

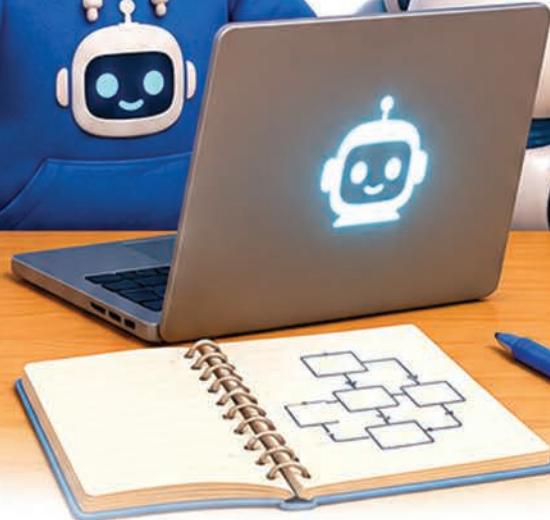


COMPUTATIONAL THINKING & AI

Code Cadets • The Adventure Begins



Class 4

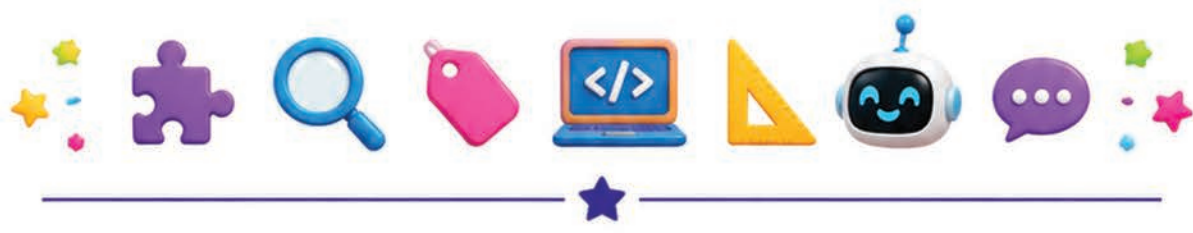




Computational Thinking & AI

Code Cadets · The Adventure Begins

For Class 4 · Book 4 of 8



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NEP 2020 and NCF–SE 2023

First Edition · 2026



Welcome

A Note for Grown-Ups









Dear Teacher and Parent,

Welcome to the most exciting book in our series yet! In Class 4, children deepen the four CT pillars from Class 3 and step into the world of **AI Domains**. They will explore **how AI actually works** – not just what it does!



What's NEW in Class 4:

-  **Nested decomposition** – breaking parts INTO more parts
-  **Complex patterns** – squares, triangles, codes
-  **Variables and classification** – labels for everything
-  **Multi-step flowcharts** with nested loops
-  **4 AI Domains** – Vision, Speech, Language, Recommendations
-  **AI ethics** – doing the right thing with AI


First Look at Code!


Class 4 introduces **pseudocode** – writing algorithms in plain English.
This builds toward real coding in Class 6+.



 Approx.
50 hours

 NEP 2020
aligned

 CBSE CT
2026-27 ready

 90%
screen-free



How to Use This Book



★ Look for these signs to know what each page is about! ★



Big Idea

A core CT or AI concept from CBSE.



Activity

Try the new skill hands-on.



India Page

CT and AI in Indian context.



Flowchart

Multi-step charts with loops!



Mini-Project

Bigger tasks across multiple sessions.



Code Box

First look at pseudocode (English code!).



50 hours over the year

About 1 hour each week. No rush!



Use a pencil — Class 4 has tougher problems. Erase and try again!



Hello!

Meet Your CODE CADETS!



Your 6 Class 3 friends are now in Class 4 – and there's a **NEW** Cadet!



Diya



Now into
AI experiments!



Arjun



Strategy &
flowchart pro!



Mithu



Spots tricky
patterns!



Beep



Speaks 22
languages now!



Tara



Plans BIG
missions!



Veer



Decompositions
king!



Riya ✨ NEW!















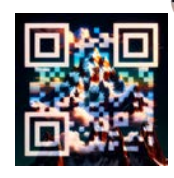
Code Cadet!
Loves writing algorithms
& finding bugs.



What's in this Book?



