7. Shapes And Patterns

Shapes And Curves

TEACHING TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. The correct answer is C) Circle.

A circle is a closed curve because it forms a continuous loop without any endpoints, whereas the other options (line segment, arc, and ray) have endpoints or are incomplete curves.

2. The correct answer is B) 7.

A heptagon is a polygon with 7 sides.

3. The correct answer is C) Regular Tessellation.

A regular tessellation uses only one type of regular polygon to cover a plane without any gaps or overlaps.

4. The correct answer is C) Triangle.

A triangle has three sides and three angles.

5. The correct answer is C) Chord.

A chord is a line segment inside a circle that connects two points on the edge of the circle.

6. The correct answer is B) Chessboard Design.

A chessboard design is an example of a repeating pattern, as it alternates between two colors in a regular, repetitive arrangement.

ADVANCED LEVEL

More than One Answer Type

7. The correct answers are a) Equilateral Triangle, c) Regular Pentagon, and d) Hexagon.

These shapes are regular polygons because all their sides and angles are equal. A rectangle and a rhombus are not regular polygons as their sides or angles are not necessarily equal.

8. The correct answers are a) A tessellation, c) A repeated sequence of circles, and d) A symmetrical arrangement of triangles.

These are all examples of geometric patterns, as they involve shapes arranged in a regular or predictable way. A random splash of colors and a unique artistic design

without a specific shape are not considered geometric patterns.

Fill In the Blanks

9. The correct answer is abstract.

An abstract pattern uses shapes and colors in a non-representational way, meaning the design doesn't have to resemble anything specific.

10. The correct answer is pentagon.

A pentagon is a polygon with five sides and five angles, similar to the shape of a home plate in baseball.

Matching Type

11. Instructions: Match each shape to its correct property.

- 1. Circle B. All points on the curve are equidistant from the center
- 2. Square C. 4 equal sides, 4 right angles
- 3. Triangle E. 3 sides, 3 angles
- 4. Hexagon D. 6 sides, 6 angles
- 5. Pentagon A. 5 sides, 5 angles

Answer the Following Questions

12. A square is a type of rectangle where all four sides are of equal length, and it also has four right angles. In contrast, a rectangle has four right angles, but its sides can have different lengths—only opposite sides are equal.

13. A polygon is a closed, two-dimensional shape with straight sides. The sides must be connected to form a closed figure. An example of a polygon with 4 sides is a quadrilateral, such as a rectangle or a square.

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. C) Square A square has four equal sides and four right angles.

2. A) Hexagon

A hexagon has six sides and six angles.

3. A) Tessellation

Tessellations use shapes that fit together perfectly without any gaps or overlaps.

4. C) Line Symmetry

A butterfly has line symmetry, where one half mirrors the other.

5. C) Spiral

A spiral is an open curve that does not form a closed loop.

6. A) Radius The radius is the distance from the center of a circle to any point on its edge.

Advanced Level

More than One Answer Type

7. a) Square, c) Rectangle, e) Rhombus Quadrilaterals are shapes with four sides, such as squares, rectangles, and rhombuses.

8. a) It has straight sides, c) It forms a closed loop, e) The sides meet at vertices Polygons have straight sides, form a closed loop, and their sides meet at vertices.

Fill In the Blanks

9. Hexagon

A hexagon has six sides and angles, commonly found in honeycombs.

10. Ray

A ray starts at one point and extends infinitely in one direction.

Matching Type

11. Match each type of curve to its correct example.

- 1. Open Curve D. A wavy line that starts at one point and ends at another
- 2. Closed Curve E. A round shape like a clock face
- 3. Spiral B. The pattern on a snail's shell
- 4. Arc C. A segment of a circular path
- 5. Parabola A. The shape of a satellite dish

Answer the Following Questions

12. An equilateral triangle has three equal sides and three equal angles, each measuring 60° .

13. An open curve does not form a complete loop and has endpoints, while a closed curve forms a continuous loop without endpoints.

Circle, Triangle and Quadrillateraly

Teaching Task

Conceptual Understanding Questions (CUQ's)

Multiple Choice Questions

1. B) Isosceles triangle

An isosceles triangle has two equal angles, and this triangle has two 45° angles.

