NCERT Solutions for Class 10 Maths Chapter 3 Ex 3.6 | Updated 2026-27

⚡ **Quick Revision Box — Exercise 3.6 at a Glance**

- **Chapter:** 3 — Pair of Linear Equations in Two Variables
- **Exercise:** 3.6 — Equations Reducible to a Pair of Linear Equations
- **Total Questions:** 2 (Q1 has 8 sub-parts; Q2 has 3 word problems)
- **Core Technique:** Substitute p = 1/x and q = 1/y (or similar) to convert non-linear equations to linear form
- **Key Problem Types:** Speed (downstream/upstream), Work-rate, Distance-time
- **CBSE Weightage:** Chapter 3 carries 6 marks in the board exam; word problems are high-frequency
- **Syllabus Status:** Fully included in CBSE 2026-27 syllabus
- **Prerequisite:** Substitution method, elimination method (Ex 3.3, 3.4, 3.5)

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The **ncert solutions for class 10 maths chapter 3 ex 3 6** on this page are fully updated for the **2026-27 CBSE board exam**. Exercise 3.6 belongs to Chapter 3 — Pair of Linear Equations in Two Variables — from the [NCERT official textbook](#) for Class 10 Mathematics. This exercise focuses on a powerful technique: reducing equations that look complicated into a simple pair of linear equations by substituting new variables. You can explore all chapters through our [NCERT Solutions for Class 10](#) hub.

For the complete collection of all subjects and classes, visit our main [NCERT Solutions](#) page. This page covers every question in Exercise 3.6 with full working, LaTeX-rendered steps, and exam-focused explanations — exactly what you need to score well in your 2026-27 board exam.

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Chapter Overview — Pair of Linear Equations in Two Variables (Class 10 Maths)

Chapter 3 of NCERT Class 10 Mathematics deals with **Pair of Linear Equations in Two Variables**. It covers graphical and algebraic methods — substitution, elimination, and cross-multiplication — and ends with equations that can be *reduced* to linear form, which is exactly what Exercise 3.6 tests.

In CBSE board exams, Chapter 3 typically carries **6 marks** and appears in both the 2-mark and 3-mark sections. Word problems (like the ones in Q2 of Ex 3.6) are frequently asked in board papers and require you to first frame the equations before solving them.

Detail	Information
Chapter	3 — Pair of Linear Equations in Two Variables
Exercise	3.6
Textbook	NCERT Mathematics — Class 10
Class	10
Subject	Mathematics
CBSE Marks Weightage	~6 marks (Chapter 3 overall)
Difficulty Level	Medium to Hard
Academic Year	2026-27

Key Concepts — Equations Reducible to Linear Form

Core Idea: Some equations are not linear in x and y but become linear when you substitute $p = 1/x$ and $q = 1/y$ (or other suitable substitutions). After solving for p and q, you reverse-substitute to find x and y.

Standard Substitution Pattern: If an equation contains 1/x and 1/y, let $p = 1/x$ and $q = 1/y$. The equation becomes linear in p and q.

Speed-Stream Concept (Downstream/Upstream):

- Downstream speed = speed of boat in still water + speed of current = x + y
- Upstream speed = speed of boat in still water − speed of current = x - y
- Use Speed = (Distance)/(Time) to frame equations

Work-Rate Concept: If a person completes the work in n days, their one-day work = 1/n. Combine fractions for multiple workers.

Distance-Time Concept: Time = (Distance)/(Speed). When total distance is split between two modes of transport, form two equations from two different journey scenarios.

