

Class 10 Mathematics – Chapter: Polynomials

1. Introduction

Polynomials are algebraic expressions consisting of variables and coefficients, involving operations of addition, subtraction, and multiplication, but no division by a variable.

2. Standard Form of a Polynomial

A polynomial is in standard form when terms are written in descending powers of the variable.

Example: $3x^3 - 5x^2 + 2x - 7$

3. Degree of a Polynomial

The degree is the highest power of the variable in the polynomial.

Example: Degree of $4x^5 + 3x^3 - 24x^5 + 3x^3 - 24x^5 + 3x^3 - 2$ is 5.

4. Types of Polynomials

- Monomial: Polynomial with one term (e.g., $5x^3$)
 - Binomial: Polynomial with two terms (e.g., $x^2 + 3x$)
 - Trinomial: Polynomial with three terms (e.g., $x^2 + 5x + 6$)
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5. Zeroes of a Polynomial

A zero of a polynomial $p(x)$ is a value a such that $p(a) = 0$.

6. Remainder Theorem

If a polynomial $p(x)$ is divided by $(x-a)$, the remainder is $p(a)$.

7. Factor Theorem

$(x-a)$ is a factor of $p(x)$ if and only if $p(a)=0$.

8. Algebraic Identities and Factorization

Common identities:

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$$(a+b)^2 = a^2 + 2ab + b^2$$

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$$(a-b)^2 = a^2 - 2ab + b^2 \quad (a-b)^2 = a^2 - 2ab + b^2$$

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$$a^2 - b^2 = (a-b)(a+b) \quad a^2 - b^2 = (a-b)(a+b)$$

9. Division Algorithm for Polynomials

For polynomials $p(x)$ and $g(x)$, there exist unique polynomials $q(x)$ and $r(x)$ such that:

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

where $\text{degree of } r(x) < \text{degree of } g(x)$.

10. Important Exam Tips

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Always write polynomials in standard form.

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Practice factorization using identities and factor theorem.

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Use remainder theorem to find remainders quickly.

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Understand the relationship between zeros and factors.