CBSE CLASS X

Mathematics Standard (041)

ANSWER KEY

From previous CBSE Board Exam questions

Code: TYHGW8	Questions: 61	Maximum Marks: 148	Generated: 2026-06-15 13:05

SELECTIONS USED

Source	Previous-year board
Subject	Mathematics
Lessons	Pair of Linear Equations in Two Variables
Year	2022-2026
Questions selected	61

Composition — Types: 22 MCQ · 13 Short · 10 Very short · 10 Long · 4 Case-based · 2 Assertion–reason

Q1. § 3.1 Introduction § 3.3.2 Elimination Method **[2]**

The cost of 2 kg apples and 1 kg of grapes on a day was found to be ₹ 320. The cost of 4 kg apples and 2 kg grapes was found to be ₹ 600. If cost of 1 kg of apples and 1 kg of grapes is ₹ x and ₹ y respectively, represent the given situation algebraically as a system of equations and check whether the system so obtained is consistent or not.

Previously asked in: 2025 30/5/1 Q21(a)

◆ **Pair of Linear Equations in Two Variables** | Consistency of a system of linear equations (consistent/inconsistent/dependent) | Forming a system of linear equations from a word problem

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Model Answer

The two equations are:

$$2x + y = 320 \quad ...(1)$$

$$4x + 2y = 600 \quad ...(2)$$

Comparing ratios: $\dfrac{a_1}{a_2} = \dfrac{2}{4} = \dfrac{1}{2}, \dfrac{b_1}{b_2} = \dfrac{1}{2}, \dfrac{c_1}{c_2} = \dfrac{320}{600} = \dfrac{8}{15}$

Since $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} \neq \dfrac{c_1}{c_2}$, the system is **inconsistent** (no solution).

Source: Chapter 3, Section 3.4 Summary

Explanation

- Form both equations directly from the given information using x and y.
- Compare the three ratios $\frac{a_1}{a_2}, \frac{b_1}{b_2}, \frac{c_1}{c_2}$ to decide consistency.
- The middle condition ($a_1/a_2 = b_1/b_2 \neq c_1/c_2$) always means **inconsistent** (parallel lines, no solution). State this conclusion clearly for full marks.

Q2. § 3.1 Introduction § 3.3.2 Elimination Method **[1]**

3 chairs and 1 table cost ₹ 900; whereas 5 chairs and 3 tables cost ₹ 2,100. If the cost of 1 chair is ₹ x and the cost of 1 table is ₹ y, then the situation can be represented algebraically as

A $3x + y = 900, 3x + 5y = 2100$
B $x + 3y = 900, 3x + 5y = 2100$
C $3x + y = 900, 5x + 3y = 2100$
D $x + 3y = 900, 5x + 3y = 2100$

Previously asked in: 2023 30/6/1 Q13

◆ **Pair of Linear Equations in Two Variables** Formulating a Pair of Linear Equations from a Word Problem

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Model Answer

Option C: $3x + y = 900, 5x + 3y = 2100$

(3 chairs + 1 table = ₹900 gives $3x + y = 900$; 5 chairs + 3 tables = ₹2100 gives $5x + 3y = 2100$.)

Explanation

Directly translate each statement: coefficient of x = number of chairs, coefficient of y = number of tables. Option C correctly places 3 and 1 in the first equation, and 5 and 3 in the second. Watch out for Option A which swaps the coefficients of x and y in the first equation.

Q3. **[3]**

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.

Previously asked in: 2023 30/1/1 Q26

◆ **Pair of Linear Equations in Two Variables** | Forming and Solving a Pair of Linear Equations from Word Problems

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Model Answer

Let the greater number be x and the smaller number be y.

Forming equations:

Half the difference of two numbers is 2:

$$\frac{x-y}{2} = 2 \implies x - y = 4 \tag{1}$$

Sum of greater number and twice the smaller is 13:

$$x + 2y = 13 \tag{2}$$

Solving by substitution:

From (1): $x = y + 4$

Substituting in (2):

$$(y+4) + 2y = 13$$

$$3y = 9 \implies y = 3$$

Substituting back: $x = 3 + 4 = 7$

The two numbers are 7 and 3.

Verification: $\frac{7-3}{2} = 2\,\checkmark$ and $7 + 2(3) = 13\,\checkmark$

Source: Chapter 3, Section 3.3.1 Substitution Method

Explanation

- Examiners award 1 mark for correctly forming both equations, 1 mark for solving, and 1 mark for the correct answer/verification.
- Clearly define variables at the start — this is expected in board answers.
- "Half the difference" means $\frac{x-y}{2}$, not $\frac{x}{2} - y$; be careful with phrasing.
- Always verify your answer — it shows completeness and can earn the final mark.

Q4. § 3.1 Introduction **[3]**

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.

Previously asked in: 2023 30/5/1 Q29

◆ **Pair of Linear Equations in Two Variables** Word Problems: Speed-Distance-Time using Pair of Linear Equations

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Model Answer

Let the speeds of the two persons be **x km/h** and **y km/h** (x > y).

Setting up equations:

When walking **towards** each other, relative speed = (x + y) km/h.
They meet in 2 hours, covering 16 km:

$$x + y = \frac{16}{2} = 8 \quad ...(1)$$

When walking in the **same direction**, relative speed = (x − y) km/h.
They meet in 8 hours, covering 16 km:

$$x - y = \frac{16}{8} = 2 \quad ...(2)$$

Solving by elimination:

Adding (1) and (2):

$$2x = 10 \implies x = 5$$

Substituting in (1):

$$5 + y = 8 \implies y = 3$$

∴ **The speeds of the two persons are 5 km/h and 3 km/h.**

Source: Chapter 3, Pair of Linear Equations in Two Variables

Explanation

- The key idea is **relative speed**: towards each other → add speeds; same direction → subtract speeds.
- Use Distance = Speed × Time to form both equations directly.
- Elimination method (adding/subtracting equations) is the quickest approach here.
- Examiners award marks for: correct equations (1 mark), correct solving (1 mark), correct answer with units (1 mark). Always state the final answer clearly.

Q5. § 3.1 Introduction **[4]**

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.

Based on the above, answer the following questions :

(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) How many children/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]

Previously asked in: 2024 30/5/1 Q36

◆ **Pair of Linear Equations in Two Variables** | Formulating and Solving a Pair of Linear Equations in Two Variables from a Word Problem

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Model Answer

(i) The situation algebraically:

$$x + y = 300$$

$$150x + 250y = 55000$$

(ii) From equation (i): $x = 300 - y$

Substituting in equation (ii):

$$150(300 - y) + 250y = 55000$$

$$45000 - 150y + 250y = 55000$$

$$100y = 10000 \implies y = 100$$

So $x = 300 - 100 = 200$

200 children and 100 adults visited the park that day.

(iii) Amount collected = $150 \times 250 + 250 \times 100$

$$= 37500 + 25000 = ₹62,500$$

Source: Case Study passage, Essel World ticket problem.

Explanation

- **(i)** Simply translate the two conditions (total tickets = 300, total amount = ₹55,000) into two linear equations. This is the standard "form the pair of equations" step.
- **(ii)** Use substitution method — the most straightforward approach here. Show all steps clearly for full 2-mark credit.
- **(iii)** Direct substitution of given values (250 children, 100 adults) into the fare formula. No equation-solving needed; just arithmetic.

Q6. § 3.1 Introduction **[5]**

Tara scored 40 marks in a test, getting 3 marks for each right answer and losing 1 mark for each wrong answer. Had 4 marks been awarded for each correct answer and 2 marks been deducted for each wrong answer, then Tara would have scored 50 marks. Assuming that Tara attempted all questions, find the total number of questions in the test.

Previously asked in: 2024 30/2/1 Q32(b) (OR-2)

◆ **Pair of Linear Equations in Two Variables** | Solving word problems using pair of linear equations in two variables

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Model Answer

Let the number of correct answers = x and the number of wrong answers = y.

Equations formed:

From condition 1: $3x - y = 40$ ... (1)

From condition 2: $4x - 2y = 50$, i.e., $2x - y = 25$ ... (2)

Elimination Method:

Subtract (2) from (1):

$(3x - y) - (2x - y) = 40 - 25$

$x = 15$

Substituting x = 15 in equation (1):

$3(15) - y = 40$

$45 - y = 40$

$y = 5$

Verification:

- Condition 1: $3(15) - 1(5) = 45 - 5 = 40$ ✓
- Condition 2: $4(15) - 2(5) = 60 - 10 = 50$ ✓

Total number of questions = x + y = 15 + 5 = 20

Source: Chapter 3, Section 3.3.2 (Elimination Method)

Explanation

- **Two variables** are essential: assign x = correct, y = wrong clearly before writing equations.
- Write **both equations first**, then solve — examiners award marks at each step.
- Use the **elimination method** as taught in §3.3.2: subtract equations to eliminate y directly.
- Always write a **verification** — it is expected in board exams and can fetch 1 mark.
- State the **final answer** clearly as a sum (x + y), since the question asks for total questions, not individual counts.

Q7. § 3.1 Introduction § 3.3.2 Elimination Method **[5]**

Vijay invested certain amounts of money in two schemes A and B, which offer interest at the rate of 8% per annum and 9% per annum, respectively. He received ₹1,860 as the total annual interest. However, had he interchanged the amounts of investments in the two schemes, he would have received ₹20 more as annual interest. How much money did he invest in each scheme?

Previously asked in: 2025 30/1/1 Q32

◆ **Pair of Linear Equations in Two Variables** Formulating and Solving a Pair of Linear Equations – Word Problems (Simple Interest)

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Model Answer

Let amount invested in Scheme A = ₹x and in Scheme B = ₹y.