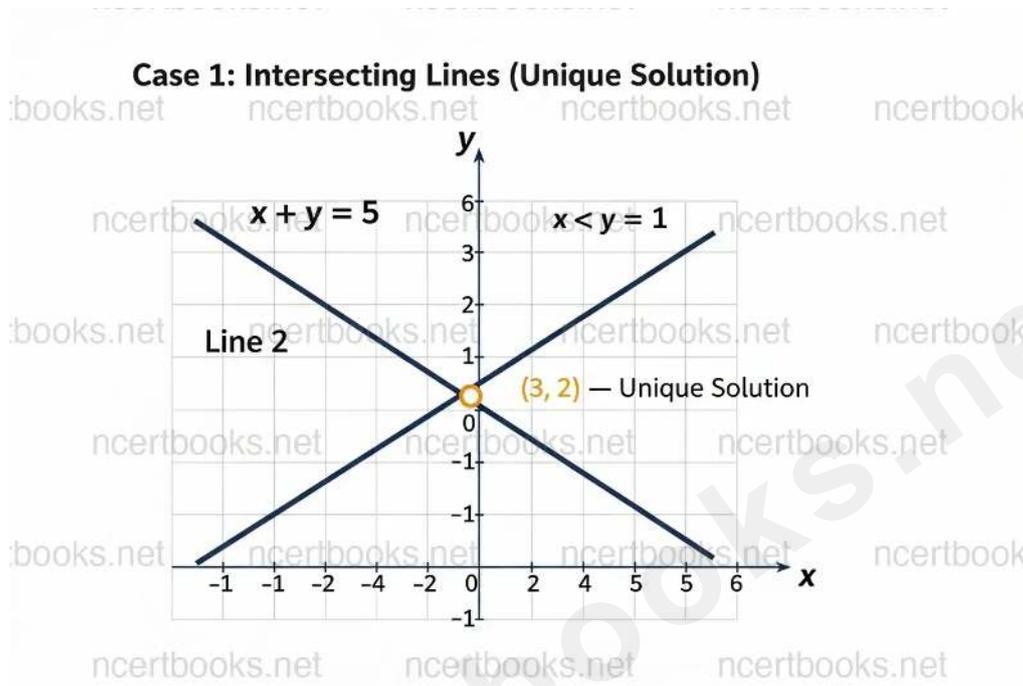## NCERT Solutions for Class 10 Maths Chapter 3 Ex 3.6 — Step-by-Step (2026-27)

Fig 3.1: Intersecting lines — unique solution at point of intersection

Question 1 — Solve Equations by Reducing to a Pair of Linear Equations

Question 1

Hard

Solve the following pairs of equations by reducing them to a pair of linear equations:

(i) 1/2x + 1/3y = 2 and 1/3x + 1/2y = 13/6

Step 1: Let $p = 1/x$ and $q = 1/y$. Rewrite the equations:

$$p/2 + q/3 = 2 \Rightarrow 3p + 2q = 12 \text{ ...(1)}$$

$$p/3 + q/2 = 13/6 \Rightarrow 2p + 3q = 13 \text{ ...(2)}$$

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

$$9p + 6q = 36 \text{ ...(3)}$$

$$4p + 6q = 26 \text{ ...(4)}$$

Step 3: Subtract (4) from (3):

$$5p = 10 \Rightarrow p = 2$$

Step 4: Substitute p = 2 into (1): 3(2) + 2q = 12 ⇒ 2q = 6 ⇒ q = 3

Step 5: Reverse-substitute: p = 1/x = 2 ⇒ x = 1/2; q = 1/y = 3 ⇒ y = 1/3

∴ **x = 1/2, y = 1/3**

(ii) (2)/(√(x)) + (3)/(√(y)) = 2 and (4)/(√(x)) - (9)/(√(y)) = -1

Step 1: Let p = (1)/(√(x)) and q = (1)/(√(y)). The equations become:

$$2p + 3q = 2 \ ...(1)$$

$$4p - 9q = -1 \ ...(2)$$

Step 2: Multiply (1) by 3: 6p + 9q = 6 ...(3)

Step 3: Add (2) and (3): 10p = 5 ⇒ p = 1/2

Step 4: Substitute into (1): 2 × 1/2 + 3q = 2 ⇒ 3q = 1 ⇒ q = 1/3

Step 5: p = (1)/(√(x)) = 1/2 ⇒ √(x) = 2 ⇒ x = 4; q = (1)/(√(y)) = 1/3 ⇒ √(y) = 3 ⇒ y = 9

