LINEAR EQUATIONS IN TWO VARIABLES

CLASS X (2025-26)

	The general form for a pair of linear equations in two variables x and y is $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$, where a_1 , b_1 , c_1 , a_2 , b_2 , c_2 are all real numbers. The geometrical (i.e., graphical) representation of a linear equation in two variables is a straight line. a pair of linear equations in two variables will represent two straight lines, both to be considered together. i) If the lines intersect, then the system of equations has one solution , given by the point of intersection. ii) If the lines are parallel , then the system of equations has no solution iii) If the lines are coincident, then the system of equations has infinitely many solutions Any system that has at least one solution is called a **consistent system**. Thus, a linear system with **one solution** and with **infinitely many solutions** are both said to be **consistent** . A pair of linear equations which has **no solution**, is called an ***inconsistent*** pair of linear equations If the lines represented by the equation : $a_1x + b_1y + c_1 = 0$, $a_2x + b_2y + c_2 = 0$ are (i) intersecting, then $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ ii) coincident, then $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ iii) parallel, then $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$
1	**Assertion (A):** The system of equations $3x + 5y - 4 = 0$ *and* $15x + 25y - 25 = 0$ is inconsistent. **Reason (R) :** The pair of linear equations in two variables x and y is $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ is inconsistent if $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ CBSE 2024 BASIC
	ANS: Both A and R are true and R is the correct explanation of A.
2	Write whether the following pair of linear equations is consistent or not. $x + y = 14$, $x - y = 4$
	$x + y = 14$ and $x - y = 4$ $\frac{a_1}{a_2} = 1$, $\frac{b_1}{b_2} = -1$ $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ since The equations have unique solution. Pair of linear equations is consistent.
3	Find the value of *k* so that the following system of equations has no solution: $3x - y - 5 = 0$, $6x - 2y + k = 0$
	ANS: Here $a_1 = 3$, $b_1 = -1$, $c_1 = -5$, and $a_2 = 6$, $b_2 = -2$, $c_2 = k$. For no solution, (parallel) then $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ $\Rightarrow \frac{3}{6} = \frac{-1}{-2} \neq -\frac{5}{k}$ $k \neq -10$
4	For what value of *k* will the equations $x + 2y + 7 = 0$, $2x + ky + 14 = 0$ represent coincident lines?
	ANS: For coincident lines, the condition is $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ $\Rightarrow \frac{1}{2} = \frac{2}{k} = \frac{7}{14}$ $\Rightarrow \frac{1}{2} = \frac{2}{k} \Rightarrow k = 4$
5	For which values of *p*, does the pair of equations given below has unique solution? $4x + py + 8 = 0$ and $2x + 2y + 2 = 0$

	ANS: For unique solution (intersecting) then $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \Rightarrow \quad \frac{4}{2} \neq \frac{p}{2}$ $p \neq 4$
6	Determine k for which the system of equations has infinite solutions: $4x + y = 3$ and $8x + 2y = 5k$
	For infinite many solutions $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ $\frac{4}{8} = \frac{1}{2} = \frac{3}{5k} \quad \Rightarrow k = \frac{6}{5}$
7	Sum of two numbers is 35 and their difference is 13. Find the numbers.
	ANS: Let the numbers are x and y and $x > y$ A.T.Q., algebraic representation of the situation is $x + y = 35$ ...(i) and $x - y = 13$ ...(ii) Solve the numbers are 24, 11
8	Find the values of α and β for which the following system of linear equations has infinite solutions $2x + 3y = 7$, $2\alpha x + (\alpha + \beta)y = 28$.
	ANS: For infinite solutions, the condition is $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \quad \Rightarrow \quad \frac{2}{2\alpha} = \frac{3}{\alpha + \beta} = \frac{7}{28}$ (i) (ii) (iii) *Take (i) and (iii)* $\frac{1}{\alpha} = \frac{1}{4} \Rightarrow \alpha = 4$ *Take (ii) and (iii)* $\frac{3}{\alpha + \beta} = \frac{7}{28} \Rightarrow \frac{3}{4 + \beta} = \frac{1}{4}$ $4 + \beta = 12 \Rightarrow \beta = 8$ so $\alpha = 4, \ \beta = 8$.
9	Half the perimeter of a rectangular garden, whose length is 12 m more than its width is 60 m. Find the dimensions of the garden.
	ANS: Let length of the garden = x m and breadth of the garden = y m A.T.Q. $x = y + 12 \quad \Rightarrow \quad x - y = 12$ and $\frac{1}{2} \times$ Perimeter = 60 $\Rightarrow \frac{1}{2} \times 2(x + y) = 60 \Rightarrow x + y = 60$ Algebraic representation is $x - y = 12; x + y = 60$ $x = 36, \quad y = 24$
10	The cost of 2 kg apples and 1 kg of grapes on a day was found to be Rs. 320. The cost of 4 kg apples and 2 kg of grapes was found to be Rs. 600. If cost of 1 kg of apples and 1 kg of grapes is Rsx and Rs.y respectively, represent the given situation algebraically as a system of equations and check whether the system so obtained is consistent or not. CBSE 2025 AJMER **OR** Solve for x and y: $\sqrt{2}x + \sqrt{3}y = 5$, $\sqrt{3}x - \sqrt{8}y = -\sqrt{6}$
	ANS: $2x + y = 320$ $4x + 2y = 600$ $\frac{a_1}{a_2} = \frac{2}{4} = \frac{1}{2}$, $\frac{b_1}{b_2} = \frac{1}{2}$, $\frac{c_1}{c_2} = \frac{320}{600}$ $\Rightarrow \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ in-consistent **OR** $\sqrt{2}x + \sqrt{3}y = 5 \quad \Rightarrow \quad \sqrt{2}.\sqrt{3}x + \sqrt{3}.\sqrt{3}\,y = 5.\sqrt{3}$

$$\sqrt{6}\,x + 3y = 5\sqrt{3} - - - - - (i)$$

$$\sqrt{3}x - \sqrt{8}y = -\sqrt{6} \Rightarrow \sqrt{3}.\sqrt{2}\ x - \sqrt{8}.\sqrt{2}\,y = -\sqrt{6}.\sqrt{2}$$

$$\sqrt{6}\,x - 4y = -\sqrt{12} - - - - - - - - (ii)$$

(i) – (ii) $\Rightarrow 7y = 5\sqrt{3} - (-\sqrt{12})$

$\Rightarrow 7y = 5\sqrt{3} + 2\sqrt{3} = 7\sqrt{3}$

$\Rightarrow y = \sqrt{3}$ substitute and we get $x = \sqrt{2}$

Solution $x = \sqrt{2}$, $y = \sqrt{3}$

11 Solve the following system of linear equations graphically.
$2x - y - 2 = 0,\ -4x + y + 4 = 0$. Also find the absolute difference between the ordinates of the points where given lines cut $y - axis$. CBSE 2025 AJMER

ANS:

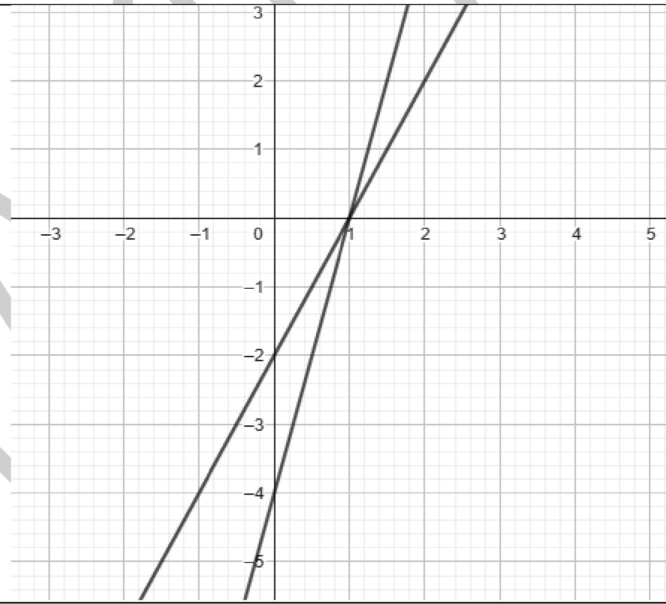
$2x - y - 2 = 0$

x	0	1
y	-2	0

$-4x + y + 4 = 0$

x	0	1
y	-4	0

Point of intersection (1,0)
Solution is (1,0)
absolute difference between the ordinates of the points where given lines cut $y - axis\ is\ |-4 - (-2)| = 2$



12 Check whether the pair of equations $x + 3y = 6$, $2x - 3y = 12$ is consistent.

System is consistent, intersecting, $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

13 For what value of k, the system of equations $2x - ky + 3 = 0$, $4x + 6y - 5 = 0$ is consistent?

ANS: $k \neq -3$

14 For what value of k, the system of equations $kx - 3y + 6 = 0$, $4x - 6y + 15 = 0$ represents parallel lines?

parallel, then $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$, $k = 2$

15 For what value of p, the pair of linear equations $5x + 7y = 10$, $2x + 3y = p$ has a unique solution.

ANS: Here given equations are
$5x + 7y = 10$ ...(i)
$2x + 3y = p$ ...(ii)
Here $a_1 = 5$, $b_1 = 7$, $c_1 = -10$
$a_2 = 2$, $b_2 = 3$, $c_2 = -p$
$\frac{a_1}{a_2} = \frac{5}{2}$, $\frac{b_1}{b_2} = \frac{7}{3}$ $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$
Given pair of linear equations has a unique solution for any value of p.

