Pair of Linear Equation in Two Variables

1. The value of k for which the pair of linear equations 5x+2y-7=0 and 2x+ky+1=0 don't have a solution, is: (2024)

(a) 5 (b) $\frac{4}{5}$ (c) $\frac{5}{4}$ (d) $\frac{5}{2}$

Answer. (b) $\frac{4}{5}$

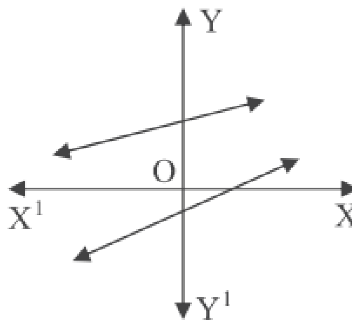
2. Solve the following pair of linear equations for x and y algebraically: (2024) x+2y=9 and y-2x=2

Answer. (A) $x + 2y = 9$, ________ (i)
$y - 2x = 2$ ________ (ii)
Solving to get $x = 1, y = 4$.

OR

3. Check whether the point (– 4, 3) lies on both the lines represented by the linear equations x + y + 1 = 0 and x - y = 1. (2024)
Answer. Substituting $x = -4$ and $y = 3$ in equation $x + y + 1 = 0$,
$(-4, 3)$ satisfies the equation $x + y + 1 = 0$
So $(-4, 3)$ lies on it.
For $x - y = 1$, $(-4, 3)$ doesn't satisfy the equation $x - y = 1$
therefore $(-4, 3)$ does not lie on $x - y = 1$

4. In the given figure, graphs of two linear equations are shown. The pair of these linear equations is : (2024)



(a) consistent with unique solution.
(b) consistent with infinitely many solutions.
(c) inconsistent.

(d) inconsistent but can be made consistent by extending these lines.

Answer. (a) consistent with unique solution

5. Solve the following system of linear equations
$7x-2y= 5$ and $8x + 7y = 15$ and verify your answer. (2024)

Answer.
$7x - 2y = 5$ ----- (i)
$8x + 7y = 15$ ----- (ii)
Solving equation (i) and (ii), we get
$x = 1$, $y = 1$
Verification of answer

6. Three years ago, Rashmi was thrice as old as Nazma. Ten years later, Rashmi will be twice as old as Nazma. How old are Rashmi and Nazma now? (2024)

Answer. Let present age of Rashmi and Nazma be x years and y years respectively.
Therefore, $x - 3 = 3 (y - 3)$
or $x - 3y + 6 = 0$
and $x + 10 = 2 (y + 10)$
or $x - 2y - 10 = 0$
Solving equations to get $x = 42$, $y = 16$
∴ Present age of Rashmi is 42 years and that of Nazma is 16 years.

Pair of Linear Equations in Two Variables

MCQ

1. The pair of linear equations $2x = 5y + 6$ and $15y=6x-18$ represents two lines which are
(a) intersecting
(b) parallel
(c) coincident
(d) either intersecting or parallel
(2023)

2. The pair of linear equations
$\frac{3x}{2}+\frac{5y}{3}=7$ and $9x + 10y = 14$ is
(a) consistent
(b) inconsistent
(c) consistent with one solution
(d) consistent with many solutions (2020)

SAI (2 marks)

3. Find whether the lines representing the following pair of linear equations intersect at a point, are parallel or coincident:
$3x + y = 7$, $6x + 2y = 8$ (Board Term 1, 2017)

SA I (2 marks)

3. Find whether the lines representing the following pair of linear equations intersect at a point, are parallel or coincident: $3x + y = 7$, $6x + 2y = 8$ (Board Term 1, 2017)

4. Find whether the lines representing the following pair of linear equations intersect at a point, are parallel or coincident:

$\frac{3}{2}x+\frac{5}{3}y=7$ and $\frac{3}{2}x+\frac{2}{3}y=6$ *(Board Term I, 2017)*

5. Find whether the lines representing the following pair of linear equations intersect at a point, are parallel or coincident:
$2x + y + 3 = 0, 4x + 2y + 6 = 0$ (Board Term I, 2017)

3.2 Graphical Method of Solution of a Pair of Linear Equations

MCQ

6. The pair of lines represented by the linear equations $3x + 2y = 7$ and $4x+8y - 11 = 0$ are
(a) perpendicular
(b) parallel
(c) intersecting
(d) coincident (Term I, 2021-22)

7. The pair of equations $y = 2$ and $y = - 3$ has
(a) one solution
(b) two solutions
(c) infinitely many solutions
(d) no solution (Term I, 2021-22)

8. The pair of equations $x = 5$ and $y = 5$ has
(a) no solution
(b) unique solution
(c) many solutions
(d) only solution (0, 0) (2020 C)

9. The pair of equations $x = a$ and $y = b$ graphically represent lines which are
(a) Intersecting at (a, b)
(b) Intersecting at (b, a)
(c) Coincident
(d) Parallel (2020 C)

SAI (2 marks)

10. Solve the pair of equations $x = 5$ and $y = 7$ graphically. (2023)

11. Using graphical method, find whether pair of equations $x = 0$ and $y = -3$, is consistent or not. (2023)

SA II (3 marks)

12. Determine graphically the coordinates of the vertices of a triangle, the equations of whose sides are given by $2yx = 8$, $5y-x = 14$ and $y = 2x = 1$. (2020)

13. Solve the equations $x + 2y = 6$ and $2x - 5y = 12$ graphically. (2020 C)

14. Draw the graph of the equations $x - y + 1 = 0$ and $3x+2y-12 = 0$. Using this graph, find the values of x and y which satisfy both the equations. (2019)

LA (4/5/6 marks)

15. For Uttarakhand flood victims two sections A and B of class X contributed 1500. If the contribution of X A was 100 less than that of X B, find graphically the amounts contributed by both the sections. (Board Term 1, 2017)

16. Three lines $3x + 5y = 15$, $6x - 5y = 30$ and $x = 0$ are enclosing a beautiful triangular park. Find the points of intersection of the lines graphically and the area of the park if all measurements are in km. What type of behaviour should be expected by public in this type of park? (Board Term I, 2017)

17. Solve the following pair of linear equations graphically $6x - y + 4 = 0$ and $2x - 5y = 8$. Shade the region bounded by the lines and y-axis. (Board Term 1, 2017)

18. Find the graphically solution of $x - 2y = 0$ and $3x + 4y = 20$. (Board Term I, 2017)

19. Solve graphically the following pair of linear equations:
$2y-3x= 14$, $2x + 3y = 8$
Hence, shade the region enclosed by these lines and y-axis. (Board Term 1, 2017)