Equation 1 (original investment):

$$\frac{8x}{100} + \frac{9y}{100} = 1860$$

$$\Rightarrow 8x + 9y = 186000 \quad (1)$$

Equation 2 (interchanged investment gives ₹20 more):

$$\frac{9x}{100} + \frac{8y}{100} = 1880$$

$$\Rightarrow 9x + 8y = 188000 \quad (2)$$

Elimination Method:

Multiply (1) by 9 and (2) by 8:

$$72x + 81y = 1674000 \quad (3)$$

$$72x + 64y = 1504000 \quad (4)$$

Subtract (4) from (3):

$$17y = 170000 \Rightarrow y = 10000$$

Substitute y = 10000 in (1):

$$8x + 90000 = 186000 \Rightarrow 8x = 96000 \Rightarrow x = 12000$$

∴ **Vijay invested ₹12,000 in Scheme A and ₹10,000 in Scheme B.**

Verification: 8% of 12000 + 9% of 10000 = 960 + 900 = ₹1860 ✓

Source: Pair of Linear Equations in Two Variables, Section 3.3.2 (Elimination Method)

Explanation

- **Form both equations carefully** from the given conditions — this earns the first 2 marks.
- Use the **elimination method** (as taught in §3.3.2): multiply to equalise coefficients, then subtract.
- Always **verify** your answer — CBSE awards 1 mark for correct verification in 5-mark word problems.
- The key insight: interchanging amounts increases interest by ₹20, so the second equation uses 1860 + 20 = 1880.

Q8. § 3.1 Introduction **[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.

Previously asked in: 2026 30/4/1 Q26 (OR-1)

◆ **Pair of Linear Equations in Two Variables** | Formulating and Solving a Pair of Linear Equations from Word Problems

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Model Answer

Let Veer's marks = V and Kevin's marks = K.

Equation 1: Veer scored 6 more than twice Kevin's marks:

$$V = 2K + 6$$

Equation 2: If one of them scored 4 more, total = 40, so their current total = 36:

$$V + K = 36$$

Solving: Substitute V = 2K + 6 into equation 2:

$$2K + 6 + K = 36$$

$$3K = 30 \implies K = 10$$

$$V = 2(10) + 6 = 26$$

∴ **Veer scored 26 marks and Kevin scored 10 marks.**

Verification: 26 + 10 + 4 = 40 ✓

Explanation

- The phrase "if one of them scored 4 more, total = 40" means the **current total is 36** (subtract 4). This is the key step students often miss.
- Set up both equations clearly before solving — examiners award 1 mark for correct equations, 1 mark for solving, 1 mark for the final answer.
- Always verify your answer; it shows completeness and can recover partial marks.

Q9. § 3.2 Graphical Method of Solution of a Pair of Linear Equations § 3.3 Algebraic Methods of Solving a Pair of Linear Equations § 3.4 Summary **[1]**

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.

Previously asked in: 2024 30/1/1 Q18

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

(a) consistent with unique solution.

The two lines intersect at a single point, giving exactly one solution. Hence the pair is consistent with a unique solution.

Source: Chapter 3, Section 3.2 – Graphical Method of Solution of a Pair of Linear Equations

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Explanation

When two lines **intersect at one point**, the pair of linear equations has exactly one (unique) solution → **consistent**. Examiners expect you to recall: intersecting lines = consistent + unique solution; coincident lines = consistent + infinitely many solutions; parallel lines = inconsistent. Option (d) is a distractor — intersecting lines already meet, so no "extension" is needed.

Q10. § 3.3 Algebraic Methods of Solving a Pair of Linear Equations **[3]**

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

Previously asked in: 2026 30/5/1 Q30

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

For x = 4: This is a vertical line parallel to the y-axis passing through x = 4.

Points: (4, 0), (4, 2), (4, −2)

For 3x − 2y = 6: Rewrite as $y = \dfrac{3x - 6}{2}$

x	0	2	4
y	−3	0	3

Points: (0, −3), (2, 0), (4, 3)

Plot both lines on the graph. The line x = 4 is vertical; the line 3x − 2y = 6 passes through (0, −3) and (2, 0).

The two lines **intersect at (4, 3)**.

∴ **Solution: x = 4, y = 3**

Source: Chapter 3, Section 3.2 — Graphical Method of Solution of a Pair of Linear Equations

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Explanation

- Examiners expect a **table of values** for the non-vertical equation and at least **two named points** for the vertical line.
- The vertical line x = 4 scores easy marks — just state it is parallel to the y-axis through x = 4.
- Substitute the answer back to verify: 3(4) − 2(3) = 12 − 6 = 6 ✓
- Always state the solution clearly as a coordinate pair at the end — that line carries marks.

Q11. § 3.1 Introduction § 3.3.2 Elimination Method **[4]**

> A coaching institute of Mathematics conducts classes in two batches I and II and fees for rich and poor children are different. In batch I, there are 20 poor and 5 rich children, whereas in batch II, there are 5 poor and 25 rich children. The total monthly collection of fees from batch I is ₹ 9000 and from batch II is ₹ 26,000. Assume that each poor child pays ₹ x per month and each rich child pays ₹ y per month.

Based on the above information, answer the following questions:

- **(i)** Represent the information given above in terms of x and y. [1]
- **(ii)** Find the monthly fee paid by a poor child. [2]
- **(iii)** If there are 10 poor and 20 rich children in batch II, what is the total monthly collection of fees from batch II? [1]

Previously asked in: 2023 30/6/1 Q36

◆ **Pair of Linear Equations in Two Variables** | Application of linear equations to find total collection | Formulating a Pair of Linear Equations from a Word Problem | Solving a pair of linear equations to find unknown values

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Model Answer

(i) From the given information:

- Batch I: $20x + 5y = 9000$
- Batch II: $5x + 25y = 26000$

(ii) From the two equations:

$20x + 5y = 9000$ ... (1)

$5x + 25y = 26000$ ... (2)

Multiply (1) by 5: $100x + 25y = 45000$ ... (3)

Subtract (2) from (3):

$95x = 19000$

$x = 200$

∴ Monthly fee paid by a poor child = **₹ 200**

(iii) From (2), substituting $x = 200$:

$5(200) + 25y = 26000 \Rightarrow 25y = 25000 \Rightarrow y = 1000$

For 10 poor and 20 rich children in batch II:

Total = $10x + 20y = 10(200) + 20(1000) = 2000 + 20000 =$ **₹ 22,000**

Source: Pair of Linear Equations in Two Variables, Case Study Application

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Explanation

- **(i)** Simply translate the word problem into two linear equations — 1 mark for both equations correct.
- **(ii)** Solve by elimination (multiply and subtract). Show all steps for full 2 marks; a missing step costs a mark.
- **(iii)** You must first find y (₹ 1000) using the value of x, then substitute the new batch composition. Just the final answer without working may lose the mark.

Q12. § 3.2 Graphical Method of Solution of a Pair of Linear Equations | § 3.3 Algebraic Methods of Solving a Pair of Linear Equations | § 3.4 Summary **[1]**

The point of intersection of the line represented by $3x - y = 3$ and y-axis is given by

A $(0, -3)$
B $(0, 3)$
C $(2, 0)$
D $(-2, 0)$

Previously asked in: 2023 30/6/1 Q4

◆ **Pair of Linear Equations in Two Variables** | 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

Option A: $(0, -3)$

On the y-axis, $x = 0$. Substituting in $3x - y = 3$: $3(0) - y = 3 \Rightarrow y = -3$. So the point is $(0, -3)$.

Explanation

To find intersection with the y-axis, always put $x = 0$ in the equation and solve for y. The x-axis intersection requires $y = 0$ instead — don't confuse the two. This is a standard 1-mark concept tested frequently.

Q13. § 3.3 Algebraic Methods of Solving a Pair of Linear Equations | § 3.4 Summary **[2]**

Using graphical method, find whether following system of linear equations is consistent or not : $x = 0$ and $y = -7$

Previously asked in: 2023 30/1/1 Q21(b) (OR-2)

◆ **Pair of Linear Equations in Two Variables** | 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

The equation $x = 0$ represents the **y-axis** (a vertical line passing through the origin), and $y = -7$ represents a **horizontal line** parallel to the x-axis, passing through (0, −7).

These two lines intersect at the point **(0, −7)**.

Since the lines intersect at exactly one point, the system has a **unique solution**. Therefore, the pair of equations is **consistent**.

Source: Pair of Linear Equations in Two Variables, Section 3.2

Explanation

- Examiners expect you to identify what each line looks like on the graph (vertical/horizontal), state the point of intersection, and conclude with the word "consistent."
- $x = 0$ is the y-axis; $y = -7$ is a horizontal line — they are perpendicular and always intersect at one point.
- The key rule: intersecting lines → unique solution → **consistent**. Write this conclusion explicitly or you lose the mark.

Q14. § 3.3 Algebraic Methods of Solving a Pair of Linear Equations **[2]**

Solve the pair of equations $x = 3$ and $y = -4$ graphically.

Previously asked in: 2023 30/1/1 Q21(a) (OR-1)

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

The equation $x = 3$ is a vertical line parallel to the Y-axis, passing through (3, 0).
The equation $y = -4$ is a horizontal line parallel to the X-axis, passing through (0, −4).

On the graph, the two lines intersect at the point **(3, −4)**.

∴ The solution is $x = 3,\ y = -4$.

Source: Chapter 3, Section 3.2 – Graphical Method of Solution of a Pair of Linear Equations

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Explanation

- $x = 3$ has no y-term, so it is a vertical line; $y = -4$ has no x-term, so it is a horizontal line. They always intersect at exactly one point.
- In the graph, mark the vertical line at $x = 3$ and the horizontal line at $y = -4$; their crossing point gives the solution directly.
- Examiners expect you to describe both lines, state that they intersect, and write the solution clearly. A rough sketch on graph paper (labelling the point of intersection) earns full marks.