16 Solve the following pair of linear equations by substitution method $y - 5 = 0$; $3x + 4y - 20 = 0$

ANS: Given equations are
$y - 5 = 0$ ...(i)

	and $3x + 4y - 20 = 0$ ...(ii) From equation (i), we get $y - 5 = 0 \quad \Rightarrow \quad y = 5$ Substituting $y = 5$ in equation (ii), we get $3x + 4 \times 5 - 20 = 0$ $\Rightarrow \quad 3x + 20 - 20 = 0 \;\Rightarrow\; 3x = 0 \;\Rightarrow\; x = 0$ $x = 0, y = 5$
17	Solve the following pair of linear equations by substitution method: $2x - y = 1$; $4x + 3y = 27$
	ANS: Given equations are $2x - y = 1$ ...(i) $4x + 3y = 27$ ...(ii) From equation (i), we get $2x - y = 1 \;\Rightarrow\; -y = 1 - 2x \;\Rightarrow\; y = 2x - 1$ ...(iii) Substituting $y = 2x - 1$ in equation (ii), we get $4x + 3(2x - 1) = 27$ $4x + 6x - 3 = 27 \;\Rightarrow\; 10x = 30 \;\Rightarrow\; x = 3$ When $x = 3$, equation (iii), becomes $y = 2 \times 3 - 1 \;\Rightarrow\; y = 5$ $x = 3, y = 5$
18	Solve the following pair of linear equations by substitution method: $2x + 3y = 8$; $4x + 6y = 12$
	ANS: Given equations are $2x + 3y = 8$ ...(i) and $4x + 6y = 12$ ...(ii) From equation (i), we get $2x + 3y = 8 \quad \Rightarrow \quad 2x = 8 - 3y$ $\Rightarrow \; x = \frac{8-3y}{2}$ ...(iii) Substituting $x = \frac{8-3y}{2}$ in equation (ii), we get $4\left(\frac{8-3y}{2}\right) + 6y = 12$ $\Rightarrow \; 2(8 - 3y) + 6y = 12 \;\Rightarrow\; 16 - 6y + 6y = 12 \;\Rightarrow\; 16 = 12$ This is not true. Given pair of linear equations has no common solution.
19	Solve the following pair of linear equations by substitution method: $2x - y = -10$; $-6x + 3y = 30$
	ANS: Given equations are $2x - y = -10$ ...(i) and $-6x + 3y = 30$ ...(ii) From equation (i), we get $2x - y = -10 \;\Rightarrow\; -y = -10 - 2x$ $\Rightarrow \; y = 10 + 2x$ ...(iii) Substituting $y = 10 + 2x$ in equation (ii) we get $-6x + 3(10 + 2x) = 30$ $\Rightarrow \; -6x + 30 + 6x = 30 \;\Rightarrow\; 30 = 30$ Which is true for all values of x and y. Given pair of linear equations has infinite many solutions.
20	Solve the following pair of linear equations by substitution method: $x + y = 8$; $x - y = 4$
	ANS: Here $x + y = 8$ ...(i) and $x - y = 4$ ...(ii) From equation (i), we get $x + y = 8 \;\Rightarrow\; y = 8 - x$ ...(iii) Putting $y = 8 - x$ in equation (ii), we get

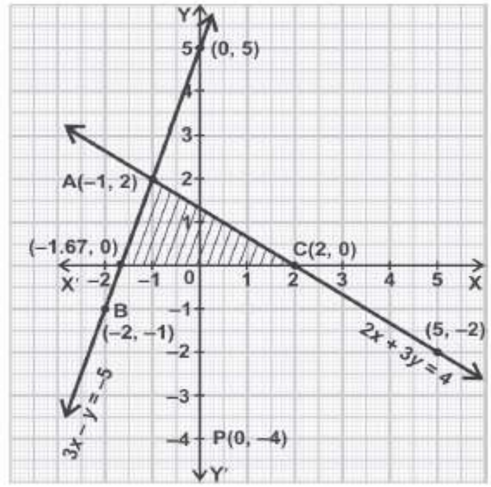
	$x-(8-x)=4 \Rightarrow \quad x-8+x=4$ $\Rightarrow \quad 2x=12 \Rightarrow \quad x=6$ When $x=6$, equation (i) becomes $y=8-6=2$ $x=6, y=2$
21	Solve: $99x + 101y = 499$; $\quad 101x + 99y = 501$
	ANS: $99x + 101y = 499 \quad ...(i)$ $101x + 99y = 501 \quad ...(ii)$ Adding $\quad 200x + 200y = 1000$ $x + y = 5 \quad ...(iii)$ Also, $\quad 99x + 101y = 499$ $101x + 99y = 501$ $- \quad - \quad -$ $-2x + 2y = -2$ $\Rightarrow \quad x - y = 1 \quad ...(iv)$ Solving (iii) and (iv) we get $x = 3, y = 2$
22	Solve for x and y using substitution method: $x + 2y - 3 = 0$; $3x - 2y + 7 = 0$.
	ANS: Given equations are $x+2y-3=0$ ...(i) $3x-2y+7=0$ ...(ii) From equation (i), we get $x+2y-3=0 \qquad x=3-2y$ ...(iii) Substituting $x=3-2y$ in equation (ii), we get $3(3-2y)-2y+7=0$ $9-6y-2y+7=0$ $-8y=-16$, $\quad y=2$ When $y=2$, equation (iii) becomes $x=3-2\times 2 \qquad x=-1$ $x=-1, y=2$
23	Find the values of α *and* β for which the following system of linear equations has infinite solutions $2x+3y=7$, $\quad 2\alpha x+(\alpha+\beta)y=28$.
	ANS: For infinite solutions, the condition is $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2} \Rightarrow \frac{2}{2\alpha}=\frac{3}{\alpha+\beta}=\frac{7}{28}$ (i) (ii) (iii) *Take (i) and (iii)* $\frac{1}{\alpha}=\frac{1}{4} \Rightarrow \alpha=4$ *Take (ii) and (iii)* $\frac{3}{\alpha+\beta}=\frac{7}{28} \Rightarrow \frac{3}{4+\beta}=\frac{1}{4}$ $4+\beta=12 \Rightarrow \beta=8$ so $\alpha=4$, $\beta=8$.
24	Solve the following system of linear equations graphically: 2x + 3y = 4; 3x – y = – 5 Shade the region bounded by the above lines and the x-axis

$2x + 3y = 4$

x	2	–1	5
y	0	2	–2

$y = 3x + 5$

x	0	–2	–1
y	5	–1	2



Two lines intersect at the point A(–1, 2).
Therefore solution is x = –1, y = 2.
Shaded portion ABC is the region bounded by the above lines and the x-axis.

25 Find the value of k for which the following system of equations has infinite number of solutions.
$2x + 3y = 4$, $(k+2)x + 6y = 3k + 2$

Here, $a_1 = 2$, $b_1 = 3$, $c_1 = -4$
and $a_2 = k + 2$, $b_2 = 6$, $c_2 = -(3k + 2)$
For infinite number of solutions. $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$\frac{2}{k+2} = \frac{3}{6} = \frac{-4}{-(3k+2)} \Rightarrow k = 2$

26 Solve the equations graphically: $2x + y = 2$; $2y - x = 4$
What is the area of the triangle formed by the two lines and the line $y = 0$?

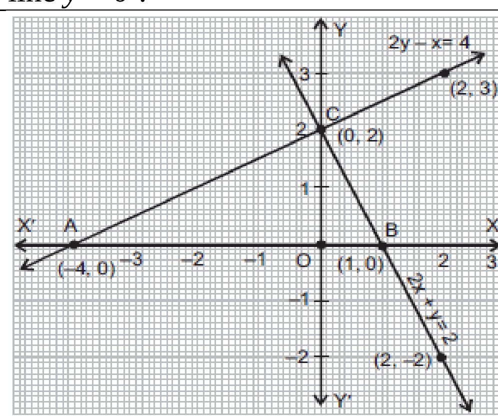
$2x + y = 2$ ...(i), $2y - x = 4$ ...(ii)
From (i), $2x + y = 2$

x	1	0	2
y	0	2	–2

From (ii), $2y - x = 4$

x	0	–4	2
y	2	0	3

Area $\Delta = \frac{1}{2}$ AB × CO $= \frac{1}{2} \times 5 \times 2 = 5$ square units.



27 The sum of the digits of a two-digit number is 8 and the difference between the number and that formed by reversing the digits is 18. Find the number

ANS: Let the digit at unit place be *y* and tenth place be *x*.
Number = $10x + y$
A.T.Q. $x + y = 8 \ldots$ (i)
and $10x + y - 10y - x = 18$
$9x - 9y = 18$
$x - y = 2 \ldots (ii)$
Adding (i) and (ii), we get

$2x = 10, \quad x = 5$

Putting $x = 5$ in equation (i)

$5 + y = 8 \quad , y = 3$

So, the number is $10 \times 5 + 3 = 53$

28 There are two rooms A and B. If 15 students are sent from A to B, the number of students in each room is same. If 5 students are sent from B to A number of students in A is double the number of students in B, find the number of students in each room.

