

Linear Equations Word Problems (Class 10)

Forming a pair of linear equations in two variables · NCERT Chapter 3 · CBSE Algebra, 20 of 80 marks

Two unknowns + two conditions $\Rightarrow$ two equations. Name them both, then translate one fact at a time.

The method: I–A–T–C

Step	What you write	Why it earns a mark
Identify	The two quantities the question asks you to find	Picking the wrong pair costs every mark after it
Assign	"Let the number of ... be x and ... be y ", in words, with units	The Let line carries credit on its own
Translate	One stated condition $\rightarrow$ one linear equation. Two conditions, two equations	Each equation is separately marked
Check	Powers of x and y are 1; both facts used; units match	Catches a reversed comparison before you solve

Two unknowns means two variables. Writing the larger number as $x + 7$ instead of naming it y folds the second condition into the first. The arithmetic still works, but the second equation never appears on the page — and neither do its marks.

Phrase $\rightarrow$ algebra

The problem says	You write	Watch out for
"the sum of the two numbers is 27"	$x + y = 27$	—
" x is 4 more than y "	$x = y + 4$	Read <i>who</i> has more; add to the smaller side
"the difference of the numbers is 3"	$x - y = 3$	Larger minus smaller
"twice / double y "	$2y$	—
"total cost"	price $\times$ quantity, added	Both sides must be in rupees
"three times as old as"	$x = 3y$	Ages and totals cannot mix units

The NCERT and CBSE numbers

What it fixes	The number
NCERT scope	Chapter 3, Pair of Linear Equations in Two Variables — one of the four Algebra chapters in a 14-chapter, 7-unit syllabus
The numbering trap	Section 3.2 is the graphical method but its exercise is Exercise 3.1 . Section 3.3 Algebraic Methods carries Ex 3.2 substitution and Ex 3.3 elimination — where the word problems sit
Removed	Cross-multiplication and equations reducible to a pair of linear equations. Substitution and elimination are the two methods examined
CBSE paper	38 questions, 80 marks, 3 hours, no overall choice, 15 minutes reading time — A 20×1 , B 5×2 , C 6×3 , D 4×5 , E 3×4
Unit weightage	Algebra 20 of 80 = 25%, the largest unit. CBSE sets marks by unit, not by chapter — chapter percentage charts online are unofficial

Key takeaways

- ▶ **Two unknowns, two conditions, two equations.** That is the whole structure of every Chapter 3 word problem.
- ▶ **I–A–T–C:** Identify, Assign, Translate, Check — in that order, every time.
- ▶ **Write the Let line in words, with units.** It defines the equations and it is marked.
- ▶ **One fact, one equation.** Merging both facts into a single equation leaves the pair incomplete.
- ▶ **Verify against the story,** not against your own equations — a wrong equation can be satisfied perfectly.
- ▶ **Once the pair is right, solving is mechanical.** The marks are won and lost in the translation.

One question, written the way CBSE marks it

Represent and solve · Section C, 3 marks · then the same numbers written two ways

SECTION C · 3 MARKS

3 notebooks and 4 pens cost Rs 180. 5 notebooks and 2 pens cost Rs 230. Represent this situation as a pair of linear equations and find the cost of each.

Identify. The unknowns are the cost of one notebook and the cost of one pen.

Assign. Let the cost of one notebook be Rs x and the cost of one pen be Rs y .

Translate. First condition: $3x + 4y = 180$. Second condition: $5x + 2y = 230$. Both facts used, both linear — this is the pair.

Solve (elimination). Multiply the second equation by 2: $10x + 4y = 460$. Subtract the first: $10x - 3x = 460 - 180$, so $7x = 280$ and $x = 40$. Substituting in $3x + 4y = 180$: $120 + 4y = 180$, $4y = 60$, $y = 15$.

Check. $3(40) + 4(15) = 120 + 60 = 180$ ✓ $5(40) + 2(15) = 200 + 30 = 230$ ✓ A notebook costs Rs 40 and a pen Rs 15.

THE SAME NUMBERS, WRITTEN TWO WAYS

The sum of two numbers is 37. One number is 7 more than the other. Find the numbers.

As a pair, in two variables	In one variable	What the difference costs you
Let the smaller be x and the larger be y . $x + y = 37$ $y - x = 7$ Adding: $2y = 44$, so $y = 22$, $x = 15$	Let the smaller be x , the larger $x + 7$. $x + (x + 7) = 37$ $2x + 7 = 37$, so $x = 15$, larger 22	Both reach 15 and 22. But the second uses the “7 more” condition to eliminate a variable before writing it down, so the second equation never appears — and a question that says “ as a pair of linear equations in two variables ” has not been answered

Check either way: $15 + 22 = 37$ ✓ and $22 - 15 = 7$ ✓

WHERE THE MARKS ACTUALLY GO

Indicatively, on a 3-mark represent-and-solve question: **1 mark** for the Let statement and the two equations, **1 mark** for a correct elimination or substitution, **1 mark** for both values with the verification line. Four ways students hand marks back:

No Let line	x and y are undefined, so the equations mean nothing on their own
Comparison reversed	“girls are 6 more than boys” written $x = y + 6$ instead of $y = x + 6$
One equation instead of two	Both facts folded together — the pair is incomplete
No verification	The answer is never tested against the original sentences, so a slip survives

NOW TRY THIS ONE

The sum of a two-digit number and the number obtained by reversing its digits is 66. The two digits differ by 2. Represent this as a pair of linear equations and find the number.

Let the tens digit be x and the units digit be y . The number is $10x + y$ and the reversed number is $10y + x$, so $(10x + y) + (10y + x) = 66$, which simplifies to $x + y = 6$; and $x - y = 2$. Answer: $x = 4$, $y = 2$, the number is **42** (24 also satisfies both conditions if the digits are taken the other way round). Check: $42 + 24 = 66$ ✓ and $4 - 2 = 2$ ✓

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- ▶ **Mistake identification** — see whether you lost the mark on translation, on solving or on presentation.
- ▶ **Anytime tests** — drill word problems by type, whenever you have twenty minutes.
- ▶ **Weekly tests** — keep Chapter 3 warm while you move on through Algebra.
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