∴ **x = 4, y = 9**

(iii) 4/x + 3y = 14 and 3/x - 4y = 23

Step 1: Let p = 1/x. The equations become:

$$4p + 3y = 14 \ ...(1)$$

$$3p - 4y = 23 \ ...(2)$$

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

$$16p + 12y = 56 \ ...(3)$$

$$9p - 12y = 69 \ ...(4)$$

Step 3: Add (3) and (4): 25p = 125 ⇒ p = 5

Step 4: Substitute into (1): 4(5) + 3y = 14 ⇒ 3y = -6 ⇒ y = -2

Step 5: p = 1/x = 5 ⇒ x = 1/5

∴ **x = 1/5, y = -2**

(iv) 5/x-1 + 1/y-2 = 2 and 6/x-1 - 3/y-2 = 1

Step 1: Let p = 1/x-1 and q = 1/y-2:

$$5p + q = 2 \quad ...(1)$$

$$6p - 3q = 1 \quad ...(2)$$

Step 2: Multiply (1) by 3: 15p + 3q = 6 ...(3)

Step 3: Add (2) and (3): 21p = 7 ⇒ p = 1/3

Step 4: Substitute into (1): 5 × 1/3 + q = 2 ⇒ q = 2 - 5/3 = 1/3

Step 5: p = 1/x-1 = 1/3 ⇒ x - 1 = 3 ⇒ x = 4; q = 1/y-2 = 1/3 ⇒ y - 2 = 3 ⇒ y = 5

∴ **x = 4, y = 5**

(v) (7x-2y)/(xy) = 5 and (8x+7y)/(xy) = 15

Step 1: Rewrite each equation by splitting the fraction:

$$7/y - 2/x = 5 \quad ...(1)$$

$$8/y + 7/x = 15 \quad ...(2)$$

Step 2: Let p = 1/x and q = 1/y:

$$7q - 2p = 5 \quad ...(3)$$

$$8q + 7p = 15 \quad ...(4)$$

Step 3: Multiply (3) by 7 and (4) by 2:

$$49q - 14p = 35 \quad ...(5)$$

$$16q + 14p = 30 \quad ...(6)$$

Step 4: Add (5) and (6): 65q = 65 ⇒ q = 1

Step 5: Substitute into (3): 7(1) - 2p = 5 ⇒ 2p = 2 ⇒ p = 1

Step 6: p = 1/x = 1 ⇒ x = 1; q = 1/y = 1 ⇒ y = 1

∴ **x = 1, y = 1**

(vi) 6x + 3y = 6xy and 2x + 4y = 5xy

Step 1: Divide both equations by xy (assuming x ≠ 0, y ≠ 0):

$$6/y + 3/x = 6 \quad ...(1)$$

$$2/y + 4/x = 5 \quad ...(2)$$

$$3p + 6q = 6 \Rightarrow p + 2q = 2 \text{ ...(3)}$$

$$4p + 2q = 5 \text{ ...(4)}$$

Step 3: Subtract (3) from (4): $3p = 3 \Rightarrow p = 1$

Step 4: Substitute into (3): $1 + 2q = 2 \Rightarrow q = 1/2$

Step 5: $x = 1/p = 1$; $y = 1/q = 2$

∴ **x = 1, y = 2**

(vii) 10/x+y + 2/x-y = 4 and 15/x+y - 5/x-y = -2

Step 1: Let $p = 1/x+y$ and $q = 1/x-y$:

$$10p + 2q = 4 \Rightarrow 5p + q = 2 \text{ ...(1)}$$

$$15p - 5q = -2 \text{ ...(2)}$$

Step 2: Multiply (1) by 5: $25p + 5q = 10$ ...(3)

