



GRADE 7 • AI OLYMPIAD HANDBOOK

AI Olympiad Handbook

A complete guide for Grade 7 students preparing for the AI Olympiad — the full syllabus, exam pattern, an 8-week preparation strategy, daily routine, exam-day strategy, and the detailed curriculum for every section.

4

SECTIONS A–D

45

QUESTIONS, 50 MARKS

8

WEEK STUDY PLAN

60

MINUTES DURATION

1. Syllabus

Section	Topics
A: CT & Logical Reasoning	3D transformations (rotations, reflections, cross-sections, nets), compound transformations (multiple flips/turns/folds), hidden relationships & constraints, symmetry, congruence, proportion, multi-rule numerical sequences (alternating, nested, dependent), algebraic patterns (variables, expressions), visual/geometric patterns (transformations, growth), letter/symbol patterns, integrated patterns (numbers + shapes + symbols + conditions), number properties (factors, multiples, ratios, percentages, powers), spatial reasoning & measurements, tables/grids/charts with multiple dependencies, multi-step logical situations (movement, exchanges, comparisons, scheduling), conditional branching algorithms, grid navigation with constraints, step-wise transformations (swaps, transfers, positional changes), ordering with multiple attributes, If-then reasoning, elimination strategies, logical consistency checks, procedural optimization
B: AI & Technology Concepts	AI domains: Data Science (patterns/insights), Computer Vision (visuals), Natural Language Processing (NLP) (language/text); predictive techniques: classification (sorting into categories), regression (predicting numerical values), clustering (grouping without labels); data literacy: structured vs. unstructured data, dataset lifecycle (training, validation, test); data visualization: bar charts (comparisons), line graphs (trends), pie charts (portions); precision, accuracy, valid data, Generative AI
C: Everyday AI Around Us	AI in healthcare (early diagnosis, robotic surgery, disease prediction), education (personalized learning, teaching tools), transport (traffic optimization, navigation), communication (translation, virtual assistants, spam filters), AI bias (historical, data, measurement, algorithmic, human bias), responsible AI (transparency, accountability, Human-in-the-Loop (HITL)), digital citizenship: rights (privacy, access, safety) & responsibilities (protecting information, verifying information)
D: Elite Thinkers	Procedure design (minimum switches, minimum interchanges), interconnected logic (3×3 grid puzzles, number placement without consecutive adjacency), algorithmic analysis (pathfinding with multiple decision points), accountability analysis (HITL in hiring and healthcare), bias identification (historical, data, measurement, algorithmic, human bias), misinformation impact (cyberbullying, digital rights violation)

2. Exam Pattern

Section	Title	Questions	Marks	Total
A	CT & Logical Reasoning	15	× 1	15
B	AI & Technology Concepts	15	× 1	15
C	Everyday AI Around Us	10	× 1	10
D	Elite Thinker	5	× 2	10

Total	45	50 Marks
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 **Duration: 60 Minutes** | **Negative Marking: No negative marking**

3. Preparation Strategy

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

Day	Topic	Activity
Monday	3D Nets & Cross-sections	Draw nets of a cube, pyramid, and cylinder; identify cross-sections.
Tuesday	Compound Transformations	Perform multiple rotations, reflections, and folds to track the final position.
Wednesday	Symmetry & Congruence	Identify symmetry axes and prove congruence in shapes.
Thursday	Hidden Relationships	Find constraints in incomplete figures and patterns.
Friday	Proportional Reasoning	Solve scale, ratio, and proportion problems in geometric contexts.
Saturday	Multi-Rule Sequences	Practice alternating, nested, and dependent patterns.
Sunday	Rest	—

Weeks 3–4: Section A (Continued)

Day	Topic	Activity
Monday	Algebraic Patterns	Use variables and expressions to predict patterns.
Tuesday	Visual/Geometric Growth Patterns	Predict the next shape in growing patterns.
Wednesday	Number Properties	Practice factors, multiples, ratios, percentages, and powers.
Thursday	Tables/Grids with Dependencies	Extract information from complex multi-source data.
Friday	Conditional Branching Algorithms	Write simple pseudo-code using If-Else logic.
Saturday	Grid Navigation with Constraints	Navigate grids using multiple rules and decision points.
Sunday	Rest	—

