NCERT Solutions Class 10 Maths Chapter 2 Polynomials 2026-27

⚡ Quick Revision Box — Chapter 2 Polynomials

- **Polynomial (बहुपद):** An algebraic expression of the form $a_0 + a_1x + a_2x^2 + \cdots + a_nx^n$ with real coefficients and non-negative integer exponents.
- **Zero of a polynomial:** A value x = r such that p(r) = 0. Geometrically, it is the x-coordinate where the graph crosses the x-axis.
- **Linear polynomial:** At most **1 zero**; graph is a straight line.
- **Quadratic polynomial:** At most **2 zeroes**; graph is a parabola.
- **Cubic polynomial:** At most **3 zeroes**.
- **Sum of zeroes (quadratic):** $\alpha + \beta = -b/a$ | **Product:** $\alpha\beta = c/a$
- **Division Algorithm:** $p(x) = g(x) \times q(x) + r(x)$, where $r(x) = 0$ or $\deg r(x) < \deg g(x)$.
- **Exercises covered:** 2.1, 2.2, 2.3, 2.4 — all updated for **2026-27** CBSE syllabus.

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These **NCERT Solutions Class 10 Maths Chapter 2 Polynomials** cover every question from Exercises 2.1 to 2.4 with complete step-by-step working, updated for the **2026-27** CBSE board exam. Whether you need help with finding zeroes of quadratic polynomials, verifying the relationship between zeroes and coefficients, or applying the division algorithm, this page has you covered. You can find all NCERT Solutions for Class 10 on our dedicated hub, and the full list of NCERT Solutions for all classes is also available. The official textbook is available on the NCERT official website.

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Chapter Overview — Polynomials Class 10 (CBSE 2026-27)

Chapter 2 of the NCERT Class 10 Mathematics textbook (*Mathematics — Textbook for Class X*, published by NCERT) introduces you to polynomials in depth. You will learn the geometrical meaning of zeroes, the algebraic relationship between zeroes and coefficients, and the division algorithm for polynomials — all essential for the 2026-27 CBSE board exam.

In board exams, questions from this chapter appear as 1-mark MCQs (identifying number of zeroes from a graph), 2–3 mark short-answer questions (finding zeroes and verifying coefficient relationships), and 4–5 mark long-answer questions (division algorithm and cubic polynomial problems). The chapter carries approximately 6–8 marks in the algebra unit.

Detail	Information
Chapter	Chapter 2 — Polynomials
Textbook	NCERT Mathematics Class 10
Class	Class 10 (Grade 10)
Subject	Mathematics
Unit	Unit II — Algebra
Difficulty Level	Medium
Academic Year	2026-27

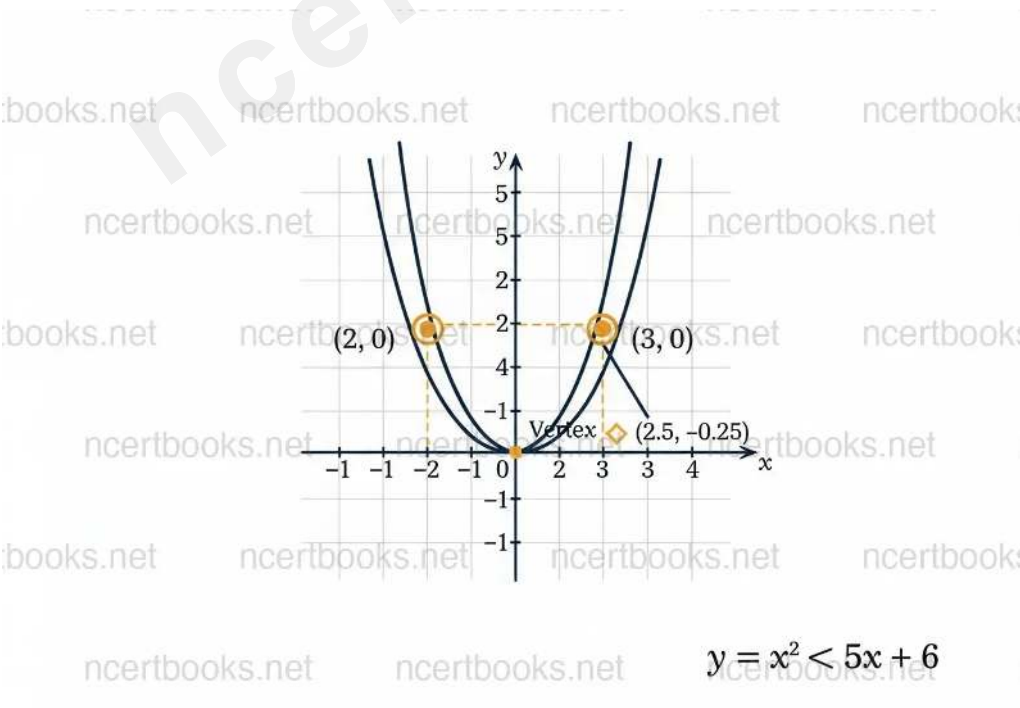

Fig 2.1: Graph of $y = x^2 - 5x + 6$ showing zeroes at $x = 2$ and $x = 3$

Key Concepts and Theorems — Chapter 2 Polynomials

What is a Polynomial? (बहुपद)

