Chapter 9 - Symmetry

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MINDMAP

1. Introduction to Symmetry
    - Symmetry: When one half of a shape is the mirror image of the other half
    - Found in nature, architecture, art, and everyday objects
2. Line of Symmetry (Mirror Line)
    - A line that divides a figure into two identical halves
    - Also called axis of symmetry
    - Can be vertical, horizontal, or diagonal
    - A figure may have one, more than one, or no line of symmetry
3. Symmetry in Common Shapes
    - Rectangle: 2 lines of symmetry (vertical & horizontal)
    - Square: 4 lines of symmetry
    - Equilateral triangle: 3 lines
    - Isosceles triangle: 1 line
    - Scalene triangle: 0 lines
    - Circle: Infinite lines of symmetry
4. Making Symmetrical Figures
    - Ink-blot devils (paper folding & ink blot)
    - Inked-string patterns
    - Cutting folded paper to create symmetric designs
5. Figures with Multiple Lines of Symmetry
    - Regular polygons: number of lines = number of sides
    - Example: Regular pentagon → 5 lines
    - Regular hexagon → 6 lines
6. Reflection and Symmetry
    - Mirror reflection = symmetry
    - Left-right reversal in mirror
    - Objects and their mirror images are symmetric
7. Symmetry in Alphabets and Numbers
    - Letters with vertical symmetry: A, H, I, M, O, T, U, V, W, X, Y
    - Letters with horizontal symmetry: B, C, D, E, H, I, K, O, X
    - Some have both (e.g., H, I, O, X)
    - Numbers: 0, 3, 8 have symmetry
8. Applications of Symmetry
    - Design (logos, rangoli, textiles)
    - Architecture (buildings, monuments)
    - Art and crafts

UNIT TEST

Section A: Very Short Answer (1 mark each)

1. What is a line of symmetry?
2. How many lines of symmetry does a square have?
3. Name a letter of the English alphabet that has vertical symmetry only.
4. Does a scalene triangle have any line of symmetry?
5. Is the number ‘8’ symmetrical? If yes, how?

Section B: Short Answer (2 marks each)
6. Draw a figure with exactly one line of symmetry.
7. How can you check if a figure is symmetrical?
8. Give two examples of symmetrical objects from daily life.
9. Explain why a circle has infinite lines of symmetry.
10. Write two letters that have both horizontal and vertical lines of symmetry.

Section C: Long Answer (3 marks each)
11. Draw a rectangle and show all its lines of symmetry.
12. How would you create a symmetric design using paper folding and cutting? Describe the steps.
13. Complete the following table:

Shape	Number of Lines of Symmetry
Equilateral triangle	
Circle	
Regular hexagon	

Section D: Application (4 marks)
14. Ritu drew the letter ‘E’. She claims it has vertical symmetry. Is she correct? Justify with a diagram or explanation.
15. Design a simple rangoli pattern that has at least two lines of symmetry. Describe or sketch it.

WORKSHEET

Part 1: Fill in the Blanks

1. A figure that can be folded along a line so that both halves match exactly is called _____.
2. The line along which a figure is folded is called the _____.
3. A regular pentagon has _____ lines of symmetry.
4. The letter ‘H’ has _____ lines of symmetry.
5. A _____ has no line of symmetry.

Part 2: True or False

6. All triangles have at least one line of symmetry.
7. A circle has only one line of symmetry.
8. The letter ‘S’ has no line of symmetry.
9. A square has more lines of symmetry than a rectangle.
10. Symmetry can only be vertical.

Part 3: Identify

For each figure, state the number of lines of symmetry:

11. Isosceles triangle → _____
12. Scalene triangle → _____
13. Regular octagon → _____
14. Oval (ellipse) → _____
15. Letter ‘O’ → _____

Part 4: Draw and Answer

16. Draw a shape with exactly 3 lines of symmetry.
17. Draw the mirror image of the letter ‘L’. Is it symmetrical?

Unit Test Solutions

Section A

1. A line that divides a figure into two identical mirror-image halves.
2. 4
3. A, M, U, V, W, or Y (any one)
4. No
5. Yes; it has both vertical and horizontal lines of symmetry.

Section B

6. Example: Isosceles triangle or letter ‘A’
7. Fold along a line; if both halves match perfectly, it is symmetrical.
8. Butterfly, human face, leaf, building façade, etc.
9. A circle can be folded along any diameter, and the halves will match—so infinite lines.
10. H, I, O, X (any two)

Section C

11. Rectangle: one vertical and one horizontal line through midpoints of opposite sides.
12. Steps: (i) Fold paper in half, (ii) Draw half a design along the fold, (iii) Cut along the design, (iv) Unfold

to reveal full symmetric figure.
13. Table:

- Equilateral triangle: 3
- Circle: Infinite
- Regular hexagon: 6

Section D
14. No. ‘E’ has horizontal symmetry (top and bottom match when folded horizontally), but not vertical. Vertical fold would not match left and right.
15. Example: A square with four petals (like a flower) — has vertical and horizontal symmetry. (Accept any reasonable description)

Worksheet Solutions

Part 1

1. symmetrical
2. line of symmetry
3. 5
4. 2
5. scalene triangle (or irregular quadrilateral)

Part 2
6. False
7. False
8. True
9. True
10. False

Part 3
11. 1
12. 0
13. 8
14. 2 (one vertical, one horizontal)
15. Infinite (or at least 2—accept 2 if considering it as an ellipse)

Part 4
16. Equilateral triangle
17. Mirror image of ‘L’ is backward ‘L’; the original ‘L’ is not symmetrical (no line of symmetry)