APPENDICES

1. LESSON PLANS FOR CONTROL GROUP

LESSON PLAN-1 (CONTROL GROUP)

Date- 19th April, 2025

Subject- Mathematics

Duration-40 minutes

Age level- 12 to 14 years

Class -VI

Name- Archit Nema

Chapter-Mensuration

Topic- Perimeter

Learning Objectives:
By the end of this lesson, students will be able to:

1. Define the term "Perimeter."
2. Identify the perimeter of regular and irregular plane figures.
3. Apply perimeter formulas for squares, rectangles, and triangles.
4. Relate the concept of perimeter to real-life examples (fencing, boundary measurement).

Materials Required:

- Blackboard and chalk/whiteboard and markers
- Chart paper showing shapes like square, rectangle, triangle
- Ruler or measuring tape
- Cut-outs of regular plane figures
- NCERT Class 6 Mathematics textbook

Instructional Steps:

1. Introduction (5 minutes)

- Begin with a simple question: "If you wanted to build a fence around your garden, what would you measure?"
- Encourage students to share responses (e.g., sides of the garden).
- Link their responses to the concept of **Perimeter** – the distance around the boundary.
- Write the term "Perimeter" on the board and highlight its meaning.

2. Presentation/Explanation (15 minutes)

- Clearly define **Perimeter**: *"The total length of the boundary of a closed figure."*
- Introduce standard **formulas**:
  - **Square**: Perimeter = 4 × Side
  - **Rectangle**: Perimeter = 2 × (Length + Breadth)
  - **Triangle**: Perimeter = sum of the three sides
- Use shape cut-outs and chart paper to visually demonstrate the figures.
- Use ruler/measuring tape to measure real items (e.g., book cover or desk) and calculate their perimeter on the spot.

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3. Illustration/Example (10 minutes)

- Solve examples from the textbook:
  - Example 1: A square with side 5 cm → 4 × 5 = 20 cm
  - Example 2: A rectangle with length 8 cm and breadth 3 cm → 2 × (8 + 3) = 22 cm
- Draw diagrams on the board and show step-by-step calculation.

4. Practice Activity (5 minutes)

- Ask students to solve two perimeter problems:
  - Find the perimeter of a rectangle with length 6 cm and breadth 4 cm.
  - Find the perimeter of a triangle with sides 4 cm, 5 cm, and 6 cm.
- Walk around the class to assist and check student responses.

5. Conclusion & Homework (5 minutes)

- Summarize:
  - Perimeter = boundary length.
  - Different shapes have different formulas.
- Oral recap quiz: "What is the perimeter of a square of side 7 cm?"
- **Homework**: Solve Exercise 10.1 from the NCERT textbook (selected questions).

LESSON PLAN-2 (CONTROL GROUP)

Date- 21st April, 2025

Subject- Mathematics

Duration-40 minutes

Age level- 12 to 14 years

Class -VI

Name- Archit Nema

Chapter-Mensuration

Topic- Area

Learning Objectives:

Students will be able to:

1. Understand and define the concept of **Area**.
2. Use formulas to calculate the area of squares and rectangles.
3. Differentiate between area and perimeter.
4. Solve textbook problems related to area using correct units.

Materials Required:

- Blackboard and chalk
- Grid paper or graph paper
- Chart displaying units of area (cm^2, m^2)
- NCERT Math textbook
- Shapes drawn on squared paper

Instructional Steps:

1. Introduction (5 minutes)

- Ask: "If you want to cover your book with paper, what would you need to measure – the boundary or the surface?"
- Lead students to understand **Area** refers to the *surface occupied*.
- Write the word "Area" on the board and define it as "the space enclosed within the boundary of a figure."

2. Presentation/Explanation (15 minutes)

- Define:
  - **Area of Square** = Side × Side
  - **Area of Rectangle** = Length × Breadth
- Demonstrate area using a piece of grid paper:
  - Count squares inside a rectangle – link counting to formula.
- Emphasize units of area: cm^2, m^2, etc.
- Write examples on the board and solve:
  - Square with side 6 cm → $6 \times 6 = 36\ cm^2$
  - Rectangle with L = 7 cm, B = 3 cm → $7 \times 3 = 21\ cm^2$

3. Illustration (10 minutes)

- Use grid paper to show how many 1-cm squares fill a rectangle.
- Encourage students to draw their own 4 cm × 2 cm rectangle and count squares.
- Solve one real-life example: "What is the area of a rectangular table top 1.2 m long and 0.8 m wide?"

4. Practice (5 minutes)

- Write two problems on the board and let students solve:
  - Area of square (side = 5 cm)
  - Area of rectangle (L = 9 cm, B = 4 cm)
- Discuss answers together.

5. Conclusion & Homework (5 minutes)

- Recap area formulas and differences from perimeter.
- Quick quiz: "Is area measured in cm or cm^2?"
- **Homework**: Solve Exercise 10.2 from the NCERT textbook.

LESSON PLAN-3(CONTROL GROUP)

Date- 22nd April, 2025

Subject- Mathematics

Duration-40 minutes

Age level- 12 to 14 years

Class -VI

Name- Archit Nema

Chapter-Mensuration

Topic- Area and Perimeter of Irregular Shapes

Learning Objectives:

Students will be able to:

1. Recognize and define **composite figures**.
2. Break down irregular shapes into regular ones for calculation.
3. Calculate area and perimeter of composite figures.
4. Apply area and perimeter formulas to real-life situations.

Materials Required:

- Blackboard and chalk
- Graph paper or squared paper
- Chart showing irregular shapes (L-shape, T-shape)
- Scissors and paper cut-outs
- NCERT Class 6 Math textbook

Instructional Steps:

1. Introduction (5 minutes)

- Ask: "How would we find the area of a garden that looks like an L-shape?"
- Show a simple irregular shape (like L) and ask how we might calculate it.
- Explain that irregular shapes can be divided into **known shapes** like rectangles/squares.