Let the number of students in room A = x

Let the number of students in room B = y

From Given conditions

$x - 15 = y + 15 \quad , \quad x - y = 30$ ______(1)

$x + 5 = 2\,(y - 5), \quad x - 2y = -15$ ______(2)

Solve x = 75   y = 45

29 Solve the equations graphically: $2x + y = 2$; $2y - x = 4$

What is the area of the triangle formed by the two lines and the line $y = 0$?

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

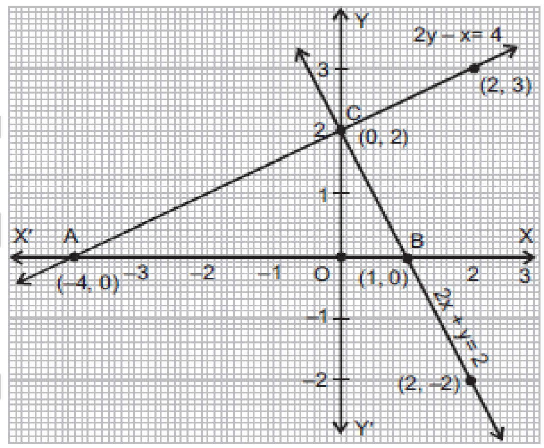
From (i), $2x + y = 2$

x	1	0	2
Y	0	2	–2

From (ii), $2y - x = 4$

x	0	–4	2
y	2	0	3

Area $\Delta = \frac{1}{2}$ AB × CO = $\frac{1}{2}$ × 5 × 2 = 5 square units.



30 **Assertion**(A): If the pair of equations $3x + y = 3$ *and* $6x + ky = 8$ does not have a solution , then the value of k is 2.

Reason (R): If the lines represented by the equation $a_1x + b_1y + c_1 = 0$, $a_2x + b_2y + c_2 = 0$ are parallel, then $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$.

ANS: (A) Both A and R are true and R is the correct explanation of A.

31 Solve the following system of equations graphically: $3x - 5y + 1 = 0, \; 2x - y + 3 = 0$

ANS:

The solution table for $3x - 5y + 1$ *is*

x	3	–7	8
y	2	–4	5

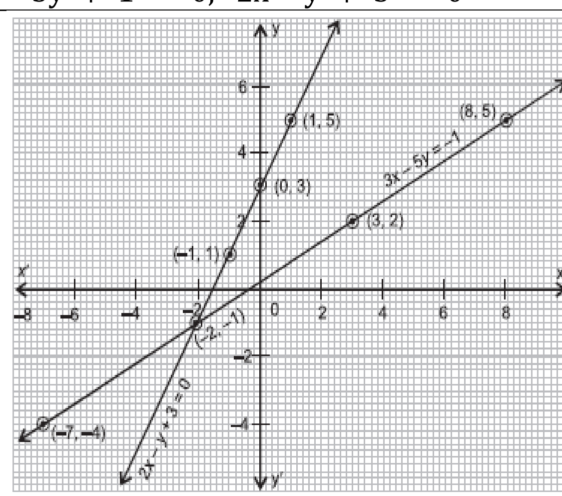
$2x - y + 3 = 0 \Rightarrow -y = -2x - 3$

$\Rightarrow y = 2x + 3$

The solution table for $2x - y + 3 = 0$ *is*

x	1	0	–1
y	5	3	1

(–2, –1) is the point of intersection,



32	**Assertion (A):** The graph of the linear equations x + 3y = 6, 2x – 3y = 12 gives a pair of intersecting lines. **Reason (R):** A pair of linear equations in two variables in x and y , $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has a unique solution if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ gives a pair of intersecting lines.
	ANS**:** (A)
33	Find the values of $\alpha\ and\ \beta$ for which the following system of linear equations has infinite solutions $2x + 3y = 7$, $2\alpha x + (\alpha + \beta)$y = 28.
	ANS: For infinite solutions, the condition is $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \Rightarrow \frac{2}{2\alpha} = \frac{3}{\alpha+\beta} = \frac{7}{28}$ (i) (ii) (iii) *Take (i) and (iii)* $\frac{1}{\alpha} = \frac{1}{4} \Rightarrow \alpha = 4$ *Take (ii) and (iii)* $\frac{3}{\alpha+\beta} = \frac{7}{28} \Rightarrow \frac{3}{4+\beta} = \frac{1}{4}$ $4 + \beta = 12 \Rightarrow \beta = 8$ so $\alpha = 4$, $\beta = 8$.
34	Solve for *x* and *y* by the method of elimination: 2*x* – *y* = 5; 3*x* – 5*y* = 4
	ANS: Here given equations are 2*x* – *y* = 5 ...(i) 3*x* – 5*y* = 4 ...(ii) For making coefficient of *x* equal in both the equations multiplying equation (i) with 3 we get 3 × (2*x* – *y* = 5) ⇒ 6*x* – 3*y* = 15 ...(iii) Multiplying equation (ii) with 2 we get 2 × (3*x* – 5*y* = 4) ⇒ 6*x* – 10*y* = 8 ...(iv) Subtracting equation (iv) from (iii) we get $6x - 3y = 15$ $6x - 10y = 8$ $-\quad +\quad\quad -$ $7y = 7$ ⇒ *y* = 1 when *y* = 1, equation (i) becomes 2*x* – 1 = 5 ⇒ 2*x* = 6 ⇒ *x* = 3 *x* = 3, *y* = 1
35	Solve for *x* and *y* by the method of elimination: 2*x* – 3*y* = 7; 5*x* + 2*y* = 10
	ANS: Given equations are 2*x* – 3*y* = 7 ...(i) 5*x* + 2*y* = 10 ...(ii) For making coefficient of *y* equal in both the equations Multiplying eq. (i) with 2 we get 2 × (2*x* – 3*y*) = 2 × 7 ⇒ 4*x* – 6*y* = 14 ...(iii) Multiplying eq. (ii) with 3, we get 3 × (5*x* + 2*y*) = 3 × 10 ⇒ 15*x* + 6*y* = 30 ...(iv) adding (iii) and (iv), we get (coefficients of *y* are of opposite sign)

	$4x - 6y = 14$ $15x + 6y = 30$ $19x = 44$ $\Rightarrow$ $x = \frac{44}{19}$ when $x = \frac{44}{19}$ eq. (i) becomes $y = -\frac{45}{57}$
36	Find the value of m for which the pair of linear equations $2x + 3y - 7 = 0$ and $(m-1)x + (m+1)y = (3m-1)$ has infinitely many solutions.
	ANS: $2x + 3y - 7 = 0$; $(m-1)x + (m+1)y = (3m-1)$ For infinitely many solutions, the condition is $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ $\Rightarrow$ $\frac{2}{m-1} = \frac{3}{m+1} = \frac{7}{3m-1}$ $\frac{2}{m-1} = \frac{3}{m+1}$ or $\frac{3}{m+1} = \frac{7}{3m-1}$ $\Rightarrow 2(m+1) = 3(m-1)$, $\Rightarrow 3(3m-1) = 7(m+1)$ $\Rightarrow 2m + 2 = 3m - 3$, $\Rightarrow 9m - 3 = 7m + 7$ $\Rightarrow 2 + 3 = 3m - 2m$, $\Rightarrow 9m - 7m = 7 + 3$ $\Rightarrow m = 5$, $\Rightarrow 2m = 10$ $\Rightarrow m = 5$ Hence, for $m = 5$, eqns have infinitely many solutions
37	For what value of p will the following pair of linear equations have infinitely many solutions? $(p-3)x + 3y = p$; $px + py = 12$
	ANS: Consider equations $(p-3)x + 3y = p$ and $px + py = 12$ For infinitely many solutions, $\frac{p-3}{p} = \frac{3}{p} = \frac{p}{12}$ ……...(i) Consider, $\frac{3}{p} = \frac{p}{12}$ $\Rightarrow$ $p^2 = 36$ $\Rightarrow$ $p = \pm 6$ For $p = 6$, from (i) $\frac{3}{6} = \frac{3}{6} = \frac{3}{6}$ *is* true For $p = -6$, from (i) $\frac{-9}{-6} = \frac{3}{-6} = \frac{-6}{12}$ false. Hence, for $p = 6$, pair of linear equations has infinitely many solutions.
38	For what value of k will the system of linear equations has infinite number of solutions? $kx + 4y = k - 4$, $16x + ky = k$
	ANS: For infinite number of solutions, $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ $\Rightarrow$ $\frac{k}{16} = \frac{4}{k} = \frac{k-4}{k}$ $\frac{k}{16} = \frac{4}{k}$ $\Rightarrow$ $k^2 = 64$ $\Rightarrow$ $k = \pm 8$ Taking $\frac{4}{k} = \frac{k-4}{k}$ $\Rightarrow$ $4k = k(k-4)$ $\Rightarrow$ $4k = k^2 - 4k$ $\Rightarrow$ $k^2 = 8k$ $\Rightarrow$ $k(k-8) = 0$ $\Rightarrow$ $k = 0$ and $k = 8$ $k = 8$ satisfies both the equality. It is solution.
39	Find the values of a and b for which the following system of linear equations has infinite number of solutions: $2x - 3y = 7$, $(a+b)x - (a+b-3)y = 4a + b$