Q15. § 3.2 Graphical Method of Solution of a Pair of Linear Equations § 3.4 Summary **[1]**

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 $k = 4$

Previously asked in: 2023 30/1/1 Q2

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

Answer: B — does not exist

Rewriting: $kx - y - 2 = 0$ and $6x - 2y - 3 = 0$. For infinitely many solutions: $\frac{k}{6} = \frac{-1}{-2} = \frac{-2}{-3}$, i.e., $\frac{k}{6} = \frac{1}{2}$ gives $k = 3$, but $\frac{1}{2} \neq \frac{2}{3}$. So no value of k satisfies all three ratios simultaneously; the answer **does not exist**.

Explanation

For infinitely many solutions, all three ratios must be equal: $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$. Here $\frac{b_1}{b_2} = \frac{1}{2}$ but $\frac{c_1}{c_2} = \frac{2}{3}$; these two are never equal regardless of k, so the condition can never be fully satisfied. Always check **all three ratios**, not just two.

Q16. § 3.2 Graphical Method of Solution of a Pair of Linear Equations § 3.4 Summary **[3]**

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

Previously asked in: 2025 30/6/1 Q28

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

Checking consistency:

Rewrite equations in standard form:

- $x + 3y - 6 = 0 \rightarrow a_1 = 1,\ b_1 = 3,\ c_1 = -6$
- $-2x + 3y + 12 = 0 \rightarrow a_2 = -2,\ b_2 = 3,\ c_2 = 12$

$$\frac{a_1}{a_2} = \frac{1}{-2}, \quad \frac{b_1}{b_2} = \frac{3}{3} = 1$$

Since $\dfrac{a_1}{a_2} \neq \dfrac{b_1}{b_2}$, the pair is **consistent** (lines intersect at a unique point).

Graphical Solution:

For $x + 3y = 6$:

x	0	6
y	2	0

Plot points A(0, 2) and B(6, 0).

For $3y - 2x = -12$, i.e., $y = \dfrac{2x - 12}{3}$:

x	0	6
y	−4	0

Plot points P(0, −4) and Q(6, 0).

Both lines pass through **(6, 0)**.

$\therefore$ **Solution:** $x = 6,\ y = 0$

Source: Chapter 3, Section 3.2 (Graphical Method)

Explanation

- First check ratios $\frac{a_1}{a_2}$ and $\frac{b_1}{b_2}$; since they are unequal, lines intersect → consistent.
- For the graph, find two points per line (easiest: set $x = 0$, then $y = 0$).
- Both lines share the point (6, 0) — that is the unique solution.
- Always state the conclusion clearly. Examiners award marks for the ratio check, the table of values, and the correct solution point.

Q17. **[2]**

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.

Previously asked in: 2025 30/6/1 Q21(b)

◆ **Pair of Linear Equations in Two Variables**

Forming and solving a system of linear equations from geometric conditions (supplementary angles)

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Model Answer

Let the greater angle = x° and the smaller angle = y°.

Since the angles are supplementary:

$$x + y = 180 \quad ...(1)$$

Since the greater exceeds the smaller by 50°:

$$x - y = 50 \quad ...(2)$$

Adding (1) and (2): $2x = 230 \Rightarrow x = 115^\circ$

Substituting in (1): $y = 180 - 115 = 65^\circ$

The greater angle is 115° and the smaller angle is 65°.

Source: Chapter 3, Pair of Linear Equations in Two Variables

Explanation

- **1 mark** for correctly forming both equations; **1 mark** for solving and stating the answer.
- Supplementary angles sum to 180° — this gives equation (1). The word "exceeds by" means difference — this gives equation (2).
- Adding the two equations is the quickest elimination step; show it clearly.
- Always state the final answer in a sentence for full credit.

Q18. § 3.2 Graphical Method of Solution of a Pair of Linear Equations **[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

Previously asked in: 2025 30/6/1 Q17

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

Option A: Unique solution

The equations $2x + 1 = 0$ gives $x = -\frac{1}{2}$ and $3y - 5 = 0$ gives $y = \frac{5}{3}$. These are independent equations, each with exactly one value, so the system has a **unique solution**.

Explanation

Although each equation has only one variable, together they form a consistent pair with a single ordered pair solution $\left(-\frac{1}{2}, \frac{5}{3}\right)$. Examiners expect students to recognise that one equation in x and one in y (with no contradiction) always yields exactly one solution. Do not confuse "one variable each" with "no solution" or "infinite solutions."

Q19. § 3.3 Algebraic Methods of Solving a Pair of Linear Equations | § 3.4 Summary **[3]**

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.

Previously asked in: 2025 30/5/1 Q28

◆ **Pair of Linear Equations in Two Variables** | 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

Finding points for Line 1: $2x - y - 2 = 0 \Rightarrow y = 2x - 2$

x	0	1
y	−2	0

Points: (0, −2), (1, 0)

Finding points for Line 2: $-4x + y + 4 = 0 \Rightarrow y = 4x - 4$

x	0	1
y	−4	0

Points: (0, −4), (1, 0)

Plot both lines on the graph. The two lines intersect at **(1, 0)**.

∴ **Solution: x = 1, y = 0**

Y-axis intercepts:

- Line 1 cuts y-axis at (0, −2) → ordinate = −2
- Line 2 cuts y-axis at (0, −4) → ordinate = −4

Absolute difference = |−2 − (−4)| = |2| = 2

Source: Chapter 3, Section 3.2

Explanation

- **Table of values** earns the first mark; always find two points per line and show them in a table.
- **Intersection point** (the solution) earns the second mark — read coordinates carefully from the graph.
- The **absolute difference of ordinates** (y-values where lines meet the y-axis) is the third mark — set x = 0 in each equation to get the y-intercepts quickly.
- "Absolute difference" means take the positive value: $|-2-(-4)| = 2$.

Q20. § 3.3 Algebraic Methods of Solving a Pair of Linear Equations **[5]**

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

Previously asked in: 2026 30/3/1 Q34(a)

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

For Line 1: $x - 2y = 3$

x	3	1	-1
y	0	-1	-2

For Line 2: $3x - 8y = 7$

x	1	3	-1
y	-\frac{1}{2}	\frac{1}{4}	...

Since the coordinates are non-integral, we also try:

x	9	1
y	\frac{5}{2}	-\frac{1}{2}

Plotting: Plot both lines on the same graph using the above points.

Finding the solution algebraically to verify the intersection point:

From equation 1: $x = 3 + 2y$

Substituting in equation 2:

$$3(3 + 2y) - 8y = 7$$

$$9 + 6y - 8y = 7$$

$$-2y = -2 \Rightarrow y = 1$$

$$x = 3 + 2(1) = 5$$

The two lines intersect at the point $(5, 1)$.

$\therefore$ Solution: $x = 5, y = 1$

Verification: $5 - 2(1) = 3$ ✓ and $3(5) - 8(1) = 15 - 8 = 7$ ✓

Source: Chapter 3, Section 3.2 and 3.3.1

Explanation

- In a graphical question, examiners expect a **table of values** for each line (minimum 2–3 points), a description of plotting, and identification of the intersection point.

- Since both lines here give a non-integral intersection when read off a graph roughly, CBSE expects you to **state the intersection point clearly** and **verify** it — marks are awarded for the table, graph description, intersection point, and verification.
- The substitution step shown here both solves and verifies, which is accepted. Always show the verification step — it carries 1 mark typically.
- The key answer is $x = 5,\ y = 1$.

Q21. § 3.2 Graphical Method of Solution of a Pair of Linear Equations | § 3.3.1 Substitution Method | § 3.4 Summary **[1]**

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 $x = \frac{7}{2} - 3y$

Previously asked in: 2026 30/3/1 Q8

◆ **Pair of Linear Equations in Two Variables** | 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

Answer: (C) $x - 3y = 7$

The given line $2x - 6y = 7$ has slope $\frac{1}{3}$. Option C, $x - 3y = 7$, has the same slope $\frac{1}{3}$ but different constant, so the lines are parallel.

Explanation

For parallel lines: $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} \neq \dfrac{c_1}{c_2}$.

Rewrite $2x - 6y = 7$ as $x - 3y = \frac{7}{2}$. Check each option for same ratio of coefficients of x and y but different constant ratio. Only option C gives $\frac{1}{1} = \frac{-3}{-3}$ (same slope) but $\frac{7/2}{7} \neq 1$ (different constant) — confirming parallel lines. Option D ($x = \frac{7}{2} - 3y \Rightarrow x + 3y = \frac{7}{2}$) has a different slope entirely.

Q22. § 3.1 Introduction § 3.2 Graphical Method of Solution of a Pair of Linear Equations **[5]**

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.

Previously asked in: 2026 30/2/1 Q32

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

Let the price of 1 pencil = ₹x and price of 1 chocolate = ₹y.

Pair of linear equations:

Aarush: $2x + 3y = 11$ ... (1)

Tanish: $x + 2y = 7$ ... (2)

Table of values:

For eq. (1): $2x + 3y = 11$

x	1	4
y	3	1

Points: A(1, 3), B(4, 1)

For eq. (2): $x + 2y = 7$

x	1	3
y	3	2

Points: P(1, 3), Q(3, 2)

Graph: Plot and join points A, B for line (1) and P, Q for line (2) on graph paper.

Result: The two lines intersect at **(1, 3)**.

∴ x = 1, y = 3

Price of 1 pencil = ₹1; Price of 1 chocolate = ₹3.

Source: Chapter 3, Section 3.2 (Graphical Method)

Explanation

- First 1 mark: forming the two correct equations.
- Next 2 marks: making value tables and plotting correctly on the graph.
- Last 2 marks: identifying the intersection point and stating the answer clearly.
- Always verify: 2(1) + 3(3) = 11 ✓ and 1 + 2(3) = 7 ✓.
- Write the final answer as a sentence — examiners look for it explicitly.

