

Patterns, Possibilities, and Computational Thinking! Transforming Middle Stage Classrooms Through Magic Squares Across Subjects!!!



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Why This Practice?



Traditional Classroom vs Interdisciplinary Classroom



Traditional Learning

Subject → Lesson → Memorization



Knowledge remains isolated.



Interdisciplinary Approach

Pattern → Logic → Subject Connections → Real-life Application



Learning becomes meaningful and interconnected.

“

When learning connects subjects,
it connects minds and builds the future.

$$1 + 2 = 3$$



MAGIC SQUARE:

Where Numbers Create Magic,
Patterns Reveal Logic

THE CLASSIC 3×3 MAGIC SQUARE

8	1	6
3	5	7
4	9	2

Magic Sum
= **15**

Every row, column
and diagonal
equals 15.

Explore the wonder of numbers through symmetry, structure and spatial thinking.

SYMMETRY IN MAGIC SQUARE

ROTATIONAL SYMMETRY



8	1	6
3	5	7
4	9	2

0°

4	3	8
9	5	1
2	7	6

90°

2	9	4
7	5	3
6	1	8

180°

6	7	2
1	5	9
8	3	4

270°

MIRROR REFLECTIONS



6	1	8
7	5	3
2	9	4

Vertical

4	9	2
3	5	7
8	1	6

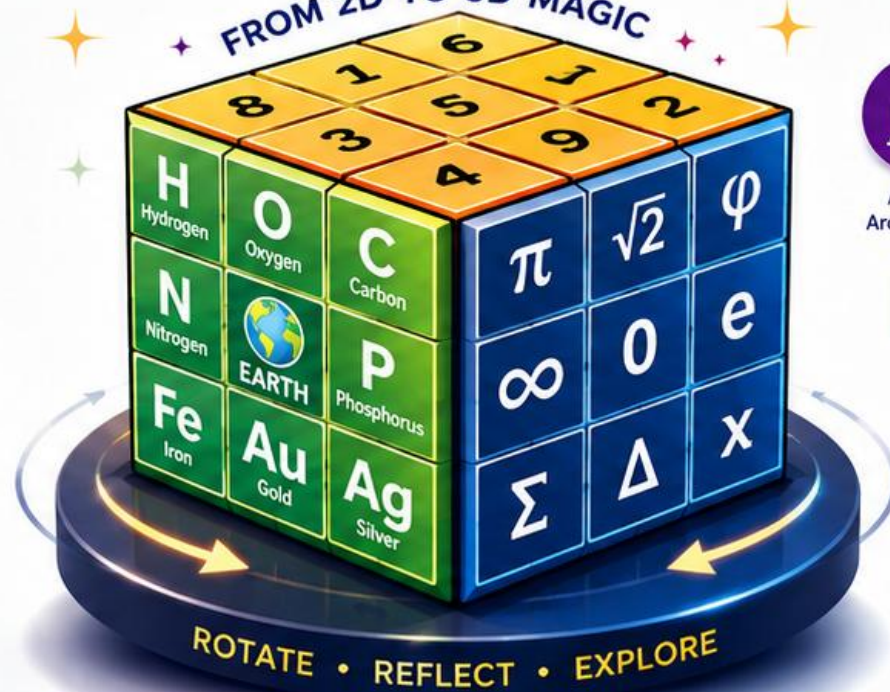
Horizontal

8	3	4
1	5	9
6	7	2

Diagonal

Symmetry shows that beauty and balance
exist in mathematics!

FROM 2D TO 3D MAGIC



- ✦ A cube has multiple rotational symmetries.
- ✦ Observe how patterns change, yet the magic lives on!

MAGIC SQUARES IN LIFE



Ancient
Architecture



Calendars &
Designs



Nature
Patterns



Digital
Encryption



Art &
Decor

“Numbers may be the language of the universe,
but patterns are the poetry.”

WHY IT MATTERS

- ✦ Enhances logical reasoning
- ✦ Builds pattern recognition
- ✦ Strengthens problem-solving skills
- ✦ Connects mathematics with real life
- ✦ Develops spatial visualization



MAGIC SQUARE – SMALL GRID, BIG IDEAS, ENDLESS POSSIBILITIES!



LOGICAL
THINKING



PATTERN
RECOGNITION



PROBLEM
SOLVING



SPATIAL
AWARENESS



CREATIVITY &
INNOVATION



REAL WORLD
CONNECTIONS



TEACHERS AND STUDENTS ARE THE BACKBONE OF OUR FRAMEWORK

1. DECOMPOSITION



Break the big problem into smaller parts (rows, columns, diagonals).

2. PATTERN RECOGNITION



Look for patterns in numbers and their positions.

3. ABSTRACTION



Focus on the important rule: equal sum, not on details.

4. ALGORITHM DESIGN



Create step-by-step rules to fill the square.

USE ACROSS SUBJECTS (IDEAS)



Maths

Consecutive numbers, fractions, decimals.



Science

Atomic numbers of elements, properties of materials.



Social Science

Historical dates, population data, map coordinates.



Language

Word lengths, alphabets, syllable counts.



Art

Symmetry, designs, patterns.



Computer Science

Programming algorithms, puzzles.



The Challenge!!



✓ Engaging activity



✓ Develop Computational Thinking



✓ Integrate different subjects



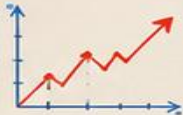
✓ Improve logical reasoning



✓ Make learning enjoyable



$$E=mc^2$$



Challenge your **mind**. Connect the **dots**. Create the **magic**!



