

10.2 CLASSES 6–8

Component	Hours/Year	Description
Advanced CT Skills	40	Builds on Classes 3–5; complex situations
Introductory AI Concepts	20	Foundational AI; exposure to AI tools
Interdisciplinary Projects	40	Cross-subject projects applying CT & AI

The syllabus for Classes 6–8 comprises three components:

Advanced CT skills: The syllabus will build on the earlier classes and provide an opportunity to apply CT skills to complex situations in tandem. Total time allocated to this is 40 hours per academic year.

Introductory concepts of AI: The syllabus extends the CT skills the students have gained to AI. They will be introduced to the fundamental concepts of AI and exposed to AI tools in this school stage. The total time allocated to these concepts is 20 hours per academic year.

Interdisciplinary projects: These encourage students to use their understanding of CT and AI to analyse problems, draw connections across disciplines, and design creative, data-driven solutions. These projects are designed to integrate concepts from various subjects, such as Mathematics, Science, Social Studies, and English, allowing students to apply their learning in authentic, real-world contexts. Each activity is carefully curated to make learning engaging and hands-on rather than academically demanding, promoting curiosity, collaboration and innovation. *Through these experiences, students not only strengthen their CT and AI skills, but also develop critical thinking and an appreciation for the interconnected nature of knowledge.*

10.2.1 LEARNING OUTCOMES**Class 6 — CT****Abstract Thinking**

Students will be able to interpret and solve multi-step problems with layered and abstract clues, using:

- Advanced viewpoints and cross-sections of 3-D objects
- Combined transformations of shapes (multiple flips, rotations, reflections, cuts/folds)
- Changes in orientation, position, order, and direction (clockwise, counter-clockwise, diagonal)
- Identifying hidden, overlapping, or implied parts in complex visual patterns
- Symmetry across multiple axes and composite mirror/water image reasoning
- Visual reasoning involving scale, proportion, and spatial relationships

Pattern Recognition

Students will be able to identify, extend, and justify complex patterns involving multiple simultaneous changes, formed using:

- Numbers with mixed operations and logical rules
- Shapes/images with changing attributes (size, position, count, orientation)
- Letters and symbols with positional or alphabetical logic
- Patterns involving alternation, skipping, grouping, or cyclic behaviour
- Mixed patterns combining numbers, shapes, and letters with dependency rules

Decomposition

Students will be able to break down higher-order problems involving interdependent clues and constraints, using information from:

- Numerical clues involving place value, operations, factors, multiples, and comparisons
- Properties of 2-D and 3-D shapes (faces, edges, vertices, diagonals, angles)
- Multi-step transfers or exchanges (money, quantities, digits, objects) with conditions
- Tables, grids, or charts requiring cross-referencing of multiple data points
- Conditional rules for counting, grouping, sorting, or eliminating possibilities
- Visual representations that encode numerical or logical values

Algorithmic Thinking

Students will be able to follow, analyse, and apply multi-layered rules and procedures to solve complex problems involving:

- Number sequences formed using combined operations and logical conditions
- Movement on grids involving direction, distance, turns, and path constraints
- Step-wise changes where values increase/decrease based on rules
- Multi-step instructions involving swaps, shifts, transfers, and rearrangements
- Ordering people, objects, or events using multiple attributes or clues
- Logical flow of steps, identifying necessary vs redundant information

Class 6 — AI

Learners will be able to:

- Summarise basic ideas and concepts of AI and its applications.
- Describe key differences between machine intelligence and human intelligence.
- Explain the difference between automation and AI using practical, real-world cases.
- Differentiate the three fundamental AI methodologies: supervised, unsupervised, and reinforcement learning.
- Develop the skill of organising and representing data in various forms, including text, numbers,

images, and sounds.

- Recognise simple patterns in data and make decisions based on observations.
- Demonstrate understanding of ethics and digital responsibility in the use of AI, including digital footprints, privacy, and responsible technology behaviour.
- Practice essential internet safety protocols, such as creating secure passwords, maintaining safe online behaviour, and applying basic privacy measures, while using digital and AI tools.
- Apply conceptual knowledge of AI to everyday activities by recognising human-centred design and ethical principles in how AI works and interacts with people.

Class 7 — CT

Abstract Thinking

Students will be able to interpret and solve complex, multi-layered problems by:

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

Pattern Recognition

Students will be able to recognise, extend, and predict complex patterns involving:

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

Decomposition

Students will be able to break down real-world and abstract problems by:

- Separating interconnected conditions and constraints into manageable components
- Analysing number properties (factors, multiples, ratios, percentages, powers) within layered clues
- Deconstructing problems involving spatial reasoning, measurements, and geometry
- Interpreting tables, grids, charts, and flow-based information with multiple dependencies
- Breaking multi-step logical situations (movement, exchanges, comparisons, scheduling) into

ordered steps

- Translating visual or verbal information into structured data for systematic analysis

Algorithmic Thinking

Students will be able to design and follow logical procedures to solve advanced problems involving:

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

Class 7 — AI

Learners will be able to:

