



GRADE 8 • AI OLYMPIAD HANDBOOK

AI Olympiad Handbook

A complete guide for Grade 8 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	Powers, exponents & numerical structures, generalization across number systems (Decimal, Binary, Ternary, Roman, Chinese Numerals), spatial visualization of 2D/3D figures (overlaps, intersections, transformations), properties of quadrilaterals (Trapeziums, Parallelograms, Rhombuses, Kites), rule-based transformations, grid navigation with constraints, conditional instructions (if-then, either-or, must/must not), sequential decision-making, optimization (maximum/minimum outcomes), multi-step processes (distribution, transfers, exchanges), tables/grids/networks with dependencies, multiple variables/cases analysis, ignoring irrelevant/misleading data
B: AI & Technology Concepts	Definitions of AI, computing vs. intelligence, AI history (Alan Turing, John McCarthy, Turing Test, AI Winter), AI vs. automation, human vs. machine intelligence (evolution, creativity, emotions, bias, accountability, privacy, transparency), supervised, unsupervised, and reinforcement learning, AI project lifecycle (6 stages: Define Problem, Data Collection, Model Training, Evaluation, Deployment, Maintenance), Data Science, Computer Vision, Natural Language Processing (NLP), data bias, fairness, transparency, accountability, Generative AI
C: Everyday AI Around Us	Healthcare: medical image analysis (X-ray TB screening), predictive health risk flagging, virtual assistants (SUMAN SAKHI); Environment: satellite analysis for plastic pollution, AI-based waste sorting (Pune/Indore models), wildlife tracking (Trail Guard AI); Automation: smart traffic signals, smart home appliances, security alerts; Agriculture: soil analysis (Bharat Vistaar), pest detection (e-NAM); no-code AI tools (Teachable Machine)
D: Elite Thinkers	Optimization problems (bag capacity, fruit seller puzzles), interconnected logic (stacked box sequences, grid puzzles), procedure design (maximum/minimum outcomes), accountability analysis (healthcare AI errors, human supervision), bias identification (hidden sources in datasets), misinformation impact (deepfakes, fake news)

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



Duration: 60 Minutes

Negative Marking: No negative marking

3. Preparation Strategy

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

Day	Topic	Activity
Monday	Powers, Exponents & Numerical Structures	Solve sequences involving squares, cubes, and exponents.
Tuesday	Number Systems	Convert between Decimal, Binary, Ternary, Roman, and Chinese numerals.
Wednesday	Spatial Visualization	Practice overlaps, intersections, and transformations in 2D and 3D.
Thursday	Properties of Quadrilaterals	Study the properties and differences of trapeziums, parallelograms, rhombuses, and kites.
Friday	Rule-based Transformations	Apply multiple rules to transform numbers and symbols.
Saturday	Grid Navigation with Constraints	Solve pathfinding problems with multiple decision points.
Sunday	Rest	—

Weeks 3–4: Section A (Continued)

Day	Topic	Activity
Monday	Conditional Instructions	Practice problems involving If-Then, Either-Or, Must, and Must Not conditions.
Tuesday	Sequential Decision-Making	Solve multi-step decision problems with given limitations.
Wednesday	Optimization Problems	Find maximum and minimum outcomes.
Thursday	Multi-step Processes	Break distribution, transfer, and exchange problems into logical steps.
Friday	Tables, Grids & Networks	Extract information from complex multi-dependency data.
Saturday	Ignoring Irrelevant Data	Identify essential information while filtering misleading data.
Sunday	Rest	—

Week 5: Section B (AI & Technology Concepts)

Day	Topic	Activity
Monday	AI History	Study Alan Turing, John McCarthy, the Turing Test, and AI Winter.
Tuesday	AI vs. Automation	Compare AI and automation using real-world examples.
Wednesday	Human vs. Machine Intelligence	Discuss bias, accountability, privacy, and transparency.
Thursday	Supervised vs. Unsupervised vs. Reinforcement Learning	Sort AI applications into the three learning categories.
Friday	AI Project Lifecycle	Learn the six stages: Define, Collect, Train, Evaluate, Deploy, and Maintain.
Saturday	Data Science, Computer Vision, NLP & Generative AI	Identify the appropriate AI domain for different applications.
Sunday	Rest	—

Week 6: Section C (Everyday AI Around Us)

Day	Topic	Activity
Monday	AI in Healthcare	Explore X-ray TB screening, predictive health risk systems, and SUMAN SAKHI.
Tuesday	AI in Environment	Study satellite analysis, waste sorting (Pune/Indore models), and Trail Guard AI.
Wednesday	AI in Automation	Learn about smart traffic signals, smart homes, and security alerts.
Thursday	AI in Agriculture	Explore Bharat Vistaar, e-NAM, and AI-based pest detection.
Friday	No-code AI Tools	Use Teachable Machine to build a simple classifier.
Saturday	Section C Test	Solve 10 MCQs and 2 case-based questions.
Sunday	Rest	—

Week 7: Section D (Elite Thinkers)

Day	Topic	Activity
Monday	Optimization Problems	Solve bag capacity and fruit seller puzzles.
Tuesday	Interconnected Logic	Practice stacked box sequences and complex grid puzzles.
Wednesday	Procedure Design	Solve problems requiring maximum or minimum outcomes under given rules.
Thursday	Accountability Analysis	Analyze healthcare AI errors and identify where human supervision is needed.
Friday	Bias Identification	Find hidden sources of bias in datasets.
Saturday	Misinformation Impact	Analyze the consequences of deepfakes and fake news.
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 (40 Minutes)