METHODOLOGY

Our Approach to Learning Magic Squares

$$a^2 + b^2 = c^2$$



1. PRE-ASSESSMENT



Basic number puzzles



Pattern recognition tasks



Logical reasoning questions



Google Forms Quiz



2. CLASSROOM ACTIVITIES



Mathematics Magic Squares



Science Magic Squares



Social Science Magic Squares



Language Magic Squares



ICT Integration



8	1	6
3	5	7
4	9	2



3 POST ASSESSMENT



Worksheets



Group Presentation



4 REFLECTION



Students explain



How they identified patterns



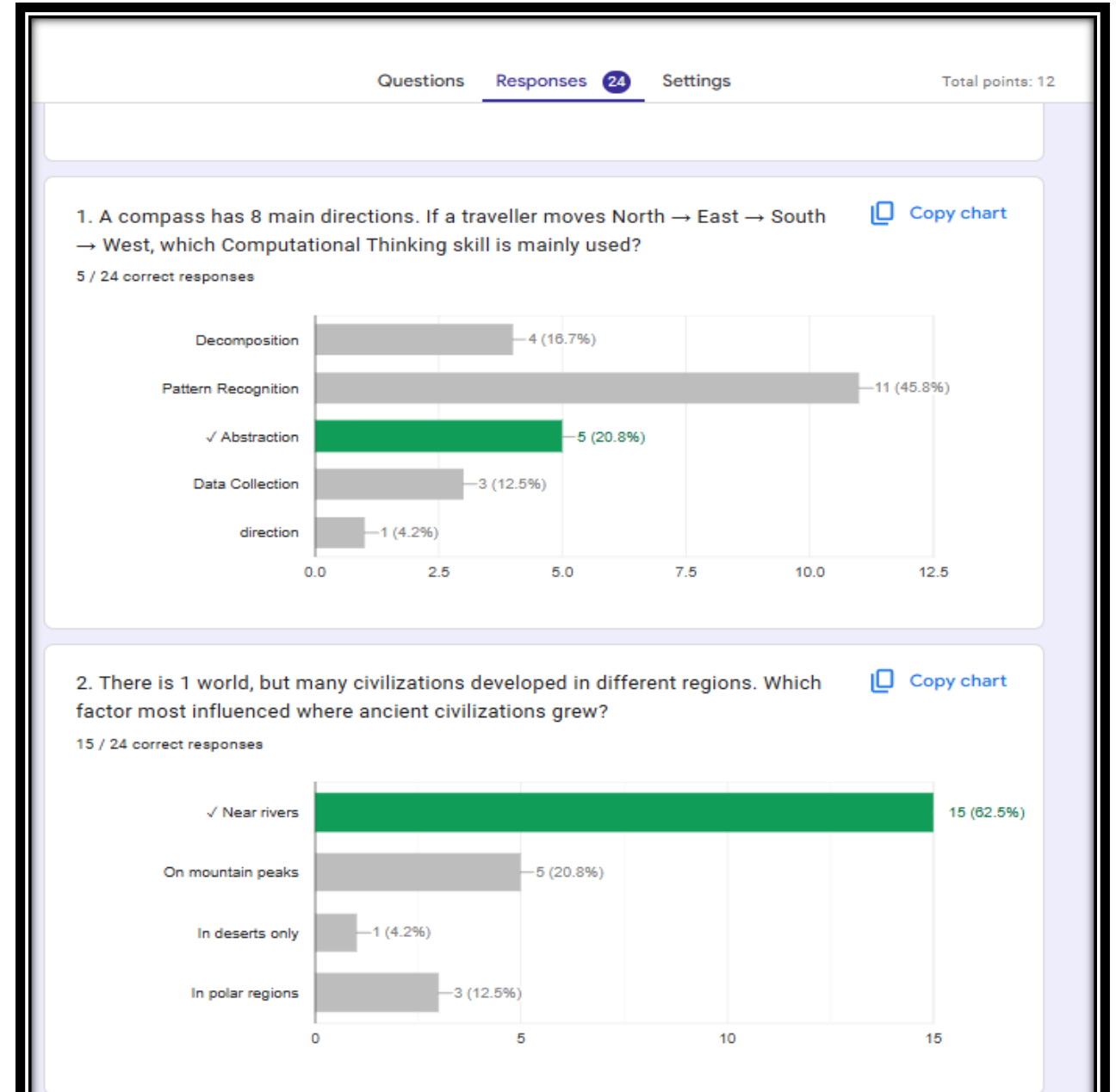
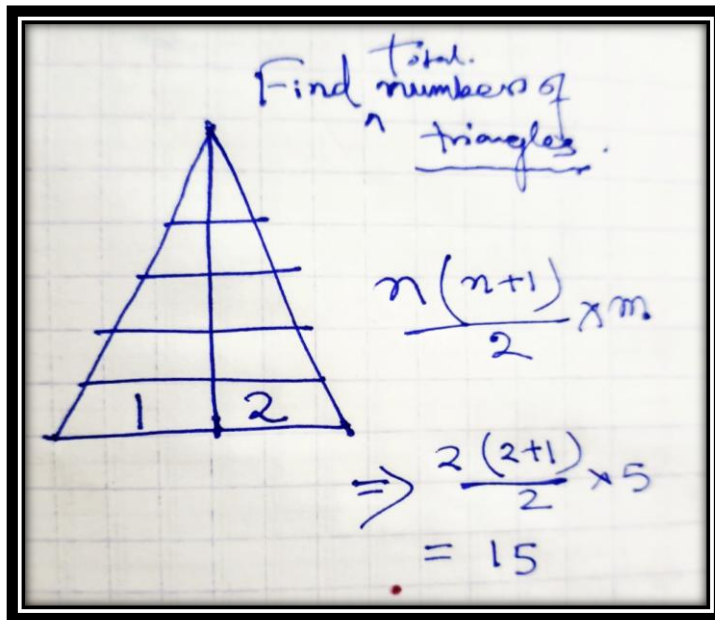
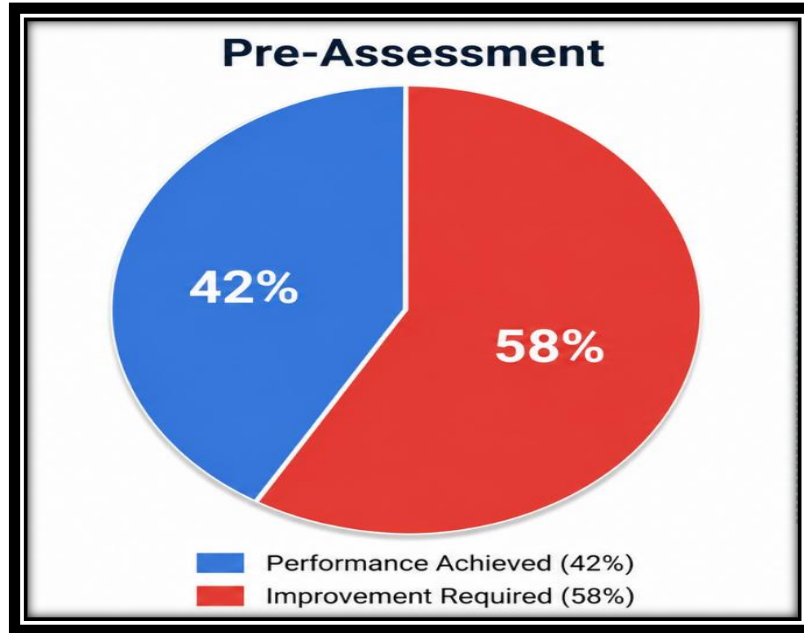
Strategize used



Subject connections discovered



Pre-Assessment Data Sheet



Activity 1

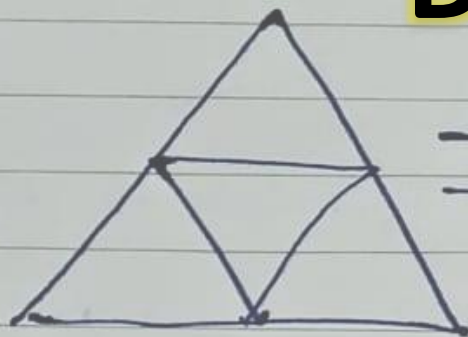
If



=

9

then



=

?

