International Math Olympiad Handbook – Grade 11

This handbook covers topics for Grade 11 students (Age 16–17).

Grade 11 (Age 16–17)

Introduction

Grade 11 students focus on advanced algebra, functions, coordinate geometry, trigonometry, probability, sequences, calculus introduction, and Olympiad-level problems.

Curriculum Topics

- Algebra: quadratic, cubic, factorization, inequalities
- Functions: polynomial, exponential, logarithmic
- Coordinate Geometry: line, circle, parabola
- Trigonometry: identities, equations, laws of sine & cosine
- Probability: conditional, multiple events
- Sequences & Series: arithmetic, geometric
- Calculus (basic introduction): limits, derivatives
- Word Problems & Olympiad Challenges
- Logical Reasoning & Puzzles

Examples & Explanations

- **Quadratic/Cubic:** Solve $x^2 - 5x + 6 = 0 \rightarrow x=2,3$
- **Functions:** $f(x)=x^2-3x+2$, $f(3)=2$
- **Trigonometry:** $\sin^2\theta + \cos^2\theta = 1$
- **Probability:** Conditional probability $P(A|B)$
- **Sequences:** $a_1=2$, $d=3 \rightarrow$ 5th term?
- **Coordinate Geometry:** Equation of line through (1,2) & (3,6) $\rightarrow y = 2x$

Practice Problems

1. Solve $x^2 - 7x + 10 = 0$
2. $f(x) = 3x^2 - 2x + 1$, $f(2)= ?$
3. $\sin^2 30° + \cos^2 30° = ?$
4. Probability: 2 dice sum = 7 $\rightarrow$?
5. 5th term of sequence $a_1=3$, $d=4$
6. Line through (0,1) & (2,5) $\rightarrow$ equation?