	ANS: Here $a_1 = 2$, $b_1 = -3$, $c_1 = -7$ and $a_2 = (a + b)$, $b_2 = -(a + b - 3)$, $c_2 = -(4a + b)$ For infinite solutions $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ $\frac{2}{a+b} = \frac{-3}{-(a+b-3)} = \frac{-7}{-(4a+b)}$ Taking $\frac{2}{a+b} = \frac{-3}{-(a+b-3)}$ $2a + 2b - 6 = 3a + 3b$ $a + b + 6 = 0$ ……..(i) and $\frac{-3}{-(a+b-3)} = \frac{-7}{-(4a+b)}$ $12a + 3b = 7a + 7b - 21$ $5a - 4b + 21 = 0$ ………...(ii) Solving (i) and (ii), we get $a = -5$, $b = -1$
40	For what value of k, the following pair of equations has no solution: $2x + 3y = 5$ and $6x + ky = 15$
	ANS: Given equations are $2x + 3y = 5$, $2x + 3y - 5 = 0$ ...(i) and $6x + ky = 15$, $6x + ky - 15 = 0$ ...(ii) Here $a_1 = 2$, $b_1 = 3$, $c_1 = -5$ and $a_2 = 6$, $b_2 = k$, $c_2 = -15$ For no solution $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ $\frac{2}{6} = \frac{3}{k} \neq \frac{-5}{-15}$ $\frac{2}{6} = \frac{3}{k}$, $\frac{3}{k} \neq \frac{-5}{-15}$ $k = 9$ and $k \neq 9$ No such value of k. Hence there is no value of k for which given pair has no solution.
41	For what value of k will the equations $x + 2y + 7 = 0$, $2x + ky + 14 = 0$ represent coincident lines?
	ANS: For $k = 4$, lines will coincide
42	For what value of k, the following system of equations $2x + ky = 1$, $3x - 5y = 7$ has (i) a unique solution (ii) no solution
	i) For unique solution, $k \neq -\frac{10}{3}$ (ii) For no solution, $k = -\frac{10}{3}$
43	Solve for x and y using substitution method: $2x - 7y + 3 = 0$, $x - 1 = 0$
	ANS: Here $2x - 7y + 3 = 0$ ...(i) and $x - 1 = 0$ ...(ii) From equation (ii), we get $x = 1$ Substituting $x = 1$ in equation (i), we get $2(1) - 7y + 3 = 0$ $-7y + 5 = 0$ $y = \frac{5}{7}$ $x = 1$, $y = \frac{5}{7}$
44	Solve for x and y using substitution method: $7x + 2y + 5 = 0$, $2y + 3 = 0$
	ANS: Given pair of linear equations is $7x + 2y + 5 = 0$ ...(i) and $2y + 3 = 0$ ...(ii) From equation (ii), we get

	$2y + 3 = 0$ $y = -\frac{3}{2}$ Substituting $y = -\frac{3}{2}$ in equation (i), we get $7x + 2\left(-\frac{3}{2}\right) + 5 = 0$ $7x - 3 + 5 = 0$ $\quad 7x = -2$ $\quad x = -\frac{2}{7}$ $x = -\frac{2}{7}, y = -\frac{3}{2}$
45	Solve for x and y using elimination method: $2x - 3y = 10$; $4x - 6y = 20$
	ANS: Given equations are $2x - 3y = 10$ ...(i) and $4x - 6y = 20$ ...(ii) Multiplying equation (i) with 2, we get $2 \times (2x - 3y) = 2 \times 10$ $4x - 6y = 20$ ...(iii) Subtracting equation (ii) from equation (iii), we get $\begin{array}{r} 4x - 6y = 20 \\ 4x - 6y = 20 \\ - \quad + \quad\quad - \\ \hline 0 = 0 \\ \hline \end{array}$ which is true for all values of x and y. Given pair of linear equations has infinitely many solution.
46	Solve for x and y using elimination method: $2x + y = 10$; $3x - 2y = 1$
	ANS: Given equations are $2x + y = 10$ ...(i) and $3x - 2y = 1$ ...(ii) Multiplying equation (i) with 2, we get $2 \times (2x + y) = 2 \times 10$ $4x + 2y = 20$ ...(iii) adding equation (ii) and (iii), we get $\begin{array}{r} 3x - \cancel{2y} = 1 \\ 4x + \cancel{2y} = 20 \\ \hline 7x = 21 \\ \hline \end{array} \Rightarrow x = 3$ when $x = 3$, equation (i), becomes $2 \times 3 + y = 10$, $\quad y = 4$ $x = 3, y = 4$
47	Solve for x and y using substitution method. $x + 2y - 3 = 0$; $3x - 2y + 7 = 0$
	ANS: Given equations are $x + 2y - 3 = 0$ ...(i) $3x - 2y + 7 = 0$ ...(ii) From equation (i), we get $x + 2y - 3 = 0$ $\quad x = 3 - 2y$ ...(iii) Substituting $x = 3 - 2y$ in equation (ii), we get $3(3 - 2y) - 2y + 7 = 0$ $9 - 6y - 2y + 7 = 0$ $-8y = -16$, $\quad y = 2$ When $y = 2$, equation (iii) becomes $x = 3 - 2 \times 2$ $\quad x = -1$ $x = -1, y = 2$

48	Solve the following system of linear equations graphically: $3x - 2y - 1 = 0$; $2x - 3y + 6 = 0$ Shade the region bounded by the lines and x-axis.
49	Two numbers are in the ratio 4:5. If 30 is subtracted from each numbers, the ratio becomes 1:2. Form the pair of linear equations for the above situation and represent them graphically.
50	The perimeter of a rectangle is 52 cm, where length is 6 cm more than the width of the rectangle. Form the pair of linear equations for the above situation and find the dimensions of the rectangle graphically.
51	A number consists of two digits. Where the number is divided by the sum of its digits, the quotient is 7. If 27 is subtracted from the number, the digits interchange their places, find the number.
	ANS: Let digit at unit place be x, and at tenth place be y. Number = $10y + x$ According to the question, $\frac{10y+x}{y+x} = 7$, $6x - 3y = 0$ $2x - y = 0$ ...(i) Again according to the question, $(10y + x) - 27 = 10x + y$ $9x - 9y = -27$ $x - y = -3$ ...(ii) Solving for x and y, we get $x = 3$ and $y = 6$ Number is 63.
52	2 tables and 3 chairs together cost Rs 2000 whereas 3 tables and 2 chairs together cost Rs 2500. Find the total cost of 1 table and 5 chairs.
	ANS: Let the cost of each table = Rs x and that of each chair = Rs y Then, $2x + 3y = 2000$ and $3x + 2y = 2500$ The above equations can be written as $3(2x + 3y = 2000)$, $\Rightarrow$ $6x + 9y = 6000$ ...(i) and $2(3x + 2y = 2500)$, $\Rightarrow$ $6x + 4y = 5000$ ...(ii) Subtracting (ii) from (i), we get $5y = 1000$, $\Rightarrow$ $y = 200$ Substituting $y = 200$ in (i), we get $2x + 3 \times 200 = 2000$ $\Rightarrow 2x = 2000 - 600 = 1400$ $\Rightarrow$ $x = 700$ Hence the cost of each table = Rs 700 And cost of each chair = Rs 200 Total cost of 1 table and 5 chairs = $700 + 5 \times 200$ = Rs 1700
58	In a rectangle , the length is increased by 2 units and the breadth is reduced by 2 units each, the area is reduced by 28 sq. units. If the length is reduced by 1 unit and breadth is increased by 2 units, the area is increased by 33 sq. units. Find the dimensions of rectangle.
59	A part of monthly hostel charges is fixed and the remaining depends on the number of days one has taken food in the mess. When a student A takes food for 20 days she has to pay Rs. 1000 as hostel charges whereas a student B, who takes food for 26 days, pays Rs. 1180 as hostel charges. Find the fixed charges and the cost of food per day.
60	Two Places A and B are 120 km apart from each other on a highway. One car starts from A and another from B at the same time. If the cars travel in the same direction at different speeds, they meet in 6 hours. If they travel towards each other, they meet in 1 hour 12 minutes. What are the speeds of the two cars?
61	Solve for x and y:

$4x + \frac{6}{y} = 15; \quad x - \frac{4}{y} = 7, \quad y \neq 0.$

ANS: Take $\frac{1}{y} = u$

equations become $4x + 6u = 15$ ----(i)

and $x - 4u = 7$ -------(ii)

Multiplying eq. (ii) with 4, we get

$4x - 16u = 28$ ...(iii)

$4x + 6u = 15$

$\underline{4x - 16u = 28}$

$22u = -13$

$u = -\frac{13}{22}$ substitute $u = -\frac{13}{22}$ in $4x + 6u = 15$

$4x + 6\times\left(-\frac{13}{22}\right) = 15$

$\Rightarrow 4x - \frac{39}{11} = 15 \Rightarrow 4x = 15 + \frac{39}{11} = \frac{204}{11\times4} \Rightarrow x = \frac{51}{11}$

$\frac{1}{y} = u = -\frac{13}{22} \Rightarrow y = -\frac{22}{13}$

Hence $x = \frac{51}{11}, \quad y = -\frac{22}{13}$

62 Solve: $\frac{6}{x+2y} + \frac{5}{x-2y} = -3, \quad \frac{3}{x+2y} + \frac{7}{x-2y} = -6$

ANS: Let $\frac{1}{x+2y} = A, \quad \frac{1}{x-2y} = B$

$6A + 5B = -3$ ...(i)

and $3A + 7B = -6$ ...(ii) Multiply eq. (ii) with 2 we get $6A + 14B = -12$ ...(iii)

