CBSE Class 9 Maths Notes Chapter 2: Polynomials are made up of numbers and variables combined with math operations like adding, subtracting, multiplying, and dividing. This chapter explains different types of polynomials, such as linear (with one variable), quadratic (with a squared variable), and cubic (with a cubed variable).

It also covers how to do math operations with polynomials, like adding and subtracting them. Understanding polynomials is important because they are used in many math problems. These notes make learning about polynomials easy with clear explanations and examples.

CBSE Class 9 Maths Notes Chapter 2 PDF

The CBSE Class 9 Maths Notes Chapter 2 "Polynomials" PDF helps students learn about polynomial expressions and equations easily. It explains what polynomials are, like terms, and coefficients in simple words. It also talks about different types of polynomials, such as those with one, two, or three variables.

The notes show how to do basic math with polynomials, like adding, subtracting, multiplying, and dividing them. With clear explanations and examples, this PDF makes learning about polynomials fun and easy for students.

CBSE Class 9 Maths Notes Chapter 2 PDF

CBSE Class 9 Maths Notes Chapter 2 Polynomials

The CBSE Class 9 Maths Notes Chapter 2 "Polynomials" are designed to make learning about polynomial expressions and equations easy. These notes use simple language to explain what polynomials are and how they work. They cover everything from basic terms like coefficients and variables to different types of polynomials, such as linear, quadratic, and cubic ones.

The notes show students how to do math operations with polynomials, like adding, subtracting, multiplying, and dividing. With these notes, students can understand polynomials better and do well in their math studies.

Polynomial Definition

Polynomials are math expressions with one or more terms that have numbers multiplied by variables, like x or y. These expressions can have many terms, but each term has to have a number with it. For example, 20 is a polynomial because it's just one number, and $x + y$ is also a polynomial because it's two terms added together.

Even if the terms have letters, like a, b, or x, they can still be polynomials as long as there's a number with them. So, $7a + b + 8$ is a polynomial because each term has a number with a letter.

Even longer expressions, like w + x + y + z, can be polynomials. And expressions with variables raised to powers, like x^2 + x + 1, are also polynomials. As long as each term has a number and a variable, it's a polynomial.

Polynomials in One Variable

Polynomials in one variable are algebraic expressions that involve only one variable, usually represented by xx. These expressions can have multiple terms, with each term consisting of a constant multiplied by a variable raised to a non-negative integer exponent. For example, 3x2−5x+73x2−5x+7 is a polynomial in one variable (xx). The highest power of the variable in the polynomial is called its degree.

In the case of 3x2−5x+73x2−5x+7, the degree is 2 because the highest power of xx is 2. Polynomials in one variable are fundamental in algebra and are used in various mathematical applications, such as solving equations, graphing functions, and modeling real-world scenarios.

Coefficient

In a polynomial expression like 2x+12x+1, each term consists of a coefficient multiplied by a variable raised to a certain power. In this case, the term 2x2x has a coefficient of 2, which is the number multiplied by the variable xx. Similarly, the constant term 11 can be considered as 1x01x0, where the coefficient of x0x0 (which is just 1) is also considered.

Types of Polynomial

Polynomials can be classified into different types based on various criteria, such as the number of terms they have or the highest power of the variable in the expression. Here are some common types of polynomials:

1. **Monomial**: A polynomial with only one term. For example, 2x2x is a monomial because it has only one term.
2. **Binomial**: A polynomial with two terms. For example, 5x+25x+2 is a binomial because it has two terms.
3. **Trinomial**: A polynomial with three terms. For example, 2x+5y−42x+5y−4 is a trinomial because it has three terms.

Constant Polynomial

Real numbers can indeed be expressed as polynomials, even if they don't have any variables. When a polynomial consists of just a constant term, such as 33, 66, or 77, it's called a constant polynomial. Additionally, the constant polynomial 00 is referred to as the zero polynomial.

Furthermore, to be considered a polynomial, the exponents of the variables must be whole numbers. For example, the expression x−2+5x+2x−2+5x+2 cannot be classified as a polynomial because the exponent of xx is −2−2, which is not a whole number. Therefore, while x−2+5x+2x−2+5x+2 contains a variable xx, it does not meet the requirement of having whole number exponents, so it is not considered a polynomial.

Degree of a Polynomial

The degree of a polynomial is determined by the highest power of the variable (or variables) present in the polynomial expression.