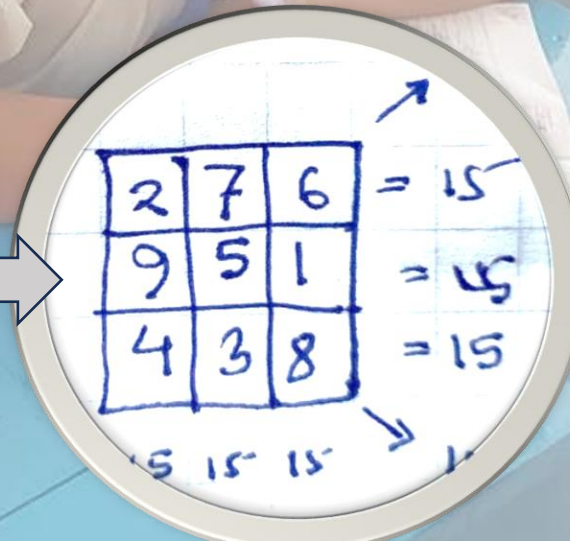
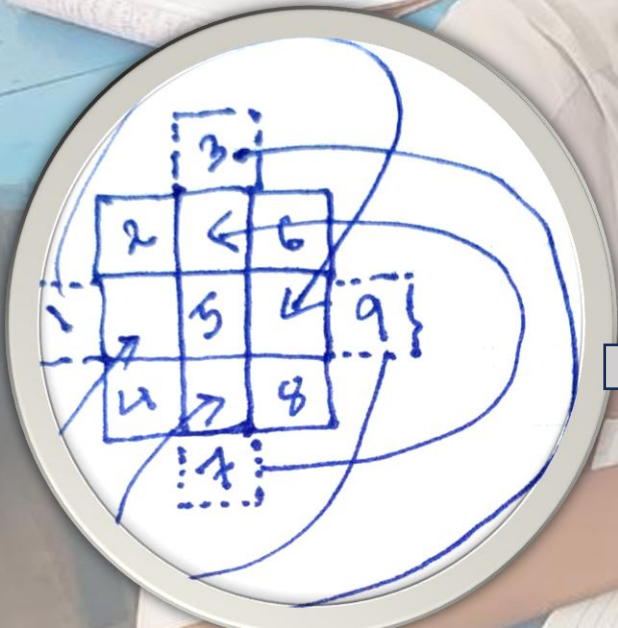
Description of practice

Basic number puzzles Simple puzzles to check number sense & understanding.
Pattern recognition tasks Identify patterns in numbers, shapes and sequences.

Activity 2 Can you find more than one magic square? How many different arrangements can you make?

8 1 6	6 1 8	4 3 8	4 3 8	8 3 4
3 5 7	7 5 3	9 5 1	9 5 1	1 5 9
4 9 2	2 9 4	2 9 4	3 7 6	6 7 2

2 7 6	6 7 2	4 9 2	2 9 4
9 5 1	1 5 9	3 5 7	7 5 3
4 3 8	8 3 4	8 1 6	6 1 8

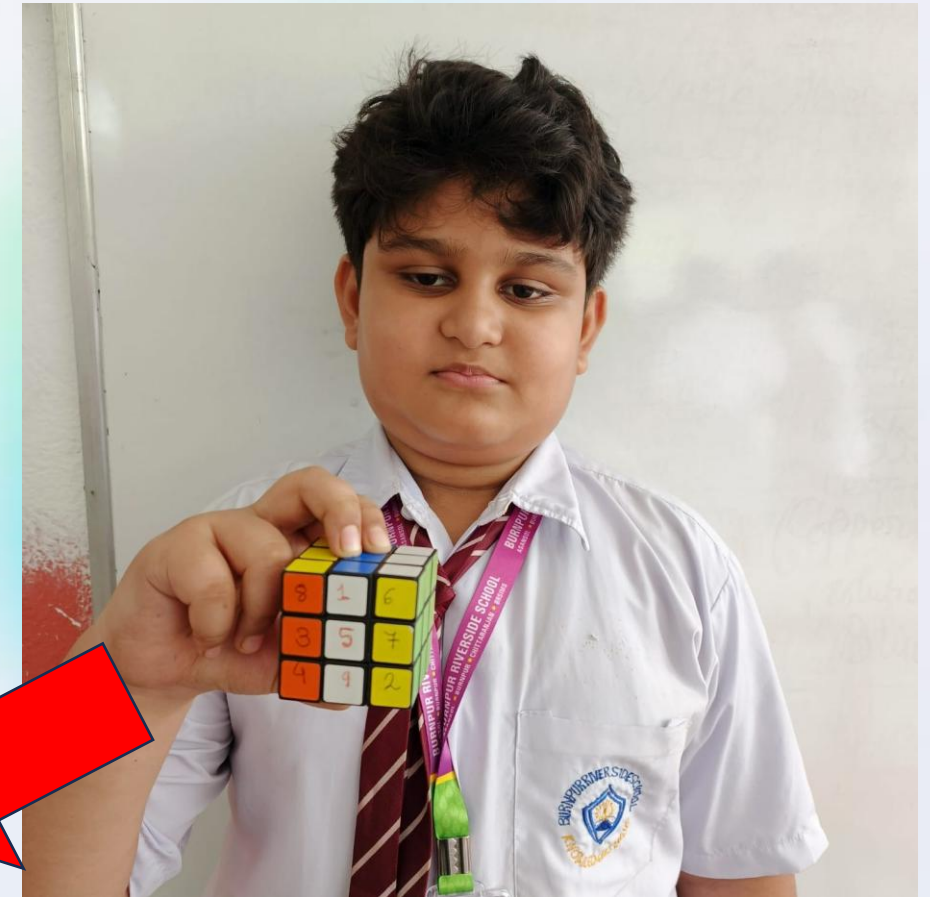
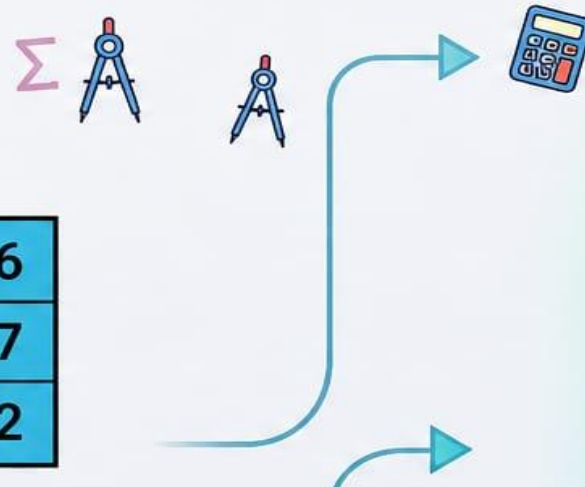


JOURNEY FROM 2D TO 3D

Activity 3

			8	1	6			
			3	5	7			
			4	9	2			
8	1	6	8	1	6	8	1	6
3	5	7	3	5	7	3	5	7
4	9	2	4	9	2	4	9	2
			8	1	6			
			3	5	7			
			4	9	2			
			8	1	6			
			3	5	7			
			4	9	2			

3x3 Magic Square net
(Six Faces, all Sum=15)



A 3x3 Magic Square (Sum=15)
folded into a cube

The Linguistic Magic Square: Bridging Languages

Q	J	O
L	N	P
M	R	K

42

17	10	15
12	14	16
13	18	11

42

42

42

42

42

42

42

48

জ	ক	চ
গ	ঙ	ছ
ঘ	ঝ	থ

48

19	12	17
14	16	18
15	20	13

48

48

48

48

48

48

54

জ	ক	চ
গ	ঙ	ছ
ঘ	ঝ	থ

54

21	14	19
16	18	20
17	22	15

54

54

54

৫৪

৫৪

৫৪

Activity 4

The Excel formula:

=CODE (UPPER (A1)) - 64

works as follows:

- 1 . UPPER (A1) converts the input to uppercase (so a becomes A).
- 2 . CODE () returns the ASCII code of the first character.
- 3.Subtracting 64 shifts the ASCII code to the alphabet position.