A polynomial in variable x is an expression of the form:

$$f(x) = a_0 + a_1x + a_2x^2 + \cdots + a_nx^n$$

where a_0, a_1, …, a_n are real numbers and all exponents are non-negative integers. The highest power of x is called the **degree** of the polynomial.

Standard Forms of Polynomials

- **Linear Polynomial:** $ax + b$, where $a \neq 0$. Has exactly **one zero**: $x = -b/a$.
- **Quadratic Polynomial:** $ax^2 + bx + c$, where $a \neq 0$. Has at most **two zeroes**. Graph is a parabola.
- **Cubic Polynomial:** $ax^3 + bx^2 + cx + d$, where $a \neq 0$. Has at most **three zeroes**.

Zeroes of a Polynomial (बहुपद के शून्यक)

A real number r is called a **zero** of polynomial p(x) if p(r) = 0. Geometrically, the zeroes are the x-coordinates of the points where the graph y = p(x) intersects the x-axis. This is the key idea tested in Exercise 2.1.

Relationship Between Zeroes and Coefficients

For a **quadratic polynomial** $ax^2 + bx + c$ with zeroes α and β:

$$\alpha + \beta = -b/a \text{ (Sum of zeroes)}$$

$$\alpha \beta = c/a \text{ (Product of zeroes)}$$

For a **cubic polynomial** $ax^3 + bx^2 + cx + d$ with zeroes α, β, γ:

$$\alpha + \beta + \gamma = -b/a$$

$$\alpha\beta + \beta\gamma + \gamma\alpha = c/a$$

$$\alpha\beta\gamma = -d/a$$

Division Algorithm for Polynomials

If p(x) and g(x) are polynomials with $g(x) \neq 0$, then there exist unique polynomials q(x) (quotient) and r(x) (remainder) such that:

$$p(x) = g(x) \times q(x) + r(x)$$

where r(x) = 0 or deg r(x) < deg g(x). This mirrors the Euclid division lemma for integers.

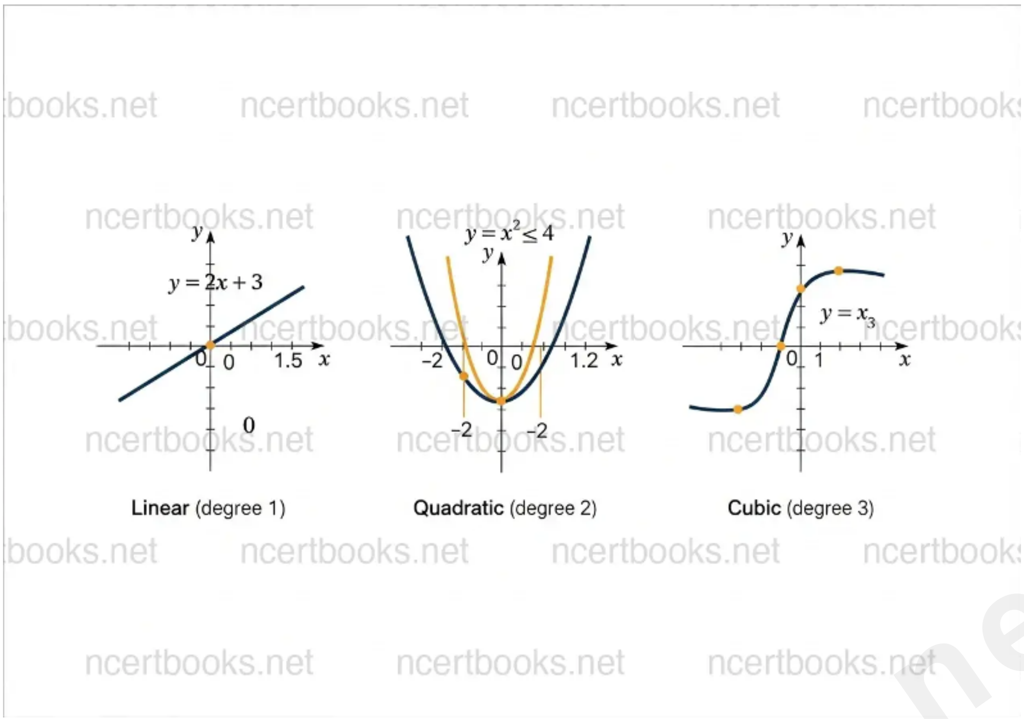

Fig 2.2: Comparison of linear, quadratic, and cubic polynomial graphs

NCERT Solutions Class 10 Maths Chapter 2 Polynomials — All Exercises (2026-27)

Exercise 2.1 — Geometrical Meaning of Zeroes of a Polynomial

Question 1

Easy

The graphs of y = p(x) are given below for some polynomials p(x). Find the number of zeroes of p(x) in each case.