20. Draw the graph of the following pair of linear equations:
$x + 3y = 6$ and $2x-3y = 12$

Find the ratio of the areas of the two triangles formed by first line, $x = 0$, $y = 0$ and second line, $x = 0$, $y = 0$. (Board Term 1, 2016)

21. Solve the following pair of linear equations graphically:
$2x + y = 4$
$2x - y = 4$.
Also, find the co-ordinates of the vertices of the triangle formed by the lines with y-axis and also find the area of triangle. (Board Term 1, 2015)

3.3 Algebraic Methods of Solving a Pair of Linear Equations

MCQ

22. The value of k for which the pair of equations $kx = y + 2$ and $6x = 2y + 3$ has infinitely many solutions.
(a) is $k = 3$
(b) does not exist
(c) is $k = -3$
(d) is $k = 4$ (2023)

23. A father is three times as old as his son. In 12 years time, he will be twice as old as his son. The sum of the present ages of the father and the son is
(a) 36 years
(b) 48 years
(c) 60 years
(d) 42 years (Term I, 2021-22)

24. If $17x - 19y = 53$ and $19x - 17y = 55$, then the value of $(x + y)$ is
(a) 1
(b) -1
(c) 3
(d) -3 (Term I, 2021-22)

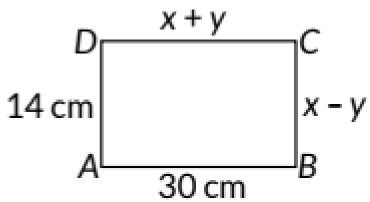
SAI (2 marks)

25. The sum of the numerator and the denominator of a fraction is 18. If the denominator is increased by 2,
the fraction reduces to $\frac{1}{3}$. Find the fraction. *(2021C)*

26. The larger of two supplementary angles exceeds the smaller by 18°. Find the angles. (2019)

27. Solve the following pair of linear equations: $3x - 5y = 4$, $2y + 7 = 9x$ (2019)

28. In figure, ABCD is a rectangle. Find the values of x and y.



SA II (3 marks)

29. Half of the difference between two numbers is 2. The sum of the greater number and twice the smaller number is 13. Find the numbers. (2023)

30.

A fraction becomes $\frac{1}{3}$ when 1 is subtracted from the numerator and it becomes $\frac{1}{4}$ when 8 is added to its denominator. Find the fraction. *(2020)* AP

31. The present age of a father is three years more than three times the age of his son. Three years hence the father's age will be 10 years more than twice the age of the son. Determine their present ages. (2020) Ev

32. A father's age is three times the sum of the ages of his two children. After 5 years his age will be two times the sum of their ages. Find the present age of the father. (Delhi 2019)

33.

A fraction becomes $\frac{1}{3}$ when 2 is subtracted from the numerator and it becomes $\frac{1}{2}$ when 1 is subtracted from the denominator. Find the fraction. (*Delhi 2019*)

34. A part of monthly hostel charges in a college hostel are fixed and the remaining depends on the number of days one has taken food in the mess. When a student A takes food for 25 days, he has to pay 4,500, whereas a student B who takes food for 30 days, has to pay ₹ 5,200. Find the fixed charges per month and the cost of food per day. (Al 2019)

35. Solve by elimination $3x = y + 5$ and $5x - y = 11$. (Board Term 1, 2017)

36. Two chairs and three tables cost 5650 whereas three chairs and two tables cost 7100. Find the cost of a chair and a table separately.
(Board Term 1, 2016)

LA (4/5/6 marks)

37. Two schools 'P' and 'Q' decided to award prizes to their students for two games of Hockey * x per student and Crickety per student. School 'P' decided to award a total of 9,500 for the two games to 5 and 4 students respectively; while school 'Q' decided to award * 7,370 for the two games to 4 and 3 students respectively.

Based on the given information, answer the following questions.
(i) Represent the following information algebraically (in terms of x and y).
information
(ii) (a) What is the prize amount for hockey?

OR

(b) Prize amount on which game is more and by how much?
(iii) What will be the total prize amount if there are 2 students each from two games? (2023)

38. The ratio of income of two persons is 9 : 7 and the ratio of their expenditure is 4: 3, if each of them manage to save 2000/month. Find their monthly incomes. (Board Term 1, 2017)

39. The sum of the digits of two digit number is 9. Also 9 times the number is twice the number obtain by reversing the order of digits. Find the numbers.
(Board Term 1, 2017)

40. While teaching about the Indian National flag, teacher asked the students that how many lines are there in Blue colour wheel? One student replies that it is 8 times the number of colours in the flag. While other says that the sum of the number of colours in the flag and number of lines in the wheel of the flag is 27. Convert the statements given by the students into Linear Equation of two variables. Find the number of lines in the wheel. What does the wheel signifies in the flag? (Board Term 1, 2016)

41. Points A and B are 100 km apart on a highway. One car starts from A and another from B at the same time. If they travel in same direction at different speeds, they meet in 5 hours. If they travel towards each other, they meet in 1 hour. What are the speeds of the two cars? What steps do you suggest to save petrol? (Board Term 1, 2015)

Solution of Pair of Linear Equations

MCQ

42. The value of k for which the system of equations x+y-4=0 and 2x+ky = 3, has no solution, is
(a) -2
(b) #2
(c) 3
(d) 2 (2020)

SAI (2 marks)

43. Find the value of k for which the system of equations x+2y= 5 and 3x+ky + 15 = 0 has no solution. (2021 C)

44. Find the value(s) of k so that the pair of equations x+2y= 5 and 3x+ky + 15 = 0 has a unique solution. (2019)

45. Find the relation between p and q if x = 3 and y = 1 is the solution of the pair of equations x - 4y+ p = 0 and 2x+y-q-2=0. (2019 C)

46. Find c if the system of equations cx + 3y+ (3-c) = 0; 12x+cy - c = 0 has infinitely many solutions? (2019 C)

47. Find the value of k for which the following pair of linear equations have infinitely many solutions.
2x + 3y = 7, (k+1)x+(2k - 1)y = 4k + 1 (Delhi 2019)

48. For what value of k, does the system of linear equations
$2x + 3y = 7$, $(k-1)x+(k+2)y = 3k$
have an infinite number of solutions? (AI 2019)

49. Find the value(s) of k for which the pair of equations
$kx+2y=3$ has a unique solution.
$3x+6y=10$ (2019)

50. Find k so that the following pair of linear equations has no solution.
$3x + y = 1$
$(2k-1)x+(k-1)y = 2k + 1$. (Board Term I, 2015)

LA (4/5/6 marks)

