COMPUTATIONAL THINKING

Sample Chapter Workbook

Developed by PiyushAI Edtech

Classes 3 – 8 | CBSE Curriculum 2026–27

Stage 1	Stage 2
Classes 3 – 5	**Classes 6 – 8**
Preparatory Level	Middle Level

Pattern Recognition	Algorithmic Thinking	Decomposition	Abstract Thinking

How to Use This Sample

This workbook contains sample exercises from all four Computational Thinking (CT) skill areas, presented at two levels: Preparatory (Classes 3–5) and Middle (Classes 6–8). Each chapter follows a consistent structure:

Section	What it contains
Learning Objective	The specific CT skill and CBSE outcome targeted
Warm-Up	A simple entry activity — accessible to all learners
Core Exercises	3–4 graded problems progressing from guided to independent
Challenge	An extension problem for high-achievers
Teacher Notes	Pedagogy tips, common errors, and answer keys

Classes 3–5 Exercises

Marked with a green border. Uses visual, game-like, and everyday contexts. Problems require 1–3 steps.

Classes 6–8 Exercises

Marked with an amber border. Uses multi-step, cross-subject, and real-world contexts. Problems require logic and structured thinking.

Chapter 1: Pattern Recognition

Pattern Recognition is the ability to identify regularities, trends, and relationships within data. It is one of the four pillars of Computational Thinking and the cognitive foundation for how machines 'learn' from data.

Classes 3–5 | Preparatory Level

Objective	Identify simple patterns involving 1 or 2 changes in consecutive terms formed using numbers, shapes, or letters.

Warm-Up ★☆☆

Look at these numbers and write the next two:

2	4	6	8	?	?

What is the rule? _____

Exercise 1 ★★☆

Find the missing number in each row:

#	Pattern	Missing term
a	5, 10, 15, ?, 25	Answer: _____
b	3, 6, 12, ?, 48	Answer: _____
c	A, C, E, ?, I	Answer: _____
d	Z, X, V, T, ?	Answer: _____

Exercise 2 ★★☆

Meera is arranging her books on shelves. The pattern of books on each shelf is shown below. How many books will be on Shelf 5?

Shelf 1	Shelf 2	Shelf 3	Shelf 4	Shelf 5
3 books	5 books	7 books	9 books	?

Answer: _____ Rule I used: _____

Challenge ★★★

The table below shows a mixed pattern using shapes and numbers. Fill in the missing row.

Row	Shape	Sides	Sides × 3
1	Triangle	3	9
2	Square	4	12
3	Pentagon	5	?
4	?	?	18

What shape comes in Row 5? _____

Teacher Notes	Warm-Up answer: 10, 12 (rule: +2). Ex 1: a=20, b=24, c=G, d=R. Ex 2: 11 books (rule: +2). Challenge: Row 3 = 15; Row 4 = Hexagon, 6, 18; Row 5 = Heptagon. Common error: students guess instead of stating the rule explicitly — always ask them to write the rule.

Classes 6–8 | Middle Level

Objective	Identify, extend, and justify complex patterns involving multiple simultaneous changes using numbers with mixed operations, algebraic expressions, and dependency rules.

Warm-Up ★☆☆

What is the next term? Justify your answer with a rule.

1	4	9	16	25	?

Rule: _____

Exercise 1 ★★☆

Two patterns run side by side. Find the relationship between Column A and Column B, then fill the missing values.

n	Column A (A)	Column B (B)	A × B

1	2	10	20
2	4	8	32
3	6	6	36
4	8	?	?
5	?	?	?

Describe the pattern in A: _____

Describe the pattern in B: _____

What happens to A × B as n increases? _____

Exercise 2 ★★★ — Real-World Context

A city records its daily average temperature (°C) for a week. Identify the pattern and predict Thursday's temperature.

Monday	Tuesday	Wednesday	Thursday	Friday
30	28	26	?	22

(a) Predicted Thursday temperature: ____°C

(b) If the pattern continues, on which day will the temperature first drop below 18°C?

_____

(c) A weather app uses this data to 'predict' future temperatures. What type of AI technique does this resemble? _____

Challenge ★★★

A nested pattern: Each term is formed by a different rule depending on whether its position is odd or even.

Term 1	Term 2	Term 3	Term 4	Term 5	Term 6	Term 7
3	10	6	20	12	40	?

(a) Rule for odd positions: _____

(b) Rule for even positions: _____

(c) What is Term 8? _____ Term 10? _____

Chapter 2: Algorithmic Thinking

Algorithmic Thinking is the ability to define a precise, step-by-step sequence of instructions to solve a problem. It is the bridge between understanding a problem and writing a program (or giving instructions to a machine) to solve it.