Letter	ASCII Code	Position
A	65	1
B	66	2
C	67	3
D	68	4
...	...	...
Z	90	26

MATCH OR LOOKUP..

The Unicode values of Bengali/ Hindi letters are not arranged as consecutive alphabet positions. For example:

UNICODE("অ") = 2437

UNICODE("আ") = 2438

UNICODE("ই") = 2439

UNICODE("ঐ") = 2447

UNICODE("ঊ") = 2309

UNICODE("ঋ") = 2310

UNICODE("ঌ") = 2311

UNICODE("঍") = 2319

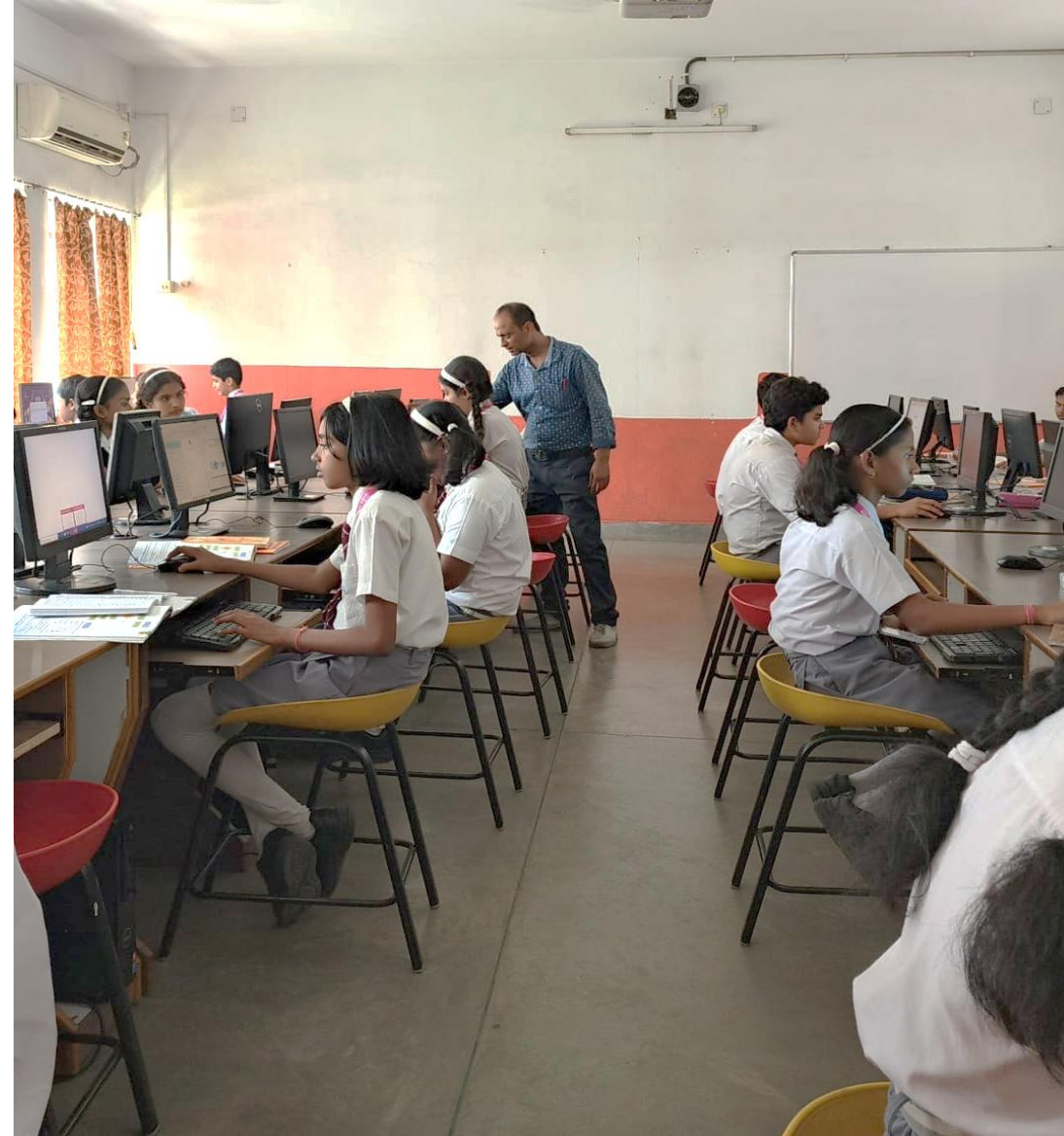
(there are gaps)

The Linguistic Magic Square

Analysis across English, Hindi, and Bengali using Excel Formulae

				54				54
ज	ग	स			21	14	19	54
P	ड	ख			16	18	20	54
च	V	ख			17	22	15	54
					५	५	५	

```
=MATCH(A1,{"अ","आ","इ","ऐ","उ".....  
=MATCH(A1,{"अ","आ","इ","ई","उ",".....
```



Patterns

$$4^2 = 16$$

$$34^2 = 1156$$

$$334^2 = 111556$$

$$3334^2 = 11115556$$

$$33334^2 = 1111155556$$

$$333334^2 = 111111555556$$

$$7^2 = 49$$

$$67^2 = 4489$$

$$667^2 = 444889$$

$$6667^2 = 44448889$$

$$66667^2 = 4444488889$$

$$666667^2 = 444444888889$$

$$7 \times 9 = 63$$

$$9^2 = 81$$

$$77 \times 99 = 7623$$

$$99^2 = 9801$$

$$777 \times 999 = 776223$$

$$999^2 = 998001$$

$$7777 \times 9999$$

$$9999^2 = 99980001$$

$$77777 \times 99999$$

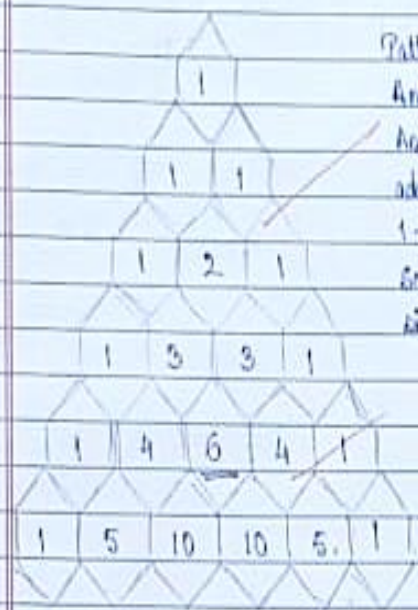
$$99999^2 = 9999800001$$

$$777777 \times 999999$$

$$999999^2 = 999998000001$$

13/7

Critical Math Pattern



Patterns (1)

Ans: - 6.

