



GRADE 5 • AI OLYMPIAD HANDBOOK

AI Olympiad Handbook

A complete guide for Grade 5 students — the full syllabus, exam pattern, an 8-week preparation strategy, exam-day tips, and the detailed curriculum for every section.

4

SECTIONS (A–D)

35

TOTAL QUESTIONS

40

TOTAL MARKS

60

MINUTES DURATION

1. Syllabus

Section	Topics
A: CT & Logical Reasoning	Spatial visualization, 3D viewpoints & cross-sections, compound transformations (multiple flips/turns/folds/cuts), hidden cues & information filtering, mirror & water images, multi-axis symmetry, multi-attribute patterns, complex numerical sequences (mixed operations, alternating, skipping), cross-representation patterns (Binary, Roman, Chinese numerals), interdependent clue analysis, structural deconstruction (faces, edges, vertices, diagonals, angles), process deconstruction, cross-referencing data (tables, grids, networks), constraint management, pathfinding (N/S/E/W with turns/constraints), conditional logic, search & optimization (binary/ternary), troubleshooting algorithms, chronological & attribute ordering
B: AI & Technology Concepts	Foundations of AI, AI-enabled systems, CT & AI relationship, human vs. machine intelligence, data & pattern recognition, data types (text, images, audio, numbers), AI decision-making, algorithms & intelligent systems, machine learning basics, training data, prediction & classification, emerging technologies (AI, ML, Data Science, Generative AI)
C: Everyday AI Around Us	AI in smartphones, voice assistants, search engines, cameras, entertainment, recommendation systems, AI in Healthcare, Banking, Agriculture, Education, Transportation, adaptive learning, AI for environmental sustainability, public services, digital citizenship, online safety, privacy protection, digital footprints, AI ethics, fairness, accountability, responsible AI use, societal impact
D: Elite Thinker	Advanced decomposition & data analysis, complex tables & logical deductions, algorithm design & optimization, pathfinding & conditional reasoning, abstract thinking, spatial visualization & pattern analysis, AI learning & decision-making, ML applications, prediction & classification, AI ethics (bias, privacy, accountability), critical analysis & real-world problem solving

2. Exam Pattern

Section	Title	Questions	Marks	Total
A	CT & Logical Reasoning	10	× 1	10
B	AI & Technology Concepts	10	× 1	10
C	Everyday AI Around Us	10	× 1	10
D	Elite Thinker	5	× 2	10
Total		35		40 Marks



60

MINUTES DURATION

No

NEGATIVE MARKING

3. Preparation Strategy

WEEK 1–2: Section A (CT & Logical Reasoning)

Day	Topic	Activity
Monday	Spatial Visualization & Cross-sections	Draw cross-sections of 3D objects (e.g., cut an apple or a cylinder).
Tuesday	Compound Transformations	Perform multiple flips, turns, and folds, then predict the final shape.
Wednesday	Mirror & Water Images	Practice vertical and horizontal mirror images along with water reflections.
Thursday	Multi-Attribute Patterns	Solve patterns where size, position, color, and count all change simultaneously.
Friday	Complex Numerical Sequences	Practice mixed operations (+, −, ×, ÷), alternating sequences, and skipping terms.
Saturday	Cross-Representation Patterns	Convert simple numbers into Binary and Roman numerals.
Sunday	Rest	—

WEEK 3–4: Section A (Continued)

Day	Topic	Activity
Monday	Interdependent Clue Analysis	Solve puzzles with 4–5 connected number clues.
Tuesday	Structural Deconstruction	Count faces, edges, vertices, and diagonals in 3D shapes.
Wednesday	Cross-Referencing Data	Read complex tables and grids to locate specific information.
Thursday	Constraint Management	Sort and group items using 3–4 conditional rules.
Friday	Pathfinding (N/S/E/W)	Navigate grids with obstacles and decision points.
Saturday	Search & Optimization	Use binary search to find a fake coin in the minimum number of steps.
Sunday	Rest	—

