

Pair of Linear Equations — the chapter in two pages

NCERT Chapter 3 · CBSE Unit II Algebra · Exercises 3.1, 3.2 and 3.3

Write both as $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$. Compare a_1/a_2 , b_1/b_2 and c_1/c_2 — and you know how many solutions the pair has **before you solve it**.

Three cases, and nothing else

Compare the ratios	The two lines	Solutions	The word for it
$a_1/a_2 \neq b_1/b_2$	Intersecting — they cross once	Exactly one	Consistent
$a_1/a_2 = b_1/b_2 \neq c_1/c_2$	Parallel — they never meet	None	Inconsistent
$a_1/a_2 = b_1/b_2 = c_1/c_2$	Coincident — the same line twice	Infinitely many	Consistent (dependent)

Coincident is not “crossing”. Coincident lines lie exactly on top of each other, so every point on one is on the other — that is *why* there are infinitely many solutions. Two lines crossing at a shallow angle is the *unique*-solution picture, not this one.

Three steps, and the trap inside each

Step	What you do	The trap
1	Put both equations in the form $ax + by + c = 0$	Moving a term across and forgetting to flip its sign
2	Write the three ratios as fractions, signs included	Dropping a minus sign, so $-3/-1$ is read as -3
3	Compare a_1/a_2 with b_1/b_2 first, then c_1/c_2	Stopping after two and calling a coincident pair parallel

Which method, and the two that are gone

Method	Reach for it when	NCERT
Graphical	The question says <i>graphically</i> , or asks for a picture or a triangle	Exercise 3.1
Substitution	One variable already has coefficient 1, or is easy to isolate	Exercise 3.2
Elimination	Coefficients match, or scale to match, in a line or two	Exercise 3.3

Cross-multiplication and **equations reducible to a pair of linear equations** were removed in the rationalised syllabus. Older books and many solution sites still print them as Exercises 3.5 and 3.6. Substitution and elimination are the only two algebraic methods CBSE now examines.

What NCERT and CBSE actually say

The graphical *section* is 3.2 but its *exercise* is 3.1 — section 3.1 is a bare introduction with no exercise. Same offset as Chapter 2 (§2.2 → Ex 2.1) and Chapter 9 (§9.2 → Ex 9.1).

“Pair of linear equations in two variables and graphical method of their solution, consistency/inconsistency. Algebraic conditions for number of solutions. Solution of a pair of linear equations in two variables algebraically – by substitution, by elimination. Simple situational problems.”

The clause that belongs to this chapter and no other is **“Algebraic conditions for number of solutions”** — the ratio test above is named in the syllabus itself, which is why a 1-mark “how many solutions?” question is fair game. Algebra is **20 of 80**, the largest unit. Chapter-wise percentage tables online are unofficial estimates.

Key takeaways

- **Two lines can only do three things** — cross once, never meet, or be the same line.
- **$a_1/a_2 \neq b_1/b_2$ means one solution.** Equal means you still have work to do.
- **c_1/c_2 is the decider** between parallel (no solution) and coincident (infinitely many).
- **Coincident means on top of, not crossing.** Getting this backwards inverts your answer.
- **Only substitution and elimination are examined** algebraically — cross-multiplication is out of syllabus.
- **On a graphical question the table and the ruled lines are the answer**, not rough work.

One question, three answers — then a graph worth 5 marks

Every number below is checked. Try each one before you read the working.

EXERCISE 3.1, Q2 · 3 MARKS

Do the lines representing each pair intersect, run parallel, or coincide?

The pair	a_1/a_2	b_1/b_2	c_1/c_2	Answer
$5x - 4y + 8 = 0$ $7x + 6y - 9 = 0$	$5/7$	$-2/3$	$-8/9$	Intersecting — one solution
$9x + 3y + 12 = 0$ $18x + 6y + 24 = 0$	$1/2$	$1/2$	$1/2$	Coincident — infinitely many
$6x - 3y + 10 = 0$ $2x - y + 9 = 0$	3	3	$10/9$	Parallel — no solution

Row 3 is the trap. a_1/a_2 and b_1/b_2 both come to 3 — stop there and you write “coincident”. It is $c_1/c_2 = 10/9$ that makes it parallel.

EXERCISE 3.1, Q1(ii) · ELIMINATION · 3 MARKS

5 pencils and 7 pens together cost Rs 50, while 7 pencils and 5 pens together cost Rs 46. Find the cost of one pencil and one pen.

Step 1 — name and form. Pencil Rs x , pen Rs y : $5x + 7y = 50 \dots (1)$, $7x + 5y = 46 \dots (2)$

Step 2 — match a coefficient. $(1) \times 7$: $35x + 49y = 350$. $(2) \times 5$: $35x + 25y = 230$.

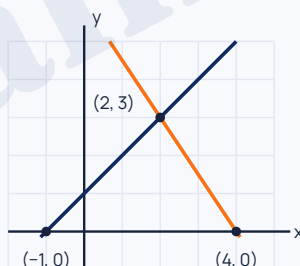
Step 3 — subtract and finish. $24y = 120$, so $y = 5$; then $5x + 35 = 50$, so $x = 3$.

A pencil costs Rs 3 and a pen costs Rs 5.

Check ✓ $5(3) + 7(5) = 50$ and $7(3) + 5(5) = 46$ — both hold. Writing this line is itself a mark.

EXERCISE 3.1, Q7 · GRAPHICAL · 5 MARKS

Draw $x - y + 1 = 0$ and $3x + 2y - 12 = 0$, and find the vertices of the triangle they make with the x -axis.



$x - y + 1 = 0$ · $3x + 2y - 12 = 0$ · 1 unit = 1 square, both lines ruled, all three vertices marked.

Vertices: $(-1, 0)$, $(4, 0)$ and $(2, 3)$. Setting $y = 0$ gives the two intercepts; the algebra confirms the apex at $(2, 3)$.

WHERE THE MARKS ACTUALLY GO

- Compared only two ratios — parallel and coincident swap, and the answer inverts.
- Read $-3/-1$ as -3 — one dropped sign turns intersecting into parallel.
- Sketched freehand, or never substituted back — both are cheap, avoidable marks.

NOW TRY THESE TWO

1. Is $2x - 3y = 8$ with $4x - 6y = 9$ consistent? 2. Half a garden's perimeter is 36 m and its length is 4 m more than its width — find both. (Answers below.)

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