	Chapter 1 – Smarter Decomposition	Page 7
	Chapter 2 – Pattern Power	Page 20
	Chapter 3 – The Abstraction Toolkit	Page 33
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	Things I Can Do Now	Page 84
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	My Certificate	Page 88



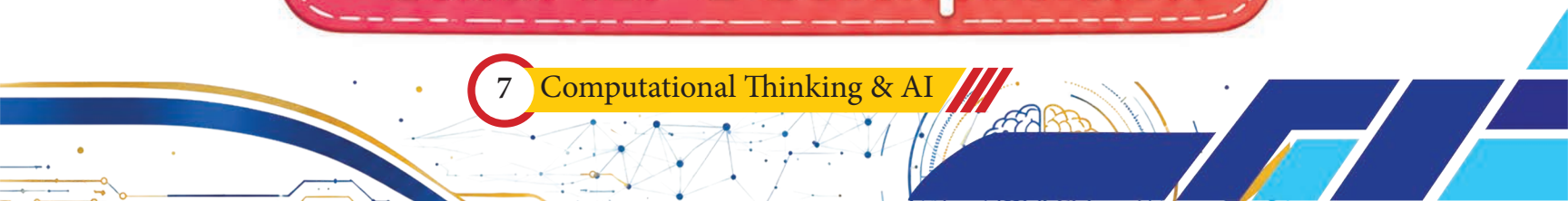
Chapter 1

CT Pillar #1

Level Up



Smarter Decomposition





Decomposition Level Up!



In Class 3 we broke things **ONCE**.
Now we can break parts **AGAIN!**



NEW Word: NESTED DECOMPOSITION

Break a thing into parts. Then break each part into smaller parts.
Like Russian dolls 🧸 – boxes inside boxes!

Watch **Veer** decompose a **HAND**:



A hand



Thumb



Fingers (4)



Palm

▼ (break further!)



Each finger has:
3 knuckles



Each finger has:
1 nail



Each finger has:
1 tip



Decompose · Decompose **AGAIN** · Even **AGAIN!**
Always go smaller.





Decomposition : Level Up! :



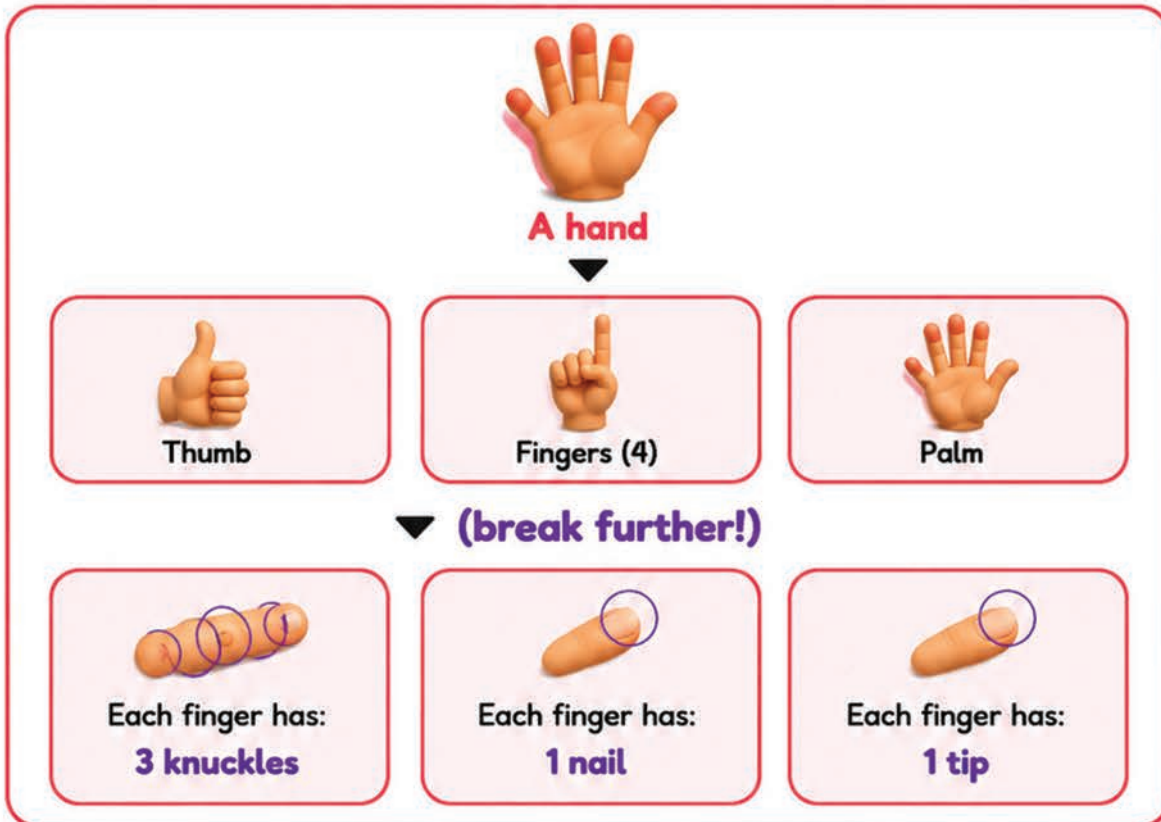
In Class 3 we broke things ONCE.
Now we can break parts AGAIN! :



