



GRADE 10 • AI OLYMPIAD HANDBOOK

AI Olympiad Handbook

A complete guide for Grade 10 students — the full syllabus, exam pattern, a 9-week preparation strategy, daily routine, exam-day tips, and the detailed curriculum for every section.

4

SECTIONS (A–D)

50

TOTAL QUESTIONS

60

TOTAL MARKS

60

MINUTES DURATION

1. Syllabus

Section	Topics
A: CT & Logical Reasoning	Computational Thinking: Problem Analysis (understanding complex problems, identifying requirements), Abstraction (identifying relevant information, simplifying), Decomposition (dividing into smaller components), Pattern Recognition (identifying relationships, trends), Logical Representation (structured formats, computational models). Algorithmic Thinking: Algorithm Design (step-by-step procedures), Sequential Processing (execution order), Conditional Logic (decision-making structures), Flowchart Development (visual representation), Algorithm Analysis (accuracy, efficiency), Algorithm Optimisation (reducing steps, increasing efficiency). Data & Statistical Reasoning: Data Representation (organising and presenting data), Data Analysis (examining datasets, identifying patterns), Statistical Measures (basic statistical concepts), Data Trends (changes, relationships), Data-Based Decision Making (using analysed information). Logical Reasoning: Analytical Reasoning (examining systematically), Logical Inference (drawing conclusions), Decision-Making (evaluating alternatives), Multi-Step Reasoning (interconnected factors), Critical Analysis (reviewing solutions).
B: AI & Technology Concepts	AI Project Cycle: Problem Scoping (identifying problems, defining objectives), Data Acquisition (collecting relevant data), Data Exploration (analysing and preparing data), Data Processing (organising data), Modelling (selecting algorithms), Evaluation (testing performance), Deployment (implementing solutions). Ethical Frameworks for AI: Bias in AI (biased data/algorithms), Fairness (unbiased outcomes), Transparency (clear decisions), Explainability (reasons behind decisions), Privacy & Security (data protection), Accountability (responsibility), Responsible AI (safe, ethical, human-centred). AI Modelling: Model Development (creating AI models), Training Data (quality data), Testing Data (evaluating performance), Machine Learning Models (prediction/classification), Feature Selection (important characteristics), Model Improvement (enhancing accuracy). Machine Learning Concepts: Supervised Learning (labelled data), Unsupervised Learning (unlabelled data), Reinforcement Learning (feedback/rewards), Classification (categorising data), Regression & Prediction (estimating outcomes), Clustering (grouping similar data).
C: Everyday AI Around Us	Computer Vision: Image Processing (analysing/modifying images), Image Classification (categorising images), Object Detection (identifying and locating objects), Face Recognition (identifying individuals), Computer Vision Applications (healthcare, security, transportation, automation). Natural Language Processing (NLP): Text Processing (analysing written language), Speech Recognition (converting spoken language to digital), Natural Language Understanding (interpreting meaning), Language Generation (generating text responses), NLP Applications (chatbots, translation, virtual assistants). AI Applications & Tools: AI Tools (platforms and technologies), Automation (minimal human intervention), Smart Systems (AI-powered systems), AI in Different Sectors (healthcare, education, business, agriculture), Responsible AI Usage (safe and ethical use).
D: Elite Thinkers	AI Model Evaluation: Model Performance (measuring effectiveness), Accuracy Evaluation (correctness), Evaluation Metrics (comparing performance), Model

Limitations (challenges and weaknesses), Model Improvement (enhancing solutions). Statistical Data Analysis: Data Distribution (organisation and representation), Data Trends (patterns and changes), Statistical Interpretation (understanding results), Data Quality Analysis (accuracy and completeness), Data-Driven Decision Making (using insights). AI Case Studies & Innovation: Real-World AI Systems (practical implementations), AI Solution Evaluation (effectiveness, benefits, limitations), Innovation Using AI (creative approaches), AI and Society (impact on communities), Future of AI (emerging trends). Ethical Decision-Making: Ethical AI Decisions (applying principles), Bias & Fairness Analysis (evaluating outcomes), Privacy & Security Concerns (data protection), Critical Thinking in AI (evaluating solutions), Advanced AI Problem Solving (innovative approaches).

