

CLASS 10

MATHS

NCERT SOLUTIONS

NCERT Solutions for Class 10 Maths Chapter 3: Pair of Linear Equations in Two Variables – Free PDF Download

Chapter 3 — Pair of Linear Equations in Two Variables is one of the highest-yield chapters in the current 2026-27 CBSE Class 10 Maths syllabus. Below are complete, step-by-step solutions for Exercise 3.1, covering forming equations from word problems, solving graphically, and checking consistency using the ratio t...

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Chapter 3 — Pair of Linear Equations in Two Variables is one of the highest-yield chapters in the current 2026-27 CBSE Class 10 Maths syllabus. Below are complete, step-by-step solutions for Exercise 3.1, covering forming equations from word problems, solving graphically, and checking consistency using the ratio test.

NCERT Solutions for Class 10 Maths Chapter 3: Pair of Linear Equations in Two Variables (Exercise 3.1)

Q1(i). Form the pair of linear equations: 10 students of Class X took part in a Mathematics quiz. If the number of girls is 4 more than the number of boys, find the number of boys and girls.

Let the number of boys = x and girls = y .

$$x + y = 10$$

$$y = x + 4$$

Solving graphically (or by substitution): substituting $y = x + 4$ into the first equation gives $x + (x+4) = 10$, so $2x = 6$, $x = 3$, $y = 7$. The two lines intersect at $(3, 7)$.

Boys = 3, Girls = 7.

Q1(ii). 5 pencils and 7 pens together cost ₹50, whereas 7 pencils and 5 pens together cost ₹46. Find the cost of one pencil and one pen.

Let cost of a pencil = ₹ x , cost of a pen = ₹ y .

$$5x + 7y = 50$$

$$7x + 5y = 46$$

Multiply the first equation by 7 and the second by 5: $35x + 49y = 350$ and $35x + 25y = 230$. Subtracting: $24y = 120$, so $y = 5$. Substituting back: $5x + 35 = 50$, so $x = 3$.

Pencil = ₹3, Pen = ₹5.

Q2. On comparing the ratios a_1/a_2 , b_1/b_2 and c_1/c_2 , find out whether the following pairs of lines are intersecting, parallel or coincident:

(i) $5x - 4y + 8 = 0$ and $7x + 6y - 9 = 0$

$a_1/a_2 = 5/7$, $b_1/b_2 = -4/6 = -2/3$. Since $a_1/a_2 \neq b_1/b_2$, the lines are **intersecting** (unique solution).

(ii) $9x + 3y + 12 = 0$ and $18x + 6y + 24 = 0$

$a_1/a_2 = 9/18 = 1/2$, $b_1/b_2 = 3/6 = 1/2$, $c_1/c_2 = 12/24 = 1/2$. All three ratios are equal, so the lines are **coincident** (infinitely many solutions).

(iii) $6x - 3y + 10 = 0$ and $2x - y + 9 = 0$

$a_1/a_2 = 6/2 = 3$, $b_1/b_2 = -3/-1 = 3$, $c_1/c_2 = 10/9$. Since $a_1/a_2 = b_1/b_2 \neq c_1/c_2$, the lines are **parallel** (no solution).

Q3. Check whether the following pairs of linear equations are consistent or inconsistent:

(i) $3x + 2y = 5$; $2x - 3y = 7$ — $a_1/a_2 = 3/2$, $b_1/b_2 = 2/-3$. Not equal → **consistent, unique solution.**

(ii) $2x - 3y = 8$; $4x - 6y = 9$ — $a_1/a_2 = 1/2$, $b_1/b_2 = 1/2$, $c_1/c_2 = 8/9$. $a_1/a_2 = b_1/b_2 \neq c_1/c_2$ → **inconsistent, no solution.**

(iii) $3/2 x + 5/3 y = 7$; $9x - 10y = 14$ — $a_1/a_2 = 1/6$, $b_1/b_2 = -1/6$. Not equal → **consistent, unique solution.**

(iv) $5x - 3y = 11$; $-10x + 6y = -22$ — all three ratios equal $-1/2$ → **consistent, infinitely many solutions (coincident lines).**

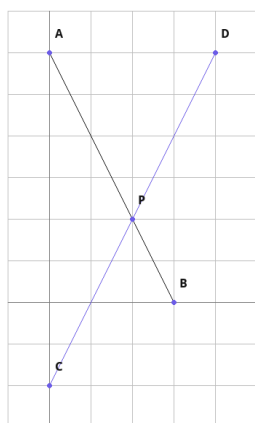
(v) $\frac{4}{3}x + 2y = 8$; $2x + 3y = 12$ — all three ratios equal $\frac{2}{3} \rightarrow$ **consistent**, infinitely many solutions (coincident lines).