NEW Word: NESTED DECOMPOSITION

Break a thing into parts. Then break each part into smaller parts.
Like Russian dolls 🧸 – boxes inside boxes!

Watch **Veer** decompose a **HAND**:



Decompose · Decompose AGAIN · Even AGAIN!
Always go smaller.













Decompose Homework!



★ Activity • Big Homework? No Worry!

When homework feels **HUGE**, decompose it. Each tiny piece is easy!



 **Example: "Write a story" (BIG task)**

1  Pick a topic	2  Name characters	3  Decide setting
4  Plan plot	5  Write start	6  Write middle
7  Write end	8  Read & fix	9  Final copy

Your turn – Decompose: "Make a science project"

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____



 **BIG = scary. SMALL = easy. Always decompose first!** 



Decompose a Recipe



Activity • Maggi Decomposed!

Making Maggi has **3 BIG** steps. Each one has small steps inside!




STEP A • Get Ready



-  Take pot
-  Open Maggi packet
-  Measure 2 cups water
-  Get tastemaker

STEP B • Cook

-  Boil water
-  Add noodles
-  Add tastemaker
-  Stir 2 min

STEP C • Serve

-  Turn off gas
-  Pour into bowl
-  Eat & enjoy! ❤️

 Same trick works for **biryani**, **samosa**, **dosa** — any recipe! 



Decompose a Recipe



Activity • Maggi Decomposed!


Making Maggi has **3 BIG** steps. Each one has small steps inside!




 **STEP A • Get Ready**



 Take pot	 Open Maggi packet	 Measure 2 cups water	 Get tastemaker
---	--	--	---

 **STEP B • Cook**

 Boil water	 Add noodles	 Add tastemaker	 Stir 2 min
---	--	--	---

 **STEP C • Serve**

 Turn off gas	 Pour into bowl	 Eat & enjoy! ❤️
---	---	--

 Same trick works for **biryani**, **samosa**, **dosa** — any recipe! 



India Page • Decompose a Wedding



Indian weddings are HUGE events.
They're built from many small rituals!



1 Roka / Engagement

Families say YES!



2 Sangeet / Music night

Dance, song!



3 Mehndi

Henna patterns!



4 Haldi

Turmeric ceremony!



5 Pheras

7 sacred rounds!



6 Reception

Big party!



🚩 Different regions = different decompositions!

Punjabi wedding: Jaago, Anand Karaj • South: Kashi Yatra, Mangalsutra
Bengali: Gaye Holud, Saat Pak.
Same big event, different parts!



Top-Down vs Bottom-Up

Two ways to decompose.

Both useful!

TOP-DOWN

Start with the **WHOLE** thing.
Break it down.



Example: "Birthday party" → invites, food, games, gifts...

Good when you know the **GOAL!**

BOTTOM-UP

Start with **SMALL** parts.
Build them up to make something big!



Example: Lego bricks → small wall → big house → city!

Good when you have **PIECES!**

Quick test: ⚡ Which is which?

1



"I want to make a robot."
Start with the goal. → _____



2



"I have wheels, motors, wires.
Let's build!" → _____



3



"Plan a school fair." → _____



Both are smart!
Computer scientists use both daily.