Step 3: Add (2) and (3): $40p = 8 \Rightarrow p = 1/5$

Step 4: Substitute into (1): $5 \times 1/5 + q = 2 \Rightarrow q = 1$

Step 5: $p = 1/x+y = 1/5 \Rightarrow x + y = 5$ ...(4)

$q = 1/x-y = 1 \Rightarrow x - y = 1$ ...(5)

Step 6: Add (4) and (5): $2x = 6 \Rightarrow x = 3$; from (5): $y = 3 - 1 = 2$

∴ **x = 3, y = 2**

(viii) (1)/(3x+y) + (1)/(3x-y) = 3/4 and (1)/(2(3x+y)) - (1)/(2(3x-y)) = -1/8

Step 1: Let $p = (1)/(3x+y)$ and $q = (1)/(3x-y)$:

$$p + q = 3/4 \text{ ...(1)}$$

$$p/2 - q/2 = -1/8 \Rightarrow p - q = -1/4 \text{ ...(2)}$$

Step 2: Add (1) and (2): $2p = 3/4 - 1/4 = 2/4 = 1/2 \Rightarrow p = 1/4$

Step 3: From (1): $q = 3/4 - 1/4 = 2/4 = 1/2$

Step 4: $(1)/(3x+y) = 1/4 \Rightarrow 3x + y = 4$ ...(3)

$(1)/(3x-y) = 1/2 \Rightarrow 3x - y = 2$ ...(4)

Step 5: Add (3) and (4): $6x = 6 \Rightarrow x = 1$; from (3): $y = 4 - 3 = 1$

Board Exam Note: Question 1 sub-parts typically appear in 2-3 mark sections of CBSE board papers. Always show your substitution step clearly — examiners award marks for the substitution even if you make a calculation error later.

Question 2 — Word Problems as Pairs of Linear Equations

Question 2

Hard

Formulate the following problems as a pair of linear equations and hence find their solutions:

(i) Ritu can row downstream 20 km in 2 hours and upstream 4 km in 2 hours. Find her speed of rowing in still water and the speed of the current.

Key Concept: Let speed of Ritu in still water = x km/h and speed of current = y km/h.

Downstream speed = x + y km/h; Upstream speed = x - y km/h.

Step 1: Frame the equations using Speed = Distance ÷ Time:

$$x + y = 20/2 = 10 \ ...(1)$$

$$x - y = 4/2 = 2 \ ...(2)$$

Step 2: Add (1) and (2):

$$2x = 12 \Rightarrow x = 6$$

Step 3: Substitute into (1): $6 + y = 10 \Rightarrow y = 4$

Verification: Downstream: 6 + 4 = 10 km/h, distance = 10 × 2 = 20 km ✓; Upstream: 6 - 4 = 2 km/h, distance = 2 × 2 = 4 km ✓

∴ **Speed of Ritu in still water = 6 km/h; Speed of current = 4 km/h**

(ii) 2 women and 5 men can together finish an embroidery work in 4 days, while 3 women and 6 men can finish it in 3 days. Find the time taken by 1 woman alone to finish the work, and also that taken by 1 man alone.

Key Concept: Let 1 woman alone finish the work in x days and 1 man alone in y days.

One-day work of 1 woman = 1/x; One-day work of 1 man = 1/y.

Step 1: Frame the equations:

2 women and 5 men finish in 4 days:

$$4(2/x + 5/y) = 1 \Rightarrow 2/x + 5/y = 1/4 \quad ...(1)$$

3 women and 6 men finish in 3 days:

$$3(3/x + 6/y) = 1 \Rightarrow 3/x + 6/y = 1/3 \quad ...(2)$$

$$2p + 5q = 1/4 \quad ...(3)$$

$$3p + 6q = 1/3 \quad ...(4)$$

Step 3: Multiply (3) by 6 and (4) by 5:

$$12p + 30q = 6/4 = 3/2 \quad ...(5)$$

$$15p + 30q = 5/3 \quad ...(6)$$

Step 4: Subtract (5) from (6):

$$3p = 5/3 - 3/2 = 10/6 - 9/6 = 1/6 \Rightarrow p = 1/18$$

Step 5: Substitute into (3):

$$2 \times 1/18 + 5q = 1/4 \Rightarrow 1/9 + 5q = 1/4 \Rightarrow 5q = 1/4 - 1/9 = 9\text{-}4/36 = 5/36 \Rightarrow q = 1/36$$