Q4. Which of the following pairs of linear equations are consistent/inconsistent? If consistent, obtain the solution graphically:

(i) $x + y = 5$; $2x + 2y = 10$ — coincident lines, **consistent**, infinitely many solutions.

(ii) $x - y = 8$; $3x - 3y = 16$ — parallel lines, **inconsistent**, no solution.

(iii) $2x + y - 6 = 0$; $4x - 2y - 4 = 0$ — ratios unequal, **consistent**. From equation 1, $y = 6 - 2x$. Substituting into equation 2: $4x - 2(6 - 2x) - 4 = 0 \rightarrow 8x - 16 = 0 \rightarrow x = 2, y = 2$. **Solution: (2, 2).**



$2x + y - 6 = 0$ and $4x - 2y - 4 = 0$ intersect at (2, 2) $\rightarrow$ consistent pair, unique solution.

(iv) $2x - 2y - 2 = 0$; $4x - 4y - 5 = 0$ — $a_1/a_2 = b_1/b_2 = 1/2$ but $c_1/c_2 = 2/5$. **Inconsistent**, no solution.

Q5. Half the perimeter of a rectangular garden, whose length is 4 m more than its width, is 36 m. Find the dimensions.

Let width = x , length = $y = x + 4$. Half the perimeter = $x + y = 36$. Substituting: $x + (x + 4) = 36 \rightarrow 2x = 32 \rightarrow x = 16, y = 20$.

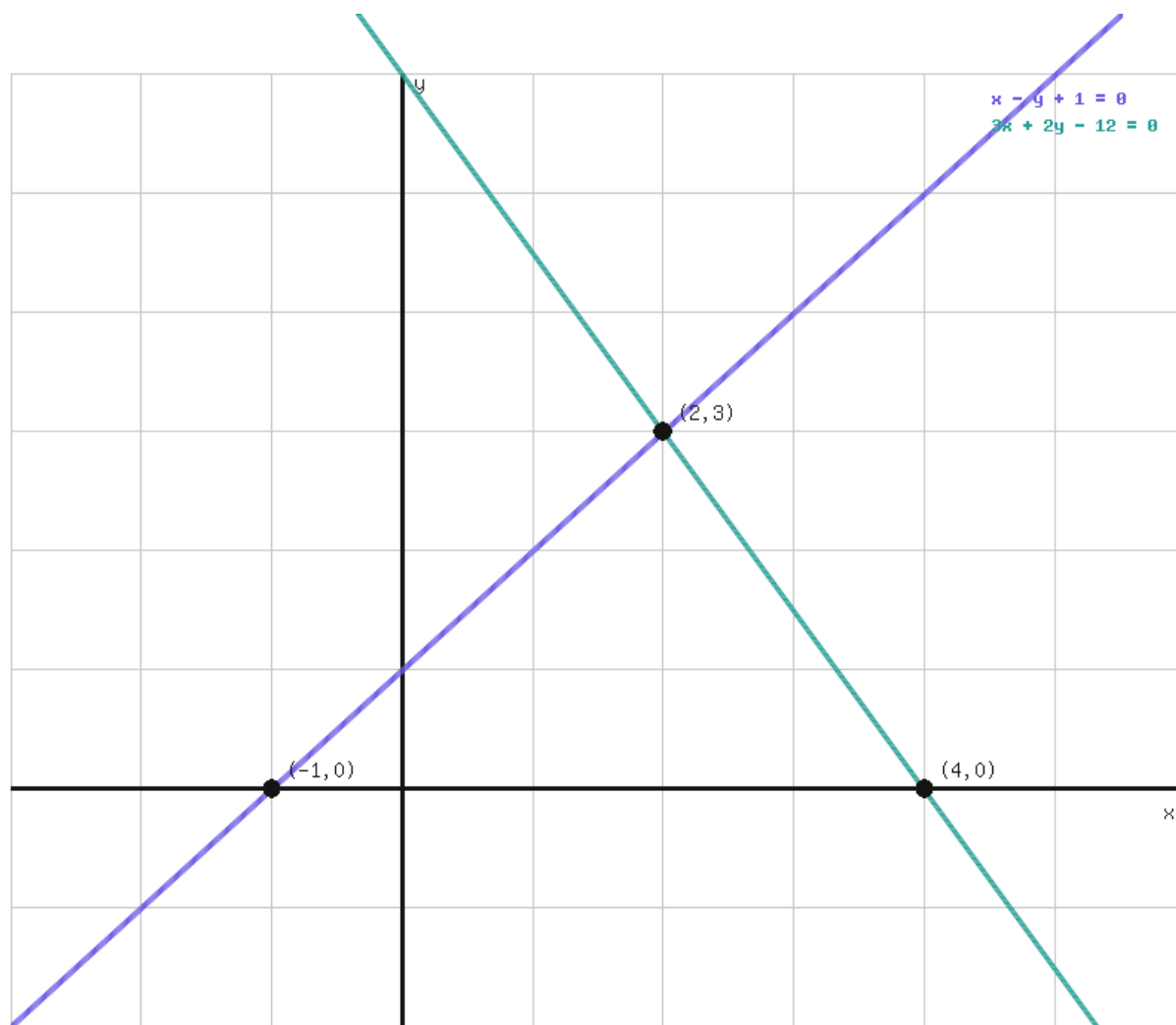
Width = 16 m, Length = 20 m.