WEEK 5: Section B (AI & Technology Concepts)

Day	Topic	Activity
Monday	CT & AI Relationship	Learn how Computational Thinking skills (decomposition, patterns, etc.) help build AI systems.
Tuesday	Data & Pattern Recognition	Identify patterns in datasets and sort different data types.
Wednesday	ML Basics & Training Data	Explore how AI learns from examples using image-based demonstrations.
Thursday	Prediction & Classification	Classify animals and flowers using simple rules.
Friday	Emerging Technologies	Compare AI, ML, Data Science, and Generative AI.
Saturday	Section B Test	Solve 10 MCQs and 2 application-based questions.
Sunday	Rest	—

WEEK 6: Section C (Everyday AI Around Us)

Day	Topic	Activity
Monday	Recommendation Systems	Explore how YouTube or Amazon recommends content.
Tuesday	AI in Sectors	Research one AI application each in Healthcare, Banking, Agriculture, and Transportation.
Wednesday	AI for Good	Study AI applications in environmental protection and public services.
Thursday	Adaptive Learning	Explore an adaptive learning platform and observe how AI personalizes learning.
Friday	Digital Citizenship & Privacy	Review privacy settings and create a strong password.
Saturday	AI Ethics & Accountability	Discuss the case study: "Who is responsible when AI makes a mistake?"
Sunday	Rest	—

WEEK 7: Section D (Elite Thinker)

Day	Topic	Activity
Monday	Advanced Decomposition	Break down complex problems into five or more smaller parts.
Tuesday	Algorithm Design & Optimization	Design the most efficient algorithm for a given task.

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Day	Topic	Activity
Wednesday	Pathfinding with Conditions	Navigate paths with multiple constraints such as time, cost, and distance.
Thursday	Spatial Pattern Analysis	Solve multi-attribute and cyclic pattern problems to predict the next terms.
Friday	AI Ethics & Bias	Write an analysis on "Can AI be biased? How can it be fixed?"
Saturday	Section D Test	Solve five questions by writing 3–4 sentence answers with reasoning.
Sunday	Rest	—

WEEK 8: Full Mocks & Revision

Day	Activity
Monday	Full Mock Test 1 (35 Questions, 60 Minutes)
Tuesday	Deep error analysis and revision of weak topics.
Wednesday	Full Mock Test 2 (35 Questions, 55 Minutes)
Thursday	Review mistakes and focus on Section D.
Friday	Solve a Previous Year Paper under timed conditions.
Saturday	Final Mock Test and light revision.
Sunday	EXAM DAY – You're Ready!

4. Daily Routine (30 Minutes)

Time	Activity	Duration
Morning	Solve one puzzle (binary search or multi-attribute pattern).	5 min
Afternoon	Learn one topic along with its real-world application.	10 min
Evening	Solve five practice questions and design one algorithm.	10 min
Night	Explain today's topic to someone.	5 min

5. Exam Day Strategy

Section	Time	Strategy
A	13 min	Attempt easy questions first and skip complex 3D or cross-section problems initially.
B	12 min	Trust your understanding of Machine Learning and data concepts.
C	12 min	Think about real-world applications while answering.
D	15 min	Write step-by-step solutions and 3–4 sentence answers with proper reasoning.
Review	8 min	Check all answers carefully and correct any silly mistakes.

★ No negative marking – guess if unsure!

6. Detailed Curriculum

A

CT & Logical Reasoning

Abstract thinking, pattern recognition, decomposition & algorithmic thinking

Abstract Thinking

Ability to solve complex problems with multi-layered hidden cues and manipulate mental models of objects.

- 1) Spatial Visualization: Interpreting 3D objects from different viewpoints and identifying advanced cross-sections.
- 2) Compound Transformations: Predicting changes in shapes after multiple flips, turns, rotations (clockwise/counter-clockwise), and cuts/folds.
- 3) Hidden Cue Analysis: Identifying hidden, missing, or overlapping parts in incomplete shapes or patterns and recognizing implied relationships.
- 4) Symmetry and Composite Reasoning: Solving problems involving mirror/water images and identical halves across multiple axes of symmetry.
- 5) Information Filtering: Isolating core structures and essential data while ignoring irrelevant or misleading information in complex scenarios.