Step 6: $p = 1/x = 1/18 \Rightarrow x = 18$; $q = 1/y = 1/36 \Rightarrow y = 36$

Verification: $4(2/18 + 5/36) = 4(4/36 + 5/36) = 4 \times 9/36 = 4 \times 1/4 = 1$ ✓

∴ **1 woman alone takes 18 days; 1 man alone takes 36 days**

(iii) Roohi travels 300 km to her home partly by train and partly by bus. She takes 4 hours if she travels 60 km by train and the remaining by bus. If she travels 100 km by train and the remaining by bus, she takes 10 minutes longer. Find the speed of the train and the bus separately.

Key Concept: Let speed of train = x km/h and speed of bus = y km/h.

Time = Distance ÷ Speed. Total distance = 300 km.

Step 1: Frame Equation 1 (60 km by train, 240 km by bus, total time = 4 hours):

$$60/x + 240/y = 4 \quad ...(1)$$

Step 2: Frame Equation 2 (100 km by train, 200 km by bus, total time = 4 hours 10 minutes = 25/6 hours):

$$100/x + 200/y = 25/6 \quad ...(2)$$

Step 3: Let $p = 1/x$ and $q = 1/y$:

$$60p + 240q = 4 \Rightarrow 15p + 60q = 1 \text{ ...(3)}$$

$$100p + 200q = 25/6 \Rightarrow 600p + 1200q = 25 \Rightarrow 24p + 48q = 1 \text{ ...(4)}$$

Why divide? Dividing by common factors simplifies the arithmetic.

Step 4: Multiply (3) by 4 and (4) by 5:

$$60p + 240q = 4 \text{ ...(5)}$$

$$120p + 240q = 5 \text{ ...(6)}$$

Step 5: Subtract (5) from (6): $60p = 1 \Rightarrow p = 1/60$

Step 6: Substitute into (3): $15 \times 1/60 + 60q = 1 \Rightarrow 1/4 + 60q = 1 \Rightarrow 60q = 3/4 \Rightarrow q = 1/80$

Step 7: $x = 1/p = 60$ km/h; $y = 1/q = 80$ km/h

Verification: $60/60 + 240/80 = 1 + 3 = 4$ hours ✓; $100/60 + 200/80 = 5/3 + 5/2 = (10+15)/(6) = 25/6$ hours ✓

∴ **Speed of train = 60 km/h; Speed of bus = 80 km/h**

Board Exam Note: Word problems in Exercise 3.6 are high-frequency in CBSE board papers and appear in long-answer sections. Always write your variable definitions clearly at the start and include a verification step — both earn marks in the CBSE marking scheme.

Formula Reference Table — Chapter 3 Pair of Linear Equations

Formula Name	Formula (LaTeX)	Variables Defined
Downstream Speed	$v\_d = x + y$	x = boat speed in still water, y = current speed
Upstream Speed	$v\_u = x - y$	x = boat speed in still water, y = current speed
Speed–Distance–Time	Speed = (Distance)/(Time)	Standard formula
One-day Work	$W = 1/n$	n = number of days to complete work alone
Combined Work Rate	$1/x + 1/y = 1/d$	x, y = individual days; d = days together
Reciprocal Substitution	$p = 1/x,\ q = 1/y$	Used to linearise non-linear equations
10 minutes in hours	10 min = 10/60 = 1/6 hour	Unit conversion for time problems