Q6. Given the linear equation $2x + 3y - 8 = 0$, write another linear equation such that the pair formed is (i) intersecting (ii) parallel (iii) coincident.

(i) Any equation with a different a/b ratio, e.g. $3x + 2y - 7 = 0$ (intersecting lines).

(ii) Same a/b ratio, different c ratio, e.g. $6x + 9y + 7 = 0$ ($a_1/a_2 = b_1/b_2 = 1/3$, c ratio different — parallel).

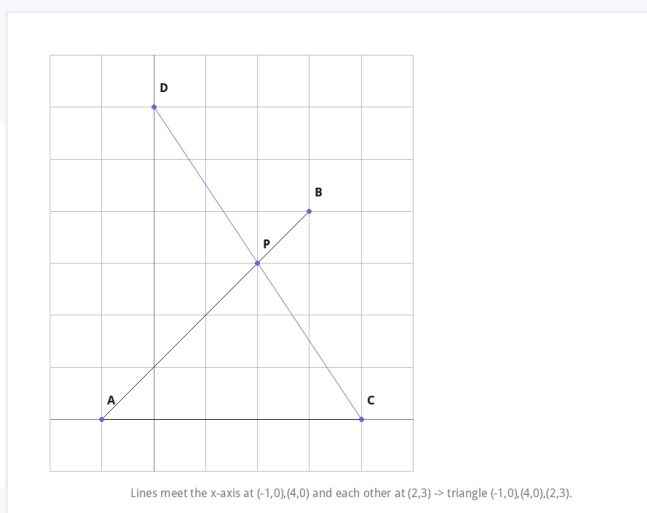
(iii) All ratios equal, e.g. $4x + 6y - 16 = 0$ (exactly double the original — coincident).



Triangle formed by the two lines and the x-axis
 Graphing both lines shows they intersect at $(2, 3)$, and meet the x-axis at $(-1, 0)$ and $(4, 0)$ respectively.

Q7. Draw the graphs of $x - y + 1 = 0$ and $3x + 2y - 12 = 0$. Find the vertices of the triangle formed by these lines and the x-axis.

Line 1 ($x - y + 1 = 0$) meets the x-axis at $(-1, 0)$. Line 2 ($3x + 2y - 12 = 0$) meets the x-axis at $(4, 0)$. Solving the two lines together: from line 1, $y = x + 1$; substituting into line 2: $3x + 2(x+1) - 12 = 0 \rightarrow 5x - 10 = 0 \rightarrow x = 2, y = 3$.



Triangle vertices: $(-1, 0)$, $(4, 0)$ and $(2, 3)$.

Why This Chapter Matters

Pair of Linear Equations in Two Variables is one of the most exam-heavy chapters in Class 10 Maths — it routinely contributes 6–8 marks across the CBSE board paper through a mix of short-answer consistency questions and long-answer word problems (ages, fractions, speed/distance), and the substitution/elimination techniques from the later exercises of this chapter are used constantly in Class 11 and 12 algebra and coordinate geometry.

CBSE Exam Weightage

This chapter falls under **Unit II: Algebra** in the CBSE Class 10 Maths board exam syllabus. This unit typically carries around **20 marks (25%)** of the 80-mark theory paper, based on CBSE's published unit-wise weightage (Question Paper Design). CBSE sets weightage at the unit level rather than chapter-by-chapter, so the exact share from this specific chapter can vary a little between years and sample papers.

How to Use These Solutions

Attempt each part yourself on paper before checking — the ratio test (a_1/a_2 vs b_1/b_2 vs c_1/c_2) in Q2–Q4 is worth memorising cold, since it appears as a standalone 1-2 mark question almost every year. You can download the full chapter directly from our [Class 10 Maths NCERT book page](#), or browse every Class 10 subject on our [Class 10 hub](#).

Class 10 Mathematics Chapter 3 – Notes and Extra Questions

Along with these NCERT Solutions, students can also use the [Class 10 Mathematics Chapter 3 Extra Questions](#) and [Class 10 Mathematics Chapter 3 Revision Notes](#) for quick revision and extra practice.