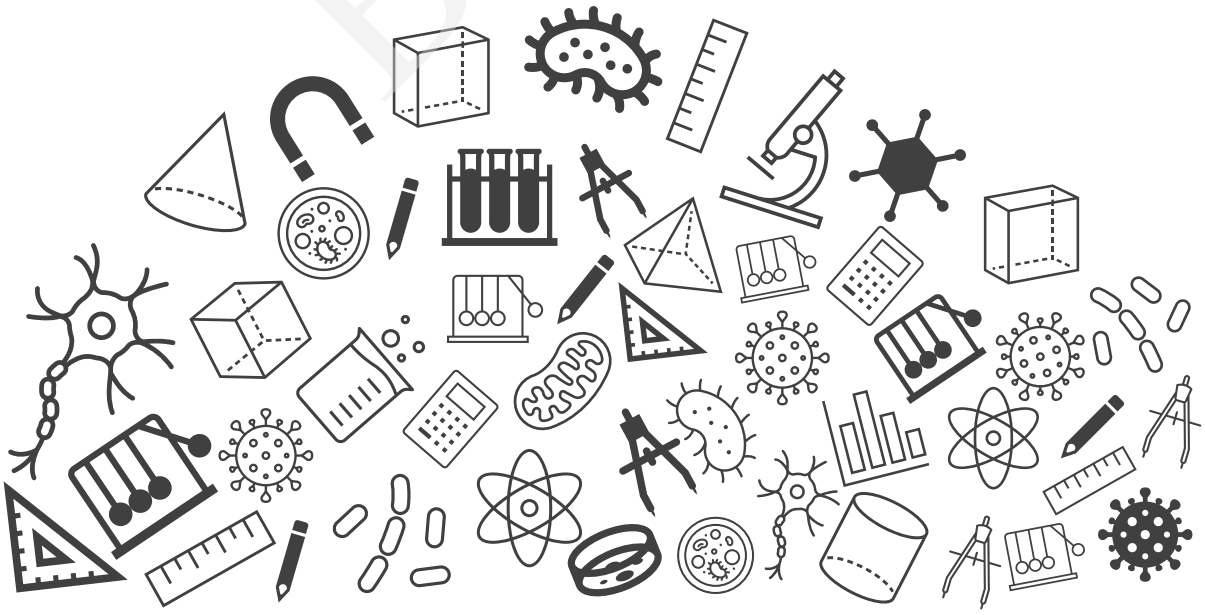
Grade 10
Mathematics Chapter Notes



MATHEMATICS

BYJU'S
CHAPTER NOTES

Polynomials

Topics

1. Polynomials and terms related to it
2. Special Types of Polynomials
3. Value of a Polynomial at a Point
4. Zeroes of a Polynomial
5. Relationship between Zeroes and Coefficients of a Polynomial

Polynomials

Polynomials

"Poly" means many

"nomials" means terms

So, polynomials means many terms

Definition of a Polynomial

An algebraic expression in which the variable(s) is/are raised to non-negative integral exponents is called a polynomial.

Standard Form of a Polynomial in x of Degree n

An algebraic expression of the form

$$\mathbf{p}(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0,$$

where $a_0, a_1, a_2, \ldots, a_n$ are real numbers and $a_n \neq 0$,

is the standard form of a polynomial in x of degree n.

B

Terms Related to Polynomials

The Degree of a Polynomial $p(x)$ is the highest exponent to which x is raised.

The Value of a Polynomial $p(x)$ at $x = k$ is obtained by replacing $x = k$ in the polynomial expression.

A real number 'a' is a Zero of a Polynomial $p(x)$ if $p(a) = 0$.

Example

Degree = 2.

Value of $p(x)$ at $x = 1$ is $p(1) = 4(1)^2 - 1 = 3$.

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

Zeroes of $p(x)$ are $\pm\frac{1}{2}$, since $p\left(\frac{1}{2}\right) = p\left(-\frac{1}{2}\right) = 0$.