2. Presentation/Explanation (15 minutes)

- Draw an **L-shaped figure** on the board and explain how to divide it into two rectangles.
- Revisit area and perimeter formulas of rectangle and square.
- Show another example using graph paper – count unit squares if necessary.
- Introduce an example from the textbook and solve it step-by-step.

3. Illustration (10 minutes)

- Use a cut-out L-shape made of two joined rectangles. Cut them apart to show how composite shapes are broken down.
- Solve a sample:
    - L-shape: upper rectangle (4 × 2), lower rectangle (6 × 3).
    - Area = (4 × 2) + (6 × 3)
    - Perimeter = add all outer sides.

4. Practice (5 minutes)

- Distribute squared paper and ask students to draw a composite shape and calculate area & perimeter.
- Help students who struggle with breaking shapes down.

5. Conclusion & Homework (5 minutes)

- Reinforce the concept of breaking down figures.
- Recap both **area** and **perimeter** formulas.
- **Homework**: Solve 2 problems from Exercise 10.3 (NCERT) involving irregular figures.

LESSON PLAN-4(CONTROL GROUP)

Date- 23rd April, 2025

Subject- Mathematics

Duration-40 minutes

Age level- 12 to 14 years

Class -VI

Name- Archit Nema

Chapter- Integers

Topic- Introduction to Integers

Learning Objectives:
By the end of the lesson, students will be able to:

1. Understand and define integers.
2. Identify positive and negative integers on the number line.
3. Compare integers using the number line.

Materials Required:

- Blackboard and chalk
- Chart showing a vertical and horizontal number line
- Thermometer cut-out or image
- Flashcards of integers
- NCERT Class 6 Mathematics textbook

Instructional Steps:

1. Introduction (5 minutes):

- Begin with real-life examples involving temperature or bank balances (e.g., "If the temperature falls below 0, how do we show it?").
- Introduce the concept of **negative numbers**.
- Define **integers**: a set that includes all positive numbers, negative numbers, and zero.

2. Presentation (15 minutes):

- Explain:
  - **Natural numbers**: 1, 2, 3, …
  - **Whole numbers**: 0, 1, 2, 3, …
  - **Integers**: ..., –3, –2, –1, 0, 1, 2, 3, ...
- Use a number line drawn on the board to show placement of positive and negative integers.
- Explain that numbers to the right of 0 are positive and to the left are negative.

3. Illustration (10 minutes):

- Draw number lines and place given integers (e.g., –5, 3, 0, –1).
- Explain how to compare integers using the number line:
  - Example: $-3 < 0 < 2$
- Discuss real-life examples:
  - Thermometer readings: 5°C, –2°C
  - Bank balances: +100 and –50

4. Practice Activity (5 minutes):

- Ask students to answer questions orally:
  - Which is greater: –4 or –1?
  - Where would you place –3 on the number line?
- Let students come to the board and mark positions of given integers.

5. Conclusion & Homework (5 minutes):

- Recap: Integers include negative, positive numbers, and zero.
- Distribute a worksheet or assign **Exercise 6.1** (selected questions) from NCERT as homework.

LESSON PLAN-5(CONTROL GROUP)

Date- 24th April, 2025

Subject- Mathematics

Duration-40 minutes

Age level- 12 to 14 years

Class -VI

Name- Archit Nema

Chapter- Integers

Topic- Addition to Integers

Learning Objectives:
By the end of the lesson, students will be able to:

1. Add integers using the number line.
2. Apply rules of addition of integers with same and different signs.
3. Solve textbook and real-life problems involving addition of integers.

Materials Required:

- Blackboard and chalk/whiteboard and marker
- Number line chart
- Flashcards with integer addition problems
- NCERT Class 6 Mathematics textbook
- Notebook and pencil

Instructional Steps:

1. Introduction (5 minutes):

- Begin by recalling the concept of integers from the previous lesson.
- Ask students: "What happens when we go 3 steps forward and then 2 more steps forward?"
- Explain that **addition** of numbers is like moving forward or backward on a number line.

2. Presentation (15 minutes):

- **Case 1: Adding two positive integers**
  Example: 3 + 5 = 8 (move 5 steps right from 3)
- **Case 2: Adding two negative integers**
  Example: (–2) + (–3) = –5 (move 3 steps left from –2)
- **Case 3: Adding a positive and a negative integer**
  Example: (–4) + 6 = 2 (start from –4, move 6 steps right)
  Example: 5 + (–8) = –3 (start from 5, move 8 steps left)
- Use the **number line** to visually demonstrate each case on the board/chart.
- Emphasize the rule:
  - If signs are the same → Add and keep the sign
  - If signs are different → Subtract and keep the sign of the bigger number

3. Illustration (10 minutes):

- Work through examples on the board:
  - (–5) + (–3) = –8
  - 7 + (–2) = 5

- (–6) + 10 = 4
- (–3) + 3 = 0

4. Practice Activity (5 minutes):

- Write 4 problems on the board and let students solve in their notebooks:
  - (–2) + (–7)
  - 6 + (–4)
  - (–8) + 11
  - (–9) + (–1)
- Call 2–3 students to solve them on the board.

5. Conclusion & Homework (5 minutes):

- Recap key rules with examples.
- Emphasize real-life applications (e.g., gain/loss of points, temperature changes).
- **Homework**: NCERT **Exercise 6.2** – Questions based on addition of integers only.

LESSON PLAN-6(CONTROL GROUP)

Date- 25th April, 2025

Subject- Mathematics

Duration-40 minutes

Age level- 12 to 14 years

Class -VI

Name- Archit Nema

Chapter- Integers

Topic- Subtraction to Integers

Learning Objectives:

By the end of the lesson, students will be able to:

1. Subtract integers using the number line.
2. Understand and apply rules for subtracting integers.
3. Solve NCERT and real-life problems involving subtraction of integers.