Ans: - It is a pattern of addition and $(1+1=2, 1+2=3, 3+3=6)$.

So, the answer will be six.

$$2+7=9$$

$$3+6=9$$

$$5+4=9$$

$$8+1=9$$

then

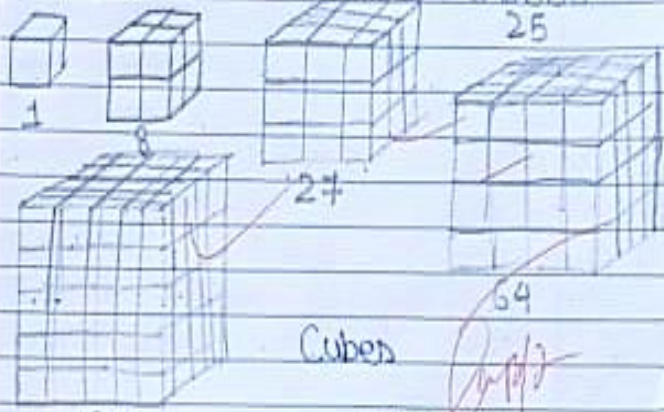
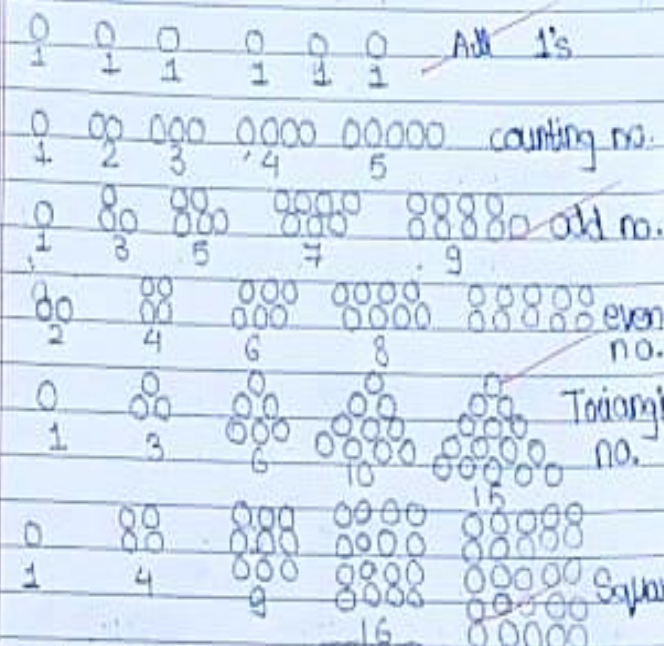
$$9+5=?$$

The answer will be 14, as $8+7=9$ and if we multiply $7 \times 9 = 63$ so, the answer of $9+5=14$ ($9+5=14, 14 \times 5=70$).

Pani Patterns

Pattern (2)

Mathematics Patterns



Cubes

Teacher's Signature

Proposed Assessment Plan – August

3×3 grid using prime numbers

177	17	89	71	177
	113	59	5	
	47	29	101	
177	177	177	177	177

Prime Number Magic Square

Fraction Magic Square

Algebraic Magic Square

Decimal Magic Square



BUILDING A MAGIC SQUARE STEP BY STEP

Watch the pattern. Understand the logic. See the magic!



Magic Square Rule

The sum of numbers in every **row**,
column and **diagonal** is the same.

8	1	6	$\Rightarrow 15$
3	5	7	$\Rightarrow 15$
4	9	2	$\Rightarrow 15$
15	15	15	

TRANSFORMATIONS

1

Start with
the given
magic
square.

8	1	6
3	5	7
4	9	2

2

Rotate
90°
clockwise.

4	3	8
9	5	1
2	7	6

3

Rotate
90°
clockwise
again.

2	9	4
7	5	3
6	1	8

4

Rotate
90°
clockwise
again.

6	7	2
1	5	9
8	3	4

TRANSFORMATIONS

8	1	6
3	5	7
4	9	2

Rotate
90°
clockwise.

4	3	8
9	5	1
2	7	6

Group Presentation Activity



Magic Square: Bridging Social Science.



SOCIAL SCIENCE / HISTORY



- 8 directions in ancient navigation.
- 1 world, many civilizations.
- 6 major ancient civilizations.
- 3 branches of government.
- 5 pillars of Indian Constitution.
- 7 continents.
- 4 noble truths.
- 9 virtues.
- 2 eyes of justice.



8	1	6
3	5	7
4	9	2



MAGIC SQUARE: BRIDGING DISCIPLINES, BUILDING MINDS

One Square, Many Connections, Endless Learning

Exploring Interdisciplinary Learning Through the Magic Square



PHYSICAL EDUCATION / SPORTS

- ✓ 8 kinds of athletics
- ✓ 1 team, one goal
- ✓ 6 basic motor skills

- ✓ 3 stages: Warm-up, Play, Cool-down
- ✓ 5 components of fitness
- ✓ 7 positions in some team sports

- ✓ 4 quarters in a game
- ✓ 9 players in some games
- ✓ 2 halves



ART & MUSIC



- ✓ 8 notes in an octave
- ✓ 1 – Music is one universal language
- ✓ 6 – A standard guitar has 6 strings
- ✓ 3 – Three primary colours (Red, Blue, Yellow)
- ✓ 5 – Five lines on a musical staff
- ✓ 7 – Seven traditional Indian swaras (Sa, Re, Ga, Ma, Pa, Dha, Ni)
- ✓ 4 – Four beats in common time (4/4 rhythm)
- ✓ 2 – Two hands work together to create rhythm and melody



THE CLASSIC 3×3 MAGIC SQUARE

8	1	6
3	5	7
4	9	2

Magic Sum
= **15**

Every row, column and diagonal equals 15!



*From Numbers to Real Life...
Magic Square Makes
Learning Meaningful!*



✓ Learn | ✓ Connect | ✓ Create | ✓ Explore | ✓ Succeed

Interdisciplinary Learning in Action!