For example:

- In the polynomial 3x2+5x−13x2+5x−1, the highest power of the variable xx is 22, so the degree of the polynomial is 22.
- In the polynomial 2y3−y+42y3−y+4, the highest power of the variable yy is 33, so the degree of the polynomial is 33.
- In the polynomial 4x4y2−3xy+74x4y2−3xy+7, the highest combined power of the variables xx and yy is 66 (since xx has a power of 44 and yy has a power of 22), so the degree of the polynomial is 66.

The degree of a polynomial helps classify it and understand its behavior when performing mathematical operations like addition, subtraction, multiplication, and division. It's an important concept in algebra and polynomial arithmetic.

Algebraic Identities

Algebraic identities are algebraic equations which are valid for all values. The important algebraic identities used in Class 9 Maths chapter 2 polynomials are listed below:

- $(x + y + z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$
- $(x + y)^3 = x^3 + y^3 + 3xy(x + y)$
- $(x – y)^3 = x^3 – y^3 – 3xy(x – y)$
- $x^3 + y^3 + z^3 – 3xyz = (x + y + z) (x^2 + y^2 + z^2 – xy – yz – zx)$

Zeroes of Polynomial

The zeroes of a polynomial are the values of the variable that make the polynomial equal to zero when substituted into it. In other words, if P(x)P(x) is a polynomial, then any value aa for which P(a)=0P(a)=0 is considered a zero (or root) of the polynomial.

For example, consider the polynomial P(x)=x2−4P(x)=x2−4. To find its zeroes, we set P(x)P(x) equal to zero and solve for xx: x2−4=0x2−4=0

This equation can be factorized as $(x-2)(x+2)=0$. So, the zeroes of the polynomial are $x=2$ and $x=-2$.

In general, a polynomial of degree n can have at most n zeroes. These zeroes may be real or complex numbers. The Fundamental Theorem of Algebra states that every polynomial equation of degree n has exactly n complex roots (including repeated roots).

The zeroes of a polynomial are important in various mathematical contexts, such as solving equations, graphing functions, and understanding the behavior of polynomial functions.

Remainder Theorem

The Remainder Theorem is a fundamental concept in algebra that relates to polynomial division. It states that if a polynomial $P(x)$ is divided by a linear polynomial of the form $x-a$, then the remainder is equal to $P(a)$, where a is any real number.

In simpler terms, if you divide a polynomial by $x-a$, the remainder you get will be the value of the polynomial evaluated at a.

For example, let's say we have the polynomial $P(x)=x^2+3x-4$ and we want to divide it by $x-2$. According to the Remainder Theorem, the remainder will be $P(2)$, which means we substitute $x=2$ into the polynomial $P(x)$. So, $P(2)=(2)^2+3(2)-4=4+6-4=6$.

Hence, when $P(x)$ is divided by $x-2$, the remainder is 6.

The Remainder Theorem is useful in various mathematical applications, including finding roots of polynomials, evaluating polynomial functions, and proving divisibility properties.

Factorisation of Polynomials

Factorization of polynomials involves expressing a given polynomial as the product of two or more simpler polynomials.

For example, consider the polynomial x^2-x-6. To factorize it, we look for two numbers whose product is -6 and whose sum is -1, because the middle term of the polynomial is x and the constant term is -6. These numbers are -3 and 2, because $(-3)\times2=-6$ and $(-3)+2=-1$. Therefore, we can express x^2-x-6 as $(x-3)(x+2)$ by using these factors.

This process of factorization helps simplify polynomial expressions and is a fundamental concept in algebra. It allows us to understand the structure of polynomials better and to solve various mathematical problems more efficiently.

Benefits of CBSE Class 9 Maths Notes Chapter 2 Polynomials

- **Concept Clarity**: These notes provide a clear explanation of polynomial concepts, ensuring that students understand the fundamentals thoroughly.
- **Structured Learning**: The notes are organized in a structured manner, covering topics sequentially. This helps students to follow a logical progression in their learning.
- **Comprehensive Coverage**: The notes cover all the essential topics related to polynomials, including definitions, types, factorization, remainder theorem, zeroes, and more. This comprehensive coverage ensures that students have a complete understanding of the chapter.
- **Example Problems**: The notes include solved examples that illustrate how to apply polynomial concepts in different scenarios. These examples help students grasp the application of theory in practical problems.
- **Practice Questions**: Along with solved examples, the notes also provide practice questions at the end of each topic or chapter. These questions allow students to test their understanding and reinforce their learning.
- **Exam Preparation**: By studying these notes, students can effectively prepare for exams. The clear explanations, solved examples, and practice questions help them revise the chapter thoroughly and build confidence for exams.