Solve (i) and (iii)

$6A + 5B = -3$ ...(i)

$\underline{6A + 14B = -12}$ ...(iii)

$9B = -9 \quad B = -1 \quad , A = \frac{1}{3}$

$\frac{1}{x+2y} = A = \frac{1}{3} \Rightarrow x + 2y = 3$ ---(iv)

$\frac{1}{x-2y} = B = -1 \Rightarrow x - 2y = -1$---(v)

Solve (iv) & (v)

$x + 2y = 3$

$\underline{x - 2y = -1}$

$2x = 2 \quad \Rightarrow x = 1$

When x= 1, y= 1

So, $x = 1, y = 1$

63 Solve for x and y :

$\frac{2}{3x+2y} + \frac{3}{3x-2y} = \frac{17}{5}; \quad \frac{5}{3x+2y} + \frac{1}{3x-2y} = 2$

ANS: $\frac{1}{3x+2y} = u, \quad \frac{1}{3x-2y} = v$

$$2u + 3v = \frac{17}{5} \quad --(i),$$

	$5u + v = 2 --(ii)$ Multiply eqn. (ii) with 3, $15u + 3v = 6 --(iii)$ solve (i) and (iii) $2u + 3v = \frac{17}{5} --(i)$ $\underline{15u + 3v = 6 --(iii)}$ (iii)- (i) 13 u= $6-\frac{17}{5} = \frac{30-17}{5} \Rightarrow u = \frac{1}{5}$ Sub: $u = \frac{1}{5}$ in $2u + 3v = \frac{17}{5}$ $2 \times \frac{1}{5} + 3v = \frac{17}{5} \Rightarrow 3v = \frac{15}{5} \Rightarrow v = 1$ there fore $\frac{1}{3x+2y} = \frac{1}{5}$, $\frac{1}{3x-2y} = 1$ $3x + 2y$ = 5------ (i), $\underline{3x - 2y = 1}$------ (ii) (add both eqn.) 6 x = 6 ⇒ x=1 so $y = 1$
64	A takes 3 hours more than B to walk 30 km. But if A doubles his pace, he is ahead of B by 3/2 hours. Find their speed of walking.
	ANS: Let speed of A = x km/hr and speed of B = y km/hr Time taken by A to cover 30 km = $\frac{30}{x}$ hrs Time taken by B to cover 30 km = $\frac{30}{y}$ hrs According to the question $\frac{30}{x} - \frac{30}{y}$ = 3-----(i) If speed of A = 2x km/hr then time taken by A to cover 30 km = $\frac{30}{2x}$ hrs = $\frac{15}{x}$ hrs $\frac{30}{y} - \frac{15}{x} = \frac{3}{2}$ ie. $-\frac{15}{x} + \frac{30}{y} = \frac{3}{2}$ -----(ii) Let $\frac{1}{x} = u$, $\frac{1}{y} = v$ $\Rightarrow 30u - 30v = 3$ $10u - 10v = 1$ ---(iii) $-15u + 30v = \frac{3}{2} \Rightarrow -5u + 10v = \frac{1}{2}$ ---(iv) solve (iii) and (iv) $10u - 10v = 1$ ---(iii) $-5u + 10v = \frac{1}{2}$ ---(iv) $5u = \frac{3}{2}$ $u = \frac{3}{10}, v = \frac{1}{5}$ $\frac{1}{x} = u = \frac{3}{10}, x = \frac{10}{3}$, $\frac{1}{y} = v = \frac{1}{5}$, y= 5 speed of A =$\frac{10}{3}$ km/hr and speed of B = 5 km/hrs
65	8 men and 12 boys can finish a piece of work in 10 days while 6 men and 8 boys can finish it in 14 days. Find the time taken by one man alone and that by one boy alone to finish the work.

1/x	For man : Total x no. of days

1/y	For a boy: Total y no. of days

ANS: Let 1 man finishes work in x days.

1 man's 1 day's work = $\frac{1}{x}$

8 men's 1 day's work = $\frac{8}{x}$

Let 1 boy finishes work in y days.

1 boy's 1 day's work = $\frac{1}{y}$

12 boy's 1 day's work = $\frac{12}{y}$

The work will be completed in 10 days. $10\left(\frac{8}{x}+\frac{12}{y}\right)=1$

According to the question,

$$\frac{8}{x}+\frac{12}{y}=\frac{1}{10}, \quad similarly \quad \frac{6}{x}+\frac{8}{y}=\frac{1}{14}$$

Let $\frac{1}{x}=u, \quad \frac{1}{y}=v$

$8u+12v=\frac{1}{10}$ and $6u+8v=\frac{1}{14}$

$80u+120v-1=0$ -----(1)

$84u+112v-1=0$---------(2)

Apply cross multiplication method to find u and v
and then x and y… (left to the student)
(ANS: 140, 280)

66 There are some students in the two examination halls A and B. To make the number of students equal in each hall, 10 students are sent from A to B. But if 20 students are sent from B to A, the number of students in A becomes double the number of students in B. Find the number of students in the two halls.

ANS: number of students in A = x

number of students in B = y

$x-10=y+10$ ie. $x-y=20----(i)$

$$x+20=2(y-20)$$

ie. $x-2y=-60-----(ii)$

Solve $(i) and\ (ii)$

$$x-y=20----(i) x-2y=-60---(ii)$$

y = 80 , x = 100

number of students in A = $x=100$

number of students in B = $y=80$

67	The sum of the digits of a two digit number is 8 and the difference between the number and that formed by reversing the digits is 18. Find the number
	ANS: Let the digit at unit place be y and tenth place be x. Number = $10x + y$ A.T.Q. $x + y = 8$ ...(i) and $10x + y - 10y - x = 18$ $9x - 9y = 18$ $x - y = 2$ ...(ii) Adding (i) and (ii), we get $2x = 10$, $x = 5$ Putting $x = 5$ in equation (i) $5 + y = 8$, $y = 3$ So, the number is $10 \times 5 + 3 = 53$.
68	Students of a class are made to stand in rows. If 4 students are extra in a row, there would be two rows less. If 4 students are less in a row, there would be four more rows. Find the number of students in the class.
	ANS: Let number of students in a row be x and number of rows be y. Total number of students = $x . y$ From condition 1 : $(x + 4) (y - 2) = xy$ $xy - 2x + 4y - 8 = \text{xy}$ $- 2x + 4y = 8$ ...(i) From condition 2 : $(x - 4) (y + 4) = xy$, $xy + 4x - 4y - 16 = xy$ $4x - 4y = 16$ ...(ii) Adding (i) and (ii), we get $2x = 24$ $x = 12$ Substituting in (i), we get $y = 8$. Total number of students = $xy = 12 \times 8 = 96$.
69	The sum of the digits of a two digit number is 9. The number obtained by reversing the order of digits of the given number exceeds the given number by 27. Find the given number
	ANS: Let the tens digit be x and unit place digit be y. Number = $10x + y$ A.T.Q., $x + y = 9$ ...(i) and $10y + x = 10x + y + 27$ $-9x + 9y = 27$ $- x + y = 3$ ...(ii) Adding (i) and (ii), we get $2y = 12$ $y = 6$ Putting value of y in equation (i), we get $x + 6 = 9$ $x = 9 - 6$, $x = 3$ So, the given number is 36.
70	Solve the following system of equations graphically for x and y: $3x + 2y = 12$; $5x - 2y = 4$. Find the co-ordinates of the points where the lines meet the y-axis.
71	On comparing the ratios $\frac{a_1}{a_2}$, $\frac{b_1}{b_2}$, $\frac{c_1}{c_2}$ find out whether the lines representing the following pairs of linear equations intersect at a point, are parallel or coincident. i) $5x - 4y + 8 = 0$, $7x + 6y - 9 = 0$ ii) $9x + 3y + 12 = 0$, $18x + 6y + 24 = 0$ iii) $6x - 3y + 10 = 0$, $2x - y + 9 = 0$

ANS. i) $5x - 4y + 8 = 0$, $7x + 6y - 9 = 0$

Here, $a_1 = 5$, $b_1 = -4$, $c_1 = 8$

$a_2 = 7$, $b_2 = 6$, $c_2 = -9$,

$\frac{a_1}{a_2} = \frac{5}{7}$, $\frac{b_1}{b_2} = -\frac{4}{6} = -\frac{2}{3}$, clearly $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ so,

the lines are intersecting. System is consistent and has unique solution.

ANS. ii) $9x + 3y + 12 = 0$, $18x + 6y + 24 = 0$

$\frac{a_1}{a_2} = \frac{9}{18} = \frac{1}{2}$, $\frac{b_1}{b_2} = \frac{3}{6} = \frac{1}{2}$, $\frac{c_1}{c_2} = \frac{12}{24} = \frac{1}{2}$

$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$, so the lines are coincident.

System is consistent and there are infinite solutions

iii) $6x - 3y + 10 = 0$, $2x - y + 9 = 0$.

ANS:

$\frac{a_1}{a_2} = \frac{6}{2} = \frac{3}{1}$, $\frac{b_1}{b_2} = \frac{-3}{-1} = \frac{3}{1}$, $\frac{c_1}{c_2} = \frac{10}{9}$ so

$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ the lines are parallel.

System is inconsistent and has no solution.

72 Solve for x and y by the method of *elimination*:

$x + y = 5$; $2x - 3y = 4$.