COLOUR THEORY



- Primary Colours: Yellow, Red, Blue
- Secondary Colours: Green, Orange, Purple
- Warm Colours: Yellow, Orange, Red
- Cool Colours: Green, Blue, Violet
- Rainbow Colours: Red, Orange, Yellow, Green, Blue, Violet

COLOUR THEORY



- Warm Colours: Yellow, Orange, Red
- Cool Colours: Green, Blue, Violet
- Primary Colours: Yellow, Red, Blue
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- Rainbow: Red, Orange, Yellow, Green, Blue, Violet

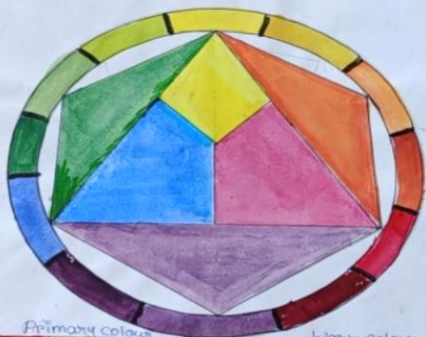
COLOUR THEORY



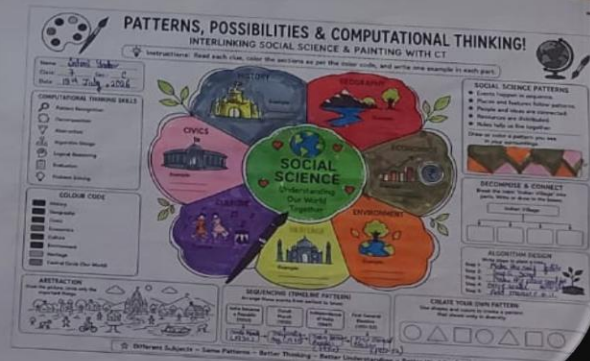
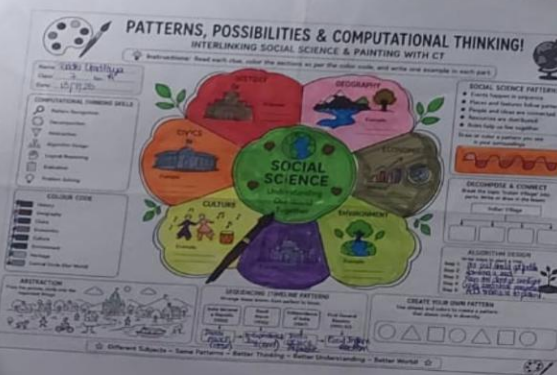
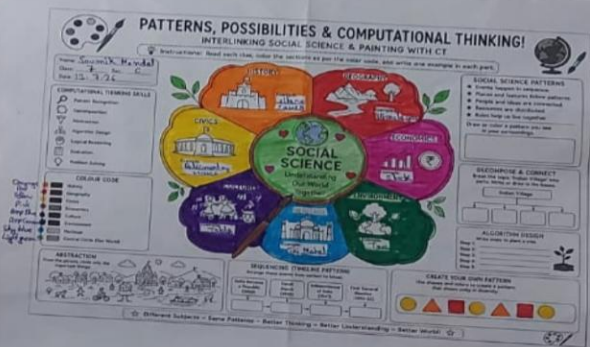
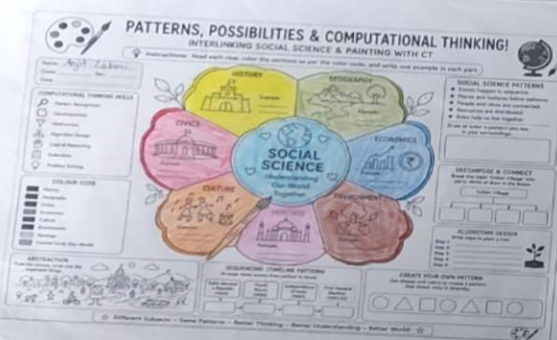
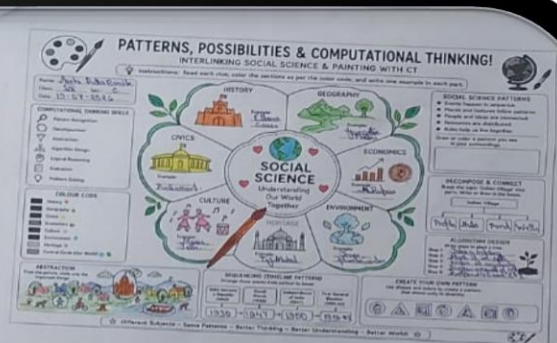
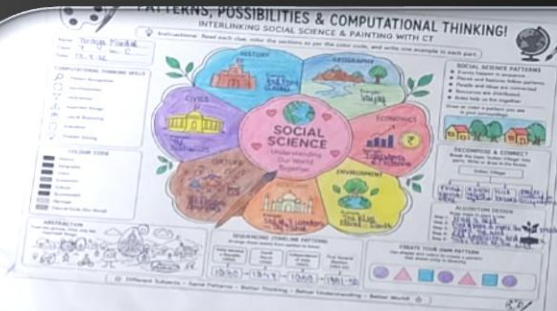
This is a colour wheel

- Primary colour: Yellow, Red, Blue
- Secondary colour: Green, Orange, Purple
- Tertiary colour: Yellow-Orange, Red-Orange, Red-Violet, Blue-Violet, Green-Blue, Yellow-Green
- Cool colours: Green, Blue, Violet
- Warm colours: Yellow, Orange, Red

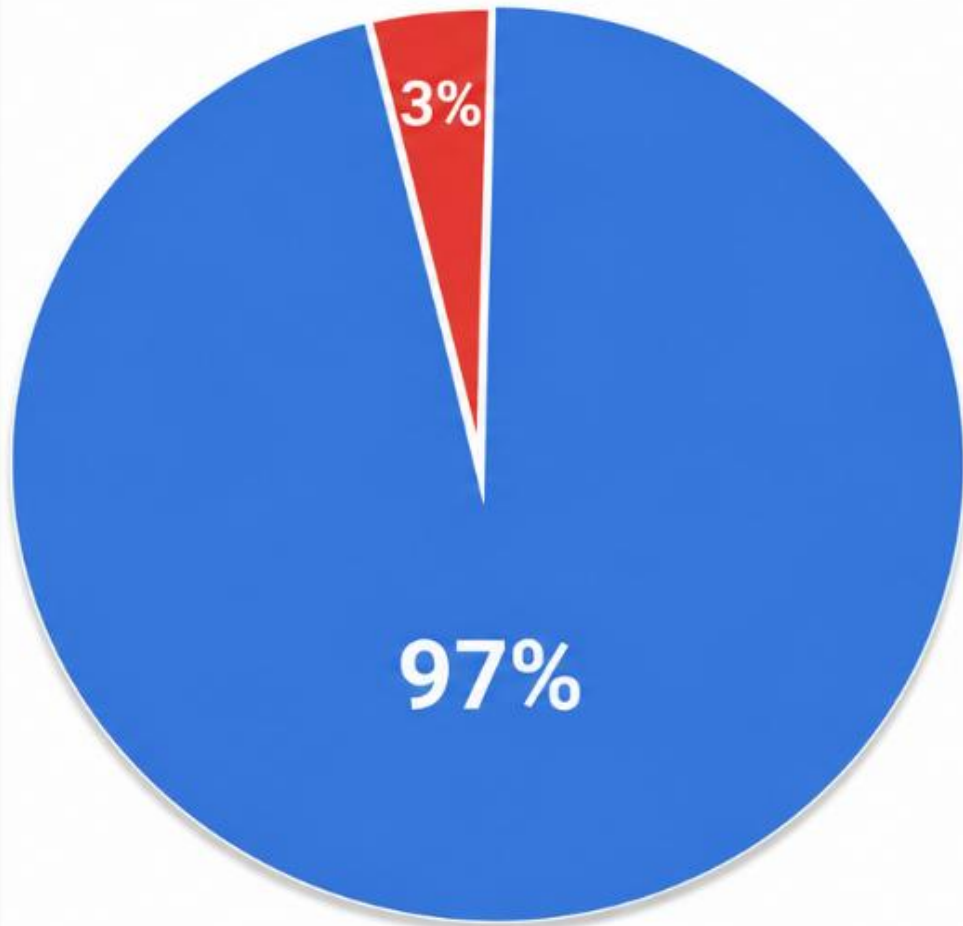
COLOUR WHEEL (Hue)



