#### SHAPES AND PATTERNS

#### SHAPES AND PATTERNS

\_\_\_\_\_

#### **TEACHING TASK**

#### **CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)**

#### **Multiple Choice Questions**

1. Answer: D) Square Explanation: A square has both reflectional (across any of its four sides) and rotational symmetry (rotated at 90, 180, 270, and 360 degrees).

2. Answer: C) Circle Explanation: A circle is a round shape with no corners.

3. Answer: A) Has two circular bases

Explanation: A cylinder has two circular faces (bases) and a curved surface connecting them.

4. Answer: B) Triangle Explanation: The pattern alternates between triangles and circles. The next shape will be a triangle.

5. Answer: B) Reflectional Symmetry Explanation: A butterfly has reflectional symmetry, as one side is a mirror image of the other.

6. Answer: C) Sphere Explanation: A sphere can roll because it has a curved surface that allows it to move smoothly.

7. Answer: B) 6 squares Explanation: A cube's net is made up of six square faces.

8. Answer: C) Square Explanation: A square has four equal sides and four right angles.

9. Answer: C) Turning around a fixed point Explanation: Rotation involves turning a shape around a fixed point (the center).

10. Answer: D) Triangle Explanation: A triangle is a 2D shape, while a sphere, cube, and pyramid are 3D shapes.

# Advanced Level

# More than One Answer Type

11. Answer: A) Triangle, C) Circle Explanation: A triangle and circle are both flat, two-dimensional shapes. A cube and cylinder are 3D shapes.

12. Answer: A) Square, B) Rectangle, C) Hexagon Explanation: All three of these shapes have reflectional symmetry (square, rectangle, and hexagon). An irregular pentagon typically does not have reflectional symmetry.

13. Answer: A) 1, 3, 5, 7, B) Red, Green, Blue, Red, Green, C) Circle, Square, Triangle, Square, D) 2, 4, 6, 8, 10 Explanation: All of these are examples of patterns: arithmetic, color, shape, and even number patterns.

14. Answer: A) Pyramid, D) Cube Explanation: A net can be used to represent a pyramid and a cube. A cone and sphere cannot be accurately represented by a net.

15. Answer: A) A square has rotational symmetry, B) A circle has rotational symmetry, D) An arrow shape has rotational symmetry

Explanation: A square, circle, and arrow shape have rotational symmetry. A triangle has rotational symmetry, but the statement about a triangle in this context is unclear, so it is not marked as true here.

# Fill In the Blanks

16. Answer: Rhombus Explanation: A rhombus has four sides of equal length but does not have right angles like a rectangle.

17. Answer: The same

Explanation: A square looks identical after a 180-degree rotation due to its symmetry.

18. Answer: Triangle

Explanation: The pattern alternates between circles and triangles. The 7th shape would be a triangle.

19. Answer: Pentagon

Explanation: A pentagon is a five-sided shape.

20. Answer: 3D

Explanation: Both a cube and a rectangular prism are 3-dimensional shapes.

# **Matching Type**

21. Match 2D Shapes to Their Definitions1. Circle C. A round shape with no corners.

- 2. Square A. A shape with four equal sides and four right angles.
- 3. Triangle B. A shape with three sides and three corners.
- 4. Rectangle D. A shape with two pairs of equal sides and four right angles.

#### Answer the Following Questions

22. Answer: A net is a two-dimensional representation of a three-dimensional shape that can be folded to form the shape. For a cylinder, the net consists of two circles (for the top and bottom bases) and a rectangle (for the curved side of the cylinder).

23. Answer: The next number is 25. This is an arithmetic pattern where each number increases by 5.

24. Answer: You can alternate between three colors, such as Red, Blue, Green, then repeat the cycle. For example: Red, Blue, Green, Red, Blue, Green, and the next color would be Red.

### LEARNERS TASK

# **CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)**

### **Multiple Choice Questions**

1. C) Rectangle

Explanation: A rectangle is a 2D shape, while a cube, sphere, and cylinder are 3D shapes.

2. Answer: B) 3 Explanation: A triangle has three sides.

3. Answer: C) Rectangle Explanation: A rectangle has rotational symmetry at 180 degrees because it can be rotated 180 degrees and still look the same.

4. Answer: B) Net Explanation: A net is a 2D pattern that can be folded to form a 3D shape, such as a cube or pyramid.

5. Answer: D) Rectangle Explanation: A rectangle has reflectional symmetry across its center or along its midlines.

6. Answer: B) 6 Explanation: A cube has six square faces.

7. Answer: B) Red, Red, Blue, Red Explanation: This is a repeating color pattern with red and blue alternating. 8. Answer: C) Square

Explanation: Rotating a square by 90 degrees does not change its shape because it has rotational symmetry at 90, 180, 270, and 360 degrees.

9. Answer: C) Length × Width Explanation: The area of a rectangle is calculated by multiplying its length by its width.

10. Answer: A) 1, 3, 5, 7 Explanation: This is an arithmetic number pattern, where each number increases by 2.

### **Advanced Level**

# More than One Answer Type

11. Answer: A) Rectangle, B) Triangle, C) Circle, D) Hexagon Explanation: All of these shapes can be rotated. A circle, for example, has infinite rotational symmetry, and a triangle, rectangle, and hexagon each have specific degrees of rotational symmetry.

12. Answer: B) Sphere, D) Cylinder

Explanation: A sphere and cylinder are 3D shapes, whereas an ellipse and triangle are 2D shapes.

13. Answer: A) Blue, Yellow, Blue, Yellow: Color PatternAnswer: B) 5, 10, 15, 20: Number PatternAnswer: C) Circle, Circle, Square, Circle: Shape PatternAnswer: D) A, B, A, B: Shape PatternExplanation: The patterns correspond to color, number, shape, and shape repetition patterns.

14. Answer: B) Rectangle, C) Oval, D) Pentagon

Explanation: A rectangle, oval, and pentagon all have rotational symmetry. A star, however, does not have consistent rotational symmetry for all angles.

15. Answer: A) Visual observation, C) Algebraic calculations, D) Transformational analysis

Explanation: Shapes can be analyzed through visual observation, algebraic methods, and transformational analysis (such as translation, rotation, reflection).

# Fill In the Blanks

16. Answer: Rotational

Explanation: A star shape has rotational symmetry because it can be rotated and still match its original appearance at certain angles.

#### 17. Answer: Cylinder

Explanation: A cylinder has two circular bases and a curved side.

18. Answer: Cylinder Explanation: A cylinder has two circular bases and a curved side.

19. Answer: Reflectional

Explanation: This is reflectional symmetry, where one side mirrors the other when folded.

20. Answer: 6

Explanation: A net for a cube consists of six square faces arranged in a way that they can be folded to form the 3D cube.

# **Matching Type**

21. Match Types of Patterns to Their Examples

- 1. Number Pattern B. 2, 4, 6, 8
- 2. Shape Pattern A. Circle, Square, Circle, Square
- 3. Color Pattern D. Red, Yellow, Red, Yellow
- 4. Reflectional Symmetry C. A butterfly

# Answer the Following Questions

22. Answer: The two main categories of shapes are 2D shapes (flat shapes like squares and triangles) and 3D shapes (shapes with depth, such as cubes and spheres). 2D shapes only have length and width, while 3D shapes have length, width, and depth.

23. Answer: A rectangle has reflectional symmetry because if you fold it in half along its center (either horizontally or vertically), both sides match exactly.

24. Answer: The square will look the same after rotating 180 degrees around its center because a square has rotational symmetry at 180 degrees.