MIND CURVE · INFINITY THINK BEYOND

Pair of Linear Equations in Two Variables

Chapter 3 · Previous Year Questions with Answers · Class X Mathematics Standard (041)

01 TOPIC 1 Consistency & Nature of Solutions

QUICK RECAP

- For $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$:
- $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$: intersecting lines, unique solution (consistent).
- $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$: coincident lines, infinitely many solutions (consistent, dependent).
- $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$: parallel lines, no solution (inconsistent).
- $x = a$ is a line parallel to the y-axis; $y = b$ is parallel to the x-axis; they meet at (a, b).

Q1 MCQ · 1 mark — **2023** – 30/C/1

The condition for which the pair of equations $ax + 2y = 7$ and $3x + by = 16$ represent parallel lines is :

(A) $ab = \frac{7}{16}$
(B) $ab = 6$
(C) $ab = 3$
(D) $ab = 2$

ANSWER **(b) $ab = 6$**

Q2 MCQ · 1 mark — **2023** – 30/C/2

Graphically, the pair of equations $-6x - 2y = 21$ and $2x - 3y + 7 = 0$ represents two lines which are :

(A) intersecting exactly at one point
(B) intersecting exactly at two points
(C) coincident
(D) parallel

ANSWER **(a) intersecting exactly at one point**

Q3 MCQ · 1 mark — **2023** – 30/C/3

Graphically, the pair of equations $3x - y + 8 = 0$ and $3x - y = 24$ represents two lines which are :

(A) intersecting exactly at one point
(B) intersecting exactly at two points
(C) coincident
(D) parallel

ANSWER **(d) parallel**

Q4 MCQ · 1 mark — **2023** – 30/C/B, 30/2/1, 30/2/2

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)

ANSWER **(d) intersecting at (a, b)**

Q5 MCQ · 1 mark **2023** – 30/C/B

If one equation of a pair of dependent equations is $-3x + 5y = 4$, then the second equation can be :

(A) $6x + 10y = 8$
(B) $9x - 15y + 12 = 0$
(C) $-9x + 15y = -12$
(D) $-6x - 10y = 8$

ANSWER **(b) $9x - 15y + 12 = 0$**

Q6 MCQ · 1 mark **2023** – 30(B)

The value of t for which the pair of linear equations $(t + 3)x - 3y = t$; $tx + ty + 12 = 0$ have infinitely many solutions, is :

(A) 6
(B) 0
(C) −6
(D) 12

ANSWER *
$\frac{t+3}{t} = \frac{-3}{t} = \frac{-t}{12} \Rightarrow t + 3 = -3 \Rightarrow t = -6$ (check: $\frac{-3}{-6} = \frac{6}{12} = \frac{1}{2}$)
(c) −6

Q7 MCQ · 1 mark **2023** – 30/1/1, 30/1/2, 30/1/3

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

ANSWER *
$kx - y - 2 = 0,\ 6x - 2y - 3 = 0$: $\frac{k}{6} = \frac{-1}{-2} \Rightarrow k = 3$, but $\frac{-2}{-3} = \frac{2}{3} \neq \frac{1}{2}$; so no value of k works.
(B) does not exist

Q8 MCQ · 1 mark **2023** – 30/2/1, 30/2/2, 30/2/3

If the pair of equations $3x - y + 8 = 0$ and $6x - ry + 16 = 0$ represent coincident lines, then the value of 'r' is :

(A) $-\frac{1}{2}$
(B) $\frac{1}{2}$
(C) −2
(D) 2

ANSWER *
$\frac{3}{6} = \frac{-1}{-r} = \frac{8}{16} \Rightarrow r = 2$
(d) 2

Q9 MCQ · 1 mark — **2023** – 30/4/1, 30/4/2, 30/4/3

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

ANSWER *

$\frac{2}{6} = \frac{-5}{-15} = \frac{-6}{-18} = \frac{1}{3}$

(c) coincident

Q10 MCQ · 1 mark — **2023** – 30/5/1, 30/5/2

The pair of equations $ax + 2y = 9$ and $3x + by = 18$ represent parallel lines, where a, b are integers, if :

(A) $a = b$
(B) $3a = 2b$
(C) $2a = 3b$
(D) $ab = 6$

ANSWER *

$\frac{a}{3} = \frac{2}{b} \neq \frac{9}{18} \Rightarrow ab = 6$

(d) $ab = 6$

Q11 MCQ · 1 mark — **2023** – 30/6/3

The condition for the system of linear equations $ax + by = c$; $lx + my = n$ to have a unique solution is

(A) $am \neq bl$
(B) $al \neq bm$
(C) $al = bm$
(D) $am = bl$

ANSWER *

$\frac{a}{l} \neq \frac{b}{m} \Rightarrow am \neq bl$

(A) $am \neq bl$

Q12 MCQ · 1 mark — **2024** – 30/S/1

The pair of equations $x = 2a$ and $y = 3b$ $(a, b \neq 0)$ graphically represents straight lines which are :

(A) coincident
(B) parallel
(C) intersecting at $(2a, 3b)$
(D) intersecting at $(3b, 2a)$

ANSWER **(C) intersecting at $(2a, 3b)$**

Q13 MCQ · 1 mark — **2024** – 30/S/2

The value of p for which the pair of linear equations $(3p + 5)x + 2y - 7 = 0$ and $10x - 2y + 7 = 0$ has infinitely many solutions is :

(A) -5
(B) 5
(C) $\frac{5}{3}$
(D) $\frac{3}{5}$

ANSWER **(A) -5**

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Q14 MCQ · 1 mark **2024** – 30/S/3

If $(k, 3)$ is the point of intersection of the lines represented by $x + py = 6$ and $x = 15$, then (k, p) will be :

(A) $(15, 3)$
(B) $(15, -3)$
(C) $(3, 15)$
(D) $(-15, 3)$

ANSWER **(B) $(15, -3)$**

Q15 MCQ · 1 mark **2024** – 30(B)/S

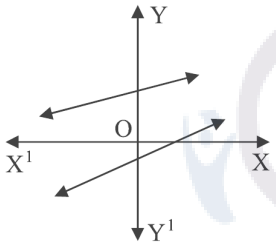
If the lines given by $3x + 2ky = 2$ and $2x + 5y = 1$ are parallel, then the value of k is :

(A) $-\frac{5}{4}$
(B) $\frac{2}{5}$
(C) $\frac{15}{4}$
(D) $\frac{3}{2}$

ANSWER **(C) $\frac{15}{4}$**

Q16 MCQ · 1 mark **2024** – 30/1/1, 30/1/2, 30/1/3

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



(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 *
The lines are parallel, so there is no solution.
(c) inconsistent.

Q17 MCQ · 1 mark **2024** – 30/2/1, 30/2/3

The value of k for which the system of equations $3x - y + 8 = 0$ and $6x - ky + 16 = 0$ has infinitely many solutions, is

(A) -2
(B) 2
(C) $\frac{1}{2}$
(D) $-\frac{1}{2}$

ANSWER *
$\frac{3}{6} = \frac{-1}{-k} = \frac{8}{16} \Rightarrow k = 2$
(B) 2

Q18 MCQ · 1 mark **2024** – 30/3/1, 30/3/3

The pair of linear equations $x + 2y + 5 = 0$ and $-3x = 6y - 1$ has

(A) unique solution
(B) exactly two solutions
(C) infinitely many solutions
(D) no solution

ANSWER *

Second equation: $3x + 6y - 1 = 0$. $\frac{1}{3} = \frac{2}{6} \neq \frac{5}{-1}$, so the lines are parallel.

(D) no solution

Q19 MCQ · 1 mark **2024** – 30/3/2

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

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

ANSWER *

Consistent means at least one solution: unique (intersecting) or infinitely many (coincident).

(D) intersecting or coincident

Q20 MCQ · 1 mark **2024** – 30/4/1, 30/4/2, 30/4/3

Two lines are given to be parallel. The equation of one of these lines is $5x - 3y = 2$. The equation of the second line can be :

(A) $-15x - 9y = 5$
(B) $15x + 9y = 5$
(C) $9x - 15y = 6$
(D) $-15x + 9y = 5$

ANSWER *

$\frac{-15}{5} = \frac{9}{-3} = -3$ but $\frac{5}{2} \neq -3$, so the lines are parallel.

(D) $-15x + 9y = 5$

Q21 MCQ · 1 mark **2024** – 30/4/3

The pair of linear equations $y = 0$ and $y = -7$ have

(A) exactly one solution
(B) two solutions
(C) infinitely many solutions
(D) no solution

ANSWER *

Both lines are parallel to the x-axis, so they never meet.