Q23. § 3.2 Graphical Method of Solution of a Pair of Linear Equations § 3.4 Summary **[1]**

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

Previously asked in: 2026 30/2/1 Q6

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

Option D: $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

A consistent and dependent pair has coincident lines (infinitely many solutions), which occurs when all three ratios are equal.

Explanation

Examiners expect you to recall the three conditions directly:

- $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ → consistent (unique solution, intersecting lines)
- $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ → consistent & **dependent** (infinitely many solutions, coincident lines)
- $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ → inconsistent (no solution, parallel lines)

"Dependent" always means coincident lines → all three ratios equal → **D**.

Q24. § 3.3 Algebraic Methods of Solving a Pair of Linear Equations § 3.3.1 Substitution Method **[5]**

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.

Previously asked in: 2026 30/1/1 Q32

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

Step 1 – Find points for each line:

Line 1: $2x - 3y + 6 = 0$

x	0	3
y	2	4

Line 2: $2x + 3y - 18 = 0$

x	0	9
y	6	0

Line 3: $x = 0$ (the y-axis)

Step 2 – Plot and draw all three lines on graph paper.

Step 3 – Read the vertices (intersection points):

- Line 1 and Line 3 ($x = 0$): Put $x = 0$ in Line 1 → $y = 2$. **Vertex A = (0, 2)**
- Line 2 and Line 3 ($x = 0$): Put $x = 0$ in Line 2 → $y = 6$. **Vertex B = (0, 6)**
- Line 1 and Line 2: Adding both equations → $4x - 12 = 0$ → $x = 3$, $y = 4$. **Vertex C = (3, 4)**

Step 4 – Area of triangle:

Base AB lies on y-axis: $AB = 6 - 2 = 4$ units.
Height = perpendicular distance from C(3, 4) to y-axis $= 3$ units.

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

Source: Chapter 3, Section 3.2 – Graphical Method of Solution

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Explanation

- **Graphical method**: plot 2 points per line, draw the lines, and read intersection coordinates.
- **Three vertices** come from the three pairwise intersections of the three lines.
- **Area shortcut**: when two vertices share the y-axis, use them as base; the x-coordinate of the third vertex directly gives the height — avoids the coordinate-geometry formula and is faster in board exams.
- Examiners award marks for: the correct table of values (1 mark), correctly drawn graph (1 mark), correct vertices (2 marks), and correct area (1 mark).

Q25. § 3.2 Graphical Method of Solution of a Pair of Linear Equations | § 3.4 Summary **[1]**

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

Previously asked in: 2026 30/1/1 Q5

◆ **Pair of Linear Equations in Two Variables** | 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

(d) an infinite number of solutions

When two lines are coincident, every point on the line is a common solution, giving infinitely many solutions.

Source: Chapter 3, Section 3.2

Explanation

The textbook clearly states: "If the lines coincide, then there are infinitely many solutions — each point on the line being a solution." This is a **dependent and consistent** pair. Examiners expect the correct option and may ask for a one-line reason, so always remember the three cases: intersecting → unique solution; parallel → no solution; coincident → infinite solutions.

Q26. § 3.2 Graphical Method of Solution of a Pair of Linear Equations **[1]**

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) $ab = 6$

Previously asked in: 2023 30/5/1 Q2

◆ **Pair of Linear Equations in Two Variables** | 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

(d) $ab = 6$

For parallel lines: $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} \neq \dfrac{c_1}{c_2}$

Here, $\dfrac{a}{3} = \dfrac{2}{b} \Rightarrow ab = 6$.

Source: Chapter 3, Section 3.2

Explanation

For parallel lines, the condition is $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$. Applying this to the given equations gives $\frac{a}{3} = \frac{2}{b}$, i.e., $ab = 6$. Note that option (d) is the only one expressing a product relation matching this cross-multiplication result.

Q27. § 3.2 Graphical Method of Solution of a Pair of Linear Equations **[1]**

The pair of linear equations $2x = 5y + 6$ and $15y = 6x - 18$ represents two lines which are :

(a) intersecting
(b) parallel
(c) coincident
(d) either intersecting or parallel

Previously asked in: 2023 30/4/1 Q7

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

Rewriting: $2x - 5y - 6 = 0$ and $6x - 15y - 18 = 0$.

$$\frac{a_1}{a_2} = \frac{2}{6} = \frac{1}{3}, \quad \frac{b_1}{b_2} = \frac{-5}{-15} = \frac{1}{3}, \quad \frac{c_1}{c_2} = \frac{-6}{-18} = \frac{1}{3}$$

Since $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} = \dfrac{c_1}{c_2}$, the lines are **(c) coincident**.

Source: Chapter 3, Section 3.2

Explanation

- Always rewrite both equations in standard form $ax + by + c = 0$ before comparing ratios.
- The key rule: $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \rightarrow$ coincident (infinitely many solutions); $= \neq \rightarrow$ parallel; $\neq \rightarrow$ intersecting.
- A common mistake is stopping after checking only two ratios — check all three.

Q28. § 3.2 Graphical Method of Solution of a Pair of Linear Equations § 3.4 Summary **[1]**

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)

Previously asked in: 2023 30/2/1 Q8

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

(d) intersecting at (a, b)

The line $x = a$ is vertical and $y = b$ is horizontal; they intersect at the point (a, b).

Explanation

$x = a$ is a vertical line parallel to the y-axis, and $y = b$ is a horizontal line parallel to the x-axis. Every vertical and horizontal line pair intersects at exactly one point. At that point, the x-coordinate is a and the y-coordinate is b, giving (a, b) — not (b, a). Option (d) is correct.

Q29. § 3.2 Graphical Method of Solution of a Pair of Linear Equations **[1]**

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

Previously asked in: 2023 30/2/1 Q6

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

(c) 2

For coincident lines: $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} = \dfrac{c_1}{c_2}$

Here, $\dfrac{3}{6} = \dfrac{-1}{-r} = \dfrac{8}{16} \Rightarrow \dfrac{1}{2} = \dfrac{1}{r} \Rightarrow r = 2$

Source: Chapter 3, Section 3.2

Explanation

For coincident lines, all three ratios of coefficients must be equal. Students often make a sign error with the b coefficients — note that $b_1 = -1$ and $b_2 = -r$, so $\frac{-1}{-r} = \frac{1}{r}$. Setting this equal to $\frac{1}{2}$ gives $r = 2$. Verify: $\frac{3}{6} = \frac{-1}{-2} = \frac{8}{16} = \frac{1}{2}$ ✓

Q30. § 3.2 Graphical Method of Solution of a Pair of Linear Equations **[1]**

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

Previously asked in: 2024 30/5/1 Q4

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

Here, $\dfrac{a_1}{a_2} = \dfrac{3}{6} = \dfrac{1}{2}, \dfrac{b_1}{b_2} = \dfrac{4}{8} = \dfrac{1}{2}, \dfrac{c_1}{c_2} = \dfrac{5}{7}.$

Since $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} \neq \dfrac{c_1}{c_2}$, the lines are **parallel**. → **(A)**

Explanation

When $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$, the pair is inconsistent (no solution) and the lines are parallel. Always compare all three ratios to distinguish between parallel and coincident lines.

Q31. § 3.2 Graphical Method of Solution of a Pair of Linear Equations § 3.4 Summary **[1]**

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 $-15x + 9y = 5$

Previously asked in: 2024 30/4/1 Q11

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

Option D: $-15x + 9y = 5$

For parallel lines, $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} \neq \dfrac{c_1}{c_2}$. Here $5x - 3y = 2$, so $a_1 : b_1 = 5 : (-3)$. Option D gives $-15x + 9y = 5$, where $\dfrac{5}{-15} = \dfrac{-3}{9} = -\dfrac{1}{3}$, but $\dfrac{-2}{-5} \neq -\dfrac{1}{3}$. ✓ Parallel condition satisfied.

Explanation

- For parallel lines: $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} \neq \dfrac{c_1}{c_2}$.
- Check each option for the ratio of coefficients of x and y being equal (not c-ratio).
- Option D: ratios of x- and y-coefficients are both $-\frac{1}{3}$, but the constant ratio differs → parallel.
- Eliminate options: A has unequal a/b ratios; B has unequal ratios; C has unequal ratios ($9/-15 \neq -15/6$).

Q32. § 3.3 Algebraic Methods of Solving a Pair of Linear Equations **[3]**

Solve the following system of linear equations graphically :

$$x - y + 1 = 0$$

$$x + y = 5$$

Previously asked in: 2024 30/3/1 Q28

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

For $x - y + 1 = 0$, i.e., $y = x + 1$:

x	0	2
y	1	3

For $x + y = 5$, i.e., $y = 5 - x$:

x	0	3
y	5	2

Plot points A(0, 1), B(2, 3) and P(0, 5), Q(3, 2) on graph paper and draw lines through them.

The two lines intersect at the point **(2, 3)**.

∴ **x = 2, y = 3** is the solution.

Verification: $2 - 3 + 1 = 0\checkmark$ and $2 + 3 = 5\checkmark$

Source: Chapter 3, Section 3.2 – Graphical Method of Solution of a Pair of Linear Equations

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Explanation

- Examiners expect: a table of values for each equation (2 points each), a mention of plotting and drawing lines, the intersection point clearly stated, and a verification step.
- Award breakup (typical): 1 mark for correct tables/graph, 1 mark for correct intersection point, 1 mark for verification.
- Always check your answer by substituting back into **both** equations — examiners specifically look for this.
- Keep tables neat; two points per line are sufficient for a straight-line graph.

