SNS ACADEMY

an international CBSE fingerprint School

Mind Map

GRADE: 10
Chapter: Polynomials

Subject: Math
Course Faculty: Mrs. Rosemary. P

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Polynomials

Grade 10 Mathematics

1. Introduction

- Definition: Algebraic expression with variables & coefficients
- Notation: $P(x), q(y)$
- Exponents must be whole numbers
- Non-polynomials: $1/x, \sqrt{x}$

2. Types of Polynomials

- **By Terms:** Monomial (1), Binomial (2), Trinomial (3)
- **By Degree:**
  - Linear (Deg 1): $ax + b$
  - Quadratic (Deg 2): $ax^2 + bx + c$
  - Cubic (Deg 3): $ax^3 + bx^2 + cx + d$

3. Operations

- **Addition/Subtraction:** Combine like terms
- **Multiplication:** Distributive property
- **Division:** Long Division Algorithm
- Dividend = Divisor × Quotient + Remainder

4. Remainder Theorem

- If $P(x)$ is divided by linear $(x - a)$
- Then the Remainder is $P(a)$
- Avoids long division for finding remainder
- Essential for checking factors

5. Factor Theorem

- Extension of Remainder Theorem
- If $P(a) = 0$, then $(x - a)$ is a factor
- Conversely, if $(x - a)$ is a factor, $P(a) = 0$
- Used to factorize higher degree polynomials

6. Factorization

- **Splitting Middle Term:** For $ax^2 + bx + c$
- **Algebraic Identities:**
  - $a^2 - b^2 = (a-b)(a+b)$
  - $(a+b)^2 = a^2 + 2ab + b^2$
  - $a^3 + b^3$ formulas

7. Zeroes & Coeffs

- For Quadratic $ax^2 + bx + c$ with zeroes α, β:
- **Sum:** $\alpha + \beta = -b/a$
- **Product:** $\alpha\beta = c/a$
- For Cubic: $\alpha+\beta+\gamma = -b/a$

8. Graphs

- **Linear:** Straight line
- **Quadratic:** Parabola (U-shape)
- **Geometric Meaning:** Zeroes are x-coordinates where graph cuts X-axis
- Number of zeroes ≤ Degree of polynomial