Materials Required:

- Blackboard and chalk/whiteboard and marker
- Number line chart
- Integer subtraction flashcards
- NCERT Class 6 Mathematics textbook
- Graph paper (optional)

Instructional Steps:

1. Introduction (5 minutes):

- Ask students: "If I have ₹5 and I spend ₹8, what happens?"
- Lead into the idea of subtracting bigger numbers from smaller ones using negative numbers.
- Introduce the concept of **Subtraction of Integers**.

2. Presentation (15 minutes):

- Use the number line to show subtraction as *moving to the left*.
- Explain:
  - $7 – 3 = 4 \rightarrow$ Move 3 steps left from 7
  - $(–2) – 3 = –5 \rightarrow$ Move 3 steps left from –2
  - $4 – (–3) = 4 + 3 = 7 \rightarrow$ *Subtracting a negative = adding the positive*
- Emphasize the rule:
  - **a – b = a + (–b)**
  - Subtracting an integer = adding its additive inverse

3. Illustration (10 minutes):

- Solve step-by-step:
  - $(–5) – (–2) = (–5) + 2 = –3$
  - $(–3) – 6 = –9$
  - $6 – (–4) = 10$

    - $(-7) - (-3) = -4$
- Show transitions using a number line.

4. Practice Activity (5 minutes):

- Write problems on the board and let students solve:
    - $5 - (-3)$
    - $(-6) - 2$
    - $(-4) - (-1)$
    - $3 - 7$
- Review the answers together and clarify misconceptions.

5. Conclusion & Homework (5 minutes):

- Recap: To subtract an integer, **add its opposite** (additive inverse).
- Emphasize direction and signs.
- **Homework**: NCERT **Exercise 6.2** – Questions focused on **subtraction of integers only**.

LESSON PLAN-7(CONTROL GROUP)

Date- 26th April, 2025

Subject- Mathematics

Duration-40 minutes

Age level- 12 to 14 years

Class -VI

Name- Archit Nema

Chapter- Symmetry

Topic- Introduction to Symmetry

Learning Objectives:
By the end of this lesson, students will be able to:

1. Understand the concept of symmetry.
2. Define a line of symmetry.
3. Identify symmetrical figures and draw lines of symmetry.

Materials Required:

- Blackboard and chalk
- A4 sheets, scissors, and mirror
- Paper cutouts of shapes (square, triangle, circle, butterfly, etc.)
- NCERT Class 6 Mathematics textbook
- Ruler and pencil

Instructional Steps:

1. Introduction (5 minutes):

- Begin with real-life examples (butterfly wings, leaves, human face).
- Ask: "What do both sides of a butterfly look like?"
- Introduce the term **symmetry** — when one half is the mirror image of the other.

2. Presentation (15 minutes):

- Define **Symmetry**: A figure is symmetrical if it can be folded in such a way that both parts match exactly.
- Define **Line of Symmetry**: The line that divides the shape into two mirror-image halves.
- Draw various shapes on the board (rectangle, square, triangle) and demonstrate lines of symmetry.

3. Illustration (10 minutes):

- Show paper folding activity: Fold square and triangle cut-outs to find symmetry.
- Demonstrate using mirror for vertical and horizontal symmetry.
- Ask students to observe and identify symmetry in alphabets (A, M, O, B, etc.)

4. Practice Activity (5 minutes):

- Distribute paper cutouts. Ask students to fold and draw the line of symmetry.
- Let them try simple shapes from the textbook.

5. Conclusion & Homework (5 minutes):

- Recap: Symmetry means balance; line of symmetry divides a shape equally.
- Homework: **NCERT Exercise 13.1** (selected questions).

LESSON PLAN-8(CONTROL GROUP)

Date- 28th April, 2025

Subject- Mathematics

Duration-40 minutes

Age level- 12 to 14 years

Class -VI

Name- Archit Nema

Chapter- Symmetry

Topic- Lines of Symmetry in Regular Shapes

Learning Objectives:

By the end of the lesson, students will be able to:

1. Identify symmetrical and asymmetrical figures.
2. Determine the number of lines of symmetry in regular shapes.
3. Draw all possible lines of symmetry for basic geometrical shapes.

Materials Required:

- Blackboard and chalk
- Chart of regular shapes (equilateral triangle, square, rectangle, circle)
- Paper cutouts
- Mirror, ruler, compass
- NCERT Class 6 textbook

Instructional Steps:

1. Introduction (5 minutes):

- Recap previous lesson.
- Show different shapes and ask: "How many ways can this shape be folded into halves?"

2. Presentation (15 minutes):

- Explain with examples:
  - **Equilateral Triangle** – 3 lines of symmetry
  - **Square** – 4 lines
  - **Rectangle** – 2 lines
  - **Circle** – Infinite lines
- Contrast with **Scalene triangle, trapezium** — no symmetry.
- Draw each on the board and draw lines of symmetry with a ruler.

3. Illustration (10 minutes):

- Show on the board: draw and divide shapes.
- Use mirror to demonstrate reflection along each line.
- Let students try drawing lines of symmetry in their notebooks.

4. Practice Activity (5 minutes):

- Give figures from the textbook and ask students to draw all lines of symmetry.
- Ask 2–3 students to come up to the board and do the same.

5. Conclusion & Homework (5 minutes):

- Recap: Lines of symmetry vary with shape.
- Homework: NCERT **Exercise 13.2** (selected figures)

LESSON PLAN-9(CONTROL GROUP)

Date- 29th April, 2025

Subject- Mathematics

Duration-40 minutes

Age level- 12 to 14 years

Class -VI

Name- Archit Nema

Chapter- Symmetry

Topic- Reflection Symmetry

Learning Objectives:
By the end of the lesson, students will be able to:

1. Understand mirror reflection as a form of symmetry.
2. Identify figures that show mirror symmetry.
3. Complete the reflection of a figure using a mirror line.

Materials Required:

- Blackboard and chalk
- Small mirrors
- Graph paper
- Worksheets with incomplete mirror images
- NCERT Class 6 textbook

Instructional Steps:

1. Introduction (5 minutes):

- Ask: "Have you seen how your face appears in the mirror?"
- Discuss how mirror images are reversed, yet symmetrical.
- Introduce **mirror symmetry** — when one side reflects the other.

