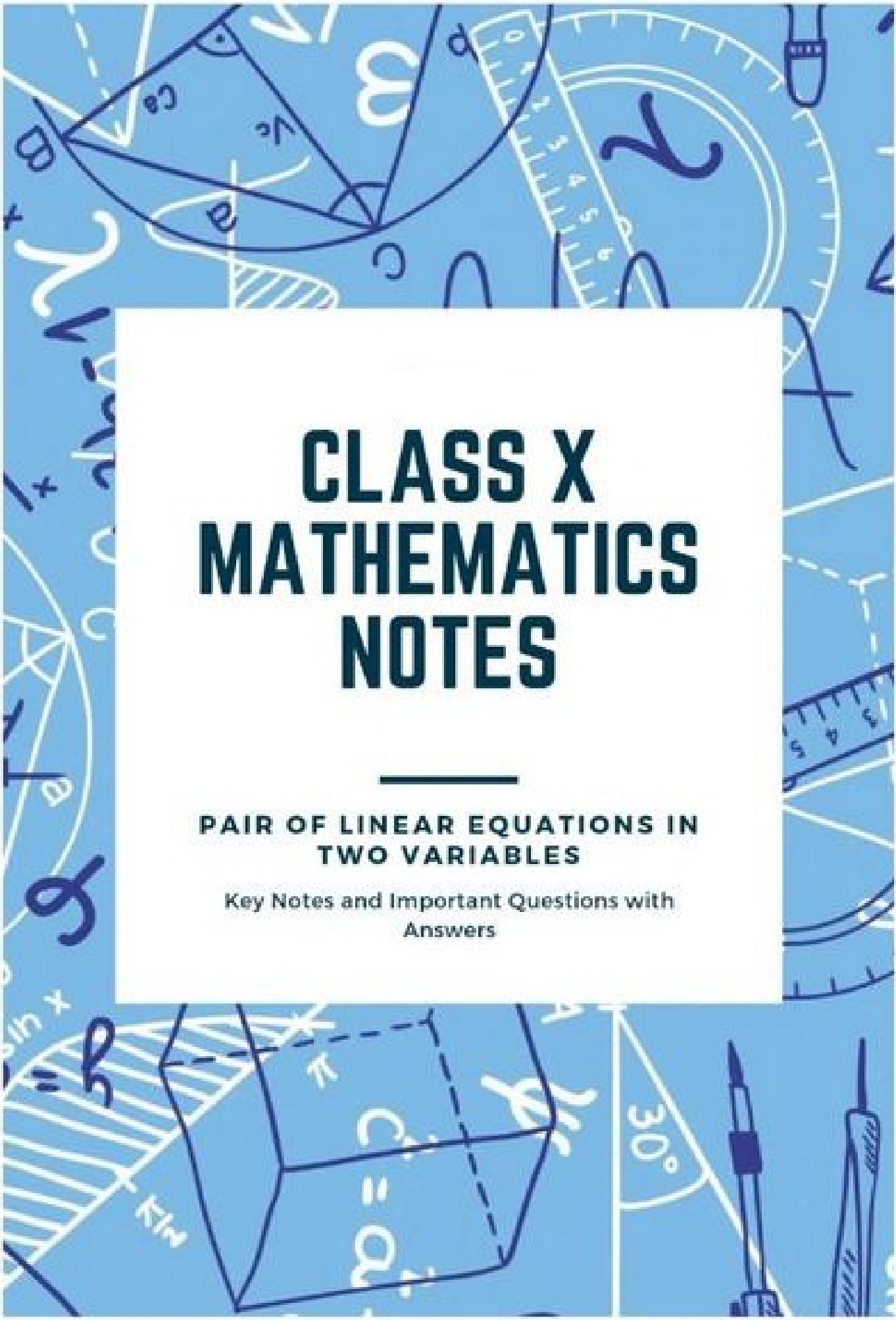


CLASS X MATHEMATICS NOTES

PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

Key Notes and Important Questions with Answers

3
Chapter

Pair of Linear Equations in Two Variables

Key Points

1. The general form of a pair of linear equations is

$a_1x + b_1y + c_1 = 0$

$a_2x + b_2y + c_2 = 0$

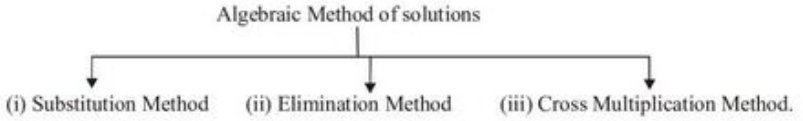
Where $a_1, a_2, b_1, b_2, c_1, c_2$ are real numbers.

2. The graph of a pair of linear equations in two variables is represented by two lines.

(*i*) If the lines intersect at a point, the pair of equations is consistent. The point of intersection gives the unique solution of the equations.

(*ii*) If the lines are parallel, then there is no solution. The pair of linear equations is inconsistent.

(*iii*) If the lines coincide, then there are infinitely many solutions. The pair of linear equations is consistent. Each point on the line is a solution of both the equations



3. If a pair of linear equations is given by

$a_1x + b_1y + c_1 = 0$

$a_2x + b_2y + c_2 = 0$

(*i*) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \Rightarrow$ the pair of linear equations is consistent (unique solution).