2. B) All angles are 90 degrees.

A parallelogram does not necessarily have all angles as 90°, unlike a rectangle.

3. A) 5 cm

 $C = 2\pi r.u \sin g C = 31.4 and \pi = 3.14, we find$

The formula for circumference is $r = \frac{31.4}{2 \times 3.14} = 5cm$.

4. B) Sector

A sector is a "pie-shaped" portion of the circle, bounded by two radii and the arc.

5. C) Hypotenuse

The hypotenuse is the side opposite the right angle in a right triangle.

6. B) The diagonals intersect at right angles.

In a kite, the diagonals intersect at right angles, but opposite sides are not parallel and angles are not necessarily equal.

Advanced Level

More than One Answer Type

7. A) Square, B) Rectangle, C) Rhombus All these quadrilaterals have diagonals that bisect each other.

8. A) Two pairs of adjacent sides that are equal, B) Diagonals that bisect each other at right angles, D) One pair of opposite angles that are equal Kites have two pairs of equal adjacent sides, diagonals that bisect at right angles, and one pair of opposite angles that are equal.

Fill In the Blanks

9. 60 Each angle in an equilateral triangle measures 60°.

10.360

The sum of the interior angles of any quadrilateral is 360°.

Matching Type

11. Match each type of quadrilateral to its correct property.

1. Square - C. All sides are equal, and opposite sides are parallel. All angles are 90 degrees.

2. Rectangle - D. Opposite sides are equal in length and parallel. All angles are right angles.

3. Parallelogram - B. Opposite sides are equal in length and parallel. The diagonals

bisect each other but are not necessarily equal.

4. Kite - A. Two pairs of adjacent sides are equal, and the diagonals intersect at right angles.

LEARNERS TASK

Conceptual Understanding Questions (CUQ's)

Multiple Choice Questions

1. C) Scalene A scalene triangle has all three sides of different lengths.

2. C) 70 degrees

The sum of the angles in a triangle is 180° , so the third angle is $180^\circ-50^\circ-60^\circ=70^\circ$

3. A) Rectangle

A rectangle has opposite sides equal in length and all angles are 90°.

4. C) Trapezoid

A trapezoid has only one pair of parallel sides.

5. C) Chord

A chord is a line segment that connects two points on the edge of a circle but does not have to pass through the center.

6. A) 5 cm

The radius is half of the diameter, so the radius is $\frac{10}{2}$ = 5cm.

Advanced Level

More than One Answer Type

7. A) A piece of paper with two parallel sides

C) A shape with only one pair of parallel sides

A trapezoid has exactly one pair of parallel sides.

8. A) The diameter is twice the length of the radius.

C) The circumference is the distance around the circle.

The diameter is twice the radius, and the circumference is the perimeter of the circle.

Fill In the Blanks

9. Radius

The radius is the distance from the center to any point on the circle's edge.

10. Diameter

The diameter is twice the radius of the circle.

Matching Type

- 11. Match each type of triangle to its correct property.
- 1. Right Triangle D. One angle is exactly 90 degrees.
- 2. Acute Triangle C. All three angles are less than 90 degrees.
- 3. Obtuse Triangle B. One angle is greater than 90 degrees
- 4. Equilateral Triangle A. All three sides and angles are different.

Answer the Following Questions

12. The sum of the angles in a triangle is 180° . So, the third angle is $180^{\circ}-45^{\circ}-45^{\circ}=90^{\circ}$.

13. Right Triangles

A right triangle has one angle that is exactly 90°.

SYMMETRY AND MIRROR REFLECTION

Teaching Task

Conceptual Understanding Questions (CUQ's)

Multiple Choice Questions

1. B) Hexagon

A regular hexagon has 6 lines of symmetry, one through each vertex and one through each pair of opposite sides.

2. B) Regular Tessellation

A regular tessellation uses only one type of regular polygon to cover a surface without gaps or overlaps.

3. C) Regular Tessellation

A tessellation using only regular hexagons is a regular tessellation, as hexagons fit together perfectly without gaps.