- Primary colour: Yellow, Red, Blue
- Secondary colour: Green, Orange, Purple
- Warm colour: Yellow, Orange, Red
- Cool colour: Green, Blue, Violet
- Violet-Red, Red, Red-Orange, Orange, Yellow-Orange, Yellow, Green-Blue, Blue, Blue-Violet, Violet



Post-Assessment



■ Performance Achieved (97%)
■ Improvement Required (3%)

Questions Responses **25** Settings

Total points: 12

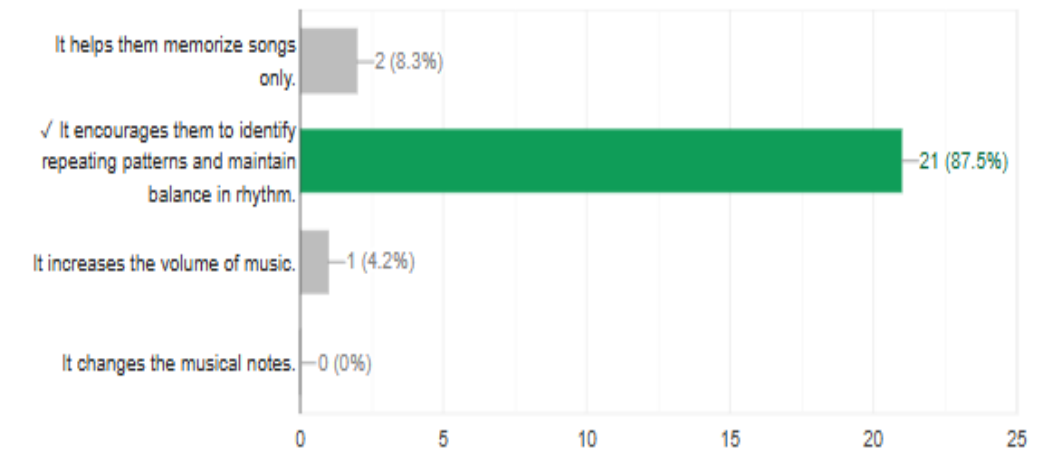
0 5 10 15 20

5. A music teacher assigns the numbers 1–9 to different musical beats (Ta, Ti, Na, Dhin, etc.) and arranges them in a Magic Square. Students clap the beats following each row.

[Copy chart](#)

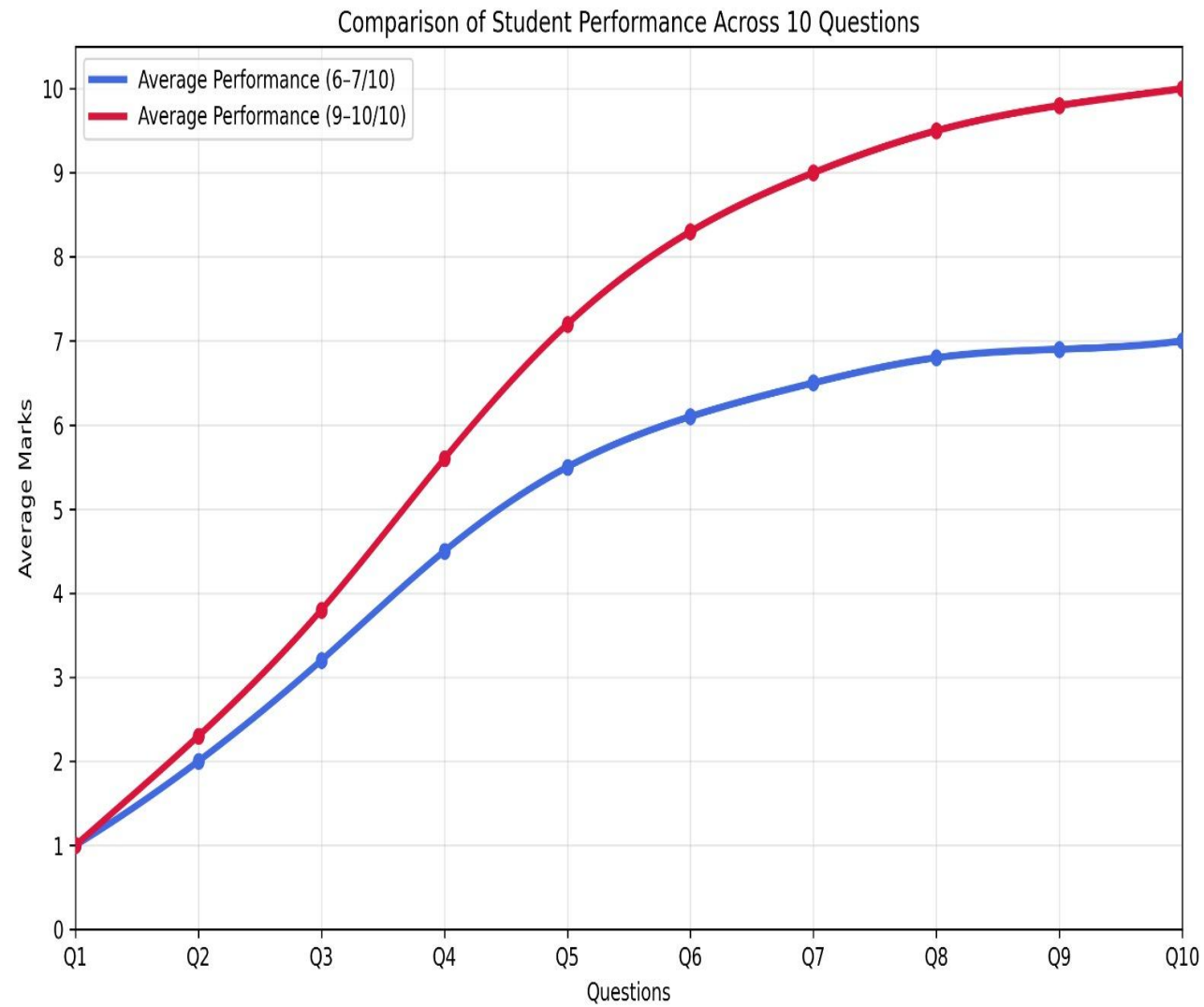
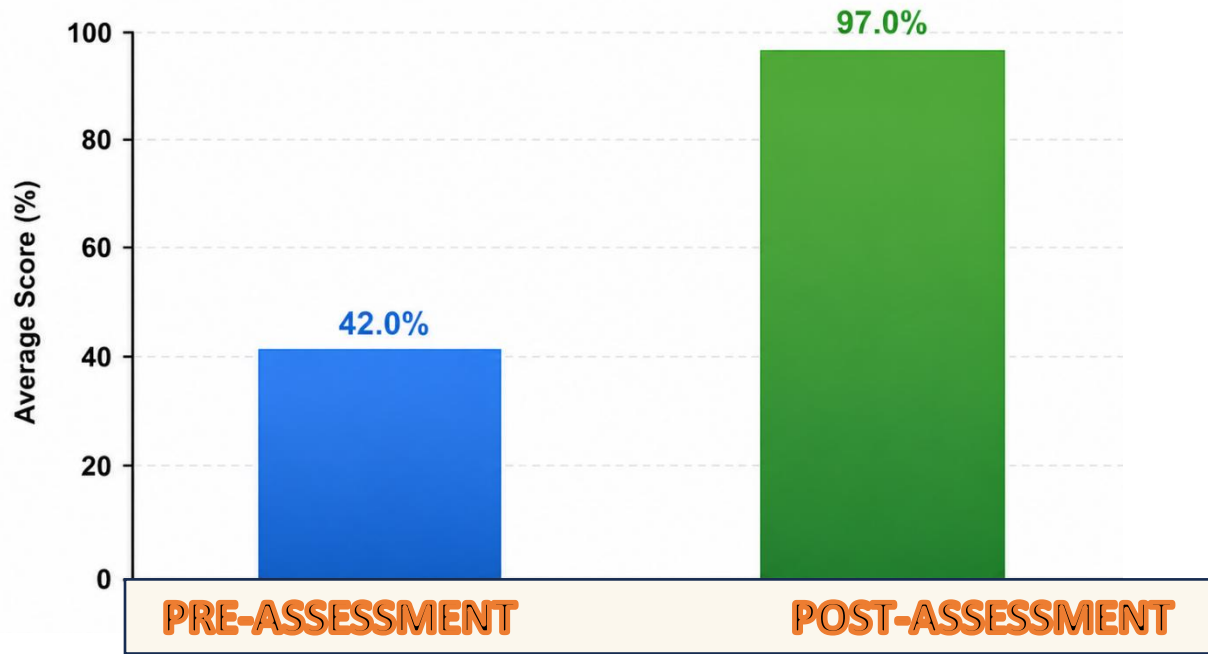
Why does arranging the beats in a Magic Square help students understand rhythm better?