(*ii*) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2} \Rightarrow$ the pair of linear equations is inconsistent (no solution).

(*iii*) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \Rightarrow$ the pair of linear equations is dependent and consistent. (infinitely many solutions)

Important Questions with Solutions

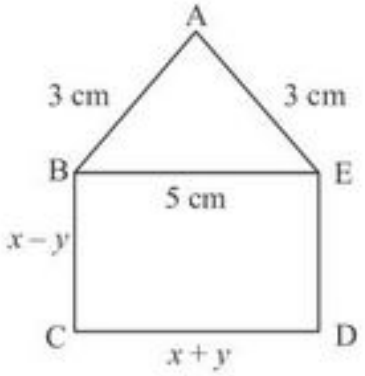
VERY SHORT ANSWER TYPE QUESTIONS

1. If $x = 3m - 1$ and $y = 4$ is a solution of the equation $x + y = 6$, then find the value of m.
2. What is the point of intersection of the line represented by $3x - 2y = 6$ and the y-axis
3. For what value of p, system of equations $2x + py = 8$ and $x + y = 6$ have no solution.
4. 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.
5. Find the value of k for which pair of linear equations $3x + 2y = -5$ and $x - ky = 2$ has a unique solution.
6. Express y in terms of x in the expression $3x - 7y = 10$
7. If $2x + 5y = 4$, write another linear equation, so that lines represented by the pair are coincident.
8. 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.
9. If the lines $3x + 2ky = 2$ and $2x + 5y + 1 = 0$ are parallel, then find value of k.
10. If we draw lines of $x = 2$ and $y = 3$ what kind of lines do we get?

SHORT ANSWER TYPE (I) QUESTIONS

11. 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.
12. 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.

13. 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



14. Solve for x and y

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

15. Solve for x and y

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

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

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

17. 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

18. 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

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

20. 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

21. 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

22. Solve for x and y

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

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

23. Solve by Cross – multiplication method

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

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

24. For what values of a and b the following pair of linear equations have infinite number of solutions?

$$2x + 3y = 7$$

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

25. Solve the pair of linear equations

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

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

26. 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?

27. A two digit number is obtained by either multiplying sum of digits by 8 and adding 1 or by multiplying the difference of digits by 13 and adding 2. Find the number

28. 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.

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

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

LONG ANSWER TYPE QUESTIONS

31. 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.

32. 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 $2x+3y \neq 0$, $3x-2y \neq 0$.

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

$$\frac{3x+2y}{xy}=1 \text{ and } \frac{4x-2y}{xy}=13$$

hence find a for which $y=ax-4$

34. 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.

35. 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

36. 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.

37. The sum of the numerator and denominator of a fraction is 4 more than twice the numerator. If the numerator and denominator are increased by 3, they are in the ratio 2 : 3.

Determine the fraction.

38. Raju used 2 plastic bags and 1 paper bag in a day which cost him Rs. 35. While Ramesh used 3 plastic bags and 4 paper bags per day, which cost him Rs. 65

(*i*) Find the cost of each bag.

(*ii*) Which bag has to be used?

39. 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.

40. 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 Rs. 15,000 annually find their annual incomes.

ANSWERS

1. $m = 1$

2. $(0, -3)$

3. $p = 2$

4. move parallel

5. $k \neq \frac{-2}{3}$

6. $y = \frac{3x - 10}{7}$

7. $4x + 10y = 8$

8. Parallel lines

9. $k = \frac{15}{4}$

10. Intersecting lines

11. $x - y = -3,\ 2x - y = 1$

12. $p \neq 4$

13. $x = 5, y = 0$

14. 4, 2

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

16. 42, 12

17. (2, 2)

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

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

19. 88, 22

20. $k = -6$

21. (2, 5) (0, – 5) and , (0, 2)

22. (3, 2)

23. a^2, b^2

24. $a = 5, b = 1$

25. 2, 1

26. 40 questions

27. 41

28. 45 years

29. T.V. = Rs. 20,000 Fridge = Rs. 10,000

30. Rs. 50 notes = 90 Rs. 100 notes = 110

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

32. (2, 1)

33. $x = \frac{-2}{5}, y = \frac{1}{2}, a = \frac{-45}{4}$

34. 60 km/hr, 80 km/hr

35. 80 km/hr , 70 km/hr

36. 10 km/hr, 2 km/hr

37. $\frac{5}{9}$

38. (*i*) 15, 5,
(*ii*) Eco-friendly

39. 1 woman in 140 days,
1 man in 280 days

40. Rs. 90,000, Rs. 1,20,000

Practice-Test

Pair of Linear Equations In Two Variables

Time : 50 Minutes *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 of graph of $3x - 2y = 5$. **1**

SECTION-B

3. For what values of a and b does the pair of linear equations have infinite number of solutions

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

4. Solve for x and y

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

SECTION-C

5. Solve for x and y by cross multiplication method

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

6. 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

7. 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.

8. The sum of a two digit number and number obtained on reversing the digits is 99. If the number obtained on reversing the digit is 9 more than the original number, find the number. **4**

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