Solved Examples Beyond NCERT — Equations Reducible to Linear Form

Extra Example 1

Medium

Solve: $3/x+1 - 1/y-1 = 0$ and $4/x+1 + 3/y-1 = 5$

Step 1: Let $p = 1/x+1$ and $q = 1/y-1$:

$$3p - q = 0 \Rightarrow q = 3p \ ...(1)$$

$$4p + 3q = 5 \ ...(2)$$

Step 2: Substitute (1) into (2): $4p + 9p = 5 \Rightarrow 13p = 5 \Rightarrow p = 5/13, q = 15/13$

Step 3: $x + 1 = 13/5 \Rightarrow x = 8/5$; $y - 1 = 13/15 \Rightarrow y = 28/15$

∴ **x = 8/5, y = 28/15**

Extra Example 2 — Speed Problem

Medium

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

Step 1: Let boat speed in still water = x, stream speed = y. Let $p = 1/x-y$, $q = 1/x+y$.

$$30p + 44q = 10 \ ...(1)$$

$$40p + 55q = 13 \ ...(2)$$

Step 2: Multiply (1) by 4 and (2) by 3: $120p + 176q = 40$ and $120p + 165q = 39$. Subtract: $11q = 1 \Rightarrow q = 1/11$

Step 3: Substitute into (1): $30p + 4 = 10 \Rightarrow 30p = 6 \Rightarrow p = 1/5$

Step 4: $x - y = 5$ and $x + y = 11$. Solving: $x = 8, y = 3$.

∴ **Boat speed = 8 km/h; Stream speed = 3 km/h**

Important Questions for CBSE Board Exam — Class 10 Maths Chapter 3

1-Mark Questions

1. If p = 1/x and q = 1/y, what does the equation 2/x + 3/y = 5 become? **Answer: 2p + 3q = 5**
2. Define downstream speed in terms of boat speed x and current speed y. **Answer: x + y**
3. If a woman can complete a work in x days, what is her one-day work? **Answer: 1/x**

3-Mark Questions

1. Solve: 2/x + 3/y = 13 and 5/x - 4/y = -2. Let p = 1/x, q = 1/y: 2p + 3q = 13, 5p - 4q = -2. Multiply first by 4 and second by 3: 8p + 12q = 52, 15p - 12q = -6. Add: 23p = 46 ⇒ p = 2 ⇒ x = 1/2. Then q = 3 ⇒ y = 1/3. **Answer: x = 1/2, y = 1/3**
2. A boat takes 3 hours to go 24 km downstream and 2 hours to go 8 km upstream. Find the speed of the boat and the stream. **Answer: Downstream speed = 8 km/h, upstream speed = 4 km/h; boat speed = 6 km/h, stream = 2 km/h.**

5-Mark (Long Answer) Question

A train covers a certain distance at a uniform speed. If the train would have been 6 km/h faster, it would have taken 4 hours less than the scheduled time. And if the train were slower by 6 km/h, it would have taken 6 more hours. Find the distance covered by the train.

Solution Hint: Let speed = x km/h and time = t hours. Distance d = xt. Set up: (x+6)(t-4) = xt and (x-6)(t+6) = xt. Expand and simplify to get two linear equations in x and t. Solve to find x = 30 km/h, t = 24 hours, d = 720 km.

Common Mistakes Students Make in Exercise 3.6

Mistake 1: Forgetting to reverse-substitute after finding p and q.

Why it's wrong: p and q are not the final answers; x and y are. You lose marks if you stop at p and q.

Correct approach: Always write x = 1/p and y = 1/q as the final step.

Mistake 2: Converting 10 minutes as 10/100 hours instead of 10/60 = 1/6 hours.

Why it's wrong: Time must be in consistent units (hours). Using 1/10 gives wrong equations.

Correct approach: Always convert minutes to hours by dividing by 60.

Mistake 3: Writing upstream speed as y - x instead of x - y.

Why it's wrong: If x > y, then y - x is negative, which makes no physical sense for speed.

Correct approach: Upstream speed = boat speed − current speed = x - y (always positive when x > y).

Mistake 4: In work problems, writing the combined work equation as x + y = 1/4 without the fractions 1/x and 1/y.