(D) no solution

Q22 MCQ · 1 mark **2024** – 30/5/1, 30/5/2, 30/5/3

Which out of the following type of straight lines will be represented by the system of equations $3x + 4y = 5$ and $6x + 8y = 7$?

(A) Parallel
(B) Intersecting

(C) Coincident
(D) Perpendicular to each other

ANSWER *
$\frac{3}{6} = \frac{4}{8} \neq \frac{5}{7}$
(A) Parallel

Q23 MCQ · 1 mark **2025** – 30/S/1

The value of 'k' for which the pair of linear equations $(k+1)x + 2(1-k)y = 15$; $4y = 3x - 8$ has no solution, is :

(A) 3
(B) $\frac{1}{5}$
(C) 5
(D) $\frac{37}{8}$

ANSWER **(C) 5**

Q24 MCQ · 1 mark **2025** – 30/S/2

If the pair of linear equations $2x + 3y = 5$ and $4ky - (1-3k)x = 6k + 2$ represents coincident lines, then the value of 'k' is :

(A) $-\frac{1}{3}$
(B) 3
(C) $\frac{1}{4}$
(D) 4

ANSWER **(B) 3**

Q25 MCQ · 1 mark **2025** – 30/S/3

The pair of linear equations $9x - 15y + 19 = 0$ and $5y - 3x - 9 = 0$ represents two lines which are :

(A) intersecting exactly at one point.
(B) intersecting exactly at two points.
(C) parallel.
(D) coincident.

ANSWER **(C) parallel**

Q26 MCQ · 1 mark **2025** – 30(B)/S

Graphically, the pair of equations $8x - 4y + 12 = 0$ and $2x - y + 5 = 0$ represents two lines which are :

(A) intersecting at exactly one point
(B) intersecting at exactly two points
(C) parallel
(D) coincident

ANSWER **(C) parallel**

Q27 MCQ · 1 mark **2025** – 30(B)/S

The line represented by $2y - x = 4$ intersects the y-axis at :

(A) $(2, 0)$
(B) $(0, -4)$
(C) $(0, 2)$
(D) $(2, 2)$

ANSWER **(C) $(0, 2)$**

Q28 MCQ · 1 mark — 2025 – 30(B)

If the system of equations $3x + 2y = 4$, $4ax + (a + b)y = 16$ has infinitely many solutions, then

(A) $5a = 3b$
(B) $3a = 5b$
(C) $a + b = 15$
(D) $a - b = 2$

ANSWER *
$\frac{3}{4a} = \frac{2}{a+b} = \frac{4}{16} \Rightarrow a = 3,\ a + b = 8 \Rightarrow b = 5; 5a = 3b$
(A) $5a = 3b$

Q29 MCQ · 1 mark — 2025 – 30/3/1, 30/3/3

The value of 'k' for which the system of linear equations $6x + y = 3k$ and $36x + 6y = 3$ have infinitely many solutions is :

(A) 6
(B) $\frac{1}{6}$
(C) $\frac{1}{2}$
(D) $\frac{1}{3}$

ANSWER *
$\frac{6}{36} = \frac{1}{6} = \frac{3k}{3} \Rightarrow k = \frac{1}{6}$
(B) $\frac{1}{6}$

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Q30 MCQ · 1 mark — 2025 – 30/3/2

A system of two linear equations in two variables is inconsistent, if the lines in the graph are :

(A) coincident
(B) parallel
(C) intersecting at one point
(D) intersecting at right angles

ANSWER *
Parallel lines never meet, so there is no solution.
(B) parallel

Q31 MCQ · 1 mark — 2025 – 30/4/1, 30/4/2, 30/4/3

The value of 'p' for which the equations $px + 3y = p - 3$, $12x + py = p$ has infinitely many solutions is :

(A) −6 only
(B) 6 only
(C) ± 6
(D) Any real number except ± 6

ANSWER *
$\frac{p}{12} = \frac{3}{p} \Rightarrow p = \pm 6; \frac{3}{p} = \frac{p-3}{p} \Rightarrow p = 6$
(b) 6 only

Q32 MCQ · 1 mark **2025** – 30/6/1

The system of equations $2x + 1 = 0$ and $3y - 5 = 0$ has

(A) unique solution
(B) two solutions
(C) no solution
(D) infinite number of solutions

ANSWER *

$x = -\frac{1}{2}$ and $y = \frac{5}{3}$: lines parallel to the axes, meeting at one point.

(A) unique solution

Q33 MCQ · 1 mark **2025** – 30/6/2

The system of equations $x + 5 = 0$ and $2x - 1 = 0$, has

(A) No solution
(B) Unique solution
(C) Two solutions
(D) Infinite solutions

ANSWER *

$x = -5$ and $x = \frac{1}{2}$ are two parallel lines (both parallel to the y-axis).

(A) No solution

Q34 MCQ · 1 mark **2025** – 30/6/3

The system of equations $y + a = 0$ and $2x = b$ has

(A) No solution
(B) $\left(-a, \frac{b}{2}\right)$ as its solution
(C) $\left(\frac{b}{2}, -a\right)$ as its solution
(D) Infinite solutions

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ANSWER *

$y = -a, x = \frac{b}{2}$

(C) $\left(\frac{b}{2}, -a\right)$ as its solution

Q35 MCQ · 1 mark **2026 (I)** – 30(B)

If pair of linear equations given by $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has infinitely many solutions, then which of the following is definitely true ?

(A) $\frac{a_1}{a_2} = \frac{c_2}{c_1}$
(B) $a_1a_2 \neq b_1b_2$
(C) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$
(D) $a_1b_2 = a_2b_1$

ANSWER *

$\frac{a_1}{a_2} = \frac{b_1}{b_2} \Rightarrow a_1b_2 = a_2b_1$

(D) $a_1b_2 = a_2b_1$

Q36 MCQ · 1 mark **2026 (I)** – 30/1/1, 30/1/2, 30/1/3

If a pair of linear equations in two variables is represented by two coincident lines, then the pair of equations has :

(A) a unique solution
(B) two solutions
(C) no solution
(D) an infinite number of solutions

ANSWER *
Coincident lines have every point in common.

(d) an infinite number of solutions

Q37 MCQ · 1 mark **2026 (I)** – 30/2/2

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

ANSWER *
First equation: $9x + 10y = 42$; with $9x + 10y = 14$ the lines are parallel.

(B) inconsistent

Q38 MCQ · 1 mark **2026 (I)** – 30/2/1, 30/2/3

If the pair of linear equations : $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ is consistent and dependent, then

(A) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$
(B) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} = \frac{c_1}{c_2}$
(C) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$
(D) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

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ANSWER *
Dependent (coincident) lines

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

Q39 MCQ · 1 mark **2026 (I)** – 30/3/1, 30/3/2

Equation of another line parallel to the line represented by $2x - 6y = 7$ is :

(A) $y = 3x - 7$
(B) $2x = 9 - 6y$
(C) $x - 3y = 7$
(D) $x = \frac{7}{2} - 3y$

ANSWER *
$\frac{2}{1} = \frac{-6}{-3} \neq \frac{7}{7}$

(C) $x - 3y = 7$

Q40 MCQ · 1 mark **2026 (I)** – 30/3/3

Equation of a line coincident with $2.5x - 2y = 3$ is :

(A) $5x - 4y = 3$
(B) $5x - 4y + 6 = 0$
(C) $15x - 12y - 3 = 0$
(D) $5x - 4y - 6 = 0$

ANSWER *
Multiplying by 2: $5x - 4y = 6$

(D) $5x - 4y - 6 = 0$

Q41 MCQ · 1 mark — **2026 (I)** – 30/4/1, 30/4/2

The value of k for which the system of linear equations $\frac{x}{2} + \frac{y}{3} = 5$ and $2x + ky = 7$ is inconsistent, is

(A) $\frac{3}{4}$
(B) $\frac{4}{3}$
(C) $\frac{1}{3}$
(D) 3

ANSWER *
$3x + 2y = 30; \frac{3}{2} = \frac{2}{k} \neq \frac{30}{7} \Rightarrow k = \frac{4}{3}$

(B) $\frac{4}{3}$

Q42 MCQ · 1 mark — **2026 (I)** – 30/4/3

The value of k for which the system of linear equations $kx - y - 2 = 0$ and $6x - 2y - 3 = 0$ has infinitely many solutions, is (does)

(A) $\frac{1}{2}$
(B) 3
(C) 4
(D) Not exist

ANSWER *
$\frac{k}{6} = \frac{1}{2} \Rightarrow k = 3$, but $\frac{-2}{-3} = \frac{2}{3} \neq \frac{1}{2}$