Classes 3–5 | Preparatory Level

Objective	Follow clear step-by-step rules to solve problems involving grid movements, number sequences, and multi-step instructions.

Warm-Up ★☆☆

Rohan is a robot standing at START on the grid below. Follow the instructions and mark where he ends up.

Instructions: Move RIGHT 2, Move DOWN 1, Move RIGHT 1, Move DOWN 2

START				
				END?

Circle the final position of Rohan on the grid above. What are his coordinates (column, row)?

_____

Exercise 1 ★★☆ — Write the Algorithm

Priya wants to make a cheese toast. The steps below are jumbled. Number them 1–6 in the correct order to make a proper algorithm.

Order	Step
_____	Eat the toast.
_____	Spread butter on the bread.
_____	Place bread in the toaster.
_____	Put grated cheese on top of the bread.
_____	Take out two slices of bread.
_____	Wait until the toast is golden and cheese melts.

Exercise 2 ★★★ — Debug the Algorithm

This algorithm is meant to find the largest number among three given numbers (A, B, C). It has ONE mistake. Find it and write the corrected step.

Step	Instruction
1	Start. Set Largest = A.
2	If B > Largest, set Largest = B.
3	If C < Largest, set Largest = C. ← Is this correct?
4	Print Largest. Stop.

Corrected Step 3: _____

Test with A=7, B=3, C=9. Does your corrected algorithm give 9? YES / NO

Teacher Notes	Warm-Up: Rohan ends at column 4, row 3 (0-indexed) or (4,3). Ex 1 order: 5,3,4,2,6,1. Ex 2: Step 3 should be 'If C > Largest, set Largest = C.' Test: after step 2, Largest=7; corrected step 3 gives 9. Common error: students often confuse < and > in conditions — use the arrow analogy (the arrow always points to the smaller number).

Classes 6–8 | Middle Level

Objective	Design and follow multi-step logical procedures using conditional branching, iterative patterns, and optimisation to solve real-world problems.

Warm-Up ★☆☆

Translate this everyday instruction into an algorithm with numbered steps:

"Check if a student has passed. If marks are 40 or above in all subjects, print PASS. Otherwise, print FAIL and list the subjects below 40."

Step 1: _____

Step 2: _____

Step 3: _____

Step 4: _____

Step 5: _____

Exercise 1 ★★☆ — Flowchart Conversion

Convert the following algorithm for calculating electricity bill into plain English steps, then identify: (a) the decision point, (b) the two possible paths.

Step	Algorithm
1	Read units_used
2	If units_used <= 100: bill = units_used × 3
3	Else: bill = 100×3 + (units_used−100)×5
4	Add fixed_charge = 50 to bill
5	Print total bill

(a) Decision point is at Step: _____

(b) Path 1 (True): _____

Path 2 (False): _____

(c) Calculate bill for 150 units: ₹ _____

Exercise 2 ★★★ — Optimisation

Aisha needs to visit 4 shops on a road (S1, S2, S3, S4) starting from HOME. The distances in metres are:

From → To	HOME	S1	S2	S3	S4
HOME	—	200	500	350	700
S1	200	—	300	150	500
S2	500	300	—	200	250
S3	350	150	200	—	400
S4	700	500	250	400	—

(a) Write an algorithm that visits all 4 shops and returns HOME in the shortest distance.

(b) Calculate the total distance for your route.

(c) Connection to AI: This type of problem is called the _____ Problem and is solved using AI techniques like _____.

Challenge ★★★

Design an algorithm for a smart traffic light at a 4-way crossing. It must: (1) give green to the road with the most waiting vehicles, (2) keep green for max 60 seconds, (3) allow emergency vehicles to override. Write your algorithm in at least 8 steps.

Step 1: _____

Step 2: _____

Step 3: _____

Step 4: _____

Step 5: _____

Step 6: _____

Step 7: _____

Step 8: _____

Chapter 3: Decomposition

Decomposition is breaking a large, complex problem into smaller, more manageable sub-problems. It is the first step any programmer — or AI engineer — takes when approaching a new challenge.

Classes 3–5 | Preparatory Level

Objective	Break down problems involving 2–4 clues using information from tables, number relationships, step-by-step transfers, and everyday contexts.

Warm-Up ★☆☆

Ravi has ₹50. He buys a pencil for ₹5, an eraser for ₹3, and a notebook for ₹15. Break this problem into parts to find how much money he has left.