21 / 24 correct responses



REFLECTION

Reflection





—★ WHY THIS ACTIVITY MATTERS? ★—



NOVELTY & RELEVANCE

One activity integrates multiple subjects.
Develops Computational Thinking naturally.
Supports Competency-Based Learning.
Aligns with NEP 2020 & NCF 2023.



—★ WHY THIS ACTIVITY MATTERS? ★—



INCLUSIVITY & EQUITY

Collaborative Learning
Multiple Solution Strategies
Equal Participation
Peer Learning
Learning by Doing



—★ WHY THIS ACTIVITY MATTERS? ★—



SCALABILITY

LOW COST • HIGH IMPACT • EASILY REPLICABLE

Can be implemented in



✓ Government Schools



✓ Private Schools



✓ Rural Schools



✓ Urban Schools



✗ Smart Classrooms



✗ Regular Classrooms



—★ WHY THIS ACTIVITY MATTERS? ★—



SUSTAINABILITY

Uses

Existing textbooks

Worksheets

Graph paper

Digital spreadsheets

Classroom resources

☒ No additional infrastructure required



LEARNINGS & REFLECTIONS



Improved reasoning



Better collaboration



Higher engagement



Pattern recognition



Computational Thinking



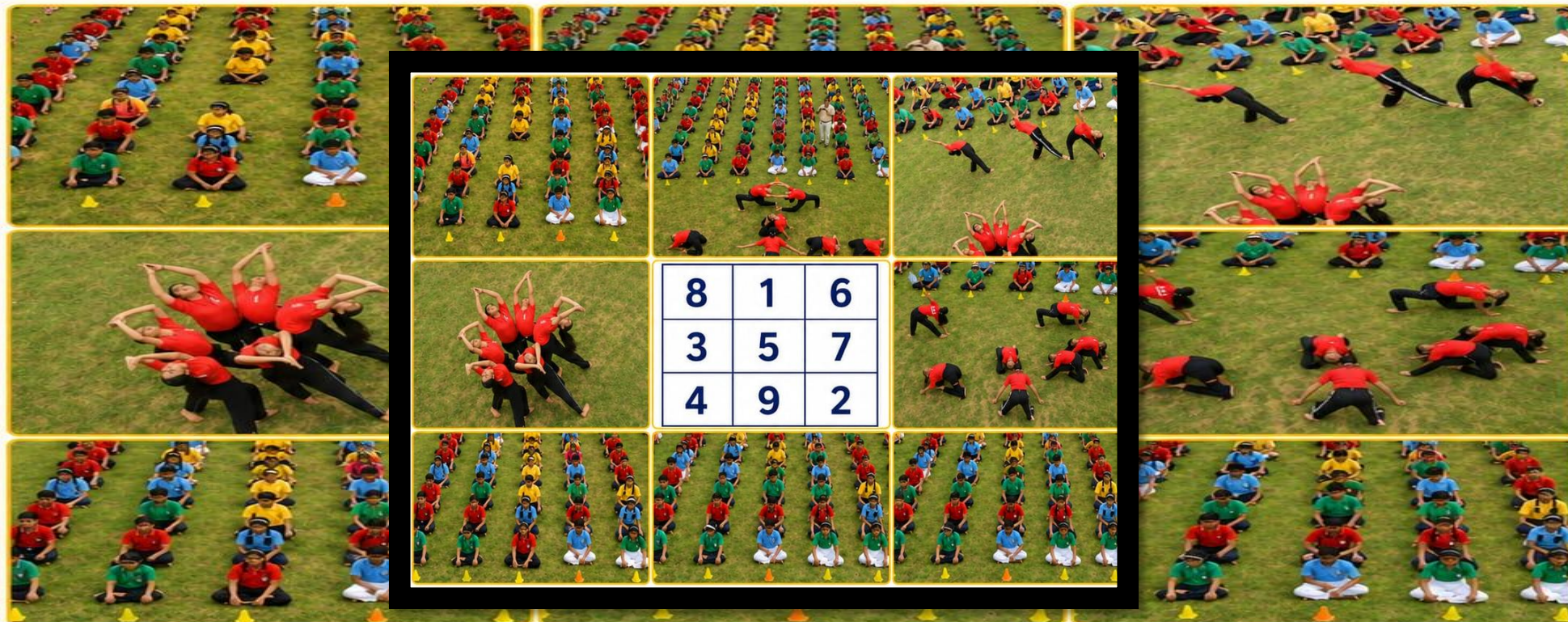
Interdisciplinary learning





Conclusion...

“ Magic Squares are **more than mathematical puzzles**—they are **powerful tools** for developing **Computational Thinking** and connecting learning across disciplines. ”



Final Thought..

“ When students **discover patterns**, they don't just solve puzzles—they **learn how to think**. ”

