

# International Math Olympiad Handbook

## – Grade 9

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This handbook covers topics for Grade 9 students (Age 14–15).

### Grade 9 (Age 14–15)

### Introduction

Grade 9 students develop algebra, quadratic equations, functions, coordinate geometry, geometry with similarity/congruence, probability, and Olympiad-level problem solving.

### Curriculum Topics

- Algebra: quadratic equations, polynomials, factorization
- Functions: linear, quadratic
- Geometry: triangles, circles, quadrilaterals, polygons
- Similarity, Congruence, Pythagoras, Trigonometry (basic)
- Coordinate Geometry
- Probability and Statistics
- Word Problems and Olympiad Challenges
- Logical Reasoning and Sequences

### Examples & Explanations

- **Quadratic:** Solve  $x^2 + 5x + 6 = 0 \rightarrow x = -2, -3$
- **Functions:**  $f(x) = 2x + 3$ , find  $f(4) = 11$

- **Geometry:** Area of triangle using Heron's formula
- **Trigonometry:**  $\sin 30^\circ = 1/2$
- **Probability:** Probability of drawing ace from deck =  $4/52$
- **Coordinate Geometry:** Distance & midpoint formulas

### Practice Problems

1. Solve:  $x^2 + 7x + 12 = 0$
2.  $f(x) = 3x + 4$ ,  $f(5) = ?$
3. Triangle sides 3,4,5  $\rightarrow$  area?
4.  $\sin 45^\circ = ?$
5. Probability: pick a king = ?
6. Midpoint: (1,2) & (5,6)