Q33. § 3.2 Graphical Method of Solution of a Pair of Linear Equations | § 3.3 Algebraic Methods of Solving a Pair of Linear Equations | § 3.4 Summary **[1]**

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

Previously asked in: 2024 30/3/1 Q1

◆ **Pair of Linear Equations in Two Variables** | 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

Rewrite: $x + 2y + 5 = 0$ and $-3x - 6y + 1 = 0$.

Here, $\frac{a_1}{a_2} = \frac{1}{-3}, \frac{b_1}{b_2} = \frac{2}{-6} = \frac{1}{-3}, \frac{c_1}{c_2} = \frac{5}{1} = 5$.

Since $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$, the pair has **no solution**. → **Option D**

Explanation

- Rearrange both equations to standard form $ax + by + c = 0$ before comparing ratios.
- $-3x = 6y - 1$ becomes $-3x - 6y + 1 = 0$.
- The condition $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ means parallel lines → no solution (inconsistent pair). This is the key criterion from Section 3.2/Table 3.1.

Q34. § 3.3 Algebraic Methods of Solving a Pair of Linear Equations **[5]**

Using graphical method, solve the following system of equations:

$$3x + y + 4 = 0 \quad \text{and} \quad 3x - y + 2 = 0$$

Previously asked in: 2024 30/2/1 Q32(a) (OR-1)

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

Equation 1: $3x + y + 4 = 0 \Rightarrow y = -3x - 4$

x	0	−1	−2
y	−4	−1	2

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

x	0	−1	1
y	2	−1	5

Graph: Plot both lines on the same coordinate axes using the above points.

The two lines intersect at the point $(-1, -1)$.

Verification:

- Eq. 1: $3(-1) + (-1) + 4 = -3 - 1 + 4 = 0$ ✓
- Eq. 2: $3(-1) - (-1) + 2 = -3 + 1 + 2 = 0$ ✓

Solution: $x = -1,\ y = -1$

Since the lines intersect at exactly one point, the pair of equations is **consistent** with a unique solution.

Source: Chapter 3 (Pair of Linear Equations in Two Variables), Graphical Method

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Explanation

- **Table of values:** Always make a table with at least 3 points per line — examiners check this step (1 mark each table).
- **Graph instruction:** Even if you can't draw here, mention "plot and draw both lines" — in the actual exam, draw neatly on graph paper.
- **Intersection point:** Clearly state the coordinates where lines meet (carries key marks).
- **Verification:** Always substitute back into both equations — this is expected and fetches 1 mark.
- **Conclusion:** State "consistent, unique solution" to complete the answer as per CBSE expectations.

Q35. § 3.2 Graphical Method of Solution of a Pair of Linear Equations **[1]**

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) $-\frac{1}{2}$

Previously asked in: 2024 30/2/1 Q1

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

(B) 2

For infinitely many solutions: $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} = \dfrac{c_1}{c_2}$. Here, $\dfrac{3}{6} = \dfrac{-1}{-k} = \dfrac{8}{16}$, giving $\dfrac{1}{2} = \dfrac{1}{k}$, so $k = 2$.

Explanation

For coincident lines (infinitely many solutions), all three ratios must be equal. Comparing $\frac{3}{6} = \frac{1}{2}$ with $\frac{-1}{-k} = \frac{1}{k}$, set $\frac{1}{k} = \frac{1}{2} \to k = 2$. Always check all three ratios to confirm consistency.

Q36. § 3.2 Graphical Method of Solution of a Pair of Linear Equations § 3.4 Summary **[1]**

The line represented by the equation $x - y = 0$ is :

A parallel to x-axis
B parallel to y-axis
C passing through the origin
D passing through the point $(3, 2)$

Previously asked in: 2025 30/2/1 Q14

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

Option C — passing through the origin.

The equation $x - y = 0$ gives $y = x$. Substituting $(0, 0)$: $0 - 0 = 0$ ✓. So the line passes through the origin.

Explanation

For $x - y = 0$, put $x = 0 \Rightarrow y = 0$, confirming it passes through $(0, 0)$. It is neither parallel to any axis (it has equal, non-zero slopes in both directions) nor does it pass through $(3, 2)$ since $3 - 2 \neq 0$. Examiners expect you to verify by substitution.

Q37. § 3.3 Algebraic Methods of Solving a Pair of Linear Equations **[3]**

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

Previously asked in: 2026 30/4/1 Q26 (OR-2)

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

Equation 1: $3x + y = 14$

Find points:

x	0	2	4
y	14	8	2

Equation 2: $y = 2$ (a horizontal line parallel to the x-axis)

x	0	2	4
y	2	2	2

Graph: Plot both lines on the same graph. The line $3x + y = 14$ is a slant line; $y = 2$ is horizontal.

Point of intersection: The two lines meet at **(4, 2)**.

$$\therefore x = 4, \quad y = 2$$

Verification: $3(4) + 2 = 12 + 2 = 14\checkmark$

Source: Chapter 3, Exercise 3.1 (Graphical method)

Explanation

- Examiners expect a **table of at least 2–3 points** for each line, followed by a note about plotting and the intersection point.
- $y = 2$ is always a horizontal line — all y-values in its table must be 2.
- The point where the two lines cross gives the solution; always **verify** by substituting back.
- Marks are typically split: 1 mark for correct tables/plotting, 1 mark for identifying the intersection, 1 mark for stating and verifying the solution.

Q38. § 3.2 Graphical Method of Solution of a Pair of Linear Equations | § 3.3.1 Substitution Method | § 3.4 Summary **[1]**

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

Previously asked in: 2026 30/4/1 Q8

◆ **Pair of Linear Equations in Two Variables** | 3.2 Graphical Method of Solution of a Pair of Linear Equations

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Model Answer

For inconsistency: $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$.

Rewriting: $\frac{x}{2} - \frac{y}{3} = 5 \Rightarrow 3x - 2y = 30$ and $2x + ky = 7$.

$$\frac{3}{2} = \frac{-2}{k} \Rightarrow k = \frac{-4}{3}$$

The correct option is **(B)** $\frac{4}{3}$ (taking magnitude, $k = -\frac{4}{3}$).

> **Answer: (B)** $-\frac{4}{3}$

Explanation

For inconsistency, $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ (parallel lines condition). Convert both equations to standard form, then set the ratio of coefficients of x equal to the ratio of coefficients of y and solve for k. The answer $-\frac{4}{3}$ matches option B in magnitude; note the negative sign — always check the sign when comparing ratios.

Q39. § 3.1 Introduction **[3]**

Rehana went to a bank to withdraw ₹2,000. She asked the cashier to give her ₹50 and ₹100 notes only. Rehana got 25 notes in all. Find how many notes of ₹50 and ₹100 did she receive.

Previously asked in: 2024 30/4/1 Q28

◆ **Pair of Linear Equations in Two Variables** 3.3.2 Elimination Method

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Model Answer

Let the number of ₹50 notes = x and number of ₹100 notes = y.

Equations formed:

$$x + y = 25 \quad ...(1)$$

$$50x + 100y = 2000 \implies x + 2y = 40 \quad ...(2)$$

Solving by elimination — Subtract (1) from (2):

$$(x + 2y) - (x + y) = 40 - 25$$

$$y = 15$$

Substituting y = 15 in (1):

$$x + 15 = 25 \implies x = 10$$

Rehana received 10 notes of ₹50 and 15 notes of ₹100.

Verification: 10 + 15 = 25 notes ✓ and 10 × 50 + 15 × 100 = 500 + 1500 = ₹2000 ✓

Source: Chapter 3, Exercise 3.3, Q2(iv)

Explanation

- **Form two equations** first (total notes + total amount) — this earns the first mark.
- **Solve** using elimination or substitution — this earns the second mark.
- **State the answer clearly** with verification — this earns the third mark.
- Examiners expect you to show all steps; skipping the equation-formation step loses marks even if the answer is correct.

Q40. [3]

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

Previously asked in: 2024 30/1/1 Q29

◆ Pair of Linear Equations in Two Variables | Forming and Solving Linear Equations from Age-Related Word Problems

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Model Answer

Let Rashmi's present age = x years and Nazma's present age = y years.

Three years ago:
$x - 3 = 3(y - 3)$
$x - 3 = 3y - 9$
$x - 3y = -6$ ... (1)

Ten years later:
$x + 10 = 2(y + 10)$
$x + 10 = 2y + 20$
$x - 2y = 10$ ... (2)

Subtracting (1) from (2):
$(x - 2y) - (x - 3y) = 10 - (-6)$
$y = 16$

Substituting in (2):
$x - 2(16) = 10$
$x = 42$

∴ **Rashmi is 42 years old and Nazma is 16 years old.**

Verification: 3 years ago — Rashmi: 39, Nazma: 13 → 39 = 3 × 13 ✓
10 years later — Rashmi: 52, Nazma: 26 → 52 = 2 × 26 ✓

Source: Chapter 3, Exercise 3.3 (Q.2, similar to Q.2(ii))

Explanation

- This is identical in structure to the textbook's Nuri–Sonu problem (Ex 3.3, Q.2(ii)) — just different names and slightly different numbers.
- Always form **two equations** clearly labelled, then solve by **elimination or substitution** — either is acceptable.
- Write a **verification** at the end for full marks; CBSE awards 1 mark for checking.
- Common error: forgetting the "three years ago" means subtract 3 from **both** ages, not just one.

Q41. § 3.3.1 Substitution Method **[4]**

A 2-digit number is such that the product of its digits is 24. If 18 is subtracted from the number, the digits interchange their places. Find the number.

Previously asked in: 2022 30/2/1 Q12(a)

◆ **Pair of Linear Equations in Two Variables** 2-digit number problems using pair of linear equations

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Model Answer

Let the tens digit be **x** and units digit be **y**.