Time	Activity	Duration
Morning	Solve one puzzle (number systems or optimization).	5 min
Afternoon	Learn one topic along with its real-world application.	15 min
Evening	Solve five practice questions and one case study.	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 number system problems initially.
B	15	15 min	Trust your understanding of the AI project lifecycle and AI domains.
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: Algorithmic Thinking, Pattern Recognition, Decomposition, Spatial Reasoning

Algorithmic Thinking

1. Rule-based transformations of numbers or symbols
2. Stepwise movement on grids, tracks or paths with constraints
3. Conditional instructions (if–then, either–or, must/must not)
4. Sequential decision-making under given limitations
5. Optimisation problems involving maximum or minimum outcomes

Pattern Recognition

1. Powers, exponents and numerical structures
2. Relationships across different representations of the same number
3. Geometric configurations and shape-based sequences
4. Conditional patterns based on rules, constraints or dependencies
5. Mixed patterns involving numbers, symbols, shapes, and movement

Decomposition

1. Separating given conditions, constraints, and goals
2. Analyzing multi-step processes such as distribution, transfers and exchanges
3. Breaking numerical expressions into simpler equivalent forms
4. Interpreting tables, grids, networks and diagrams with multiple dependencies
5. Structuring problems involving multiple variables, positions or cases

Abstract Thinking

1. Properties and relationships of numbers (powers, factors, remainders, divisibility)
2. Generalization across different number systems (decimal, binary, ternary, Roman, Chinese numerals)
3. Spatial visualization of 2D and 3D figures, including overlaps, intersections, and transformation
4. Logical interpretation of symbols, codes and operations representing numerical or algebraic ideas
5. Identification of essential information by ignoring irrelevant or misleading data

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

Content Coverage: Basic Computer Concepts, Hardware/Software, Input/Output, Intro to AI

Foundations of AI

1. Distinguishing between Computing and Intelligence.
2. Understanding the history of AI through pioneers such as Alan Turing and John McCarthy.
3. Exploring the concepts of the Turing Test and the AI Winter.
4. Explaining the uses of AI in daily life and understanding AI as a specific type of algorithm that uses datasets, learning, and prediction.
5. Describing AI ethics as the values and guidelines that ensure AI is created and used responsibly.

Human vs. Machine Intelligence

1. Comparing natural biological evolution, creativity, emotional understanding, and human judgment with machine learning, processing speed, pattern recognition, and accuracy.
2. Recognizing how bias in AI can lead to unfair conclusions and understanding the importance of accountability, privacy, transparency, and serving human interests.
3. Understanding the role of human oversight in the development and deployment of AI systems.

AI vs. Automation

1. Recognizing that automation follows fixed rules while AI learns from data to handle new and unfamiliar situations.
2. Analysing contributions of AI to fields such as healthcare, automation, education, transportation, and communication.
3. Understanding both the benefits and potential risks associated with AI-driven systems.

Introduction to Machine Learning

Understanding fundamental methodologies including:

1. Supervised Learning (labelled data)
2. Unsupervised Learning (unlabelled data)
3. Reinforcement Learning (rewards and penalties)
4. Understanding how AI systems learn from data to make predictions and decisions.
5. Exploring simple no-code AI tools and understanding how machine learning powers their functionality.

Data Fundamentals

1. Identifying properties of numerical, text, image, video, and sound data types.
2. Explaining how AI uses data as the foundation for learning and decision-making.
3. Finding and researching sources of bias in datasets.
4. Applying basic strategies to ensure fairness, inclusivity, and representation in data collection and usage.
5. Understanding the importance of privacy, data security, and responsible data handling.

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

C

Section C: Everyday AI Around Us

Content Coverage: Real-world AI applications (Bhashini, Maps, Autocomplete), Internet Safety

This section highlights specific, real-world practical applications of AI in modern society.

Environmental Protection

- **Pollution Control:** Using satellite imagery to detect plastic waste dumps and forecasting hazardous air quality levels.
- **Waste Management:** AI-powered sorting machines (e.g., Indore model) and mobile apps for automatic neighborhood waste report processing (e.g., Pune model).
- **Conservation:** Trail Guard AI for real-time endangered species identification in tiger reserves.

Healthcare Transformation

- **Diagnostics:** AI-driven TB screening in chest X-rays (ICMR validated tools) and early tumor detection through scan analysis.
- **Predictive Care:** Flagging high-risk individuals by analyzing digitized health records (Ayushman Bharat Digital Mission).
- **Virtual Assistants:** Medication reminders and chatbots like SUMAN SAKHI for maternal care info.

Agriculture & Smart Automation

- **Precision Farming:** Soil analysis via platforms like Bharat Vistaar and pest detection through crop photo analysis (e.g., e-NAM).
- **Smart Homes & Cities:** Voice-controlled appliances, security cameras detecting "unusual activity," and AI-based traffic signal timing in cities like Delhi/Bengaluru.
- **No-Code AI Implementation:** Familiarity with the practical use of tools like Teachable Machine for building waste classifiers or voice recognition models.

D

Section D: Elite Thinkers Section (10 Marks)

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 a valid solution under strict weight or quantity limitations (e.g., the bag capacity and fruit seller puzzles).
- **Interconnected Logic:** Solving complex grid-based puzzles requiring the reconciliation of multiple interdependent rules (e.g., stacked box sequences).

Critical Ethical Reflection (AI Focus)

- **Accountability Analysis:** Evaluating high-stakes scenarios (like healthcare AI errors) to determine where human supervision is essential.
- **Bias Identification:** Researching hidden sources of bias in datasets and proposing strategies for fairness and inclusivity.
- **Impact of Misinformation:** Analyzing the social consequences of AI-generated misinformation like deepfakes and fake news.

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