

Polynomials

CBSE Class 10 Maths · Knowledge organiser

KEY DEFINITIONS

Zero of a polynomial

A value of x that makes $p(x) = 0$; on a graph, where the curve meets the x -axis.

Quadratic polynomial

A polynomial of degree 2: $ax^2 + bx + c$ with $a \neq 0$.

Sum and product of zeroes

For $ax^2 + bx + c$, $\alpha + \beta = -b/a$ and $\alpha\beta = c/a$.

YOU SHOULD BE ABLE TO...

- Find the zeroes of a quadratic by splitting the middle term and read the number of zeroes from a graph.
- Use $\text{sum} = -b/a$ and $\text{product} = c/a$ confidently, verify the relationship, and build a quadratic from given zeroes.
- Write full-marks long answers and case studies, including completing a table, plotting the graph and reading off the zeroes.
- Handle expressions like $\alpha^2 + \beta^2$ or $\alpha/\beta + \beta/\alpha$ without solving, and build new polynomials whose zeroes are changed versions of old ones.

COMMON MISTAKES

- ✗ Sign slip: the sum of zeroes is $-b/a$, not b/a .
- ✗ Writing $x^2 + Sx + P$ instead of $x^2 - Sx + P$.
- ✗ Stating that a quadratic “has exactly 2 zeroes” — it may have 0, 1 or 2 real zeroes.
- ✗ When verifying the relationship, forgetting to compare with $-b/a$ and c/a explicitly.

KEY FORMULAS

Zeroes α, β of $ax^2 + bx + c$ $\alpha + \beta = -\frac{b}{a}$, $\alpha\beta = \frac{c}{a}$

Quadratic with zeroes α, β $k[x^2 - (\alpha + \beta)x + \alpha\beta]$

Zeroes of $p(x) = x$ -coordinates where $y = p(x)$ meets the x -axis; degree $n \Rightarrow$ at most n zeroes

WORKED EXAMPLE

Zeroes of $3x^2 + 5x - 2$: split $-6 = 6 \times (-1)$:

$3x^2 + 6x - x - 2 = (3x - 1)(x + 2)$. Zeroes $\frac{1}{3}, -2$. Check:

sum $-\frac{5}{3} = -\frac{b}{a}$, product $-\frac{2}{3} = \frac{c}{a}$.