Pattern Recognition

Ability to identify, extend, and justify progressive patterns and relationships in varied data formats.

- 1) Multi-Attribute Sequences: Recognizing progressive patterns involving multiple simultaneous changes (size, position, count, orientation) in consecutive terms.
- 2) Complex Numerical Structures: Identifying sequences involving mixed operations, alternating terms, skipping, nested rules, or functional algebraic relationships.
- 3) Cross-Representation Patterns: Identifying patterns across different systems, such as binary, ternary, Roman, or Chinese numerals.

- 4) Cyclic and Dependency Rules: Understanding patterns that follow cyclic behavior or where the next term depends on specific logical conditions or previous results.

Decomposition

Ability to break down higher-order problems and interconnected clues into manageable, logical parts.

- 1) Interdependent Clue Analysis: Breaking down problems involving clusters of numerical clues such as place values, sum/difference/product, factors, and multiples.
- 2) Structural Deconstruction: Analyzing 3D objects by their constituent parts (faces, edges, corners, vertices, diagonals, and angles).
- 3) Process Deconstruction: Breaking multi-step logical situations—such as money exchanges, quantity transfers, or scheduling—into a series of ordered steps.
- 4) Cross-Referencing Data: Interpreting complex tables, grids, networks, and charts that require cross-referencing multiple data points and dependencies.
- 5) Constraint Management: Identifying and applying conditional rules for counting, grouping, sorting, or eliminating possibilities based on specific criteria.

Algorithmic Thinking

Ability to design, follow, and evaluate multi-layered rules and procedures to reach optimal solutions.

- 1) Navigation and Pathfinding: Solving grid-based movement problems involving direction (North, South, East, West), turns, path constraints, and decision points.
- 2) Step-wise Rule Execution: Design and follow procedures involving swaps, shifts, transfers, and rearrangements of people, events, or objects.
- 3) Conditional Logic: Applying "if-then," "either-or," and "must/must-not" reasoning to navigate complex constraints and branching paths.
- 4) Search and Optimization: Applying systematic techniques—such as binary or ternary search—to find specific items (e.g., a fake weight) in the minimum number of steps or finding maximum/minimum outcomes.
- 5) Logical Consistency and Troubleshooting: Checking procedures for correctness and effectiveness, and identifying redundant versus necessary information in a logical flow.
- 6) Chronological and Attribute Ordering: Arranging elements in a precise sequence using chronological clues, attributes, or logical dependencies.

B

AI & Technology Concepts

Understanding the fundamental concepts of Artificial Intelligence, how intelligent systems work, and the role of data, patterns, and decision-making in AI.

Foundations of Artificial Intelligence

- 1) Understanding Artificial Intelligence as technology that enables machines to perform tasks that typically require human intelligence.
- 2) Identifying examples of AI-enabled systems and applications.
- 3) Understanding the relationship between Computational Thinking and Artificial Intelligence.

Human Intelligence vs Machine Intelligence

- 1) Understanding how humans learn through experience, reasoning, and creativity.
- 2) Understanding how machines learn from data and patterns.
- 3) Comparing the strengths and limitations of humans and AI systems.

Data and Pattern Recognition

- 1) Understanding the importance of data in AI systems.
- 2) Recognizing different types of data such as text, images, audio, and numbers.
- 3) Understanding how AI identifies patterns and uses them to make decisions and predictions.

Problem Solving and Decision Making

- 1) Understanding how AI helps solve problems and support decision-making.
- 2) Recognizing the role of algorithms and logical instructions in intelligent systems.
- 3) Understanding how AI systems process information to generate outcomes.