ANS: 1 $x + y = 5$ -----(1)

$2x - 3y = 4$------(2)

For making coefficient of y equal in both the equations, multiplying equation (i) with 3.

$3x + 3y = 15$ ----- (3)

$2x - 3y = 4$ -------(2) add (3) + (2)

$5x = 19 \Rightarrow x = \frac{19}{5}$

substitute $x = \frac{19}{5}$ in eqn. (1) , $x + y = 5$

$\frac{19}{5} + y = 5 \Rightarrow y = 5 - \frac{19}{5} = \frac{25-19}{5} = \frac{6}{5}$, $x = \frac{19}{5}$, $y = \frac{6}{5}$

Same question , **alternate method**,

$x + y = 5$ -----(1)

$2x - 3y = 4$------(2)

For making coefficient of x equal in both the equations multiplying equation (i) with 2.

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

$2x - 3y = 4$ ------ (2) subtract (3) – (2)

$5y = 6 \Rightarrow y = \frac{6}{5}$

substitute $y = \frac{6}{5}$ in equation (1) , $x + y = 5$

$x + \frac{6}{5} = 5 \Rightarrow x = 5 - \frac{6}{5} = \frac{19}{5}$

so $x = \frac{19}{5}$, $y = \frac{6}{5}$ (Ans. will be same always)

73 Solve for x and y by the method of elimination: $2x - y = 5$; $3x - 5y = 4$.

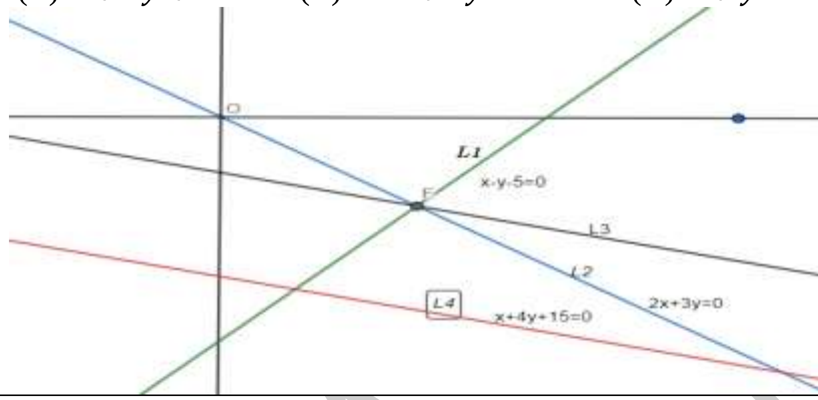
ANS: $2x - y = 5$ .....(i)

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

	For making coefficient of x equal in both the equations multiplying equation (i) with 3 we get $6x - 3y = 15$ ...(iii) Multiplying equation (ii) with 2 we get $6x - 10y = 8$ ...(iv) Subtracting equation (iv) from (iii) we get $6x - 3y = 15$ ...(iii) $6x - 10y = 8$ ...(iv) $7y = 7$, $y = 1$ when $y = 1$, equation (i) becomes $2x - 1 = 5$ $2x = 6$ $x = 3$ $x = 3, y = 1$ (Observe the equations ,and It is your decision to compare the coefficients of x or y .)
74	Solve for x and y by the method of elimination: $4x - 3y = 1$; $5x - 7y = -2$
	ANS: Given equations are $4x - 3y = 1$ ...(i) $5x - 7y = -2$ ...(ii) For making coefficient of y equal in both the equations multiplying equation (i) with 7, we get $7 \times (4x - 3y) = 7 \times 1$ $28x - 21y = 7$ ...(iii) Multiplying equation (ii) with 3, we get $3 \times (5x - 7y) = 3 \times -2$ $15x - 21y = -6$ ...(iv) Subtracting equation (iv) from (iii), we get $28x - 21y = 7$ ...(iii) $\underline{15x - 21y = -6}$ ...(iv) $13x = 13$, $x = 1$ when $x = 1$, equation (i) becomes $4 \times 1 - 3y = 1$ $-3y = -3$ $y = 1$ $x = 1, y = 1$
75	Solve for x and y by the method of elimination: $2x + 3y = 7$; $4x + 3y = 11$
	ANS: Given equation are $2x + 3y = 7$ ...(i) $\underline{4x + 3y = 11}$ ...(ii) Here coefficients of y in both the equations are equal Subtracting (ii) from (i) we get $x = 2$ when $x = 2$, equation (i) becomes $2 \times 2 + 3y = 7$ $3y = 3$ $y = 1$ $x = 2, y = 1$
	TRY YOURSELF
1	Five years hence, father's age will be 3 times the age of his son. Five years ago, father was seven times as old as his son. Find their present ages. ANS: 10, 40
2	From a bus stand in Bangalore , if we buy 2 tickets to Malleswaram and 3 tickets to Yeshwanthpur, the total cost is Rs. 46; but if we buy 3 tickets to Malleswaram and 5 tickets to Yeshwanthpur the total cost

	is Rs. 74. Find the fares from the bus stand to Malleswaram, and to Yeshwanthpur. (HINT: $2x + 3y = 46$, i.e., $2x + 3y - 46 = 0$ ----- (1) $3x + 5y = 74$, i.e., $3x + 5y - 74 = 0$ ------(2) By cross multiplication method Ans: 8, 10)
3	Solve the following pair of linear equations for x and y : $2(ax - by) + (a + 4b) = 0$; $2(bx + ay) + (b - 4a) = 0$ (HINT: Re write the equations $2ax - 2by + a + 4b = 0$ ...(i) and $2bx + 2ay (b - 4a) = 0$ ...(ii) , ANS: $x= -\frac{1}{2}$, $y = 2$.)
4	The sum of numerator and denominator of a fraction is 3 less than twice the denominator. If each of the numerator and denominator is decreased by 1, the fraction becomes $\frac{1}{2}$. Find the fraction. (HINT : Let Numerator = x and denominator = y Then $x + y = 2y - 3$, ie. $x - y + 3 = 0$ ...(i), $\frac{x-1}{y-1} = \frac{1}{2}$, ie. $2x - y - 1 = 0$ ...(ii))
5	For what value of k, the system of equations $k x - 3y + 6 = 0$, $4x - 6y + 15 = 0$ represents parallel lines? ANS : 2
6	Check whether the pair of equations $x + 3y = 6$, $2x - 3y = 12$ is consistent. ANS: Yes
7	For what value of k will the following system of equations have no solutions? $kx + 3y = 1$, $12x + ky = 2$ ANS: -6
8	If the lines represented by $3x + 2ky = 2$ and $2x + 5y + 1 = 0$ are parallel, then the value of k is. ANS: 15/4
9	If the system of equations have infinitely many solutions, find k : kx + 3y = 2k + 1 , 2(k+1)x + 9y = 7k + 1 ANS: 2
10	The sum of the digits of a two digit number is 11. The number obtained by interchanging the digits of the given number exceeds that number by 63. Find the number. ANS: 29
11	Place A and B are 100 km apart on a highway. One car starts from A and another at B at the same time. If the cars travel in the same direction at different speeds, they meet in 5 hours, if they travel towards each other, they meet in one hour. What are the speeds of the two cars? ANS: 60, 40
12	The sum of two numbers is 8. If their sum is four times their difference, find the numbers. ANS: 5 and 3.
13	9 A person rowing at the rate of 5km/h in still water, takes thrice as much as time in going 40 km upstream as in going 40km downstream. Find the speed of the stream. ANS: 2.5 km/hr.
14	The boat goes 30km upstream and 44km downstream in 10 hours. In 13 hours, it can go 40km upstream and 55km downstream. Determine the speed of stream and that of the boat in still water. ANS**:** speed of the boat in still water is 8 km/hr and the speed of the stream is 3 km/hr.
15	Determine by drawing the graphs, whether the following system of linear equations has a unique solution or not: $2x + 5y = 10$; $x - 3 = 0$
16	The sum of the digits of a two digit number is 15. The number obtained by interchanging the digits

