

For $ax^2 + bx + c$ with zeroes α and β ► $\alpha + \beta = -b/a$ · $\alpha\beta = c/a$

Three ideas, one chapter

Idea	What it means	What the exam does with it
Degree	The highest power of x — linear 1, quadratic 2, cubic 3	It caps the count: a polynomial has <i>at most</i> as many zeroes as its degree
Zeroes	The values of x for which $p(x) = 0$	Find them by factorising, then verify with the relationship
The graph	$y = p(x)$ meets the x -axis at every zero	Count where the curve meets the axis to count the zeroes

The relationship, and the one minus sign

You are asked for	Written as	It equals
Sum of the zeroes	$\alpha + \beta$	$-b/a$ — the minus lives here
Product of the zeroes	$\alpha\beta$	c/a — and not here
Building the polynomial back	sum S , product P	$p(x) = x^2 - Sx + P$

The whole chapter's marks turn on that one minus sign. Write the two formulas at the top of your rough work before you start, and the sign error cannot happen.

Reading a graph without being fooled

What you see on the graph	What it is
The curve crosses the x -axis	A zero
The curve touches the x -axis and turns back	Still a zero — two equal zeroes there
A peak or a dip that never reaches the axis	Not a zero — only a turning point
Where the curve cuts the y -axis	Not a zero — that value is $p(0)$

What NCERT and CBSE actually set

Where it lives	The detail worth knowing
NCERT Chapter 2	2.1 Introduction · 2.2 Geometrical Meaning of the Zeroes · 2.3 Relationship between Zeroes and Coefficients
Mind the offset	2.1 has no exercise, so §2.2 is examined in Exercise 2.1 and §2.3 in Exercise 2.2
Two exercises only	Ex 2.1 is one question with six graphs; Ex 2.2 is two of six parts — three questions in the whole chapter
Removed	The division algorithm (old §2.4, Ex 2.3) and the old optional Ex 2.4 — older books still print both
CBSE scope	"Zeros of a polynomial. Relationship between zeros and coefficients of quadratic polynomials." The cubic case is in the book but footnoted as not examinable

Marks sit with the unit, not the chapter. Algebra is 20 of 80; the rest are Number Systems 6, Coordinate Geometry 6, Geometry 15, Trigonometry 12, Mensuration 10, Statistics & Probability 11. Chapter-wise percentage tables online are unofficial estimates.

Key takeaways

1. $\alpha + \beta = -b/a$ and $\alpha\beta = c/a$. The sum carries the minus; the product does not.
2. Degree caps the zeroes — a quadratic has at most two, a cubic at most three.
3. A zero is where the graph meets the x -axis, not where it turns and not where it cuts the y -axis.
4. Verify every answer with the sum and product — it costs one line and catches sign slips.
5. Going backwards is a standard question: from sum S and product P , write $x^2 - Sx + P$.
6. Three NCERT questions is not the whole chapter — the exam rewords the same three skills.

Three questions, three skills

3 MARKS · NCERT EX 2.2 Q1(iii)

Find the zeroes of $6x^2 - 7x - 3$ and verify the relationship between the zeroes and the coefficients.

Step 1 – standard form. $a = 6$, $b = -7$, $c = -3$.

Step 2 – split the middle term. $ac = -18$ and the two numbers are -9 and $+2$, so $6x^2 - 9x + 2x - 3 = 3x(2x - 3) + 1(2x - 3) = (2x - 3)(3x + 1)$.

Step 3 – read off the zeroes. $2x - 3 = 0$ or $3x + 1 = 0$, so $\alpha = 3/2$ and $\beta = -1/3$.

Step 4 – verify (this is where the third mark is). $\alpha + \beta = 3/2 - 1/3 = 7/6$, and $-b/a = 7/6$ ✓. $\alpha\beta = (3/2)(-1/3) = -1/2$, and $c/a = -3/6 = -1/2$ ✓

2 MARKS · NCERT EX 2.2 Q2(ii)

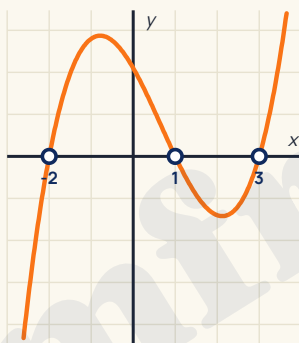
Find a quadratic polynomial whose zeroes have sum $\sqrt{2}$ and product $1/3$.

Use $p(x) = x^2 - (\text{sum})x + (\text{product})$ ▶ $p(x) = x^2 - \sqrt{2}x + 1/3$.

Multiplying through by 3 gives the tidier $3x^2 - 3\sqrt{2}x + 1$, which has the same zeroes. Either form earns full marks – but say which one you are giving, because **any multiple $k(x^2 - Sx + P)$ works.**

1 MARK · NCERT EX 2.1 STYLE

The graph of $y = p(x)$ is shown. How many zeroes does $p(x)$ have?



Both tails run away from the axis, so there are no further crossings outside the picture.

Three. Count only where the curve *meets the x-axis*. The two turning points are not zeroes, and nor is the point where the curve cuts the y-axis – counting turns instead of crossings is the commonest 1-mark loss in this chapter.

WHERE THE MARKS ACTUALLY GO

Dropping the minus in $-b/a$

Sign wrong, answer wrong, every later line wrong

Stopping at the zeroes

"Verify the relationship" is a separate, marked step – write both checks out

Factorising in your head

The split-the-middle-term line is a method mark; show it

Counting turns on a graph

Count meetings with the x-axis, nothing else

NOW TRY THESE

1. Find the zeroes of $3x^2 - x - 4$ and verify the relationship. 2. Write a quadratic polynomial with sum of zeroes 0 and product $\sqrt{5}$.

Answers: $4/3$ and -1 (sum $1/3 = -b/a$, product $-4/3 = c/a$) · $x^2 + \sqrt{5}$

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