(i) Graph (i)

Key Concept: The number of zeroes of p(x) equals the number of times the graph y = p(x) intersects the x-axis.

Observation: The graph does not intersect the x-axis at any point.

∴ Number of zeroes = 0

(ii) Graph (ii)

Observation: The graph intersects the x-axis at exactly **one** point.

∴ Number of zeroes = 1

(iii) Graph (iii)

Observation: The graph intersects the x-axis at exactly **three** points.

∴ **Number of zeroes = 3**

(iv) Graph (iv)

Observation: The graph intersects the x-axis at exactly **two** points.

∴ **Number of zeroes = 2**

(v) Graph (v)

Observation: The graph intersects the x-axis at exactly **four** points.

∴ **Number of zeroes = 4**

(vi) Graph (vi)

∴ **Number of zeroes = 3**

Board Exam Note: This type of question typically appears in 1-mark or 2-mark sections. Just count the x-axis intersection points — no calculation needed.

Exercise 2.2 — Relationship Between Zeroes and Coefficients

Question 1

Medium

Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and their coefficients.

(i) $x^2 - 2x - 8$

Step 1: Factorise $x^2 - 2x - 8$.

$$x^2 - 2x - 8 = x^2 - 4x + 2x - 8 = x(x-4) + 2(x-4) = (x-4)(x+2)$$

Step 2: Set each factor to zero.

$$x - 4 = 0 \Rightarrow x = 4 \quad x + 2 = 0 \Rightarrow x = -2$$

Verification: Here a=1, b=-2, c=-8.

Sum of zeroes: $4 + (-2) = 2 = -((-2))/(1) = -b/a$ ✓

Product of zeroes: $4 \times (-2) = -8 = -8/1 = c/a$ ✓

∴ **Zeroes are 4 and −2.**

(ii) $4s^2 - 4s + 1$

Step 1: Factorise $4s^2 - 4s + 1$.

$$4s^2 - 4s + 1 = (2s-1)^2$$

Step 2: Set $(2s-1)^2 = 0 \Rightarrow s = 1/2$ (repeated zero).

Verification: a=4, b=-4, c=1.

Sum: $1/2 + 1/2 = 1 = -((-4))/(4)$ ✓ Product: $1/2 \times 1/2 = 1/4 = 1/4$ ✓

∴ **Zero is 1/2 (repeated).**

(iii) $6x^2 - 3 - 7x$

Step 1: Rewrite as $6x^2 - 7x - 3$. Factorise by splitting the middle term.

$$6x^2 - 9x + 2x - 3 = 3x(2x-3) + 1(2x-3) = (3x+1)(2x-3)$$

Step 2: Zeroes: $x = -1/3$ and $x = 3/2$.

Verification: a=6, b=-7, c=-3.

Sum: $-1/3 + 3/2 = (-2+9)/(6) = 7/6 = -((-7))/(6)$ ✓ Product: $-1/3 \times 3/2 = -1/2 = -3/6$ ✓

∴ **Zeroes are -1/3 and 3/2.**

(iv) $4u^2 + 8u$

Step 1: Factorise: $4u^2 + 8u = 4u(u + 2)$.

Step 2: Zeroes: $u = 0$ and $u = -2$.

Verification: a=4, b=8, c=0.

Sum: $0 + (-2) = -2 = -8/4$ ✓ Product: $0 \times (-2) = 0 = 0/4$ ✓

∴ **Zeroes are 0 and −2.**

(v) $t^2 - 15$

Step 1: $t^2 - 15 = 0 \Rightarrow t^2 = 15 \Rightarrow t = \pm\sqrt{(15)}$.

Verification: a=1, b=0, c=-15.

Sum: $\sqrt{(15)} + (-\sqrt{(15)}) = 0 = -0/1$ ✓ Product: $\sqrt{(15)} \times (-\sqrt{(15)}) = -15 = -15/1$ ✓

∴ **Zeroes are $\sqrt{15}$ and $-\sqrt{15}$.**

(vi) $3x^2 - x - 4$

Step 1: Factorise: $3x^2 - 4x + 3x - 4 = x(3x-4) + 1(3x-4) = (x+1)(3x-4)$.

Step 2: Zeroes: $x = -1$ and $x = 4/3$.

Verification: $a=3, b=-1, c=-4$.

