



GRADE 12 • AI OLYMPIAD HANDBOOK

AI Olympiad Handbook

A complete guide for Grade 12 students preparing for the AI Olympiad — the full content coverage, exam pattern, a 9-week phase-based preparation strategy, daily routine, exam-day strategy, and the detailed curriculum for every section.

4

SECTIONS A–D

50

QUESTIONS, 60 MARKS

9

WEEK STUDY PLAN

60

MINUTES DURATION

1. Exam Pattern & Content Coverage

Grade 12 — 50 questions across four sections, 60 marks total, 60-minute duration, no negative marking. The table below sets out each section's weightage alongside its full content coverage.

Sec.	Title	Qs	Marks	Total	Content Coverage
A	CT & Logical Reasoning	15	×1	15	Computational Thinking: Decomposition, abstraction, pattern recognition, problem formulation and solution design. Algorithmic Thinking: Algorithms, flowcharts, sequencing, logical decision-making and optimisation. Logical & Analytical Reasoning: Deductive and inductive reasoning, cause-effect analysis, comparison and critical thinking. Problem Solving: Structured problem-solving, computational modelling and real-world problem analysis.
B	AI & Technology Concepts	15	×1	15	Data Science Methodology: Problem definition, data collection, understanding, preparation, modelling, evaluation and deployment. AI & Machine Learning: Model development, training, testing, feature selection, classification and prediction. Big Data & AI: Big Data characteristics, processing, analytics and AI applications. AI Tools & Data Analytics: AI development tools, data analysis, visualisation and model-building platforms. Capstone Project: AI solution planning, implementation and evaluation.
C	Everyday AI Around Us	10	×1	10	Computer Vision: Image processing, image classification, object detection and image recognition. AI Applications: Healthcare, education, business, smart infrastructure and automation. AI Tools & Intelligent Systems: Virtual assistants, recommendation systems, chatbots and automation systems. Human-AI Interaction: Human-AI collaboration and intelligent decision-support systems. Responsible AI: Data privacy, cybersecurity, digital responsibility and ethical AI usage.
D	Elite Thinkers Section	10	×2	20	CT-Based AI Problem Solving: Decomposition, abstraction, pattern recognition, algorithmic reasoning and solution evaluation. Data Science Decision-Making: Data interpretation, trends, data quality and evidence-based decisions. AI Model Evaluation: Model performance, limitations, evaluation and improvement. Computer Vision Case Studies: Image classification, object detection and real-world applications. Capstone Project Analysis: Problem identification, data requirements, solution evaluation and impact. Ethical AI & Innovation: Bias, fairness, privacy, accountability, responsible AI, AI for social good and societal impact.
Total		50 Questions • 60 Minutes • No Negative Marking			60 Marks

2. Preparation Strategy

Phase 1: Build Concepts (Weeks 1–4)

Section	What to Do
A: CT & Logical Reasoning	Practice decomposition, abstraction and pattern recognition on real-world problems daily. Work through algorithmic thinking exercises, flowcharts and sequencing tasks. Build deductive and inductive reasoning through cause-effect and comparison exercises. Practice structured, stepwise problem-solving, computational modelling and solution optimisation.
B: AI & Technology Concepts	Study the Data Science Methodology in depth (7 stages). Understand the five characteristics (5 V's) of Big Data. Practice the Machine Learning workflow, covering supervised and unsupervised learning, model training and feature selection. Explore AI tools for data analysis and modelling. Work on capstone project planning.
C: Everyday AI Around Us	Explore Computer Vision applications in detail. Research AI applications in healthcare, business and smart cities. Build chatbots and virtual assistants using no-code tools. Analyse recommendation systems. Discuss responsible AI usage and cybersecurity.
D: Elite Thinkers	Analyse two real-world AI case studies every week. Evaluate capstone projects and AI models by identifying strengths and weaknesses. Practice ethical decision-making scenarios. Develop innovative AI solutions for societal problems. Write detailed analysis reports covering both technical and ethical perspectives.

Phase 2: Practice (Weeks 5–6)

Frequency	Activity
Daily	Solve 5 MCQs and work through 2 computational-thinking or logical-reasoning problems. Analyse 1 AI case study. Design and optimise 1 algorithm or flowchart. Complete 1 data interpretation exercise.
Saturday	Take a section-wise test (15 questions each for Sections A & B, 10 questions for Section C, and 10 questions for Section D).

Phase 3: Mock Drills (Weeks 7–9)

Week	Plan
Week 7	Attempt 2 full mock tests (50 questions, 60 minutes) followed by deep error analysis.
Week 8	Solve 3 previous years' papers and focus on Section D by writing detailed answers.
Week 9	Take the final mock test, complete light revision, and relax the day before the exam.

3. Daily Routine (50–60 Minutes)

Time	Activity	Duration
Morning	Computational thinking & logical reasoning practice (2–3 problems).	10 min
Afternoon	Learn one topic along with its real-world application.	15 min
Evening	Solve five practice questions and analyse one AI case study.	15 min
Night	Revise the Data Science Methodology and Machine Learning workflow.	10 min

4. Exam Day Strategy

Section	Qs	Time	Strategy
A	15	14 min	Attempt computational-thinking and pattern-recognition questions first; skip complex multi-step logic problems initially.
B	15	14 min	Trust your understanding of the Data Science Methodology.
C	10	12 min	Think about real-world AI applications while answering.
D	10	15 min	Write detailed answers with proper reasoning (5–6 sentences).
Review	All	5 min	Check all answers carefully and correct any silly mistakes.

Key Reminders

- No negative marking – guess if unsure!
- Section D carries 2 marks per question – write complete, well-reasoned answers.
- Computational Thinking and Data Science Methodology are key focus areas.
- Big Data and AI are important concepts for the examination.