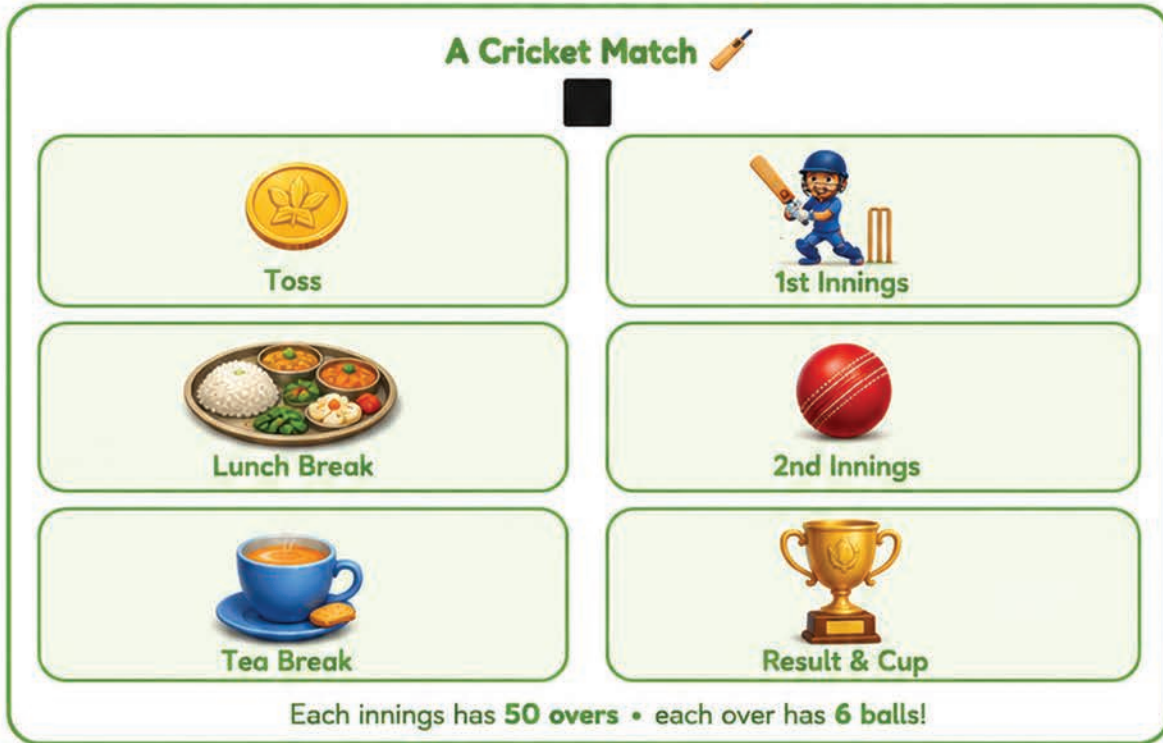


Decompose Cricket Match



Activity · Sports Decomposed

Arjun loves cricket. He decomposes a **1-day match** like this:



Now you! Decompose YOUR favourite sport:

Sport: _____

1 Part 1: _____

2 Part 2: _____

3 Part 3: _____

4 Part 4: _____



Think like a champion!

Break it down. Build it up. Win the game!



Mini-Project • My Week Planner



Mini-Project • Decompose Your Week!



Mission: Plan a perfect week using nested decomposition!


1 Step 1: Big plan – list 7 days:



2 Step 2: Pick 3 days, decompose each into 5 things:

Day 1 (___)	1. ___	2. ___	3. ___	4. ___	5. ___
Day 2 (___)	1. ___	2. ___	3. ___	4. ___	5. ___
Day 3 (___)	1. ___	2. ___	3. ___	4. ___	5. ___

