

Class 12 Mathematics Advanced Guide

Senior Secondary Board Examination & Advanced Curriculum — Essential Formulas & Problem-Solving Strategies

1. Calculus: Differentiation & Integration

Continuity, Differentiability & Applications of Derivatives

Analyzing limits, rate of change, tangents/normals, increasing/decreasing functions, and optimization problems.

Derivative Rules: Chain rule $\frac{d}{dx}[f(g(x))] = f'(g(x))g'(x)$

Max/Min Test: Critical points where $f'(x) = 0$; Second Derivative Test for local extrema.

Integrals & Differential Equations

Mastering indefinite/definite integrals, area under curves, and solving first-order differential equations.

Integration by Parts: $\int u \, dv = uv - \int (u' \, v) \, dx$

Differential Equations: Separation of variables and integrating factor method for linear equations.

2. Algebra: Matrices & Determinants

Matrices & Determinants

Matrix algebra, properties of determinants, inverse of matrices, and solving systems of linear equations.

Matrix Inverse: $A^{-1} = \frac{1}{|A|} \text{adj}(A)$

Determinant Properties: $|AB| = |A||B|$, Area of triangle using coordinates.

3. Vectors & Three-Dimensional Geometry

Vector Algebra & 3D Space

Vector operations, dot/cross products, equations of lines and planes in three-dimensional space.

Products: Dot product $\vec{a} \cdot \vec{b} = |a||b|\cos\theta$, Cross product $\vec{a} \times \vec{b} = |a||b|\sin\theta \hat{n}$

Shortest Distance: Distance between two skew lines in 3D space.

4. Relations, Functions & Probability

Relations, Functions & Inverse Trigonometric Functions

Reflexive, symmetric, transitive relations, bijective functions, and principal value branches of ITF.

ITF Properties: $\sin^{-1}(x) + \cos^{-1}(x) = \frac{\pi}{2}$ for $x \in [-1, 1]$

Probability & Linear Programming

Conditional probability, Bayes' theorem, probability distributions, and graphical optimization of LPP.

Bayes' Theorem: $P(E_i | A) = \frac{P(E_i)P(A | E_i)}{\sum P(E_j)P(A | E_j)}$

Board Exam Strategy: Calculus and Vectors/3D carry over 55% weightage in CBSE/ICSE board examinations. Prioritize step-by-step derivation and clean layout.