Sum: $-1 + 4/3 = 1/3 = -((-1))/(3)$ ✓ Product: $-1 \times 4/3 = -4/3 = -4/3$ ✓

∴ **Zeroes are −1 and 4/3.**

Board Exam Note: Always write the verification step — it carries marks in 2-3 mark sections of CBSE board papers.

Question 2

Medium

Find a quadratic polynomial each with the given numbers as the sum and product of its zeroes respectively: (i) 1/4, -1 (ii) $\sqrt{2}$, 1/3 (iii) 0, $\sqrt{5}$ (iv) 1, 1 (v) -1/4, 1/4 (vi) 4, 1

Key Concept: A quadratic polynomial with sum S and product P of zeroes is $k(x^2 - Sx + P)$ for any non-zero constant k. Take k = 1 for simplest form.

(i) Sum = 1/4, Product = -1

$$p(x) = x^2 - 1/4x - 1 \Rightarrow 4x^2 - x - 4$$

Polynomial: $4x^2 - x - 4$

(ii) Sum = $\sqrt{2}$, Product = 1/3

$$p(x) = x^2 - \sqrt{2}x + 1/3 \Rightarrow 3x^2 - 3\sqrt{2}x + 1$$

Polynomial: $3x^2 - 3\sqrt{2}x + 1$

(iii) Sum = 0, Product = $\sqrt{5}$

$$p(x) = x^2 - 0 \cdot x + \sqrt{5} = x^2 + \sqrt{5}$$

Polynomial: $x^2 + \sqrt{5}$

(iv) Sum = 1, Product = 1

$$p(x) = x^2 - x + 1$$

Polynomial: $x^2 - x + 1$

(v) Sum = -1/4, Product = 1/4

$$p(x) = x^2 + 1/4x + 1/4 \Rightarrow 4x^2 + x + 1$$

Polynomial: $4x^2 + x + 1$

(vi) Sum = 4, Product = 1

$$p(x) = x^2 - 4x + 1$$

Polynomial: $x^2 - 4x + 1$

Board Exam Note: Multiply through by an integer to clear fractions — both forms are acceptable in board exams.

Exercise 2.3 — Division Algorithm for Polynomials

Question 1

Medium

Divide the polynomial p(x) by the polynomial g(x) and find the quotient and remainder in each case.

(i) $p(x) = x^3 - 3x^2 + 5x - 3$, $g(x) = x^2 - 2$

Step 1: Divide the leading term x^3 by x^2 to get x. Multiply: $x(x^2 - 2) = x^3 - 2x$.

Step 2: Subtract: $(x^3 - 3x^2 + 5x - 3) - (x^3 - 2x) = -3x^2 + 7x - 3$.

Step 3: Divide $-3x^2$ by x^2 to get -3. Multiply: $-3(x^2 - 2) = -3x^2 + 6$.

Step 4: Subtract: $(-3x^2 + 7x - 3) - (-3x^2 + 6) = 7x - 9$.

Degree of 7x - 9 is 1, which is less than degree of g(x) = 2. Stop.

∴ **Quotient q(x) = x - 3, Remainder r(x) = 7x - 9**

(ii) $p(x) = x^4 - 3x^2 + 4x + 5$, $g(x) = x^2 + 1 - x$

Step 1: Rewrite $g(x) = x^2 - x + 1$.

Step 2: Divide x^4 by $x^2 \rightarrow x^2$. Multiply: $x^2(x^2 - x + 1) = x^4 - x^3 + x^2$.

Step 3: Subtract: $x^4 - 3x^2 + 4x + 5 - (x^4 - x^3 + x^2) = x^3 - 4x^2 + 4x + 5$.

Step 4: Divide x^3 by $x^2 \rightarrow x$. Multiply: $x(x^2 - x + 1) = x^3 - x^2 + x$.

Step 5: Subtract: $x^3 - 4x^2 + 4x + 5 - (x^3 - x^2 + x) = -3x^2 + 3x + 5$.

Step 6: Divide $-3x^2$ by $x^2 \rightarrow -3$. Multiply: $-3(x^2 - x + 1) = -3x^2 + 3x - 3$.

Step 7: Subtract: $-3x^2 + 3x + 5 - (-3x^2 + 3x - 3) = 8$.

∴ Quotient $q(x) = x^2 + x - 3$, Remainder $r(x) = 8$

(iii) $p(x) = x^4 - 5x + 6$, $g(x) = 2 - x^2$

Step 1: Rewrite $g(x) = -x^2 + 2$. Divide x^4 by $-x^2 \rightarrow -x^2$.

Step 2: Multiply: $-x^2(-x^2 + 2) = x^4 - 2x^2$. Subtract: $x^4 - 5x + 6 - (x^4 - 2x^2) = 2x^2 - 5x + 6$.

Step 3: Divide $2x^2$ by $-x^2 \rightarrow -2$. Multiply: $-2(-x^2 + 2) = 2x^2 - 4$.