Sub-problem 1	Sub-problem 2	Final Answer
Total spent = ₹___ + ₹___ + ₹___ = ₹___	Money left = ₹50 − ₹___ = ₹___	Ravi has ₹___ left.

Exercise 1 ★★☆ — Multi-Clue Problem

Use all the clues to find the secret number:

Clue	Information
1	I am a 2-digit number.
2	The sum of my digits is 9.
3	I am greater than 50.
4	My tens digit is 3 more than my units digit.

Show your working (use each clue one step at a time):

After Clue 1: Possible numbers are _____

After Clue 2: Possible numbers are _____

After Clue 3: Possible numbers are _____

After Clue 4: The secret number is _____

Exercise 2 ★★★ — Scheduling Problem

A school has 3 periods in the morning: Math, Science, and English. Use the clues to arrange them in the correct order.

Clue	Information

1	English is not the first period.
2	Math is before Science.
3	Science is not the last period.

Period 1	Period 2	Period 3
_____	_____	_____

Classes 6–8 | Middle Level

Objective	Break down high-order logical problems involving interdependent clues, multiple variables, and cross-subject contexts into manageable sub-problems.

Warm-Up ★☆☆

A mobile plan charges ₹199/month for 1 GB data. Each extra GB costs ₹49. A student used 4.5 GB this month. Decompose this into sub-problems and find the total bill.

Sub-problem 1 (base): _____

Sub-problem 2 (extra): _____

Final bill: ₹ _____

Exercise 1 ★★☆ — Constraint Satisfaction

A school canteen has 5 items. Each student can choose 2 items with a budget of ₹40. Find all valid combinations.

Item	Samosa	Juice	Sandwich	Cookie	Banana
Price	₹15	₹25	₹30	₹10	₹12

List all valid 2-item combinations within ₹40:

Combination 1: _____ + _____ = ₹___

Combination 2: _____ + _____ = ₹___

Combination 3: _____ + _____ = ₹___

Combination 4: _____ + _____ = ₹___

How many invalid combinations did you eliminate? _____

Exercise 2 ★★★ — Project Planning

A team of 3 students (Arun, Bina, Cyrus) must complete a science project in 3 days. Use the constraints to assign tasks.

C	Constraint
1	Arun cannot do research (he is travelling Day 1).
2	Writing must happen after Research.
3	Bina must do the Presentation (she has the display board).
4	Cyrus must work on Day 2 only.
5	Each task takes exactly 1 day. Tasks: Research, Writing, Presentation.

	Task	Day
Arun	_____	_____
Bina	_____	_____
Cyrus	_____	_____

Show step-by-step how you eliminated possibilities:

Step 1: _____

Step 2: _____

Step 3: _____

Step 4: _____

Chapter 4: Abstract Thinking

Abstraction is identifying what is essential and ignoring irrelevant details. In computing, abstraction allows us to build models of real-world situations — and it is the principle that makes AI systems generalise from examples to new situations.

Classes 3–5 | Preparatory Level

Objective	Solve problems with hidden or unseen ideas using 3D viewpoints, shape transformations, mirror/rotational symmetry, and incomplete pattern reasoning.

Warm-Up ★☆☆

Circle the shape that is DIFFERENT from all others in the group. State WHY in one sentence.

Triangle	Square	Pentagon	Rectangle	Circle

The odd one out is: _____ because: _____

(Hint: Think about what property all others share.)

Exercise 1 ★★☆ — Spatial Reasoning

A cube has each face painted a different colour. The table shows what you see from 3 directions. Fill in the missing faces.

View from Front	View from Top	View from Right	View from Back
RED	BLUE	GREEN	?

The face opposite to RED is: _____

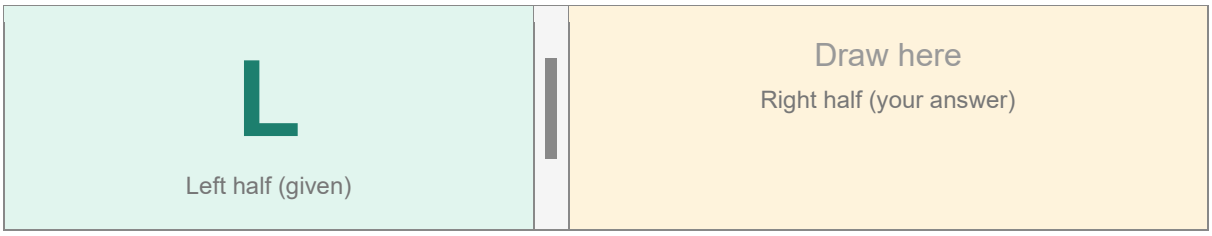
The face opposite to BLUE is: _____

The face opposite to GREEN is: _____

Remaining colours available: YELLOW, ORANGE, PURPLE

Exercise 2 ★★☆ — Symmetry & Mirror Images

The left half of a figure is shown. Draw the mirror image on the right side using the axis of symmetry.