Special Types of Polynomials

Based on Number of Terms

1 term → **Monomial**

Ex: $x, -5y$

2 terms → **Binomial**

Ex: $2x - 5, 6y + 8$

3 terms → **Trinomial**

Ex: $x^2 - 3x + 2$

Based on Degree

Degree = 1 → **Linear**

Ex: $2y - 3$

Degree = 2 → **Quadratic**

Ex: $4x^2 + 5x - 2$

Degree = 3 → **Cubic**

Ex: $8x^3 - 5$

B

Relationship between Zeroes and Coefficients of a Polynomial

Quadratic Polynomial

General form: $p(x) = ax^2 + bx + c$

$$\text{Sum of zeroes} = \alpha + \beta = \frac{-b}{a}$$

$$\text{Product of zeroes} = \alpha\beta = \frac{c}{a}$$

Cubic Polynomial

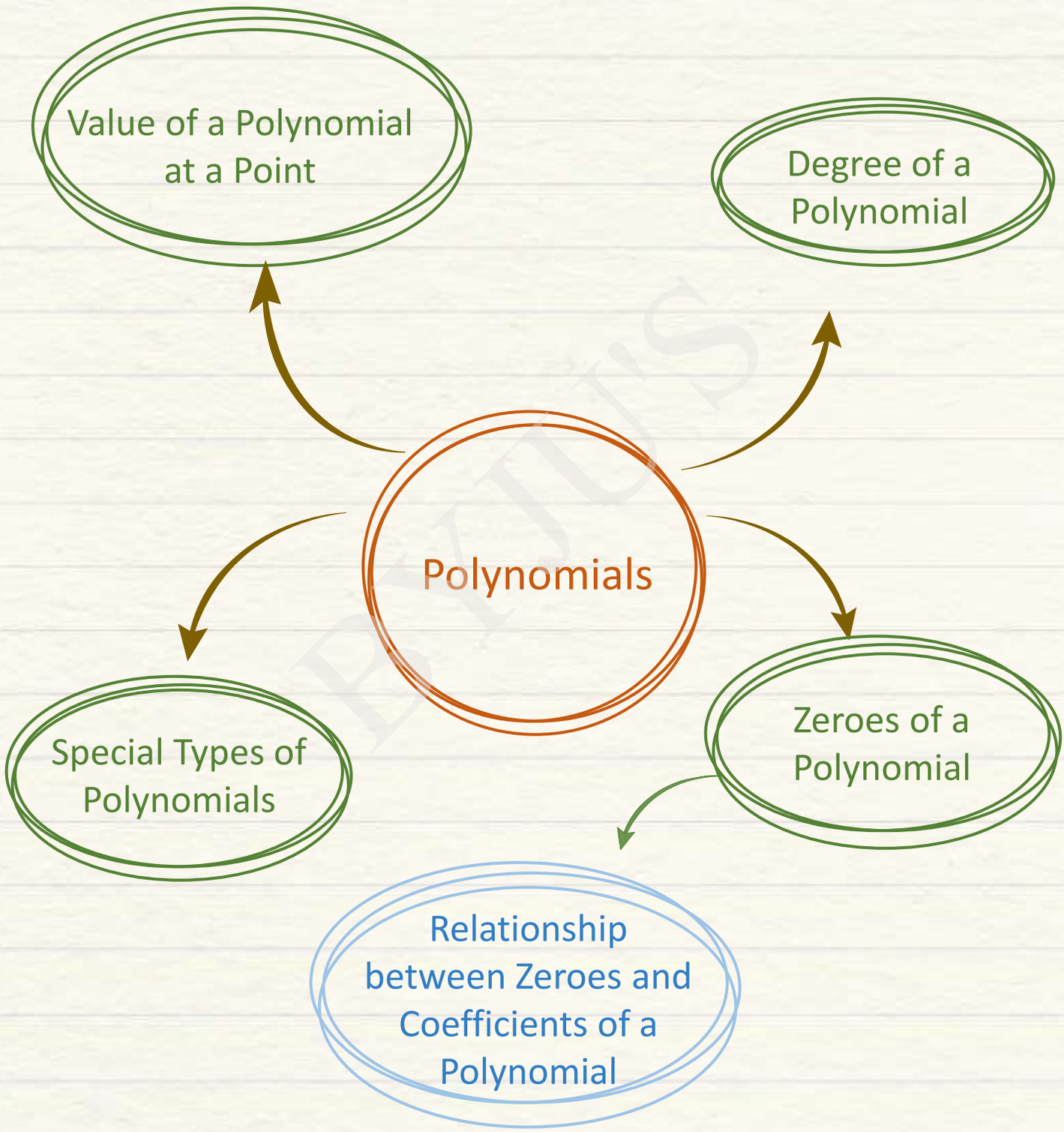
General form: $p(x) = ax^3 + bx^2 + cx + d$

$$\text{Sum of zeroes} = \alpha + \beta + \gamma = \frac{-b}{a}$$

$$\text{Sum of product of zeroes taken two at a time} = \alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{a}$$

$$\text{Product of zeroes} = \alpha\beta\gamma = \frac{-d}{a}$$

Mind Map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