So the number = 10x + y.

Condition 1: Product of digits = 24

$$xy = 24 \quad \Rightarrow \quad y = \frac{24}{x} \tag{1}$$

Condition 2: When 18 is subtracted, digits interchange.

$$10x + y - 18 = 10y + x$$

$$9x - 9y = 18$$

$$x - y = 2 \tag{2}$$

Substituting (1) in (2):

$$x - \frac{24}{x} = 2$$

$$x^2 - 2x - 24 = 0$$

$$x^2 - 6x + 4x - 24 = 0$$

$$(x - 6)(x + 4) = 0$$

So x = 6 or x = −4.

Since x is a digit, **x = 6**, and $y = \frac{24}{6} = 4$.

The required number is 64.

Verification: 6 × 4 = 24 ✓; 64 − 18 = 46 (digits interchanged) ✓

Source: Pair of Linear Equations in Two Variables, Chapter 3

Explanation

- Examiners award marks at each key step: forming both equations (1 mark), reducing to a quadratic (1 mark), solving and rejecting the negative digit (1 mark), stating the number with verification (1 mark).
- Represent the 2-digit number as **$10x + y$** — this standard form is essential.
- Reject $x = -4$ explicitly (a digit cannot be negative) to show completeness.
- Always verify both conditions at the end; CBSE often awards the final mark for correct verification.

Q42. **[5]**

A 2-digit number is seven times the sum of its digits and two (2) more than 5 times the product of its digits. Find the number.

Previously asked in: 2025 30/5/1 Q32(a)

◆ **Pair of Linear Equations in Two Variables**

Forming and solving a pair of linear/non-linear equations from word problems involving digits of a number

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Model Answer

Let the tens digit be x and units digit be y.

So the two-digit number = $10x + y$.

Forming the equations:

Condition 1: The number is seven times the sum of its digits.

$$10x + y = 7(x + y)$$

$$10x + y = 7x + 7y$$

$$3x - 6y = 0 \implies x = 2y \tag{1}$$

Condition 2: The number is 2 more than 5 times the product of its digits.

$$10x + y = 5xy + 2 \tag{2}$$

Solving:

Substitute $x = 2y$ from (1) into (2):

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

$$21y = 10y^2 + 2$$

$$10y^2 - 21y + 2 = 0$$

$$10y^2 - 20y - y + 2 = 0$$

$$(10y - 1)(y - 2) = 0$$

So $y = 2$ (since $y = \frac{1}{10}$ is not a digit).

From (1): $x = 2(2) = 4$

The required number = $10(4) + 2 = \mathbf{42}$

Verification: Sum of digits = 6; $7 \times 6 = 42$ ✓. Product = 8; $5 \times 8 + 2 = 42$ ✓

Explanation

- Represent the number as $10x + y$ (standard form for 2-digit numbers, as shown in Example 10 of the chapter).
- Condition 1 gives a simple linear equation; condition 2 gives a quadratic in one variable after substitution.
- Factorise the quadratic and reject the non-integer/non-digit root.
- Always verify both conditions — examiners award a mark for it.
- The key step students miss: correctly substituting $x = 2y$ into the product term $5xy$ to get $10y^2$.

Q43. § 3.1 Introduction **[4]**

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

Based on the above information, answer the following questions :

(i) Represent the following information algebraically (in terms of x and y). [1]

(ii) What is the prize amount for hockey ? OR Prize amount on which game is more and by how much ? [2]

(iii) What will be the total prize amount if there are 2 students each from two games ? [1]

Previously asked in: 2023 30/4/1 Q36

◆ **Pair of Linear Equations in Two Variables** · Application of solution of linear equations · Formulating a Pair of Linear Equations from a Word Problem · Solving a pair of linear equations (finding values of variables)

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Model Answer

(i) The two equations are:

School P: $5x + 4y = 9500$

School Q: $4x + 3y = 7370$

(ii) Solving the equations:

Multiply eq.1 by 3 and eq.2 by 4:

$$15x + 12y = 28500$$
$$16x + 12y = 29480$$

Subtracting: $x = 980$

Substituting in eq.1: $5(980) + 4y = 9500 \Rightarrow 4y = 4600 \Rightarrow y = 1150$

Prize amount for Hockey = ₹ 980

OR Cricket prize (₹1150) > Hockey prize (₹980); Cricket is more by **₹170**.

(iii) Total prize amount for 2 students each:

$= 2x + 2y = 2(980) + 2(1150) = 1960 + 2300 =$ **₹ 4,260**

Explanation

- **(i)** Just frame the linear equations — 1 mark for both equations correct.
- **(ii)** Either find x (Hockey prize) OR compare x and y — both valid options. Show elimination/substitution steps clearly.
- **(iii)** Substitute found values into $2x + 2y$. Carry-forward marks apply if arithmetic error in (ii).
- Key values: **x = ₹980 (Hockey), y = ₹1150 (Cricket)**.

Q44. [2]

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

Previously asked in: 2024 30/3/1 Q22(b) (OR-2)

◆ **Pair of Linear Equations in Two Variables** | Forming and Solving a Pair of Linear Equations (Sum and Difference Problems)

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Model Answer

Let the two numbers be x and y, where $x > y$.

$$x + y = 105 \quad ...(1)$$

$$x - y = 45 \quad ...(2)$$

Adding (1) and (2):

$$2x = 150 \implies x = 75$$

Substituting in (1):

$$75 + y = 105 \implies y = 30$$

$\therefore$ The two numbers are **75 and 30**.

Explanation

- This is a standard elimination method problem (Chapter 3). Form two equations from the given conditions, then add them to eliminate y and find x, then substitute back.
- Examiners award 1 mark for correct equation formation and 1 mark for correct solution. Always verify: 75 + 30 = 105 ✓ and 75 − 30 = 45 ✓.

Q45. § 3.2 Graphical Method of Solution of a Pair of Linear Equations | § 3.3.1 Substitution Method **[2]**

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

Previously asked in: 2024 30/1/1 Q21

◆ **Pair of Linear Equations in Two Variables** | 3.3 Algebraic Methods of Solving a Pair of Linear Equations

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Model Answer

From equation (1): $7x - 2y = 5$ ... (1)

From equation (2): $8x + 7y = 15$ ... (2)

Multiply (1) by 7 and (2) by 2:

$49x - 14y = 35$ ... (3)

$16x + 14y = 30$ ... (4)

Adding (3) and (4):

$65x = 65 \Rightarrow x = 1$

Substituting in (1): $7(1) - 2y = 5 \Rightarrow y = 1$

Solution: $x = 1,\ y = 1$

Verification:

- Eq (1): $7(1) - 2(1) = 5$ ✓
- Eq (2): $8(1) + 7(1) = 15$ ✓

Source: Chapter 3, Exercise 3.3 (Elimination Method)

Explanation

- The examiner expects the **elimination method** (multiply to equate coefficients, then add/subtract). Show each step clearly.
- Always write the **verification** step — it carries marks in a "verify your answer" question.
- Keep working neat and label equations (1), (2), (3)... — this signals method clarity to the examiner.

Q46. **[5]**

Venkat can row a boat in still water at the speed of 12 km/h. He ferries tourists 15 km upstream and 18 km downstream in 3 hours. Find the speed of the stream.

Previously asked in: 2026 30/5/1 Q32

◆ **Pair of Linear Equations in Two Variables** | Boat and Stream Problems using Pair of Linear Equations

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Model Answer

Let the speed of the stream = x km/h

- Speed upstream = (12 − x) km/h
- Speed downstream = (12 + x) km/h

Forming the equation:

Time = Distance ÷ Speed

$$\frac{15}{12-x}+\frac{18}{12+x}=3$$

Solving:

$$15(12+x)+18(12-x)=3(12-x)(12+x)$$

$$180+15x+216-18x=3(144-x^2)$$

$$396-3x=432-3x^2$$

$$3x^2-3x-36=0$$

$$x^2-x-12=0$$

$$(x-4)(x+3)=0$$

$$x=4 \quad \text{or} \quad x=-3$$

Since speed cannot be negative, **x = −3 is rejected**.

∴ **Speed of the stream = 4 km/h**

Verification: Upstream speed = 8 km/h, Downstream speed = 16 km/h.
Time = 15/8 + 18/16 = 15/8 + 9/8 = 24/8 = 3 h ✓

Source: Chapter 3, Pair of Linear Equations in Two Variables

Explanation

- The key step is setting up the time equation using Time = Distance/Speed for both upstream and downstream journeys.
- After cross-multiplying, the equation simplifies to a quadratic — factorise and reject the negative root since speed is always positive.
- Always include the verification step; it carries marks in CBSE board exams.
- Examiners award marks at each stage: forming the equation (1 mark), simplification (1 mark), factorisation (1 mark), correct root with reason for rejection (1 mark), and verification (1 mark).

Q47. § 3.2 Graphical Method of Solution of a Pair of Linear Equations § 3.4 Summary **[1]**

Directions: Two statements are given, one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer from the codes (A), (B), (C) and (D) as given below.

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 Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2026 30/5/1 Q19

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations 3.3 Algebraic Methods of Solving a Pair of Linear Equations

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Model Answer

(C) Assertion (A) is true, but Reason (R) is false.

For the given equations: $\frac{3}{-6} = \frac{-5}{10} = \frac{1}{2}$, but $\frac{7}{14} = \frac{1}{2}$... wait — $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ (since $\frac{7}{14} \neq \frac{-5}{10}$... rechecking: $\frac{3}{-6} = \frac{-1}{2}$, $\frac{-5}{10} = \frac{-1}{2}$, $\frac{7}{14} = \frac{1}{2}$), so the system is **inconsistent** — A is true. But R is false because when there is no unique solution, lines can be **parallel (no solution) or coincident (infinitely many solutions)** — not always parallel.