2. Presentation (15 minutes):

- Define **mirror line** or **axis of symmetry**.
- Demonstrate with examples: letters like A, B, D, M, O, etc.
- Show reflection of a simple shape across a vertical or horizontal line using the mirror.

3. Illustration (10 minutes):

- Use graph paper and draw half a shape (e.g., triangle) beside a vertical line.
- Reflect and draw the mirror image on the other side.
- Use mirrors to check alignment.

4. Practice Activity (5 minutes):

- Distribute graph paper with half shapes and ask students to complete the figure.
- Use mirrors to verify their symmetry.

5. Conclusion & Homework (5 minutes):

- Recap: Mirror symmetry reflects one half into the other.
- Homework: NCERT **Exercise 13.3** – mirror reflection questions.

2. LESSON PLANS FOR EXPERIMENTAL GROUP

TOY-BASED PEDAGOGY LESSON PLAN-1

Date- 19th April, 2025

Subject- Mathematics

Duration-40 minutes

Age level- 12 to 14 years

Class -VI

Name- Archit Nema

Chapter-Mensuration

Topic- Perimeter

Learning Objectives:

- Define perimeter as the distance around a closed figure.
- Calculate the perimeter of square, rectangle, and triangle using formula and measurement.
- Apply perimeter to real-life scenarios using toys and manipulatives.

Materials Needed:

- Toy train tracks (can be arranged in different shapes)
- Rulers, measuring tapes, strings
- Geometric toy blocks (square, rectangle, triangle)
- Worksheets for practice

5E Model Detailed Breakdown:

1. Engage

- **Activity:** Show a **toy train track set** arranged in a square or rectangular shape on the table. Ask,
  "If we want to put lights all around this track, how much wire will we need?"
- **Purpose:** This real-world scenario grabs attention and motivates students to think about the perimeter as "the distance around."
- **Discussion:** Allow students to discuss and share guesses, reinforcing curiosity.

2. Explore

- **Activity:** Distribute **toy blocks** of different shapes (square, rectangle, triangle).
- Students measure each side using a **ruler or string**, mark measurements, and add side lengths to find the perimeter.
- **Group Work:** Let students work in pairs and compare results.
- **Observation:** Teacher walks around to observe how students measure and calculate.

3. Explain

- **Teacher Explanation:** Define perimeter as "the total length around a closed figure."
- Write formulas on the board:
  - Square: Perimeter = 4 × side length
  - Rectangle: Perimeter = 2 × (length + breadth)
  - Triangle: Perimeter = sum of all three sides
- Show worked examples using toy block measurements from the explore phase.

4. Elaborate

- **Activity:** Students create a **toy garden or fenced area** using LEGO blocks or matchboxes on the table.
- They use **colored string or ribbon** to "fence" around the toy garden and measure the length of the string used.
- **Challenge:** Ask, “If we wanted to put a fence around your garden, how many meters of wire will we need?”
- Connect this to the perimeter concept in a concrete way.
- **Extension:** Measure real-world objects like the classroom door frame, books, or desks for perimeter.

5. Evaluate

- Provide a worksheet with questions like:
    - Find the perimeter of a square with side 7 cm.
    - Calculate perimeter of a rectangle with length 10 cm and breadth 5 cm.
    - A triangle has sides 3 m, 4 m, and 5 m. Find its perimeter.
- Collect and review answers, giving feedback.

TOY-BASED PEDAGOGY LESSON PLAN-2

Date- 21st April, 2025

Subject- Mathematics

Duration-40 minutes

Age level- 12 to 14 years

Class -VI

Name- Archit Nema

Chapter-Mensuration

Topic- Area of Rectangles and Squares

Learning Objectives:

- Understand the concept of area as "the space covered inside a figure."
- Calculate area of rectangles and squares using formulas.
- Visualize and relate area using toy blocks.

Materials Needed:

- LEGO blocks or square tiles
- Graph paper
- Rulers
- Toy mats or cardboard rectangles

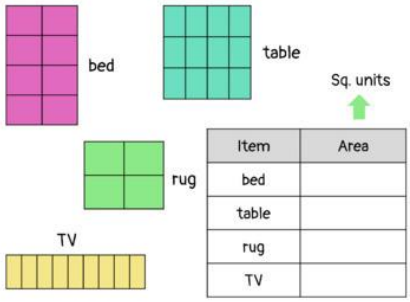
5E Model Detailed Breakdown:

1. Engage

- Show a **LEGO base mat** of a certain size and ask,
  "How many LEGO blocks will cover this mat completely?"
- Encourage students to guess and discuss how to find the answer.

2. Explore

- Provide students with LEGO blocks or square tiles and graph paper.
- Ask them to **cover a rectangle drawn on graph paper** using tiles and count how many tiles fill the space completely.
- Students record the number of tiles and compare with others.
- Use rulers to measure length and breadth of the rectangles on the paper.



Item	Area
bed	
table	
rug	
TV	

3. Explain

- Define area as “the amount of surface covered by a shape.”
- Write formulas:
    - Square: Area = side × side
    - Rectangle: Area = length × breadth
- Connect counting of tiles to multiplication (length × breadth).

4. Elaborate

- **Activity:** Students design a “toy carpet” or “floor mat” for a toy house using colored tiles or LEGO blocks.
- Calculate the area of their design using the formula.
- Extend by asking, “If each tile costs Rs 5, how much will it cost to buy enough tiles for your carpet?” (Integrating math with real life).
- Let students share their designs and calculations with the class.

5. Evaluate

- Worksheet problems:
    - Calculate the area of a rectangle with length 8 cm and breadth 6 cm.
    - Find the area of a square with side 9 cm.
    - Draw rectangles on graph paper and find the area by counting squares and then by formula.
- Discuss answers.