Week 5: Section B (AI & Technology Concepts)

Day	Topic	Activity
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Monday	Classification vs. Regression vs. Clustering	Sort examples into the three predictive technique categories.
Tuesday	Data Science vs. Computer Vision vs. NLP	Identify the AI domain for different real-world applications.
Wednesday	Training, Validation & Test Sets	Understand the dataset lifecycle.
Thursday	Bar Charts, Line Graphs & Pie Charts	Interpret trends and create your own charts.
Friday	Precision, Accuracy & Valid Data	Understand and calculate these concepts.
Saturday	Generative AI	Compare Generative AI with Traditional AI.
Sunday	Rest	—

Week 6: Section C (Everyday AI Around Us)

Day	Topic	Activity
Monday	AI in Healthcare	Research robotic surgery and disease prediction.
Tuesday	AI in Education	Explore a personalized learning platform.
Wednesday	AI in Transport & Communication	Learn about traffic optimization and translation tools.
Thursday	Types of AI Bias	Study historical, data, measurement, algorithmic, and human bias.
Friday	Responsible AI & HITL	Discuss why humans should remain in control of AI systems.
Saturday	Digital Citizenship	Prepare a list of rights and responsibilities.
Sunday	Rest	—

Week 7: Section D (Elite Thinkers)

Day	Topic	Activity
Monday	Procedure Design	Solve minimum switches and minimum swaps problems.
Tuesday	Interconnected Logic	Solve 3×3 grid puzzles with constraints (e.g., no three in a row or diagonal).
Wednesday	Number Placement Puzzles	Place numbers 1–9 while avoiding consecutive adjacency.
Thursday	Accountability & HITL	Analyze case studies on hiring algorithms and healthcare systems.
Friday	Bias Identification	Identify sources of bias in given datasets.
Saturday	Misinformation & Cyberbullying	Analyze the impact and write your views.
Sunday	Rest	—

Week 8: Full Mocks & Revision

Day	Activity
Monday	Full Mock Test 1 (45 Questions, 60 Minutes)
Tuesday	Deep error analysis and revision of weak topics.
Wednesday	Full Mock Test 2 (45 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 (35–40 Minutes)

Time	Activity	Duration
Morning	Solve one puzzle (nets, transformations, or grid navigation).	5 min
Afternoon	Learn one topic along with its real-world application.	15 min
Evening	Solve five practice questions and design one algorithm.	15 min
Night	Explain today's topic to someone.	5 min

5. Exam Day Strategy

Section	Questions	Time	Strategy
A	15	16 min	Attempt easy questions first and skip complex nets and transformation problems initially.
B	15	15 min	Trust your understanding of AI domains and predictive techniques.
C	10	12 min	Think about real-world examples while answering.
D	5	12 min	Write step-by-step solutions and 4–5 sentence answers with proper reasoning.
Review	All	5 min	Check all answers carefully and correct any silly mistakes.

6. Detailed Curriculum

A

Section A: CT & Logical Reasoning

Content Coverage: Abstract Thinking, Pattern Recognition, Decomposition, Algorithmic Thinking

Abstract Thinking

1. Visualising and analysing 3D objects and their transformations, including rotations, reflections, cross-sections, and nets.
2. Understanding compound transformations involving multiple flips, turns, folds, and rearrangements.
3. Identifying hidden relationships and constraints within incomplete figures, patterns, or logical setups.
4. Analysing symmetry, congruence, and proportional reasoning across different representations.
5. Interpreting relative positions, orientations, and viewpoints of objects in advanced visual scenarios.

Pattern Recognition

1. Multi-rule numerical sequences, including alternating, nested, and dependent patterns.
2. Algebraic patterns using variables, expressions, and functional relationships.
3. Visual and geometric patterns formed through transformations or growth rules.
4. Letter and symbol-based patterns involving positional and logical dependencies.
5. Integrated patterns combining numbers, shapes, symbols, and logical conditions.