(D) Not exist

Q43 MCQ · 1 mark — **2026 (II)** – 30/7/1, 30/7/3

The pair of equations $5x - 15y = 8$ and $3x - 9y = \frac{24}{5}$ has :

(A) one solution
(B) two solutions
(C) infinitely many solutions
(D) no solution

ANSWER **(C) infinitely many solutions**

Q44 MCQ · 1 mark — **2026 (II)** – 30/7/2

Value of k for which equations $3x - y + 8 = 0$ and $6x - ky = -16$ represent coincident lines, is :

(A) $\frac{1}{2}$
(B) $-\frac{1}{2}$
(C) 2
(D) −2

ANSWER **(C) 2**

Q45 MCQ · 1 mark — **2026 (II)** – 30/8/2

For which value(s) of 'p' will the lines represented by the following pair of linear equations be parallel ?
$3x - y - 5 = 0$ and $6x - 2y - p = 0$

(A) $\frac{1}{2}$
(B) 10
(C) $\frac{5}{2}$
(D) All real values except 10

ANSWER **(D) All real values except 10**

Q46 MCQ · 1 mark — **2026 (II)** – 30/8/3

The pair of equations $x + 2y = 4$ and $3x + 6y = 15$ represents :

(A) intersecting lines
(B) parallel lines
(C) coincident lines
(D) perpendicular lines

ANSWER **(B) parallel lines**

Q47 Assertion–Reason · 1 mark — **2025** – 30/2/1, 30/2/3, 30/2/2

Assertion (A) : The pair of linear equations $px + 3y + 59 = 0$ and $2x + 6y + 118 = 0$ will have infinitely many solutions if $p = 1$.
Reason (R) : If the pair of linear equations $px + 3y + 19 = 0$ and $2x + 6y + 157 = 0$ has a unique solution, then $p \neq 1$.

(A) Both true, R explains A · (B) Both true, R does not explain A · (C) A true, R false · (D) A false, R true

ANSWER *
A: $\frac{p}{2} = \frac{3}{6} = \frac{59}{118} = \frac{1}{2} \Rightarrow p = 1$ (true). R: unique solution needs $\frac{p}{2} \neq \frac{1}{2}$, i.e. $p \neq 1$ (true). R does not explain A.
(B) Both A and R are true but R is not the correct explanation of A.

Q48 Assertion–Reason · 1 mark — **2026 (I)** – 30/5/1, 30/5/2, 30/5/3

Assertion (A) : The system of linear equations $3x - 5y + 7 = 0$ and $-6x + 10y + 14 = 0$ is inconsistent.
Reason (R) : When two linear equations don\'t have unique solution, they always represent parallel lines.

(A) Both true, R explains A · (B) Both true, R does not explain A · (C) A true, R false · (D) A false, R true

ANSWER *
$\frac{3}{-6} = \frac{-5}{10} \neq \frac{7}{14}$: parallel, so A is true. Without a unique solution the lines may also be coincident, so R is false.
(C) Assertion (A) is true, but Reason (R) is false.

Q49 Very Short Answer · 2 marks · Internal choice (OR) part — **2023** – 30(B)

For what values of k does the pair of equations given below have a unique solution ? $6x + ky + 9 = 0$; $2x +$

$3y + 4 = 0$

ANSWER *

For unique solution $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

$\frac{6}{2} \neq \frac{k}{3} \Rightarrow k \neq 9$

All real values of k except $k = 9$

Q50 Very Short Answer · 2 marks | Internal choice (OR) part | **2023** – 30/2/1, 30/2/2, 30/2/3

If the system of linear equations $2x + 3y = 7$ and $2ax + (a + b)y = 28$ have infinite number of solutions, then find the values of 'a' and 'b'.

ANSWER *

$\frac{2}{2a} = \frac{3}{a+b} = \frac{7}{28} = \frac{1}{4}$

$\frac{1}{a} = \frac{1}{4} \Rightarrow a = 4; a + b = 12 \Rightarrow b = 8$

$a = 4,\ b = 8$

Q51 Very Short Answer · 2 marks | **2025** – 30(B)/S

Find the value(s) of k for which the pair of linear equations $kx + y = k^2; x + ky = 1$ have infinitely many solutions.

ANSWER

For infinitely many solutions $\frac{k}{1} = \frac{1}{k} = \frac{k^2}{1}$ ½

$\Rightarrow k^2 = 1$ and $k^3 = 1 \Rightarrow k = \pm 1$ and $k = 1$ 1

$\therefore k = 1$ ½

$k = 1$

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Q52 Short Answer · 3 marks | Internal choice (OR) part | **2025** – 30(B)

For what values of m and n, does the following pair of linear equations have infinitely many solutions ?
$2x + 3y = 7; m(x + 2y) + n(x - y) = 21$

ANSWER *

Second equation: $(m + n)x + (2m - n)y = 21$

$\frac{2}{m+n} = \frac{3}{2m-n} = \frac{7}{21} = \frac{1}{3}$

$m + n = 6$ and $2m - n = 9 \Rightarrow m = 5,\ n = 1$

$m = 5,\ n = 1$

TOPIC 2

02 Graphical Method of Solution

QUICK RECAP

- Find two or three points on each line (put $x = 0$, $y = 0$), plot and join. The point of intersection gives the solution.
- For the area of the triangle formed with an axis, read the vertices from the graph and use $\frac{1}{2} \times \text{base} \times \text{height}$.

Q53 MCQ · 1 mark — **2023** – 30/6/2

The coordinates of the point where the line $2y = 4x + 5$ crosses x-axis is

(A) $\left(0, \frac{-5}{4}\right)$ (B) $\left(0, \frac{5}{2}\right)$

(C) $\left(\frac{-5}{4}, 0\right)$ (D) $\left(\frac{-5}{2}, 0\right)$

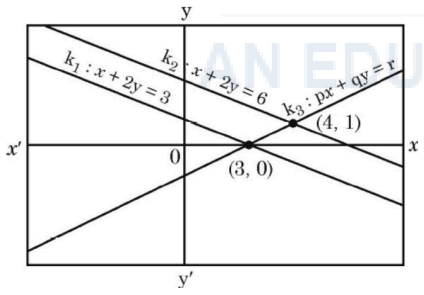
ANSWER *

Put $y = 0$: $4x + 5 = 0 \Rightarrow x = -\frac{5}{4}$

(C) $\left(\frac{-5}{4}, 0\right)$

Q54 MCQ · 1 mark — **2026 (II)** – 30/8/1, 30/8/2, 30/8/3

Three lines k_1, k_2, k_3 represent three different equations as shown in the figure below. Solution of the equations represented by lines k_1 and k_3 is $x = 3,\ y = 0$, while solution of equations represented by lines k_2 and k_3 is $x = 4,\ y = 1$. Which of the following is the equation of line k_3 ?



(A) $x - y = 3$ (B) $x - y = -3$

(C) $x + y = 3$ (D) $x + y = 1$

ANSWER (A) $x - y = 3$

Q55 Assertion–Reason · 1 mark — **2023** – 30/1/1, 30/1/2, 30/1/3

Assertion (A) : Point P(0, 2) is the point of intersection of y-axis with the line $3x + 2y = 4$.
Reason (R) : The distance of point P(0, 2) from x-axis is 2 units.

(A) Both true, R explains A · (B) Both true, R does not explain A · (C) A true, R false · (D) A false, R true

ANSWER *

Putting $x = 0$: $2y = 4 \Rightarrow y = 2$, so A is true. R is true, but it does not explain A.

(B) Both A and R are true but R is not the correct explanation of A.

Q56 Short Answer · 3 marks — **2023** – 30/C/1

Draw the graph of the following equations : $x + y = 5$, $x - y = 5$, and (i) find the solution of the equations from the graph. (ii) shade the triangular region formed by the lines and the y-axis.

ANSWER

Correct graph of $x + y = 5$	1
Correct graph of $x - y = 5$	1
(i) $(5, 0)$	½
(ii) Correct shading	½

Solution $x = 5,\ y = 0$

Q57 Short Answer · 3 marks — **2023** – 30/C/3

Solve the following pair of equations graphically : $x + 3y = 6$, $2x - 3y = 12$. Also, find the area of the triangle formed by the lines representing the equations with y-axis.