TOY-BASED PEDAGOGY LESSON PLAN-3

Date- 22nd April, 2025

Subject- Mathematics

Duration-40 minutes

Age level- 12 to 14 years

Class -VI

Name- Archit Nema

Chapter-Mensuration

Topic- Area of Irregular shapes

Learning Objectives:

By the end of the lesson, students will be able to:

- Understand the concept of irregular shapes.
- Estimate and calculate the area of irregular figures by decomposing them into regular shapes.
- Apply their understanding using toy-based and hands-on activities.

Materials Required (Toy-Based Resources):

- Toy mats with irregular shapes printed on them
- Geoboards or dot grids
- LEGO blocks and square tiles
- Graph paper
- Rulers and pencils
- Toy furniture pieces (miniature beds, tables, etc.)
- Cardboard cutouts of irregular shapes

5E Instructional Model:

1. Engage – 5 minutes

- **Activity:** Show a **miniature toy room layout** with irregular floor shapes using toys (e.g., a bed and a cupboard with L-shaped or combined shapes).
- Ask:

"If we want to lay carpet on this toy floor, how can we find the area it covers when the shape is not regular like a rectangle?"

- Students will observe and predict how they might measure such areas.

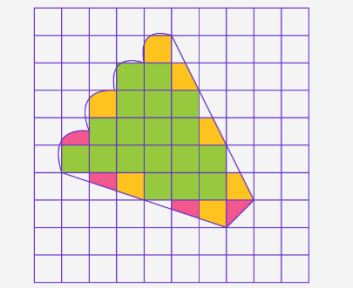
2. Explore – 10 minutes

- Give each student a cardboard cutout of an **irregular shape** (composed of combinations of squares and rectangles, like an "L" shape).
- Provide **graph paper** and ask students to **trace the shape**.
- Let them **count squares** to estimate the area. Teach them to count:
    - Full squares as 1 sq unit.
    - Half or almost full as ½ sq unit.
- Alternatively, give a **Geoboard** to create irregular shapes using rubber bands and count grid units.

3. Explain – 10 minutes

- Explain that **irregular shapes** can be broken into **smaller regular shapes** like rectangles and squares.
- Demonstrate with an example:
  Break an "L" shape into two rectangles, calculate area of each, and add.
- Introduce and write the strategy:

"To find the area of an irregular shape, divide it into regular shapes, calculate each, then add them together."



4. Elaborate – 15 minutes

- **Toy-Based Activity:** Provide students with **LEGO boards**. Ask them to build a structure of an irregular shape using colored LEGO pieces.
- Instruct them to break their shape into measurable squares or rectangles and **calculate total area**.
- Challenge them with:

"You are an interior designer. Calculate how much space your toy furniture occupies on this oddly-shaped toy floor!"

- Extension task: Use **toy garden plots** with curved boundaries approximated using grid-based estimation (half and full squares).

5. Evaluate – 5 minutes

- Provide students a **worksheet** with 3–4 irregular shapes.
- Ask them to:
  - Divide shapes into regular components
  - Calculate total area
- Quick oral quiz:
  - What is the strategy to calculate area of irregular shapes?
  - Why do we break the shape into rectangles/squares?

TOY-BASED PEDAGOGY LESSON PLAN-4

Date- 23rd April, 2025

Subject- Mathematics

Duration-40 minutes

Age level- 12 to 14 years

Class -VI

Name- Archit Nema

Chapter-Integers

Topic- Introduction to Integers

Learning Objectives:

- Understand positive and negative integers.
- Locate and represent integers on a number line.
- Compare and order integers.

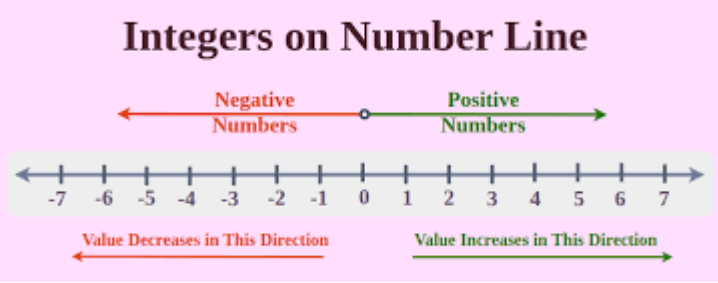
Materials Required:

- Toy cars labeled with integers
- Floor or wall-mounted number line (or long chart paper with numbers marked)
- Flashcards with numbers
- Magnetic number line board and counters

5E Model:

1. Engage (5 mins)

- **Activity**: Use **toy cars** labeled with positive and negative integers.
- Arrange a **floor number line** from -10 to +10.
- Ask: *"If a toy car is parked at 0 and moves 5 steps backward, where will it land?"*
- Let students predict, sparking curiosity.



2. Explore (10 mins)

- Distribute integer cards to students.
- Students walk along the number line placing their toy/car based on the number they hold.
- They physically compare positions on the line.

3. Explain (10 mins)

- Explain integers using real-life examples: temperature, bank transactions.
- Define:
    - Positive numbers (above 0)

    - Negative numbers (below 0)
    - 0 as the origin
- Teach rules for comparing integers using the number line.

4. Elaborate (15 mins)

- **Game**: "Integer Hop" – One student says a number, the other must jump to its opposite.
- Use magnets on a whiteboard number line to show additions and subtractions of integers visually.

5. Evaluate (5 mins)

- Quick oral quiz using flashcards.
- Ask students to arrange a given set of integers in ascending/descending order.

TOY-BASED PEDAGOGY LESSON PLAN-5

Date- 24th April, 2025

Subject- Mathematics

Duration-40 minutes

Age level- 12 to 14 years

Class -VI

Name- Archit Nema

Chapter-Integers

Topic- Addition of Integers

Learning Objectives:

- Understand and apply rules for addition of integers.
- Use toy-based tools and a number line to visualize addition.
- Solve addition problems involving integers in real-life contexts.