Step 4: Subtract: $2x^2 - 5x + 6 - (2x^2 - 4) = -5x + 10$.

∴ Quotient $q(x) = -x^2 - 2$, Remainder $r(x) = -5x + 10$

Board Exam Note: Long division of polynomials is a common 3-mark question. Always verify using $p(x) = g(x) \cdot q(x) + r(x)$.

Question 2

Medium

Check whether the first polynomial is a factor of the second polynomial by dividing the second polynomial by the first polynomial.

(i) $t^2 - 3$ and $2t^4 + 3t^3 - 2t^2 - 9t - 12$

Step 1: Divide $2t^4 + 3t^3 - 2t^2 - 9t - 12$ by $t^2 - 3$.

Performing long division: Quotient = $2t^2 + 3t + 4$, Remainder = 0.

Why does this work? Since remainder = 0, $t^2 - 3$ divides the second polynomial exactly.

∴ Yes, $t^2 - 3$ is a factor.

(ii) $x^2 + 3x + 1$ and $3x^4 + 5x^3 - 7x^2 + 2x + 2$

Step 1: Divide $3x^4 + 5x^3 - 7x^2 + 2x + 2$ by $x^2 + 3x + 1$.

Quotient = $3x^2 - 4x + 2$, Remainder = 0.

∴ Yes, $x^2 + 3x + 1$ is a factor.

(iii) $x^3 - 3x + 1$ and $x^5 - 4x^3 + x^2 + 3x + 1$

Step 1: Divide $x^5 - 4x^3 + x^2 + 3x + 1$ by $x^3 - 3x + 1$.

Quotient = $x^2 - 1$, Remainder = $2 \neq 0$.

∴ No, $x^3 - 3x + 1$ is NOT a factor.

Board Exam Note: State clearly whether remainder is zero or not — this conclusion line carries marks in board exams.

Question 3

Hard

Obtain all other zeroes of $3x^4 + 6x^3 - 2x^2 - 10x - 5$, if two of its zeroes are √(frac5)3 and -√(frac5)3.

Step 1: Since √(frac5)3 and -√(frac5)3 are zeroes, (x - √(frac5)3)(x + √(frac5)3) = $x^2 - 5/3$ is a factor.

Multiply by 3: $3x^2 - 5$ is a factor of $3x^4 + 6x^3 - 2x^2 - 10x - 5$.

Step 2: Divide $3x^4 + 6x^3 - 2x^2 - 10x - 5$ by $3x^2 - 5$.

$$3x^4 + 6x^3 - 2x^2 - 10x - 5 = (3x^2 - 5)(x^2 + 2x + 1)$$

Step 3: Factorise $x^2 + 2x + 1 = (x+1)^2$. So the remaining zeroes are x = -1 (repeated).

∴ All four zeroes: √(frac5)3,\ -√(frac5)3,\ -1,\ -1

Board Exam Note: This is a classic long-answer section question. Show the division step clearly.

Question 4

Hard

On dividing $x^3 - 3x^2 + x + 2$ by a polynomial g(x), the quotient and remainder were x - 2 and -2x + 4 respectively. Find g(x).

Step 1: Use the division algorithm: p(x) = g(x) × q(x) + r(x).

$$x^3 - 3x^2 + x + 2 = g(x) \times (x-2) + (-2x+4)$$

Step 2: Rearrange:

$$g(x) \times (x-2) = x^3 - 3x^2 + x + 2 - (-2x + 4) = x^3 - 3x^2 + 3x - 2$$

Step 3: Divide $x^3 - 3x^2 + 3x - 2$ by x - 2.

$$x^3 - 3x^2 + 3x - 2 = (x-2)(x^2 - x + 1)$$

∴ $g(x) = x^2 - x + 1$

Board Exam Note: This reverse-application of the division algorithm is frequently asked in long-answer sections.

Question 5

Medium

Give examples of polynomials p(x), g(x), q(x) and r(x) which satisfy the division algorithm and: (i) deg p(x) = deg q(x)   (ii) deg q(x) = deg r(x)   (iii) deg r(x) = 0

(i) deg p(x) = deg q(x)

This happens when g(x) is a constant. Let $p(x) = 2x^2 + 2x + 2$, $g(x) = 2$, $q(x) = x^2 + x + 1$, $r(x) = 0$.

Check: $2(x^2+x+1) + 0 = 2x^2+2x+2$ ✓ Both p(x) and q(x) have degree 2.

Example valid.

(ii) deg q(x) = deg r(x)

Let $p(x) = x^3 + x$, $g(x) = x^2 - 1$, $q(x) = x$, $r(x) = 2x$.

Check: $(x^2-1)(x) + 2x = x^3 - x + 2x = x^3 + x$ ✓ Both q(x) and r(x) have degree 1.

