



GRADE 9 • AI OLYMPIAD HANDBOOK

AI Olympiad Handbook

A complete guide for Grade 9 students — the full syllabus, exam pattern, a 9-week preparation strategy, 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: Abstraction (identifying essential information), Decomposition (breaking problems into components), Pattern Recognition (similarities, trends, recurring structures), Algorithmic Thinking (step-by-step procedures), Logical Problem Solving (reasoning, evaluating possibilities). Algorithmic Thinking: Rule-Based Transformations, Sequential Instructions, Conditional Reasoning (IF-THEN, IF-ELSE), Flowchart Interpretation, Grid and Path-Based Problems, Optimisation and Decision-Making, Algorithm Tracing. Pattern Recognition: Number Patterns, Powers and Exponents, Shape and Geometric Patterns, Symbolic and Visual Patterns, Mixed Logical Patterns, Rule-Based Sequences.
B: AI & Technology Concepts	Foundations of AI: Artificial Intelligence (concept, characteristics), Human Intelligence vs. Machine Intelligence, AI Applications (healthcare, education, agriculture, business), Capabilities and Limitations of AI, Intelligent Systems. AI Project Cycle: Problem Scoping, Data Acquisition, Data Exploration, Modelling, Evaluation, Deployment. Machine Learning: Supervised Learning (labelled data), Unsupervised Learning (unlabelled data), Reinforcement Learning (feedback/rewards), Classification, Prediction, Clustering. AI Domains: Data Science, Computer Vision, Natural Language Processing (NLP), Generative AI. Responsible AI: Bias, Fairness, Transparency, Explainability, Accountability, Privacy, Responsible AI Practices.
C: Everyday AI Around Us	AI Applications: Healthcare (diagnosis, research, patient care), Agriculture (crop monitoring, smart farming), Education (personalised learning, assessment), Smart Cities (urban planning, transport), Robotics (automated tasks), Environmental Sustainability (climate monitoring, resource management), Language Technologies (translation, communication). Digital Citizenship: Cybersecurity, Data Privacy, Digital Footprints, Online Safety, Responsible AI Usage. Social Impact of AI: Benefits of AI, Challenges of AI, Responsible Technology, Human-AI Collaboration, Sustainable Use of AI.
D: Elite Thinkers	Higher-Order Thinking: AI case studies, Computational Thinking, Problem-solving. Ethical Decision-Making: Bias, Privacy, Misinformation, Deepfakes, Responsible AI. Innovation: Evaluating AI solutions and their impact on society.

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

Section	Title	Questions	Marks	Total
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 abstraction by identifying essential vs. irrelevant information in problems. - Break complex problems into 3–4 smaller components. - Draw flowcharts for daily processes (e.g., making tea, morning routine). - Solve grid-based navigation problems daily. - Practice IF-THEN and IF-ELSE logic using real-life examples. - Trace algorithms step by step to verify outputs. - Identify patterns in numbers, shapes, and symbols.
B: AI & Technology Concepts	- Create flashcards for the AI Project Cycle (6 stages). - Compare Supervised, Unsupervised, and Reinforcement Learning with examples. - Research one application each for Data Science, Computer Vision, NLP, and Generative AI. - Analyze a case study to identify bias in a given scenario. - Discuss Fairness, Transparency, and Accountability in AI.
C: Everyday AI Around Us	- Research two AI applications each in Healthcare, Agriculture, and Education. - Explore Smart City initiatives in your city. - Review your own digital footprint. - Create a strong password and a privacy checklist. - Debate the Benefits vs. Challenges of AI.
D: Elite Thinkers	- Solve one AI case study every week. - Practice ethical dilemma scenarios involving bias, privacy, and deepfakes. - Evaluate the pros and cons of an AI solution and its impact on society.

PHASE 2: Practice (Weeks 5–6)

Daily	Saturday
Solve 5 MCQs (mix of all sections).	Take a section-wise test.
Design 1 flowchart.	(15 Questions each for Sections A & B, 10 Questions for Section C, and 10 Questions for Section D.)
Trace 1 algorithm.	
Analyze 1 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 (40–45 Minutes)

Time	Activity	Duration
Morning	Solve one puzzle (pattern, flowchart, or grid).	5 min
Afternoon	Learn one topic along with its real-world application.	15 min
Evening	Solve five practice questions and analyze one case study.	15 min
Night	Revise the stages of the AI Project Cycle.	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 AI concepts and Machine Learning.
C	10	12 min	Think about real-world applications while answering.
D	10	15 min	Write detailed answers with proper reasoning (4–5 sentences).