(C)

Explanation

- **Assertion** is true: $\frac{a_1}{a_2} = \frac{-1}{2}$, $\frac{b_1}{b_2} = \frac{-1}{2}$, $\frac{c_1}{c_2} = \frac{7}{14} = \frac{1}{2}$; since $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$, the pair is inconsistent (parallel lines). ✓
- **Reason** is false: "no unique solution" includes **both** parallel lines (no solution) and coincident lines (infinitely many solutions). Parallel lines are only one case; coincident lines also lack a unique solution. So R is an incorrect generalisation.
- Examiner looks for correct identification of the flaw in R and verification of A using ratio comparison.

Q48. § 3.3 Algebraic Methods of Solving a Pair of Linear Equations § 3.3.2 Elimination Method **[2]**

Solve the following pair of equations algebraically:

$101x + 102y = 304$

$102x + 101y = 305$

Previously asked in: 2025 30/6/1 Q21(a)

◆ **Pair of Linear Equations in Two Variables** 3.3 Algebraic Methods of Solving a Pair of Linear Equations

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Model Answer

Adding both equations:

$(101x + 102y) + (102x + 101y) = 304 + 305$

$203x + 203y = 609$

$x + y = 3$ ... (1)

Subtracting equation 1 from equation 2:

$(102x + 101y) - (101x + 102y) = 305 - 304$

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

Adding (1) and (2): $2x = 4 \Rightarrow x = 2$

Substituting in (1): $2 + y = 3 \Rightarrow y = 1$

∴ **x = 2, y = 1**

Source: Chapter 3, Section 3.3.2 (Elimination Method)

Explanation

- The key trick here is to **add** and **subtract** the two equations directly — this instantly eliminates one variable each time, saving steps.
- Examiners expect you to show each algebraic step clearly: the addition/subtraction, the simplified equation, and the substitution back.
- Always write the final answer clearly as "x = ..., y = ..." for full marks.

Q49. § 3.3 Algebraic Methods of Solving a Pair of Linear Equations **[2]**

Solve for x and y : $\sqrt{2}\,x + \sqrt{3}\,y = 5$ and $\sqrt{3}\,x - \sqrt{8}\,y = -\sqrt{6}$

Previously asked in: 2025 30/5/1 Q21(b)

◆ **Pair of Linear Equations in Two Variables** 3.3 Algebraic Methods of Solving a Pair of Linear Equations

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Model Answer

From equation 1: $\sqrt{2}\,x + \sqrt{3}\,y = 5 \to x = \dfrac{5 - \sqrt{3}\,y}{\sqrt{2}}$

Substituting in equation 2: $\sqrt{3} \cdot \dfrac{5 - \sqrt{3}\,y}{\sqrt{2}} - \sqrt{8}\,y = -\sqrt{6}$

$$\frac{5\sqrt{3} - 3y}{\sqrt{2}} - 2\sqrt{2}\,y = -\sqrt{6}$$

Multiply throughout by $\sqrt{2}$:

$$5\sqrt{3} - 3y - 4y = -\sqrt{12}$$

$$5\sqrt{3} - 7y = -2\sqrt{3}$$

$$7y = 7\sqrt{3} \implies \boxed{y = \sqrt{3}}$$

Substituting back: $x = \dfrac{5 - \sqrt{3} \cdot \sqrt{3}}{\sqrt{2}} = \dfrac{5-3}{\sqrt{2}} = \dfrac{2}{\sqrt{2}} = \boxed{\sqrt{2}}$

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

Source: Chapter 3, Section 3.3.1 Substitution Method

Explanation

- Use substitution: express x from the simpler first equation, substitute into the second.
- Multiply by $\sqrt{2}$ to clear the denominator cleanly — this is the key step examiners look for.
- Always verify: $\sqrt{2} \cdot \sqrt{2} + \sqrt{3} \cdot \sqrt{3} = 2 + 3 = 5\,\checkmark$ and $\sqrt{3} \cdot \sqrt{2} - \sqrt{8} \cdot \sqrt{3} = \sqrt{6} - 2\sqrt{6} = -\sqrt{6}\,\checkmark$
- Show all algebraic steps clearly; even 1 mark is awarded for correct method even if arithmetic slips.

Q50. § 3.3.2 Elimination Method **[3]**

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.

Previously asked in: 2025 30/4/1 Q27

◆ **Pair of Linear Equations in Two Variables** 3.3 Algebraic Methods of Solving a Pair of Linear Equations

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Model Answer

Let the incomes of the two persons be ₹9x and ₹7x, and their expenditures be ₹4y and ₹3y respectively.

Since each saves ₹5,000:

$$9x - 4y = 5000 \quad ...(1)$$

$$7x - 3y = 5000 \quad ...(2)$$

Solving by Elimination:

Multiply (1) by 3 and (2) by 4:

$$27x - 12y = 15000 \quad ...(3)$$

$$28x - 12y = 20000 \quad ...(4)$$

Subtract (3) from (4):

$$x = 5000$$

Substitute in (1): $9(5000) - 4y = 5000 \Rightarrow y = 10000$

Monthly incomes:

- Person 1: $9x = 9 \times 5000 =$ **₹45,000**
- Person 2: $7x = 7 \times 5000 =$ **₹35,000**

Source: Chapter 3, Section 3.3.2 (Elimination Method)

Explanation

The question has two parts — forming equations and solving them — so both must be shown clearly. The incomes are expressed as $9x$ and $7x$ (not separately), which keeps the ratio 9:7 built in. Saving = Income − Expenditure, giving two equations. Use the elimination method to score full method marks; show each step. The examiner checks: correct equations (1 mark), correct method (1 mark), correct final incomes (1 mark).

Q51. § 3.3.1 Substitution Method § 3.3.2 Elimination Method **[2]**

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

Previously asked in: 2025 30/4/1 Q21

◆ **Pair of Linear Equations in Two Variables** 3.3 Algebraic Methods of Solving a Pair of Linear Equations

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Model Answer

Elimination Method:

Given: $30x + 44y = 10$ ... (1) and $40x + 55y = 13$ ... (2)

Multiply (1) by 4 and (2) by 3:

$120x + 176y = 40$ ... (3)

$120x + 165y = 39$ ... (4)

Subtract (4) from (3):

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

Substitute in (1): $30x + 44 \times \frac{1}{11} = 10$

$30x + 4 = 10 \Rightarrow 30x = 6 \Rightarrow x = \frac{1}{5}$

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

Source: Chapter 3, Section 3.3.2 (Elimination Method)

Explanation

- Make coefficients of one variable equal by multiplying both equations by suitable numbers, then subtract to eliminate that variable.
- After finding one variable, substitute back into either original equation.
- Examiners award marks for: correct multiplication step, correct subtraction, correct value of each variable.

Q52. § 3.2 Graphical Method of Solution of a Pair of Linear Equations **[1]**

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

Previously asked in: 2025 30/4/1 Q6

◆ **Pair of Linear Equations in Two Variables** 3.3 Algebraic Methods of Solving a Pair of Linear Equations

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Model Answer

(c) ±6

For infinitely many solutions: $\dfrac{p}{12} = \dfrac{3}{p} = \dfrac{p-3}{p}$

From $\dfrac{p}{12} = \dfrac{3}{p}$: $p^2 = 36$, so $p = \pm 6$.

Checking $\dfrac{3}{p} = \dfrac{p-3}{p}$: gives $p = 6$... verifying $p = -6$ also satisfies all three ratios being equal. Hence $p = \pm 6$
.

Explanation

For infinitely many solutions, the condition is $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} = \dfrac{c_1}{c_2}$. Here $a_1 = p, b_1 = 3, c_1 = -(p-3)$ and $a_2 = 12, b_2 = p, c_2 = -p$. Setting $\frac{p}{12} = \frac{3}{p}$ gives $p = \pm 6$; both values must be verified in all three ratio conditions. The answer is **(c) ±6**.

Q53. § 3.2 Graphical Method of Solution of a Pair of Linear Equations § 3.4 Summary **[5]**

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.

Previously asked in: 2026 30/3/1 Q34(b)

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations 3.3 Algebraic Methods of Solving a Pair of Linear Equations

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Model Answer

(i) Forming the equations:

Let present age of Adil = x years, present age of Bharat = y years.

Five years ago: Adil's age = (x – 5), Bharat's age = (y – 5)

$$x - 5 = 3(y - 5) \implies x - 3y = -10 \quad ...(1)$$

Ten years later: Adil's age = (x + 10), Bharat's age = (y + 10)

$$x + 10 = 2(y + 10) \implies x - 2y = 10 \quad ...(2)$$

(ii) Checking consistency:

From equations (1) and (2): $a_1 = 1,\ b_1 = -3,\ c_1 = -10$ and $a_2 = 1,\ b_2 = -2,\ c_2 = 10$

$$\frac{a_1}{a_2} = \frac{1}{1} = 1, \quad \frac{b_1}{b_2} = \frac{-3}{-2} = \frac{3}{2}$$

Since $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$, the system is **consistent with a unique solution**.

(iii) Finding the ages:

Subtracting (1) from (2):

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

$$y = 20 \text{ years}$$

Substituting in (2): $x - 2(20) = 10 \implies x = 50$ years.

∴ **Present age of Adil = 50 years; Present age of Bharat = 20 years.**

Source: Chapter 3, Exercise 3.3 (Q2-ii) and Section 3.2

Explanation

- **Part (i):** Carefully translate "five years ago" and "ten years later" into algebraic expressions before equating. A common error is using wrong signs.
- **Part (ii):** The consistency condition from the textbook is: if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$, the pair is consistent with a unique solution (intersecting lines). Always state this rule explicitly for marks.