51. Case study based question is compulsory. Attempt any 4 sub-part from the question. Each sub-part carries 1 mark.
The residents of a housing society, on the occasion of environment day, decided to build two straight paths in the central park of the society and also plant trees along the boundary lines of each path. Taking one corner of the park as origin and the two mutually perpendicular lines as the x-axis and y-axis, the paths were represented by the two linear equations $2x-3y= 5$ and $-6x+9y=7$.
Based on the above, answer the following questions:
(i) Two paths represented by the two equations here are
(a) intersecting
(b) overlapping
(c) parallel
(d) mutually perpendicular

(ii) Which one of the following points lie on the line $2x-3y=5$?
(a) (-4,1)
(b) (4,-1)
(c) (4, 1)
(d) (-4, -1)

(iii) If the line $-6x + 9y= 7$ intersects the y-axis at a point, then its coordinates are

(iv) If a pair of equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has a unique solution, then

(a) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

(b) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

(c) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

(d) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

(v) If $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$, , then the two lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are

(a) parallel
(b) coincident
(c) intersecting
(d) perpendicular to each other (2021 C)

CBSE Sample Questions

Pair of Linear Equations in Two Variables

MCQ

1. If the system of equations 3x + y = 1 and (2k - 1)x + (k-1)y = 2k + 1 is inconsistent, then k =
(a) -1
(b) 0
(c) 1
(d) 2 (2022-23)

2. The value of k for which the lines 5x + 7y = 3 and 15x+21y=k coincide is
(a) 9
(b) 5
(c) 7
(d) 18 (Term I, 2021-22)

3. The lines x = a and y = b, are
(a) intersecting
(b) parallel

(c) overlapping
(d) none of these (Term I, 2021-22)

4. One equation of a pair of dependent linear equations is $-5x + 7y = 2$. The second equation can be
(a) $10x + 14y+4=0$
(b) $-10x-14y+4=0$
(c) $-10x+14y+4=0$
(d) $10x - 14y = -4$ (Term 1, 2021-22)

5. If 3 chairs and 1 table costs Rs. 1500 and 6 chairs and 1 table costs Rs. 2400. Form linear equations to represent this situation. (2020-21)

3.3 Algebraic Methods of Solving a Pair of Linear Equations

MCQ

6. If $217x+131y=913$, $131x+217y = 827$, then x+yis
(a) 5
(b) 6
(c) 7
(d) 8 (Term I, 2021-22)

VSA (1 mark)

7. For what value of k, the pair of linear equations $3x + y = 3$ and $6x+ky = 8$ does not have a solution? (2020-21)

SAI (2 marks)

8. If $49x+51y = 499$, $51x + 49y= 501$, then find the value of x and y. (2022-23)

SA II (3 marks)

9. A train covered a certain distance at a uniform speed. If the train would have been 6 km/h faster, it would have taken 4 hours less than the scheduled time. And, if the train were slower by 6 km/hr ; it would have taken 6 hours more than the scheduled time. Find the length of the journey. (2022-23)

SOLUTIONS

Previous Years' CBSE Board Questions

1. (c): The given pair of linear equations is $2x = 5y + 6$ and $15y=6x-18$
i.e., $2x-5y-6= 0$ and $6x - 15y - 18 = 0$

As $\frac{2}{6}=\frac{-5}{-15}=\frac{-6}{-18}$

i.e., $1/3 = 1/3 = 1/3$
:- Lines are coincident.

2. (b): The given pair of linear equations is

$$\frac{3x}{2}+\frac{5y}{3}=7 \quad \text{or} \quad \frac{3x}{2}+\frac{5y}{3}-7=0 \qquad \text{...(i)}$$

$$\text{and } 9x+10y=14 \quad \text{or} \quad 9x+10y-14=0 \qquad \text{...(ii)}$$

Here, $a_1=\frac{3}{2}, b_1=\frac{5}{3}, c_1=-7;$

$a_2=9, b_2=10, c_2=-14$

$$\therefore \quad \frac{a_1}{a_2}=\frac{3/2}{9}=\frac{1}{6}, \frac{b_1}{b_2}=\frac{5/3}{10}=\frac{1}{6}, \frac{c_1}{c_2}=\frac{-7}{-14}=\frac{1}{2}$$

$$\Rightarrow \quad \frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2},$$

So, the given pair of equations is inconsistent.

3. The pair of linear equations are
$3x+y-7=0$ and $6x+2y-8=0$
Here, $a_1 = 3, b_1 = 1, c_1 = -7; a_2 = 6, b_2 = 2, c_2 = -8$

$$\therefore \quad \frac{a_1}{a_2}=\frac{3}{6}=\frac{1}{2}, \frac{b_1}{b_2}=\frac{1}{2}, \frac{c_1}{c_2}=\frac{-7}{-8}=\frac{7}{8}$$

$$\therefore \quad \frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$$

Thus, the pair of linear equations are parallel.

4. The given pair of linear equations are

$$\frac{3}{2}x+\frac{5}{3}y=7 \quad \text{or} \quad \frac{3}{2}x+\frac{5}{3}y-7=0 \qquad \text{...(i)}$$

and $\frac{3}{2}x+\frac{2}{3}y=6$ or $\frac{3}{2}x+\frac{2}{3}y-6=0$ ...(ii)

Here $a_1 = \frac{3}{2}, b_1 = \frac{5}{3}, c_1 = -7; a_2 = \frac{3}{2}, b_2 = \frac{2}{3}, c_2 = -6$

$$\frac{a_1}{a_2}=\frac{3/2}{3/2}=1, \frac{b_1}{b_2}=\frac{5/3}{2/3}=\frac{5}{2}$$

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

So, the pair of linear equations intersect at a point.

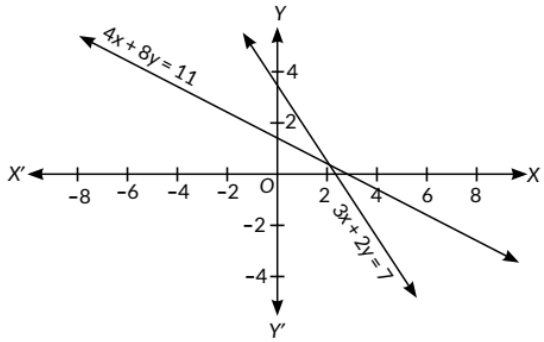
5. We have, $2x + y + 3 = 0$; $4x+2y+6=0$ Here, $a_1 = 2, b_1 = 1, C_1 = 3; a_2 = 4, b_2 = 2, c_2 = 6$

$$\therefore \quad \frac{a_1}{a_2}=\frac{2}{4}=\frac{1}{2}, \frac{b_1}{b_2}=\frac{1}{2} \text{ and } \frac{c_1}{c_2}=\frac{3}{6}=\frac{1}{2}$$

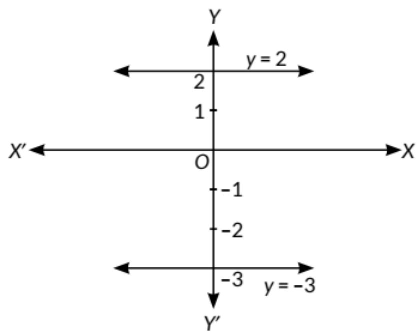
$$\Rightarrow \quad \frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}=\frac{1}{2}$$

Hence, the given pair of linear equations is coincident.