Decomposition

1. Separating interconnected conditions and constraints into manageable components.
2. Analysing number properties (factors, multiples, ratios, percentages, powers) within layered clues.
3. Deconstructing problems involving spatial reasoning, measurements, and geometry.
4. Interpreting tables, grids, charts, and flow-based information with multiple dependencies.
5. Breaking multi-step logical situations (movement, exchanges, comparisons, scheduling) into ordered steps.
6. Translating visual or verbal information into structured data for systematic analysis.

Algorithmic Thinking

1. Rule-based sequences and algorithms with conditional branching.
2. Grid-based navigation and pathfinding with constraints and decision points.
3. Step-wise transformations involving calculations, swaps, transfers, or positional changes.
4. Ordering and arranging elements (people, objects, events) using multiple attributes and logical clues.
5. Solving problems using if-then reasoning, elimination strategies, and logical consistency checks.
6. Creating or analysing procedural steps to reach an optimal or valid solution.

B**Section B: AI & Technology Concepts**

Content Coverage: Predictive Techniques, AI Domains, Data Visualisation and Analysis, Generative AI

Introduction to Predictive Techniques

1. Classification (sorting data into predefined categories).
2. Regression (predicting numerical values based on patterns).
3. Clustering (automatically grouping similar items without labels).

AI Domains

1. Data Science (extracting insights from data).
2. Computer Vision (how machines understand visual information).
3. Natural Language Processing (processing speech and text).

Data Visualisation and Analysis

1. Collecting and organising simple structured data; identifying parts of a dataset (Training, Validation, and Testsets).
2. Creating and interpreting bar charts (comparisons), line graphs (trends over time), and pie charts (portions of a whole).
3. Understanding data analysis concepts including Precision (exactness), Accuracy (closeness to truth), and Valid Data.

Generative AI is also covered as part of Section B's content.

C**Section C: Everyday AI Around Us**

Content Coverage: AI in Industries, Ethics & AI Bias Awareness, Responsible AI, Digital Citizenship

AI in Industries

1. Practical applications of AI in Healthcare (early diagnosis, robotic surgery, disease risk prediction).
2. Education (personalised learning, teaching tools).
3. Transport (traffic flow optimization, navigation).
4. Communication (translation, virtual assistants, spam filters).
5. Understanding AI's role in improving accuracy, efficiency, and productivity.

Ethics & AI Bias Awareness

Identifying situations where AI gives unfair results; understanding types of bias: Historical (past mistakes), Data (incomplete sets), Measurement (wrong parameters), Algorithmic (design flaws), and Human (designer preferences). Principles of Responsible AI, including transparency, accountability, and the Human-in-the-Loop (HITL) concept. Practicing Digital Citizenship through rights (privacy, access, safety) and responsibilities (respecting others, protecting personal info, verifying information).

D

Section D: Elite Thinkers Section

Designed for high-order thinking, this section draws from "The Thinking Spot" activities and advanced ethical case studies.

Optimization & Algorithmic Analysis (CT Focus)

- **Procedure Design:** Devising the most efficient multi-step procedure to reach an optimal or valid solution, such as determining the minimum number of switches required to light up a bulb system or the minimum number of pairs to interchange to arrange squares alternately.
- **Interconnected Logic:** Solving complex grid-based puzzles requiring the reconciliation of multiple interdependent rules, such as placing items in a 3x3 grid without making three in a row, column, or diagonal, or placing numbers 1–9 such that no two consecutive numbers are adjacent in any direction.

Critical Ethical Reflection (AI Focus)

- **Accountability Analysis:** Evaluating high-stakes scenarios, such as hiring algorithms or healthcare risk predictions, to determine where the Human-in-the-Loop (HITL) concept is essential to ensure humans remain in final control of decisions.
- **Bias Identification:** Researching and identifying hidden sources of bias—including Historical, Data, Measurement, Algorithmic, and Human bias—within datasets and proposing strategies to ensure fairness and inclusivity.
- **Impact of Misinformation:** Analyzing the social consequences of AI-generated misinformation and irresponsible digital behavior, focusing on the violation of digital rights (privacy and safety) and the impact of actions like cyberbullying.

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