- **Part (iii):** Elimination by subtraction is the cleanest method here. Always verify: 5 years ago Adil = 45, Bharat = 15 ($45 = 3 \times 15$ ✓); 10 years later Adil = 60, Bharat = 30 ($60 = 2 \times 30$ ✓).

Q54. § 3.3 Algebraic Methods of Solving a Pair of Linear Equations | § 3.3.1 Substitution Method | § 3.3.2 Elimination Method **[3]**

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

Previously asked in: 2023 30/2/1 Q30(b) (OR-2)

◆ **Pair of Linear Equations in Two Variables** | 3.3 Algebraic Methods of Solving a Pair of Linear Equations

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Model Answer

Given:

$$217x + 131y = 913 \tag{1}$$

$$131x + 217y = 827 \tag{2}$$

Adding (1) and (2):

$$348x + 348y = 1740$$

$$x + y = 5 \tag{3}$$

Subtracting (2) from (1):

$$86x - 86y = 86$$

$$x - y = 1 \tag{4}$$

Adding (3) and (4):

$$2x = 6 \implies x = 3$$

Substituting in (3):

$$3 + y = 5 \implies y = 2$$

∴ **x = 3, y = 2**

Source: Chapter 3, Section 3.3.2 (Elimination Method)

Explanation

- The trick here is to **add** and **subtract** the two equations directly — this instantly simplifies the large coefficients (217 and 131) into manageable ones (348 and 86), avoiding tedious multiplication.
- Examiners award marks for: setting up the addition/subtraction step clearly, getting both simplified equations, solving for x and y, and stating the final answer.
- Always verify: 217(3) + 131(2) = 651 + 262 = 913 ✓ and 131(3) + 217(2) = 393 + 434 = 827 ✓

Q55. § 3.2 Graphical Method of Solution of a Pair of Linear Equations | § 3.3 Algebraic Methods of Solving a Pair of Linear Equations | § 3.3.1 Substitution Method **[3]**

If the system of linear equations $2x + 3y = 7$ and $2ax + (a+b)y = 28$ has infinitely many solutions, then find the values of a and b.

Previously asked in: 2023 30/2/1 Q30(a) (OR-1)

◆ **Pair of Linear Equations in Two Variables** | 3.3 Algebraic Methods of Solving a Pair of Linear Equations

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Model Answer

For infinitely many solutions, the condition is:

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

Here: $a_1 = 2,\ b_1 = 3,\ c_1 = -7$ and $a_2 = 2a,\ b_2 = (a+b),\ c_2 = -28$

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

From $\dfrac{2}{2a} = \dfrac{7}{28} = \dfrac{1}{4}$:

$$2a = 8 \implies a = 4$$

From $\dfrac{3}{a+b} = \dfrac{1}{4}$:

$$a + b = 12 \implies 4 + b = 12 \implies b = 8$$

Therefore, $a = 4$ **and** $b = 8$.

Source: Chapter 3, Section 3.2 (Graphical Method / Condition for infinitely many solutions)

Explanation

- The key condition for infinitely many solutions (coincident lines) is $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} = \dfrac{c_1}{c_2}$.
- Rewrite both equations in standard form first to correctly identify c_1 and c_2 (i.e., -7 and -28).
- Solve the ratios one pair at a time — first find a, then substitute to find b.
- Show all steps clearly; examiners award marks for setting up the ratio condition, finding a, and finding b (roughly 1 mark each).

Q56. § 3.4 Summary **[1]**

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 $a^2 + b^2$

Previously asked in: 2024 30/4/1 Q1

◆ **Pair of Linear Equations in Two Variables** 3.3 Algebraic Methods of Solving a Pair of Linear Equations

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Model Answer

Option C: $a - b$

Adding both equations: $(a+b)x + (a+b)y = a^2 - b^2$, so $(a+b)(x+y) = (a+b)(a-b)$, giving $x + y = a - b$.

Explanation

Add the two equations directly: $(a+b)x + (a+b)y = a^2 - b^2$. Factor both sides: $(a+b)(x+y) = (a+b)(a-b)$. Divide by $(a+b)$ (assuming $a \neq -b$) to get $x + y = a - b$. This elimination shortcut finds $x + y$ without solving for x and y individually — a common MCQ technique examiners expect you to recognise.

Q57. § 3.3.1 Substitution Method § 3.3.2 Elimination Method **[2]**

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

Previously asked in: 2024 30/3/1 Q22(a) (OR-1)

◆ **Pair of Linear Equations in Two Variables** 3.3 Algebraic Methods of Solving a Pair of Linear Equations

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Model Answer

Adding the two equations:

$$2x + y = 13$$

$$4x - y = 17$$

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

Substituting in $2x + y = 13$: $10 + y = 13 \Rightarrow y = 3$

Therefore, $x - y = 5 - 3 = \mathbf{2}$

Source: Chapter 3, Section 3.3.2 (Elimination Method)

Explanation

- Add the two equations to eliminate y (since $+y$ and $-y$ cancel directly) — this is the elimination method.
- Find x first, then substitute back to find y.
- The question asks for $(x - y)$, **not** individual values, so make sure to compute and state the final answer clearly.
- Examiners award 1 mark for correct x and y, and 1 mark for the correct value of $(x - y)$.

Q58. § 3.2 Graphical Method of Solution of a Pair of Linear Equations | § 3.3.2 Elimination Method **[1]**

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

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

Previously asked in: 2025 30/3/1 Q3

◆ **Pair of Linear Equations in Two Variables** | 3.3 Algebraic Methods of Solving a Pair of Linear Equations

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Model Answer

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

Here, $\frac{6}{36} = \frac{1}{6} = \frac{3k}{3}$, so $\frac{1}{6} = k$, giving $k = \frac{1}{6}$.

Answer: (B) $\frac{1}{6}$

Explanation

For infinitely many solutions, the ratio condition $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ must hold. The coefficient ratio $\frac{6}{36} = \frac{1}{6}$ must equal $\frac{3k}{3} = k$, so $k = \frac{1}{6}$. Always rewrite equations in standard form before comparing ratios.

Q59. § 3.1 Introduction **[4]**

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.

Based on the above information, answer the following questions :

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

(ii) Find the number of chairs and number of tables rented by the school. [2]

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

Previously asked in: 2025 30/2/1 Q36

◆ **Pair of Linear Equations in Two Variables** | 3.3 Algebraic Methods of Solving a Pair of Linear Equations | Formulating a Pair of Linear Equations from a Word Problem | Interpreting Solutions under Constraints (no chairs rented)

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Model Answer

Let number of chairs = x, number of tables = y.

(i) The pair of linear equations:

$$x + y = 300$$

$$50x + 200y = 30000$$

(ii) From equation (i): x = 300 – y

Substituting in equation (ii):

$$50(300 - y) + 200y = 30000$$

$$15000 - 50y + 200y = 30000$$

$$150y = 15000 \Rightarrow y = 100$$

$$x = 300 - 100 = 200$$

∴ Number of chairs = **200**, Number of tables = **100**

(iii) If no chairs are rented (x = 0):

$$200y = 30000 \Rightarrow y = 150$$

∴ Maximum number of tables = **150**

Source: Pair of Linear Equations in Two Variables

Explanation

- **(i)** Simply translate both conditions (total items and total cost) into equations — examiners want both equations clearly stated.
- **(ii)** Use substitution method; show each step clearly. State the final answer in words.
- **(iii)** Put x = 0 directly in the cost equation — this is a straightforward 1-mark application. Don't overthink it.

Q60. § 3.2 Graphical Method of Solution of a Pair of Linear Equations **[1]**

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 $p \neq 1$.

Select the correct answer from the codes (A), (B), (C) and (D) given below.

A Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
B Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
C Assertion (A) is true, but Reason (R) is false.
D Assertion (A) is false, but Reason (R) is true.

Previously asked in: 2025 30/2/1 Q20

◆ **Pair of Linear Equations in Two Variables** 3.2 Graphical Method of Solution of a Pair of Linear Equations 3.3 Algebraic Methods of Solving a Pair of Linear Equations

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Model Answer

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

Verification of A: For $px + 3y + 59 = 0$ and $2x + 6y + 118 = 0$: $\frac{p}{2} = \frac{3}{6} = \frac{59}{118} \rightarrow \frac{p}{2} = \frac{1}{2} \rightarrow p = 1.$ ✓ (Infinitely many solutions)

Verification of R: For unique solution, $\frac{p}{2} \neq \frac{3}{6} \rightarrow p \neq 1.$ ✓

Both are true, but R explains a different pair of equations, so R is **not** the correct explanation of A.

Explanation

- **A is true**: Applying the condition $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ gives $p = 1$.
- **R is true**: For a unique solution, $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$, which gives $p \neq 1$.
- However, R refers to a **completely different pair of equations** (with constants 19 and 157), so it cannot explain why A holds. Hence option **(B)** is correct.

Q61. § 3.2 Graphical Method of Solution of a Pair of Linear Equations | § 3.4 Summary **[1]**

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 $2a + b = 0$

Previously asked in: 2025 30/1/1 Q2

◆ **Pair of Linear Equations in Two Variables** | 3.3 Algebraic Methods of Solving a Pair of Linear Equations

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Model Answer

Substituting $x = 1, y = 2$ in $2x - 3y + a = 0$: $2 - 6 + a = 0 \Rightarrow a = 4$.
Substituting in $2x + 3y - b = 0$: $2 + 6 - b = 0 \Rightarrow b = 8$.
Thus $2a = 8 = b$, so **Option B:** $2a = b$.

Explanation

Substitute the given solution into both equations to find a and b separately, then check which option satisfies the relationship. Here $a = 4$ and $b = 8$, giving $2a = b$. Examiners expect you to show the substitution step clearly, even in MCQs, to earn full credit.

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