6. (c): Clearly, from graph we can see that, both lines intersect each other.

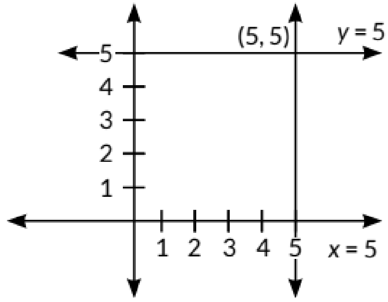


7. (d): Given equations are, y = 2 and y = - 3.



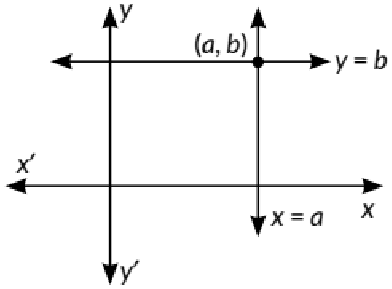
Clearly, from graph we can see that, both equations are parallel to each other. So, there will be no solution.

8. (b): Given equations are x = 5 and y = 5

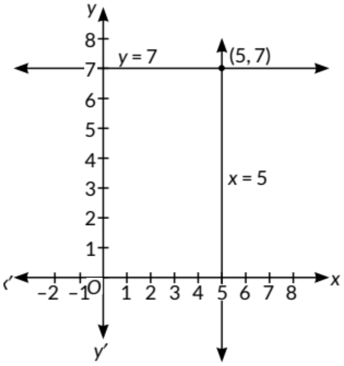


Clearly, from graph we can see that both lines intersect each other at (5, 5).
:- The given pair of equations has a unique solution.

9. (a): The pair of equations x = a and y = b graphically represents lines which are parallel to y-axis and x-axis respectively.
The lines will intersect each other at (a, b).



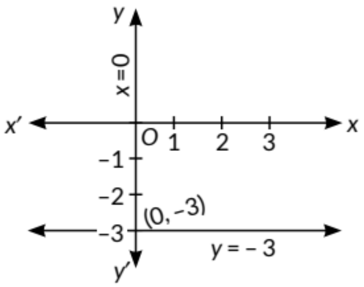
10. Given equations are
x = 5 ... (i)
y = 7 ... (ii)
Draw the line x = 5 parallel to y-axis and y = 7 parallel to x-axis.
:- The graph of equation (i) and (ii) is as follows:



The lines x = 5 and y = 7 intersects each other at (5, 7).

Pair of Linear Equations in Two Variables

11. Given pair of equations are
x=0 ...(i)
and y = -3 ...(ii)
x = 0 means y-axis and draw a line y = -3 parallel to x-axis.
:- The graph of given equation (i) and (ii) is



The lines intersect each other at (0, -3). Therefore, the given pair of equations is consistent.

12. Solutions of linear equations
2y-x=8 ...(i)
5y-x=14 ...(ii)
and y- 2x = 1 ...(iii)
are given below:

x	-4	0	2
y	2	4	5

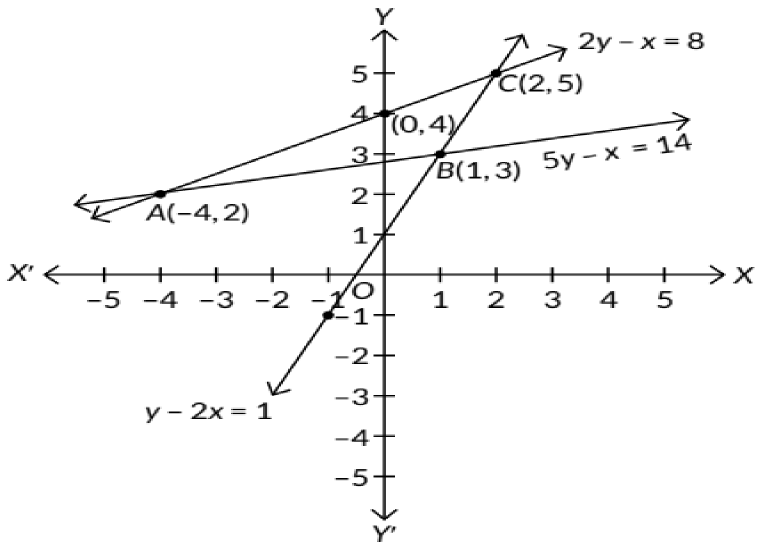
(i)

x	-4	1
y	2	3

(ii)

x	-1	1	2
y	-1	3	5

(iii)



From the graph of lines represented by given equations, we observe that
Lines (i) and (iii) intersect each other at C(2,5),
Lines (ii) and (iii) intersect each other at B(1, 3) and
Lines (i) and (ii) intersect each other at A(-4, 2).
Coordinates of the vertices of the triangle are
A(-4, 2), B(1, 3) and C(2,5).

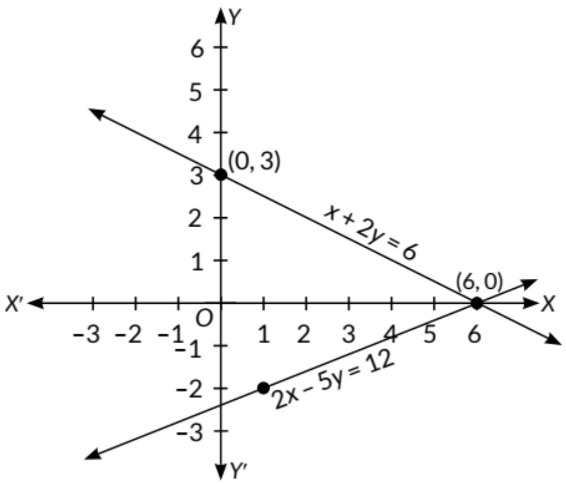
13. Solution of linear equations
x+2y=6 ...(i)
and 2x-5y= 12 ...(ii)
are given below

x	0	6
y	3	0

(i)

x	6	1
y	0	-2

(ii)



From the graph, the two lines intersect each other at point (6,0)
:- x = 6 and y = 0