Section	Questions	Time	Strategy
Review	All	5 min	Check all answers carefully and correct any silly mistakes.

★ No negative marking – guess if unsure!

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

6. Detailed Curriculum

A

CT & Logical Reasoning

Computational Thinking, Algorithmic Thinking, Pattern Recognition, Decomposition, Logical Reasoning, Flowcharts and Spatial Reasoning

Computational Thinking

Students will develop systematic problem-solving skills by learning how to analyse problems, identify patterns, simplify complex information and design efficient solutions. The focus will be on applying computational approaches to logical, mathematical and real-world problems.

Topics include:

- **Abstraction:** Identifying essential information and simplifying complex problems by removing unnecessary details.
- **Decomposition:** Breaking large problems into smaller, manageable components for easier analysis and solution development.
- **Pattern Recognition:** Identifying similarities, trends and recurring structures to predict outcomes and improve problem-solving efficiency.
- **Algorithmic Thinking:** Developing step-by-step procedures and logical sequences to solve problems effectively.
- **Logical Problem Solving:** Applying reasoning techniques to analyse situations, evaluate possibilities and reach accurate conclusions.

Algorithmic Thinking

Students will learn to design, analyse and interpret algorithms used for solving problems. They will understand how instructions, conditions and logical decisions are represented and executed.

Topics include:

- **Rule-Based Transformations:** Understanding how outputs are generated by applying predefined rules.
- **Sequential Instructions:** Learning the importance of order and accuracy in step-by-step processes.
- **Conditional Reasoning (IF–THEN, IF–ELSE):** Understanding decision-making structures used in algorithms.
- **Flowchart Interpretation:** Reading and analysing visual representations of algorithms and processes.
- **Grid and Path-Based Problems:** Solving movement, navigation and route-based logical problems.
- **Optimisation and Decision-Making:** Evaluating different solutions and selecting efficient approaches.
- **Algorithm Tracing:** Following algorithm steps to determine outputs and identify errors.

Pattern Recognition

Students will develop the ability to identify relationships, similarities and recurring structures in numerical, visual and logical information. This skill helps in predicting outcomes and developing efficient problem-solving strategies.

Topics include:

- **Number Patterns:** Identifying numerical sequences, relationships and mathematical patterns.
- **Powers and Exponents:** Understanding patterns involving repeated multiplication and mathematical relationships.
- **Shape and Geometric Patterns:** Analysing visual arrangements, shapes and geometric relationships.
- **Symbolic and Visual Patterns:** Recognising patterns represented through symbols, images and diagrams.
- **Mixed Logical Patterns:** Solving complex patterns involving multiple rules and conditions.
- **Rule-Based Sequences:** Understanding sequences generated through specific logical rules.

B

AI & Technology Concepts

Artificial Intelligence Fundamentals, AI Project Cycle, Machine Learning, AI Domains, Generative AI and Responsible AI

Foundations of Artificial Intelligence

Students will understand the fundamental concepts of Artificial Intelligence, its development, applications and role in solving real-world problems. They will explore how AI systems simulate human intelligence and perform tasks through data, algorithms and computational methods.

Topics include:

- **Artificial Intelligence:** Understanding the concept, characteristics and basic principles of AI systems.
- **Human Intelligence vs Machine Intelligence:** Comparing human cognitive abilities with the capabilities and limitations of AI systems.
- **AI Applications:** Exploring the use of AI in different fields such as healthcare, education, agriculture, business and technology.
- **Capabilities and Limitations of AI:** Understanding what AI systems can achieve and the challenges associated with AI implementation.
- **Intelligent Systems:** Learning about systems that use data, algorithms and decision-making processes to perform intelligent tasks.

AI Project Cycle

Students will learn the structured process involved in developing AI-based solutions. They will understand how real-world problems are identified, analysed and solved using AI methodologies.

Topics include:

- **Problem Scoping:** Identifying problems, defining objectives and understanding the requirements for developing AI solutions.
- **Data Acquisition:** Understanding the process of collecting relevant and reliable data required for AI models.
- **Data Exploration:** Analysing, organising and interpreting data to identify patterns and meaningful information.
- **Modelling:** Developing AI models by applying suitable algorithms and techniques to solve problems.
- **Evaluation:** Assessing the performance, accuracy and effectiveness of AI models.

- **Deployment:** Understanding the process of implementing AI solutions in real-world environments.