3 Step 3: Pick ONE task. Decompose it MORE:

 **Task:** _____ → tiny parts: 1. ___ 2. ___ 3. ___





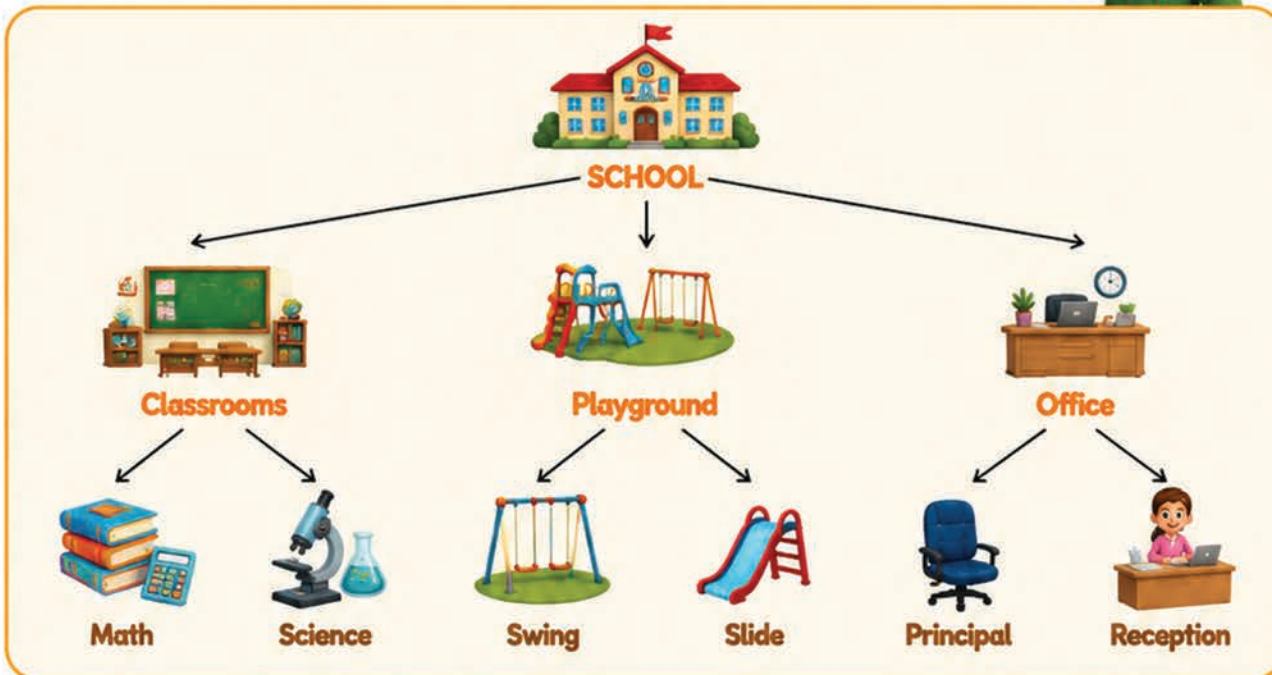
Build a Decomposition Tree




Activity • Drawing Game



A decomposition tree shows nesting visually. Look:



Your turn! Draw a 2-level decomposition tree for "MY HOUSE":

Start with 🏠 at top, then arrows down to rooms, then arrows down to things inside rooms! 





Decomposition Puzzle



Brain Puzzle · Reverse Decomposition!



Here are **PARTS**. Can you guess the **BIG** thing?

1



Puzzle 1 – Parts: wheels, pedals, handle, seat, chain, brake

Big thing: _____

2



Puzzle 2 – Parts: cover, pages, words, pictures, spine

Big thing: _____

3



Puzzle 3 – Parts: screen, keyboard, mouse, speakers, camera

Big thing: _____

4



Puzzle 4 – Parts: stage, audience, lights, music, dancers, costumes

Big thing: _____

5



Puzzle 5 – Parts: hour hand, minute hand, second hand, dial, numbers

Big thing: _____



Reverse decomposition is also called “**composition**” – putting parts together!





Try it Yourself!



Smart Decomposition Challenge

1



2-Level Family Tree: Decompose your family – parents, kids, then names!

2



City Decompose: Pick an Indian city. Decompose into 5 famous places. Then decompose each place!

3



Movie Decompose: Your favourite movie has parts (start, middle, end). Decompose each into scenes!

4



Top-Down vs Bottom-Up: Plan a class trip with BOTH methods!

5



Recipe Master: Help mom cook one dish. Write all the nested steps.



In Chapter 1 you learned:

- Nested decomposition – parts inside parts!
- Top-down vs Bottom-up thinking
- Decomposition trees
- Indian weddings, cricket, recipes – all decomposed!



Decomposition Pro!



Next step: Pattern Power!





Chapter 2

CT Pillar #2 Level Up



Pattern Power

Find patterns. Predict the future!








Pattern Power Up!



Level 4 patterns are smarter — they have **RULES** that change!



