

NCERT Class 9 Maths - Chapter 2

Polynomials: Formula Sheet

1. Polynomial: An expression of the form $a_n x^n + \dots + a_1 x + a_0$, where coefficients are real and $a_n \neq 0$.
2. Degree of a Polynomial: Highest power of variable with non-zero coefficient.
3. Types of Polynomials:
 - Constant: Degree 0 (e.g., 7).
 - Linear: Degree 1 (e.g., $2x+3$).
 - Quadratic: Degree 2 (e.g., $x^2 + 3x + 2$).
 - Cubic: Degree 3 (e.g., $x^3 + x^2 + 1$).
 - Monomial: One term, Binomial: Two terms, Trinomial: Three terms.
4. Zero of a Polynomial: Value of x for which $p(x)=0$.
5. Factor Theorem: If $p(a)=0$, then $(x - a)$ is a factor of $p(x)$.
6. Remainder Theorem: If $p(x)$ is divided by $(x - a)$, remainder = $p(a)$.
7. Identities:
 - $(x + y)^2 = x^2 + 2xy + y^2$
 - $(x - y)^2 = x^2 - 2xy + y^2$
 - $(x + y)(x - y) = x^2 - y^2$
 - $(x + a)(x + b) = x^2 + (a+b)x + ab$
 - $(x + y + z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$
 - $(x + y + z)^3 = x^3 + y^3 + z^3 + 3(x+y)(y+z)(z+x)$ - but expand systematically.
8. Cubic Identities:
 - $(x + y)^3 = x^3 + y^3 + 3xy(x + y)$
 - $(x - y)^3 = x^3 - y^3 - 3xy(x - y)$
 - $x^3 + y^3 = (x + y)(x^2 - xy + y^2)$
 - $x^3 - y^3 = (x - y)(x^2 + xy + y^2)$
 - $x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$
9. Special Results:
 - If $x+y+z=0$, then $x^3 + y^3 + z^3 = 3xyz$.
10. Perfect Square Recognition:
 - Expression of form $a^2 + b^2 + c^2 + 2ab - 2bc - 2ca$ can be written as $(a+b-c)^2$ etc.
11. Factorisation Tips:
 - Grouping method.
 - Using identities.
 - Trial and error with possible rational roots (Rational Root Theorem).