

Quadratic Equation Word Problems — the 3-phase method

Form → Solve → Check. The algebra hands you two candidate answers; the story decides which one survives.

Form the equation ► **Solve** it by factorisation ► **Check** each root against the real situation

The three phases, and the mark each one earns

Phase	What you write	Why the examiner gives the mark
1. Form	"Let the breadth be x m", the other quantities in terms of x , then $ax^2 + bx + c = 0$	The <i>Let</i> line and the standard form are separate marks — a wrong equation costs everything after it
2. Solve	Split the middle term (sum b , product $a \times c$), factorise, set each factor to zero	Method marks live in the split and the factors, not in the two roots
3. Check	Test both roots against the story, reject the impossible one <i>in writing</i> , answer in words with units	The rejection line is a credited step, and " $x = 7$ " alone is not the answer the question asked for

Read the command word first. *Represent the situation in the form of a quadratic equation* stops at Phase 1 — solving it earns nothing extra. *Find the dimensions* wants all three phases.

Turning the sentence into algebra

The story says	You write
Two consecutive integers	x and $x + 1$ (consecutive <i>odd</i> or <i>even</i> : x and $x + 2$)
The length is 2 m more than the width	width x , length $x + 2$, area $x(x + 2)$
A father is 27 years older than his son	son x , father $x + 27$
Their ages 3 years from now	$x + 3$ and $(x + 27) + 3$ — add to <i>both</i>
8 km/h less would take 3 hours more	$480/(x - 8) - 480/x = 3$

The rejection line — the sentence that wins the marks

When one root is impossible, do not delete it quietly. Write one sentence: "**Since x is the breadth of the garden, x cannot be negative. Therefore $x = -12$ is rejected, and $x = 7$.**" It proves you tested *both* roots on purpose.

Standard reasons to reject: a negative length, breadth or distance; a negative age; a fractional count of people or objects; a speed that is zero or negative.

The opposite trap. Do not auto-reject every negative root. "Find two numbers whose product is -36 " has no positivity condition, so a negative answer is perfectly valid. Judge each root against the exact wording.

Where this sits in NCERT and CBSE

NCERT chapter	Chapter 4, <i>Quadratic Equations</i> . The topic is Section 4.2 but the questions are in Exercise 4.1 — the usual section-versus-exercise offset.
The word-problem set	Ex 4.1 Q2 : the 528 m ² plot, two consecutive integers with product 306, Rohan's ages, the 480 km train. Q2 says <i>represent</i> — it stops at Phase 1.
Where you solve them	Ex 4.2 (6 questions, factorisation). Ex 4.3 (5 questions) is the nature of roots. Three exercises in all — a four-exercise book is the old edition.
CBSE marks	Algebra is 20 of the 80 theory marks, the largest unit. Word problems land as 3-mark Section C or 5-mark Section D items, sometimes inside a 4-mark case study.

Key takeaways

- Every word problem is **Form → Solve → Check** — no exceptions.
- The equation gives **two roots**; the **situation** decides which of them is an answer.
- Write the rejection**, with its reason. Deleting a root silently loses a credited step.
- Never reject a negative root on reflex — pure number problems can accept one.
- Divide through by any common factor before factorising: $2x^2 + 4x - 126 = 0 \rightarrow x^2 + 2x - 63 = 0$.
- Verify against the **story**, not the equation: $6 \times 8 = 48$ is the real check.

Three problems, all three phases

An area problem, an NCERT age problem, and the speed–distance–time variant that is the hardest common type.

3 MARKS • AREA

A rectangle has area 48 m^2 . Its length is 2 m more than its width. Find the dimensions.

Form. Let the width be $x \text{ m}$. Then the length is $(x + 2) \text{ m}$, and area = length $\times$ width.

$$x(x + 2) = 48 \rightarrow x^2 + 2x - 48 = 0$$

Solve. $a \times c = -48$; two numbers with sum 2 and product -48 are **8 and -6** .

$$x^2 + 2x - 48 = x(x + 8) - 6(x + 8) = (x + 8)(x - 6) = 0, \text{ so } x = -8 \text{ or } x = 6.$$

Check. x is the width of a rectangle, so it cannot be negative. **$x = -8$ is rejected**, and $x = 6$.

Answer: width **6 m**, length **8 m**. Verify against the story: $6 \times 8 = 48 \text{ m}^2 \checkmark$ and $8 - 6 = 2 \text{ m} \checkmark$

NCERT EX 4.1 Q2(iii) • AGES

Rohan's mother is 26 years older than him. The product of their ages 3 years from now will be 360 . Find Rohan's present age.

Form. Let Rohan be x years now; his mother is $(x + 26)$. In 3 years they are $(x + 3)$ and $(x + 29)$ — add the 3 to *both*.

$$(x + 3)(x + 29) = 360 \rightarrow x^2 + 32x - 273 = 0$$

Solve. Sum 32 , product $-273 \rightarrow$ **39 and -7** ; $(x + 39)(x - 7) = 0$, so $x = -39$ or $x = 7$.

Check. An age cannot be negative, so **$x = -39$ is rejected**.

Answer: Rohan is **7** and his mother is **33**. Verify: in 3 years they are 10 and 36 , and $10 \times 36 = 360 \checkmark$

NCERT EX 4.1 Q2(iv) • SPEED

A train travels 480 km at a uniform speed. At 8 km/h less it would have taken 3 hours more. Find the speed.

Form. Let the speed be $x \text{ km/h}$. Time = distance / speed, so the slower journey takes 3 hours longer:

$$480/(x - 8) - 480/x = 3 \rightarrow x^2 - 8x - 1280 = 0$$

Solve. Sum -8 , product $-1280 \rightarrow$ **-40 and 32** ; $(x - 40)(x + 32) = 0$, so $x = 40$ or $x = -32$.

Check. A speed cannot be negative, so **$x = -32$ is rejected**.

Answer: the speed is **40 km/h**. Verify: $480/40 = 12 \text{ h}$, $480/32 = 15 \text{ h}$, and $15 - 12 = 3 \text{ h} \checkmark$

WHERE THE MARKS ACTUALLY GO

No <i>Let</i> statement	The examiner cannot tell what x is — the setup mark goes
Both roots presented as the answer	The Check phase is missing; the reasoning mark goes
Root rejected but no reason written	Half the Check mark, at best
Answer left as " $x = 6$ "	The question asked for <i>both</i> dimensions, in words, with units

NOW TRY THESE TWO

- Find two consecutive positive integers whose squares sum to 365 . (NCERT Ex 4.2 Q4 • 13 and 14)
- A cottage industry makes x articles a day. The cost of each article in rupees is 3 more than twice the number made, and the day's total cost was Rs 90 . Find both. (NCERT Ex 4.2 Q6 • 6 articles at Rs 15 ; reject $x = -7.5$)

Practise this on examfront

- Chapter 1 is free** — start the moment you finish this sheet, no payment.
- Mistake identification** — it names whether you lost the mark in Form, Solve or Check.
- Anytime tests** — a timed set on quadratic word problems whenever you want one.
- Weekly tests** — steady practice that keeps Algebra from going cold.
- Mock tests before the exam** — full 80-mark papers in exam conditions.

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