What's NEW:

-  Changing-rule patterns
-  Predicting the future from data
-  Tessellations – patterns that tile!
-  Squares, triangles, cubes in numbers
-  Patterns in code



Example of a changing-rule pattern:

2 • 4 • 7 • 11 • 16 • ____ • ____

Differences: +2, +3, +4, +5, +6 (gap GROWS each time!)



Smart patterns don't just repeat — they **EVOLVE!** Find what's growing or changing.



Smart Sequences

Activity · Find the Hidden Rule!

Each pattern has a smart RULE. Find it. Then fill the blank!

1



5 · 10 · 20 · 40 · _____ · _____

Rule: _____ **Hint:** each number **DOUBLES!**

2



1 · 3 · 6 · 10 · 15 · _____

Rule: _____ **Hint:** add +2, +3, +4, +5...

3



100 · 95 · 85 · 70 · 50 · _____

Rule: _____ **Hint:** subtract more each time

4



2 · 6 · 12 · 20 · 30 · _____

Rule: _____ **Hint:** gaps are 4, 6, 8, 10...

5



★★★★★ ★★★★★ ★★★★★ _____

Rule: _____ **Hint:** **DOUBLES** each time! Next: 16 stars!



Computers use these patterns to predict
weather, **stock prices**,
even **cricket scores!**





Predict the Future!



Patterns help us predict what's next –
that's how AI predicts too!



Big Word: PREDICTION

Using past patterns to guess the future.

Weather apps, cricket apps, even mom guessing your moods – all use prediction!



Example: Weather Prediction



Last 5 days in Delhi:



What will tomorrow be like? _____



Your turn – Predict bus arrival:

1 Bus came at 7:00, 7:15, 7:30, 7:45... When next? _____



2 Mom buys vegetables every 3 days.
Last on Monday. Next? _____



3 School holidays start on 15th every month.
Next? _____





Tessellations · Tile Patterns



When shapes fit perfectly with no gaps – that's a **TESSELLATION!**



Big Word: TESSELLATION

Tess-eh-lay-shun!

When shapes tile together with **NO** gaps and **NO** overlaps.



Which shapes can tessellate?



Triangle



YES!



Square



YES!



Hexagon



YES!



Circle



NO – gaps!



Spot tessellations in real life:



Honeycomb!

Hexagons everywhere!



Floor tiles!

Squares fit perfectly!



Turtle shell!

Tiny hexagons!



Bees and turtles invented tessellations **LONG** before humans!





Square & Triangle Numbers



Activity • Number Shapes!

Some numbers can be drawn as shapes!



■ SQUARE NUMBERS:



1 (1×1)



4 (2×2)



9 (3×3)



16 (4×4)

Pattern: 1, 4, 9, 16, 25, _____, _____

▲ TRIANGLE NUMBERS:



1



3



6



10

Pattern: 1, 3, 6, 10, 15, _____, _____



Ancient Indians **KNEW** these number patterns **2000+** years ago!



Code is **FULL** of patterns. Computers love them!



NEW Word: PSEUDOCODE

Soo-doh-code! Writing algorithms in plain English with simple words – almost like real code!



✗ Without a pattern (boring code):



```
# Tell hello 5 times  
say "hello"  
say "hello"  
say "hello"  
say "hello"  
say "hello"
```



✓ WITH a pattern (smart code!):



```
# Tell hello 5 times using a loop!  
repeat 5 times: say "hello"
```



Coders find **patterns** and use **loops** to save time!



Write pseudocode for: **"Brush each of my 32 teeth"**

Your code here: **repeat** _____ **times:** _____



Indian classical music uses PATTERNS called Tala!



Big Word: TALA

A beat pattern that repeats!
Tabla players use tala to keep music flowing!



Famous Talas:



Teen Taal

16 beats!

Dha-Dhin-Dhin-Dha • Dha-Dhin-Dhin-Dha...



Roopak

7 beats!

Faster, fewer beats!



Dadra

6 beats!

Used in semi-classical!



Try clapping a Tala!

Clap-pattern of Teen Taal (16 beats):



Beat 1 is the **LOUDEST!** Then medium, medium, medium, medium...



Songs you love use tala too!

Listen carefully to count beats!





Patterns in YOUR Body!



Your body runs on amazing patterns!



Heartbeat

Lub-DUB-lub-DUB-lub-DUB!
About 80 times per minute!



Breathing

In · Out · In · Out –
15–20 times per minute!