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 Thinkers Section	10	× 2	20
Total		50		60 Marks

**60**

MINUTES DURATION

No

NEGATIVE MARKING

3. Preparation Strategy

Phase 1: Build Concepts (Weeks 1–4)

Section	What to Do
A: CT & Logical Reasoning	- Practice Problem Analysis by identifying requirements before solving. - Apply Abstraction to real-life scenarios by filtering essential information. - Draw flowcharts for complex processes (traffic signals, ATM withdrawal, etc.). - Analyse algorithms to identify errors and optimise solutions. - Practice statistical concepts such as mean, median, mode, and range. - Interpret data from charts and tables daily. - Solve multi-step reasoning problems.

B: AI & Technology Concepts

- Create detailed notes on the AI Project Cycle (all stages with examples).
- Compare Supervised, Unsupervised, and Reinforcement Learning in depth.
- Understand Feature Selection and identify what makes a good feature.
- Research ethical frameworks including bias, fairness, and transparency.
- Analyse case studies to identify bias in real-world AI systems.
- Practice AI model evaluation scenarios.

C: Everyday AI Around Us

- Explore Computer Vision applications such as face recognition and object detection.
- Use NLP tools including chatbots, translation tools, and voice assistants.
- Research AI tools used in different sectors.
- Discuss the difference between Automation and AI in daily life.
- Practice responsible AI usage scenarios.

D: Elite Thinkers

- Evaluate one real-world AI case study every week.
- Practice statistical data analysis using datasets.
- Analyse AI model performance metrics.
- Debate ethical dilemmas involving bias, privacy, and deepfakes.
- Propose innovative AI solutions for real societal problems.

Phase 2: Practice (Weeks 5–6)

Daily	Saturday
Solve 5 MCQs (mix of all sections).	Take a section-wise test.
Design or optimise 1 algorithm.	(15 Questions each for Sections A & B, 10 Questions for Section C, and 10 Questions for Section D.)
Complete 1 data interpretation exercise.	
Analyse 1 AI case study.	

Phase 3: Mock Drills (Weeks 7–9)

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

4. Daily Routine (45–50 Minutes)

Time	Activity	Duration
Morning	Solve one puzzle (flowchart, algorithm, or statistical reasoning).	5 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 AI Project Cycle and Ethical Frameworks.	5 min

5. Exam Day Strategy

Section	Questions	Time	Strategy
A	15	14 min	Attempt easy questions first and skip complex algorithm problems initially.
B	15	14 min	Trust your understanding of the AI Project Cycle and core AI concepts.
C	10	12 min	Think about real-world AI applications while answering.
D	10	15 min	Write detailed answers with proper reasoning (4–5 sentences).
Review	All	5 min	Check all answers carefully and correct any silly mistakes.

TIPS

No negative marking – guess if unsure!

Section D carries 2 marks per question – write complete, well-reasoned answers.

Focus on the AI Project Cycle – it is a key scoring area!

6. Detailed Curriculum

A

CT & Logical Reasoning

Computational thinking, algorithmic thinking, data interpretation & logical reasoning

Content Coverage: Computational Thinking, Algorithmic Thinking, Problem Analysis, Data Interpretation, Statistical Reasoning, Logical Reasoning and Structured Problem-Solving

Computational Thinking

Students will strengthen their computational thinking skills by applying structured approaches to analyse problems, organise information and develop efficient solutions. The focus will be on logical analysis, data-driven thinking and problem-solving approaches used in AI systems.

Topics include:

- **Problem Analysis:** Understanding complex problems, identifying requirements and defining appropriate approaches for solving real-world situations.
- **Abstraction:** Identifying relevant information, selecting important features and simplifying problems for effective analysis.
- **Decomposition:** Dividing complex problems into smaller components and analysing individual parts to develop structured solutions.
- **Pattern Recognition:** Identifying relationships, trends and repeated structures within information and datasets.
- **Logical Representation:** Representing problems using structured formats, relationships and computational models.

Algorithmic Thinking

Students will learn to design, analyse and improve algorithms that support computational and AI-based problem-solving. They will understand how logical steps and decision structures influence outcomes.

Topics include:

- **Algorithm Design:** Creating systematic step-by-step procedures to solve problems effectively.
- **Sequential Processing:** Understanding the execution of instructions in a defined order.
- **Conditional Logic:** Applying decision-making structures using conditions and rules.
- **Flowchart Development:** Representing processes and solutions visually using flowcharts.
- **Algorithm Analysis:** Evaluating the accuracy, efficiency and effectiveness of algorithms.
- **Algorithm Optimisation:** Improving solutions by reducing unnecessary steps and increasing efficiency.