	exceeds the given number by 9. Find the number. (Graphically)
17	The sum of numerator and denominator of a fraction is 3 less than twice the denominator. If each of the numerator and denominator is decreased by 1, the fraction becomes $\frac{1}{2}$. Find the fraction. (Graphically) ANS: $x = 4$, $y = 7$
18	Solve for x and y using substitution method: $a^2x - b^2y = a^2 - 2b^2$; $b^2x + a^2y = b^2 + 2a^2$ ANS: $x = 1$, $y = 2$
19	On comparing the ratios find out whether the following pair of linear equations are consistent with (unique or infinite solution), or inconsistent (no solution). i) $2x - 3y = 10$; $4x + 6y = 20$ ii) $2x + y = 10$; $3x - 2y = 1$ iii) $3x + 2y = 5$; $2x - 3y = 7$ iv) $2x - 3y = 8$; $4x - 6y = 9$ v) $5x - 3y = 11$; $-10x + 6y = -22$ vi) $5x + 5y = 8$; $-5x - 5y = 10$
	ANS: i) consistent with unique solution ii) consistent with unique solution iii) consistent with unique solution iv) inconsistent (no solution). V) consistent with infinite solution vi) inconsistent (no solution).
20	Which of the following pairs of linear equations are consistent /inconsistent? If consistent, obtain the solution **graphically**: (i) $3x - 5y = -1$, $2x - y = -3$ Ans:(–2, –1) (ii) $5x - y = 7$, $x - y = -1$ Ans: (2, 3) (iii) $x - 2y = 1$, $2x + y = 7$ Ans:(3, 1) (iv) $2x - 2y - 2 = 0$, $4x - 4y - 5 = 0$ (Parallel) v) $x + 4y = 3$, $2x + 8y = 6$ (coincident)
21	Find the number of solutions of the following pair of linear equations: $x + 2y - 8 = 0$, $2x + 4y = 16$
	ANS: $x + 2y - 8 = 0$ ... (i) $2x + 4y - 16 = 0$ ... (ii) Here, $a_1 = 1$, $b_1 = 2$, $c_1 = -8$ and $a_2 = 2$, $b_2 = 4$, $c_2 = -16$ $\frac{a_1}{a_2} = \frac{1}{2}$, $\frac{b_1}{b_2} = \frac{2}{4} = \frac{1}{2}$ and $\frac{c_1}{c_2} = \frac{-8}{-16} = \frac{1}{2}$ Now, $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ Given pair of linear equations has infinite many solutions
	MCQs
1.	Solve : $2p + 3q = 13, 5p - 4q = -2$. CBSE 2024 (A) $p = 2, q = 3$ (B) $p = -2, q = 3$ (C) $p = 3, q = 2$ (D) $p = -2, q = -3$
2.	In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices. (A) Both A and R are true and R is the correct explanation of A. (B) Both A and R are true but R is not the correct explanation of A. (C) A is true but R is false. (D) A is false but R is true.

	Assertion (A) : The pair of linear equations $3x + 5y - 4 = 0, 15x + 25y - 25 = 0$ is inconsistent. **Reason (R)** : A pair of linear equations $a_1x + b_1y + c_1 = 0$, $a_2x + b_2y + c_2 = 0$ is inconsistent $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$. CBSE 2024
3.	Akshiti has drawn some lines as given below. It is given that lines L_1, L_2 *and* L_3 intersect at exactly one point and line $L_3 \parallel L_4$. Which one is the equation of L_3 ? (A) $x + 4y - 5 = 0$ (B) $x + 4y + 5 = 0$ (C) $2x + 8y - 5 = 0$ (D) $x + y - 5 = 0$ 
4.	The pair of equations $y = -4$ *and* $x = -3$ graphically represents lines which are _____ (A) parallel (B) intersecting at $(-4, -3)$ (C) coincident (D) intersecting at $(-3, -4)$
5.	For what value of c will the following system of equations have infinite number of solutions? $2x + (c-2)y = c$, $6x + (2c-1)y = 2c + 5$. (A) 7 (B) ± 5 (C) 5 (D) 3
6.	For what value of k will the following system of equations have no solutions? $kx + 3y = 1$, $12x + ky = 2$ (A) 6 (B) ± 6 C) -6 (D) 36
7.	The perimeter of a rectangle is 52 cm, where length is 6 cm more than the width of the rectangle. find the dimensions. (A) Length = 16 cm, breadth = 10 cm. (B) Length = 16 cm, breadth = 12 cm. (C) Length = 17 cm, breadth = 10 cm. (D) Length = 8 cm, breadth = 5 cm.
8.	The pair of linear equations $2x + 3y = 5$ *and* $4x + 6y = 10$ is_____ (A) inconsistent (B) consistent with Unique solution (C) consistent with infinite solution (D) both passing through the origin
9.	For what value of k, the system of equations $kx - 3y + 6 = 0, 4x - 6y + 15 = 0$ represents parallel lines? (A) 2 (B) 1 (C) -6 (D) -2
10.	The pair of linear equations $x + 3y = 6$, $2x - 3y = 12$ is _____ (A) inconsistent (B) consistent with Unique solution (C) consistent with infinite solution (D) both passing through the origin
11.	The pair of equations $y = 0$ *and* $y = -7$ has ______ (A) one solution (B) two solutions (C) infinitely many solutions (D) no solution
12.	The pair of equations $x = a$ *and* $y = b$ graphically represents lines which are (A) parallel (B) intersecting at (b, a) (C) coincident (D) intersecting at (a, b)
13.	A pair of linear equations which has a unique solution x = 2, y = –3 is (A) $x + y = -1;\ 2x - 3y = -5$ (B) $2x + 5y = -11;\ 4x + 10y = -22$

	(C) $2x - y = 1$; $3x + 2y = 0$ (D) $x - 4y - 14 = 0$; $5x - y - 13 = 0$
14.	If x = a, y = b is the solution of the pair of equations x – y = 2 and x + y = 4, then the respective values of a and b are (A) 3, 5 (B) 5, 3 (C) 3, 1 (D) –1, –3
15.	Graphically, the pair of equations $6x - 3y + 10 = 0$ *and* $2x - y + 9 = 0$ represents two lines which are_____ (A) No solution (B) consistent with Unique solution (C) consistent with infinite solution (D) both passing through the origin
16.	The difference between a two digit number and the number obtained by interchanging the digits is 27. What is the difference between the two digits of the number? (A) 9 (B) 6 (C) 12 (D) 3
17.	The pair of equations $ax + 2y = 7$ *and* $3x + by = 16$ represent parallel lines if (A) a = b (B) 3a = 2b (C) 2a = 3b (D) ab = 6
18.	The equations $ax + by + c = 0$ *and* $dx + ey + c = 0$ represent the same straight line if (A) $ad = be$ (B) $ac = bd$ (C) $bc = ad$ (D) $ab = de$
19.	If $47x + 31y = 63$ *and* $31x + 47y = 15$, then $x - y =$__________. (A) 2 (B) 3 (C) 1 (D) 5
20.	The pair of equations $x + y = 14$, $x - y = 4$ is _____ (A) inconsistent (B) consistent with Unique solution (C) consistent with infinite solution (D) both passing through the origin
21.	Find the value of *k* so that the following system of equations has no solution: $3x - y - 5 = 0$, $6x - 2y + k = 0$ (A) $k = 10$ (B) $k \neq -10$ (C) $k \neq 10$ (D) $k = 5$
22.	For what value of *k* will the equations $x + 2y + 7 = 0$, $2x + k\,y + 14 = 0$ represent coincident lines? (A) $k = 4$ (B) $k \neq 4$ (C) $k = -4$ (D) $k = 2$
23.	For which values of *p*, does the pair of equations given below has unique solution? $4x + py + 8 = 0$ *and* $2x + 2y + 2 = 0$ (A) $p = 8$ (B) $p = 4$ (C) $p \neq 4$ (D) $p = 2$
24.	Find *k* for which the system of equations has infinite solutions: $4x + y = 3$ *and* $8x + 2y = 5k$ (A) $k = \frac{5}{6}$ (B) $k = \frac{6}{5}$ (C) $k \neq \frac{6}{5}$ (D) $k = 6$
25.	Solve the following pair of linear equations : $2x - y = 1$; $4x + 3y = 27$ (A) $x = 3, y = 5$ (B) $x = 5, y = 5$ (C) $x = 3, y = 3$ (D) $x = -3, y = 5$
26.	Find the values of α *and* β for which the following system of linear equations has infinite solutions $2x + 3y = 7$, $2\alpha x + (\alpha + \beta)y = 28$. (A) $\alpha = 4$, $\beta = 8$ (B) $\alpha = -4$, $\beta = 8$ (C) $\alpha = 4$, $\beta = -8$ (D) $\alpha = -4$, $\beta = -8$
27.	Half the perimeter of a rectangular garden, whose length is 12 m more than its width is 60 m. Find the dimensions of the garden. (A) $x = 36$, $y = 24$ (B) $x = 35$, $y = 25$ (C) $x = 30$, $y = 30$ (D) $x = 38$, $y = 22$
28.	Solve the following pair of linear equations: $x + y = 8$; $x - y = 4$ (A) $x = 2, y = 6$ (B) $x = 6, y = 2$ (C) $x = -6, y = -3$ (D) $x = -3, y = 6$