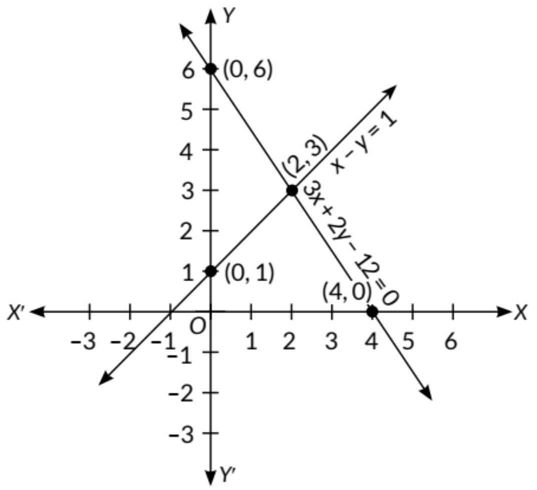
14. Solutions of linear equations
x-y+1=0
and 3x+2y-12=0 ...(i)
are given below: ...(ii)

x	0	-1
y	1	0

(i)

x	4	0
y	0	6

(ii)



From the graph, the two lines intersect each other at the point (2, 3). ..
x=2,y=3.

15. Let x and y be the amount contributed by two
sections A and B respectively.
According to question,
x+y=1500 ...(i) and x - y = -100 ...(ii)
Two solutions of each linear equations are

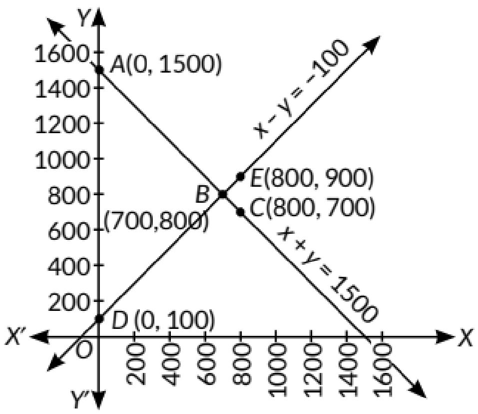
x	0	800
y	1500	700

(i)

x	0	800
y	100	900

(ii)

The graphical representation of the given pair of linear equations is given below:



The two lines intersect each other at the point (700, 800).
So, x = 700, y = 800.
:- The amount contributed by section A is 700 and by section B is 800.

16. Two solutions of linear equations
3x+5y=15 ...(i)
and 6x-5y=30 ...(ii)
are given below:

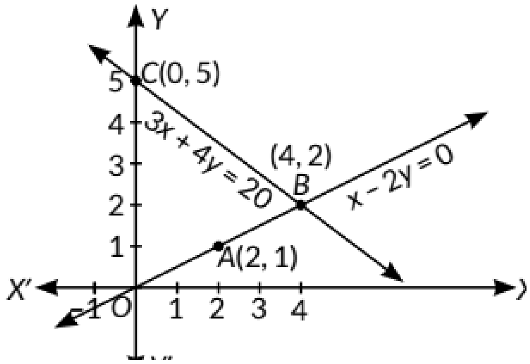
x	0	5
y	3	0

(i)

x	0	5
y	-6	0

(ii)

The graphical representation of the given pair of linear equations is given below:



The two lines intersect each other at the point (4, 2). So, x = 4, y = 2 is the required solution.

19. Two solutions of linear equations.
2y-3x=14 ...(i) and 2x + 3y = 8 ...(ii)
are given below:

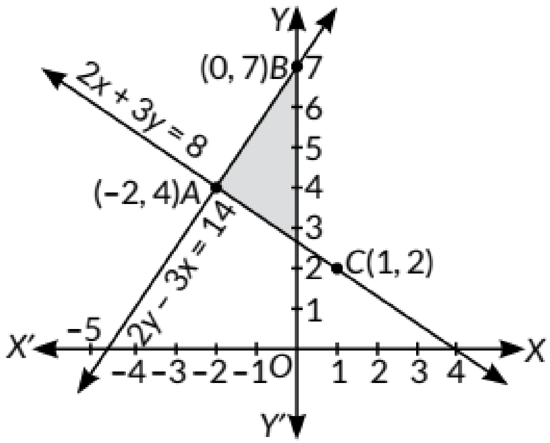
x	-2	0
y	4	7

(i)

x	-2	1
y	4	2

(ii)

The graphical representation of the given pair of linear equations is as follows:



The two lines intersect at the point (-2, 4).
So, x = -2, y = 4, is the required solution.

20. Two solutions of the given linear equations
x+3y=6 ...(i)
and 2x-3y = 12 ...(ii)
are given below:

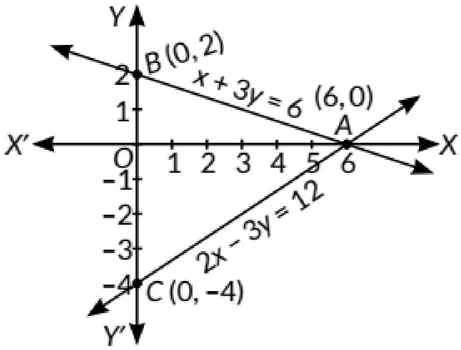
x	6	0
y	0	2

(i)

x	6	0
y	0	-4

(ii)

The graphical representation of the given pair of linear equations is as follows:



The line x + 3y = 6 intersects the y-axis at (0, 2) and the line 2x-3y= 12 intersects the y-axis at (0, -4) and the two lines intersect at the point (6, 0) on x-axis.
The area of the triangle formed by first line, x = 0, y = 0.
= Area of AABO

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

And the area of the triangle formed by second line, x = 0,
y=0
= Area of AAOC

$$= \frac{1}{2} \times 4 \times 6 = 12 \text{ sq. units.}$$

So, the ratio of areas of triangles $= \dfrac{\text{Area of } \Delta ABO}{\text{Area of } \Delta AOC}$

$$= \frac{6}{12} = \frac{1}{2}$$

Hence, the ratio of the areas of triangles is 1 : 2.

21. Two solutions of each linear equations
$2x+y=4$ (i) and $2x - y = 4$ ...(ii)
are given below:

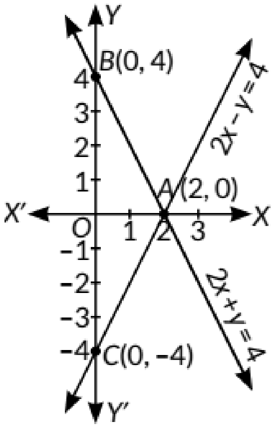
x	0	2
y	4	0

(i)

x	0	2
y	−4	0

(ii)

The graphical representation of the given pair of linear equations is as follows:



The coordinates of the vertices of AABC are A(2, 0),
B(0, 4) and C(0, -4).
Now, required area = Area of AABC

$= \frac{1}{2}(\text{Base} \times \text{Height})$

$= \frac{1}{2} \times BC \times OA$

$= \frac{1}{2} \times 8 \times 2 = 8$ sq. units.