Why it's wrong: x is the number of days, not the rate. Rate = 1/x.

Correct approach: Write 2/x + 5/y = 1/4 (rate × time = 1 complete work).

Mistake 5: Not verifying the answer after solving.

Why it's wrong: CBSE marking schemes often award 1 mark for verification. Skipping it costs you marks.

Correct approach: Substitute your x and y back into both original equations and confirm both sides are equal.

Exam Tips for 2026-27 CBSE Board — Chapter 3 Exercise 3.6

- **Define variables first:** In word problems, always start by writing "Let speed of boat = x km/h" etc. The CBSE 2026-27 marking scheme awards 1 mark for correct variable definition.
- **Show substitution explicitly:** Write "Let p = 1/x and q = 1/y" as a separate line. Examiners check this step.
- **Unit conversion is a trap:** The Roohi problem uses "10 minutes longer" — always convert to 1/6 hour before writing the equation.
- **Chapter 3 weightage:** Pair of Linear Equations carries approximately 6 marks in the CBSE Class 10 board exam. Exercise 3.6 word problems are among the most commonly repeated question types.
- **Verification earns marks:** In long-answer questions, always verify your solution — it is explicitly mentioned in CBSE answer keys and earns a dedicated mark.
- **Last-minute checklist:** (1) Substitution step shown ✓ (2) Linear equations formed correctly ✓ (3) Solved using elimination/substitution ✓ (4) Reverse-substituted to find original variables ✓ (5) Verified the answer ✓

For related exercises, also see [NCERT Solutions Class 10 Maths Chapter 3 Exercise 3.5](#) and [NCERT Solutions Class 10 Maths Chapter 3 Exercise 3.4](#) which cover the elimination and cross-multiplication methods that build up to this exercise.

Frequently Asked Questions — NCERT Class 10 Maths Chapter 3 Ex 3.6

How do you solve equations reducible to a pair of linear equations in Class 10 Maths?

You introduce a substitution — typically p = 1/x and q = 1/y — to replace the complex expressions and convert the equations into standard linear form. Then solve the resulting pair using the substitution or elimination method. Finally, reverse-substitute to find the values of the original variables x and y. This technique is the core skill tested in Exercise 3.6 of the NCERT Class 10 Maths textbook.

What is the Ritu rowing problem answer in NCERT Class 10 Maths Exercise 3.6?

In the Ritu rowing problem, her speed in still water is **6 km/h** and the speed of the current is **4 km/h**. This is found by setting up two equations: downstream x + y = 10 and upstream x - y = 2, then solving by adding and subtracting. The problem tests the concept of downstream and upstream speed in the context of linear equations.

What is the answer to the Roohi train and bus problem in Exercise 3.6?

In the Roohi travel problem, the speed of the train is **60 km/h** and the speed of the bus is **80 km/h**. The key step is converting "10 minutes longer" to 1/6 hour before writing the second equation. After substituting p = 1/x and q = 1/y and solving, the values are reverse-substituted to get the final speeds.

How many questions are in NCERT Class 10 Maths Chapter 3 Exercise 3.6?

Exercise 3.6 of NCERT Class 10 Maths Chapter 3 contains **2 questions**. Question 1 has 8 sub-parts, each requiring you to solve a pair of equations by reducing them to linear form. Question 2 has 3 word problems — the Ritu rowing problem, the embroidery work problem, and the Roohi train-bus problem. All five concepts in these questions are important for the 2026-27 CBSE board exam.

Is Exercise 3.6 of Class 10 Maths in the current CBSE 2026-27 syllabus?

Yes, Exercise 3.6 is fully included in the CBSE Class 10 Maths syllabus for 2026-27. The topic of equations reducible to a pair of linear equations is listed under Section 3.5 of the NCERT textbook and is examinable in board exams. Word problems from this exercise — especially the speed and work-rate types — have appeared repeatedly in previous CBSE board papers and are expected to continue in 2026-27.