29.	For what value of *k*, the system of equations $2x - ky + 3 = 0$, $4x + 6y - 5 = 0$ is consistent? (A) $k = -3$ (B) $k \neq -3$ (C) $k \neq -4$ (D) $k = 2$
30.	For what value of *k*, the system of equations $kx - 3y + 6 = 0$, $4x - 6y + 15 = 0$ represents parallel lines? (A) $k = 2$ (B) $k \neq -2$ (C) $k \neq -4$ (D) $k = 4$
31.	For what value of *p*, the pair of linear equations $5x + 7y = 10, 2x + 3y = p$ has a unique solution. (A) $p = 2$ (B) $p \neq -2$ (C) $p \neq 3$ (D) $Any\ value\ of\ p$
32.	Solve the following pair of linear equations $y - 5 = 0;\ 3x + 4y - 20 = 0$ (A) $x = 0, y = 6$ (B) $x = 0, y = 2$ (C) $x = 0, y = 5$ (D) $x = 0, y = -5$
33.	Solve the following pair of linear equations : $2x - y = 1;\ 4x + 3y = 27$ (A) $x = 3, y = 6$ (B) $x = 3, y = 5$ (C) $x = -3, y = 5$ (D) $x = -2, y = -5$
34.	Solve the following pair of linear equations : $2x - y = 5;\ 3x - 5y = 4$ (A) $x = 3, y = -1$ (B) $x = 3, y = 2$ (C) $x = 1, y = 3$ (D) $x = 3, y = 1$
35.	The pair of equations $x + 2y + 5 = 0$ and $-3x - 6y + 1 = 0$ have (A) a unique solution (B) exactly two solutions (C) infinitely many solutions (D) no solution
36.	Solve the following pair of linear equations : $x + y = 8;\ x - y = 4$ (A) $x = 3, y = 2$ (B) $x = 6, y = -2$ (C) $x = 6, y = 2$ (D) $x = 3, y = 2$
37.	Solve for *x* and *y* by the method of elimination: $2x - 3y = 7;\ 5x + 2y = 10$ (A) $x = \frac{44}{19}, y = -\frac{45}{57}$ (B) $x = -\frac{44}{19}, y = -\frac{45}{57}$ (C) $x = \frac{44}{19}, y = \frac{45}{57}$ (D) $x = \frac{45}{57}, y = -\frac{44}{19}$
38.	Find the value of *m* for which the pair of linear equations $2x + 3y - 7 = 0$ and $(m - 1)x + (m + 1)y = (3m - 1)$ has infinitely many solutions. (A) 5 (B) 4 (C) 2 (D) 10
39.	For what value of *p* will the following pair of linear equations have infinitely many solutions? $(p - 3)\ x + 3y = p;\quad px + py = 12$ (A) 5 (B) 6 (C) 2 (D) -6
40.	For what value of *k* will the system of linear equations has infinite number of solutions? $kx + 4y = k - 4, 16x + ky = k$ (A) 8 (B) 4 (C) 2 (D) 5
41.	Find the values of *a* and *b* for which the following system of linear equations has infinite number of solutions: $2x - 3y = 7, (a + b)\ x - (a + b - 3)\ y = 4a + b$ (A) $a = -5, b = 15$ (B) $a = -5, b = -1$ (C) $a = 5, b = -1$ (D) $a = 5, b = 1$
42.	For what value of *k* will the equations $x + 2y + 7 = 0, 2x + ky + 14 = 0$ represent coincident lines? (A) 7 (B) 4 (C) 2 (D) -4
43.	Solve for *x* and *y* using substitution method. $x + 2y - 3 = 0;\ 3x - 2y + 7 = 0$ (A) $x = 1, y = 2$ (B) $x = -1, y = 2$ (C) $x = -1, y = -2$ (D) $x = -2, y = -1$
44.	A number consists of two digits. Where the number is divided by the sum of its digits, the quotient is 7. If 27 is subtracted from the number, the digits interchange their places, find the number. (A) *36* (B) *63* (C) *54* (D) 45

45. Solve for x and y by cross multiplication method: $\frac{x}{a} - \frac{y}{b} = 0$, $ax + by = a^2 + b^2$

(A) $x = a, y = b$ (B) $x = -a, y = b$ (C) $x = a, y = -b$ (D) $x = b, y = b$

46. 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.

(A) $\frac{5}{12}$ (B) $\frac{3}{12}$ (C) $\frac{7}{12}$ (D) $\frac{5}{13}$

47. For what value of k, the system of equations $kx - 3y + 6 = 0, 4x - 6y + 15 = 0$ represents parallel lines?

(A) 3 (B) 2 (C) 7 (D) -2

48. For what value of k will the following system of equations have no solutions?

$kx + 3y = 1$, $12x + ky = 2$

(A) 3 (B) 2 (C) 6 (D) -6

49. If the lines represented by $3x + 2ky = 2$ and $2x + 5y + 1 = 0$ are parallel, then the value of k is.

(A) $\frac{15}{2}$ (B) $\frac{15}{4}$ (C) 3 (D) $-\frac{15}{4}$

50. If the system of equations have infinitely many solutions, find k : $kx + 3y = 2k + 1$,
$2(k+1)x + 9y = 7k + 1$.

(A) -2 (B) 3 (C) -3 (D) 2

51. The sum of the digits of a two digit number is 11. The number obtained by interchanging the digits of the given number exceeds that number by 63. Find the number.

(A) 29 (B) 92 (C) 83 (D) 74

52. The sum of two numbers is 8. If their sum is four times their difference, find the numbers.

(A) 5 *and* 3 (B) 4 *and* 6 (C) 3 *and* 7 (D) 2 *and* 4

53. On comparing the ratios find out whether the following pair of linear equations are consistent with (unique or infinite solution), or inconsistent (no solution). $5x - 3y = 11$; $-10x + 6y = -22$

(A) consistent one solution (B) two solutions

(C) consistent with infinite solution (D) no solution

54. If a pair of linear equations is consistent, then the lines will be

(A) parallel (B) always coincident (C) intersecting or coincident (D) always intersecting

55. The pair of equations $x = 10$ *and* $y = -10$ graphically represents lines which are ____

(A) parallel (B) intersecting at (b, a) (C) coincident (D) intersecting at (a, b)

56. If the pair of equations $x + y = \sqrt{2}$ and $x \sin\theta + y \cos\theta = 1$ has infinitely many solutions, then θ = ?

(A) 30° (B) 45° (C) 60° (D) 90°

57. Using the following equations: $\frac{4}{x}$ + 6y = 10; $\frac{1}{x}$ – 6y = 5, find the value of p if p = 5x.

(A) 1 (B) 2 (C) 3 (D) 4

58. If the lines represented by $3x + 2ky = 2$ *and* $2x + 5y + 1 = 0$ are parallel, then the value of k is__

(A) - 5/4 (B) 2/5 (C) 15/4 (D) 3/2

59. Match the Column:

(1)	**2x + 5y = 10** **3x + 4y = 7**	**(A)**	**Unique solution**
(2)	2x + 5y = 10	(B)	Infinitely

	$6x + 15y = 20$		many solutions
(3)	$5x + 2y = 10$ $10x + 4y = 20$	(C)	No common solution

(A) $1 \longrightarrow A, 2 \longrightarrow B, 3 \longrightarrow C$ (B) $1 \longrightarrow B, 2 \longrightarrow C, 3 \longrightarrow A$
(C) $1 \longrightarrow C, 2 \longrightarrow B, 3 \longrightarrow A$ (D) $1 \longrightarrow A, 2 \longrightarrow C, 3 \longrightarrow B$

60. The pair of equations $5x - 15y = 8$ and $3x - 9y = \frac{24}{5}$
(A) one solution (B) two solutions
(C) infinitely many solutions (D) no solution

61. The sum of the digits of a two-digit number is 9. If 27 is added to it, the digits of the number get reversed. The number is—
(A) 25 (B) 72 (C) 63 **(D) 36**

62. Graphically, the pair of equations $6x - 3y + 10 = 0$
$2x - y + 9 = 0$ represents two lines which are____
(A) intersecting at exactly one point. (B) intersecting at exactly two points.
(C) coincident. **(D) parallel.**

63. The pair of equations $x + 2y + 5 = 0$ *and* $-3x - 6y + 1 = 0$ have
(A) a unique solution (B) exactly two solutions
(C) infinitely many solutions **(D) no solution**

64. If a pair of linear equations is consistent, then the lines will be_____
(A) parallel (B) always coincident
(C) intersecting or coincident (D) always intersecting

65. The pair of equations x = 4 and y = 3 graphically represents lines which are
(a) parallel **(b) intersecting at (4, 3)** (c) coincident (d) intersecting at (3, 4)

66. For what value of c will the following system of equations have infinite number of solutions?
$2x + (c - 2)y = c$, $6x + (2c - 1)y = 2c + 5.$
(a) 7 (b) ± 5 **(c) 5** (d) 3

67. For what value of k will the following system of equations have no solutions?
$kx + 3y = 1$, $12x + ky = 2$
a) 6 b) ± 6 **c) -6** d) none of these

68. The perimeter of a rectangle is 52 cm, where length is 6 cm more than the width of the rectangle. find the dimensions.
a) Length = 16 cm, breadth = 10 cm. b) Length = 16 cm, breadth = 12 cm.
c) Length = 17 cm, breadth = 10 cm. d) Length = 8 cm, breadth = 5 cm.

69. For what value of k, the system of equations $kx - 3y + 6 = 0$, $4x - 6y + 15 = 0$ represents parallel lines?
a) 2 b) 1 c) 3 d) 4

70. The pair of equations x = a and y = b graphically represents lines which are
(a) parallel (b) intersecting at (b, a) (c) coincident **(d) intersecting at (a, b)**

71. A pair of linear equations which has a unique solution x = 2, y = –3 is
(a) $x + y = -1; 2x - 3y = -5$
(b) $2x + 5y = -11; 4x + 10y = -22$
(c) $2x - y = 1 ; 3x + 2y = 0$
(d) $x - 4y - 14 = 0; 5x - y - 13 = 0$

72. If x = a, y = b is the solution of the pair of equations x – y = 2 and x + y = 4, then the respective values of a and b are

	(a) 3, 5 (b) 5, 3 **(c) 3, 1** (d) –1, –3
73.	The difference between a two digit number and the number obtained by interchanging the digits is 27. What is the difference between the two digits of the number? a) 2 b) 1 **c) 3** d) 4
74.	The pair of equations ax + 2y = 7 and 3x + by = 16 represent parallel lines if (a) a = b (b) 3a = 2b (c) 2a = 3b **(d) ab = 6**
75.	The equations ax + by + c = 0 and dx + ey + c = 0 represent the same straight line if____ (a) ad = be (b) ac = bd (c) bc = ad (d) **ab = de**