Sleep Cycle

Light sleep · Deep sleep ·
Dreams · Repeat!



Eating

Breakfast · Lunch · Snack ·
Dinner! Every day!



Your turn: Put your hand on chest. Count heartbeats in 1 minute.
Then run 10 jumping jacks and count again!



Resting heartbeat: _____ per min



After exercise: _____ per min



Difference: _____ MORE beats!



Your heart **never** stops.
It's the most **amazing**
pattern in the universe!





Pattern Detective · Hard Level



Game · Solve These!

Mystery 1: A, C, F, J, O, _____

Gaps: 2, 3, 4, 5... Next: skip 6 letters!



Mystery 2: 🐰 🐰 🐰 🐰 🐰 🐰 🐰 🐰 🐰 _____

1, 2, 4, 8... Each one DOUBLES!



Mystery 3: Mon, Tue, Wed, ?, ?, ?, Sun

Fill in the missing days!



Mystery 4: 11, 22, 33, 44, 55, _____

Pattern: Same digit twice!



Mystery 5: ● ● ● ● ● ● ● ● ● ● _____ ●

Reds grow by 1 each time. Next: 5 reds!



Mystery 6 (tricky!): 1, 1, 2, 3, 5, 8, _____, _____

Famous Fibonacci! Each = sum of 2 previous!





Mini-Project · Code Your Pattern



Mini-Project · Pattern Programmer!



Mission: Design a pattern and write its rule like pseudocode!

Step 1: Draw a 10-item pattern. Use shapes, colours, or numbers!



Step 2: What's your pattern's RULE? Write it!

Rule: _____



Step 3: Write it as pseudocode:

```
# My pattern: start with: _____ repeat _____ times:
```



Step 4: Show your sibling. Can THEY predict the next 5 items?





Bonus · Mandala Patterns








≡ **Mandalas are circular patterns from Indian art!** ≡



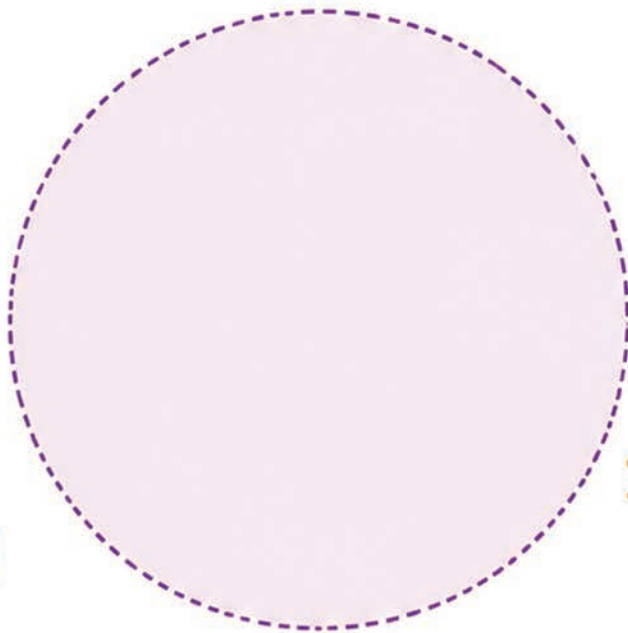
What makes a mandala?

A center point · symmetry around the center · repeating shapes!

Easy mandala steps:

- 1 Draw a dot in the center. 
- 2 Draw 4 small lines coming out (like a +) 
- 3 Add 4 MORE lines between (now you have 8!) 
- 4 Add petals or dots at each line end! 
- 5 Repeat shapes in a circle pattern! 

Try YOUR mandala:





Chapter 2



Try it Yourself!



Pattern Detective Pro Challenge

- 1 Weather Detective:** Note the weather for 5 days. Spot the pattern!
- 2 Tessellation Hunt:** Find 3 tessellations in your home (tiles, fabric, etc.)
- 3 Body Beat:** Count your heartbeat 3 times today!
- 4 Mandala Drawing:** Make a 6-petal mandala with 3 colours!
- 5 Code Detective:** Write pseudocode for "wash all my dishes" using a loop!

In Chapter 2 you learned:



- Changing-rule patterns
- Prediction from past data
- Tessellations (tile patterns)
- Square & triangle numbers
- Pseudocode – your first code!
- Indian Tala & mandalas!

