

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., $5x^35x^35x^3$)
- Binomial: Polynomial with two terms (e.g., $x^2 + 3x^2 + 3x^2 + 3x$)
- Trinomial: Polynomial with three terms (e.g., $x^2 + 5x + 6x^2 + 5x + 6x^2 + 5x + 6$)

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 $(x-a)(x - a)(x-a)$, the remainder is $p(a)p(a)p(a)$.

7. Factor Theorem

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

8. Algebraic Identities and Factorization

Common identities:

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

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

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

9. Division Algorithm for Polynomials

For polynomials $p(x)$ and $g(x)$, there exist unique polynomials $q(x)$ and $r(x)$ such that:
 $p(x) = g(x) \times q(x) + r(x)$
where $\deg(r(x)) < \deg(g(x))$.

10. Important Exam Tips

- Always write polynomials in standard form.

- Practice factorization using identities and factor theorem.
- Use remainder theorem to find remainders quickly.
- Understand the relationship between zeros and factors.