Materials Required (Toy-Based Resources):

- Integer floor mat or large number line (–20 to +20)
- Toy figures (soldiers, animals, cars, etc.)
- Integer flashcards (+ve and –ve numbers)
- Stackable blocks or cubes (different colours for + and –)
- Toy tokens or coins (red for –ve, green for +ve)
- Word problem cards

5E Instructional Model

1. Engage (5 minutes)

- **Activity**: Story Prompt using toy soldiers
  "Captain Aman moves forward (+5 steps) to attack. Then, a retreat is ordered, and he steps back (–3 steps). Where is he now?"
- **Demonstration**: Use a toy soldier on a **floor number line** to act this out.
- **Discussion Prompt**:

"What happens when you add a positive and a negative number? Can we predict the outcome?"

2. Explore (10 minutes)

- Students are given:
  - **Integer flashcards**
  - **Toy tokens** (red = negative, green = positive)
  - **Stackable blocks** (+1 = green block, –1 = red block)
- **Activity**: In pairs, students:
  - Pick two integer flashcards
  - Use colored blocks to build each number
  - Combine them and count net total (e.g., 5 green + 3 red = +2)
- Let students explore various combinations, such as:
  - (+3) + (–1)
  - (–4) + (+2)
  - (–3) + (–2)

3. Explain (10 minutes)

- Explain rules for addition of integers:
  - **Same signs**: Add absolute values, keep the sign.
    → (–4) + (–3) = –7
  - **Different signs**: Subtract smaller absolute from larger and keep the sign of the larger.
    → (+5) + (–3) = +2
- **Visual Demo**: Use **toy counters on a board** or **colored tokens** to show that:
  - Green cancels out red (and vice versa)
  - The net result reflects what's left
- **Draw a number line** on the board and show movement for + and – additions.

4. Elaborate (15 minutes)

- **Game**: **"Integer Race"**
  - Each student gets a toy car on a floor number line.
  - Draw two integer cards → sum them → move the car accordingly.
  - Objective: Reach the farthest positive position in 5 rounds.
- **Real-Life Role Play**:
  - Give students toy coins to simulate:
    - Earning money (+)
    - Losing money or spending (–)
  - Ask:
    "If you had ₹10 and spent ₹6, how much left?" → (+10) + (–6) = +4
- **Extension Task**:
  Design your own integer addition word problem using the toy figures or coins.

5. Evaluate (5 minutes)

- **Worksheet**: Includes problems like:
  - (–7) + (–5) = ?
  - (+8) + (–3) = ?
  - Real-life scenarios (money, temperature, etc.)
- **Exit Ticket**: One question each:

"If I add –6 and +4, what is the result?"

TOY-BASED PEDAGOGY LESSON PLAN-6

Date- 25th April, 2025

Subject- Mathematics

Duration-40 minutes

Age level- 12 to 14 years

Class -VI

Name- Archit Nema

Chapter-Integers

Topic- Subtraction of Integers

Learning Objectives:

- Understand and apply rules of subtracting integers.
- Visualize subtraction using number lines and toy models.
- Solve subtraction problems in real-life contexts.

Materials Required (Toy-Based Resources):

- Floor or wall-mounted number line (from –20 to +20)
- Toy soldiers or cars
- Integer flashcards (positive and negative numbers)
- Stackable color blocks (green for +, red for –)
- Play money or integer chips
- Integer operation spinners

5E Instructional Model

1. Engage (5 minutes)
Activity:
Tell a story:
"Riya has ₹5 (represented as +5). She gives ₹3 to her brother. What operation is this? What will be the result?"
Demonstration:
Use **play money/toy coins** to show this exchange and initiate the concept of subtraction.
Ask:
What happens when we subtract a positive from a positive? What if we subtract a negative?

2. Explore (10 minutes)
Materials:
Integer flashcards, toy soldiers, number line mats.
Activity:

- Distribute flashcards with subtraction expressions like (+5) – (+3), (–2) – (–4), (+3) – (–5).
- Let students walk on a number line mat with a **toy soldier** starting at the first number.
- They perform subtraction by moving **backward for +**, and **forward for –** (subtracting a negative means going right).

Discussion Prompt:
What pattern do you see when subtracting a negative number?

3. Explain (10 minutes)
Concept Clarification:

- Show that **subtraction is the addition of the additive inverse**.
    - (+5) – (–3) = (+5) + (+3)
    - (–2) – (+4) = (–2) + (–4)

Rule Summary:

- Subtracting a positive: move left
- Subtracting a negative: move right

Demonstration with blocks:

- Green = +1 block, Red = –1 block
- Model the subtraction of different integers physically.

4. Elaborate (15 minutes)
Toy-Based Game: "Integer Treasure Hunt"

- Setup: A number line board with treasure spots marked.
- Task: Students pick integer subtraction cards and solve to move closer to the treasure.
- Bonus: "Subtract a negative" card moves them forward faster.

Toy Spinner Activity:

- Spin two integers and a sign.
- Subtract using chips and explain reasoning.
- Work in pairs for discussion and support.

Real-Life Role Play:

- Use play money:
    - "You have ₹7. You owe ₹3. What's your actual wealth?"
    - Subtraction modeled as loss or debt recovery.

5. Evaluate (5 minutes)
Worksheet:

- Mix of numerical and story-based problems like:
    - (–3) – (–5) = ?
    - (+7) – (+2) = ?
    - "If a submarine is at –15 meters and it ascends 5 meters, where is it now?"

Exit Question (Verbal or Written):
"What is the result of (–6) – (–4), and how do you know?"

Word Problems for Practice:

1. Rahul is at –7 on a number line. He moves to the right by subtracting –3. Where is he now?
2. You had a loss of ₹5, but then subtracted a loss of ₹3 (–5 – (–3)). What's your net loss?
3. Temperature was –2°C in the morning. It dropped by 4°C more. What's the new temperature?