Example valid.

(iii) deg r(x) = 0

Let $p(x) = x^3 + 1$, $g(x) = x^2$, $q(x) = x$, $r(x) = 1$.

Check: $x^2 \cdot x + 1 = x^3 + 1$ ✓ Remainder is a non-zero constant, so degree = 0.

Example valid.

Board Exam Note: Always verify your example satisfies p(x) = g(x)q(x) + r(x) — the verification is what earns marks.

Exercise 2.4 — Cubic Polynomial Zeroes and Coefficients

Question 1

Medium

Verify that the numbers given alongside the cubic polynomials below are their zeroes. Also verify the relationship between zeroes and coefficients.

(i) $2x^3 + x^2 - 5x + 2$; zeroes: 1/2, 1, -2

Step 1: Verify zeroes by substitution.

$p(1/2) = 2 \cdot 1/8 + 1/4 - 5/2 + 2 = 1/4 + 1/4 - 5/2 + 2 = 0$ ✓

$p(1) = 2 + 1 - 5 + 2 = 0$ ✓ $p(-2) = 2(-8) + 4 - 5(-2) + 2 = -16 + 4 + 10 + 2 = 0$ ✓

Step 2: Verify relationships. a=2, b=1, c=-5, d=2.

Sum: $1/2 + 1 + (-2) = -1/2 = -b/a$ ✓

Sum of products of pairs: $1/2(1) + 1(-2) + 1/2(-2) = 1/2 - 2 - 1 = -5/2 = c/a$ ✓

Product: $1/2 \times 1 \times (-2) = -1 = -2/2 = -d/a$ ✓

∴ **All verified.**

(ii) $x^3 - 4x^2 + 5x - 2$; zeroes: 2, 1, 1

$p(2) = 8 - 16 + 10 - 2 = 0$ ✓ $p(1) = 1 - 4 + 5 - 2 = 0$ ✓

a=1, b=-4, c=5, d=-2.

Sum: $2+1+1 = 4 = -((-4))/(1)$ ✓ Sum of pairs: $2(1)+1(1)+2(1) = 2+1+2 = 5 = 5/1$ ✓
Product: $2 \times 1 \times 1 = 2 = -((-2))/(1)$ ✓

∴ **All verified.**

Board Exam Note: Show all three relationship checks — sum, sum of products of pairs, and product of zeroes. Each check carries partial marks.

Question 2

Medium

Find a cubic polynomial with the sum, sum of product of its zeroes taken two at a time, and the product of its zeroes as 2, -7, -14 respectively.

Key Concept: A cubic polynomial with zeroes α, β, γ is:

$$k[x^3 - (\alpha+\beta+\gamma)x^2 + (\alpha\beta+\beta\gamma+\gamma\alpha)x - \alpha\beta\gamma]$$

Step 1: Substitute: sum = 2, sum of pairs = -7, product = -14. Take k = 1.

$$p(x) = x^3 - 2x^2 + (-7)x - (-14) = x^3 - 2x^2 - 7x + 14$$

∴ **Cubic polynomial: $x^3 - 2x^2 - 7x + 14$**

Board Exam Note: This is a standard 2-3 mark question in CBSE board papers.

Question 3

Hard

If the zeroes of the polynomial $x^3 - 3x^2 + x + 1$ are a-b,\ a,\ a+b, find a and b.

Step 1: Sum of zeroes: $(a-b) + a + (a+b) = 3a = -((-3))/(1) = 3 \Rightarrow a = 1$.

Step 2: Product of zeroes: $(a-b) \cdot a \cdot (a+b) = a(a^2 - b^2) = -1/1 = -1$.

Substitute a = 1: $1(1 - b^2) = -1 \Rightarrow 1 - b^2 = -1 \Rightarrow b^2 = 2 \Rightarrow b = \pm\sqrt{(2)}$.

∴ a = 1 and b = $\pm\sqrt{(2)}$

Board Exam Note: Show both steps clearly — finding a from sum and b from product. This is a common long-answer section question.

Question 4

Hard

If two zeroes of the polynomial $x^4 - 6x^3 - 26x^2 + 138x - 35$ are $2 \pm \sqrt{(3)}$, find the other zeroes.

Step 1: Since $2 + \sqrt{(3)}$ and $2 - \sqrt{(3)}$ are zeroes, $(x - 2 - \sqrt{(3)})(x - 2 + \sqrt{(3)}) = (x-2)^2 - 3 = x^2 - 4x + 1$ is a factor.

Step 2: Divide $x^4 - 6x^3 - 26x^2 + 138x - 35$ by $x^2 - 4x + 1$.

$$x^4 - 6x^3 - 26x^2 + 138x - 35 = (x^2 - 4x + 1)(x^2 - 2x - 35)$$

Step 3: Factorise $x^2 - 2x - 35 = (x-7)(x+5)$.