5. Detailed Curriculum

A

Section A: CT & Logical Reasoning

Content Coverage: Computational Thinking, Algorithmic Thinking, Logical Reasoning, Analytical Thinking and Problem-Solving Strategies

Computational Thinking

Topics include:

- **Decomposition:** Breaking complex problems into manageable components.
- **Pattern Recognition:** Identifying patterns, relationships and recurring structures.
- **Abstraction:** Identifying essential information and simplifying complex problems.
- **Problem Formulation:** Defining problems, objectives and constraints.
- **Solution Design:** Developing structured and efficient solutions.

Logical & Analytical Reasoning

Topics include:

- **Deductive Reasoning:** Drawing conclusions from established facts and rules.

- **Inductive Reasoning:** Identifying general patterns from specific observations.
- **Cause & Effect Analysis:** Analysing relationships between events and outcomes.
- **Sequencing & Ordering:** Arranging information or actions logically.
- **Decision-Making:** Comparing alternatives and selecting appropriate solutions.
- **Critical Thinking:** Evaluating information, arguments and solutions.

Problem-Solving Strategies

Topics include:

- Stepwise Problem Solving
- Flowchart Interpretation
- Real-Life Problem Analysis
- Computational Modelling
- Optimisation of Solutions

B

Section B: AI & Technology Concepts

Content Coverage: Data Science Methodology, AI Modelling, Machine Learning, Big Data, AI Tools, Data Analytics and Capstone Project Development

Data Science Methodology

Topics include:

- **Problem Definition:** Identifying objectives, requirements and constraints.
- **Data Collection:** Gathering relevant and reliable data.
- **Data Understanding:** Analysing data characteristics, patterns and relationships.
- **Data Preparation:** Cleaning, organising and transforming data.
- **Data Modelling:** Applying suitable algorithms and techniques.
- **Model Evaluation:** Assessing model performance and effectiveness.
- **Deployment & Communication:** Implementing and communicating data-driven solutions.

AI Modelling & Machine Learning

Topics include:

- **Machine Learning Workflow:** Understanding the process of developing ML solutions.
- **Training & Testing Data:** Understanding datasets used for model development and evaluation.
- **Supervised Learning:** Learning from labelled data.
- **Unsupervised Learning:** Identifying patterns in unlabelled data.
- **Model Training:** Learning patterns from data to improve performance.
- **Feature Selection:** Identifying relevant data characteristics.
- **Classification & Prediction:** Generating outputs using learned patterns.

Big Data & Artificial Intelligence

Topics include:

- **Big Data:** Large-scale structured and unstructured datasets.
- **Characteristics of Big Data:** Volume, Velocity, Variety, Veracity and Value.
- **Data Processing:** Collecting, processing and analysing large datasets.
- **Big Data Analytics:** Extracting meaningful insights from large datasets.
- **Big Data & AI:** Using large datasets for AI-based prediction and decision-making.

AI Tools & Data Analytics

Topics include:

- AI Development Tools
- Data Analysis Tools
- AI Model-Building Tools
- Data Visualisation
- Tool-Based AI Development

Capstone Project Development

Topics include:

- Problem Identification
- Solution Planning
- Data Requirement Analysis
- Model Implementation
- Project Evaluation
- Solution Impact Analysis

C

Section C: Everyday AI Around Us

Content Coverage: Computer Vision, AI Applications, Data-Driven Systems, AI Tools, Automation, Intelligent Systems and Responsible AI

Computer Vision

Topics include:

- **Image Processing:** Analysing and enhancing digital images.
- **Image Classification:** Categorising images based on visual features.
- **Object Detection:** Identifying and locating objects in images and videos.
- **Image Recognition:** Recognising patterns and features in visual information.
- **Computer Vision Applications:** Healthcare, security, transportation, agriculture and automation.

AI Applications in Real Life

Topics include:

- **Healthcare AI:** Diagnosis, medical research and healthcare management.
- **Smart Automation:** AI-powered automated systems.
- **Business Applications:** Decision-making, customer services and analytics.
- **Education Technology:** Personalised learning and AI-based education systems.
- **Smart Infrastructure:** AI applications in transportation, cities and public services.

AI Tools & Intelligent Systems

Topics include:

- **Virtual Assistants:** AI-based voice and text interaction.
- **Recommendation Systems:** Personalised suggestions and predictions.
- **Chatbots:** AI-based conversational systems.
- **Automation Systems:** AI-driven task automation.
- **Human-AI Collaboration:** Combining human judgement with AI capabilities.

Responsible AI Usage

Topics include:

- Data Privacy

- Cybersecurity
- Responsible AI Practices
- Digital Responsibility
- Human Oversight

D**Section D: Elite Thinkers Section**

Content Coverage: Applied Computational Thinking, Data Science Decision-Making, AI Model Evaluation, Computer Vision Case Studies, Capstone Project Analysis and Ethical AI

- **CT-Based AI Problem Solving:** Decomposition, abstraction, pattern recognition, algorithmic reasoning and solution evaluation.
- **Data Science Decision-Making:** Data interpretation, trends, data quality, statistical analysis and evidence-based decisions.
- **AI Model Evaluation:** Model performance, evaluation, limitations, reliability and improvement.
- **Computer Vision Case Studies:** Image classification, object detection, image recognition and real-world applications.
- **Capstone Project Analysis:** Problem identification, data requirements, solution evaluation, limitations and impact.
- **Ethical AI & Innovation:** Bias, fairness, privacy, accountability, responsible AI, AI for social good and societal impact.

Bharat AI Olympiads

Partnering with You in Your Child's AI Journey

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