TOY-BASED PEDAGOGY LESSON PLAN-7

Date- 26th April, 2025

Subject- Mathematics

Duration-40 minutes

Age level- 12 to 14 years

Class -VI

Name- Archit Nema

Chapter-Symmetry

Topic- Introduction to Symmetry

Learning Objectives

By the end of this lesson, students will be able to:

- Understand the concept of symmetry and line of symmetry.
- Identify symmetrical objects in their surroundings.
- Create symmetrical patterns using toys.
- Reflect on the importance of symmetry in design and nature.

Materials Required:

- Mirror toys (small handheld mirrors)
- Paper cutouts of symmetrical shapes (butterfly, heart, star, leaf)
- Symmetry pattern cards (printed or laminated)
- Coloured pencils or markers (for folding and drawing symmetry lines)
- Worksheet for marking lines of symmetry

5E-Based Lesson Plan

Phase	Description
Engage	Show a butterfly cutout and fold it to spark curiosity: "What do you notice?" Let them use mirrors to explore real objects (leaf, coin, etc.). 
Explore	Students use symmetry cards and fold them or place mirrors to find the **line of symmetry**. Use folding and mirror reflection activities.

Phase	Description
Explain	Teacher explains symmetry and **line of symmetry** with visuals and real-life examples (human face, Taj Mahal). Show how mirror line divides shape into two equal halves.
Elaborate	Using toys like magnetic pattern blocks, students create symmetrical patterns and identify axes of symmetry. Group activity: "Find symmetry in classroom objects."
Evaluate	Worksheet: Mark lines of symmetry in given shapes. Quiz with toy shapes: “Symmetrical or Not?” Peer review of pattern block designs.

TOY-BASED PEDAGOGY LESSON PLAN-8

Date- 28th April 2025 **Subject-** Mathematics

Duration-40 minutes **Age level-** 12 to 14 years

Class -VI **Name-** Archit Nema

Chapter-Symmetry

Topic- Line of Symmetry in Regular Shapes and Reflection Symmetry

Learning Objectives:

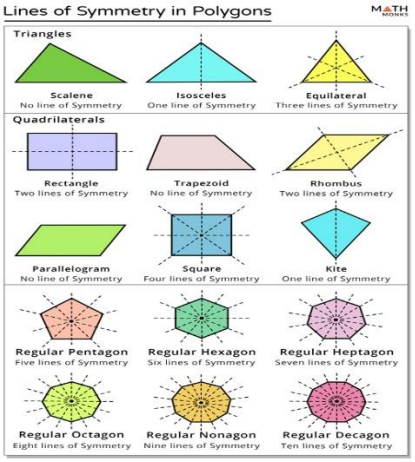
- Understand what a line of symmetry is.
- Identify and draw lines of symmetry in regular shapes (square, rectangle, equilateral triangle, regular hexagon).
- Explore symmetrical properties using toys and manipulatives.

Materials Required:

- Paper cutouts of regular shapes (square, rectangle, equilateral triangle, regular hexagon)
- Handheld mirrors
- LEGO blocks or magnetic tiles
- Whiteboard and markers
- Worksheets on lines of symmetry

5E Lesson Plan with Toy-Based Activities

Stage	Teacher's Role & Activity	Student Activity	Materials/Toys
Engage	Show physical models or cutouts of regular shapes (square, rectangle, equilateral triangle). Ask: "Can these shapes be folded so that both halves match exactly?"	Observe and respond; discuss prior knowledge of symmetry in shapes.	Paper cutouts of regular shapes, mirrors
Explore	Let students fold paper shapes along different lines to find lines of symmetry. Use mirrors to verify if halves match perfectly.	Fold and test lines of symmetry on shapes; use mirrors to confirm symmetry.	Paper shapes, handheld mirrors
Explain	Demonstrate on the board the number of lines of symmetry in each regular shape: - Square: 4 lines - Rectangle: 2 lines - Equilateral Triangle: 3 lines - Regular Hexagon: 6 lines	Watch demonstration; note down and ask questions about symmetry lines.	Whiteboard, marker, chart with shapes

Stage	Teacher's Role & Activity	Student Activity	Materials/Toys
			
Elaborate	Use LEGO blocks or magnetic tiles to build regular shapes and draw or place lines of symmetry on them. In groups, students identify and mark lines of symmetry on toy models.	Build shapes using blocks; mark symmetry lines; discuss with peers.	LEGO blocks/magnetic tiles, paper, markers
Evaluate	Distribute worksheet with various regular and irregular shapes. Ask students to draw all lines of symmetry for regular shapes and explain why irregular shapes have none or fewer lines.	Complete worksheet; explain answers orally or in writing.	Worksheet sheets, pencils

TOY-BASED PEDAGOGY LESSON PLAN-8

Date- 29th April 2025 | **Subject-** Mathematics

Duration-40 minutes | **Age level-** 12 to 14 years

Class -VI | **Name-** Archit Nema

Chapter-Symmetry

Topic- Reflection Symmetry

Learning Objectives:

By the end of the lesson, students will be able to:

- Define **Reflection Symmetry**.
- Identify figures with reflection symmetry.
- Create figures using reflection symmetry with the help of mirrors and toy tools.

Teaching-Learning Materials (TLM):

- Small mirrors
- Symmetry viewer toy (cardboard setup with L-shaped mirrors)
- Tangram sets
- Ink stamp blocks and ink pads
- Graph paper
- Coloured paper cut into half-designs
- Geometry box

5E Model Lesson Flow

Phase	Teacher's Role	Student's Role
Engage	Show a capital letter "M" and its mirror image using a mirror. Ask: “Does it look the same?”	Observe and answer. Predict what other letters would look like in a mirror.
Explore	Provide students with: a mirror, tangrams, and half-figures. Ask them to place the mirror along one side and observe.	Use mirror to complete the image. Explore reflection in simple shapes and letters.
Explain	Introduce the term “Reflection Symmetry” — a figure has reflection symmetry if one half is a mirror image of the other.	Note key points; explain reflection symmetry using their own shapes.
Elaborate	Provide students with half-patterns on graph paper and ask them to complete the other side using reflection. Use ink stamps to design symmetrical patterns.	Complete the patterns; create their own reflection art using stamps or tangrams.
Evaluate	Distribute a worksheet with half-completed shapes/letters. Ask students to draw their reflection-symmetrical counterpart.	Attempt and complete the worksheet. Present one of their symmetrical designs.