Machine Learning

Students will explore how machines learn from data, identify patterns and make predictions or decisions without being explicitly programmed for every task.

Topics include:

- **Supervised Learning:** Understanding learning methods where machines use labelled data to make predictions and classifications.
- **Unsupervised Learning:** Exploring techniques where machines identify hidden patterns and structures in unlabelled data.
- **Reinforcement Learning:** Understanding learning through interaction, feedback and rewards.
- **Classification:** Learning how AI systems categorise data into predefined groups.
- **Prediction:** Understanding how AI models use existing data to estimate future outcomes.
- **Clustering:** Learning how AI systems group similar data points based on common characteristics.

AI Domains

Students will understand the major domains of Artificial Intelligence and their applications in different industries and real-world scenarios.

Topics include:

- **Data Science:** Understanding the process of collecting, analysing and interpreting data to extract meaningful insights.
- **Computer Vision:** Learning how AI systems interpret and analyse images, videos and visual information.
- **Natural Language Processing:** Understanding how AI systems process, analyse and generate human language.
- **Generative AI:** Exploring AI systems that create new content such as text, images, audio and other digital outputs.

Responsible AI

Students will develop awareness about the ethical, social and responsible use of Artificial Intelligence. They will understand the importance of fairness, transparency and accountability in AI systems.

Topics include:

- **Bias:** Understanding how unfair patterns or prejudices in data can affect AI decisions.
- **Fairness:** Learning the importance of developing AI systems that provide equal and unbiased outcomes.
- **Transparency:** Understanding the need for clear and understandable AI decision-making processes.
- **Explainability:** Learning how AI systems can provide reasons behind their predictions and decisions.
- **Accountability:** Understanding responsibility in the development and use of AI technologies.
- **Privacy:** Learning about protecting personal information and ensuring secure use of data.
- **Responsible AI:** Understanding ethical guidelines and practices for safe and beneficial AI development.

C

Everyday AI Around Us

AI Applications, Robotics, Digital Citizenship, Cybersecurity, Data Privacy and Responsible Technology

AI Applications

Students will explore how Artificial Intelligence is transforming various sectors and improving efficiency, decision-making and innovation in everyday life.

Topics include:

- **Healthcare:** Understanding the use of AI in diagnosis, medical research, patient care and healthcare management.
- **Agriculture:** Exploring AI applications in crop monitoring, smart farming and agricultural decision-making.
- **Education:** Understanding the role of AI in personalised learning, assessment and educational support systems.
- **Smart Cities:** Learning how AI supports urban planning, transportation management and public services.
- **Robotics:** Understanding the integration of AI with machines to perform automated and intelligent tasks.
- **Environmental Sustainability:** Exploring how AI contributes to climate monitoring, resource management and environmental protection.
- **Language Technologies:** Understanding AI-based tools that support communication, translation and language processing.

Digital Citizenship

Students will understand the responsible, safe and ethical use of digital technologies. They will develop awareness about online behaviour, security and digital responsibility.

Topics include:

- **Cybersecurity:** Understanding methods to protect digital systems, devices and information from online threats.
- **Data Privacy:** Learning the importance of protecting personal information and controlling data sharing.
- **Digital Footprints:** Understanding the information users leave behind through online activities.
- **Online Safety:** Developing awareness about safe internet practices and responsible digital behaviour.
- **Responsible AI Usage:** Understanding ethical practices while interacting with AI-based technologies.

Social Impact of AI

Students will evaluate the influence of Artificial Intelligence on individuals, organisations and society. They will understand both the benefits and challenges associated with AI adoption.

Topics include:

- **Benefits of AI:** Understanding how AI improves efficiency, innovation and decision-making.
- **Challenges of AI:** Exploring limitations, risks and concerns related to AI technologies.
- **Responsible Technology:** Understanding the need for ethical and sustainable use of technology.
- **Human-AI Collaboration:** Learning how humans and AI systems can work together effectively.
- **Sustainable Use of AI:** Understanding the importance of developing AI solutions that support society and the environment.

D

Elite Thinkers

Higher-Order Thinking, Ethical Decision-Making, and Innovation applied to advanced AI case studies and real-world evaluation.

Higher-Order Thinking

- AI case studies.
- Computational Thinking.
- Problem-solving.

Ethical Decision-Making

- Bias.
- Privacy.
- Misinformation.
- Deepfakes.
- Responsible AI.

Innovation

- Evaluating AI solutions and their impact on society.

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