ANSWER

Correct graph of both lines	1½
Point of intersection $(6, 0)$	½
Area $= \frac{1}{2} \times 6 \times 6 = 18$ sq units	1

Solution (6, 0); area = 18 sq units

Q58 Short Answer · 3 marks — **2024** – 30/3/1, 30/3/3

Solve the following system of linear equations graphically : $x - y + 1 = 0$, $x + y = 5$

ANSWER *

$x - y + 1 = 0$: points $(0, 1),\ (-1, 0),\ (2, 3)$

$x + y = 5$: points $(0, 5),\ (5, 0),\ (2, 3)$

The lines intersect at $(2, 3)$, so $x = 2,\ y = 3$

$x = 2,\ y = 3$

Q59 Short Answer · 3 marks · Internal choice (OR) part — **2025** – 30/S/1, 30/S/2, 30/S/3

Check graphically whether the pair of linear equations $2x + 3y = 12$; $5x - 3y = 9$ is consistent. If so, solve

it graphically.

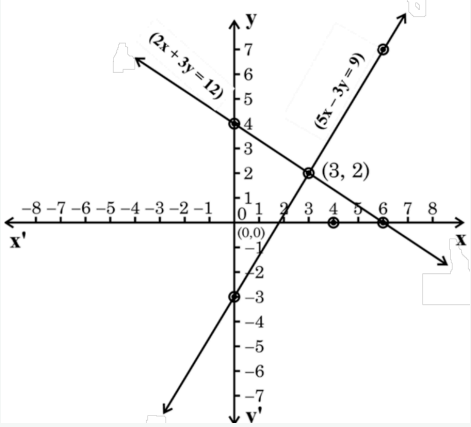
ANSWER

Correct graph of $2x + 3y = 12$ — 1

Correct graph of $5x - 3y = 9$ — 1

As lines are intersecting, the given system of linear equations is consistent. — ½

Solution is $x = 3,\ y = 2$ — ½



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

Q60 Short Answer · 3 marks — **2025** – 30/5/1

Solve the following system of 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.

ANSWER *

$2x - y - 2 = 0$: points $(0, -2),\ (1, 0),\ (2, 2)$

$-4x + y + 4 = 0$: points $(0, -4),\ (1, 0),\ (2, 4)$

The lines intersect at $(1, 0)$: $x = 1,\ y = 0$

They cut the y-axis at $(0, -2)$ and $(0, -4)$; absolute difference of ordinates $= 2$

$x = 1,\ y = 0$; difference $= 2$

Q61 Short Answer · 3 marks — **2025** – 30/5/2

Solve the following system of equations graphically : $2x + y = 5$ and $4x - y = 7$. Hence, write the coordinates of the points where given lines meet y-axis.

ANSWER *

$2x + y = 5$: points $(0, 5),\ (2, 1),\ (1, 3)$

$4x - y = 7$: points $(0, -7),\ (2, 1),\ (1, -3)$

Intersection $(2, 1)$: $x = 2,\ y = 1$

Lines meet the y-axis at $(0, 5)$ and $(0, -7)$

$x = 2,\ y = 1$; $(0, 5)$ and $(0, -7)$

Q62 Short Answer · 3 marks — **2025** – 30/5/3

Solve the following system of equations graphically : $2x + 3y = 6,\ x + y - 1 = 0$. Also, find the sum of

ordinates of the points where given lines meet y axis.

ANSWER *

$2x + 3y = 6$: points $(0, 2),\ (3, 0),\ (-3, 4)$

$x + y = 1$: points $(0, 1),\ (1, 0),\ (-3, 4)$

Intersection $(-3, 4)$: $x = -3,\ y = 4$

They meet the y-axis at $(0, 2)$ and $(0, 1)$; sum of ordinates $= 3$

$x = -3,\ y = 4$; **sum** $= 3$

Q63 Short Answer · 3 marks **2025** – 30/6/1

Check whether the following pair of equations is consistent or not. If consistent, solve graphically : $x + 3y = 6,\ 3y - 2x = -12$

ANSWER *

$\frac{a_1}{a_2} = \frac{1}{-2} \neq \frac{b_1}{b_2} = \frac{3}{3}$, so the pair is consistent (unique solution).

$x + 3y = 6$: points $(0, 2),\ (6, 0),\ (3, 1)$; $3y - 2x = -12$: points $(0, -4),\ (6, 0),\ (3, -2)$

The lines intersect at $(6, 0)$: $x = 6,\ y = 0$

Consistent; $x = 6,\ y = 0$

Q64 Short Answer · 3 marks **2025** – 30/6/2, 30/6/3

Check whether the following system of equations is consistent or not. If consistent, solve graphically : $x - 2y + 4 = 0,\ 2x - y - 4 = 0$

ANSWER *

$\frac{1}{2} \neq \frac{-2}{-1}$, so the pair is consistent.

$x - 2y + 4 = 0$: points $(0, 2),\ (-4, 0),\ (4, 4)$; $2x - y - 4 = 0$: points $(0, -4),\ (2, 0),\ (4, 4)$

The lines intersect at $(4, 4)$: $x = 4,\ y = 4$

Consistent; $x = 4,\ y = 4$

Q65 Short Answer · 3 marks Internal choice (OR) part **2026 (I)** – 30/4/1, 30/4/2, 30/4/3

Solve the linear equations $3x + y = 14$ and $y = 2$ graphically.

ANSWER *

$3x + y = 14$: points $(4, 2),\ (5, -1),\ (3, 5)$

$y = 2$ is a line parallel to the x-axis

The lines intersect at $(4, 2)$: $x = 4,\ y = 2$

$x = 4,\ y = 2$

Q66 Short Answer · 3 marks — **2026 (I)** – 30/5/1

Solve the system of linear equations : $x = 4$ and $3x - 2y = 6$ graphically.

ANSWER *

$x = 4$ is a line parallel to the y-axis

$3x - 2y = 6$: points $(2, 0),\ (0, -3),\ (4, 3)$

The lines intersect at $(4, 3)$: $x = 4,\ y = 3$

$x = 4,\ y = 3$

Q67 Short Answer · 3 marks — **2026 (I)** – 30/5/2, 30/5/3

Use graphical method to solve the system of linear equations : $y = -3$ and $x + 2y = 4$.

ANSWER *

$y = -3$ is a line parallel to the x-axis

$x + 2y = 4$: points $(4, 0),\ (0, 2),\ (10, -3)$

The lines intersect at $(10, -3)$: $x = 10,\ y = -3$

$x = 10,\ y = -3$

Q68 Long Answer · 5 marks — **2026 (I)** – 30/1/1

Determine graphically, the coordinates of vertices of a triangle whose equations are $2x - 3y + 6 = 0$; $2x + 3y - 18 = 0$ and $x = 0$. Also, find the area of this triangle.

ANSWER *

$2x - 3y + 6 = 0$: points $(0, 2),\ (-3, 0),\ (3, 4)$

$2x + 3y - 18 = 0$: points $(0, 6),\ (9, 0),\ (3, 4)$; $x = 0$ is the y-axis

Vertices: $(0, 2),\ (0, 6),\ (3, 4)$

Area $= \frac{1}{2} \times$ base $(6 - 2) \times$ height $3 = 6$ sq units

Vertices (0, 2), (0, 6), (3, 4); area = 6 sq units

Q69 Long Answer · 5 marks — **2026 (I)** – 30/1/3

Draw the graph of the pair of linear equations $x - y + 2 = 0$ and $4x - y - 4 = 0$. Calculate the area of the triangle formed by the lines so drawn and the x-axis.

ANSWER *

$x - y + 2 = 0$: points $(0, 2),\ (-2, 0),\ (2, 4)$

$4x - y - 4 = 0$: points $(0, -4),\ (1, 0),\ (2, 4)$

The lines meet at $(2, 4)$ and cut the x-axis at $(-2, 0)$ and $(1, 0)$

Area $= \frac{1}{2} \times 3 \times 4 = 6$ sq units

Vertices (−2, 0), (1, 0), (2, 4); area = 6 sq units

Q70 Long Answer · 5 marks — **2026 (I)** – 30/2/1, 30/2/2

Aarush bought 2 pencils and 3 chocolates for ₹ 11 and Tanish bought 1 pencil and 2 chocolates for ₹ 7 from the same shop. Represent this situation in the form of a pair of linear equations. Find the price of 1

pencil and 1 chocolate, graphically.