Sample Activities:

1. Mirror Drawing Activity (Toy-Based)

- **Material:** Half-butterfly design, mirror viewer
- **Instruction:** Place mirror on the axis and observe complete butterfly.
- **Outcome:** Understand mirror-based reflection symmetry.

2. Tangram Challenge

- **Material:** Tangram sets
- **Instruction:** Create a shape. Now replicate its mirror image.
- **Outcome:** Explore spatial arrangement and symmetry through hands-on play.

3. Ink Stamp Pattern Design

- **Material:** Stamp blocks and pads
- **Instruction:** Press a design on the left, now reflect it on the right side of the axis.
- **Outcome:** Understand symmetrical positioning and stamping accuracy.

Learning Outcomes (as per NCERT):

- Students will identify and describe reflection symmetry in various figures.
- Students will construct figures showing reflection symmetry using paper-folding, mirrors, and tools.
- Students will demonstrate creativity using symmetrical patterns in art and mathematics.

Assessment Techniques:

- **Formative Assessment:**
  - Observation during mirror activity
  - Oral Q&A during the class
  - Peer feedback on symmetrical artwork
- **Summative Assessment:**
  - Completion of worksheet
  - Drawing and labeling line of reflection
  - Verbal explanation of what reflection symmetry means

Extension/Home Activity:

- Draw your name in capital letters and test which letters have reflection symmetry.
- Observe and record symmetrical objects at home (e.g., utensils, decorations, leaves).

Evaluation Scale of the Achievement Test

Archit Nema
M.Ed IVth Sem

Dr. Saurabh Kumar
(Associate Professor)
Department of Education, RIE Bhopal

Regional Institute of Education (RIE), Bhopal

Name:

Class:

Sec:

Gender:

Date:

Section	Total Question	Marks per Question	Total Marks	Marks Obtained
Knowledge based	9	1	9	
Understanding based	3	1	3	
Application based	3	2	6	
HOTS based	3	3	9	
Total	18		27	

Remarks and Teacher's Feedback

Strengths: _____

Areas for Improvement: _____

Teacher's Signature: _____

Achievement Test

Topics

1. Mensuration
2. Symmetry
3. Integers

Class: 6th

Skills

1. Knowledge: Recall facts, definitions, formulas, and properties.
2. Understanding: Comprehend and explain concepts.
3. Application: Solve problems using the concepts in practical situations.
4. Higher Order Thinking Skills (HOTS): Analyze, evaluate, and solve complex problems.

Skill-Wise Distribution of Questions

Topic	Knowledge	Understanding	Application	HOTS	Total question
Mensuration	3 (1 marks)	1(1 marks)	1(2 marks)	1(3 marks)	6(9 marks)
Symmetry	3(1 marks)	1(1 marks)	1(2 marks)	1(3 marks)	6(9 marks)
Integers	3(1marks)	1(1 marks)	1(2 marks)	1(3 marks)	6(9 marks)
Total questions	9(9 marks)	3(3 marks)	3(6 marks)	3(9 marks)	18(27 marks)

Skill-Wise Distribution

Marks Distribution:

1-mark questions: 12

2-mark questions: 3

3-mark questions: 3

Total Marks: 27

Duration: 40 min

General Instructions:

1. All questions are compulsory.

2. Each MCQ has four options. Choose the correct answer.

3. Write all answers neatly.

Section A: Knowledge-Based Questions (1 Mark Each)

1.Formula of perimeter of rectangle is

a) lxb b) 2x(l+b)

c) l+b d) 2x(l-b)

2. Find the perimeter of a square with side 6 cm.

a) 36 cm b) 12 cm

c) 24 cm d) 18 cm

3. A rectangle has length 10 cm and breadth 4 cm. What is its perimeter?

a) 40 cm b) 28 cm

c) 20 cm d) 41 cm

4. How many lines of symmetry does a square have?

a) 1 b) 2

c) 4 d) 6

5. A circle has how many lines of symmetry?

a) Infinite b) 1

c) 2 d) 3

6. Which of the following shapes does not have a line of symmetry?

a) Equilateral triangle b) Rhombus

c) Parallelogram d) Rectangle

7. Simplify (-7+1).

a) -6 b) -3

c) 17 d) -17

8. What is (-5) + (-6)?

a) 11 b) -1

c) -11 d) 1

9. Which number is its own additive inverse?

a) 0 b) -1 c) 1 d) None of these

Section B: Understanding-Based Questions (1 Mark Each)

10. A rectangle has length 15 cm and breadth 8 cm. Find its perimeter.

a) 46 cm b) 23 cm

c) 30 cm d) 38 cm

11. A figure has 6 lines of symmetry. Name a possible shape.

a) Hexagon b) Square

c) Equilateral Triangle d) Circle

12. Find the result of (-8) + 5 – (-3).

a) 0 b) -10

c) 5 d) None of these

Section C: Application-Based Questions (2 Marks Each)

13. A square has a side length of 10 cm. Find its area and perimeter.

a) Area = 100 cm^2, Perimeter = 40 cm

b) Area = 50 cm^2, Perimeter = 20 cm

c) Area = 40 cm^2, Perimeter = 100 cm

d) Area = 20 cm^2, Perimeter = 80 cm

14. If a mirror is placed along the vertical line of the letter M, what will the reflection look like?

a) Same as M b) Like W

c) Like N d) Like A

15. Solve (-10) + (-12) – (-5).

a) -10 b) -17

c) -20 d) 15

Section E: HOTS Questions (3 Marks Each)

16. A rectangular garden is 20m long and 10m wide. Apath of 20m is built around it. Find the area of the path.

17. Draw a regular pentagon and show all its lines of symmetry.

18. A submarine is at -350 meters below sea level. It ascends by 120 meters, then descends by 50 meters. What is its final position?