Remaining zeroes: x = 7 and x = -5.

∴ Other zeroes are 7 and −5.

Board Exam Note: This is a high-value long-answer question. Show the quadratic factor formation and the division step explicitly.

Question 5

Hard

If the polynomial $x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by another polynomial $x^2 - 2x + k$, the remainder comes out to be $x + a$. Find k and a.

Step 1: Perform the division of $x^4 - 6x^3 + 16x^2 - 25x + 10$ by $x^2 - 2x + k$.

Quotient: $x^2 - 4x + (8-k)$.

Remainder: $(2k-9)x + (10 - 8k + k^2)$.

Step 2: Compare with $x + a$:

Coefficient of x: $2k - 9 = 1 \Rightarrow k = 5$.

Constant: $a = 10 - 8(5) + 25 = 10 - 40 + 25 = -5$.

∴ k = 5 and a = -5

Board Exam Note: Compare coefficients of x and the constant term separately — both comparisons are needed for full marks.

Formula Reference Table — Class 10 Maths Chapter 2 Polynomials

Formula Name	Formula	Variables Defined
Zero of linear polynomial	$x = -b/a$	$ax + b, a \neq 0$
Sum of zeroes (quadratic)	$\alpha + \beta = -b/a$	$ax^2 + bx + c$
Product of zeroes (quadratic)	$\alpha\beta = c/a$	$ax^2 + bx + c$
Sum of zeroes (cubic)	$\alpha+\beta+\gamma = -b/a$	ax^3+bx^2+cx+d
Sum of products of pairs (cubic)	$\alpha\beta+\beta\gamma+\gamma\alpha = c/a$	ax^3+bx^2+cx+d
Product of zeroes (cubic)	$\alpha\beta\gamma = -d/a$	ax^3+bx^2+cx+d
Division Algorithm	$p(x) = g(x) \cdot q(x) + r(x)$	$r(x)=0$ or $\deg r < \deg g$
Quadratic from zeroes	$k(x^2 - Sx + P)$	S = sum, P = product

Important Questions for Board Exam 2026-27 — Polynomials Class 10

1-Mark Questions

Q1. What is the maximum number of zeroes a cubic polynomial can have?

Answer: A cubic polynomial can have at most **3 zeroes**.

Q2. If α and β are zeroes of $2x^2 - 5x + 3$, find $\alpha + \beta$.

Answer: $\alpha + \beta = -b/a = -((-5))/(2) = 5/2$.

Q3. The graph of $y = p(x)$ is a straight line parallel to the x-axis. How many zeroes does $p(x)$ have?

Answer: 0 zeroes (the line never crosses the x-axis).

3-Mark Questions

Q4. Find a quadratic polynomial whose zeroes are $3 + \sqrt{2}$ and $3 - \sqrt{2}$.

Answer: Sum = 6, Product = 9 - 2 = 7. Polynomial: $x^2 - 6x + 7$.

Q5. If one zero of $2x^2 + 3x + k$ is 1/2, find k and the other zero.

Answer: $p(1/2) = 2 \cdot 1/4 + 3/2 + k = 0 \Rightarrow 1/2 + 3/2 + k = 0 \Rightarrow k = -2$. Product of zeroes = $k/2 = -1$. Other zero = $-1 \div 1/2 = -2$.

5-Mark Questions

Q6. Divide $3x^3 + x^2 + 2x + 5$ by $1 + 2x + x^2$. Verify using the division algorithm.

Answer: Rewrite divisor as $x^2 + 2x + 1$. Performing long division: Quotient = $3x - 5$, Remainder = $9x + 10$. Verification: $(x^2+2x+1)(3x-5) + (9x+10) = 3x^3+x^2+2x+5$ ✓.

Common Mistakes Students Make — Polynomials Class 10

Mistake 1: Confusing the number of x-axis intersections with the degree of the polynomial.

Why it's wrong: A degree-3 polynomial can have 1, 2, or 3 real zeroes — the degree gives the maximum, not the actual count.

Correct approach: Count only the actual intersection points on the graph to find the number of zeroes.

Mistake 2: Writing sum of zeroes as $+b/a$ instead of $-b/a$.

Why it's wrong: The negative sign comes from Vieta's formulas and is non-negotiable.

Correct approach: Always write $\alpha + \beta = -b/a$. Memorise the sign carefully.

Mistake 3: Forgetting to subtract the entire term (including sign) during polynomial long division.

Why it's wrong: A sign error in one step cascades through all subsequent steps, giving a wrong remainder.

Correct approach: Change signs of every term in the product before subtracting, just like in numerical long division.

Mistake 4: Not verifying the division algorithm answer using $p(x) = g(x) \cdot q(x) + r(x)$.

Why it's wrong: The verification step is explicitly required in CBSE marking schemes and carries marks.