ANSWER *

Let the price of a pencil be ₹ x and a chocolate ₹ y: $2x + 3y = 11$, $x + 2y = 7$

$2x + 3y = 11$: points $(1, 3),\ (4, 1),\ (-2, 5)$; $x + 2y = 7$: points $(1, 3),\ (7, 0),\ (3, 2)$

The lines intersect at $(1, 3)$: pencil ₹ 1, chocolate ₹ 3

Pencil ₹ 1, chocolate ₹ 3

Q71 Long Answer · 5 marks **2026 (I)** – 30/2/3

Represent the following pair of linear equations graphically and hence comment on the condition of consistency of this pair : $x - 5y = 6$; $2x - 10y = 12$

ANSWER *

$x - 5y = 6$: points $(6, 0),\ (1, -1),\ (-4, -2)$

$2x - 10y = 12$: points $(6, 0),\ (1, -1),\ (-4, -2)$

Both lines coincide; $\frac{1}{2} = \frac{-5}{-10} = \frac{6}{12}$

The pair is consistent (dependent) with infinitely many solutions.

Coincident lines; consistent (dependent) with infinitely many solutions

Q72 Long Answer · 5 marks Internal choice (OR) part **2026 (I)** – 30/3/1, 30/3/3

Solve the following system of equations graphically : $x - 2y = 3$, $3x - 8y = 7$

ANSWER *

$x - 2y = 3$: points $(3, 0),\ (5, 1),\ (1, -1)$

$3x - 8y = 7$: points $(5, 1),\ (-3, -2),\ (13, 4)$

The lines intersect at $(5, 1)$: $x = 5,\ y = 1$

$x = 5,\ y = 1$

Q73 Long Answer · 5 marks Internal choice (OR) part **2026 (I)** – 30/3/2

Solve the following system of equations graphically : $2x + 3y = 5$, $-3x + y = -2$

ANSWER *

$2x + 3y = 5$: points $(1, 1),\ (4, -1),\ (-2, 3)$

$-3x + y = -2$: points $(0, -2),\ (1, 1),\ (2, 4)$

The lines intersect at $(1, 1)$: $x = 1,\ y = 1$

$x = 1,\ y = 1$

Q74 Long Answer · 5 marks **2026 (II)** – 30/7/1, 30/7/3

Draw the graphs of the following equations : $2x - y = 1$ and $3x + 2y = 12$. Determine the vertices of the triangle formed by the lines representing these equations and the x-axis. Shade the triangular region so

formed and find its area.

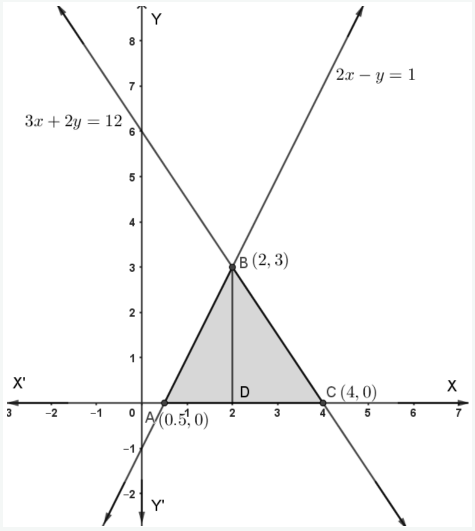
ANSWER

Drawing correct graph — 1+1

Coordinates of vertices of $\triangle ABC$ are $A(0.5, 0),\ B(2, 3),\ C(4, 0)$ — 1½

Correct shading — ½

Area of $\triangle ABC = \frac{1}{2} \times AC \times BD = \frac{1}{2} \times 3.5 \times 3 = \frac{21}{4}$ or 5.25 sq units — 1



Vertices $(0.5, 0),\ (2, 3),\ (4, 0)$; area $= \frac{21}{4}$ or 5.25 sq units

Q75 Long Answer · 5 marks — **2026 (II)** – 30/7/2

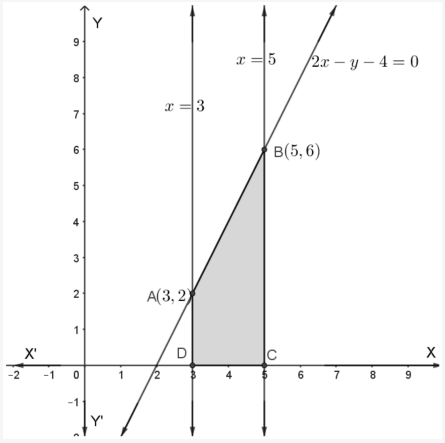
Draw the graphs of the equations $x = 3$; $x = 5$ and $2x - y - 4 = 0$. Also, find the area of the quadrilateral formed by the lines and the x-axis.

ANSWER

Drawing correct graph of the equations $x = 3,\ x = 5,\ 2x - y = 4$ — 3

Required quadrilateral ABCD is a trapezium — 1

Area of quadrilateral ABCD $= \frac{1}{2} \times (2 + 6) \times 2 = 8$ sq units — 1



Area = 8 sq units

TOPIC 3

03 Algebraic Methods of Solution

QUICK RECAP

- Substitution: express one variable from one equation and substitute in the other. Elimination: make coefficients of one variable equal and add/subtract.
- When coefficients are interchanged, e.g. $ax + by = c,\ bx + ay = d$, add and subtract the equations to get $x + y$ and $x - y$ directly.

Q76 MCQ · 1 mark — **2023** – 30/2/3

If $2x + 3y = 15$ and $3x + 2y = 25$, then the value of $x - y$ is :

(A) -10 (B) 8
(C) 10 (D) -8

ANSWER *

Subtracting the first equation from the second, $x - y = 10$

(c) 10

Q77 MCQ · 1 mark — **2023** – 30/5/3

The solution of the pair of equations $x + y = a + b$ and $ax - by = a^2 - b^2$ is :

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

ANSWER *

$x = a,\ y = b$ satisfies both: $a + b = a + b$; $a^2 - b^2 = a^2 - b^2$

(c) $x = a,\ y = b$

Q78 MCQ · 1 mark — **2024** – 30(B)

The solution of the pair of linear equations $\frac{2x}{3} - \frac{y}{2} = -\frac{1}{6}$ and $\frac{x}{2} + \frac{2y}{3} = 3$ is :

(A) $x = 2,\ y = -3$ (B) $x = -2,\ y = 3$
(C) $x = 2,\ y = 3$ (D) $x = -2,\ y = -3$

ANSWER *

The equations are $4x - 3y = -1$ and $3x + 4y = 18$; $x = 2,\ y = 3$ satisfies both.

(C) $x = 2,\ y = 3$

Q79 MCQ · 1 mark — **2024** – 30/4/1, 30/4/2

If $ax + by = a^2 - b^2$ and $bx + ay = 0$, then the value of $x + y$ is :

(A) $a^2 - b^2$ (B) $a + b$
(C) $a - b$ (D) $a^2 + b^2$

ANSWER *

Adding, $(a+b)(x+y) = a^2 - b^2 \Rightarrow x + y = a - b$

(C) $a - b$

Q80 MCQ · 1 mark — **2025** – 30/1/1, 30/1/2, 30/1/3

If $x = 1$ and $y = 2$ is a solution of the pair of linear equations $2x - 3y + a = 0$ and $2x + 3y - b = 0$, then :

(A) $a = 2b$ (B) $2a = b$

(C) $a + 2b = 0$ (D) $2a + b = 0$

ANSWER *

$2 - 6 + a = 0 \Rightarrow a = 4$; $2 + 6 - b = 0 \Rightarrow b = 8$; so $2a = b$

(B) $2a = b$

Q81 Very Short Answer · 2 marks — Internal choice (OR) part — **2023** – 30(B)

Solve the following pair of linear equations by elimination method : $7x - 2y = 3$; $11x - \frac{3}{2}y = 8$

ANSWER *

Multiplying the first equation by 3 and the second by 4 : $21x - 6y = 9$, $44x - 6y = 32$

Subtracting, $23x = 23 \Rightarrow x = 1$

Then $7(1) - 2y = 3 \Rightarrow y = 2$

$x = 1,\ y = 2$

Q82 Very Short Answer · 2 marks — Internal choice (OR) part — **2023** – 30/2/1, 30/2/2, 30/2/3

If $217x + 131y = 913$ and $131x + 217y = 827$, then solve the equations for the values of x and y.