For class exercises, teachers may substitute the 'L' shape with any age-appropriate figure — a house outline, leaf, or letter.

Challenge ★★★ — Rotation Reasoning

A shape is rotated 90° clockwise each step. Fill in what the shape looks like after each rotation.

Original (0°)	After 90°	After 180°	After 270°	After 360°
→	?	?	?	?

After how many 90° rotations does the shape look exactly the same as the original? _____

What type of shapes look the same after every rotation? _____

Classes 6–8 | Middle Level

Objective	Apply abstraction and generalisation to identify core structures across varied contexts, interpret logical symbols and codes, and visualise complex 2D/3D transformations.

Warm-Up ★☆☆

Three different number systems represent the same value. Identify the common value and fill in the blanks.

Decimal	Binary	Roman
10	1010	X
5	101	V
?	1100	?

Decimal value of binary 1100: _____ Roman numeral: _____

What does Abstraction tell us here? _____

Exercise 1 ★★☆ — Generalisation

The same pattern is expressed in three different ways. Identify what they have in common and write a generalised rule.

Form	Expression
Numbers	1, 4, 9, 16, 25 … (each term = position²)
Geometry	Squares with sides 1cm, 2cm, 3cm, 4cm, 5cm … (area = side²)
Story	A town doubles its park area each year starting from 1 hectare: 1, 4, 9… wait — is this the same pattern?

General rule (write as a formula using n): _____

Is the Story example the same pattern? YES / NO. Justify: _____

Exercise 2 ★★★ — Code Abstraction

A secret code replaces letters with symbols using a rule. Decode the message and identify the rule.

Letter	A	B	C	D	E	F
Code	1	3	5	7	9	11

Decode this message: 5 – 15 – 4 – 9 – 14 – 7

Decoded word: _____

The rule (expressed as a formula): Code = _____

What letter has code 27? _____ Code for Z (position 26)? _____

Connection to AI: This type of encoding is similar to _____ used in Natural Language Processing.

Challenge ★★★ — Abstraction in AI

Read the following description and answer the questions:

> A doctor looks at 10,000 X-ray images and learns that tumours appear as irregularly shaped, bright white patches. An AI system is trained on the same images. It learns that whenever brightness > 80% in a cluster of pixels AND the cluster shape is irregular, it flags as 'possible tumour'.

(a) What has the AI 'abstracted' from the images? (What details does it ignore?) _____

(b) What is the 'essential feature' the AI focuses on? _____

(c) Can the AI model make correct decisions if tumours also appear as dark patches? Why / Why not?

(d) This is an example of which AI domain: _____

About This Resource

This sample workbook was developed to demonstrate the depth, quality, and curriculum alignment of the CT & AI Learning Solutions content series. The full workbook suite covers:

Class	CT Skill Areas	AI Literacy Hours	Projects
3	Pattern, Algorithm, Decomposition, Abstraction (Basic)	None (CT integrated into Math/TWAU)	None
4	As above + moderate complexity	None	None
5	As above + multi-layered clues	None	None
6	Advanced CT (all four areas)	20 hrs: Intro to AI, data, ethics	1 interdisciplinary project
7	Advanced CT + applied problems	20 hrs: AI domains, data viz, bias	1 interdisciplinary project
8	Advanced CT + optimisation	20 hrs: AI lifecycle, ethics, no-code tools	1 AI project + presentation

What Schools Get

Student Workbooks (Classes 3–8)

Chapter-by-chapter alignment to Math, Science, TWAU & Social Studies textbooks. Graded exercises from warm-up to challenge.

Teacher Manuals (Classes 3–8)

Lesson plans, pedagogical tips, full answer keys, rubrics for competency-based assessment, and common error guides.

AI Foundation Handbook (Classes 6–8)

20-hour AI literacy course with illustrated concepts, real-world examples, no-code tool activities, and ethics case studies.

Teacher Training Program

40-hour blended certification for Math, Science, and Computer teachers to confidently deliver the CBSE CT & AI curriculum.

To request full workbooks, pricing, or a school demo session:

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