Correct approach: Always multiply back and confirm the result matches $p(x)$.

Mistake 5: Using $\alpha\beta\gamma = +d/a$ for cubic polynomials instead of $-d/a$.

Why it's wrong: The product of zeroes of a cubic polynomial is $-d/a$, not $+d/a$.

Correct approach: Learn all three cubic formulas together as a set to avoid sign confusion.

Exam Tips for 2026-27 — NCERT Solutions Class 10 Maths Chapter 2 Polynomials

📝 **CBSE 2026-27 Exam Tips — Chapter 2 Polynomials**

- **Graph-based questions (Ex 2.1)** are almost always 1-mark MCQs. Just count x-axis crossings — no formula needed.
- **Verification of zeroes-coefficients relationship** (Ex 2.2 Q1) is a guaranteed 3-mark question every year. Always write all three steps: find zeroes, then verify sum, then verify product.
- **Division algorithm questions** (Ex 2.3) carry 3–4 marks. Show every long-division step. Do not skip intermediate rows.
- **Cubic polynomial questions** (Ex 2.4) are high-value 4–5 mark questions. Learn all three Vieta's formulas for cubic polynomials by heart.
- **CBSE marking scheme 2026-27:** Partial marks are awarded for correct steps even if the final answer is wrong. Never leave a step blank.
- **Last-minute revision checklist:** (1) Zeroes = x-axis intersections; (2) Sum formula has negative sign; (3) Division algorithm formula; (4) Cubic product formula has negative sign; (5) Always verify your answer.

You can also explore all NCERT Solutions for Class 10 and the complete NCERT Solutions library for other subjects and classes.

For the official syllabus and textbook reference, visit CBSE Academic website.

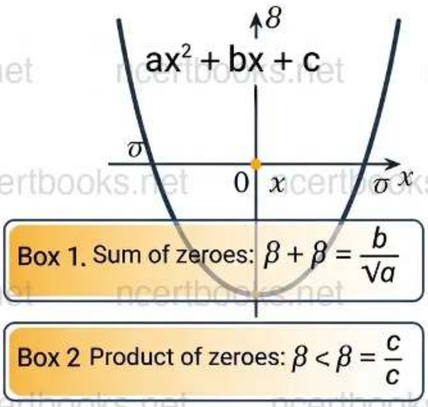

Fig 2.3: Relationship between zeroes (α, β) and coefficients of $ax^2 + bx + c$

Frequently Asked Questions — NCERT Solutions Class 10 Maths Chapter 2 Polynomials

How do you find zeroes of a quadratic polynomial in Class 10?

To find zeroes of a quadratic polynomial $ax^2 + bx + c$, set it equal to zero and factorise by splitting the middle term. The values of x that satisfy the equation are the zeroes. For example, $x^2 - 2x - 8 = (x-4)(x+2)$ gives zeroes 4 and −2. You can also use the quadratic formula $x = (-b \pm \sqrt{b^2-4ac})/(2a)$ for polynomials that are harder to factorise.

What is the division algorithm for polynomials in Class 10?

The division algorithm for polynomials states that for any two polynomials p(x) and g(x) with g(x) ≠ 0, there exist unique polynomials q(x) and r(x) such that p(x) = g(x) × q(x) + r(x), where r(x) = 0 or the degree of r(x) is less than the degree of g(x). This is the polynomial version of the Euclid division lemma. It is covered in Exercise 2.3 of Chapter 2.

What is the relationship between zeroes and coefficients of a cubic polynomial?

For a cubic polynomial $ax^3 + bx^2 + cx + d$ with zeroes α, β, γ: the sum $\alpha+\beta+\gamma = -b/a$; the sum of products taken two at a time $\alpha\beta+\beta\gamma+\gamma\alpha = c/a$; and the product $\alpha\beta\gamma = -d/a$. Note the negative signs in the sum and product formulas — these are the most common sources of error in board exams. These formulas are tested in Exercise 2.4.

How many zeroes can a quadratic polynomial have?

A quadratic polynomial can have at most two zeroes. Its graph is a parabola. If the parabola intersects the x-axis at two distinct points, it has two zeroes. If it touches the x-axis at exactly one point, it has one repeated zero. If it does not touch the x-axis at all, it has no real zeroes. This geometrical interpretation is the focus of Exercise 2.1.

Which exercises are in NCERT Solutions Class 10 Maths Chapter 2 for 2026-27?

For the 2026-27 CBSE syllabus, Chapter 2 Polynomials contains four exercises: Exercise 2.1 (geometrical meaning of zeroes from graphs), Exercise 2.2 (finding zeroes and verifying coefficient relationships for quadratic polynomials), Exercise 2.3 (division algorithm for polynomials), and Exercise 2.4 (zeroes and coefficients of cubic polynomials). All exercises are fully solved on this page with step-by-step working.