22. (b): Given equations are
$kx = y + 2 = kx-y-2=0$
$6x=2y+36x-2y-3=0$

For infinitely many solutions $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

As, $\frac{k}{6} = \frac{1}{2} \neq \frac{2}{3}$

Hence, value of k does not exist.

23. (b): Let age of father be 'x' years and age of son be
'y' years.
According to the question, $x = 3y$ ...(i)

and $x+12=2(y+12) \Rightarrow x - 2y = 12$ ...(ii)
From (i) and (ii), we get $x = 36, y = 12$
:- $x+y=48$ years

24. (a): Given, $17x-19y= 53$ ...(i)
and $19x - 17y = 55$ ...(ii)
Multiplying (i) by 19 and (ii) by 17, and by subtracting we get, $323x-361y-(323x-289y) = 1007 - 935$
$\Rightarrow -72y=72 \Rightarrow y=-1$
Putting $y = -1$ in (i), we get, $17x - 19 (-1) = 53$
$\Rightarrow 17x=53-19$
$x+y=2-1=1$
$17x=34 \Rightarrow x=2$

25. Let the numerator be x and denominator be y of the fractions. Then, the fraction = $\frac{x}{y}$.
Given, $x + y = 18$ ...(i)
and $\frac{x}{y+2} = \frac{1}{3}$
$\Rightarrow 3x - y = 2$ ...(ii)
Adding (i) and (ii), we get
$4x = 20 \Rightarrow x = 5$
Put the value of x in (i), we get
$5 + y = 18 \Rightarrow y = 13$
$\therefore$ The required fraction is $\frac{5}{13}$.

26. Let the larger angle be x° and smaller angle be y°. We know that the sum of two supplementary pair of angles is always 180°.
:. We have $x + y° = 180°$ ...(i)
and $x° - y° = 18°$ ...(ii) [Given]
By (i), we have $x° =180° - y°$ ...(iii)
Put the value of x° in (ii), we get
$180° - y° - y° = 18°$
$162°= 2y° \Rightarrow y=81$
From (3), we have $x°\ 180° - 81° = 99°$
:- The angles are 99° and 81°.

27. Given pair of linear equations,
$3x-5y=4$ ...(i)

2y+7=9x

$\Rightarrow$ 9x-2y=7 ...(ii)

Multiply (i) by 3 and subtract from (ii), as

9x-2y-(9x-15y) = 7 – 12

$$\Rightarrow \quad 9x - 2y - 9x + 15y = -5 \Rightarrow 13y = -5 \Rightarrow y = \frac{-5}{13}$$

Put $y = \frac{-5}{13}$ in (i), we get

$$3x - 5\left(\frac{-5}{13}\right) = 4$$

$$\Rightarrow \quad 3x + \frac{25}{13} = 4 \quad \Rightarrow \quad 3x = 4 - \frac{25}{13} \quad \Rightarrow \quad x = \frac{27}{13 \times 3} = \frac{9}{13}$$

Hence, $x = \frac{9}{13}$ and $y = \frac{-5}{13}$

28. Here, ABCD is the rectangle

:- AB = DC and DA = CB

$\Rightarrow$ x+y=30 ...(i)

and x - y = 14 ...(ii)

Adding (i) and (ii), we get

2x=44$\Rightarrow$ x=22

Putting the value of x in (i), we get

22+y=30$\Rightarrow$y=30-228 x = 22, y = 8

29. Let x and y be two number such that x > y. According to question,

$$\frac{x-y}{2} = 2 \Rightarrow x - y = 4 \qquad \text{...(i)}$$

and x + 2y = 13 ...(ii)

Subtracting (i) from (ii), we get

3y=9y=3

Substitute y = 3 in (i), we get

x-3=4$\Rightarrow$x=7

30.

Let the required fraction be $\frac{x}{y}$.

According to question, we have

$\frac{x-1}{y}=\frac{1}{3}$ ...(i)

and $\frac{x}{y+8}=\frac{1}{4}$ ...(ii)

From (i), $3x - 3 = y$

$\Rightarrow \quad 3x - y - 3 = 0$ ...(iii)

From (ii), $4x = y + 8$

$4x-y-8=0$ ...(iv)

Subtracting (iii) from (iv), we get $x = 5$

Substituting the value of x in (iii), we get $y = 12$

Thus, the required fraction is $\frac{5}{12}$.

31. Let the present age of son be x years and that of father be y years.

According to question, we have

$y=3x+3=3x-y+3=0$ ...(i)

And $y+3=2(x+3)+10$

$\Rightarrow y+3=2x+6+10$

$\Rightarrow 2x-y+13=0$ ...(ii)

Subtracting (ii) from (i), we get $x = 10$

Substituting the value of x in (ii), we get $y = 33$

So, the present age of son is 10 years and that of father is 33 years.

32. Let the age of two children be x and y respectively.

:- Father's present age $= 3(x + y)$

After 5 years, sum of ages of children $= x + 5 + y + 5$

and age of father $= 3(x + y) + 5$

According to question,

$3(x+y)+5=2(x+y+10)$

$= x + y + 10$

$3x + 3y+5=2x+2y+20 \Rightarrow x+y=15$

Hence, present age of father= $3(x + y)$
$= 3 \times 15 = 45$ years

33.

Let the fraction be $\frac{x}{y}$.

Then, according to question,

$$\frac{x-2}{y} = \frac{1}{3} \text{ and } \frac{x}{y-1} = \frac{1}{2}$$

⇒ 3x-6=y and 2x=y-1
⇒ 3x - y - 6 = 0... (i) and 2x - y +1=0 ... (ii)
Subtracting (ii) from (i), we get
x-7=0 ⇒ x=7
From (i), 3(7) -y-6-0 21-6=yy=15

∴ Required fraction = $\frac{7}{15}$

34. Let the monthly fixed charges be Rs x and cost of food per day be Rs y.
For student A, Fixed charges + cost of food for 25 days = Rs 4500
i.e., x+25y = 4500 (i)
For student B, Fixed charges + cost of food for 30 days = Rs 5200
i.e., x+30y=5200 ...(ii)
Subtracting (i) from (ii), we get
5y=700⇒ y = 140
From (i), x + 25(140) = 4500 ⇒x= 4500 - 3500 = 1000
Hence, monthly fixed charges is Rs 1000 and cost of food per day is Rs 140.