4. C) Rotational Symmetry

A shape with rotational symmetry looks the same after being rotated by a certain angle, such as 90 degrees.

5. C) D

The letter "D" has vertical mirror symmetry because it can be divided into two equal halves by a vertical line.

6. C) Scalene Triangle

A scalene triangle has no lines of symmetry, as all its sides and angles are different.

Advanced Level

More than One Answer Type

7. A) Tessellations with hexagons

B) Tessellations with equilateral triangles

C) Tessellations with squares

These tessellations use only one type of regular polygon, covering a surface without gaps or overlaps.

8. A) A pattern with hexagons and squares

B) A pattern with equilateral triangles and squares

Semi-regular tessellations involve two or more regular polygons arranged in a repeating pattern.

Fill In the Blanks

9. Vertical

The letter "A" has vertical mirror symmetry because it is symmetrical along a vertical axis.

10. Gaps

Tessellations require shapes to fit together perfectly, without leaving any gaps or overlaps.

Matching Type

11. Match each concept to its correct description.

1. Rotational Symmetry - C. A shape looks the same after being rotated by a certain angle less than a full circle.

2. Translational Symmetry - D. A shape looks the same after being moved a certain distance in a particular direction.

3. Human Face - B. The image looks the same when split vertically down the middle, showing symmetry on both sides.

4. Semi-Regular Tessellation - A. A pattern where squares and equilateral triangles are arranged together to cover a surface.

Answer the Following Questions

12. At each vertex, the angle formed is the sum of the angles of the adjacent shapes. The angle of a square is 90°, and the angle of an equilateral triangle is 60° . Therefore, at each vertex, the total angle is $90^{\circ}+60^{\circ}=210^{\circ}$.

So, the unique angle formed at each vertex is 210° .

13. Rotational Symmetry

A regular pentagon has rotational symmetry of 72°, meaning it looks the same after being rotated by this angle $(360^\circ \div 5 \text{ sides} = 72^\circ)$.

LEARNERS TASK

Conceptual Understanding Questions (CUQ's)

Multiple Choice Questions

1. B) Mirror Line

The mirror line (also known as the line of reflection or symmetry) is the line along which a shape is folded to test if the two halves are mirror images of each other.

2. C) Reflective Symmetry

A butterfly has reflective (or mirror) symmetry, where its wings are mirror images of each other.

3. B) It is inverted horizontally.

In a mirror reflection, the object is flipped, which results in an inversion of its orientation horizontally.

4. A) The same letter "A"

The letter "A" has vertical mirror symmetry, so when reflected along its vertical axis, it remains the same.

5. B) Triangle

Semi-regular tessellations often use shapes like triangles and squares to form repeating patterns.

6. A) Wallpaper with repeating patterns

Translational symmetry occurs when a pattern is shifted (translated) along a direction without rotation or reflection, as seen in repeating wallpaper patterns.

More than One Answer Type

Advanced Level

7. A) Tessellations with hexagons

B) Tessellations with equilateral triangles

C) Tessellations with squares

Regular tessellations use only one type of regular polygon, such as hexagons, equilateral triangles, or squares.

8. A) A square

C) A regular pentagon

A square and a regular pentagon have rotational symmetry because they look the same when rotated by specific angles (90° for a square, 72° for a pentagon).

Fill In the Blanks

9. Line

A shape has line symmetry if folding it along a line results in two matching halves.

10. Regular

A pattern made using only one type of regular polygon is called a regular tessellation.

Matching Type

11. Match each concept to its correct description.

1. Line Symmetry - D. A shape has a line where folding it along that line results in two identical halves.

2. Butterfly - A. The wings are mirror images of each other when folded along the center.

3. Letter "A" - B. The letter has vertical mirror symmetry, with both sides being mirror images of each other.

4. Regular Tessellation - C. A pattern made from hexagons fitting together perfectly, like a honeycomb.

Answer the Following Questions

12. You are creating an irregular tessellation. These tessellations use irregular shapes that fit together to cover a surface without gaps or overlaps.

13. The angles of the reflected triangle will remain the same. Reflection only changes the orientation, not the size or measure of the angles. The acute angle remains acute.