Data Interpretation and Statistical Reasoning

Students will develop skills to analyse and interpret data, which are essential for AI model development and decision-making. They will learn how data patterns influence AI outcomes.

Topics include:

- **Data Representation:** Understanding different formats used to organise and present data.
- **Data Analysis:** Examining datasets to identify patterns, relationships and meaningful information.
- **Statistical Measures:** Understanding basic statistical concepts used to summarise and interpret data.
- **Data Trends:** Identifying changes, relationships and patterns within datasets.
- **Data-Based Decision Making:** Using analysed information to support logical conclusions and predictions.

Logical Reasoning

Students will enhance their ability to analyse information, evaluate possibilities and make logical decisions. These skills support AI problem-solving and model evaluation processes.

Topics include:

- **Analytical Reasoning:** Examining information systematically to identify relationships and solutions.
- **Logical Inference:** Drawing conclusions based on available information and evidence.
- **Decision-Making:** Evaluating alternatives and selecting suitable solutions.
- **Multi-Step Reasoning:** Solving problems involving multiple conditions and interconnected factors.
- **Critical Analysis:** Reviewing solutions and identifying improvements.

B**AI & Technology Concepts**

AI Project Cycle, ethical frameworks, AI modelling & machine learning concepts

Content Coverage: Artificial Intelligence Fundamentals, AI Project Cycle, Ethical Frameworks for AI, AI Modelling, Machine Learning Concepts, Model Development and AI Technologies

AI Project Cycle

Students will understand the systematic process involved in developing AI-based solutions. They will learn how AI projects are planned, developed, tested and implemented to solve real-world problems.

Topics include:

- **Problem Scoping:** Identifying real-world problems, defining objectives, understanding requirements and determining the scope of AI solutions.
- **Data Acquisition:** Understanding the process of collecting relevant, reliable and suitable data required for AI model development.
- **Data Exploration:** Analysing and preparing data to identify patterns, relationships and useful information for AI systems.
- **Data Processing:** Understanding the preparation and organisation of data to improve the quality and effectiveness of AI models.
- **Modelling:** Learning how AI models are developed by selecting appropriate algorithms and techniques based on problem requirements.
- **Evaluation:** Understanding how AI models are tested and assessed based on performance, accuracy and effectiveness.
- **Deployment:** Learning how AI solutions are implemented and used in real-world environments.

Ethical Frameworks for AI

Students will develop awareness about the ethical considerations involved in designing and using AI systems. They will understand the importance of responsible and trustworthy AI development.

Topics include:

- **Bias in AI:** Understanding how biased data and algorithms can influence AI decisions and outcomes.
- **Fairness:** Learning the importance of creating AI systems that provide unbiased and equitable results.
- **Transparency:** Understanding the need for clear and understandable AI decision-making processes.
- **Explainability:** Learning how AI systems communicate the reasons behind their predictions and decisions.
- **Privacy and Security:** Understanding responsible data handling, protection of personal information and secure AI practices.

- **Accountability:** Recognising responsibility in the development, deployment and use of AI systems.
- **Responsible AI:** Understanding principles required for developing safe, ethical and human-centred AI solutions.

AI Modelling

Students will understand the process of creating AI models by applying suitable techniques to analyse data and solve problems. They will explore how models learn patterns and generate outcomes.

Topics include:

- **Model Development:** Understanding the process of creating AI models using data and appropriate algorithms.
- **Training Data:** Understanding the importance of quality data in teaching AI systems.
- **Testing Data:** Learning how separate datasets are used to evaluate model performance.
- **Machine Learning Models:** Understanding different approaches used for AI-based prediction and classification tasks.
- **Feature Selection:** Identifying important data characteristics required for effective model performance.
- **Model Improvement:** Understanding methods to enhance accuracy and reliability of AI systems.

Machine Learning Concepts

Students will explore how machines learn from data and identify patterns to make predictions and decisions.

Topics include:

- **Supervised Learning:** Understanding learning approaches where models are trained using labelled datasets.
- **Unsupervised Learning:** Understanding how models identify hidden patterns from unlabelled data.
- **Reinforcement Learning:** Learning how AI systems improve through feedback and rewards.
- **Classification:** Understanding how data is categorised into predefined classes.
- **Regression and Prediction:** Learning how AI models estimate continuous values and future outcomes.
- **Clustering:** Understanding how similar data points are grouped based on common characteristics.