- Distinguish key predictive techniques such as:
 - **Regression** — predicting a number based on patterns in past data
 - **Classification** — arranging things in groups based on learned patterns
 - **Clustering** — automatically grouping similar items together
- Explain key AI domains of AI, namely
 - **Data Science:** learn to manage and extract insights from data
 - **Computer Vision:** learn the basics of how machines understand and respond to visual information
 - **Natural Language Processing:** understand the basics and limitations of how computers process and handle natural language inputs
- Explain what bias in AI means, and identify situations where AI can give unfair results
- Demonstrate courteous, safe, and responsible use of technology as part of good digital citizenship
- Use safe practices for maintaining data privacy, including giving informed consent before personal data is collected, used, shared, archived, or deleted
- Collect and organise simple structured data, interpreting patterns and trends, and create bar charts, line graphs and pie charts
- Apply basic predictive approaches/techniques to a small dataset
- Explain uses of AI in healthcare, education, transport, and communication

Class 8 — CT**Abstract Thinking**

Students will be able to solve advanced, multi-layered problems involving abstract relationships and hidden structures, using:

- Properties and relationships of numbers (powers, factors, remainders, divisibility)
- Generalisation across different number systems (decimal, binary, ternary, Roman, Chinese numerals)²⁶
- Spatial visualisation of 2-D/3-D figures, including overlaps, intersections, and transformations
- Logical interpretation of symbols, codes, and operations representing numerical or algebraic ideas
- Identification of essential information by ignoring irrelevant or misleading data

Pattern Recognition

Students will be able to identify, compare, and extend complex patterns involving multiple simultaneous changes, formed using:

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

Decomposition

Students will be able to break down high-order logical problems into manageable components by:

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

Algorithmic Thinking

Students will be able to design, follow, and evaluate multi-step logical procedures to solve problems involving:

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

Class 8 — AI

Learners will be able to:

- Describe the stages of the AI project cycle: Define Problem, Collect Data, Test AI Tools, Reflect and Improve
- Apply no-code tools to tackle real-world problems and reflect on their utility/effectiveness
- Explain how AI uses data, find and research sources of bias in datasets, and apply basic strategies to ensure fairness and inclusivity
- Recognise how bias in AI leads to unfair conclusions and realise the importance of accountability, privacy, and serving human interests
- Explain the uses of AI in daily life and understand AI as a specific type of algorithm that uses datasets, learning, and prediction
- Analyse contributions of AI to fields like healthcare, automation, and education, understanding both benefits and risks
- Describe AI ethics as the values and guidelines that ensure AI is created and used responsibly

10.2.2 SYLLABUS FOR ADVANCED CT SKILLS (CLASSES 6–8)

For Classes 6–8, the CT curriculum will build upon the foundational skills developed in Classes 3–5, introducing more advanced applications and problem-solving tasks. The design of the curriculum will be closely aligned with the mathematics textbooks for each class, ensuring seamless integration of CT concepts into existing topics. The accompanying resource book will parallel the structure of the mathematics textbook while incorporating targeted CT exercises in every chapter. This approach will allow teachers to naturally reinforce and expand CT skills as they progress through the mathematics curriculum.

10.2.3 SYLLABUS FOR EARLY AI (CLASSES 6–8)

Duration: 20 hours per class

Class 6 — AI Syllabus

#	Content	Hours
1	Introduction to AI & Everyday Examples — Understanding what AI is; Difference between AI and Automation; Comparison between human and machine intelligence; Introduction to AI concepts and its types (supervised, unsupervised, and reinforcement learning)	05
2	Basic Data Concepts — Introduction to data types (numbers, text, images, sound); Simple data organisation and representation using tables or charts	05

#	Content	Hours
3	Simple Pattern Recognition & Decision Making — Identifying patterns in data or daily routines; Making simple decisions based on observations	05
4	Ethics and Digital Responsibility — Basic online safety, privacy, passwords, and ethical use of technology; Understanding digital footprints	05
Total		20

Class 7 — AI Syllabus

#	Content	Hours
1	AI Domains — Introduction to predictive techniques: classification, regression, and clustering, with hands-on practice applying them to a small dataset using AI tools; Understanding Computer Vision, Natural Language Processing (NLP), and Data Science; Examples like chatbots, image recognition, and translation tools	05
2	AI in Industries — Applications in healthcare, education, transport, and communication; How AI improves accuracy, efficiency, and productivity	05
3	Data Visualisation & Analysis — Collecting structured data; Creating bar charts, line graphs, or pie charts; Interpreting patterns	05
4	Ethics & AI Bias Awareness — Introduction to bias in AI; Case examples; Responsible and fair use of AI; Digital citizenship	05
Total		20

Class 8 — AI Syllabus

#	Content	Hours
1	AI Project Lifecycle (Conceptual) — Understanding stages of AI projects: Define Problem, Collect Data, Test AI Tools, Reflect and Improve; How AI learns from patterns in data	05
2	Deeper Dive into AI Applications — Exploring AI in the environment, healthcare, automation, and education; Connecting AI systems to real-world problem-solving; Hands-on experience with simple no-code AI tools (image classifiers, chatbots, data prediction apps)	05
3	Data and Fairness — Understanding how AI uses data; Identifying bias in datasets; Simple strategies to ensure fairness and inclusivity	05
4	Ethics and Responsible AI — Recognising privacy issues, misinformation, and social impact; Responsible use of AI and digital tools; Reflection on real-world challenges	05
Total		20



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