35. Given pair of linear equations are
3x - y = 5 ...(i) and 5x - y = 11 ...(ii)
Subtracting (ii) from (i), we get
3x-y-(5x - y) = 5-11
= -2x=-6x=3
Substituting the value of x in (i), we get

3x3-y=5-y=5-9 = y=4
Hence, x = 3, y=4

36. Let the cost of a chair bex and the cost of a table be Rs y.
Then, according to question,
2x + 3y = 5650 ...(i)
3x + 2y = 7100 ...(ii)
Multiply (i) by 2 and (ii) by 3, we get
4x+6y= 11300 ...(iii)
9x+6y=21300 ...(iv)
Subtracting (iv) from (iii), we get
5x = 10000 → x = 2000
Putting the value of x in (i), we get
2 x 2000 + 3y = 5650
3y=5650-4000 = 3y = 1650

$$\Rightarrow \quad y = \frac{1650}{3} = 550$$

37. (i) For Hockey, the amount given to per student = Rs x
For cricket, the amount given to per student=Rs y
From the question,
5x + 4y = 9500 ...(1)
4x + 3y = 7370 ...(2)
(ii) (a) Multiply (1) by 3 and (2) by 4 and then subtracting, we get
15x+12y - (16x + 12y) = 28500 – 29480
⇒x=-980 ⇒ x=980
The prize amount given for hockey is Rs 980 per student
OR
(b) Multiply (1) by 4 and (2) by 5 and then subtracting, we get
20x + 16y - 20x-15y = 38000-36850
⇒ y = 1150
The prize amount given for cricket is more than hockey by Rs (1150 - 980) = 170.
(iii) Total prize amount = 2 × 980 + 2 × 1150
= Rs (1960+2300) = 4260

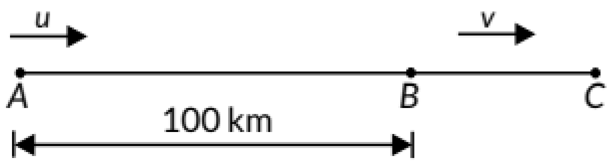
38. Let the income of first person be 9x and the income of second person be 7x. Further, let the expenditures of first and second persons be 4y and 3y respectively. Then, Saving of the first person = 9x - 4y Saving of the second person = 7x-3y According to question,
$9x-4y = 2000$ ...(i)
and $7x-3y=2000$ ...(ii)
Multiply (i) by 7 and (ii) by 9 and by subtracting, we get
$63x-28y-(63x - 27y) = 14000 – 18000$
$\Rightarrow y = 4000$
From (i), $9x = 2000 + 4 \times 4000 = 18000 \Rightarrow x=2000$
Thus, monthly income of first person = 9 x 2000
= Rs 18000
Monthly income of second person = 7 x 4000 =
28000

39. Let the tens digit of a number be a and ones digit
be b, then the number be 10a + b.
On reversing the digits, the number is 10b + a
According to question,
$a+b=9$ ...(i)
and $9(10a + b) = 2(10b + a)$
$90a + 9b = 20b + 2a$
$\Rightarrow -11b +88a0b-8a=0$ ...(ii)
Subtracting (i) from (ii), we get a = 1
Putting the value of a in (ii), we get $b = 8 \times 1 = 8$
Hence, required number = 10x1+8=18

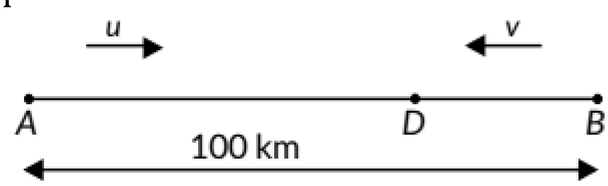
40. Let the number of colours in the flag be x and number
of lines in the blue colour wheel be y.
According to question,
$8x=y\Rightarrow 8x - y = 0$ ...(i)
and $x + y = 27$ ...(ii)
Adding (i) & (ii), we get
$9x=27\Rightarrow x=27/9 = 3$
Putting the value of x in (i), we get
$y=8x3\Rightarrow y = 24$
Thus, the number of colours in the flag is 3 and number of

lines in the blue colour wheel is 24.
The wheel in flag signifies the law of dharma. This wheel denotes motion.

41. Let the speed of car at A be u km/h and car at B be v km/h.
Case 1: When both cars travel in the same direction



Let both the cars meet at point C in 5 hours.
Car at A travels distance AC, whereas car at B travels distance BC.
:- $AC = 5 \times u$ and $BC = 5 \times v$
Now, $AC - BC = 100 = 5u - 5v = 100$
$\Rightarrow u - v = 20$ ...(i)
Case 2: When both cars travel in opposite directions Let both cars meet at point D.



Car at A will travel distance AD, whereas car at B will travel distance BD.
:- $AD = 1 \times u$ and $BD = 1 x v$
Now, $AD + BD = 100$
$= u + v = 100$ ...(ii)
On adding (i) and (ii), we get
$2u\ 120 = u = 60$
From (ii), we get
$60 + v = 100\ v = 40$
Steps to save petrol:
(i) Drive at a moderate speed, as higher the speed, the higher the fuel consumption.
(ii) Use public transport.

42. (d): The given system of equation will have no solution.

$$\therefore \quad \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

The given system of equations will have no solution.

$$\therefore \quad \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2} \Rightarrow \frac{1}{2} = \frac{1}{k} \neq \frac{-4}{-3}$$

Now, $\frac{1}{2} = \frac{1}{k} \Rightarrow k = 2$

Clearly, $\frac{1}{k} \neq \frac{-4}{-3}$ for $k = 2$

Hence, the given system of equations will have no solution for k = 2.

43. Given, system of equations
x+2y= 5
3x+ky = -15 has no solution.

$$\therefore \quad \frac{1}{3} = \frac{2}{k} \neq \frac{5}{-15} \Rightarrow k = 6$$

:- For k = 6, the given system of equations has no solution.

44. The given pair of linear equations is
x+2y=5
3x+ky = -15
Since, the system of equations has a unique solution.

$$\therefore \quad \frac{1}{3} \neq \frac{2}{k} \Rightarrow k \neq 6$$

:- For all values of k except k = 6, the given pair of linear equations will have unique solution.