ANSWER *

Adding, $348(x + y) = 1740 \Rightarrow x + y = 5$

Subtracting, $86(x - y) = 86 \Rightarrow x - y = 1$

$\Rightarrow x = 3,\ y = 2$

$x = 3,\ y = 2$

Q83 Very Short Answer · 2 marks — **2024** – 30/1/1

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

ANSWER *

Multiplying the first equation by 7 and the second by 2: $49x - 14y = 35$, $16x + 14y = 30$

Adding, $65x = 65 \Rightarrow x = 1$; then $7 - 2y = 5 \Rightarrow y = 1$

Verification: $7(1) - 2(1) = 5$ and $8(1) + 7(1) = 15$

$x = 1,\ y = 1$

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Q84 Very Short Answer · 2 marks — **2024** – 30/1/2

Solve the following system of linear equations : $2p + 3q = 13$ and $5p - 4q = -2$

ANSWER *

Multiplying the first by 4 and the second by 3: $8p + 12q = 52$, $15p - 12q = -6$

Adding, $23p = 46 \Rightarrow p = 2$

$4 + 3q = 13 \Rightarrow q = 3$

$\boxed{p = 2,\ q = 3}$

Q85 Very Short Answer · 2 marks — **2024** – 30/1/3

Solve the following system of linear equations algebraically : $2x + 5y = -4$; $4x - 3y = 5$

ANSWER *

Multiplying the first by 2: $4x + 10y = -8$

Subtracting $4x - 3y = 5$: $13y = -13 \Rightarrow y = -1$

$2x - 5 = -4 \Rightarrow x = \frac{1}{2}$

$\boxed{x = \frac{1}{2},\ y = -1}$

Q86 Very Short Answer · 2 marks · Internal choice (OR) part — **2024** – 30/3/1, 30/3/2

If $2x + y = 13$ and $4x - y = 17$, find the value of $(x - y)$.

ANSWER *

Adding, $6x = 30 \Rightarrow x = 5$

$y = 13 - 10 = 3$; $x - y = 2$

$\boxed{x - y = 2}$

Q87 Very Short Answer · 2 marks — **2025** – 30/4/1

Solve the following system of equations algebraically : $30x + 44y = 10$; $40x + 55y = 13$

ANSWER *

Multiplying the first by 4 and the second by 3: $120x + 176y = 40$, $120x + 165y = 39$

Subtracting, $11y = 1 \Rightarrow y = \frac{1}{11}$

$30x + 4 = 10 \Rightarrow x = \frac{1}{5}$

$\boxed{x = \frac{1}{5},\ y = \frac{1}{11}}$

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Q88 Very Short Answer · 2 marks — **2025** – 30/4/2

Solve the following system of equations algebraically : $37x + 63y = 137,\ 63x + 37y = 163$

ANSWER *

Adding, $100(x + y) = 300 \Rightarrow x + y = 3$

Subtracting, $26(x - y) = 26 \Rightarrow x - y = 1$

$\Rightarrow x = 2,\ y = 1$

$x = 2,\ y = 1$

Q89 Very Short Answer · 2 marks — **2025** – 30/4/3

Solve the following system of equations algebraically : $73x - 37y = 109,\ 37x - 73y = 1$

ANSWER *

Adding, $110(x - y) = 110 \Rightarrow x - y = 1$

Subtracting, $36(x + y) = 108 \Rightarrow x + y = 3$

$\Rightarrow x = 2,\ y = 1$

$x = 2,\ y = 1$

Q90 Very Short Answer · 2 marks | Internal choice (OR) part — **2025** – 30/6/1, 30/6/2, 30/6/3

Solve the following pair of equations algebraically : $101x + 102y = 304,\ 102x + 101y = 305$

ANSWER *

Adding, $203(x + y) = 609 \Rightarrow x + y = 3$

Subtracting, $x - y = 1$

$\Rightarrow x = 2,\ y = 1$

$x = 2,\ y = 1$

Q91 Short Answer · 3 marks | Internal choice (OR) part — **2023** – 30(B)

Solve for x and y : $\frac{ax}{b} + \frac{by}{a} = a - b,\ ax - by = 2ab$

ANSWER *

From the second equation, $by = ax - 2ab$

Substituting, $\frac{ax}{b} + \frac{ax - 2ab}{a} = a - b \Rightarrow \frac{ax}{b} + x - 2b = a - b \Rightarrow x\left(\frac{a + b}{b}\right) = a + b$

$\Rightarrow x = b$; then $ab - by = 2ab \Rightarrow y = -a$

$x = b,\ y = -a$

Q92 Short Answer · 3 marks · Internal choice (OR) part — **2024** – 30/S/1, 30/S/2, 30/S/3

Find the values of x and y from the following pair of linear equations : $62x + 43y = 167$, $43x + 62y = 148$

ANSWER

Adding and simplifying, $x + y = 3$ ...(iii) — 1

Subtracting and simplifying, $x - y = 1$ ...(iv) — 1

Solving, $x = 2,\ y = 1$ — 1

$x = 2,\ y = 1$

Q93 Short Answer · 3 marks — **2026 (II)** – 30(B)

Solve the following pairs of linear equations and verify your solution. $8x + 5y = 9$ and $3x + 2y = 4$

ANSWER

On solving, $x = -2,\ y = 5$ — 1+1

Verification: LHS $= 8x + 5y = 8(-2) + 5(5) = -16 + 25 = 9 =$ RHS — ½

and LHS $= 3x + 2y = 3(-2) + 2(5) = -6 + 10 = 4 =$ RHS. Hence verified. — ½

$x = -2,\ y = 5$

04 TOPIC 4 Word Problems on Linear Equations

QUICK RECAP

- Two-digit number with ten's digit x and unit's digit y is $10x + y$; on reversing digits it becomes $10y + x$.
- Boat/stream: upstream speed $= (u - v)$, downstream speed $= (u + v)$. Time $= \dfrac{\text{distance}}{\text{speed}}$.

Q94 MCQ · 1 mark — **2026 (II)** – 30/8/1, 30/8/2, 30/8/3

The sum of ages of Sania and Yogesh is 50 years. If now Sania is twice as old as Yogesh was 5 years ago, then present age of Sania is :

(A) 40 years (B) 35 years
(C) 20 years (D) 30 years

ANSWER **(D) 30 years**

Q95 Very Short Answer · 2 marks · Internal choice (OR) part — **2024** – 30/3/1, 30/3/2

Sum of two numbers is 105 and their difference is 45. Find the numbers.

ANSWER *

$x + y = 105,\ x - y = 45$

Adding, $2x = 150 \Rightarrow x = 75$; $y = 30$

The numbers are 75 and 30.

Q96 Very Short Answer · 2 marks · Internal choice (OR) part — **2025** – 30/6/1, 30/6/2, 30/6/3

In a pair of supplementary angles, the greater angle exceeds the smaller by $50°$. Express the given situation as a system of linear equations in two variables and hence obtain the measure of each angle.

ANSWER *

Let the angles be $x°$ and $y°$ $(x > y)$. $x + y = 180$, $x - y = 50$

$\Rightarrow x = 115,\ y = 65$

$115°$ **and** $65°$

Q97 Short Answer · 3 marks — **2023** – 30/C/1, 30/C/3

The age of the father is twice the sum of the ages of his two children. After 20 years, his age will be equal to the sum of the ages of his children. Find the present age of the father.

ANSWER

Let the present age of the father be x years and the sum of present ages of his two children be y years.

$x = 2y$ ...① — 1

$x + 20 = y + 40$ ...② — 1

Solving ① and ②, $x = 40$ — 1

Hence, the present age of the father is 40 years.

Q98 Short Answer · 3 marks — **2023** – 30/C/2

In a $\triangle ABC$, $\angle A = x°$, $\angle B = (3x - 2)°$ and $\angle C = y°$. Also, $\angle C - \angle B = 9°$. Determine the three angles of the triangle.

ANSWER

$x + (3x - 2) + y = 180 \Rightarrow 4x + y = 182$ ...① — 1

$y - (3x - 2) = 9 \Rightarrow y - 3x = 7$ ...② — ½

Solving, $x = 25,\ y = 82$ — 1

$\angle A = 25°,\ \angle B = 73°,\ \angle C = 82°$ — ½

$\angle A = 25°,\ \angle B = 73°,\ \angle C = 82°$

Q99 Short Answer · 3 marks — **2023** – 30/C/B

A boat goes 30 km upstream and 44 km downstream in 10 hours. It goes 40 km upstream and 55 km downstream in 13 hours. Find the speed of the boat in still water and that of the stream.

ANSWER

Let speed of boat be x km/h and stream y km/h. $\frac{30}{x-y} + \frac{44}{x+y} = 10;\ \frac{40}{x-y} + \frac{55}{x+y} = 13$ — 1

$\Rightarrow x + y = 11,\ x - y = 5$ — 1

$\Rightarrow x = 8,\ y = 3$ — 1

Boat 8 km/h, stream 3 km/h

Q100 Short Answer · 3 marks · Internal choice (OR) part — **2023** – 30(B)

A 2-digit number is 4 times the sum of its digits and twice the product of the digits. Find the number.