Everyday AI Around Us

Computer vision, NLP, AI applications & responsible usage

Content Coverage: Computer Vision, Natural Language Processing, AI Applications, AI Tools, Automation, Responsible AI Usage and Real-World Implementation of AI Technologies

Computer Vision

Students will understand how AI systems interpret and analyse visual information such as images and videos. They will explore how computer vision enables machines to identify objects, patterns and features.

Topics include:

- **Image Processing:** Understanding how digital images are analysed and modified for AI applications.
- **Image Classification:** Learning how AI systems categorise images into different groups.
- **Object Detection:** Understanding how AI identifies and locates objects within images or videos.

- **Face Recognition:** Exploring AI techniques used for identifying individuals through facial features.
- **Computer Vision Applications:** Understanding the use of computer vision in healthcare, security, transportation and automation.

Natural Language Processing (NLP)

Students will understand how AI systems process, interpret and generate human language. They will explore how machines communicate and analyse textual information.

Topics include:

- **Text Processing:** Understanding how AI systems analyse and process written language.
- **Speech Recognition:** Learning how AI converts spoken language into digital information.
- **Natural Language Understanding:** Understanding how machines interpret human language and meaning.
- **Language Generation:** Exploring how AI systems generate human-like text responses.
- **NLP Applications:** Understanding applications such as chatbots, translation systems and virtual assistants.

AI Applications and Tools

Students will explore the practical use of AI technologies and tools in different areas of everyday life. They will understand how AI supports automation, decision-making and innovation.

Topics include:

- **AI Tools:** Understanding different AI-based platforms and technologies used for solving problems.
- **Automation:** Exploring how AI enables machines to perform tasks with minimal human intervention.
- **Smart Systems:** Understanding AI-powered systems used in daily life and industries.
- **AI in Different Sectors:** Exploring applications of AI in healthcare, education, business, agriculture and society.
- **Responsible AI Usage:** Understanding safe, ethical and effective use of AI tools.

D

Elite Thinkers Section

AI model evaluation, statistical analysis, case studies & ethical decision-making

Content Coverage: AI Model Evaluation, Statistical Analysis, AI Case Studies, Innovation, Ethical Decision-Making, AI Solution Assessment and Advanced Problem-Solving

AI Model Evaluation

Students will learn how AI models are assessed to determine their accuracy, reliability and effectiveness. They will understand the importance of evaluating AI solutions before deployment.

Topics include:

- **Model Performance:** Understanding methods used to measure the effectiveness of AI models.
- **Accuracy Evaluation:** Analysing how correctly AI models produce expected results.
- **Evaluation Metrics:** Understanding measures used to compare and improve AI model performance.
- **Model Limitations:** Identifying challenges and weaknesses in AI systems.
- **Model Improvement:** Applying evaluation results to enhance AI solutions.

Statistical Data Analysis

Students will develop the ability to interpret statistical information used in AI systems. They will understand how data analysis supports decision-making and model development.

Topics include:

- **Data Distribution:** Understanding how data values are organised and represented.
- **Data Trends:** Analysing patterns and changes within datasets.
- **Statistical Interpretation:** Using statistical information to understand AI results.
- **Data Quality Analysis:** Evaluating data accuracy, completeness and reliability.
- **Data-Driven Decision Making:** Applying insights from data analysis to solve problems.

AI Case Studies and Innovation

Students will analyse real-world AI applications and evaluate their effectiveness, impact and ethical considerations. They will apply AI concepts to develop innovative solutions.

Topics include:

- **Real-World AI Systems:** Studying practical AI implementations and their applications.
- **AI Solution Evaluation:** Assessing the effectiveness, benefits and limitations of AI solutions.
- **Innovation Using AI:** Exploring creative approaches to solve problems using AI technologies.
- **AI and Society:** Understanding the impact of AI on individuals, communities and industries.
- **Future of AI:** Exploring emerging trends and possibilities in AI development.

Ethical Decision-Making and Advanced Problem Solving

Students will apply critical thinking skills to analyse AI-related challenges and make responsible decisions. They will evaluate AI solutions considering technical, social and ethical perspectives.

Topics include:

- **Ethical AI Decisions:** Applying ethical principles while developing and using AI systems.
- **Bias and Fairness Analysis:** Evaluating AI outcomes for fairness and reliability.
- **Privacy and Security Concerns:** Analysing challenges related to data protection and responsible AI.
- **Critical Thinking in AI:** Applying reasoning skills to evaluate AI systems and solutions.
- **Advanced AI Problem Solving:** Developing innovative and responsible approaches to complex AI challenges.

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