45. Given pair of equations are
x-4y+p=0 ...(i)
and 2x+y-q-2=0 ...(ii)
It is given that x = 3 and y = 1 is the solution of (i) and (ii)
:- 3-4x1+p=0⇒ p=1 and 2×3+1-q-2=0q=5. q = 5p

46. Given system of equations

cx+3y+(3-c)=0

and 12x+cy - c = 0 has infinitely many solutions.

$$\therefore \frac{c}{12}=\frac{3}{c}=\frac{3-c}{-c}$$

$$\Rightarrow \frac{c}{12}=\frac{3}{c} \text{ or } \frac{3}{c}=\frac{3-c}{-c}$$

$$\Rightarrow c^2=36 \text{ or } -3c=3c-c^2$$

$$\Rightarrow c=\pm 6 \text{ or } c^2-6c=c(c-6)=0 \Rightarrow c=0 \text{ or } 6$$

:- The value of c, that satisfies both the condition is c = 6.

47. The given pair of linear equations is

2x + 3y-7=0

(k+1)x+(2k - 1)y - (4k + 1) = 0

Since, given equations have infinitely many solutions.

$$\therefore \frac{2}{k+1}=\frac{3}{2k-1}=\frac{-7}{-(4k+1)}$$

$$\text{Now, } \frac{2}{k+1}=\frac{3}{2k-1} \Rightarrow 4k-2=3k+3$$

$$\Rightarrow 4k-3k=3+2 \Rightarrow k=5$$

48. The given pair of linear equations is

2x + 3y-7=0

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

Since, given equations have infinitely many solutions

$$\therefore \frac{2}{k-1}=\frac{3}{k+2}=\frac{-7}{-3k}$$

$$\text{Now, } \frac{2}{k-1}=\frac{7}{3k}$$

$$\Rightarrow 6k=7k-7 \Rightarrow k=7$$

49. The given pair of linear equations is

kx + 2y = 3

3x+6y= 10

Since, the system of equations has unique solution.

$$\therefore \frac{k}{3} \neq \frac{2}{6} \Rightarrow k \neq 1$$

:- For all values of k except k = 1, the given pair of linear equations will have unique solution.

50. The given system of equation will have no solution.

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

Now, $\frac{3}{2k-1} = \frac{1}{k-1} \Rightarrow 3k - 3 = 2k - 1 \Rightarrow k = 2$

Clearly, $\frac{3}{2k-1} \neq \frac{1}{2k+1}$ for $k = 2$

Hence, the given system of equations will have no solution for k = 2.

51. (i) (c): Given equations are:
2x-3y=5
-6x+9y=7
Hence, $a_1 = 2$, $b_1 = -3$, $c_1 = -5$
a2=-6, $b_2 = 9$, $c_2 = -7$

Now, $\frac{a_1}{a_2} = \frac{2}{-6} = \frac{-1}{3}$,

$\frac{b_1}{b_2} = \frac{-3}{9} = \frac{-1}{3}$ and $\frac{c_1}{c_2} = \frac{-5}{-7} = \frac{5}{7}$

As $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

Equations are inconsistant and lines are parallel.
(ii) (c): If any point lies on the line ax + by = c, then it must satisfy the equation of the line.
Here, (4, 1) satisfies the equation of line 2x-3y = 5. As 2x4-3x1=5
= 8-3=5
= 5=5
(iii) (a) If a line ax + by = c intersects the y-axis at a particular point, then x = 0 at that point.
In this case, if x =0, then we have

$$-6 \times 0 + 9y = 7 \Rightarrow y = \frac{7}{9}$$

$\therefore$ The required coordinates are $\left(0, \frac{7}{9}\right)$.

(iv) (b) : If a pair of equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has a unique solution, then $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

(v) (b) : If $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$, then the two lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are coincident and system of equations has infinite solutions.

CBSE Sample Questions

1. (d): The system of equation is inconsistent when,

$$\frac{3}{2k-1} = \frac{1}{k-1} \neq \frac{1}{2k+1} \Rightarrow 3(k-1) = 2k-1 \Rightarrow k = 2 \qquad \textbf{(1)}$$

2.

(a): For lines to coincide, $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

So, $\frac{5}{15} = \frac{7}{21} = \frac{-3}{-k} \Rightarrow \frac{1}{3} = \frac{3}{k} \Rightarrow k = 9$ **(1)**

3. (a): Lines x = a is a line parallel to y-axis and y = b is a line parallel to x-axis.
So, they will intersect. (1)

4. (d): The given equation is -5x + 7y = 2
Multiplying both sides by -2, we get
-2(-5x + 7y) = -4⇒ 10x - 14y = -4

(a): Lines x = a is a line parallel to y-axis and y = b is a line parallel to x-axis.
So, they will intersect. (1)
(d): The given equation is -5x + 7y = 2
Multiplying both sides by -2, we get
-2(-5x + 7y) = -4⇒ 10x - 14y = -4

5. Let the cost of 1 chair = Rs x and the cost of 1 table = Rs y

Then, according to given condition, we get
3x + y = 1500, 6x + y = 2400 (1)

6. (a): We have,
217x+131y=913 ...(i)
131x+217y=827 ...(ii)
Adding (i) and (ii), we get
348x+348y = 1740 = x+y=5 (1)

7. Since the given system of equations have no solution.

$\therefore \quad \frac{3}{6} = \frac{1}{k} \neq \frac{3}{8}$ **(1/2)**

Now, $\frac{3}{6} = \frac{1}{k} \Rightarrow k = 2$

Clearly, $\frac{1}{k} \neq \frac{3}{8}$ for $k = 2$. **(1/2)**

8. We have, 49x+51y = 499 ...(i)
51x+49y=501 ... (ii)
Now, adding (i) and (ii), we get
100x + 100y= 1000
Dividing both sides by 100, we get
x + y = 10 ...(iii) (1/2)
Now, subtracting (i) from (ii), we get
2x-2y=2
⇒ x-y=1 ...(iv) (1/2)
Now, adding equation (iii) and (iv), we get
2x = 11⇒ x=11/2 (1/2)
Substitute the value of x in equation (iii), we get

$\frac{11}{2} + y = 10 \Rightarrow y = 10 - \frac{11}{2} = \frac{9}{2}$ **(1/2)**

9. Let length of journey is d. If usual speed of train is s km/hr and it takes time to reach the destination is t.
So, d = st

When train is faster by 6 km/hr, then

$\Rightarrow \quad t-4=\frac{d}{s+6} \quad \Rightarrow \quad t-4=\frac{st}{s+6}$

$\Rightarrow \quad 6t - 4s = 24$ ...(i) **(1)**

when train is slower by 6 km/hr then,

$t+6=\frac{d}{s-6}$

$\Rightarrow \quad t+6=\frac{st}{s-6}$

$\Rightarrow \quad -6t + 6s = 36$ ...(ii) **(1)**

Adding (i) and (ii), we get

6t-4s-6t+6s = 24 +36

2s=60 = s=30

Put s = 30 in (i), we get

= 6t-4 x 30=24

= 6t=144 t = 24

So, length of journey, d = st

= 30 × 24 km = 720 km (1)