ANSWER *

Let ten's digit be x and unit's digit be y; number $= 10x + y$

$10x + y = 4(x + y) \Rightarrow y = 2x$

$10x + y = 2xy \Rightarrow 12x = 4x^2 \Rightarrow x = 3\ (x \neq 0),\ y = 6$

The number is 36.

Q101 Short Answer · 3 marks — **2023** – 30/1/1, 30/1/2

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.

ANSWER *

Let the greater number be x and the smaller y. $\frac{x - y}{2} = 2 \Rightarrow x - y = 4$

$x + 2y = 13$

Subtracting, $3y = 9 \Rightarrow y = 3,\ x = 7$

The numbers are 7 and 3.

Q102 Short Answer · 3 marks — **2023** – 30/5/1

Two people are 16 km apart on a straight road. They start walking at the same time. If they walk towards each other with different speeds, they will meet in 2 hours. Had they walked in the same direction with same speeds as before, they would have met in 8 hours. Find their walking speeds.

ANSWER *

Let the speeds be x km/h and y km/h $(x > y)$

Towards each other: $2(x + y) = 16 \Rightarrow x + y = 8$

Same direction: $8(x - y) = 16 \Rightarrow x - y = 2$

$\Rightarrow x = 5,\ y = 3$

5 km/h and 3 km/h

Q103 Short Answer · 3 marks — **2023** – 30/5/3

A fraction becomes $\frac{1}{3}$ when 1 is subtracted from the numerator. It becomes $\frac{1}{4}$ when 8 is added to the denominator. Find the fraction.

ANSWER *

Let the fraction be $\frac{x}{y}$. $\frac{x - 1}{y} = \frac{1}{3} \Rightarrow y = 3x - 3$

$\frac{x}{y + 8} = \frac{1}{4} \Rightarrow 4x = y + 8$

$\Rightarrow 4x = 3x + 5 \Rightarrow x = 5,\ y = 12$

The fraction is $\frac{5}{12}$

Q104 Short Answer · 3 marks · Internal choice (OR) part — **2024** – 30/S/1, 30/S/2, 30/S/3

The sum of the digits of a 2-digit number is 12. Seven times the number is equal to four times the number obtained by reversing the order of the digits. Find the number.

ANSWER

Let unit's digit be x and ten's digit be y; number $= 10y + x$ — ½

$x + y = 12$ ...(i) — ½

$7(10y + x) = 4(10x + y) \Rightarrow x - 2y = 0$ ...(ii) — 1

Solving, $x = 8,\ y = 4$ — ½

Number is 48 — ½

Number is 48.

Q105 Short Answer · 3 marks — **2024** – 30(B)/S

Places A and B are 160 km apart 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 4 hours. If they travel towards each other, they meet in 1 hour 36 minutes. What are the speeds of the two cars ?

ANSWER

Let speeds be x km/h and y km/h $(x > y)$. $4x - 4y = 160$ or $x - y = 40$ ...(i) — 1

1 hour 36 minutes $= 1.6$ hours $\therefore 1.6x + 1.6y = 160$ or $x + y = 100$ ...(ii) — 1

Solving, $x = 70,\ y = 30$ — 1

70 km/h and 30 km/h

Q106 Short Answer · 3 marks — **2024** – 30/1/3

The sum of the digits of a 2-digit number is 14. The number obtained by interchanging its digits exceeds the given number by 18. Find the number.

ANSWER *

Let ten's digit be x and unit's digit y. $x + y = 14$

$(10y + x) - (10x + y) = 18 \Rightarrow y - x = 2$

$\Rightarrow y = 8,\ x = 6$; number is 68

The number is 68.

Q107 Short Answer · 3 marks — **2024** – 30/4/3

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 ₹ 1,500 as hostel charges while another student B, who takes food for 26 days, pays ₹ 1,800. Find the fixed charges and the cost of food.

ANSWER *

Let fixed charges be ₹ x and cost of food per day ₹ y

$x + 20y = 1500,\ x + 26y = 1800$

Subtracting, $6y = 300 \Rightarrow y = 50$; $x = 500$

Fixed charges ₹ 500; cost of food ₹ 50 per day

Q108 Short Answer · 3 marks · Internal choice (OR) part — **2025** – 30/S/1, 30/S/2, 30/S/3

A 2-digit number is obtained by either multiplying the sum of the digits by 7 and then adding 3 or by multiplying the difference of the digits by 19 and then subtracting 1. It is given that the digit at ten's place is greater than that of unit's place. Find the 2-digit number.

ANSWER

Let unit's digit be y and ten's digit be x; number $= 10x + y$. $10x + y = 7(x + y) + 3 \Rightarrow x - 2y = 1$ ...① — 1

$10x + y = 19(x - y) - 1 \Rightarrow -9x + 20y = -1$ ...② — 1

Solving, $x = 9,\ y = 4$ — ½

Required number is 94. — ½

The required number is 94.

Q109 Short Answer · 3 marks — **2025** – 30(B)/S

The ratio of monthly incomes of two persons is 11 : 7 and the ratio of their monthly expenditures is 9 : 5. If each of them saves ₹ 400 per month, find their monthly incomes.

ANSWER

Let incomes be ₹ $11x$ & ₹ $7x$ and expenditures ₹ $9y$ & ₹ $5y$ — ½

$11x - 9y = 400$ ...① — ½

$7x - 5y = 400$ ...② — ½

Solving, $x = 200$ — ½

Monthly incomes are ₹ 2200 and ₹ 1400 — ½+½

₹ 2200 and ₹ 1400

Q110 Short Answer · 3 marks · Internal choice (OR) part — **2025** – 30(B)

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

ANSWER *

Let the fraction be $\frac{x}{y}$. $x + y = 2x + 4 \Rightarrow y = x + 4$

$\frac{x+3}{y+3} = \frac{2}{3} \Rightarrow 3x + 9 = 2y + 6$

$\Rightarrow 3x + 9 = 2x + 14 \Rightarrow x = 5,\ y = 9$

The fraction is $\frac{5}{9}$

Q111 Short Answer · 3 marks — **2025** – 30/4/1

The monthly incomes of two persons are in the ratio 9 : 7 and their monthly expenditures are in the ratio 4 : 3. If each saved ₹ 5,000, express the given situation algebraically as a system of linear equations in two

variables. Hence, find their respective monthly incomes.

ANSWER *

Let incomes be ₹ $9x$, ₹ $7x$ and expenditures ₹ $4y$, ₹ $3y$. $9x - 4y = 5000$, $7x - 3y = 5000$

Multiplying by 3 and 4: $27x - 12y = 15000$, $28x - 12y = 20000 \Rightarrow x = 5000$

Incomes are ₹ 45,000 and ₹ 35,000

₹ 45,000 and ₹ 35,000

Q112 Short Answer · 3 marks **2025** – 30/4/2

The two angles of a right angled triangle other than 90° are in the ratio 2 : 3. Express the given situation algebraically as a system of linear equations in two variables and hence solve it.

ANSWER *

Let the angles be x° and y°. $x + y = 90$ and $3x = 2y$

$\Rightarrow x + \frac{3x}{2} = 90 \Rightarrow x = 36$

$y = 54$; angles are 36° and 54°

36° and 54°

Q113 Short Answer · 3 marks **2025** – 30/4/3

The perimeter of a rectangle is 70 cm. The length of the rectangle is 5 cm more than twice its breadth. Express the given situation as a system of linear equations in two variables and hence solve it.

ANSWER *

Let length be l cm and breadth b cm. $2(l + b) = 70 \Rightarrow l + b = 35$; $l = 2b + 5$

$\Rightarrow 3b + 5 = 35 \Rightarrow b = 10$

$l = 25$

Length 25 cm, breadth 10 cm

Q114 Short Answer · 3 marks Internal choice (OR) part **2026 (I)** – 30/4/1, 30/4/2, 30/4/3

In a class test, Veer scored 6 more than twice as many marks as Kevin scored. If one of them had scored 4 more marks, their total score would have been 40. Find the marks obtained by Veer and Kevin.

ANSWER *

Let Veer score x and Kevin y. $x = 2y + 6$

$x + y + 4 = 40 \Rightarrow x + y = 36$

$\Rightarrow 3y + 6 = 36 \Rightarrow y = 10,\ x = 26$

Veer 26, Kevin 10

Q115 Short Answer · 3 marks Internal choice (OR) part **2026 (II)** – 30(B)

The sum of a 2-digit number and the number obtained by interchanging the digits of the number is 132. If

the digits of the number differ by 2, find the number. How many numbers of this type are there ?