Machine Learning Basics

- 1) Introduction to Machine Learning as a method through which computers learn from examples.
- 2) Understanding the importance of training data.
- 3) Recognizing simple examples of machine learning in everyday applications.

Emerging Technologies

- 1) Awareness of Artificial Intelligence, Machine Learning, and Data Science as emerging technologies and Generative AI.
- 2) Understanding how these technologies are transforming different sectors and industries.
- 3) Exploring the future potential of intelligent technologies.

C

Everyday AI Around Us

Recognizing AI applications in daily life and developing awareness of ethical, safe, and responsible use of technology.

AI in Daily Life

- 1) Identifying AI applications in smartphones, voice assistants, search engines, cameras, and entertainment platforms.
- 2) Understanding recommendation systems used in videos, music, and online shopping.
- 3) Recognizing how AI assists people in everyday activities.

AI Across Different Sectors

- 1) Understanding AI applications in healthcare, banking, agriculture, education, transportation, and entertainment.
- 2) Identifying how AI helps improve efficiency, accuracy, and convenience.
- 3) Exploring real-world examples of AI solving practical problems.

AI in Education and Learning

- 1) Understanding technology-enabled learning and personalized education.

- 2) Recognizing adaptive learning systems that support individual learning needs.
- 3) Exploring how AI helps students learn and discover knowledge.

AI for Good

- 1) Understanding how AI can contribute to environmental protection and sustainability.
- 2) Recognizing the role of AI in improving healthcare and public services.
- 3) Exploring how intelligent technologies help solve societal challenges.

Digital Citizenship and Online Safety

- 1) Practicing safe and responsible use of digital devices and online platforms.
- 2) Understanding the importance of protecting personal information and privacy.
- 3) Recognizing digital footprints and responsible online behavior.

AI Ethics and Responsible Use

- 1) Understanding that AI should be used in ways that are fair, safe, and beneficial to society.
- 2) Recognizing that AI systems can sometimes make mistakes and require human supervision.
- 3) Understanding the importance of fairness, privacy, and accountability in AI systems.
- 4) Developing awareness of ethical decision-making while using AI-powered technologies.
- 5) Encouraging responsible and respectful use of AI for the benefit of individuals and communities.

D

Elite Thinker

This section challenges students to apply advanced Computational Thinking and Artificial Intelligence concepts to solve complex, multi-step problems requiring analysis, reasoning, evaluation, and decision-making.

Computational Thinking & Logical Reasoning

Advanced Decomposition and Data Analysis

- Analyzing interconnected numerical and logical clues involving factors, multiples, sums, and constraints.
- Interpreting complex tables, grids, charts, and networks by cross-referencing multiple data points.
- Solving higher-order sorting, grouping, elimination, and classification problems using conditional rules.

Algorithm Design, Pathfinding and Optimization

- Solving grid-based navigation and pathfinding problems involving multiple conditions and decision points.
- Applying conditional logic, branching rules, and multi-step procedures to reach optimal solutions.
- Identifying errors, redundancies, and inefficiencies in algorithms and selecting the best approach.

Abstract Thinking, Spatial Reasoning and Pattern Analysis

- Visualizing complex 3D objects, viewpoints, cross-sections, and spatial relationships.
- Predicting outcomes after multiple rotations, reflections, folds, cuts, and transformations.
- Identifying hidden relationships, multi-attribute patterns, cyclic sequences, and information embedded within complex visual structures.

Artificial Intelligence

AI Systems, Learning and Decision-Making

- Evaluating how AI systems learn from data and recognize patterns.
- Understanding the role of training data, machine learning, and decision-making processes in AI systems.
- Applying AI concepts to real-world scenarios involving prediction, classification, and automation.

AI Ethics, Safety and Societal Impact

- Analyzing situations involving fairness, bias, privacy, and accountability in AI systems.
- Evaluating the need for human supervision and responsible decision-making when using AI technologies.
- Assessing how AI can be used ethically to solve societal, environmental, and community challenges while protecting human interests and digital rights.

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