ANSWER

Let units digit be x and tens digit be y. $\therefore$ Number is $10y + x$ ½

$\Rightarrow 10y + x + 10x + y = 132 \Rightarrow 11x + 11y = 132$ or $x + y = 12$ ...(i) ½

Also, $x - y = 2$ ...(ii) or $y - x = 2$ ...(iii) ½

Solving (i) and (ii), $x = 7,\ y = 5$ ½

Solving (i) and (iii), $x = 5,\ y = 7$ ½

Numbers are 75 or 57. Hence, two such numbers. ½

Numbers are 75 or 57; two such numbers.

Q116 Long Answer · 5 marks **2025** – 30/3/3

The students of a class are made to stand equally in rows. If 3 students are extra in each row, there would be 1 row less. If 3 students are less in a row, there would be 2 more rows. Find the number of students in the class.

ANSWER *

Let there be x rows with y students in each row; total $= xy$

$(y + 3)(x - 1) = xy \Rightarrow 3x - y = 3$ ...(1)

$(y - 3)(x + 2) = xy \Rightarrow -3x + 2y = 6$ ...(2)

Adding, $y = 9$; then $x = 4$

Number of students $= 4 \times 9 = 36$

Number of students = 36

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Q117 Long Answer · 5 marks Internal choice (OR) part **2026 (I)** – 30(B)

The sum of numerator and denominator of a fraction is 4 less than twice the denominator. If each of the numerator and denominator is decreased by 1, the fraction becomes $\frac{1}{3}$. Find the fraction.

ANSWER *

Let the fraction be $\frac{x}{y}$. $x + y = 2y - 4 \Rightarrow x - y = -4$

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

Subtracting, $2x = 6 \Rightarrow x = 3, y = 7$

The fraction is $\frac{3}{7}$

Q118 Long Answer · 5 marks Internal choice (OR) part **2026 (I)** – 30/3/1, 30/3/3

Five years ago, Adil was thrice as old as Bharat. Ten years later Adil shall be twice as old as Bharat. To know the present ages of Adil and Bharat : (i) form the linear equations representing the above

information. (ii) show that the system of equations is consistent with unique solution. (iii) find the present ages of Adil and Bharat.

ANSWER *

(i) Let present ages be x (Adil) and y (Bharat). $x-5=3(y-5) \Rightarrow x-3y=-10$; $x+10=2(y+10) \Rightarrow x-2y=10$

(ii) $\frac{1}{1} \neq \frac{-3}{-2}$, so the system is consistent with a unique solution.

(iii) Subtracting, $y=20$; $x=50$. Adil 50 years, Bharat 20 years

Adil 50 years, Bharat 20 years

Q119 Long Answer · 5 marks | Internal choice (OR) part | **2026 (I)** – 30/3/2

The sum of the digits of a 2-digit number is 11. The number obtained by interchanging its digits exceeds the given number by 9. To know the number : (i) form the linear equations representing the above situation. (ii) verify that the equations have a unique solution. (iii) solve the equations to get the given 2-digit number.

ANSWER *

(i) Let ten's digit be x and unit's digit y: $x+y=11$; $(10y+x)-(10x+y)=9 \Rightarrow -x+y=1$

(ii) $\frac{1}{-1} \neq \frac{1}{1}$, so the equations have a unique solution.

(iii) Adding, $2y=12 \Rightarrow y=6$, $x=5$; number is 56

The number is 56.

Q120 Case Study · 4 marks | **2024** – 30/5/1, 30/5/2, 30/5/3

Case study: Essel World is one of India's largest amusement parks that offers a diverse range of thrilling rides, water attractions and entertainment options for visitors of all ages. The park is known for its iconic \"Water Kingdom\" section, making it a popular destination for family outings and fun-filled adventure. The ticket charges for the park are ₹ 150 per child and ₹ 250 per adult. On a day, the cashier of the park found that 300 tickets were sold and an amount of ₹ 55,000 was collected.

(i) If the number of children visited be x and the number of adults visited be y, then write the given situation algebraically. **[1]**

(ii)(a) How many children visited the amusement park that day ? **[2]** OR (b) How many adults visited the amusement park that day ? **[2]**

(iii) How much amount will be collected if 250 children and 100 adults visit the amusement park ? **[1]**



ANSWER *

(i) $x + y = 300$ and $150x + 250y = 55000$ (i.e. $3x + 5y = 1100$)

(ii)(a) From $x + y = 300$: $3x + 5(300 - x) = 1100 \Rightarrow 2x = 400 \Rightarrow x = 200$ children

OR (b) $y = 300 - 200 = 100$ adults

(iii) $250 \times 150 + 100 \times 250 = 37500 + 25000 = ₹\ 62{,}500$

(ii)(a) 200 children OR (b) 100 adults (iii) ₹ 62,500

Q121 Case Study · 4 marks **2025** – 30/2/1, 30/2/2, 30/2/3

Case study: A school is organizing a grand cultural event to show the talent of its students. To accommodate the guests, the school plans to rent chairs and tables from a local supplier. It finds that rent for each chair is ₹ 50 and for each table is ₹ 200. The school spends ₹ 30,000 for renting the chairs and tables. Also, the total number of items (chairs and tables) rented are 300. If the school rents 'x' chairs and 'y' tables, answer the following questions :

(i) Write down the pair of linear equations representing the given information. **[1]**

(ii)(a) Find the number of chairs and number of tables rented by the school. **[2]** OR (b) If the school wants to spend a maximum of ₹ 27,000 on 300 items (tables and chairs), then find the number of chairs and tables it can rent. **[2]**

(iii) What is maximum number of tables that can be rented in ₹ 30,000 if no chairs are rented ? **[1]**



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ANSWER *

(i) $x + y = 300$ and $50x + 200y = 30000$ (i.e. $x + 4y = 600$)

(ii)(a) Subtracting, $3y = 300 \Rightarrow y = 100$, $x = 200$: 200 chairs and 100 tables

OR (b) $x + y = 300$, $50x + 200y = 27000 \Rightarrow x + 4y = 540$; $3y = 240 \Rightarrow y = 80$, $x = 220$: 220 chairs and 80 tables

(iii) $\frac{30000}{200} = 150$ tables

(ii)(a) 200 chairs, 100 tables OR (b) 220 chairs, 80 tables (iii) 150 tables

Q122 Case Study · 4 marks **2026 (II)** – 30/8/1, 30/8/2, 30/8/3

Case study: Essel World is one of India's largest amusement park that offers a diverse range of thrilling rides and water attractions for visitors of all ages. The entry ticket charges for the park is ₹ 150 per child and ₹ 250 per adult. On a day cashier of park found that 300 tickets were sold and an amount of ₹ 55,000 was collected.

(i) If number of children visited be x, the number of adults visited be y, write the given situation algebraically. **[1]**

(ii) How many children visited the park that day ? **[1]**

(iii)(a) How many adults visited the park that day ? If there were 50 more adults that day, how much

money would have been collected from adults ? **[2]** OR (b) How many adults visited the park that day ? If a special show was arranged and hence the per ticket rate for adults was increased by ₹ 100, totally how much money will be collected ? **[2]**



ANSWER

(i) $x + y = 300$ ...(I) ½

$150x + 250y = 55000$ ...(II) ½

(ii) Solving (I) & (II), $x = 200$ 1

(iii)(a) From (I), $y = 100$ 1

Money collected from adults $= (100 + 50) \times 250 =$ ₹ 37500 1

OR (iii)(b) From (I), $y = 100$ 1

Total money collected $= 100 \times (250 + 100) + 200 \times 150 =$ ₹ 65000 1

(ii) 200 (iii)(a) 100 adults; ₹ 37500 OR (b) 100 adults; ₹ 65000

Q123 Case Study · 4 marks **2026 (II)** – 30(B)

Case study: Ankita went to a fair organised in an open ground near her school. After taking a round she decided to enjoy rides on the giant wheel and also play hoopla (a game in which you throw a ring on the items kept in a stall and if the ring covers any object completely, you get it). The number of times she rides the giant wheel is 2 less than twice the number of times she played hoopla. Each ride cost ₹ 5 and a game of hoopla costs ₹ 6 and she spent ₹ 54 in the fair.

(i) Taking x as the number of times she played hoopla and y as the number of rides on the wheel, represent the above statements algebraically. **[2]**

(ii) Solve the above equations for x and y. **[2]**

ANSWER

(i) $y = 2x - 2$ 1

$6x + 5y = 54$ 1

(ii) On solving equations $2x - y = 2$ and $6x + 5y = 54$, $x = 4,\ y = 6$ 1+1

(i) $y = 2x - 2, 6x + 5y = 54$ **(ii)** $x = 4,\ y = 6$

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